CHAPTER 6

Configuring the LightStream 1010 ATM Switch

This chapter discusses the initial configuration of the LightStream 1010 Asynchronous Transfer mode (ATM) switch. Because the LightStream 1010 offers true plug-and-play operation, most users may not need to perform any of these procedures.

The LightStream 1010 is shipped with the ATM address autoconfigured to an address assigned by Cisco Systems. This feature lets the switch automatically configure attached end systems using the Interim Local Management Interface (ILMI) protocol and automatically establishes itself as a node in a single-level Private Network-Network Interface (PNNI) routing domain.

Note The default software image for the LightStream 1010 contains only the Interim Interswitch Signaling Protocol (IISP) for routing. This is suitable for small networks that do not require the sophistication of the PNNI protocols. A separate orderable image contains both PNNI and IISP. The PNNI protocol provides the route dissemination mechanism for complete plug-and-play capability.

The ILMI and PNNI protocols, when used with such IP address autoconfiguration mechanisms as BOOTP, allow the LightStream 1010 to be entirely self-configured. Through network management applications and the text-based command line interface (CLI), the switch's network operator has the capability, if desired, to configure and customize all aspects of the operation of the switch.

An IP address must be assigned to allow up to eight simultaneous Telnet sessions to connect to the switch or to use Simple Network Management Protocol (SNMP) network management for the switch. The Ethernet IP address can be assigned either manually or by a BOOTP server. See the section "Configuring Ethernet IP Interface Parameters."

Note If your Telnet station or SNMP network management workstation is on a different network from the switch, a static routing table entry must also be added to the routing table. Use the **configure ip route** command to set the static routing table entry.

For definitions of all commands discussed in this chapter, refer to the publication *LightStream 1010 ATM Switch Command Reference.*

The following sections describe how to initially configure the LightStream 1010:

- Before You Begin
- Powering Up Your System
- BOOTP Server Configuration
- ATM Address Configuration
- Configuring the Interfaces
- Configuring the Network Routing
- Configuring the System Information
- Configuring SNMP Management
- Storing the Configuration at Startup
- Testing the Configuration

Before You Begin

You may need the following information before you can begin your LightStream 1010 configuration if you want to configure some additional features:

- Media Access Control (MAC) address of the Ethernet port if you want to configure a BOOTP server to inform the switch of its Ethernet IP address and mask
- ATM address assigned by your system administrator if you want to configure a new ATM address for the switch (an autoconfigured ATM address is assigned by Cisco Systems)

- IP address of the Ethernet port if not using BOOTP
- Netmask address if you want to configure the Ethernet port on the ATM Switch Processor (ASP)
- Broadcast address if you want to configure the Ethernet port on the ASP

To help configure your switch you should have already completed the worksheets in the section “Port Configuration Worksheets” in the appendix “Configuration Worksheets.”

Note Complete all interface and power connections described in the chapter “Installing the LightStream 1010 ATM Switch” before beginning to configure the switch.

Powering Up Your System

Before powering up your system, check for correct AC power voltages. See the appendix “System Specifications” for correct AC power voltages.

Warning This product relies on the building’s installation for short-circuit (overcurrent) protection. Ensure that a fuse or circuit breaker no larger than 120 VAC, 15A U.S. (240 VAC, 10A international) is used on the phase conductors (all current-carrying conductors). To see translated versions of this warning, refer to the appendix “Translated Safety Warnings.”

Warning Care must be given to connecting units to the supply circuit so that wiring is not overloaded. To see translated versions of this warning, refer to the appendix “Translated Safety Warnings.”

Now you can safely power up your system by flipping the power switch(es) on the power supply(ies).

Verifying Installed LightStream 1010 Software and Hardware

When you first power up your console and LightStream 1010, a screen similar to the following 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) IISP Software (LS1010-WI-M), Version 11.1(1.083),
MAINTENANCE INTERIM SOFTWARE
Copyright (c) 1986-1996 by cisco Systems, Inc.
Compiled Wed 10-Apr-96 06:11 by
Image text-base: 0x600108C0, data-base: 0x602E8000
```

The first section of the script displays the banner information, including the software version.

Note In the previous example,
LS Software (LS1010-I-M) means that the IISP software image is loaded, and
LS Software (LS1010-P-M) means that the PNNI software image is loaded.

The next portion of the script lists installed hardware configuration.

```
cisco ASP1 (R4600) processor with 16384K bytes of memory.
R4600 processor, Implementation 32, Revision 2.0
Last reset from power-on
1 Ethernet/IEEE 802.3 interface.
16 ATM network interfaces.
125K 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).


Press RETURN to get started!



Switch>
```

Use the **show hardware** command to confirm installed hardware part and serial numbers:

```
Switch#show hardware

LS1010 named Switch, Date: 13:44:09 UTC Thu Apr 18 1996

Slot Ctrlr-Type   PartNo.    Rev Ser No  Mfg Date  RMA No. Hw Vrs Tst EEP
---- ----------   -------    --  ------  --------  ------ ------- ------
0/0  155UTP PAM   73-1572-02 01 02749041 1/17/96 00-00-00  3.0     0  2
0/1  155MM PAM    73-1496-03 06 02180424 1/16/96 00-00-00  3.0     0  2
1/0  155MM PAM    73-1496-03 06 02180444 1/17/96 00-00-00  3.0     0  2
1/1  155MM PAM    73-1496-03 06 02202228 1/11/96 00-00-00  3.0     0  2
2/0  ATM Swi/Proc 73-1402-02 00 02827677 0/07/13 00-00-00  2.3     0  2
```

The LightStream 1010 should be operating correctly and transferring data. To confirm that the hardware and software installation and configuration procedures were successful, see the chapter “Confirming the Installation.”

BOOTP Server Configuration

The LightStream 1010 Ethernet IP address can be automatically assigned using the BOOTP protocol 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 setting is the default for a new switch or a switch that has had its configuration file cleared using the **erase startup-config** command.)

To allow your LightStream 1010 to retrieve its IP address from a BOOTP server, find the MAC address label attached to the front of the switch. Add that MAC address to the BOOTP configuration file on the BOOTP server. The following tasks provide an example of creating a BOOTP server configuration file:

Task	Command
Install the BOOTP server code on the workstation if it is not already installed.	None
The switch MAC address is printed on a label attached to the front of the switch.	None
Add 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. Figure 6-1 is an example of a server BOOTP configuration file.	None
Restart the LightStream 1010 to automatically request the IP address from the BOOTP server.	Restart

Figure 6-1 Example of a Server BOOTP Configuration File

```
# /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

#
# Be careful about including backslashes where they're needed. Weird (bad)
# things can happen when a backslash is omitted where one is intended.
#


# First, we define a global entry which specifies the stuff every host
uses.


<information deleted>

##############################################################################
#
# Start of individual host entries
##############################################################################
#
switch:         tc=netcisco0:   ha=0000.0ca7.ce00:      ip=192.31.7.97:
dross:          tc=netcisco0:   ha=00000c000139:        ip=192.31.7.26:

<information deleted>
```

ATM Address Configuration

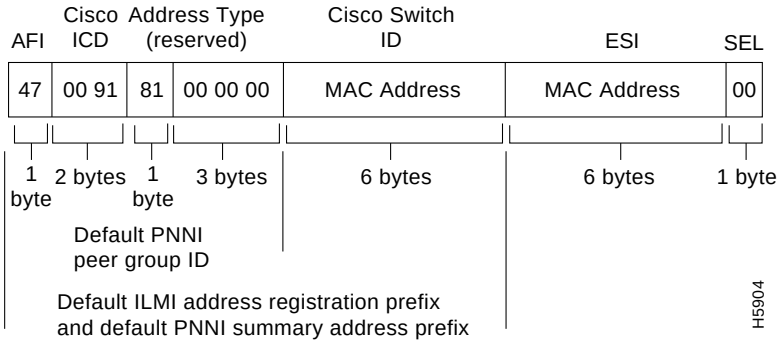
The LightStream 1010 ATM switch is autoconfigured with an ATM address using a hierarchical addressing model similar to the Open System Interconnection (OSI) network service access point (NSAP) addresses. PNNI uses this hierarchy to construct ATM peer groups.

Note The most important rule in the addressing scheme is to maintain the uniqueness of the address across very large networks.

Autoconfigured ATM Addressing Scheme

During the initial startup, the LightStream 1010 generates an ATM address using the defaults shown in Figure 6-2.

Figure 6-2 ATM Address Format



- Authority Format Identifier (AFI)—1 byte
- Cisco-specific International Code Designator (ICD)—2 bytes
- Cisco-specific information—4 bytes
- Unique MAC address—6 bytes (used to distinguish multiple switches)

Note In the address, the first 13 bytes comprise a switch prefix used by ILMI in assigning addresses to end systems connected to user-to-network interface (UNI) ports.

- MAC address of the switch—6 bytes (used to distinguish multiple end systems attached to the same switch)

Note Both MAC address fields are the same.

- Selector—1 byte

The switch's ATM address uses a hierarchical addressing model similar to the Open System Interconnect (OSI) network service access point (NSAP) addresses. PNNI uses this hierarchy to construct ATM peer groups. ILMI uses the first 13-bytes of this address as the switch prefix that it registers with end systems.

Default Address Format Features and Implications

Using the default address format has the following features and implications:

- Switches other than LightStream 1010 ATM Switches can be manually configured using the Cisco autoconfigured address format. This allows them to be used in a single-level PNNI routing domain consisting primarily of autoconfigured LightStream 1010 ATM switches. A globally unique MAC address must be used to generate the ATM address.
- The same MAC address can be used for bytes 8 through 13 and bytes 14 through 19.
- This address assignment format is relatively flat. To achieve scalable hierarchical network organization the ATM routing addresses will need to be changed when connecting to a large ATM network with multiple levels of PNNI hierarchy.
- Summary addresses less than 13 bytes long should *not* be used with autoconfigured ATM addresses. Other switches with autoconfigured ATM addresses matching the summary may exist outside the default peer group.

Manually Setting the ATM Address

To configure a new ATM address that replaces the previous ATM address when running IISP software only, see the section “Configure the ATM Address” in the chapter “Configuring ILMI” in the *LightStream 1010 ATM Switch Software Configuration Guide*.

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 section “Configure PNNI Node” in the chapter “Configuring PNNI” in the *LightStream 1010 ATM Switch Software Configuration Guide*.

Multiple addresses can be configured for a single switch and this configuration can be used during ATM address migration. ILMI registers end systems with multiple prefixes during this period until an old address is removed. PNNI automatically summarizes all of the switch prefixes in its reachable address advertisement.

If operation with ATM addresses other than the autoconfigured ATM address is desired, use the **atm address** command to manually assign a 20-byte ATM address to the switch. The **atm address** command *address_template* variable can be a full 20-byte address or a 13-byte prefix followed by ellipsis (...). Entering the ellipsis will automatically add one of the switch’s 6-byte MAC addresses in the ESI portion and 0 in the selector portion of the address.

Caution ATM addressing may lead to conflicts if not configured correctly. The correct address must always be present. For instance, if you are configuring a new ATM address, the old one must be completely removed from the configuration.

To set the ATM address manually, refer to the *LightStream 1010 ATM Switch Software Configuration Guide*.

Configuring the Interfaces

When the switch is powered on initially without any previous configuration data, the ATM interfaces are automatically configured on the physical ports. ILMI and the physical card type are used to automatically derive the ATM interface type, UNI version, maximum virtual path identifier (VPI) and virtual channel identifier (VCI) bits, ATM interface side, and ATM UNI type.

Default ATM Interface Configuration Without Autoconfiguration

If ILMI has been disabled or if the connecting end node does not support ILMI, the following defaults are assigned to all interfaces:

- ATM interface type = UNI
- UNI version = 3.0
- Maximum VPI bits = 8
- Maximum VCI bits = 14
- ATM interface side = network
- ATM UNI type = private

The following PAM types have specific defaults assigned:

OC3 PAM:

- Framing = sts-3c
- Clock-source = free-running
- Synchronous Transfer Signal (STS) -stream scrambling = on
- Cell payload scrambling = on

OC12 PAM:

- Framing = sts-12c
- Clock-source = free-running
- STS-stream scrambling = on
- Cell payload scrambling = on

DS3 PAM:

- Framing = cbit-adm
- Cell payload scrambling = off
- Clock-source = free-running
- Line build out (LBO) = short

- Auto-ferf on loss of signal (LOS) = on
- Auto-ferf on out of frame (OOF) = on
- Auto-ferf on red = on
- Auto-ferf on loss of cell delineation (LCD) = on
- Auto-ferf on alarm indication signaling (AIS) = on

E3 PAM:

- Framing = g.751 plcp
- Cell payload scrambling = on
- Clock-source = free-running
- Auto-ferf on LOS = on
- Auto-ferf on out of frame (OOF) = on
- Auto-ferf on red = on
- Auto-ferf on LCD = on
- Auto-ferf on AIS = on

You can accept the default ATM interface configuration or overwrite the default interface configuration using the CLI commands. These commands are described in the *LightStream 1010 ATM Switch Software Configuration Guide*, which provides detailed ATM interface configuration tasks.

Configuring Ethernet IP Interface Parameters

Three different IP addresses may be configured on the LightStream 1010. The IP address for the Ethernet port, classical IP over ATM, and a LAN emulation (LANE) client. Each IP address is configured using one of the following methods:

- Ethernet port—May be configured either from the BOOTP server or using the **interface ethernet 2/0/0 ip address** command
- Classical IP over ATM—See the section “Configuring Classical IP Over ATM” in the chapter “Configuring an ATM Network”

- LANE client—See the section “Configuring LAN Emulation Client Example” in the chapter “Configuring an ATM Network”

Note These IP connections are used only with network management.

Configure the interface to communicate with the switch central processor unit (CPU) (interface 2/0/0) or Ethernet interface 2/0/0 using the following information as a guide:

Provide the IP address and subnet mask bits for the interface as follows:

- IP address

  Internet addresses are 32-bit values assigned to hosts that use the IP protocols. These addresses are in dotted decimal format (four decimal numbers separated by periods) such as 192.17.5.100. Each number is an 8-bit value between 0 and 255. The following is a summary of IP addressing concepts for those who are somewhat familiar with IP addressing.

  The addresses are divided into three classes; the classes differ in the number of bits allocated to the *network* and *host* portions of the address.

  The Class A Internet address format allocates the highest 8 bits to the network field and sets the highest-order bit to 0 (zero). The remaining 24 bits form the host field.

  The Class B Internet address allocates the highest 16 bits to the network field and sets the two highest-order bits to 1, 0. The remaining 16 bits form the host field.

  The Class C Internet address allocates the highest 24 bits to the network field and sets the three highest-order bits to 1, 1, 0. The remaining 8 bits form the host field.

  Default: None.

  Action: Enter your Internet address in dotted decimal format for each interface you plan to configure.

- Subnet mask bits

Subnetting is an extension of the Internet addressing scheme, that allows multiple physical networks to exist within a single Class A, B, or C network. The usual practice is to use a few of the far left bits in the host portion of the network address for a subnet field. The subnet mask determines whether subnetting is in effect on a network.

Internet addressing conventions allow a total of 24 host bits for Class A addresses, a total of 16 host bits for Class B addresses, and a total of 8 host bits for Class C addresses. When you are further subdividing your network (that is, subnetting your network), the number of host addressing bits is divided between subnetting bits and actual host address bits. You must specify a minimum of two host address bits, or the subnetwork could not be populated by hosts. Therefore, the **ip address** command permits you to specify up to 22 host bits for Class A subnetting, 14 bits for Class B subnetting, and 6 bits for Class C subnetting. Table 6-1 provides summaries of these subnetting parameters.

Table 6-1 Summary of Subnetting Parameters

			Host Bits	
First Class	**First Byte**	**Network Bits**	**Max Subnet Bits**	**Min Address Bits**
A	1–126	8	22	2
B	128–191	16	14	2
C	192–223	24	6	2

Default: 0.

Note Because all zeros in the host field specify the entire network, subnetting with subnet address 0 is illegal and is strongly discouraged.

Define subnet mask bits as a decimal number between 0 and 22 for Class A addresses, 0 and 14 for Class B addresses, or 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.

Configuring the Network Routing

The default software image for the LightStream 1010 will contain only the IISP routing protocol. This will be suitable for small networks that do not require the sophistication of the PNNI protocols. A separate orderable image contains both PNNI and IISP protocols. The PNNI protocol provides the route dissemination mechanism for complete plug-and-play capability.

The following section describes modifications that may be made to the default PNNI or IISP routing configurations:

- Configuring PNNI Connections
- Configuring ATM Routes for IISP or PNNI

For detailed descriptions of these routing protocols see the section “ATM Routing” in the chapter “What is the LightStream 1010 ATM Switch?”

Configuring PNNI Connections

The PNNI routing protocol automatically creates peer groups that are a collection of logical nodes, each of which exchanges information with the other members of the group, so that all members maintain an identical view of the group. For example, hellos, database synchronization, and flooding are carried out among members of the same peer group. All members of the same peer group have the same 13-byte PNNI prefix in their ATM address. A peer group can be considered similar to either open shortest path first (OSPF) or IP routing domains, depending on usage.

This peer group configuration information is in the hierarchy database stored within each switch and updated regularly.

The following section will discuss manually configuring two autonomous peer groups to create one single peer group.

Peer Group ID Modification

To manually configure two autonomous peer groups into one, all members of the peer group must have the same peer group ID in their ATM address. The following sections describe the manual PNNI peer-group modification process:

- Using show atm pnni node id to Determine Peer-Group ID
- Using atm address to Manually Change Peer-Group ID
- Configuring ATM Routes for IISP or PNNI

Using show atm pnni node id to Determine Peer-Group ID

Use the **show pnni node-id** command to determine the peer-group IDs to modify:

Task	Command
Display ATM address prefix	**show atm pnni node-id**

Example

```
Switch#show atm pnni node-id
  Node    Node Id
  ----    -------
  1       56:160:47.000000000000000000000000.000000005656.00
Switch#
```

Using atm address to Manually Change Peer-Group ID

The **atm address** command assigns a 20-byte ATM address to the switch. See the section "ATM Address Configuration" for a complete description of this command.

Multiple addresses can be configured for a single switch and this can be used during address migration. ILMI would register end systems with multiple prefixes during this period until an old address is removed. PNNI automatically summarizes all switch prefixes in its reachable address advertisement.

To configure the ATM address manually, use the following commands using the **no** form of this command to disable.

Task	Command
At the privileged EXEC prompt, enter configuration mode from the terminal	**configure**[1] [**terminal**]
Change 13 byte ATM prefix in the ATM address to match the desired switch prefix	**atm address** 13_byte_switch _prefix **...**
Delete the old ATM address	**no atm address** 13_byte_switch_prefix **...**
Start PNNI configuration mode	**atm router pnni**
Disable the node	**atm node 1 disable**
Enable the node	**atm node 1 enable**
Restart PNNI to force it to read the new node IDs.	**restart pnni**

1. This command is documented in the *LightStream 1010 ATM Switch Command Reference* publication.

Example

The following steps configure a peer-group ID manually:

Step 1 Adds the ATM address prefix 47.0091.8100.5670.000.0ca7.ce01, (...), and adds the default MAC address as the last six bytes.

Step 2 Deletes the old ATM address prefix.

Step 3 Starts PNNI configuration mode.

Step 4 Disables ATM node 1.

Step 5 Reenables node 1.

Step 6 Restarts PNNI.

```
Switch(config)#atm address 47.0091.8100.5670.0000.0ca7.ce01...
Switch(config)#no atm address 47.0091.8100.1200.0000.0ca7.ce01...
Switch(config)#atm router pnni
Switch(config)#atm node 1 disable
Switch(config)#atm node 1 enable
Switch(config)#restart pnni
```

Configuring ATM Routes for IISP or PNNI

Use the **atm route** command to configure a static route. A static route attached to an interface allows all ATM address prefixes where the static route is a match to be reached through that interface.

Note Two PNNI peer groups may be connected using the IISP protocol. This requires a static route to be configured on the IISP interfaces to allow connections to be setup across the IISP link(s).

Figure 6-3 is an example of the **atm route** command configuring a static route to the 13-byte-switch-prefix = **47.0091.8100.567.0000.0ca7.ce01** to interface 3/0/0.

Figure 6-3 Example of the atm route Command

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

Configuring the System Information

Although not required, several system parameters should be set as part of the initial system configuration. These system information commands make troubleshooting and configuring the switches easier. To set the system parameters, perform the following tasks in EXEC mode:

Task	Command
Set the system clock.	**clock set** ***hh:mm:ss***
At the privileged EXEC prompt, enter configuration mode from the terminal.	**configure**[1] [**terminal**]
Set the system name.	**hostname** *name_string*

1. This command is documented in the *LightStream 1010 ATM Switch Command Reference* publication.

Syntax Description

- *hh:mm:ss*—Current time in hours (military format), minutes, and seconds.
- *name_string*—Desired name of the switch.

Configuring SNMP Management

SNMP, an application-layer protocol, facilitates the exchange of Management Information Bases (MIBs) between network devices. SNMP community strings authenticate access to the MIB and function as embedded "passwords."

To manually configure the LightStream 1010 SNMP, refer to the *LightStream 1010 ATM Switch Software Configuration Guide*. For definitions of all commands discussed in this chapter, refer to the publication *LightStream 1010 ATM Switch Command Reference.*

Storing the Configuration at Startup

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 LightStream 1010 prior to saving the configuration in NVRAM, all manual configuration changes will be lost. Figure 6-4 is an example of the **copy running-config startup-config** command.

Figure 6-4 Storing Configuration in NVRAM Example

```
Switch#copy running-config startup-config
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]
Building configuration...
[OK]Switch#
```

Testing the Configuration

The following sections describe commands that may be used to confirm that the hardware, software, and interfaces for the LightStream 1010 are configured as intended:

- Using show version to Confirm Software
- Using show interface ethernet to Confirm Ethernet Configuration
- Using ping to Test the Ethernet Connection
- Using ping atm to Confirm the ATM Connections
- Using show atm interface to Confirm ATM Interface Configuration
- Using show atm status to Confirm Interface Status
- Using show atm vc to Confirm Virtual Connection
- Using show running-config to Confirm Configuration
- Using show startup-config to Confirm Saved Configuration

Using show version to Confirm Software

Use the **show version** command to confirm that the correct version and type of LightStream 1010 software is installed. Figure 6-5 is an example of the **show version** command.

Figure 6-5 Example of show version Command

```
Switch#show version
Cisco Internetwork Operating System Software
IOS (tm) IISP Software (LS1010-WI-M), Version 11.1(1.083),
MAINTENANCE INTERIM SOFTWARE
Copyright (c) 1986-1996 by cisco Systems, Inc.
Compiled Wed 10-Apr-96 06:11 by
Image text-base: 0x600108C0, data-base: 0x602E8000

ROM: System Bootstrap, Version 11.0(5726), INTERIM SOFTWARE

Switch uptime is 4 days, 1 hour, 13 minutes
System restarted by power-on
System image file is "slot0:rhino/ls1010-wi-m_1.083.bin.Z", booted via
console

cisco ASP1 (R4600) processor with 16384K bytes of memory.
R4600 processor, Implementation 32, Revision 2.0
Last reset from power-on
1 Ethernet/IEEE 802.3 interface.
16 ATM network interfaces.
125K 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).
Configuration register is 0x0

Switch#
```

Using show hardware to Confirm Hardware Configuration

Use the **show hardware** command to confirm the type of hardware installed in the system. Figure 6-7 is an example of the **show hardware** command.

Figure 6-6 Example of show hardware Command

```
Switch#show hardware

LS1010 named Switch, Date: 07:09:00 UTC Wed Apr 24 1996

Slot Ctrlr-Type    Part No.  Rev  Ser No  Mfg Date  RMA No. Hw Vrs  Tst EEP
---- ------------  ---------- -- -------- -------- -------- ------- ---
---
0/0  155UTP PAM    73-1572-02 01 02749041  1/17/96 00-00-00   3.0     0   2
0/1  155MM PAM     73-1496-03 06 02180424  1/16/96 00-00-00   3.0     0   2
1/0  155MM PAM     73-1496-03 06 02180444  1/17/96 00-00-00   3.0     0   2
1/1  155MM PAM     73-1496-03 06 02202228  1/11/96 00-00-00   3.0     0   2
2/0  ATM Swi/Proc  73-1402-02 00 02827677  0/07/13 00-00-00   2.3     0   2

Switch#
```

Using show interface ethernet to Confirm Ethernet Configuration

Use the **show interface ethernet** command to confirm that the Ethernet interface on the ASP is configured correctly. Figure 6-7 is an example of the **show interface ethernet** command.

Figure 6-7 Example of show interface ethernet 2/0/0 Command

```
Switch#show interface ethernet 2/0/0
Ethernet2/0/0 is up, line protocol is up
  Hardware is SonicT, address is 0000.0b0a.1000 (bia 0040.0b0a.1080)
  Internet address is 80.0.0.10/8
  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 never, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
  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 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 input packets with dribble condition detected
     40894 packets output, 3907161 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
Switch#
```

Using show running-config Command to Confirm ATM Address

Use the **show atm address** command to confirm the ATM address for the LightStream 1010 is configured correctly. Figure 6-8 is an example of the **show atm address** command.

Figure 6-8 Example of show atm address Command

```
Switch#show atm address

Switch Address(es):
  47.00918100000000410B0A1081.00410B0A1081.00 active
  47.00918100000000603E5ADB01.00603E5ADB01.00

Soft VC Address(es):
  47.0091.8100.0000.0041.0b0a.1081.4000.0c80.0000.00 ATM0/0/0
  47.0091.8100.0000.0041.0b0a.1081.4000.0c80.0000.63 ATM0/0/0.99
  47.0091.8100.0000.0041.0b0a.1081.4000.0c80.0010.00 ATM0/0/1
  47.0091.8100.0000.0041.0b0a.1081.4000.0c80.0020.00 ATM0/0/2
  47.0091.8100.0000.0041.0b0a.1081.4000.0c80.0030.00 ATM0/0/3
  47.0091.8100.0000.0041.0b0a.1081.4000.0c80.1000.00 ATM0/1/0
  47.0091.8100.0000.0041.0b0a.1081.4000.0c80.1010.00 ATM0/1/1
  47.0091.8100.0000.0041.0b0a.1081.4000.0c80.1020.00 ATM0/1/2
  47.0091.8100.0000.0041.0b0a.1081.4000.0c80.1030.00 ATM0/1/3
  47.0091.8100.0000.0041.0b0a.1081.4000.0c80.8000.00 ATM1/0/0
  47.0091.8100.0000.0041.0b0a.1081.4000.0c80.8010.00 ATM1/0/1
  47.0091.8100.0000.0041.0b0a.1081.4000.0c80.8020.00 ATM1/0/2
  47.0091.8100.0000.0041.0b0a.1081.4000.0c80.8030.00 ATM1/0/3
  47.0091.8100.0000.0041.0b0a.1081.4000.0c80.9000.00 ATM1/1/0
  47.0091.8100.0000.0041.0b0a.1081.4000.0c80.9010.00 ATM1/1/1
  47.0091.8100.0000.0041.0b0a.1081.4000.0c80.9020.00 ATM1/1/2
  47.0091.8100.0000.0041.0b0a.1081.4000.0c80.9030.00 ATM1/1/3

ILMI Switch Prefix(es):
  47.0091.8100.0000.0041.0b0a.1081
  47.0091.8100.0000.0060.3e5a.db01

ILMI Configured Interface Prefix(es):

LECS Address(es):
Switch#
```

Using ping to Test 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, perform the following tasks:

Task	Command
Test the configuration using the **ping** command. The **ping** command sends an echo request to the host specified in the command line.	**ping** [***protocol***] {***host*** | ***address***}

For example, to test Ethernet connectivity from the switch to a workstation with an IP address of 192.34.56.5, enter the command **ping 192.34.56.5**. If the switch receives a response, a message is displayed as show, in Figure 6-9.

Figure 6-9 Example of ping ip Command

```
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
Switch#
```

Using ping atm to Confirm the ATM Connections

Use the **ping atm** command to confirm that the ATM interfaces are configured correctly. Figure 6-10 is an example of the **ping atm** command.

Figure 6-10 Example of ping atm Command

```
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 0 percent (0/5)
Switch#
```

Using show atm interface to Confirm ATM Interface Configuration

Use the **show atm interface** command to confirm that the atm interfaces are configured correctly. Figure 6-11 is an example of the **show atm interface** command.

Figure 6-11 Example of show atm interface Command

```
Switch#show atm interface

Interface:      ATM0/0/0        Port-type:    oc3suni
IF Status:      UP              Admin Status: up
Auto-config:    disabled        AutoCfgState: not applicable
IF-Side:        User            IF-type:      IISP
Uni-type:       not applicable  Uni-version:  V3.0
Max-VPI-bits:   8               Max-VCI-bits: 14
Max-VP:         255             Max-VC:       32768
ATM Address for Soft VC: 47.0091.8100.0000.0060.3e5a.db01.4000.0c80.0000.00
Configured virtual links:
  PVCLs SoftVCLs   SVCLs   PVPLs SoftVPLs   SVPLs  Total-Cfgd  Installed-Conns
      4        0       0       1        0       0           5                4
Logical ports(VP-tunnels):     1
Input cells:    23355           Output cells: 27251
5 minute input rate:             0 bits/sec,       0 cells/sec
5 minute output rate:            0 bits/sec,       0 cells/sec
Input AAL5 pkts: 23355, Output AAL5 pkts: 27247, AAL5 crc errors: 0


Logical ports(VP-tunnels):     0
Input cells:    0               Output cells: 0
5 minute input rate:             0 bits/sec,       0 cells/sec
5 minute output rate:            0 bits/sec,       0 cells/sec
Input AAL5 pkts: 0, Output AAL5 pkts: 0, AAL5 crc errors: 0

<information deleted>

Interface:      ATM2/0/0        Port-type:    cpu
IF Status:      UP              Admin Status: up
Auto-config:    disabled        AutoCfgState: not applicable
IF-Side:        not applicable  IF-type:      not applicable
Uni-type:       not applicable  Uni-version:  not applicable
Max-VPI-bits:   8               Max-VCI-bits: 14
Max-VP:         0               Max-VC:       32768
Configured virtual links:
```

```
  PVCLs SoftVCLs   SVCLs   PVPLs SoftVPLs   SVPLs  Total-Cfgd  Installed-Conns
     53        0       0       0        0       0          53               18
Logical ports(VP-tunnels):     0
Input cells:    21973           Output cells: 21980
5 minute input rate:             0 bits/sec,       0 cells/sec
5 minute output rate:            0 bits/sec,       0 cells/sec
Input AAL5 pkts: 21875, Output AAL5 pkts: 21878, AAL5 crc errors: 0

Switch#
```

Using show atm status to Confirm Interface Status

Use the **show atm status** command to confirm the status of the ATM interfaces. Figure 6-12 is an example of the **show atm status** command.

Figure 6-12 Example of show atm status Command

```
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        0         0        0        30
P2MP         0         0        0        0         0        0         0
                              TOTAL INSTALLED CONNECTIONS =        30

PER-INTERFACE STATUS SUMMARY AT 13:50:30 UTC Tue Apr 16 1996:
   Interface      IF          Admin  Auto-Cfg    ILMI Addr     SSCOP
     Name       Status       Status    Status    Reg State     State
------------- -------- ------------ -------- ------------ ---------
ATM0/0/0           UP           up      n/a          n/a    Active
ATM0/0/0.99        UP           up      n/a          n/a  OConPend
ATM0/0/1           UP           up      n/a          n/a    Active
ATM0/0/2           UP           up      n/a          n/a    Active
ATM0/0/3           UP           up     done  UpAndNormal    Active
ATM0/1/0           UP           up     done  UpAndNormal    Active
ATM0/1/1           UP           up     done  UpAndNormal    Active
ATM0/1/2         DOWN         down  waiting          n/a      Idle
Switch#
```

Using show atm vc to Confirm Virtual Connection

Use the **show atm vc** command to confirm the status of ATM virtual interfaces. Figure 6-13 is an example of the **show atm vc** command.

Figure 6-13 Example of show atm vc Command

```
Switch#show atm vc
Interface     VPI     VCI     Type   X-Interface  X-VPI   X-VCI   Status
ATM0/0/0      0       5       PVC      ATM2/0/0     0       32      UP
ATM0/0/0      0       16      PVC      ATM2/0/0     0       33      UP
ATM0/0/0      0       18      PVC      ATM2/0/0     0       34      UP
ATM0/0/0      0       89      PVC      ATM0/0/0.99  99      100     UP
ATM0/0/0.99   99      3       PVC      ATM2/0/0     0       83      UP
ATM0/0/0.99   99      4       PVC      ATM2/0/0     0       84      UP
ATM0/0/0.99   99      5       PVC      ATM2/0/0     0       80      UP
ATM0/0/0.99   99      16      PVC      ATM2/0/0     0       81      UP
ATM0/0/0.99   99      18      PVC      ATM2/0/0     0       82      UP
ATM0/0/0.99   99      100     PVC      ATM0/0/0     0       89      UP
ATM0/0/1      0       5       PVC      ATM2/0/0     0       35      UP
ATM0/0/1      0       16      PVC      ATM2/0/0     0       36      UP
ATM0/0/1      0       18      PVC      ATM2/0/0     0       37      UP
ATM0/0/2      0       5       PVC      ATM2/0/0     0       38      UP
ATM0/0/2      0       16      PVC      ATM2/0/0     0       39      UP
ATM0/0/2      0       18      PVC      ATM2/0/0     0       40      UP
ATM0/0/3      0       5       PVC      ATM2/0/0     0       41      UP
ATM0/0/3      0       16      PVC      ATM2/0/0     0       42      UP

<Information Deleted>

ATM2/0/0      0       66      PVC      ATM1/0/3     0       16      UP
ATM2/0/0      0       67      PVC      ATM1/0/3     0       18      UP
ATM2/0/0      0       68      PVC      ATM1/1/0     0       5       DOWN
ATM2/0/0      0       69      PVC      ATM1/1/0     0       16      DOWN
ATM2/0/0      0       70      PVC      ATM1/1/0     0       18      DOWN
ATM2/0/0      0       71      PVC      ATM1/1/1     0       5       DOWN
ATM2/0/0      0       72      PVC      ATM1/1/1     0       16      DOWN
ATM2/0/0      0       73      PVC      ATM1/1/1     0       18      DOWN
ATM2/0/0      0       74      PVC      ATM1/1/2     0       5       DOWN
Switch#
```

Using show running-config to Confirm Configuration

Use the **show running-config** command to confirm that the configuration being used is configured correctly. Figure 6-14 is an example of the **show running-config** command.

Figure 6-14 Example of show running-config Command

```
Switch#show running-config

Switch#write terminal
Building configuration...

Current configuration:
!
version 11.1
no service pad
service udp-small-servers
service tcp-small-servers
!
hostname Switch
!
boot system flash slot0:rhino/ls1010-wi-m_1.083.bin.Z
!
atm over-subscription-factor 16
atm service-category-limit cbr 3000
atm qos uni3-default  cbr max-cell-loss-ratio 12
atm address 47.0091.8100.0000.0060.3e5a.db01.0060.3e5a.db01.00
!
interface ATM0/0/0
 no keepalive
 no atm auto-configuration
 no atm ilmi-enable
 no atm ilmi-lecs-implied
 atm iisp side user
 atm pvp 99

<information deleted>

end

Switch#
```

Using show startup-config to Confirm Saved Configuration

Use the **show startup-config** command to confirm that the configuration saved in NVRAM is configured correctly. Figure 6-15 is an example of the **show startup-config** command.

Figure 6-15 Example of show startup-config Command

```
Switch#show startup-config
Using 1830 out of 129016 bytes
!
version 11.1
no service pad
service udp-small-servers
service tcp-small-servers
!
hostname Switch
!
boot system flash slot0:rhino/ls1010-wi-m_1.083.bin.Z
!
atm over-subscription-factor 16
atm service-category-limit cbr 3000
atm qos uni3-default  cbr max-cell-loss-ratio 12
atm address 47.0091.8100.0000.0060.3e5a.db01.0060.3e5a.db01.00

<information deleted>

!
interface ATM0/0/0.99 point-to-point
 no atm ilmi-enable
 no atm ilmi-lecs-implied
 atm maxvp-number 0interface ATM0/0/2
 no keepalive
 no atm ilmi-enable
 no atm ilmi-lecs-implied
 atm iisp side user
!
end
Switch#
```