CHAPTER 3

Initially Configuring the ATM Switch Router

This chapter discusses specific steps used to initially configure 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 conceptual and background information, 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:

- Methods for Configuring the ATM Switch Router on page 3-2
- Configuration Prerequisites on page 3-2
- Configuring the BOOTP Server on page 3-4
- Configuring the ATM Address on page 3-5
- Modifying the Physical Layer Configuration of an ATM Interface on page 3-6
- Configuring the IP Interface on page 3-7
- Configuring Network Clocking on page 3-10
- Configuring Network Routing on page 3-18
- Configuring System Information on page 3-18
- Configuring Online Diagnostics (Catalyst 8540 MSR) on page 3-19
- Configuring Redundancy and Enhanced High System Availability (Catalyst 8540 MSR) on page 3-23
- Configuring SNMP and RMON on page 3-32
- Storing the Configuration on page 3-32
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Methods for Configuring the ATM Switch Router

The ATM switch router defaults to a working configuration suitable for most networks. However, you might need to customize the configuration for your network.

Note If your Telnet station or SNMP network management workstation is on a different network from the switch, you must add a static routing table entry to the routing table. See the "Configuring Static Routes" section on page 10-7.

Terminal Line Configuration (Catalyst 8540 MSR)

The ATM switch router has a console terminal line that might require configuration. For line configuration, you must first set up the line for the terminal or the asynchronous device attached to it. For a complete description of configuration tasks and commands used to set up your terminal line and settings, refer to the *Configuration Fundamentals Configuration Guide* and *Dial Solutions Configuration Guide*.

You can connect a modem to the console port. The following settings on the modem are required:

- Enable auto answer mode
- Suppress result codes

You can configure your modem by setting the DIP switches on the modem or by connecting the modem to terminal equipment. Refer to the user manual provided with your modem for the correct configuration information.

Note Because there are no hardware flow control signals available on the console port, the console port terminal characteristics should match the modem settings.

Terminal Line Configuration (Catalyst 8510 MSR and LightStream 1010)

The ATM switch has two types of terminal lines: a console line and an auxiliary line. For line configuration, you must first set up the lines for the terminals or other asynchronous devices attached to them. For a complete description of configuration tasks and commands used to set up your lines, modems, and terminal settings, refer to the *Configuration Fundamentals Configuration Guide* and *Dial Solutions Configuration Guide*.

Configuration Prerequisites

Consider the following information you might need before you configure your ATM switch router:

- If you want to configure a BOOTP server to inform the switch of its Ethernet IP address and mask, you need the Media Access Control (MAC) address of the Ethernet port.
- If you want to configure a new ATM address for the switch (an autoconfigured ATM address is assigned by Cisco), you need an ATM address assigned by your system administrator.
- If you are not using BOOTP, you need an IP address and a netmask address.

Verifying Software and Hardware Installed on the ATM Switch Router

When you first power up your console and ATM switch router, a screen similar to the following from a Catalyst 8540 MSR appears:

```
Restricted Rights Legend

Use, duplication, or disclosure by the Government is
subject to restrictions as set forth in subparagraph
(c) of the Commercial Computer Software - Restricted
Rights clause at FAR sec. 52.227-19 and subparagraph
(c) (1) (ii) of the Rights in Technical Data and Computer
Software clause at DFARS sec. 252.227-7013.

           cisco Systems, Inc.
           170 West Tasman Drive
           San Jose, California 95134-1706



Cisco Internetwork Operating System Software
IOS (tm) PNNI Software (cat8540m-WP-M), Version 12.0(4a)W5(10.44),  INTERIM TEST
 SOFTWARE
Copyright (c) 1986-1999 by cisco Systems, Inc.
Compiled Tue 17-Aug-99 03:18 by
Image text-base: 0x60010930, data-base: 0x60936000



CUBI Driver subsystem initializing ...

primary interrupt reg read FFC00
secondary interrupt reg read EA800
*** this cpu is the primary
Enabling the MS timer



Switch Fabric Driver subsystem initializing ...

found
 smid=0
 smid=2
 smid=4
 smid=6
 smid=1
 smid=3
 smid=5
 smid=7
in cfc_init

... DONE


IDPROM in slot 0 not properly programmed
cisco C8540MSR (R5000) processor with 262144K bytes of memory.
R5000 processor, Implementation 35, Revision 2.1 (512KB Level 2 Cache)
Last reset from power-on
3 Ethernet/IEEE 802.3 interface(s)
11 ATM network interface(s)
507K bytes of non-volatile configuration memory.

20480K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
```

```
8192K bytes of Flash PCMCIA card at slot 1 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).
%ENABLING INTERFACES.PLEASE WAIT...
%Secondary CPU has not booted IOS


Press RETURN to get started!
```

Note If an rommon> prompt appears, your switch requires a manual boot to recover. Refer to the *Configuration Fundamentals Configuration Guide* for instructions on manually booting from Flash memory.

Configuring the BOOTP Server

The BOOTP protocol automatically assigns an Ethernet IP address by adding the MAC and IP addresses of the Ethernet port to the BOOTP server configuration file. When the switch boots, it automatically retrieves the IP address from the BOOTP server.

The switch performs a BOOTP request *only* if the current IP address is set to 0.0.0.0. (This is the default for a new switch or a switch that has had its startup-config file cleared using the **erase** command.)

To allow your ATM switch router to retrieve its IP address from a BOOTP server, you must first determine the MAC address of the switch and add that MAC address to the BOOTP configuration file on the BOOTP server. The following steps provide an example of creating a BOOTP server configuration file:

	Command	Purpose
Step 1	—	Installs the BOOTP server code on the workstation, if it is not already installed.
Step 2	—	Determines the MAC address from the label on the chassis.
Step 3	—	Adds an entry in the BOOTP configuration file (usually */usr/etc/bootptab*) for each switch. Press **Return** after each entry to create a blank line between each entry. See the example BOOTP configuration file that follows.
Step 4	Switch# **reload**	Restarts the ATM switch router to automatically request the IP address from the BOOTP server.

Example

The following example BOOTP configuration file shows the added entry:

```
# /etc/bootptab: database for bootp server (/etc/bootpd)
#
# Blank lines and lines beginning with '#' are ignored.
#
# Legend:
#
#       first field -- hostname
#                       (may be full domain name and probably should be)
#
#       hd -- home directory
#       bf -- bootfile
#       cs -- cookie servers
#       ds -- domain name servers
#       gw -- gateways
#       ha -- hardware address
#       ht -- hardware type
#       im -- impress servers
#       ip -- host IP address
#       lg -- log servers
#       lp -- LPR servers
#       ns -- IEN-116 name servers
#       rl -- resource location protocol servers
#       sm -- subnet mask
#       tc -- template host (points to similar host entry)
#       to -- time offset (seconds)
#       ts -- time servers
#
<information deleted>
#
################################################################################
# Start of individual host entries
################################################################################
→ Switch:         tc=netcisco0:   ha=0000.0ca7.ce00:      ip=172.31.7.97:
dross:          tc=netcisco0:   ha=00000c000139:        ip=172.31.7.26:

<information deleted>
```

Configuring the ATM Address

The ATM switch router ships with a preconfigured ATM address. The Integrated Local Management Interface (ILMI) protocol uses the first 13 bytes of this address as the switch prefix that it registers with end systems. Autoconfiguration also allows the ATM switch router to establish itself as a node in a single-level Private Network-Network Interface (PNNI) routing domain.

Note If you chose to manually change any ATM address, it is important to maintain the uniqueness of the address across large networks. Refer to the *Guide to ATM Technology* for PNNI address considerations and for information on obtaining registered ATM addresses.

For a description of the autoconfigured ATM address and considerations when assigning a new address, refer to the *Guide to ATM Technology.*

Manually Setting the ATM Address

To configure a new ATM address that replaces the previous ATM address when running IISP software only, see the "Configuring the ATM Address" section on page 10-5.

To configure a new ATM address that replaces the previous ATM address and generates a new PNNI node ID and peer group ID, see the "Configuring an ATM Address and PNNI Node Level" section on page 10-10.

Modifying the Physical Layer Configuration of an ATM Interface

Each of the ATM switch router's physical interfaces has a default configuration, listed in Chapter 17, "Configuring Interfaces." You can accept the defaults, or you can override them by reconfiguring the physical interface.

The following example describes modifying an OC-3c interface from the default settings to the following:

- Disable scrambling cell-payload.
- Disable scrambling STS-streaming.
- Change Synchronous Optical Network (SONET) mode of operation from Synchronous Time Stamp level 3c (STS-3c) mode to Synchronous Transfer Module level 1 (STM-1).

To change the configuration of the example interface, perform the following steps, beginning in global configuration mode:

	Command	Purpose
Step 1	Switch(config)# **interface atm** *card*/*subcard*/*port* Switch(config-if)#	Selects the physical interface to be configured.
Step 2	Switch(config-if)# **no scrambling cell-payload**	Disables cell-payload scrambling.
Step 3	Switch(config-if)# **no scrambling sts-stream**	Disables STS-stream scrambling.
Step 4	Switch(config-if)# **sonet stm-1**	Configures SONET mode as SDH/STM-1.

Example

The following example shows how to disable cell-payload scrambling and STS-stream scrambling and changes the SONET mode of operation to Synchronous Digital Hierarchy/Synchronous Transfer Module 1 (SDH/STM-1) of OC-3c physical interface ATM 0/0/0:

```
Switch(config)# interface atm 0/0/0
Switch(config-if)# no scrambling cell-payload
Switch(config-if)# no scrambling sts-stream
Switch(config-if)# sonet stm-1
```

To change any of the other physical interface default configurations, refer to the commands in the *ATM Switch Router Command Reference* publication.

To display the physical interface configuration, use the following privileged EXEC commands:

Command	Purpose
show controllers atm *card/subcard/port*	Shows the physical layer configuration.
more system:running-config	Shows the physical layer scrambling configuration.

Examples

The following example demonstrates using the **show controllers** command to display the OC-3c physical interface configuration after modification of the defaults:

```
Switch# show controllers atm 0/0/0
IF Name: ATM0/0/0    Chip Base Address: A8808000
Port type: 155UTP    Port rate: 155 Mbps    Port medium: UTP
Port status:SECTION LOS    Loopback:None    Flags:8300
TX Led: Traffic Pattern    RX Led: Traffic Pattern  TX clock source:  network-derived
Framing mode:  stm-1
Cell payload scrambling off
Sts-stream scrambling off

<information deleted>
```

The following example displays the OC-3c physical layer scrambling configuration after modification of the defaults using the **more system:running-config** command:

```
Switch# more system:running-config
!
version XX.X
<information deleted>
!
interface ATM0/0/0
 no keepalive
 atm manual-well-known-vc
 atm access-group tod1 in
 atm pvc 0 35 rx-cttr 3 tx-cttr 3  interface  ATM0 0 any-vci  encap qsaal
 sonet stm-1
 no scrambling sts-stream
 no scrambling cell-payload
!
<information deleted>
```

Configuring the IP Interface

IP addresses can be configured on the multiservice route processor interfaces. Each IP address is configured for one of the following types of connections:

- Ethernet port—Can be configured either from the BOOTP server or by using the **ip address** command in interface configuration mode.
- Classical IP over ATM—See Chapter 12, “Configuring IP over ATM.”
- LANE client—See Chapter 13, “Configuring LAN Emulation.”
- Serial Line Internet Protocol/Point-to-Point Protocol (SLIP/PPP)—See the *Dial Solutions Configuration Guide*.

Note These IP connections are used only for network management.

To configure the switch to communicate via the Ethernet interface, provide the IP address and subnet mask bits for the interface.

This section includes the following:

- Configuring IP Address and Subnet Mask Bits on page 3-8
- Testing the Ethernet Connection on page 3-9

Configuring IP Address and Subnet Mask Bits

Define subnet mask bits as a decimal number between 0 and 22 for Class A addresses, between 0 and 14 for Class B addresses, or between 0 and 6 for Class C addresses. Do not specify 1 as the number of bits for the subnet field. That specification is reserved by Internet conventions.

To configure the IP address, perform the following steps, beginning in global configuration mode:

	Command	Purpose
Step 1	Switch(config)# **interface ethernet 0** Switch(config-if)#	Selects the interface to be configured.
Step 2	Switch(config-if)# **ip address** *ip-address mask*	Configures the IP and subnetwork address.

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

Example

The following example shows how to configure interface ethernet 0 with IP address 172.20.40.93 and subnetwork mask 255.255.255.0:

```
Switch(config)# interface ethernet 0
Switch(config-if)# ip address 172.20.40.93 255.255.255.0
```

Displaying the IP Address

To display the IP address configuration, use the following privileged EXEC commands:

Command	Purpose
show interfaces ethernet 0	Displays the Ethernet interface IP address.
more system:running-config	Shows the physical layer scrambling configuration.

Examples

The following example shows how to use the **show interfaces** command to display the IP address of interface ethernet 0:

```
Switch# show interfaces ethernet 0
Ethernet0 is up, line protocol is up
  Hardware is SonicT, address is 0040.0b0a.1080 (bia 0040.0b0a.1080)
  Internet address is 172.20.40.93/24
  <information deleted>
```

The following example uses the **more system:running-config** command to display the IP address of interface ethernet 0:

```
Switch# more system:running-config
!
version XX.X
<information deleted>
!
interface Ethernet0
 ip address 172.20.40.93 255.255.255.0
!
<information deleted>
```

Testing the Ethernet Connection

After you have configured the IP address(es) for the Ethernet interface, test for connectivity between the switch and a host. The host can reside anywhere in your network. To test for Ethernet connectivity, use the following EXEC command:

Command	Purpose
ping ip *ip-address*	Tests the configuration using the ping command. The ping command sends an echo request to the host specified in the command line.

The following example show how to test the Ethernet connectivity from the switch to a workstation with an IP address of 172.20.40.201:

```
Switch# ping ip 172.20.40.201

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.20.40.201, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/202/1000 ms
```

Configuring Network Clocking

This section describes network clocking configuration of the ATM switch router. Properly synchronized network clocking is important in the transmission of constant bit rate (CBR) and variable bit rate real time (VBR-RT) data. For an overview of network clocking and network clock configuration issues, refer to the chapter "Network Clock Synchronization" in the *Guide to ATM Technology.*

This section includes the following:

- Configuring Network Clock Sources and Priorities (Catalyst 8540 MSR) on page 3-11
- Configuring Network Clock Sources and Priorities (Catalyst 8510 MSR and LightStream 1010) on page 3-12
- Displaying the Network Clocking Configuration on page 3-13
- Configuring Network Clocking with NCDP on page 3-14
- Network Clock Services for CES Operations and CBR Traffic on page 3-17

Network Clocking Features

Different types of network clock sources are available on the ATM switch router, both internal and external. Table 3-1 provides a summary of network clocking features.

Table 3-1 Network Clocking Feature Summary

Platform	Up/Down Detection	Loss of Synchronization Detection	Phase Adjustment Cutover	Stratum 3 Clock	BITS[1] Port	Clock Source Preference
Catalyst 8540 MSR with network clock module	Yes	Yes	Yes	Yes	Yes	Best
Catalyst 8510 MSR	Yes	Yes	Yes	No	No	Medium
LightStream 1010 with FC-PFQ	Yes	Yes	Yes	No	No	Medium
Catalyst 8540 MSR without network clock module	Yes	No	No	No	No	Poor
LightStream 1010 with FC-PCQ	Yes	No	No	No	No	Poor

1. BITS = Building Integrated Timing Supply

Configuring Network Clock Sources and Priorities (Catalyst 8540 MSR)

To configure the network clocking priorities and sources, use the following command in global configuration mode:

Command	Purpose
network-clock-select {*priority* {{**atm** | **cbr**} *card/subcard/port*} | **bits** {**0** | **1**} | **system**} | **bits** {**e1** | **t1**} | **revertive**	Configures the network clock priority.

Note Specifying the keyword **system** with the **network-clock-select command** selects the route processor reference clock (a stratum 4 clock source) or the network clock module (a stratum 3 clock source), if present.

Systems equipped with the network clock module can derive clocking from a Building Integrated Timing Supply (BITS) source. To specify the line type attached to the BITS ports on the network clock module and to assign a priority to a port, use the following commands in global configuration mode:

Command	Purpose
network-clock-select bits {**t1** | **e1**}	Selects the line type. This command applies to both BITS ports.
network-clock-select *priority* **bits** {**0** | **1**}	Selects the priority for a BITS port.

Examples

The following example shows how to configure the network clock priorities:

```
Switch(config)# network-clock-select 1 atm 0/0/0
Switch(config)# network-clock-select 2 atm 0/0/3
```

Note This configuration assumes that a full-width module, such as the 4-port OC-12c module, is being used to derive clocking. If port adapters inserted into carrier modules are used, the priority 1 and 2 source ports must be on different port adapters.

The following example shows how to configure the network clock to revert to the highest priority clock source after a failure and takeover by the source with the next lowest priority.

```
Switch(config)# network-clock-select revertive
```

Configuring Network Clock Sources and Priorities (Catalyst 8510 MSR and LightStream 1010)

To configure the network clocking priorities and sources, use the following command in global configuration mode:

Command	Purpose
network-clock-select {*priority* {{**atm** | **cbr**} *card*/*subcard*/*port*} | **system**} | **revertive**	Configures the network clock priority.

Note Specifying the keyword **system** with the **network-clock-select command** selects the processor card reference clock (a stratum 4 clock source).

Examples

The following example shows how to configure the network clock priorities:

```
Switch(config)# network-clock-select 1 atm 0/0/0
Switch(config)# network-clock-select 2 atm 0/0/3
```

The following example shows how to configure the network clock to revert to the highest priority clock source after a failure and takeover by the source with the next lowest priority.

```
Switch(config)# network-clock-select revertive
```

Configuring the Transmit Clocking Source

To configure where each interface receives its transmit clocking, perform the following steps, beginning in global configuration mode:

	Command	Purpose
Step 1	Switch(config)# **interface atm** *card*/*subcard*/*port* Switch(config-if)#	Selects the interface to be configured.
Step 2	Switch(config-if)# **clock source** {**free-running** | **loop-timed** | **network-derived**}	Configures the interface clock source.

Caution If the Network Clock Distribution Protocol (NCDP) is running on an interface, you should not override that port's clock source by configuring it to free-running or loop-timed. Doing so could cause synchronization problems, particularly in the case of loop-timed, which could cause a clocking loop to be formed on a link. See the "Configuring Network Clocking with NCDP" section on page 3-14.

Example

The following example configures ATM interface 3/0/0 to receive its transmit clocking from a network-derived source:

```
Switch(config)# interface atm 3/0/0
Switch(config-if)# clock source network-derived
```

Displaying the Network Clocking Configuration

To show the switch's network clocking configuration, use the following privileged EXEC commands:

Command	Purpose
show network-clocks	Shows the network clocking configuration.
more system:running-config	Shows the interface clock source configuration.
show controllers [**atm** *card*/*subcard*/*port*]	Shows the interface controller status.

Examples

The following example shows the configured network clock sources on a Catalyst 8510 MSR or LightStream 1010:

```
Switch# show network-clocks
clock configuration is NON-Revertive
Priority 1 clock source: ATM1/0/0
Priority 2 clock source: ATM1/1/0
Priority 3 clock source: No clock
Priority 4 clock source: No clock
Priority 5 clock source: System clock
Current clock source:System clock, priority:5
```

Note A source listed as "No clock" indicates that no clock source configured at that priority.

The following example shows the switch clock source configuration with the network clock module installed:

```
Switch# show network-clocks
Network clocking information:
-------------------------------------
Source switchover mode:    revertive
Netclkd state:             Active
Source selection method:   provisioned
NCLKM hardware status:     installed & usable
NCLKM status:              software enabled
Primary   clock source:    ATM0/0/0
Secondary clock source:    not configured
Present   clock source:    NCLKM Stratum 3 osc (0)
```

The following example shows the clock source configuration stored in the running configuration:

```
Switch# more system:running-config
!
<information deleted>
!
network-clock-select revertive
network-clock-select 1 ATM0/0/0
<information deleted>
```

Configuring Network Clocking with NCDP

The Network Clock Distribution Protocol (NCDP) provides a means by which a network can synchronize automatically to a primary reference source (PRS). To do so, NCDP constructs and maintains a spanning network clock distribution tree. This tree structure is superimposed on the network nodes by the software, resulting in an efficient, synchronized network suitable for transport of traffic with inherent synchronization requirements, such as voice and video.

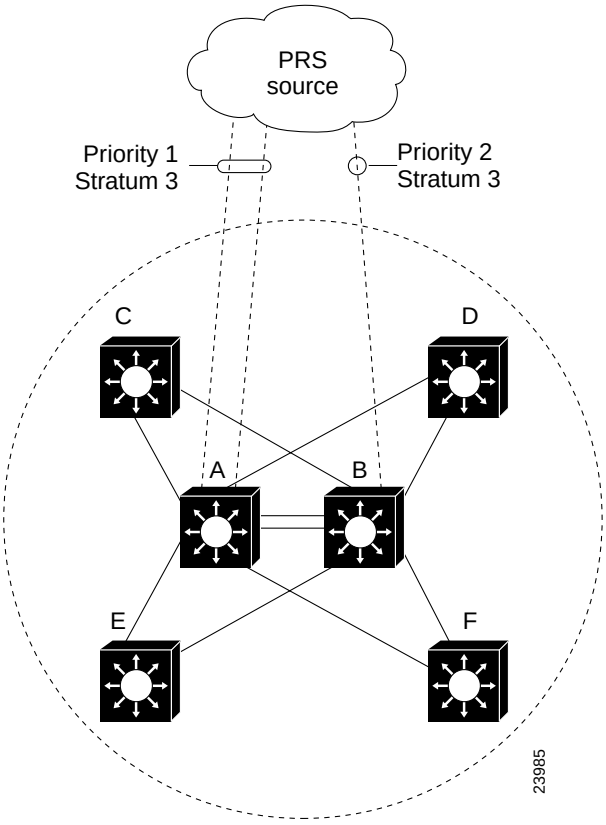
The following sections provide instructions for configuring NCDP. For a description of how NCDP works, refer to the *Guide to ATM Technology.*

Note The NCDP is intended for use on ATM switch routers equipped with FC-PFQ or with the network clock module.

NCDP Network Example

Figure 3-1 shows a network of six ATM switch routers with clocking derived from a stratum 3 PRS. Node A is configured to receive priority 1 clocking on two of its ports, while node B is configured to receive priority 2 clocking on one of its ports.

Figure 3-1 Network Configuration for NCDP



Enabling NCDP

To enable NCDP, use the following global configuration command for each node that you want to configure for NCDP:

Command	Purpose
ncdp	Enables NCDP.

Configuring Network Clock Sources and Priorities

You must specify the clocking sources, their priorities, and associated stratums used by NCDP in constructing the clock distribution tree. To do so, use the following command in global configuration mode:

Command	Purpose
ncdp source *priority* {{**atm** | **cbr**} *card/subcard/port stratum* | **bits**[1] {**0** | **1**} *stratum* | **system**}	Specifies a priority and source (stratum level or system) for this interface.

1. Allows you to specify a Building Integrated Timing Supply (BITS) source. This option is available only on the Catalyst 8540 MSR equipped with the network clock module.

If you do not configure a clock source, NCDP advertises its default source of network clock, which is its local oscillator; if no nodes in the network have a clock source configured, the tree is built so that it is rooted at the switch having the highest stratum oscillator (lowest numerical value) and lowest ATM address.

Example

The following example demonstrates configuring the network clock source, priority, and stratum on node A in Figure 3-1.

```
Switch(config)# ncdp source 1 atm 1/0/0 3
Switch(config)# ncdp source 1 atm 3/0/0 3
```

Configuring Optional NCDP Global Parameters

Optional NCDP parameters you can configure at the global level include the maximum number of hops between any two nodes, revertive behavior, and the values of the NCDP timers. To change any of these parameters from their defaults, use the following commands in global configuration mode:

Command	Purpose
ncdp max-diameter *hops*	Specifies the maximum network diameter for the protocol. The default maximum network diameter is 20.
ncdp revertive	Specifies the NCDP as revertive.
ncdp timers {**hello** | **hold**} *time-in-msec jitter-percent*	Specifies the values to be used by the NCDP timers.

When you specify a maximum diameter, you constrain the diameter of the spanning tree by specifying the maximum number of hops between any two nodes that participate in the protocol. Each node must be configured with the same maximum network diameter value for NCDP to operate correctly.

When you configure the NCDP as revertive, a clock source that is selected and then fails is selected again once it has become operational for a period of time. On the Catalyst 8510 MSR and LightStream 1010 platforms, if NCDP is configured to be revertive, a failed clocking source node after a switchover is restored to use after it has been functioning correctly for at least 1 minute. On the Catalyst 8540 MSR the failed source is restored after about 25 seconds. The network clock is, by default, configured as nonrevertive. Nonrevertive prevents a failed source from being selected again.

Example

The following example shows setting the maximum number of hops to 11 and enabling revertive behavior:

```
Switch(config)# ncdp max-diameter 11
Switch(config)# ncdp revertive
```

Configuring Optional NCDP Per-Interface Parameters

On a per-interface basis, you can enable or disable NCDP, specify the cost metric associated with the port, and change the control virtual circuit used to transport protocol messages between adjacent protocol entities. To change any of these parameters from their defaults, use the following commands in interface configuration mode:

Command	Purpose
ncdp admin-weight *weight*	Specifies the cost metric associated with the given port.
ncdp control-vc *vpi vci*	Specifies the VPI/VCI values to use for control VCs. The default is 0, 34.
no ncdp	Disables NCDP on the interface.

Example

The following example demonstrates setting the administrative weight on an interface:

```
Switch(config)# interface atm 0/0/0
Switch(config-if)# ncdp admin-weight 75
```

Displaying the NCDP Configuration

To display the NCDP configuration, use the following EXEC commands:

Command	Purpose
show ncdp path root	Displays the NCDP clock path from the switch to the root source.
show ncdp ports	Displays NCDP port information.
show ncdp sources	Displays NCDP clock sources configured on the switch.

Command	Purpose
show ncdp status	Displays NCDP status.
show ncdp timers	Displays NCDP timer information.

Example

The following example shows the NCDP status:

```
Switch# show ncdp status
 = ncdp switch information ==== enabled ==============
 non-revertive
 root clock source priority:      1
 root clock source stratum level: 4
 root clock source prs id:        255
 stratum level of root switch:    4
 clocking root address:           4700918100000000E0F75D040100E0F75D040100
 hop count:                       0
 root path cost:                  0
 root port:                       0
 max age:                         5
 hello time:                      500
 priority      of best source:    1
 stratum level of best source:    4
 prs id        of best source:    255
 switch stratum level:            4
 address:                         4700918100000000E0F75D040100E0F75D040100
 switch max age:                  5
 switch hello time:               500
 switch hold time:                500
 max diameter:                    5
 converged root count:            359375
 converged:                       1
 total timer events:              687271
 total queue events:              0
 rx config messages:              0
 tx config messages:              363716
 rx tcn messages:                 0
 tx tcn messages:                 0
 rx non-participant messages:     0
 rx unknown messages:             0

Switch#
```

Network Clock Services for CES Operations and CBR Traffic

Circuit emulation services-interworking functions (CES-IWF) and constant bit rate (CBR) traffic relate to a quality of service (QoS) classification defined by the ATM Forum for Class A (ATM adaptation layer 1 [AAL1]) traffic in ATM networks. In general, Class A traffic pertains to voice and video transmissions, which have particular clocking requirements. For details, refer to Chapter 18, “Configuring Circuit Emulation Services.”

Configuring Network Routing

The default software image for the ATM switch router contains the Private Network-Network Interface (PNNI) routing protocol. The PNNI protocol provides the route dissemination mechanism for complete plug-and-play capability. The following section, "Configuring ATM Static Routes for IISP or PNNI," describes modifications that can be made to the default PNNI or Interim-Interswitch Signalling Protocol (IISP) routing configurations.

For routing protocol configuration information, refer to Chapter 9, "Configuring ILMI,"and Chapter 10, "Configuring ATM Routing and PNNI."

Configuring ATM Static Routes for IISP or PNNI

Static route configuration allows ATM call setup requests to be forwarded on a specific interface if the addresses match a configured address prefix. To configure a static route, use the following command in global configuration mode:

Command	Purpose
atm route *addr-prefx* **atm** *card/subcard/port*	Specifies a static route to a reachable address prefix.

Note An interface must be User-Network Interface (UNI) or Interim Interswitch Signalling Protocol (IISP) to be configured with static route. Static routes configured as PNNI interfaces default as down.

The following example shows how to use the **atm route** command to configure the 13-byte peer group prefix = 47.0091.8100.567.0000.0ca7.ce01 at interface ATM 3/0/0:

```
Switch(config)# atm route 47.0091.8100.567.0000.0ca7.ce01 atm 3/0/0
Switch(config)#
```

Configuring System Information

Although not required, the system clock and hostname should be set as part of the initial system configuration. To set these system parameters, perform the following steps, beginning in privileged EXEC mode:

	Command	Purpose
Step 1	Switch# **clock set** *hh:mm:ss day month year*	Sets the system clock.
Step 2	Switch# **configure terminal** Switch(config)#	Enters global configuration mode from the terminal.
Step 3	Switch(config)# **hostname** *name*	Sets the system name.

Examples

The following example shows how to configure the time, date, and month using the **clock se**t command, enter global configuration mode, and assign a hostname.

```
Switch# clock set 15:01:00 17 October 1999
Switch# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)# hostname Publications
Publications#
```

The following example shows how to confirm the clock setting using the **show clock** command:

```
Publications# show clock
*15:03:12.015 UTC Fri Oct 17 1999
```

Configuring Online Diagnostics (Catalyst 8540 MSR)

Online and insertion diagnostics detect and report hardware failures in the Catalyst 8540 MSR during system bootup and operation.

The online diagnostics on the Catalyst 8540 MSR provide the following types of tests:

- Access tests between the route processor and the switch processors, feature cards, port adapters, and interface modules
- Online insertion and removal (OIR) diagnostic tests
- Snake tests through the switch router to ensure connectivity between the ports

Note Online diagnostics tests only run on the primary route processor.

Access Test (Catalyst 8540 MSR)

The access tests ensure connectivity at a configurable interval between the primary route processor and the following:

- Active switch processors
- Standby switch processor, if it is present
- Feature cards
- Carrier modules
- ATM port adapters
- ATM and Layer 3 interface modules
- ATM router modules

When the access test detects a hardware failure, the system issues an error message to the console.

If the access test detects a hardware problem with an active switch processor, the standby switch processor, if it is present, automatically takes over and becomes an active switch processor. The system generates an SNMP trap when the switchover occurs.

Note The access test does not support the network clock module.

OIR Test (Catalyst 8540 MSR)

Online insertion and removal (OIR) tests check the functioning of the switch fabric and interfaces on a per-port basis. The switch router performs these tests when the system boots up and when you insert a port adapter or interface module into a slot. The OIR test sends a packet to the interface loopback and expects to receive it back within a certain time period. If the packet does not reach the port within the expected time period, or the route processor receives a corrupted packet, the system issues an error message to the console, generates an SNMP trap, and brings the port to an administrative down state.

Note The size of the packet used in the test is configurable.

The OIR tests support all ATM port adapters, all ATM interface modules, and all Layer 3 interface modules except the 8-port Gigabit Ethernet. It does not support ATM router modules.

Snake Test (Catalyst 8540 MSR)

The snake test detects and reports port-to-port connectivity failures. The snake test establishes a connection across all the active ports in the switch router, originating and terminating at the primary route processor. The route processor establishes a connection by sending a packet to each port in turn, which then terminates at the route processor. If the packet does not reach the route processor within the expected time period, or the received packet is corrupted, further testing is performed to isolate and disable the port causing the problem.The size of the packet and frequency of the test are configurable to minimize the impact on system performance.

The snake test supports all ATM interface modules and enhanced Gigabit Ethernet interface modules. It does not support ATM port adapters, ATM router modules, 16-port 10/100 Fast Ethernet interface modules, 2-port Gigabit Ethernet interface modules, or 8-port Gigabit Ethernet interface modules.

Note The snake test does not support ATM port adapters because of a hardware limitation in the carrier module.

Configuring Online Diagnostics (Catalyst 8540 MSR)

To configure online diagnostics, use the following global configuration commands:

Command	Purpose
diag online	Enables all of the online diagnostic tests.
diag online access	Enables only the access diagnostic test.
diag online access freq [*seconds*]	Configures the frequency of the access diagnostic tests. The default frequency is every 10 seconds.
diag online oir	Enables only the OIR test.
diag online oir pktsize [*bytes*]	Specifies the packet size for the OIR test. The default size is 1000 bytes.
diag online snake	Enables only the snake test.

Command	Purpose
diag online snake timer [*seconds*]	Specifies the time interval for the snake test. The default interval is 60 seconds.
no diag online [**access** | **oir** | **snake**]	Disables the online diagnostic tests.
debug diag online [**access** | **oir** | **snake**]	Enables debugging of online diagnostic tests.
no debug diag online [**access** | **oir** | **snake**]	Disables debugging of online diagnostic tests.

Examples

The following example shows how to enable all online diagnostic tests:

```
Switch(config)# diag online
 ONLINE-DIAG: Enabling all Online Diagnostics tests
```

The following example shows how to change the frequency of the access test to 20 seconds:

```
Switch(config)# diag online access freq 20
ONLINE-DIAG: Online Access Test Frequency set to 20 sec
```

Displaying the Online Diagnostics Configuration and Results (Catalyst 8540 MSR)

To display the online diagnostics configuration and results, use the following EXEC command:

Command	Purpose
show diag online [**details** | **status**] [**access** | **oir** | **snake**]	Displays information about the online diagnostics test configuration and the test results.

Examples

The following example shows how to display detailed access test configuration and results:

```
Switch# show diag online details access
======== Online Access Test Details ========

Current Test Status : Test is Enabled
Current Frequency of Access Test : 20 seconds

Slot Card-Type       Iteration    Success    Failure    Last Failure
---- ----------      ----------   -------    -------    ------------
 0/* Super Cam       42998        42998      0          ----
 0/0 8T1 IMA PAM     42998        42998      0          ----
 0/1 8E1 IMA PAM     42998        42998      0          ----
 2/* ARM PAM         42998        42998      0          ----
 3/* ETHERNET PAM    42998        42998      0          ----
 5/* Switch Card     42998        42998      0          ----
 5/0 Feature Card    42998        42998      0          ----
 7/* Switch Card     42998        42998      0          ----
 7/0 Feature Card    42998        42998      0          ----
 9/* OC48c PAM       42998        42998      0          ----
10/* OCM Board       42998        42998      0          ----
10/0 QUAD 622 Generi 42998        42998      0          ----
======== Online Access Test Details End ========
```

The following example shows how to display the status of the OIR test:

```
Switch# show diag online status oir
======== Online OIR Test Status ========
Current Test Status : Test is Enabled
-------- Bootup OIR status --------
Port    Card Type   Pkt Size  Result                    Test Time LOOP
_______ __________ _________ ____________________  _____________ ____
00/0/00 8T1 IMA PAM       300 OIR_SUCCESS                00:00:41  PIF
00/0/01 8T1 IMA PAM       300 OIR_SUCCESS                00:00:41  PIF
00/0/02 8T1 IMA PAM       300 OIR_SUCCESS                00:00:41  PIF
00/0/03 8T1 IMA PAM       300 OIR_SUCCESS                00:00:41  PIF
00/1/00 8E1 IMA PAM       300 OIR_SUCCESS                00:00:41  PIF
00/1/01 8E1 IMA PAM       300 OIR_SUCCESS                00:00:46  PIF
00/1/02 8E1 IMA PAM       300 OIR_SUCCESS                00:00:41  PIF
00/1/03 8E1 IMA PAM       300 OIR_SUCCESS                00:00:46  PIF

03/0/00 ETHERNET PA      1000 OIR_SUCCESS                00:01:54  PIF
03/0/01 ETHERNET PA      1000 OIR_SUCCESS                00:01:52  PIF
03/0/02 ETHERNET PA      1000 OIR_SUCCESS                00:01:50  PIF
03/0/03 ETHERNET PA      1000 OIR_SUCCESS                00:01:48  PIF
03/0/04 ETHERNET PA      1000 OIR_SUCCESS                00:01:55  PIF
03/0/05 ETHERNET PA      1000 OIR_SUCCESS                00:01:53  PIF
03/0/06 ETHERNET PA      1000 OIR_SUCCESS                00:01:51  PIF
03/0/07 ETHERNET PA      1000 OIR_SUCCESS                00:01:49  PIF
03/0/08 ETHERNET PA      1000 OIR_SUCCESS                00:02:02  PIF
03/0/09 ETHERNET PA      1000 OIR_SUCCESS                00:02:00  PIF
03/0/10 ETHERNET PA      1000 OIR_SUCCESS                00:01:58  PIF
03/0/11 ETHERNET PA      1000 OIR_SUCCESS                00:01:56  PIF
03/0/12 ETHERNET PA      1000 OIR_SUCCESS                00:02:03  PIF
03/0/13 ETHERNET PA      1000 OIR_SUCCESS                00:02:01  PIF
03/0/14 ETHERNET PA      1000 OIR_SUCCESS                00:01:59  PIF
03/0/15 ETHERNET PA      1000 OIR_SUCCESS                00:01:57  PIF

09/0/00 OC48c PAM         300 OIR_SUCCESS                00:00:46 Both

10/0/00 QUAD 622 Ge       300 OIR_SUCCESS                00:00:46 Both
10/0/01 QUAD 622 Ge       300 OIR_SUCCESS                00:00:46 Both
10/0/02 QUAD 622 Ge       300 OIR_SUCCESS                00:00:46 Both
10/0/03 QUAD 622 Ge       300 OIR_SUCCESS                00:00:46 Both
```

The following example shows how to display the details and status of the snake test:

```
8540MSR#show diag online snake
========  Online Snake Test Status and Details ========
--------  Test Status --------
Current Test Status    : Test is Enabled
Current Test Type      : Normal Snake
Last Test Status       : Pass
Last Test Run Time     : 1w1d
Last Test Success Time : 1w1d

--------  Test Details --------
Snake Test Pkt Size    : 30 bytes
Default Test Period    : 60 seconds
Current Test Period    : 60 seconds

---------------------------------
      Statistics from Bootup
---------------------------------
Total Test Runs                         : 17311
Number Normal Snake Test Runs           : 17311
Number of Successive Normal Snake Test : 14083
Number of Incrimental Snake Test Runs  : 0

----------------------------------------
      Ports Test Stat in Last Iteration
----------------------------------------

Port      Card Type          Result         Test Time
_______   _________________  ___________    _________
09/0/00   OC48c PAM          PORT_OK        1w1d
10/0/00   QUAD 622 Generic   PORT_OK        1w1d
11/0/00   OC48c PAM          PORT_OK        1w1d
12/0/00   QUAD 622 Generic   PORT_OK        1w1d

----------------------------------------
      Ports Failed Stat from Bootup
----------------------------------------
     No Port failed from Bootup
```

Configuring Redundancy and Enhanced High System Availability (Catalyst 8540 MSR)

The ATM switch router supports redundant CPU operation with dual route processors. In addition, Enhanced High System Availability (EHSA) is provided in the switching fabric when three switch processors are installed in the chassis. These features and their configuration are described in the following sections:

- Route Processor Redundant Operation (Catalyst 8540 MSR) on page 3-24
- Synchronizing the Configurations (Catalyst 8540 MSR) on page 3-26
- Displaying the Route Processor Redundancy Configuration (Catalyst 8540 MSR) on page 3-28
- Preparing a Route Processor for Removal (Catalyst 8540 MSR) on page 3-28
- Configuring Switch Fabric Enhanced High System Availability Operation (Catalyst 8540 MSR) on page 3-30

Route Processor Redundant Operation (Catalyst 8540 MSR)

The ATM switch router supports fault tolerance by allowing a secondary route processor to take over if the primary fails. This secondary, or redundant, route processor runs in standby mode. In standby mode, the secondary route processor is partially booted with the Cisco IOS software; however, no configuration is loaded.

At the time of a switchover, the secondary route processor takes over as primary and loads the configuration as follows:

- If the running configuration between the primary and secondary route processors match, the new primary uses the running configuration file
- If the running configuration between the primary and secondary route processors do not match, the new primary uses the last saved configuration file in its nonvolatile random-access memory (NVRAM) (not the NVRAM of the former primary)

The former primary then becomes the secondary route processor.

Note If the secondary route processor is unavailable, a major alarm is reported. Use the **show facility-alarm status** command to display the redundancy alarm status.

When the ATM switch router is powered on, the two route processors go through an arbitration to determine which is the primary route processor and which is the secondary. The following rules apply during arbitration:

- A newly inserted route processor card always comes up as the secondary, except in cases where the newly inserted card is the only one present.
- If the configuration is corrupted, one of the route processors comes up as primary, allowing you to correct the situation manually.
- The primary route processor when the ATM switch is powered off continues as the primary when the ATM switch is powered on.
- If none of the above conditions is true, the route processor in slot 4 becomes the primary.

During normal operation, the primary route processor is booted completely. The secondary CPU is partially up, meaning it stops short of parsing the configuration. From this point, the primary and secondary processors communicate periodically to synchronize any system configuration changes.

The following situations can cause a switchover of the primary route processor:

- The primary route processor is removed or swapped. When a route processor functioning as primary is removed, the secondary takes over. The ATM switch router is now nonredundant until a second route processor is inserted.
- The primary route processor is rebooted. When a route processor functioning as primary is rebooted, the secondary takes over.
- The primary route processor fails. The secondary route processor takes over as primary, using the last saved configuration (or the current running configuration if they have been synchronized with the **sync config** command).
- A switchover is manually forced with the **redundancy force-failover main-cpu** command.

When a switchover occurs, permanent virtual channels (PVCs) are preserved; switched virtual channels (SVCs) and Integrated Local Management Interface (ILMI) address states are lost, and then restored after they are dynamically redetermined.

Configuring Route Processor Redundancy (Catalyst 8540 MSR)

For redundant operation, the following requirements must be met:

- Two route processors and three switch cards are required.
- The route processors must have identical hardware configurations. This includes variables such as DRAM size, presence or absence of network clock modules, and so on.
- Both route processors must have the same functional image. For more information, see the "Maintaining Functional Images (Catalyst 8540 MSR)" section on page 22-5.
- Both route processors must be running the same system image.
- Both route processors must be set to autoboot (a default setting).

If these requirements are met, the ATM switch router runs in redundant mode by default. The tasks described in the following sections are optional and used only to change nondefault values.

Forcing a Route Processor Switchover (Catalyst 8540 MSR)

You can manually force the secondary route processor to take over as primary. To do so, use the following privileged EXEC command:

Command	Purpose
redundancy force-failover main-cpu	Forces a route processor switchover.

As long as you have not changed the default configuration register setting, which is set to autoboot by default, the secondary route processor (formerly the primary) completes the boot process from standby mode.

If you have changed the default configuration register value, you can change it back to autoboot, and ensure that the correct system image is used at startup, by performing the following steps, beginning in global configuration mode:

	Command	Purpose
Step 1	Switch(config)# **config-register 0x2102**	Sets the config register for autoboot.
Step 2	Switch(config)# **boot system** {[*device***:**]*filename* [*hostname* | *ip-address*] | **flash** [*device***:**][*filename*] | **mop** *filename* [*type*] [*card/subcard/port*] | **rcp** *filename* [*ip-address*] | **rom** | **tftp** *filename* [*hostname* | *ip-address*]}	Specifies the system image file to load at startup.
Step 3	Switch(config)# **end** Switch#	Returns to privileged EXEC mode.
Step 4	Switch# **copy running-config startup-config**	Saves the configuration to NVRAM.

Note If the secondary route processor remains in ROM monitor mode, you can manually boot the processor from either the bootflash or Flash PC card.

Caution If no system image is specified in the startup configuration, the ROM monitor automatically boots the first system image on the Flash PC card in slot0. If there is no system image on the Flash PC card, or the Flash PC card is not available, the ROM monitor boots the first system image in bootflash. If there is no system image in bootflash, the switch remains in ROM monitor mode.

Displaying the Configuration Register Value

To display the configuration register value, use the following privileged EXEC command:

Command	Purpose
show version	Displays the configuration register value.

The following example shows the configuration register value:

```
Switch# show version
Cisco Internetwork Operating System Software
IOS (tm) PNNI Software (cat8540m-WP-M), Version XX.X(X)WX(X),  RELEASE SOFTWARE
Copyright (c) 1986-19XX by cisco Systems, Inc.
Compiled Mon XX-XXX-XX 10:15 by integ
Image text-base: 0x60010930, data-base: 0x606CE000

ROM: System Bootstrap, Version XX.XXX.X(X)WX(X) [BLD-JAGUAR120-4.0.9 ], E

Switch uptime is 3 weeks, 5 days, 23 hours, 30 minutes
System restarted by bus error at PC 0x6007EF24, address 0xFC
System image file is "bootflash:cat8540m-wp-mz.XXX-X.X.WX.X.XX"

cisco C8540MSR (R5000) processor with 65536K/256K bytes of memory.
R5000 processor, Implementation 35, Revision X.X (512KB Level 2 Cache)
Last reset from power-on
1 Ethernet/IEEE 802.3 interface(s)
9 ATM network interface(s)
507K bytes of non-volatile configuration memory.

8192K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).
Secondary is up
Secondary has 0K bytes of memory.

→ Configuration register is 0x100 (will be 0x2102 at next reload)
```

Synchronizing the Configurations (Catalyst 8540 MSR)

During normal operation, the startup and running configurations are synchronized by default between the two route processors. In the event of a switchover, the new primary route processor uses the current configuration. Configurations synchronize either immediately from the command line or during route processor switchover.

Immediately Synchronizing Route Processor Configurations (Catalyst 8540 MSR)

To immediately synchronize the configurations used by the two route processors, use the following privileged EXEC command on the primary route processor:

Command	Purpose
redundancy manual-sync {**startup-config** | **running-config** | **both**}	Immediately synchronizes the configuration.

Example

In the following example, both the startup and running configurations are synchronized immediately:

```
Switch# redundancy manual-sync both
```

Synchronizing the Configurations During Switchover (Catalyst 8540 MSR)

To manually synchronize the configurations used by the two route processors during a switchover, perform the following steps on the primary route processor, beginning in global configuration mode:

	Command	Purpose
Step 1	Switch(config)# **redundancy** Switch(config-r)#	Enters redundancy configuration mode.
Step 2	Switch(config-r)# **main-cpu** Switch(config-r-mc)#	Enters main-cpu configuration submode.
Step 3	Switch(config-r-mc)# **sync config** {**startup** | **running** | **both**}[1]	Synchronizes either or both configurations during switchover or writing the files to NVRAM.
Step 4	Switch(config-r-mc)# **end** Switch#	Returns to privileged EXEC mode.
Step 5	Switch# **copy running-config startup-config**	Forces a manual synchronization of the configuration files in NVRAM. **Note** This step is unnecessary to synchronize the running configuration file in DRAM.

1. Alternatively, you can force an immediate synchronization by entering the **redundancy manual-sync** command in privileged EXEC mode.

Example

In the following example, both the startup and running configurations are synchronized:

```
Switch(config)# redundancy
Switch(config-r)# main-cpu
Switch(config-r-mc)# sync config both
Switch(config-r-mc)# end
Switch# copy running-config startup-config
```

Displaying the Route Processor Redundancy Configuration (Catalyst 8540 MSR)

To display the route processor redundancy configuration, use the following privileged EXEC command:

Command	Purpose
show redundancy	Displays the redundancy configuration.

In the following example shows the route processor redundancy configuration:

```
Switch# show redundancy

This CPU is the PRIMARY
Primary
-------
Slot:                         4
Uptime:                       1 day, 18 hours, 40 minutes
Image:                        PNNI Software (cat8540m-WP-M), Version 12.0(4a)W5(10.44)

Time Since :
  Last Running Config. Sync:  3 hours, 13 minutes
  Last Startup Config. Sync:  Never
Last Restart Reason:          Normal Boot

Secondary
---------
State:                        UP
Slot:                         8
Uptime:                       3 hours, 16 minutes
Image:                        PNNI Software (cat8540m-WP-M), Version 12.0(4a)W5(10.46)
```

Preparing a Route Processor for Removal (Catalyst 8540 MSR)

Before removing a route processor that is running the IOS in secondary mode, it is necessary to change it to ROM monitor mode. You could use the reload command to force the route processor to ROM monitor mode but the automatic reboot would occur and you would interrupt switch traffic.

Caution If you fail to prepare the secondary route processor for removal, the traffic through the switch could be interrupted.

To change the secondary route processor to ROM monitor mode and eliminate the automatic reboot prior to removal, perform the following task beginning in privileged EXEC mode:

	Command	Purpose
Step 1	Switch# **copy running-config startup-config**	Forces a manual synchronization of the configuration files in NVRAM.
Step 2	Switch)# **redundancy prepare-for-cpu-removal**	Changes the current route processor to ROM monitor mode prior to removal.

Example

The following example shows how to change the current route processor to ROM monitor mode prior to removal:

```
Switch# copy running-config startup-config
Destination filename [startup-config]?
Building configuration...

EHSA:Syncing monvars to secondary, : BOOT=
EHSA:Syncing monvars to secondary, : CONFIG_FILE=
EHSA:Syncing monvars to secondary, : BOOTLDR=[OK]
Switch#
Switch# redundancy prepare-for-cpu-removal
This command will cause this CPU to go to the
rom monitor through a forced crash.
After this cpu goes to the rom monitor prompt, it is
safe to remove it from the chassis
Please DO NOT REBOOT this cpu before removing it
Do you want to remove it?[confirm]y

Queued messages:
1d22h: %SYS-3-LOGGER_FLUSHING: System pausing to ensure console debugging outpu.

*** System received a reserved exception ***
signal= 0x9, code= 0x0, context= 0x61818df8
PC = 0x600b62e0, Cause = 0x20, Status Reg = 0x34008702
AT: be840000, V0: 9, V1: 0
A0: 2b, A1: 9, A2: 0
A3: 61818df8, T0: 30, T1: 34008701
T2: 34008700, T3: ffff00ff, T4: 61059f88
T5: 7f, T6: 0, T7: 0
S0: 34008701, S1: 1, S2: 9
S3: 0, S4: 61818df8, S5: 611f8540
S6: 611e3740, S7: 61363710, T8: 47d1
T9: 618189d8, K0: 61612634, K1: 600b7e30
GP: 61177fa0, SP: 61818da8, S8: 611e3740
RA: 600a81b8
STATUS: 34008702
mdlo_hi: 0, mdlo: 0
mdhi_hi: 0, mdhi: 0
bvaddr_hi: ffffffff, bvaddr_lo: ffffffff
cause: 20, epc_hi: 0, epc:600b62e0
err_epc_hi: 0, err_epc: 200004
TIGER Masked Interrupt Register = 0x0000007f
TIGER Interrupt Value Register = 0x00000020

monitor: command "boot" @Ø--<ÒagZç
rommon 3 >
```

Configuring Switch Fabric Enhanced High System Availability Operation (Catalyst 8540 MSR)

Slots 5, 6, and 7 in the ATM switch router chassis can accommodate either two or three switch processor cards, with a switching capacity of 10 Gbps each. The possible configurations are as follows:

- Two switch processors—20 Gbps non-EHSA switching fabric (no spare)
- Three switch processors—20 Gbps EHSA switching fabric (one spare)

When three switch processors are installed, two are active at any time, while the third runs in standby mode. By default, switch processors 5 and 7 are active and switch processor 6 is the standby. To force the standby switch processor to become active, use the **redundancy preferred-switch-card-slots** command.

Caution Do not hot swap an active switch processor module before putting it in standby mode. Removing an active switch processor breaks active connections and stops the flow of traffic through the switch. Put an active switch in standby mode using the **redundancy preferred-switch-card-slots** command before removing it from the chassis.

When a switchover to the standby switch processor occurs, the system resets and all connections are lost. When the system comes up again, all PVCs and SVCs are reestablished automatically.

Configuring Preferred Switching Processors (Catalyst 8540 MSR)

To configure which two of the three switch processors are active and which runs in standby mode, use the following privileged EXEC command on the primary route processor:

Command	Purpose
r**edundancy preferred-switch-card-slots** {**5** | **6** | **7**} {**5** | **6** | **7**}	Configures the active and standby switch processors.

Example

In the following example, the preferred switch processors are configured to be in slots 5 and 7 with the slot 6 switch processor running in standby mode:

```
Switch# redundancy preferred-switch-card-slots 5 7
The preferred switch cards selected are already active
```

Note The preferred switch card slot configuration reverts to the default configuration when the switch is power cycled.

Displaying the Preferred Switch Processor Redundancy Configuration (Catalyst 8540 MSR)

To display the preferred switch processor redundancy configuration, use the following privileged EXEC command:

Command	Purpose
show preferred-switch-card-slots	Displays the redundancy configuration.

The following example shows the preferred switch processor redundancy configuration:

```
Switch# show preferred-switch-card-slots
The currently preferred switch card slots are slot: 5 and slot: 7
The currently active switch card slots are slot: 5 and slot: 7
```

Displaying the Switch Processor EHSA Configuration (Catalyst 8540 MSR)

To display the switch processor EHSA configuration, use the following privileged EXEC command:

Command	Purpose
show capability {**primary** | **secondary**}	Displays the switch redundancy configuration.

The following shows the primary switch processor EHSA configuration:

```
Switch# show capability primary
 Dram Size is :64 MB
 Pmem Size is :4 MB
 Nvram Size is :512 KB
 BootFlash Size is :8 MB
 ACPM hw version 5.2
 ACPM functional version 4.0
 Netclk Module present flag :16
 NCLK hw version 3.1
 NCLK func version 8.0

 Printing the parameters for Switch card: 0
 SWC0 HW version 7.2
 SWC0 Functional version 1.2
 SWC0 Table memory size: 0 MB
 SWC0 Feat Card Present Flag: 0
 SWC0 Feat Card HW version 0.0
 SWC0 Feat Card Functional version 0.0

 Printing the parameters for Switch card: 1
 SWC1 HW version 0.0
 SWC1 Functional version 0.0
 SWC1 Table memory size: 0 MB
 SWC1 Feat Card Present Flag: 0
 SWC1 Feat Card HW version 0.0
 SWC1 Feat Card Functional version 0.0

 Printing the parameters for Switch card: 2
 SWC2 HW version 7.2
 SWC2 Functional version 1.2
 SWC2 Table memory size: 0 MB
```

```
SWC2 Feat Card Present Flag: 0
SWC2 Feat Card HW version 0.0
SWC2 Feat Card Functional version 0.0

Number of Controller supported in IOS: 7

Driver 0 type: 2560 super cam Functional Version 1.3

Driver 1 type: 2562 OC12 SPAM Functional Version 5.1

Driver 2 type: 2564 OC mother board Functional Version 5.1

Driver 3 type: 258 Switch Card Functional Version 1.0

Driver 4 type: 259 Switch Feature Card Functional Version 4.0
```

Configuring SNMP and RMON

SNMP is an application-layer protocol that allows an SNMP manager, such a network management system (NMS), and an SNMP agent on the managed device to communicate. You can configure SNMPv1, SNMPv2, or both, on the ATM switch router. Remote Monitoring (RMON) allows you to see the activity on network nodes. By using RMON in conjunction with the SNMP agent on the ATM switch router, you can monitor traffic through network devices, segment traffic that is not destined for the ATM switch router, and create alarms and events for proactive traffic management.

For detailed instructions on SNMP and general RMON configuration, refer to the *Configuration Fundamentals Configuration Guide*. For instructions on configuring ATM RMON, refer to Chapter 14, "Configuring ATM Accounting and ATM RMON."

Storing the Configuration

When autoconfiguration and any manual configurations are complete, you should copy the configuration into nonvolatile random-access memory (NVRAM). If you should power off your ATM switch router prior to saving the configuration in NVRAM, all manual configuration changes are lost.

To save the running configuration to NVRAM, use the following command in privileged EXEC mode:

Command	Purpose
copy system:running-config nvram:startup-config	Copies the running configuration in system memory to the startup configuration stored in NVRAM.

Testing the Configuration

The following sections describe tasks you can perform to confirm the hardware, software, and interface configuration:

- Confirming the Hardware Configuration (Catalyst 8540 MSR) on page 3-33
- Confirming the Hardware Configuration (Catalyst 8510 MSR and LightStream 1010) on page 3-34

- Confirming the Software Version on page 3-34
- Confirming Power-on Diagnostics (Catalyst 8540 MSR) on page 3-35
- Confirming the Ethernet Configuration on page 3-36
- Confirming the ATM Address on page 3-37
- Testing the Ethernet Connection on page 3-37
- Confirming the ATM Connections on page 3-38
- Confirming the ATM Interface Configuration on page 3-38
- Confirming the Interface Status on page 3-39
- Confirming Virtual Channel Connections on page 3-39
- Confirming the Running Configuration on page 3-41
- Confirming the Saved Configuration on page 3-42

Note The following examples differ depending on whether the switch processor feature card is present. (Catalyst 8540 MSR)

Note The following examples differ depending on the feature card installed on the processor. (Catalyst 8510 MSR and LightStream 1010)

Confirming the Hardware Configuration (Catalyst 8540 MSR)

Use the **show hardware** and **show capability** commands to confirm the correct hardware installation:

```
Switch# show hardware

C8540 named Switch, Date: 08:36:44 UTC Fri May 21 1999

Slot Ctrlr-Type    Part No.  Rev  Ser No  Mfg Date   RMA No. Hw Vrs  Tst EEP
---- ------------  ---------- -- -------- --------- -------- ------- --- ---
 0/* Super Cam     73-2739-02 02 07287xxx Mar 31 98            3.0
 0/0 155MM PAM     73-1496-03 06 02180424 Jan 16 96 00-00-00   3.0     0   2
 0/1 155MM PAM     73-1496-03 00 02180455 Jan 17 96 00-00-00   3.0     0   2
 4/* Route Proc    73-2644-05 A0 03140NXK Apr 04 99 0          5.7
 4/0 Netclk Modul  73-2868-03 A0 03140NSU Apr 04 99 0          3.1
 5/* Switch Card   73-3315-08 B0 03170SMB May 03 99 0          8.3
 5/0 Feature Card  73-3408-04 B0 03160S4H May 03 99 0          4.1
 7/* Switch Card   73-3315-08 B0 03160SDT May 03 99 0          8.3
 7/0 Feature Card  73-3408-04 B0 03160RQV May 03 99 0          4.1
 8/* Route Proc    73-2644-05 A0 03140NXH Apr 04 99 0          5.7
 8/0 Netclk Modul  73-2868-03 A0 03140NVT Apr 04 99 0          3.1

DS1201 Backplane EEPROM:
Model  Ver.  Serial  MAC-Address  MAC-Size  RMA  RMA-Number   MFG-Date
------ ---- -------- ------------ --------  ---  ----------  -----------
C8540  2   6315484 00902156D800   1024      0        0      Mar 23 1999
cubi version : F

Power Supply:
Slot Part No.         Rev  Serial No.  RMA No.     Hw Vrs  Power Consumption
---- ---------------- ---- ----------- ----------- ------- -----------------
0          34-0829-02 A000 APQ0225000R 00-00-00-00   1.0             2746 cA
```

See the "Displaying the Switch Processor EHSA Configuration (Catalyst 8540 MSR)" section on page 3-31 for an example of the **show capability** command.

Confirming the Hardware Configuration (Catalyst 8510 MSR and LightStream 1010)

Use the **show hardware** command to confirm the correct hardware installation:

```
Switch# show hardware

LS1010 named ls1010_c5500, Date: XX:XX:XX UTC Thu Jan 8 1998
Feature Card's FPGA Download Version: 10

Slot Ctrlr-Type    Part No.  Rev  Ser No  Mfg Date   RMA No. Hw Vrs  Tst EEP
---- ------------  ---------- -- -------- --------- -------- ------- --- ---
0/0  T1 PAM        12-3456-78 00 00000022 Aug 01 95 00-00-00   0.4     0   2
0/1  T1 PAM        12-3456-78 00 00000025 Aug 01 95 00-00-00   0.4     0   2
1/0  155MM PAM     73-1496-03 06 02180446 Jan 17 96 00-00-00   3.0     0   2
1/1  QUAD DS3 PAM  73-2197-02 00 03656116 Dec 18 96 00-00-00   1.0     0   2
3/0  155MM PAM     73-1496-03 00 02180455 Jan 17 96 00-00-00   3.0     0   2
2/0  ATM Swi/Proc  73-1402-06 D0 07202996 Dec 20 97 00-00-00   4.1     0   2
2/1  FeatureCard1  73-1405-05 B0 07202788 Dec 20 97 00-00-00   3.2     0   2

DS1201 Backplane EEPROM:
Model  Ver.  Serial  MAC-Address  MAC-Size  RMA  RMA-Number   MFG-Date
------ ---- -------- ------------ --------  ---  ----------  -----------
LS1010  2   69000050 00400B0A2E80   256      0        0      Aug 01 1995
```

Confirming the Software Version

Use the **show version** command to confirm the correct version and type of software and the configuration register are installed:

```
Switch# show version
Cisco Internetwork Operating System Software
IOS (tm) PNNI Software (cat8540m-WP-M), Version XX.X(X), RELEASE SOFTWARE
Copyright (c) 1986-1998 by cisco Systems, Inc.
Compiled XXX XX-XXX-XX XX:XX by
Image text-base: 0x600108B4, data-base: 0x6057A000

ROM: System Bootstrap, Version XX.X(X) RELEASE SOFTWARE

Switch uptime is 1 hour, 1 minute
System restarted by reload
System image file is "tftp://cat8540m-wp-mz_nimmu"

cisco C8540MSR (R5000) processor with 65536K/256K bytes of memory.
R5000 processor, Implementation 35, Revision 2.1 (512KB Level 2 Cache)
Last reset from power-on
1 Ethernet/IEEE 802.3 interface(s)
8 ATM network interface(s)
507K 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).
Configuration register is 0x0
```

Confirming Power-on Diagnostics (Catalyst 8540 MSR)

Use the **show diag power-on** command to confirm the power-on diagnostics:

```
Switch# show diag power-on
Cat8540 Power-on Diagnostics Status (.=Pass,F=Fail,U=Unknown,N=Not Applicable)
--------------------------------------------------------------------------------
   Last Power-on Date: 1999/07/28   Time: 11:06:12

   BOOTFLASH:  .   PCMCIA-Slot0: .   PCMCIA-Slot1: .
   CPU-IDPROM: .   NVRAM-Config: .
   ETHSRAM:    .   DRAM:         .   SARSRAM:       .

   PS0:        .   PS2:          N   PS (12V):     .
   FAN:        .   Temperature:  .   Bkp-IDPROM:   .


   Ethernet-port Access:   .         Ethernet-port CAM-Access: .
   Ethernet-port Loopback: .         Ethernet-port Loadgen:    .

Power-on Diagnostics Passed.
```

Confirming Power-on Diagnostics (Catalyst 8510 MSR and LightStream 1010)

Use the **show diag power-on** command to confirm the power-on diagnostics:

```
NewLs1010# show diag power-on
LS1010 Power-on Diagnostics Status (.=Pass,F=Fail,U=Unknown,N=Not Applicable)
--------------------------------------------------------------------------------
   Last Power-on Diags  Date: 99/07/09   Time: 07:52:17   By: V 4.51

   BOOTFLASH:  .   PCMCIA-Slot0: .   PCMCIA-Slot1: N
   CPU-IDPROM: .   FCard-IDPROM: .   NVRAM-Config: .
   SRAM:       .   DRAM:         .

   PS1:        .   PS2:          N   PS (12V):     .
   FAN:        .   Temperature:  .   Bkp-IDPROM:   .

   MMC-Switch Access: .              Accordian Access: .
   LUT: .   ITT: .   OPT: .   OTT: .   STK: .   LNK: .   ATTR: .   Queue: .
   Cell-Memory:  .

   FC-PFQ
    Access: .
     RST: .    REG: .    IVC: .    IFILL: .    OVC: .    OFILL: .

    TEST:
     CELL: .   SNAKE: .   RATE: .   MCAST: .   SCHED: .
     TGRP: .   UPC  : .   ABR : .   RSTQ : .
```

```
Access/Interrupt/Loopback/CPU-MCast/Port-MCast/FC-MCast/FC-TMCC Test Status:
Ports                     0         1         2         3
--------------------------------------------------------------------------------
PAM 0/0 (IMA8T1)        .....NN   .....NN   .....NN   .....NN
    Port 4  to 7 :      .....NN   .....NN   .....NN   .....NN
PAM 0/1 (IMA8E1)        .....NN   .....NN   .....NN   .....NN
    Port 4  to 7 :      .....NN   .....NN   .....NN   .....NN
PAM 1/0 (FR4CE1)       .....NN   .....NN   .....NN   .....NN
PAM 1/1 (155UTP)        .....NN   .....NN   .....NN   .....NN
PAM 3/0 (T1)            .....NN   .....NN   .....NN   .....NN
PAM 3/1 (E1CEUTP)       .....NN   .....NN   .....NN   .....NN
PAM 4/0 (DS3)           .....NN   .....NN      N         N
PAM 4/1 (25M)           .....NN   .....NN   .....NN   .....NN
    Port 4  to 7 :      .....NN   .....NN   .....NN   .....NN
    Port 8  to 11:      .....NN   .....NN   .....NN   .....NN


FRPAM#          ING-SSRAM ING-SDRAM EGR-SSRAM EGR-SDRAM LOOPBACK
-----------------------------------------------------------------------
PAM 1/0 (FR4CE1)  .         .         .         .         .
   Ethernet-port Access:    .        Ethernet-port CAM-Access: .
   Ethernet-port Loopback:  .        Ethernet-port Loadgen:    .
   GEPAM Microcode:         .        GEPAM Access:            .
   GEPAM CAM Access:        .

Power-on Diagnostics Passed.
```

Confirming the Ethernet Configuration

Use the **show interfaces** command to confirm that the Ethernet interface on the route processor is configured correctly:

```
Switch# show interfaces ethernet 0
Ethernet0 is up, line protocol is up
  Hardware is SonicT, address is 0000.0000.0000 (bia 0000.0000.0000)
  Internet address is 172.20.52.20/26
  MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:00, output 00:00:00, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 1000 bits/sec, 2 packets/sec
  5 minute output rate 0 bits/sec, 1 packets/sec
     69435 packets input, 4256035 bytes, 0 no buffer
     Received 43798 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 input packets with dribble condition detected
     203273 packets output, 24079764 bytes, 0 underruns
     0 output errors, 0 collisions, 2 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
```

Confirming the ATM Address

Use the **show atm addresses** command to confirm correct configuration of the ATM address for the ATM switch router:

```
Switch# show atm addresses

Switch Address(es):
  47.009181000000000100000001.000100000001.00 active

Soft VC Address(es):
  47.0091.8100.0000.0001.0000.0001.4000.0c80.9000.00 ATM1/1/0
  47.0091.8100.0000.0001.0000.0001.4000.0c80.9010.00 ATM1/1/1
  47.0091.8100.0000.0001.0000.0001.4000.0c80.9020.00 ATM1/1/2
  47.0091.8100.0000.0001.0000.0001.4000.0c80.9030.00 ATM1/1/3
  47.0091.8100.0000.0001.0000.0001.4000.0c81.8000.00 ATM3/0/0
  47.0091.8100.0000.0001.0000.0001.4000.0c81.8000.63 ATM3/0/0.99
  47.0091.8100.0000.0001.0000.0001.4000.0c81.8010.00 ATM3/0/1
  47.0091.8100.0000.0001.0000.0001.4000.0c81.8020.00 ATM3/0/2
  47.0091.8100.0000.0001.0000.0001.4000.0c81.8030.00 ATM3/0/3
  47.0091.8100.0000.0001.0000.0001.4000.0c81.9000.00 ATM3/1/0
  47.0091.8100.0000.0001.0000.0001.4000.0c81.9010.00 ATM3/1/1
  47.0091.8100.0000.0001.0000.0001.4000.0c81.9020.00 ATM3/1/2
  47.0091.8100.0000.0001.0000.0001.4000.0c81.9030.00 ATM3/1/3

 <information deleted>

ILMI Switch Prefix(es):
  47.0091.8100.0000.0001.0000.0001

ILMI Configured Interface Prefix(es):

LECS Address(es):
```

Testing the Ethernet Connection

After you have configured the IP address(es) for the Ethernet interface, test for connectivity between the switch and a host. The host can reside anywhere in your network. To test for Ethernet connectivity, use the following user EXEC command:

Command	Purpose
ping ip *ip-address*	Tests the configuration using the **ping** command. The **ping** command sends an echo request to the host specified in the command .

For example, to test Ethernet connectivity from the switch to a workstation with an IP address of 172.20.40.201, enter the command **ping ip 172.20.40.201**. If the switch receives a response, the following message displays:

```
Switch# ping ip 172.20.40.201

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.20.40.201, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/202/1000 ms
```

Confirming the ATM Connections

Use the **ping atm interface** command to confirm that the ATM connections are configured correctly:

```
Switch# ping atm interface atm 3/0/0 0 5 seg-loopback

Type escape sequence to abort.
Sending Seg-Loopback 5, 53-byte OAM Echoes to a neighbour,timeout is 5 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/4 ms
Switch#
```

Confirming the ATM Interface Configuration

Use the **show atm interface** command to confirm the ATM interfaces are configured correctly:

```
Switch# show atm interface atm 1/0/0

Interface:      ATM1/0/0        Port-type:      oc3suni
IF Status:      UP              Admin Status:   up
Auto-config:    disabled        AutoCfgState:   not applicable
IF-Side:        Network         IF-type:        NNI
Uni-type:       not applicable  Uni-version:    not applicable
Max-VPI-bits:   8               Max-VCI-bits:   14
Max-VP:         255             Max-VC:         16383
ConfMaxSvpcVpi: 255             CurrMaxSvpcVpi: 255
ConfMaxSvccVpi: 255             CurrMaxSvccVpi: 255
ConfMinSvccVci: 35              CurrMinSvccVci: 35
Svc Upc Intent: pass            Signalling:     Enabled
ATM Address for Soft VC: 47.0091.8100.0000.00e0.4fac.b401.4000.0c80.8000.00
Configured virtual links:
  PVCLs SoftVCLs   SVCLs   TVCLs   PVPLs SoftVPLs   SVPLs Total-Cfgd Inst-Conns
      4        0       0       0       1        0       0          5          3
Logical ports(VP-tunnels):     1
Input cells:    263109          Output cells:   268993
5 minute input rate:             0 bits/sec,       0 cells/sec
5 minute output rate:         1000 bits/sec,       2 cells/sec
Input AAL5 pkts: 171788, Output AAL5 pkts: 174718, AAL5 crc errors: 0
```

Confirming the Interface Status

Use the **show atm status** command to confirm the status of ATM interfaces:

```
Switch# show atm status
NUMBER OF INSTALLED CONNECTIONS: (P2P=Point to Point, P2MP=Point to MultiPoint)

Type       PVCs  SoftPVCs      SVCs      PVPs  SoftPVPs      SVPs      Total
P2P          30         0         0         1         1         0         32
P2MP          0         0         0         1         0         0          1
                                     TOTAL INSTALLED CONNECTIONS =         33

PER-INTERFACE STATUS SUMMARY AT 16:07:59 UTC Wed Nov 5 1997:
   Interface      IF         Admin  Auto-Cfg    ILMI Addr     SSCOP    Hello
     Name       Status      Status    Status    Reg State     State    State
------------- -------- ------------ -------- ------------ --------- --------
ATM1/1/0          DOWN         down  waiting          n/a      Idle      n/a
ATM1/1/1          DOWN         down  waiting          n/a      Idle      n/a
ATM1/1/2          DOWN         down  waiting          n/a      Idle      n/a
ATM1/1/3          DOWN         down  waiting          n/a      Idle      n/a
ATM0                UP           up      n/a  UpAndNormal      Idle      n/a
ATM3/0/0            UP           up      n/a  UpAndNormal    Active  LoopErr
ATM3/0/0.99         UP           up  waiting  WaitDevType      Idle      n/a
ATM3/0/1            UP           up     done  UpAndNormal    Active  LoopErr
ATM3/0/2            UP           up      n/a  UpAndNormal    Active  LoopErr
ATM3/0/3            UP           up     done  UpAndNormal    Active  LoopErr
ATM3/1/0            UP           up     done  UpAndNormal    Active  LoopErr
ATM3/1/1            UP           up     done  UpAndNormal    Active  LoopErr
ATM3/1/2            UP           up     done  UpAndNormal    Active  LoopErr
ATM3/1/3            UP           up     done  UpAndNormal    Active  LoopErr
<information deleted>
```

Confirming Virtual Channel Connections

Use the **show atm vc** command to confirm the status of ATM virtual channels:

```
Switch# show atm vc
Interface    VPI   VCI   Type    X-Interface  X-VPI X-VCI  Encap Status
ATM1/1/0     0     5      PVC     ATM0         0     52    QSAAL  DOWN
ATM1/1/0     0     16     PVC     ATM0         0     32    ILMI   DOWN
ATM1/1/1     0     5      PVC     ATM0         0     53    QSAAL  DOWN
ATM1/1/1     0     16     PVC     ATM0         0     33    ILMI   DOWN
ATM1/1/2     0     5      PVC     ATM0         0     54    QSAAL  DOWN
ATM1/1/2     0     16     PVC     ATM0         0     34    ILMI   DOWN
ATM1/1/3     0     5      PVC     ATM0         0     55    QSAAL  DOWN
ATM1/1/3     0     16     PVC     ATM0         0     35    ILMI   DOWN
ATM0         0     32     PVC     ATM1/1/0     0     16    ILMI   DOWN
ATM0         0     33     PVC     ATM1/1/1     0     16    ILMI   DOWN
ATM0         0     34     PVC     ATM1/1/2     0     16    ILMI   DOWN
ATM0         0     35     PVC     ATM1/1/3     0     16    ILMI   DOWN
ATM0         0     36     PVC     ATM3/0/0     0     16    ILMI   UP
ATM0         0     37     PVC     ATM3/0/1     0     16    ILMI   UP
ATM0         0     38     PVC     ATM3/0/2     0     16    ILMI   UP
ATM0         0     39     PVC     ATM3/0/3     0     16    ILMI   UP
ATM0         0     40     PVC     ATM3/1/0     0     16    ILMI   UP
ATM0         0     41     PVC     ATM3/1/1     0     16    ILMI   UP
ATM0         0     42     PVC     ATM3/1/2     0     16    ILMI   UP
ATM0         0     43     PVC     ATM3/1/3     0     16    ILMI   UP
<information deleted>
```

Use the **show atm vc interface** *card*/*subcard*/*port* command to confirm the status of ATM virtual channels on a specific interface:

```
Switch# show atm vc interface atm 3/0/0
Interface    VPI   VCI   Type    X-Interface  X-VPI X-VCI  Encap Status
ATM3/0/0     0     5      PVC     ATM0         0     56    QSAAL  UP
ATM3/0/0     0     16     PVC     ATM0         0     36    ILMI   UP
ATM3/0/0     0     18     PVC     ATM0         0     85    PNNI   UP
ATM3/0/0     50    100    PVC     ATM3/0/1     60    200         DOWN
                                   ATM3/0/2     70    210         UP
                                   ATM3/0/3     80    220         UP
ATM3/0/0     100   200    SoftVC  NOT CONNECTED
```

Use the **show atm vc interface atm** *card*/*subcard*/*port vpi vci* command to confirm the status of a specific ATM interface and virtual channel.

```
Switch# show atm vc interface atm 0/0/0 0 16

Interface: ATM0/0/0, Type: oc3suni
VPI = 0  VCI = 16
Status: DOWN
Time-since-last-status-change: 1w5d
Connection-type: PVC
Cast-type: point-to-point
Packet-discard-option: enabled
Usage-Parameter-Control (UPC): pass
Wrr weight: 15
Number of OAM-configured connections: 0
OAM-configuration: disabled
OAM-states:  Not-applicable
Cross-connect-interface: ATM0, Type: Unknown
Cross-connect-VPI = 0
Cross-connect-VCI = 35
Cross-connect-UPC: pass
Cross-connect OAM-configuration: disabled
Cross-connect OAM-state:  Not-applicable
Encapsulation: AAL5ILMI
Threshold Group: 6, Cells queued: 0
Rx cells: 0, Tx cells: 0
Tx Clp0:0,  Tx Clp1: 0
Rx Clp0:0,  Rx Clp1: 0
Rx Upc Violations:0, Rx cell drops:0
Rx pkts:0, Rx pkt drops:0
Rx connection-traffic-table-index: 3
Rx service-category: VBR-RT (Realtime Variable Bit Rate)
Rx pcr-clp01: 424
Rx scr-clp01: 424
Rx mcr-clp01: none
Rx      cdvt: 1024 (from default for interface)
Rx       mbs: 50
Tx connection-traffic-table-index: 3
Tx service-category: VBR-RT (Realtime Variable Bit Rate)
Tx pcr-clp01: 424
Tx scr-clp01: 424
Tx mcr-clp01: none
Tx      cdvt: none
Tx       mbs: 50
```

Confirming the Running Configuration

Use the **more system:running-config** command to confirm that the current configuration is correct:

```
Switch# more system:running-config
version XX.X
no service pad
no service password-encryption
!
hostname Switch
!
<information deleted>
!
interface Ethernet0
 ip address 172.20.52.11 255.255.255.224
 no ip directed-broadcast
!
interface ATM-E0
 no ip address
 no ip directed-broadcast
 atm pvc 0 29 pd on wrr-weight 15 rx-cttr 3 tx-cttr 3  interface  ATM0 0 any-vci
 wrr-weight 15  encap
!
interface Async1
 no ip address
 no ip directed-broadcast
 hold-queue 10 in
!
logging buffered 4096 debugging
!
line con 0
 exec-timeout 0 0
 transport input none
line vty 0 4
 exec-timeout 0 0
 no login
!
end
```

Confirming the Saved Configuration

Use the **more nvram:startup-config** command to confirm that the configuration saved in NVRAM is correct:

```
Switch# more nvram:startup-config
version XX.X
no service pad
no service password-encryption
!
hostname Switch
!
<information deleted>
!
interface Ethernet0
 ip address 172.20.52.11 255.255.255.224
 no ip directed-broadcast
!
interface ATM-E0
 no ip address
 no ip directed-broadcast
!
interface Async1
 no ip address
 no ip directed-broadcast
 hold-queue 10 in
!
logging buffered 4096 debugging
!
line con 0
 exec-timeout 0 0
 transport input none
line vty 0 4
 exec-timeout 0 0
 no login
!
end
```