CHAPTER 4

# Configuring the PA-A3

To continue your PA-A3 installation, you must configure the PA-A3 interface. The instructions that follow apply to all supported platforms. Minor differences between the platforms—with Cisco IOS software commands—are noted.

This chapter contains the following sections:


- Using the EXEC Command Interpreter, page 4-1
- PA-A3 Configurations, page 4-2
- Customizing the PA-A3, page 4-15
- Checking the Configuration, page 4-16
- Traffic Management, page 4-32
- Troubleshooting the PA-A3 Installation and Configuration, page 4-32
- ATM Configuration, page 4-36
- Upgrading Your Boot Flash Image, page 4-37
- Port Adapter Error Messages, page 4-38


## Using the EXEC Command Interpreter

You modify the configuration of your router through the software command interpreter called the EXEC (also called enable mode). You must enter the privileged level of the EXEC command interpreter with the **enable** command before you can use the **configure** command to configure a new interface or change the existing configuration of an interface. The system prompts you for a password if one has been set.

The system prompt for the privileged level ends with a pound sign (#) instead of an angle bracket (>). At the console terminal, use the following procedure to enter the privileged level:

**Step 1** At the user-level EXEC prompt, enter the **enable** command. The EXEC prompts you for a privileged-level password as follows:

```
Router> enable

Password:
```

**Step 2** Enter the password (the password is case sensitive). For security purposes, the password is not displayed.

When you enter the correct password, the system displays the privileged-level system prompt (#):

```
Router#
```

# PA-A3 Configurations

After you verify that the new PA-A3 is installed correctly (the ENABLED LED goes on), use the privileged-level **configure** command to configure the new interface. Have the following information available:

- Protocols you plan to route on the new interface
- IP addresses, if you plan to configure the interface for IP routing
- Bridging protocols you plan to use

If you installed a new PA-A3 or if you want to change the configuration of an existing interface, you must enter configuration mode to configure the new interface. If you replaced a PA-A3 that was previously configured, the system recognizes the new interface and brings it up in its existing configuration.

For a summary of the configuration options available and instructions for configuring the interface on a PA-A3, refer to the appropriate configuration publications listed in the "Related Documentation" section on page -ix.

When an interface is enabled (taken out of shutdown mode) with no additional arguments, the default interface configuration file parameters are functional.

You execute configuration commands from the privileged level of the EXEC command interpreter, which usually requires password access. Contact your system administrator, if necessary, to obtain password access. (See the "Using the EXEC Command Interpreter" section on page 4-1 for an explanation of the privileged level of the EXEC.)

This section contains the following subsections:


- Shutting Down an Interface, page 4-3
- Performing a Basic Interface Configuration, page 4-4
- Configuring the PA-A3 for T3, page 4-5
- Configuring the PA-A3 for E3, page 4-6
- Configuring the PA-A3 for OC-3, page 4-6
- Configuring VCs, page 4-7
- Configuring PVCs, page 4-8
- Configuring SVCs, page 4-10
- Configuring Classical IP and ARP over ATM, page 4-13
- Classes of Service and Transmit Priority on the PA-A3, page 4-13


# Shutting Down an Interface

Before you remove an interface that you will not replace, replace interface cables, or replace port adapters, use the **shutdown** command to shut down (disable) the interfaces to prevent anomalies when you reinstall the new port adapter or reconfigured port adapter. When you shut down an interface, it is designated administratively down in the **show** command displays.

Follow these steps to shut down an interface:

**Step 1** Enter the privileged level of the EXEC command interpreter (also called enable mode). (See the "Using the EXEC Command Interpreter" section on page 4-1 for instructions.)

**Step 2** At the privileged-level prompt, enter configuration mode and specify that the console terminal is the source of the configuration subcommands, as follows:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
```

**Step 3** Shut down the interface by entering the **interface** command (followed by the interface address of the interface), and then enter the **shutdown** command. See the "Using the show interfaces Command" section on page 4-26.

When you have finished, press **Ctrl-Z**—hold down the **Control** key while you press **Z**—or enter **end** or **exit** to exit configuration mode and return to the EXEC command interpreter.

**Note** If you need to shut down additional interfaces, enter the **interface** command (followed by the interface type and the interface address of the interface) for each of the interfaces on your port adapter. Use the **no shutdown** command to enable the interface.

**Step 4** Write the new configuration to NVRAM as follows:

```
Router# copy running-config startup-config
[OK]
Router#
```

The system displays an OK message when the configuration has been stored in NVRAM.

**Step 5** Verify that new interface is now in the correct state (shut down) using the **show interfaces** command (followed by the interface type and interface address of the interface) to display the specific interface. See the "Using the show interfaces Command" section on page 4-26.

**Step 6** Re-enable the interface by doing the following:

**a.** Repeat Step 3 to re-enable an interface. Substitute the **no shutdown** command for the **shutdown** command.

**b.** Repeat Step 4 to write the new configuration to memory. Use the **copy running-config startup-config** command.

**c.** Repeat Step 5 to verify that the interface is in the correct state. Use the **show interfaces** command followed by the interface address of the interface.

For descriptions of software configuration commands, refer to the publications listed in the "Related Documentation" section on page -ix.

# Performing a Basic Interface Configuration

Following are instructions for a basic configuration, which include enabling an interface and specifying IP routing. You might also need to enter other configuration subcommands, depending on the requirements for your system configuration and the protocols you plan to route on the interface. For complete descriptions of configuration subcommands and the configuration options available for the interfaces of your port adapter, refer to the appropriate software documentation.

In the following procedure, press the **Return** key after each step unless otherwise noted. At any time you can exit the privileged level and return to the user level by entering **disable** at the prompt as follows:

```
Router# disable

Router>
```

**Step 1** Enter configuration mode and specify that the console terminal is the source of the configuration subcommands, as follows:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
```

**Step 2** Specify the first interface to configure by entering the **interface** command, followed by the type of interface and the interface address of the interface you plan to configure. (The command for your port adapter will be specific to the technology of your interface.) The "Using the show interfaces Command" section on page 4-26 provides examples.

**Step 3** Assign an IP address and subnet mask to the interface (if IP routing is enabled on the system) by using the **ip address** subcommand, as in the following example:

```
Router(config-if)# ip address 10.0.0.0 10.255.255.255
```

**Step 4** Add any additional configuration subcommands required to enable routing protocols and set the interface characteristics.

**Step 5** Re-enable the interfaces using the **no shutdown** command. (See the "Shutting Down an Interface" section on page 4-3.)

**Step 6** After including all of the configuration subcommands to complete your configuration, press **Ctrl-Z**—hold down the **Control** key while you press **Z**—or enter **end** or **exit** to exit configuration mode and return to the EXEC command interpreter prompt.

**Step 7** Write the new configuration to NVRAM as follows:

```
Router# copy running-config startup-config
[OK]
Router#
```

The system displays an OK message when the configuration has been stored in NVRAM.

**Note** If you are going to disconnect or reconfigure the ATM interface cable, use the **shutdown** command before doing so. After reattaching the ATM interface cable, use the **no shutdown** command to bring up the ATM interface.

# Configuring the PA-A3 for T3

To configure the PA-A3 for T3, perform the following tasks in interface configuration mode:

**Step 1** Specify an ATM interface configuration. See"Identifying Interface Addresses" section on page 1-21 for the appropriate interface address for your system.

```
Router# interface atm slot/port or slot/port-adapter/port
```

**Step 2** Set the line build-out length (0 to 50 feet is **short** and greater than 50 feet is **long**). Use the **no** form of this command to return to the default, which is **short**.

```
Router(config-if)# lbo {short | long}
```

**Step 3** Select the transmit clock source. This can be internal or derived from the receive clock through use of the **no** form of the command. By default, the receive clock source is used for the transmit clock.

```
Router(config-if)# clock internal
```

**Step 4** Enable DS-3 scrambling. Use the **no** form of the command to restore the default value.

```
Router(config-if)# DS3-scramble
```

**Step 5** Specify DS-3 framing: **m23plcp**, **cbitplcp**, **m23adm**, or **cbitadm**. Use the **no** form of the command to return to the default, which is **cbitadm**.

```
Router(config-if)# framing {m23plcp | cbitplcp | m23adm | cbitadm}
```

# Configuring the PA-A3 for E3

To configure the PA-A3 for E3, perform the following tasks in interface configuration mode:

**Step 1** Specify an ATM interface configuration. See the "Identifying Interface Addresses" section on page 1-21 for the appropriate interface address for your system.

```
Router# interface atm slot/port or slot/port-adapter/port
```

**Step 2** Select the transmit clock source. This can be internal or derived from the receive clock through use of the **no** form of this command. By default, the receive clock source is used for the transmit clock.

```
Router(config-if)# clock internal
```

**Step 3** Enable E3 scrambling. Use the **no** form of the command to restore the default value.

```
Router(config-if)# e3-scramble
```

**Step 4** Specify DS-3 framing: **g832adm**, **g751adm**, or **g751plcp**. Use the **no** form of the command to return to the default, which is **g832adm**.

```
Router(config-if)# framing {g832adm | g751adm | g751plcp}
```

# Configuring the PA-A3 for OC-3

To configure the PA-A3 for OC-3, perform the following tasks in interface configuration mode:

**Step 1** Specify an ATM interface configuration. See "Identifying Interface Addresses" section on page 1-21 for the appropriate interface address for your system.

```
Router# interface atm slot/port or slot/port-adapter/port
```

**Step 2** Select the transmit clock source. This can be internal or derived from the receive clock through use of the **no** form of this command. By default, the receive clock source is used for the transmit clock.

```
Router(config-if)# clock internal
```

**Step 3** Specify SONET framing by using the **sonet stm-1** command. Use the **no** form of this command to return to the default, STS-3c framing.

```
Router(config-if)# sonet stm-1
```

**Note** In ATM environments, the key difference between SONET and SDH framing modes is the type of cell transmitted when no user or data cells are available. The ATM forum specifies use of idle cells if unassigned cells are not generated. More specifically, in Synchronous Transport Module-X (STM-X) mode, an ATM interface sends idle cells for cell-rate decoupling. In Synchronous Transport Signal-Xc (STS-Xc) mode, the ATM interface sends unassigned cells for cell-rate decoupling.

# Configuring VCs

A virtual circuit (VC) is a point-to-point connection between remote hosts and routers. A VC is established for each ATM end node with which the router communicates. The characteristics of the VC are established when the VC is created and include the following:

- Class of service category:
  - Constant bit rate (CBR)
  - Non-real-time variable bit rate (nrt-VBR)
  - Real-time variable bit rate (rt-VBR)
  - Available bit rate (ABR)
  - Unspecified bit rate (UBR)
- ATM adaptation layer 5 (AAL5)
- Encapsulation type:
  - Logical link control Subnetwork Address Protocol (AAL5SNAP)
  - Multiplexer (AAL5MUX)
  - Network Layer Protocol ID (AAL5NLPID)
  - Integrated Local Management Interface (ILMI)
  - Switched Multimegabit Data Service (SMDS)
  - ITU/Q.2931 Signaling ATM Adaptation Layer (QSAAL)
  - Cisco AUTO PPP over AAL5 (aal5autoppp)
  - Cisco PPP over AAL5 (aal5ciscoppp)

**Note** See the ATM virtual circuit configuration commands in the example output of the "Classes of Service and Transmit Priority on the PA-A3" section on page 4-13.

Each VC supports the following router functions:

- Multiprotocol
- Fast switching of IP packets
- Flow, and Cisco Express Forwarding (CEF) switching of IP packets
- Pseudobroadcast support for multicast packets

By default, CEF switching is enabled on all PA-A3 interfaces. These switching features can be turned off with interface configuration commands. Flow must be explicitly enabled for each interface.

# Configuring PVCs

To use a permanent virtual circuit (PVC), configure the PVC in both the router and the ATM switch. PVCs remain active until the circuit is removed from either configuration. When a PVC is configured, all of the configuration options are passed on to the PA-A3. You can write these PVCs into nonvolatile RAM (NVRAM); they are used when the system image is reloaded.

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

Like Frame Relay, ATM supports two types of interface: point-to-point and multipoint. The one you choose determines whether you need to use the configuration commands that ensure IP to ATM mappings.

To configure a PVC, refer to the following sections:

- Configuring a PVC on a Point-to-Point Subinterface, page 4-8
- Configuring a PVC on a Multipoint Subinterface, page 4-9

## Configuring a PVC on a Point-to-Point Subinterface

With point-to-point subinterfaces, each pair of routers has its own subnet. If you put the PVC on a point-to-point subinterface, the router assumes that there is only one point-to-point PVC configured on the subinterface. Therefore, any IP packets with a destination IP address in the same subnet are forwarded on this VC.

To configure a point-to-point PVC, perform the following tasks from configuration mode:

**Step 1** Enter interface configuration mode and specify an ATM interface using the **interface atm** command. Specify the creation of a point-to-point interface by using the **point** command.

```
Router(config)# interface atm5/0.200 point
```

**Step 2** You can list the VPI and VCI values using the **pvc ?** command.

```
Router(config-if)# pvc ?
  <0-255>    Enter VPI/VCI value(slash required)
  <1-65535>  Enter VCI value
  WORD       Optional handle to refer to this connection
```

**Step 3** Create the PVC. Notice the output telling you that the circuit has been configured on a specific interface.

```
Router(config-if)# pvc 1/1
Configuring vc 1/1 on interface ATM5/0.200

Router(config-if-atm-vc)#
```

**Note** Static map statements are not required for point-to-point subinterfaces.

## Configuring a PVC on a Multipoint Subinterface

Multipoint networks generally have three or more routers in the same subnet. If you put the PVC in a point-to-multipoint subinterface or in the main interface (which is multipoint by default), you need to either configure a static mapping or enable inverse Address Resolution Protocol (InARP) for dynamic mapping.

The following output example shows a PVC 2/200 on ATM interface 1/1/0.200. It uses the global default AAL5SNAP encapsulation. The local interface IP address is 2.2.2.1, and the remote interface IP address is 2.2.2.2.

```
Router# show interfaces atm 1/1/0.200
interface ATM1/1/0.200 multipoint
ip address 2.2.2.1 255.255.255.0
no ip directed-broadcast
pvc 2/200
protocol ip 2.2.2.2 broadcast
```

InARP is enabled on multipoint links by default. The following example, creates a multipoint subinterface. By using the **show atm map** command, you can see that InARP builds a dynamic mapping between the Layer 3 IP address and the Layer 2 VPI/VCI:

```
Router# show atm map
   Map list ATM1/1/0.100_ATM_INARP : DYNAMIC
   ip 1.1.1.2 maps to VC 19, VPI 2, VCI 100, ATM1/1/0.100
   Map list ATM1/1/0.200_ATM_INARP : DYNAMIC
   ip 2.2.2.2 maps to VC 20, VPI 2, VCI 200, ATM1/1/0.200
```

You can check the mapping using the **show atm map** command. In the following example, you can see the mapping of Layer 3 to Layer 2 addresses is dynamic. Such mapping is dynamic using InARP as illustrated in the previous **show atm map** command example.

```
Router# show atm map
Map list ATM1/1/0.100_ATM_INARP : DYNAMIC
ip 1.1.1.2 maps to VC 19, VPI 2, VCI 100, ATM1/1/0.100
Map list ATM1/1/0.200pvc20 : PERMANENT
ip 2.2.2.2 maps to VC 20, VPI 2, VCI 200, ATM1/1/0.200, broadcast
```

You can use the **inarp** command to change the frequency of transmitting a new ATM InARP packet in order to reconfirm the mapping:

```
Router(config-subif)# pvc 2/200
Router(config-if-atm-vc)# inarp ?
     <1-60>  InARP Frequency in minutes
     <cr>
Router(config-if-atm-vc)# inarp 5
Router(config-if-atm-vc)# end
```

Use the **show atm vc** command to confirm your configured value:

```
Router# show atm vc
   5d10h: ATMARP:Sending first PVC INARP
   5d10h: ATMARP(ATM1/1/0.200)O: INARP_REQ to VCD#20 2/200 for link 7(IP)
   5d10h: ATMARP(ATM1/1/0.200)I: INARP Reply VCD#20 2/200 from 2.2.2.2
   ATM1/1/0.200: VCD: 20, VPI: 2, VCI: 200
   UBR, PeakRate: 44209
   AAL5-LLC/SNAP, etype:0x0, Flags: 0xC20, VCmode: 0x0
   OAM frequency: 0 second(s)
   InARP frequency: 5 minutes(s)
   Transmit priority 4
   InPkts: 10, OutPkts: 11, InBytes: 680, OutBytes: 708
   InPRoc: 10, OutPRoc: 5, Broadcasts: 0
   InFast: 0, OutFast: 0, InAS: 0, OutAS: 6
```

```
InPktDrops: 0, OutPktDrops: 0
CrcErrors: 0, SarTimeOuts: 0, OverSizedSDUs: 0
OAM cells received: 0
OAM cells sent: 0
Status: UP
```

# Configuring SVCs

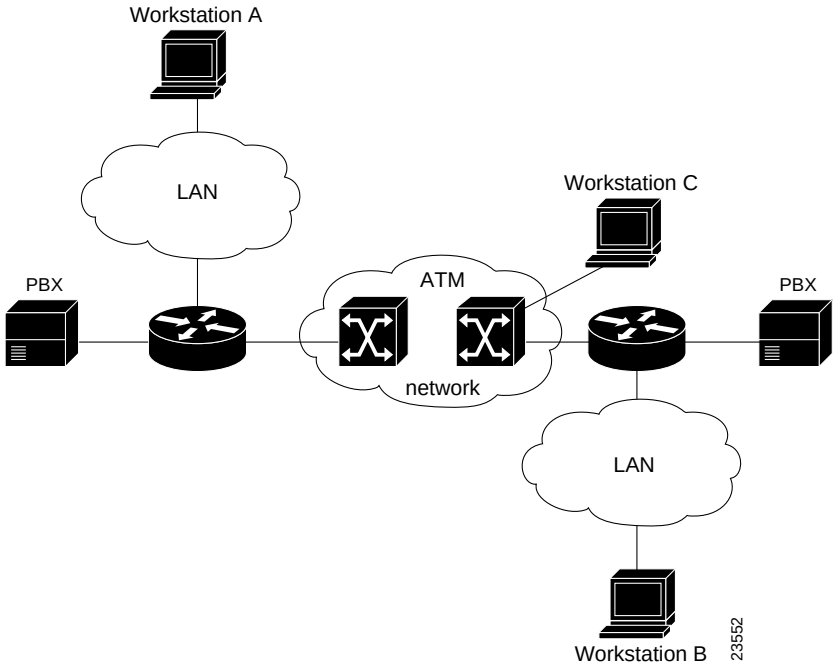
ATM switched virtual circuits (SVCs) are created and released dynamically, providing user bandwidth on demand. This service requires a signaling protocol between the router and the switch.

The ATM signaling software provides a method of dynamically establishing, maintaining, and clearing ATM connections at the User-Network Interface (UNI). The ATM signaling software conforms to the ATM Forum UNI 4.0 specification.

In UNI mode, the user is the router, and the network is an ATM switch. This is an important distinction. The Cisco router does not perform ATM-level call routing. Instead, the ATM switch does the ATM call routing, and the router routes packets through the resulting circuit. The router is viewed as the user and the LAN interconnection device at the end of the circuit, and the ATM switch is viewed as the network.

Figure 4-1 on page 4-10 illustrates the router position in a basic ATM environment. The router is used primarily to interconnect LANs through an ATM network. Workstation C in Figure 4-1 on page 4-10 is connected directly to the destination ATM switch. You can connect not only routers to ATM switches, but also any network device with an ATM interface that conforms to the ATM Forum UNI specification.

***Figure 4-1 Basic ATM Environment***



To use SVCs, complete the required tasks in the following sections:

- Configuring the PVC That Performs SVC Call Setup, page 4-11
- Configuring the Network Service Access Point Address, page 4-12

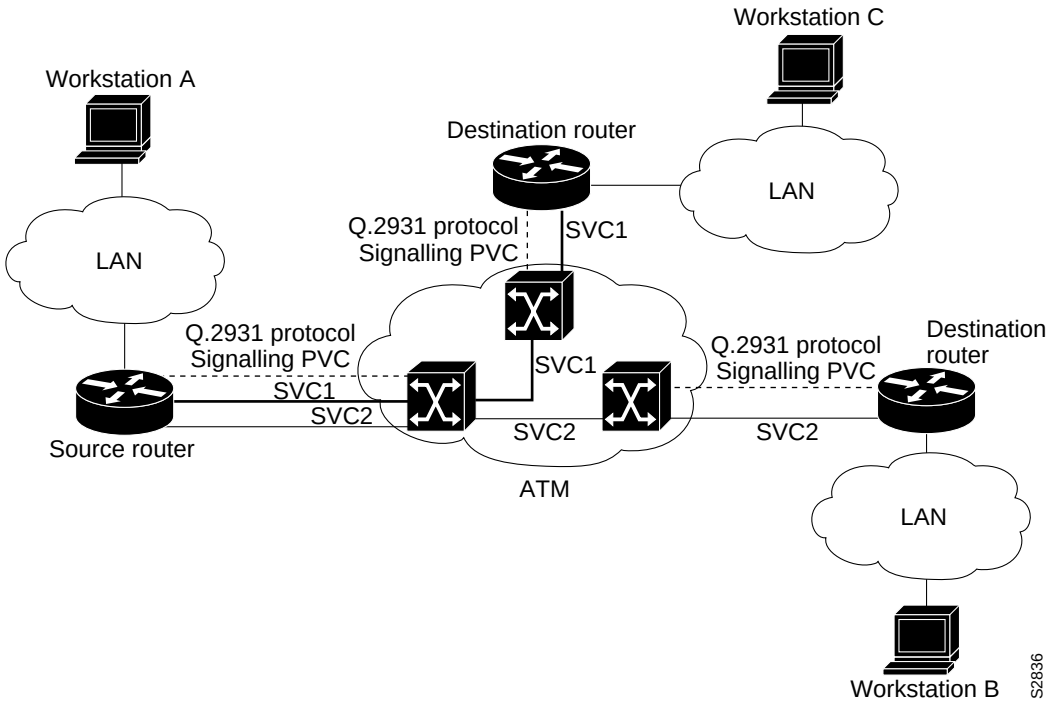
For further information on configuring the PA-A3 port adapter for SVCs, see the *Wide-Area Networking Configuration Guide*.

## Configuring the PVC That Performs SVC Call Setup

ATM uses out-of-band signaling. One dedicated PVC exists between the router and the ATM switch, over which all SVC call establishment and call termination requests flow. After the call is established, data transfer occurs over the SVC, from router to router. The signaling that accomplishes the call setup and teardown is called *Layer 3 signaling* or the *Q.2931 protocol*.

For out-of-band signaling, a signaling PVC must be configured before any SVCs can be set up. In Figure 4-2, a signaling PVC from the source router to the ATM switch is used to set up two SVCs. This is a fully meshed network; workstations A, B, and C can all communicate with one another.

***Figure 4-2 One or More SVCs Require a Signaling PVC***




To configure the signaling PVC for all SVC connections, enter the **pvc** *vcd vpi vci* **qsaal** command in interface configuration mode.

**Note** This signaling PVC can be set up on a major interface only, not on the subinterfaces.

The VPI and VCI values must be configured consistently with the local switch. The standard value of VPI is 0, and the range of VPI values is 0 through 255. The standard value of VCI is 5, and the range of VCI values is 0 through 65535.

**Note** VCI values 0 through 31 are reserved and do not carry data traffic.

## Configuring the Network Service Access Point Address

Every ATM interface involved with signaling must be configured with a network service access point (NSAP) address. The NSAP address is the ATM address of the interface and must be unique across the network.

To configure an NSAP address, complete the tasks in the following sections:

- Configuring the Complete NSAP Address Manually, page 4-12
- Configuring the ESI and Selector Fields, page 4-13

To configure the ESI and Selector fields, you must also configure a PVC to communicate with the switch through ILMI:

```
Router(config-if)# pvc 0/16 ilmi
```

The switch then provides the Prefix field of the NSAP address.

### Configuring the Complete NSAP Address Manually

When you configure the NSAP address manually, you must enter the entire address in hexadecimal format; that is, each digit entered represents a hexadecimal digit. To represent the complete NSAP address, you must enter 40 hexadecimal digits in the following format:

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

**Note** All NSAP addresses must be entered in the dotted hexadecimal format shown, which conforms to the UNI specification.

Because the interface has no default NSAP address, you must configure the NSAP address for SVCs. To set the ATM interface source NSAP address, enter the **nsap-address** *nsap-address* command in interface configuration mode.

The following is an example of an NSAP address assigned to ATM interface 4/0 on a Cisco 7200 series, Cisco uBR7200 series, or Cisco 7100 series router:

```
Router(config)# interface atm 4/0
Router(config-if)# nsap-address AB.CDEF.01.234567.890A.BCDE.F012.3456.7890.1234.12
```

You can display the ATM address for the interface by executing the **show interfaces atm** command.

### Configuring the ESI and Selector Fields

You can configure the router to get the NSAP address prefix from the switch; however, the switch must be capable of delivering the NSAP address prefix to the router through ILMI, and the router must be configured with a PVC for communication with the switch through ILMI.

To configure the router to get the NSAP prefix from the switch and use locally entered values for the remaining fields of the address, complete the following tasks in interface configuration mode:

**Step 1** Specify an ATM interface to configure.

```
Router(config)# interface atm slot/port or slot/port-adapter/port
```

**Step 2** Enter the ESI and Selector fields of the NSAP address.

```
Router(config-if)# esi-address esi.selector
```

In the **esi-address** command, the *esi* argument is 6 hexadecimal bytes long (12 digits), and the *selector* argument is 1 hexadecimal byte long (2 digits).

In the following example on a Cisco 7200 series router, the ESI and Selector field values are assigned, and the ILMI PVC is set up:

```
Router(config)# interface atm 4/0
Router(config-if)# esi-address 345678901234.12
```

## Configuring Classical IP and ARP over ATM

Cisco implements both the ATM Address Resolution Protocol (ARP) server and ATM ARP client functions described in RFC 1577. RFC 1577 models an ATM network as a logical IP subnetwork on a LAN.

The tasks required to configure classical IP and ARP over ATM depend on whether there are SVCs or PVCs present in the environment. For further information, refer to the *Wide-Area Networking Configuration Guide, Release 12.2* at the following URL:

http://www.cisco.com/en/US/products/sw/iosswrel/ps1835/products_configuration_guide_book09186a0080080f69.html

## Classes of Service and Transmit Priority on the PA-A3

The transmit priority determines which queued cell is chosen to be transmitted out of an interface during a cell time slot and ensures that real-time ATM service classes, which typically offer more robust QoS and traffic guarantees, have a higher likelihood of access to the next cell time slot. Table 4-1 lists the ATM service classes and their default transmit priorities on the PA-A3.

**Note** Refer to the Feature Module documentation and Technical Tips on Cisco.com for detailed information about classes of service, configuration features, and the Cisco IOS releases that the support specific features.

*Table 4-1 ATM Classes of Service and Default Transmit Priorities on the PA-A3*

| Service Category | Transmit Priority |
|---|---|
| CBR, OAM cells and signaling | 0 |
| AAL5 or AAL2 VoATM VC (any service category) | 1 |
| rt-VBR | 2 |
| nrt-VBR | 3 |
| ABR | 4 |
| UBR | 5 |

**Caution** Transmit priority 0 is reserved for control traffic such as OAM and signaling.

You can use the **transmit-priority** command in VC configuration mode to change the priority value. The following example shows a customized prioritization scheme with the transmit priority value of a VC changed from 4 to 2.

**Step 1** First, view the characteristics of the existing configuration using the **show atm vc {***vcd#***}** command. Note how the router has assigned a default transmit priority value of 5 to the UBR PVC:

```
Router# show atm vc 2
ATM5/0: VCD: 2, VPI: 1, VCI: 100
UBR, PeakRate: 10000
AAL5-LLC/SNAP, etype:0x0, Flags: 0x20, VCmode: 0x0
OAM frequency: 0 second(s)
PA TxRingLimit: 0 paritcles
PA Rx Limit: 0 particles
InARP frequency: 15 minute(s)
Transmit priority 5
InPkts: 0, OutPkts: 0, InBytes: 0, OutBytes: 0
InPRoc: 0, OutPRoc: 0, Broadcasts: 0
InPktsDrops: 0, OutPktDrops: 0
CrcErrors: 0, SarTimeOuts: 0. OverSizedSDUs: 0
OAM cells received: 0
OAM cells sent:0
Status: ACTIVE
```

**Step 2** Next, customize the transmit priority value from VC configuration mode.

```
Router(config)# interface atm 5/0
Router(config-if)# pvc x/100
Router(config-if-atm-vc)# transmit-priority 2
```

**Step 3** The final action is to confirm your settings. Note how the router indicates the changed transmit priority level. It is now at level 2.

```
Router# show atm vc 2
ATM5/0: VCD: 2, VPI: 1, VCI: 100
UBR, PeakRate: 10000
AAL5-LLC/SNAP, etype:0x0, Flags: 0x20, VCmode: 0x0
OAM frequency: 0 second(s)
PA TxRingLimit: 0 paritcles
PA Rx Limit: 0 particles
InARP frequency: 15 minute(s)
Transmit priority 2
```

```
InPkts: 0, OutPkts: 0, InBytes: 0, OutBytes: 0
InPRoc: 0, OutPRoc: 0, Broadcasts: 0
InPktsDrops: 0, OutPktDrops: 0
CrcErrors: 0, SarTimeOuts: 0. OverSizedSDUs: 0
OAM cells received: 0
OAM cells sent:0
Status: ACTIVE
```

# Customizing the PA-A3

You can customize the PA-A3. The features you can customize have default values that will probably suit your environment and not need to be changed. However, you might need to enter configuration commands, depending on the requirements for your system configuration and the protocols you plan to route on the interface. Perform the tasks in the following sections if you need to customize the PA-A3:

- Setting the MTU Size, page 4-15
- Configuring an ATM Interface for Local Loopback, page 4-15
- Configuring an ATM Interface for External Loopback, page 4-16

**Note** For the commands that follow, you need to be in interface configuration mode. To enter interface configuration mode, use the **interface atm** command, followed by the interface address of the ATM interface you plan to configure.

## Setting the MTU Size

Each ATM interface has a default maximum packet size or maximum transmission unit (MTU) size. On the PA-A3, this number defaults to 4470 bytes, the range being 64 through 9188 bytes. To set the maximum MTU size, enter the following command in interface configuration mode:

```
Router(config-if)# mtu bytes
```

**Note** This command is documented in the *Cisco IOS Configuration Fundamentals Command Reference, Release 12.2* at the following URL:

http://www.cisco.com/en/US/products/sw/iosswrel/ps1835/products_command_reference_book09186a00800811e0.html

## Configuring an ATM Interface for Local Loopback

To configure an ATM interface for local loopback (useful for checking that the PA-A3 is working by looping the transmit data back to the receive data), use the following command:

```
Router(config-if)# loopback diagnostic
Router(config-if)# loopback diagnostic
```

The **no** form of the command turns off local loopback:

```
Router(config-if)# no loopback diagnostic
```

## Configuring an ATM Interface for External Loopback

To configure an ATM interface for external loopback (useful for checking that the PA-A3 is working by looping the receive data back to the transmit data), use the following command:

```
Router(config-if)# loopback line
```

The **no** form of the command turns off external loopback:

```
Router(config-if)# no loopback line
```

# Checking the Configuration

After configuring the interface, use the **show** commands to display the status of the new interface or all interfaces, and use the **ping** and **loopback** commands to check connectivity. This section includes the following subsections:


- Using show Commands to Verify the New Interface Status, page 4-16
- Using the ping Command to Verify Network Connectivity, page 4-30
- Using loopback Commands, page 4-30


## Using show Commands to Verify the New Interface Status

This section demonstrates how you can use the **show** commands to verify that new interfaces are configured and operating correctly and that the port adapter appears in them correctly. Sample displays of the output of selected **show** commands appear in the sections that follow.

If an interface is shut down and you configured it as up, or if the displays indicate that the hardware is not functioning properly, ensure that the interface is properly connected and terminated. If you still have problems bringing up the interface, contact a service representative for assistance. This section includes the following subsections:


- Using the show version or show hardware Commands, page 4-16
- Using the show diag Command, page 4-22
- Using the show interfaces Command, page 4-26


### Using the show version or show hardware Commands

Display the configuration of the system hardware, the number of each interface type installed, the Cisco IOS software version, the names and sources of configuration files, and the boot images, using the **show version** (or **show hardware**) command.

**Note** The outputs that appear in this document may not match the output you receive when running these commands. The outputs in this document are examples only.

The following sections provide platform-specific output examples using the **show version** command:


- Catalyst RSM/VIP2 in Catalyst 5000 Family Switches—Example Output of the show version Command, page 4-17
- Catalyst 6000 Family FlexWAN Module in Catalyst 6000 Family Switches—Example Output of the show version Command, page 4-18
- Cisco 7100 Series Routers—Example Output of the show version Command, page 4-18
- Cisco 7200 Series Routers and Cisco 7200 VXR Routers—Example Output of the show version Command, page 4-19
- Cisco 7201 Router—Example Output of the show version Command, page 4-20
- Cisco 7401ASR Router—Example Output of the show version Command, page 4-20
- VIP in Cisco 7000 Series Routers and Cisco 7500 Series Routers—Example Output of the show version Command, page 4-21


### Catalyst RSM/VIP2 in Catalyst 5000 Family Switches—Example Output of the show version Command

Following is an example of the **show version** command from a Catalyst 5000 family switch with a PA-A3 installed:

```
Switch# show version
Cisco Internetwork Operating System Software
IOS (tm) C5RSM Software (C5RSM-JV-M), Version 12.0(1)
Copyright (c) 1986-1998 by cisco Systems, Inc.
Compiled Mon 10-May-99 06:02 by biff
Image text-base: 0x60010910, data-base: 0x60A62000

ROM: System Bootstrap, Version 11.1(2), RELEASE SOFTWARE (fc1)
ROM: GS Software (RSP-JV-M), Version 11.1(6), RELEASE SOFTWARE (fc1)

Switch uptime is 2 days, 2 hours, 59 minutes
System restarted by reload
System image file is "c5rsm-jv-mz", booted via tftp from 10.10.10.10

cisco RSP2 (R4700) processor with 32768K/2072K bytes of memory.
R4700 processor, Implementation 33, Revision 1.0
Last reset from power-on
G.703/E1 software, Version 1.0.
G.703/JT2 software, Version 1.0.
SuperLAT software (copyright 1990 by Meridian Technology Corp).
Bridging software.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
TN3270 Emulation software (copyright 1994 by TGV Inc).
Chassis Interface.

(Additional display text omitted from this example)

1 VIP2 R5K controller (1 ATM).
1 ATM network interface(s)

(Additional display text omitted from this example)

123K bytes of non-volatile configuration memory.

16384K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).
No slave installed in slot 3.
Configuration register is 0x0
```

### Catalyst 6000 Family FlexWAN Module in Catalyst 6000 Family Switches—Example Output of the show version Command

Following is an example of the **show version** command from a Catalyst 6000 family switch with a Catalyst 6000 family FlexWAN module with a PA-A3 installed:

```
Router# show version
Cisco Internetwork Operating System Software
IOS (tm) MSFC Software (C6MSFC-JSV-M), Experimental Version 12.1(20000209:134547)
[amcrae-cosmos_e_nightly 163]
Copyright (c) 1986-2000 by cisco Systems, Inc.
Compiled Wed 09-Feb-00 07:10 by
Image text-base: 0x60008900, data-base: 0x6140E000

ROM: System Bootstrap, Version 12.0(3)XE, RELEASE SOFTWARE

const-uut uptime is 5 minutes
System returned to ROM by reload
System image file is "bootflash:c6msfc-jsv-mz.Feb9"

cisco Cat6k-MSFC (R5000) processor with 122880K/8192K bytes of memory.
Processor board ID SAD03457061
R5000 CPU at 200Mhz, Implementation 35, Rev 2.1, 512KB L2 Cache
Last reset from power-on
Channelized E1, Version 1.0.
Bridging software.
X.25 software, Version 3.0.0.
SuperLAT software (copyright 1990 by Meridian Technology Corp).
TN3270 Emulation software.
Primary Rate ISDN software, Version 1.1.
6 FlexWAN controllers (13 Serial)(8 E1)(8 T1)(2 HSSI)(2 ATM)(1 Channelized T3)(1
Channelized E3)(2 POS).
1 Virtual Ethernet/IEEE 802.3  interface(s)
17 Serial network interface(s)
2 HSSI network interface(s)
2 ATM network interface(s)
2 Packet over SONET network interface(s)
1 Channelized T3 port(s)
1 Channelized E3 port(s)
123K bytes of non-volatile configuration memory.
4096K bytes of packet SRAM memory.

16384K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x1
```

### Cisco 7100 Series Routers—Example Output of the show version Command

Following is an example of the **show version** command from a Cisco 7120 router with a PA-A3 installed:

```
Router# show version
Cisco Internetwork Operating System Software
IOS (tm) EGR Software (c7100-IS-M), Version 12.0(4)XE, EARLY DEPLOYMENT RELEASE)
TAC:Home:SW:IOS:Specials for info
Copyright (c) 1986-1999 by cisco Systems, Inc.
Compiled Thu 10-Jun-99 15:32 by linda
Image text-base: 0x60008900, data-base: 0x60D8E000

ROM: System Bootstrap, Version 12.0(5r)XE, RELEASE SOFTWARE (fc1)
BOOTFLASH: EGR Software (C7100-BOOT-M), Version 12.0(5)XE5, EARLY DEPLOYMENT RE)

Router uptime is 14 minutes
System restarted by power-on
Running default software
```

```
cisco 7120-4T1 (EGR) processor with 61440K/69632K bytes of memory.
R527x CPU at 225Mhz, Implementation 40, Rev 10.0, 2048KB L2 Cache
Last reset from power-on
Bridging software.
X.25 software, Version 3.0.0.
2 FastEthernet/IEEE 802.3 interface(s)
4 Serial network interface(s)
1 ATM network interface(s)
125K bytes of non-volatile configuration memory.

40960K bytes of ATA PCMCIA card at slot 0 (Sector size 512 bytes).
8192K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x102
```

### Cisco 7200 Series Routers and Cisco 7200 VXR Routers—Example Output of the show version Command

Following is an example of the **show version** command from a Cisco 7200 series router with a PA-A3 installed:

```
Router# show version
Cisco Internetwork Operating System Software
IOS (tm) 7200 Software (C7200-J-M), Version 12.0(3)T
Copyright (c) 1986-1998 by cisco Systems, Inc.
Compiled Mon 10-May-99 06:02 by biff
Image text-base: 0x600088E0, data-base: 0x6083C000

ROM: System Bootstrap, Version 11.1(5), RELEASE SOFTWARE (fc1)
ROM: 7200 Software (C7200-BOOT-M), Released Version 11.3

Router uptime is 22 hours, 57 minutes
System restarted by reload at 15:56:03 UTC Tue Apr 28 1998
System image file is "c7200-j-mz", booted via tftp from 10.10.10.10

cisco 7206 (NPE150) processor with 57344K/8192K bytes of memory.
R4700 processor, Implementation 33, Revision 1.0 (512KB Level 2 Cache)
Last reset from power-on
Bridging software.
SuperLAT software (copyright 1990 by Meridian Technology Corp).
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
TN3270 Emulation software (copyright 1994 by TGV Inc).

(Additional display text omitted from this example)

1 ATM network interface(s)

(Additional display text omitted from this example)

125K bytes of non-volatile configuration memory.
1024K bytes of packet SRAM memory.

8192K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
20480K bytes of Flash PCMCIA card at slot 1 (Sector size 128K).
4096K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x0
```

### Cisco 7201 Router—Example Output of the show version Command

Following is an example of the **show version** command from a Cisco 7201 router:

```
Router# show version
Cisco IOS Software, 7200 Software (C7200P-ADVENTERPRISEK9-M), Version
12.4(biffDEV.061001), INTERIM SOFTWARE Copyright (c) 1986-2006 by Cisco Systems, Inc.
Compiled Sun 01-Oct-06 23:42 by biff
ROM: System Bootstrap, Version 12.4(4r)XD5, RELEASE SOFTWARE (fc1)
BOOTLDR: Cisco IOS Software, 7200 Software (C7200P-KBOOT-M), Version 12.4(TAZ3DEV.060927),
INTERIM SOFTWARE
c7201alpha1 uptime is 5 days, 18 hours, 32 minutes System returned to ROM by power-on
System image file is "disk0:c7200p-adventerprisek9-mz.2006-10-01.biffdev"
This product contains cryptographic features and is subject to United States and local
country laws governing import, export, transfer and use. Delivery of Cisco cryptographic
products does not imply third-party authority to import, export, distribute or use
encryption.
Importers, exporters, distributors and users are responsible for compliance with U.S. and
local country laws. By using this product you agree to comply with applicable laws and
regulations. If you are unable to comply with U.S. and local laws, return this product
immediately.
A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html
If you require further assistance please contact us by sending email to export@cisco.com.
Cisco 7201 (c7201) processor (revision A) with 917504K/65536K bytes of memory.
Processor board ID 2222222222222
MPC7448 CPU at 1666Mhz, Implementation 0, Rev 2.2
1 slot midplane, Version 2.255
Last reset from power-on
1 FastEthernet interface
4 Gigabit Ethernet interfaces
2045K bytes of NVRAM.
62443K bytes of USB Flash usbflash0 (Read/Write)
250880K bytes of ATA PCMCIA card at slot 0 (Sector size 512 bytes).
65536K bytes of Flash internal SIMM (Sector size 512K).
Configuration register is 0x2
```

### Cisco 7401ASR Router—Example Output of the show version Command

Following is an example of the **show version** command from a Cisco 7401ASR router:

```
Router# show version
Cisco Internetwork Operating System Software
IOS (tm) 7401ASR Software (C7401ASR-J-M), Version 12.0(3)T
Copyright (c) 1986-1998 by cisco Systems, Inc.
Compiled Mon 10-May-99 06:02 by biff
Image text-base: 0x600088E0, data-base: 0x6083C000

ROM: System Bootstrap, Version 11.1(5), RELEASE SOFTWARE (fc1)
ROM: 7401ASR Software (C7401ASR-BOOT-M), Released Version 11.3

Router uptime is 22 hours, 57 minutes
System restarted by reload at 15:56:03 UTC Tue Apr 28 1998
System image file is "c7401ASR-j-mz", booted via tftp from 10.10.10.10

cisco 7401ASR processor with 57344K/8192K bytes of memory.
R4700 processor, Implementation 33, Revision 1.0 (512KB Level 2 Cache)
Last reset from power-on
Bridging software.
SuperLAT software (copyright 1990 by Meridian Technology Corp).
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
TN3270 Emulation software (copyright 1994 by TGV Inc).
```

```
(Additional display text omitted from this example)

1 ATM network interface(s)

125K bytes of non-volatile configuration memory.
1024K bytes of packet SRAM memory.
8192K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
20480K bytes of Flash PCMCIA card at slot 1 (Sector size 128K).
4096K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x0
```

### VIP in Cisco 7000 Series Routers and Cisco 7500 Series Routers—Example Output of the show version Command

Following is an example of the **show version** command from a Cisco 7500 series router with a PA-A3 installed on a VIP4:

```
Router# show version
Cisco Internetwork Operating System Software
IOS (tm) GS Software (RSP-JV-M), Version 12.0(10)S1
Copyright (c) 1986-1999 by cisco Systems, Inc.
Compiled Mon 10-May-99 06:02 by biff
Image text-base: 0x60010910, data-base: 0x60A62000

ROM: System Bootstrap, Version 11.1(2), RELEASE SOFTWARE (fc1)
ROM: GS Software (RSP-JV-M), Version 11.1(6), RELEASE SOFTWARE (fc1)

router uptime is 2 days, 2 hours, 59 minutes
System restarted by reload
System image file is "rsp-jv-mz", booted via tftp from 10.10.10.10

cisco RSP2 (R4700) processor with 32768K/2072K bytes of memory.
R4700 processor, Implementation 33, Revision 1.0
Last reset from power-on
G.703/E1 software, Version 1.0.
G.703/JT2 software, Version 1.0.
SuperLAT software (copyright 1990 by Meridian Technology Corp).
Bridging software.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
TN3270 Emulation software (copyright 1994 by TGV Inc).
Chassis Interface.

[Additional display text omitted from this example]

1 VIP4 RM7000 controller (1 ATM).
1 ATM network interface(s)

[Additional display text omitted from this example]

123K bytes of non-volatile configuration memory.

16384K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).
No slave installed in slot 3.
Configuration register is 0x0
```

## Using the show diag Command

Display the types of port adapters installed in your system (and specific information about each) using the **show diag** *slot* command, s*lot* is the *port adapter slot* in a Catalyst 5000 family switch, Cisco 7100 series router, Cisco 7200 series router, Cisco 7200 VXR router, Cisco uBR7200 series router Cisco 7201 router, Cisco 7301 router, or Cisco 7401ASR router, the *module slot* in a Cisco 7304 PCI Port Adapter Carrier Card in a Cisco 7304 router, and the *interface processor slot* in a Cisco 7000 series or Cisco 7500 series router with a VIP. In the FlexWAN module, the **show diag** command is used without the *slot* designation.

**Note** The outputs that appear in this document may not match the output you receive when running these commands. The outputs in this document are examples only.

**Note** The *slot* argument is not required for Catalyst 5000 family switches.

The following sections provide platform-specific output examples using the **show diag** command:

- Catalyst RSM/VIP2 in Catalyst 5000 Family Switches—Example Output of the show interfaces Command, page 4-26
- Catalyst 6000 Family FlexWAN Module in Catalyst 6000 Family Switches—Example Output of the show diag Command, page 4-23
- Cisco 7100 Series Routers—Example Output of the show diag Command, page 4-23
- Cisco 7200 Series Routers and Cisco 7200 VXR Routers—Example Output of the show diag Command, page 4-24
- Cisco 7201 Router—Example Output of the show diag Command, page 4-24
- Cisco 7401ASR Router—Example Output of the show diag Command, page 4-25
- VIP in Cisco 7000 Series Routers and Cisco 7500 Series Routers—Example Output of the show diag Command, page 4-25

### Catalyst RSM/VIP2 in Catalyst 5000 Family Switches—Example Output of the show diag Command

Following is an example of the **show diag** command from a Catalyst 5000 family switch:

```
Switch# show diag
Slot 0:
        Physical slot 0, ~physical slot 0xD, logical slot 0, CBus 0
        Microcode Status 0x4
        Master Enable, LED, WCS Loaded
        Board is analyzed
        Pending I/O Status: None
        EEPROM format version 1
        VIP2 R5K controller, HW rev 2.00, board revision UNKNOWN
        Serial number: 0123455  Part number: 73-2167-03
        Test history: 0x00        RMA number: 00-00-00
        Flags: cisco 7000 board; 7500 compatible

        EEPROM contents (hex):
          0x20: 01 1E 02 00 00 45 1F 73 49 08 77 03 00 00 00 00
          0x30: 02 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

        Slot database information:
        Flags: 0x4      Insertion time: 0x1544 (01:18:59 ago)
```

```
Controller Memory Size: 128 MBytes DRAM, 4096 KBytes SRAM

PA Bay 0 Information:
ENHANCED ATM E3 PA, 1 ports
EEPROM format version 1
HW rev 2.00, Board revision 90
Serial number:0123457  Part number:73-2434-02
```

### Catalyst 6000 Family FlexWAN Module in Catalyst 6000 Family Switches—Example Output of the show diag Command

Following is an example of the **show diag** command from a Catalyst 6000 family FlexWAN module:

```
Router# show diag

(additional displayed text omitted from this example)

Slot 8: Logical_index 16
     Board is analyzed ipc ready FlexWAN controller

     Slot database information:
     Flags: 0x2004Insertion time: unknown

     CWAN Controller Memory Size: Unknown

     PA Bay 0 Information:
          ENHANCED ATM DS3 PA, 1 ports
          EEPROM format version 0
          HW rev 0.00, Board revision UNKNOWN
          Serial number: 00000000  Part number: 00-0000-00
```

### Cisco 7100 Series Routers—Example Output of the show diag Command

Following is an example of the **show diag** command from a Cisco 7120 series router:

```
Router# show diag 3
Slot 3:
        ATM WAN E3 Port adapter, 1 port
        Port adapter is analyzed
        Port adapter insertion time 00:19:48 ago
        EEPROM contents at hardware discovery:
        Hardware revision 2.1           Board revision B0
        Serial number     15225284      Part number    73-2434-04
        Test history      0x0           RMA number     00-00-00
        EEPROM format version 1
        EEPROM contents (hex):
          0x20: 01 5D 02 01 00 E8 51 C4 49 09 82 04 00 00 00 00
          0x30: 58 00 00 00 99 10 16 00 FF FF FF FF FF FF FF FF
```

**Note** To use the **show diag** command with the Cisco 7140 series router, replace the slot argument **3** with **4**.

### Cisco 7200 Series Routers and Cisco 7200 VXR Routers—Example Output of the show diag Command

Following is an example of the **show diag** command from a Cisco 7200 series router:

```
Router# show diag 2
Slot 2:
        ENHANCED ATM DS3 port adapter, 1 port
        Port adapter is analyzed
        Port adapter insertion time 03:54:58 ago
        Hardware revision 1.0           Board revision A0
        Serial number     0123456       Part number    73-2432-02
        Test history      0x0           RMA number     00-00-00
        EEPROM format version 1
        EEPROM contents (hex):
          0x20: 01 5B 01 00 00 66 33 80 49 09 80 02 00 00 00 00
          0x30: 06 00 00 00 97 10 31 00 FF FF FF FF FF FF FF FF
```

### Cisco 7201 Router—Example Output of the show diag Command

Following is an example of the **show diag** command from a Cisco 7201 router:

```
Router# show diag 1
Slot 1:
    Dual OC3 POS Port adapter, 2 ports
    Port adapter is analyzed
    Port adapter insertion time 00:02:19 ago
    EEPROM contents at hardware discovery:
    Hardware Revision : 1.0
    PCB Serial Number : JAE07520DYL
    Part Number : 73-8220-02
    Board Revision : A0
    RMA Test History : 00
    RMA Number : 0-0-0-0
    RMA History : 00
    Deviation Number : 0
    Product (FRU) Number : PA-POS-2OC3
    Top Assy. Part Number : 800-21857-02
    EEPROM format version 4
    EEPROM contents (hex):
        0x00: 04 FF 40 03 E3 41 01 00 C1 8B 4A 41 45 30 37 35
        0x10: 32 30 44 59 4C 82 49 20 1C 02 42 41 30 03 00 81
        0x20: 00 00 00 00 04 00 88 00 00 00 00 CB 94 50 41 2D
        0x30: 50 4F 53 2D 32 4F 43 33 20 20 20 20 20 20 20 20
        0x40: 20 C0 46 03 20 00 55 61 02 FF FF FF FF FF FF FF
        0x50: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
        0x60: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
        0x70: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
```

### Cisco 7401ASR Router—Example Output of the show diag Command

Following is an example of the **show diag** command from a Cisco 7401ASR router:

```
Router# show diag 1
Slot 1:
        ENHANCED ATM DS3 port adapter, 1 port
        Port adapter is analyzed
        Port adapter insertion time 03:54:58 ago
        Hardware revision 1.0           Board revision A0
        Serial number     0123456       Part number    73-2432-02
        Test history      0x0           RMA number     00-00-00
        EEPROM format version 1
        EEPROM contents (hex):
          0x20: 01 5B 01 00 00 66 33 80 49 09 80 02 00 00 00 00
          0x30: 06 00 00 00 97 10 31 00 FF FF FF FF FF FF FF FF
```

### VIP in Cisco 7000 Series Routers and Cisco 7500 Series Routers—Example Output of the show diag Command

Following is an example of the **show diag** command from a VIP4 in interface processor slot 8 of a Cisco 7500 series router:

```
Router# show diag 8
Slot 8:
        Physical slot 8, ~physical slot 0x7, logical slot 8, CBus 0
        Microcode Status 0x4
        Master Enable, LED, WCS Loaded
        Board is analyzed
        Pending I/O Status:None
        EEPROM format version 2
        VIP4 RM7000 controller, HW rev 2.01, board revision A0
        Serial number:0123459  Part number:211-18700-71
        Test history:0x02        RMA number:00-00-00
        Flags: unknown flags 0x7F; 7500 compatible

        EEPROM contents (hex):
          0x20:02 22 02 01 00 AF 7B C9 D3 49 0C 47 02 00 00 00
          0x30:02 3A 0C FF FF FF FF FF FF FF FF FF FF FF FF FF

        Slot database information:
        Flags:0x4      Insertion time:0x322708 (21:41:44 ago)

        Controller Memory Size:64 MBytes DRAM, 65536 KBytes SRAM

        PA Bay 0 Information:
                ENHANCED ATM E3 PA, 1 ports
                EEPROM format version 1
                HW rev 2.00, Board revision 90
                Serial number:0123457  Part number:73-2434-02
```

## Using the show interfaces Command

Display status information (including the physical slot and interface address) for the interfaces you specify using the **show interfaces** command.

For a description of the interface subcommands and configuration options available for specific interfaces, refer to "Related Documentation" section on page -ix.

**Note** The outputs that appear in this document may not match the output you receive when running these commands. The outputs in this document are examples only.

The following sections offer output examples using the **show interfaces** command for some of the platforms that support the PA-A3:


- Catalyst RSM/VIP2 in Catalyst 5000 Family Switches—Example Output of the show interfaces Command, page 4-26
- Catalyst 6000 Family FlexWAN Module in Catalyst 6000 Family Switches—Example Output of the show interfaces Command, page 4-27
- Cisco 7100 Series Routers—Example Output of the show interfaces Command, page 4-27
- Cisco 7200 Series Routers and Cisco7200 VXR Routers—Example Output of the show interfaces Command, page 4-28
- Cisco 7201 Router—Example Output of the show interfaces Command, page 4-28
- Cisco 7401ASR Router—Example Output of the show interfaces Command, page 4-29
- VIP in Cisco 7000 Series and Cisco 7500 Series Routers—Example Output of the show interfaces Command, page 4-29


### Catalyst RSM/VIP2 in Catalyst 5000 Family Switches—Example Output of the show interfaces Command

Following is an example of the **show interfaces atm** command used with a Catalyst RSM/VIP2 in a Catalyst 5000 family switch. In this example, the PA-A3 is installed in port adapter slot 0 on the Catalyst RSM/VIP2:

```
Switch# show interfaces atm 0/0
ATM0/0 is up, line protocol is up
  Hardware is cyBus ENHANCED ATM PA
  Internet address is 10.10.10.1/24
  MTU 4470 bytes, sub MTU 1500, BW 149760 Kbit, DLY 80 usec, rely 255/255, load 2/255
  Encapsulation ATM, loopback not set, keepalive not set
  Encapsulation(s): AAL5 AAL3/4
  4096 maximum active VCs, 11 current VCCs
  VC idle disconnect time: 300 seconds
  Signalling vc = 1, vpi = 0, vci = 5
  UNI Version = 3.0, Link Side = user
  Last input 00:00:00, output 00:00:00, output hang never
  Last clearing of "show interface" counters 18:51:06
  Queueing strategy: fifo
  Output queue 0/40, 307 drops; input queue 0/75, 316274481 drops
  30 second input rate 33637000 bits/sec, 87606 packets/sec
  30 second output rate 1665000 bits/sec, 4336 packets/sec
     2629255419 packets input, 1649955763 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants
     181187605 packets output, 106941585 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
     0 output buffers copied, 0 interrupts, 0 failures
```

### Catalyst 6000 Family FlexWAN Module in Catalyst 6000 Family Switches—Example Output of the show interfaces Command

Following is an example of the **show interfaces atm** command used with a Catalyst 6000 family FlexWAN module in module slot 8, port adapter bay 0:

```
Router# show interfaces atm 8/0/0
ATM8/0/0 is administratively down, line protocol is down
  Hardware is ENHANCED ATM PA
  MTU 4470 bytes, sub MTU 4470, BW 10000000 Kbit, DLY 0 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ATM, loopback not set
  Keepalive not supported
  Encapsulation(s): AAL5
  1024 maximum active VCs, 0 current VCCs
  VC idle disconnect time: 300 seconds
  0 carrier transitions
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
     Conversations  0/0/256 (active/max active/max total)
     Reserved Conversations 0/0 (allocated/max allocated)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 packets output, 0 bytes, 0 underruns
0 output errors, 0 collisions, 0 interface resets
     0 output buffer failures, 0 output buffers swapped out
```

### Cisco 7100 Series Routers—Example Output of the show interfaces Command

Following is an example of the **show interfaces atm** command used with a Cisco 7120 series router installed in port adapter slot 3:

```
Router# show interfaces atm 3/0
ATM3/0 is administratively down, line protocol is down
  Hardware is ENHANCED ATM PA
  MTU 4470 bytes, sub MTU 4470, BW 34013 Kbit, DLY 100 usec,
     reliability 0/255, txload 1/255, rxload 1/255
  Encapsulation ATM, loopback not set
  Keepalive not supported
  Encapsulation(s): AAL5
  4096 maximum active VCs, 0 current VCCs
  VC idle disconnect time: 300 seconds
  0 carrier transitions
  Last input never, output never, 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, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 output buffer failures, 0 output buffers swapped out
```

### Cisco 7200 Series Routers and Cisco7200 VXR Routers—Example Output of the show interfaces Command

Following is an example of the **show interfaces atm** command used with a Cisco 7200 series router or Cisco 7200 VXR router. In this example, the PA-A3 is installed in port adapter slot 6 of a Cisco 7206 router:

```
Router# show interfaces atm 6/0
ATM6/0 is up, line protocol is up
  Hardware is ENHANCED ATM PA
  Internet address is 10.10.10.2/8
  MTU 4470 bytes, sub MTU 4470, BW 44209 Kbit, DLY 190 usec, rely 0/255, load 1/255
  Encapsulation ATM, loopback not set, keepalive set (10 sec)
  Encapsulation(s): AAL5
  4096 maximum active VCs, 2 current VCCs
  VC idle disconnect time: 300 seconds
  Last input never, output never, 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
  30 second input rate 0 bits/sec, 0 packets/sec
  30 second output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 output buffer failures, 0 output buffers swapped out
```

### Cisco 7201 Router—Example Output of the show interfaces Command

Following is an example of the **show interfaces** command for the Cisco 7201 router:

```
Router# show interfaces

GigabitEthernet0/0 is up, line protocol is up
  Hardware is MV64460 Internal MAC, address is 0019.56c5.2adb (bia
0019.56c5.2adb)
  Internet address is 209.165.200.225
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 45/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 1000Mb/s, media type is RJ45
  output flow-control is XON, input flow-control is XON
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:07:03, output 00:00:07, output hang never
  Last clearing of "show interface" counters 00:00:04
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 180240000 bits/sec, 430965 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     2222975 packets input, 133378500 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     0 watchdog, 0 multicast, 0 pause input
     0 input packets with dribble condition detected
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier, 0 pause output
     0 output buffer failures, 0 output buffers swapped out
```

### Cisco 7401ASR Router—Example Output of the show interfaces Command

Following is an example of the **show interfaces atm** command used with a Cisco 7401ASR router:

```
Router# show interfaces atm 1/0
ATM1/0 is up, line protocol is up
  Hardware is ENHANCED ATM PA
  Internet address is 10.10.10.2/8
  MTU 4470 bytes, sub MTU 4470, BW 44209 Kbit, DLY 190 usec, rely 0/255, load 1/255
  Encapsulation ATM, loopback not set, keepalive set (10 sec)
  Encapsulation(s): AAL5
  4096 maximum active VCs, 2 current VCCs
  VC idle disconnect time: 300 seconds
  Last input never, output never, 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
  30 second input rate 0 bits/sec, 0 packets/sec
  30 second output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 output buffer failures, 0 output buffers swapped out
```

### VIP in Cisco 7000 Series and Cisco 7500 Series Routers—Example Output of the show interfaces Command

Following is an example of the **show interfaces** command used with the VIP. In this example, the PA-A3 is installed on a VIP4 in interface processor slot 8 of a Cisco 7513 router:

```
Router# show interfaces atm 8/0/0
ATM8/0/0 is administratively down, line protocol is down
  Hardware is cyBus ENHANCED ATM PA, address is 0060.3e47.5800 (bia 0060.3e47.5800)
  MTU 4470 bytes, sub MTU 4470, BW 34013 Kbit, DLY 100 usec, rely 0/255, load 1/255
  Encapsulation ATM, loopback not set
  Keepalive not supported
  Encapsulation(s):AAL5
  4096 maximum active VCs, 0 current VCCs
  VC idle disconnect time:300 seconds
  0 carrier transitions
  Last input never, output never, 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, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 output buffer failures, 0 output buffers swapped out
```

You have completed a basic interface configuration. Depending on your version of the PA-A3, you might need to specify configuration for T3 (DS-3), E3, or OC-3c.

**Note** To verify your network connectivity, see the "Using the ping Command to Verify Network Connectivity" section on page 4-30, for a brief description of the **ping** command.

For a description of the interface subcommands and configuration options available for ATM interfaces, refer to the "Related Documentation" section on page -ix.

# Using the ping Command to Verify Network Connectivity

Using the **ping** command, you can verify that an interface port is functioning properly. This section provides a brief description of this command.

The **ping** command sends echo request packets out to a remote device at an IP address that you specify. After sending an echo request, the system waits a specified time for the remote device to reply. Each echo reply is displayed as an exclamation point (!) on the console terminal; each request that is not returned before the specified timeout is displayed as a period (.). A series of exclamation points (!!!!!) indicates a good connection; a series of periods (.....) or the messages [timed out] or [failed] indicate a bad connection.

Following is an example of a successful **ping** command to a remote server with the address 10.0.0.10:

```
Router# ping 10.0.0.10 <Return>
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 10.0.0.10, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/15/64 ms
Router#
```

If the connection fails, verify that you have the correct IP address for the destination and that the device is active (powered on), and repeat the **ping** command.

# Using loopback Commands

The **loopback** command places an interface in loopback mode, which enables test packets that are generated from the **ping** command to loop through a remote device. If the packets complete the loop, the connection is good. If not, you can isolate a fault to the remote device in the path of the loopback test.

The **loopback diagnostic** command on an ATM interface of a Cisco router causes traffic going out of the interface to come back to the router.

If loopback is not set on the ATM interface, traffic will not be looped back. Traffic will go out but will not return. Apply the **loopback diagnostic** command, and then use the **show interfaces atm** command to show that loopback is indeed set:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.

Router(config)# interface atm 1/0
Router(config-if)# loopback diagnostic
Router(config-if)# atm clock internal
Router(config-if)# ^Z

Router# show interface atm 1/0
ATM1/0 is up, line protocol is up
Hardware is A3 ATM
MTU 4470 bytes, sub MTU 4470, BW 155520 Kbit, DLY 80 usec,
```

```
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation ATM, loopback set
Keepalive not supported
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 00:03:16, output 00:03:16, 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, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
163861 packets input, 3164940 bytes, 0 no buffer
Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
33 input errors, 33 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
144191 packets output, 2138298 bytes, 0 underruns
0 output errors, 0 collisions, 1 interface resets
0 output buffer failures, 0 output buffers swapped out
```

**Note** To ensure proper clocking, set the router as the clock source by specifying the **atm clock internal** command in the main interface configuration.

The **loopback line** command on an ATM interface of a Cisco router causes incoming traffic to be sent back to the network. Apply the **loopback line** command, and then use the **show interfaces atm** command to show that loopback is indeed set:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.

Router(config)# interface atm 2/0
Router(config-if)# loopback line
Router(config-if)# ^Z

Router# config show interfaces atm 2/0
ATM2.0 is up, line protocol is up
Hardware is A3 ATM
MTU 4470 bytes, sub MTU 4470, BW 155520 kbit, DLY 80 usec,
reliability 255/255, txload 1/255, rxload 1/255

Encapsulation ATM, loopback set
Keepalive not supported
Encapsulation(s): AAL5, PVC mode
2048 maximum active VCs, 1024 VCs per VP, 1 current VCCs
VC idle disconnect time: 300 seconds
Last input 00:02:45, output 00:02:45, output hang never
Last clearing of "show interface" counter never
Queueing strategy: fifo
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
94917 packets input, 1638383 bytes, 0 no buffer
Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
102898 packets output, 2042785 bytes, 0 underruns
0 output errors, 0 collisions, 5 interface resets
0 ouput buffer failures, 0 output buffers swapped out
```

**Note** For more information on understanding loopback modes on Cisco routers, refer to *Understanding Loopback Modes on Cisco Router*s on Cisco.com at the following URL:

http://www.cisco.com/en/US/tech/tk39/tk48/technologies_tech_note09186a00800c93c4.shtml

# Traffic Management

The PA-A3 supports the traffic-shaping parameters defined in Table 4-2. These parameters ensure that generated traffic conforms to the ATM Forum Traffic Management Specification Version 4.0. Shaping values are configured using the **vbr-nrt** command in VC configuration mode.

***Table 4-2 Traffic-Shaping Parameters and Ranges***

| Traffic Parameter | Range | Default |
|---|---|---|
| T3 | 56 kbps to 45 Mbps | If the peak rate is not defined, each new VC is set to the maximum physical layer rate. The VC is assigned to the UBR service category. |
| E3 | 56 kbps to 34 Mbps | If the peak rate is not defined, each new VC is set to the maximum physical layer rate. The VC is assigned to the UBR service category. |
| OC-3c Peak Rate | 56 kbps to 155 Mbps | If the peak rate is not defined, each new VC is set to the maximum physical layer rate. The VC is assigned to the UBR service category. |
| Average Rate | 0 < average ≤ peak rate | Average = peak rate at the maximum physical layer rate. |
| Maximum Burst Size | 1 to 64,000 cells | Equal to the PA-A3 MTU size. |

**Note** For more information about traffic management specific to the various class of service categories, refer to ATM Traffic Management technology support on Cisco.com at the following URL:

http://www.cisco.com/en/US/tech/tk39/tk51/tsd_technology_support_protocol_home.html

# Troubleshooting the PA-A3 Installation and Configuration

The following sections provide suggested guidelines for troubleshooting the PA-A3. Use the **ping** command to verify network connectivity, the **debug** commands to help solve network problems, and the **show** commands to display the current state of the network.

**Note** For more information about troubleshooting ATM port adapters and understanding the output from the **debug** commands, refer to Troubleshooting TechNotes on Cisco.com at the following URL:

http://www.cisco.com/en/US/products/hw/modules/ps2033/prod_tech_notes_list.html9

The following topics are covered within this section:


- PA-A3 Statistics, page 4-33
- Using the debug atm Commands, page 4-34
- Displaying ATM Information, page 4-35


# PA-A3 Statistics

The PA-A3 maintains a count of certain errors and tracks the ATM facility performance. In addition to keeping a count of these errors, the PA-A3 also takes snapshots of the last VCI/VPI that caused the error. Each PA-A3 error counter is made up of 16 bits. Errors counted include the following:

- Cyclic Redundancy Check (CRC) errors
- Giants received
- No buffers available
- Framing errors
- Application layer or physical layer errors
- Packet timeout errors on receive

The PA-A3 provides port adapter-specific error statistics through the **show interfaces atm** command.

**Note** For examples of the **show interfaces atm** command for all supported platforms, see the "Using the show interfaces Command" section on page 4-26.

The **show controllers atm** command displays the ATM framing information and ATM facility performance statistics. The statistics report section includes up to 96 15-minute interval reports, as well as the current interval level. Only those intervals with non-zero data are displayed.

The following is an example of the **show controllers atm** command from a Cisco 7200 series router:

```
Router# show controllers atm 6/0
Interface ATM6/0 is up
Hardware is ENHANCED ATM PA Plus - OC3 (155000Kbps)
Framer is PMC PM5346 S/UNI-155-LITE, SAR is LSI ATMIZER II
Firmware rev: X101, Framer rev: 0, ATMIZER II rev: 4
 idb=0x62EB7C74, ds=0x62EBF0A0, vc=0x62F41080
 slot 6, unit 1, subunit 0, fci_type 0x03A7, ticks 9790
 5200 rx buffers: size=512, encap=64, trailer=28, magic=4
Curr Stats:
 VCC count: current=1, peak=1
 AAL2 VCC count: 0
 AAL2 TX no buffer count: 0
 AAL2 RX no buffer count: 0
 SAR crashes: Rx SAR=0, Tx SAR=0
 rx_cell_lost=0, rx_no_buffer=0, rx_crc_10=0, rx_no_mem=0
 rx_cell_len=0, rx_no_vcd=0, rx_cell_throttle=0, tx_aci_err=0
Rx Free Ring status:
 base=0x3F2EE040, size=8192, write=40
Rx Compl Ring status:
 base=0x7E6AFF80, size=8192, read=3083
Tx Ring status:
 base=0x3F723A00, size=12288, write=255
Tx Compl Ring status:
 base=0x0E6BFFC0, size=8192, read=6271
BFD Cache status:
```

```
 base=0x62F35000, size=12288, read=12286
Rx Cache status:
 base=0x62F265C0, size=16, write=11
Tx Shadow status:
 base=0x62F28F80, size=12288, read=239, write=255
Control data:
 rx_max_spins=9, max_tx_count=50, tx_count=16
 rx_threshold=3467, rx_count=11, tx_threshold=9216
 tx bfd write indx=0x451, rx_pool_info=0x62F26660
Control data base address:
 rx_buf_base = 0x0E3ABEE0 rx_p_base = 0x62ECAD80
    rx_pak = 0x62DDE7F8 cmd = 0x62ECA7A0
    framer = 0x603F75C0 framer_cb = 0x62ECABA0
 framer_base = 0x3F100000 pci_pa_stats = 0x7E1B6840
 device_base[0] = 0x3F000000 device_base[1] = 0x3F400000
 ssram_base[0] = 0x3F200000 ssram_base[1] = 0x3F600000
 sdram_base[0] = 0x3F300000 sdram_base[1] = 0x3F700000
 pa_cmd_buf[0] = 0x3F2FFC00 pa_cmd_buf[1] = 0x3F6FFC00
   vcd_base[0] = 0x3F200000 vcd_base[1] = 0x3F630000
   chip_dump[0] = 0x0E1B6868 chip_dump[1] = 0x0E1B6958
 sar_buf_base[0] = 0x3F334000 sar_buf_base[1] = 0x3F730000
   bfd_base[0] = 0x3F2BE000 bfd_base[1] = 0x3F600000
   acd_base[0] = 0x3F240080 acd_base[1] = 0x3F670240
Framer Information:
 Framing mode: SONET OC3 STM-1
 No alarm detected
```

**Note** For more information about CRC errors, using the **show interfaces** command, and using the **show controllers** command, refer to the *CRC Troubleshooting Guide for ATM Interfaces* on Cisco.com at the following URL:

http://www.cisco.com/en/US/tech/tk39/tk48/technologies_tech_note09186a00800c93ef.shtml

# Using the debug atm Commands

The following **debug** commands help to solve ATM network problems:

- Use the **debug atm packet** command to create a dump of all protocol packets. The command displays the contents of the SNAP/NLPID/SMDS header followed by the first 40 bytes of a packet in hexadecimal format.

  ```
  Router# debug atm packet
  ```

- Use the **debug atm errors** command to display errors. The command displays information from all detected ATM errors. This includes such errors as encapsulation failures and errors during ATM configuration.

  ```
  Router# debug atm errors
  ```

- Use the **debug atm events** command to display ATM events. The command displays event changes to the PA-A3; reset, VC configurations, and PA-A3 configurations are displayed.

  ```
  Router# debug atm events
  ```

- Use the **debug atm oam** command to display information about OAM cells. The command displays the contents of OAM cells as they arrive from the network.

  ```
  Router# debug atm oam
  ```

- Use the **no debug** command to turn off debugging after using a **debug** command.

```
Router# no debug atm packet
```

# Displaying ATM Information

You can use **show atm** commands to display the current state of the ATM network and the connected VCs.

- Use the **show atm vc** [*vcd*] command to show current VCs and traffic information. Specifying a VCD displays specific information about that VCD.

```
Router# show atm vc [vcd]
```

- Use the **show atm interfaces** command to show current information about an ATM interface. The command displays ATM-specific information about an interface.

```
Router# show atm interfaces
```

- Use the **show atm traffic** command to show current ATM traffic. The command displays global information about traffic to and from all ATM networks connected to the router.

```
Router# show atm traffic
```

- Use the **show atm map** command to show the current ATM mapping. The command displays the active list of ATM static maps to remote hosts on an ATM network.

```
Router# show atm map
```

- Use the **show sscop** command to display SSCOP details for the ATM interface.

```
Router# show sscop
```

- Use the **show version** command to display the configuration of the system hardware (the number of each interface processor type installed), the software version, the names and sources of configuration files, and the boot images.

**Note** For examples of the **show version** command for all supported platforms, see the "Using the show interfaces Command" section on page 4-26.

The following **show atm vc** command example displays statistics for all PVCs:

```
Router# show atm vc
           VCD/                                          Peak    Avg/Min Burst
Interface  Name  VPI   VCI     Type    Encaps  SC      Kbps    Kbps    Cells Status
6/0        1     10    100     PVC     SNAP    VBR     33920   0       0     UP
6/0.300    4     8     88      PVC     SNAP    VBR     30000   30000   20000 UP
```

The following **show atm vc** *vcd* command example displays statistics for a given PVC:

```
Router# show atm vc 4
ATM6/0.300: VCD:4, VPI:8, VCI:88
VBR-NRT, PeakRate:30000, Average Rate:30000, Burst Cells:20000
AAL5-LLC/SNAP, etype:0x0, Flags:0x20, VCmode:0x0
OAM frequency: 0 second(s)
VC TxRingLimit: 1179 particles
InARP frequency: 15 minute(s)
Transmit priority: 4
InPkts: 0, OutPkts: 0, InBytes: 0, OutBytes: 0
InPRoc: 0, OutPRoc: 0, Broadcasts: 0
```

```
InFast: 0, OutPktDrops: 0/0/0 (holdq/outputq/total)
CrcErrors: 0, SarTimeOuts: 0, OverSizedSDUs: 0, Length Violation: 0, CPIErrors: 0
Out CLP=1 Pkts: 0
OAM cells received: 0
OAM cells sent: 0
Status: UP
```

The following **show atm interface atm** *slot*/*port* command example displays the currently running PA-A6 configuration in RAM:

```
Router# show interfaces atm 3/0
interface ATM 3/0
 ip address 10.10.10.2 255.255.255.0
 map-group atm1
pvc 1 0 1 aal5snap
```

**Note** For examples of the **show interfaces atm** command for all supported platforms, see the "Using the show interfaces Command" section on page 4-26.

# ATM Configuration

Cisco IOS Release 11.3T introduced the ATM VC command mode, which, in turn, introduced several new ATM commands that allow you to configure ATM parameters more easily. The new VC configuration mode uses **protocol ip** and other statements (replace **ip** with **ipx**, **decnet**, and so on) to configure static mappings. The protocol statement takes the place of the **map-list** and **map-group** statements used in versions prior to Cisco IOS Release 11.3T.

The following example shows how to create a PVC AAL5SNAP on a Cisco IOS version earlier than Cisco IOS Release 11.3T. The interface is at IP address 10.0.0.1, with 10.0.0.2 at the other end of the connection.

### First Router

```
interface ATM 3/0
ip address 10.0.0.1 255.0.0.0
no keepalive
map-group atm-in
atm clock internal
atm pvc 1 1 5 aal5snap
!
map-list atm-in
ip 10.0.0.2 atm-vc 1 broadcast
```

**Second Router**

```
interface ATM 3/0
ip address 10.0.0.2 255.0.0.0
no keepalive
map-group atm-in
atm pvc 1 1 5 aal5snap
!
map-list atm-in
ip 10.0.0.1 atm-vc 1 broadcast
```

The following example shows how to create a PVC AAL5SNAP on Cisco IOS Release 11.3T or later. The interface is at IP address 10.0.0.1, with 10.0.0.2 at the other end of the connection.

**First Router**

```
interface ATM1/1/0.200 multipoint
ip address 10.0.0.1 255.255.255.0
no ip directed-broadcast
pvc 2/200
protocol ip 10.0.0.2 broadcast
```

**Second Router**

```
interface ATM1/1/0.200 multipoint
ip address 10.0.0.2 255.255.255.0
pvc 2/200
protocol ip 10.0.0.1 broadcast
atm clock internal
```

# Upgrading Your Boot Flash Image

The boot image contains a subset of the Cisco IOS software. This image is used to perform network booting or to load Cisco IOS images onto the router. This image is also used if the system cannot find a valid system image. When you upgrade your Cisco IOS software to the minimum required software release, we recommend that you also upgrade your boot image. To upgrade your boot image, you can copy the new boot image from a network server to flash memory on your router.

To copy a boot image from a Trivial File Transfer Protocol (TFTP) server to flash memory, complete the following procedure:

**Step 1** Enter configuration mode.

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
```

**Step 2** Display and note the exact spelling of the system image filename in flash memory.

```
Router(config)# show flash all
```

**Step 3** Make a backup copy of the current boot image.

```
Router(config)# copy flash tftp
```

**Step 4** Copy a boot image to flash memory.

```
Router(config)# copy tftp flash
```

**Step 5** When prompted, enter the IP address or domain name of the server.

```
Router(config)# ip-address or name
```

For further information, such as how to set up the TFTP server, refer to the *Cisco IOS Configuration Fundamentals Configuration Guide, Release 12.2* at the following URL:

http://www.cisco.com/en/US/products/sw/iosswrel/ps1835/products_configuration_guide_book09186a0080080ff9.html

# Port Adapter Error Messages

All of the PA-A3 receive buffers are allocated from static random-access memory (SRAM). As a result, during bootup, if the PA-A3 cannot find enough *contiguous* SRAM for its use, the system stops bringing up the PA-A3 and displays an error message such as the following:

```
%ATMPA-3-PCIMEMNOTENOUGH: Not Enough PCI memory (0x19874) to support ATM PA on
bay 5
```