Doc. No. 78-3302-01 Rev. A0

LightStream 1010 ATM Switch 622 SM/MM Port Adapter Module Configuration Note

Product Numbers: WAI-OC12-1SM=, WAI-OC12-1MM=

This document contains instructions for installing and configuring the 622 single-mode (SM) and the 622 multimode port adapter modules. For a complete description of commands used to configure and maintain the 622 SM/MM port adapter modules, refer to the *LightStream 1010 ATM Switch Software Configuration Guide* and the *LightStream 1010 ATM Switch Command Reference* publications. For complete hardware configuration and maintenance procedures, refer to the *LightStream 1010 ATM Switch User Guide* publication.

Cisco documentation and additional literature are available on a CD called Cisco Connection Documentation, Enterprise Series. The CD is updated and shipped monthly, so it might be more up-to-date than the printed documentation. To order the Cisco Connection Documentation, Enterprise Series CD, contact your local sales representative or call Customer Service. The CD is available both as a single CD and as an annual subscription. You can access Cisco technical documentation on the World Wide Web Universal Resources Locator (URL) `http://www.cisco.com`.

Note The 622 MM PAMs only work with version 11.1(4) of the IOS software.

Sections in this document include the following:

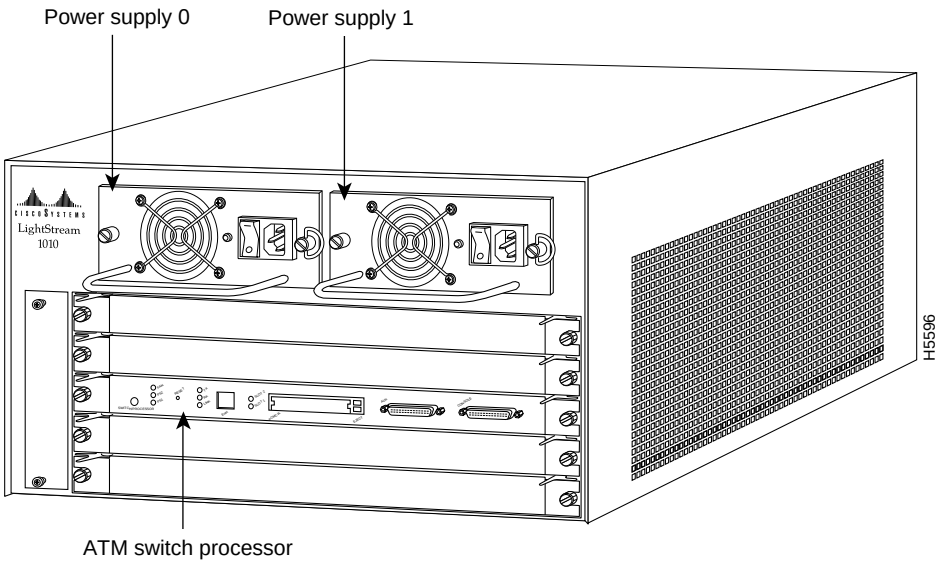
- What is the LightStream 1010 ATM Switch?
- 622 SM Port Adapter Module Description
- 622 MM Port Adapter Module Description
- Module LEDs
- Preparing Network Connections
- Safety Recommendations
- Installing and Replacing PAMs
- Configuring the Interfaces

Warning Only trained and qualified personnel should install or replace the LightStream 1010 ATM switch, chassis, power supplies, fan assembly, or modules.

What is the LightStream 1010 ATM Switch?

The LightStream 1010 uses a five-slot, modular chassis featuring the option of dual, fault-tolerant, load-sharing power supplies. (See Figure 1.) The central slot in the LightStream 1010 is dedicated to a single, field-replaceable ATM switch processor (ASP) module that supports both the 5-Gbps shared memory and the fully nonblocking switch fabric. The ASP also supports the feature card and high performance reduced instruction set (RISC) processor that provides the central intelligence for the device. The remaining slots support up to four hot-swappable Carrier Modules (CAMs). Each CAM supports up to two hot-swappable Port Adapter Modules (PAMs) for a maximum of eight PAMs per switch, supporting a wide variety of desktop, backbone, and wide-area interfaces.

Figure 1 Front View of the LightStream 1010 ATM Switch



The LightStream 1010 ATM switch provides switched ATM connections to individual workstations, servers, LAN segments, or other ATM switches and routers using fiber-optic, unshielded twisted-pair (UTP), and coaxial cable.

The LightStream 1010 ATM switch can accommodate up to 8 OC-12 switched ATM ports in a standard 19-inch (48-centimeter) rack.

Figure 2 shows an example of a network configuration using the LightStream 1010 ATM switch in a high-performance workgroup.

Figure 2 LightStream 1010 Workgroup Configuration Example

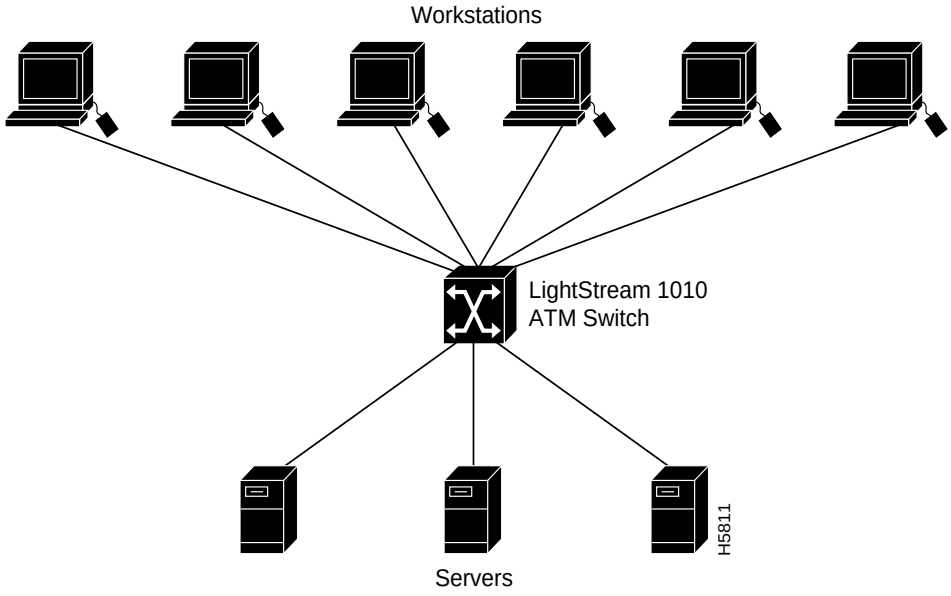
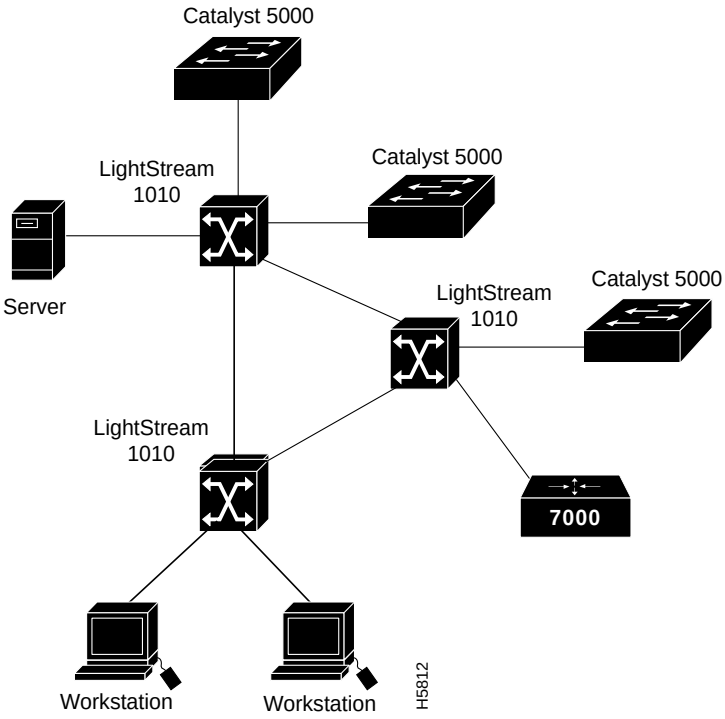


Figure 3 shows an example of a network configuration using the LightStream 1010 ATM switch for a campus backbone.

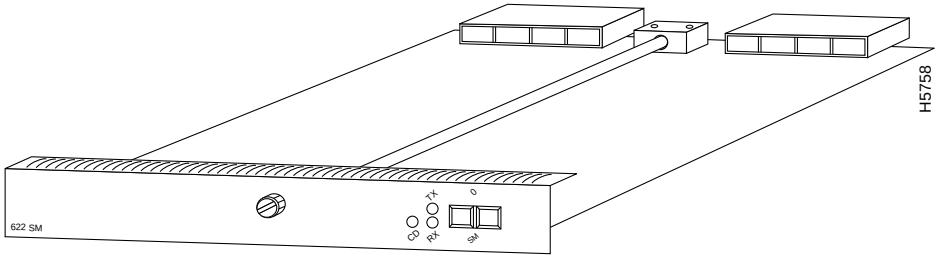
Figure 3 LightStream 1010 Backbone Configuration Example



622 SM Port Adapter Module Description

The 622 SM (single-mode) PAM, shown in Figure 4, provides connection to one OC12 interface using a duplex SC SM fiber-optic connector.

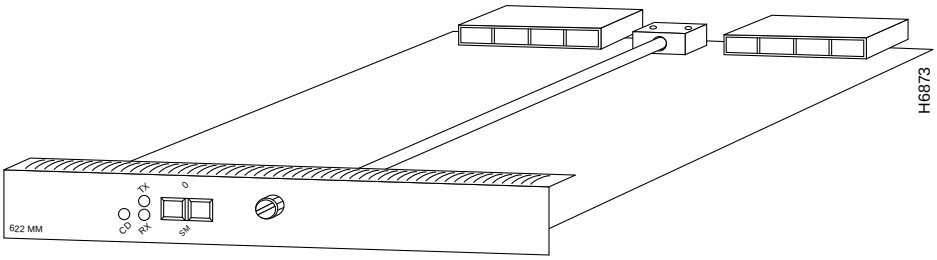
Figure 4 622 SM Port Adapter Module



622 MM Port Adapter Module Description

The 622 MM (multimode) PAM, shown in Figure 5, provides connection to one OC12 interface using a duplex SC MM fiber-optic connector.

Figure 5 622 MM Port Adapter Module



Specifications

Table 1 lists the 622 single-mode port adapter module specifications:

Table 1 622 SM Port Adapter Module Specifications

Description	Specifications
Dimensions (H x W x D)	PAM: 1.2 x 6.5 x 10 in. (3.0 x 16.5 x 25.4 cm)
Weight	1.10 lb (.50 kg))
Operating temperature	32 to 104 F (0 to 40 C)
Nonoperating temperature	-40 to 167 F (-40 to 75 C)
Humidity	10 to 90%, noncondensing
Altitude	-500 to 10,000 ft (-52 to 3,048 m)
Interface timing	Loop timing, Stratum 4 accuracy clock for self-timing

Description	Specifications
Port adapter modules (PAM)	PAM with 1SONET STS12c/SDH STM4c single-mode fiber ports, SC connector (WAI-OC3-4MM) PAM with 1SONET STS12c/SDH STM4c multimode fiber ports, SC connector (WAI-OC3-4SM)
Network management	Port Tx and Rx LEDs
Mean Time Between Failures	2.6 years for system configuration
Management Information Bases (MIB)	SNMP MIB II (RFC 1213) Interface table MIB(RFC 1573) AToMIC (RFC 1695) ATM Forum LANE A MIB ATM Forum PNNI MIB SONET MIB (RFC 1595) ATM Forum UNI 30/3.11 ILMI MIB RMON MIB (RFC 1757) Ethernet MIB (RFC 1398) RS-232 MIB (RFC 1659)
Maximum station-to-station cabling distance	OC-12—8/125-micron single-mode fiber: 9 miles (15 km) OC-12—862.5/125- and 50/125-micron multimode fiber: .31 miles (500 m)
Fiber-optic power levels:	
OC-12 Single-mode	
Output center wavelength	1274 to 1356 nm
Transmit	Minimum: -15.0 dBm Maximum: -8.0 dBm
Receive	Minimum: -28.0 dBm Maximum: -8.0 dBm
OC-12 Multimode	
Output center wavelength	1270 to 1380
Transmit optical outpur	-14 to -20 dBm
Receive senstivity	-14 to -26 dBm
Agency approvals	Safety: UL[1] 1950, CSA[2]-C22.2 No. 950-93, and EN60950 EMI[3]: FCC Class A CE Mark, and VCCI Class II with shielded cables

1. UL = Underwriters Laboratory
2. CSA = Canadian Standards Association
3. EMI = electromagnetic interference

Maximum Configuration

The eight available CAMs support any combination of network interfaces to provide the following maximum port densities:

- Up to 8 622-Mbps OC-12 single-mode ports
- Up to 8 622-Mbps OC-12 multimode ports

You can install any combination of PAMs in any of the eight available PAM slots. There are no restrictions on either the number of modules that can be installed or their proximity to the ASP.

Module LEDs

The LEDs on the 622 SM PAM provide status information for the SC fiber-optic interface connection. The LEDs are shown in Figure 6 and described in Table 2.

Figure 6 622 SM Port Adapter Module LEDs

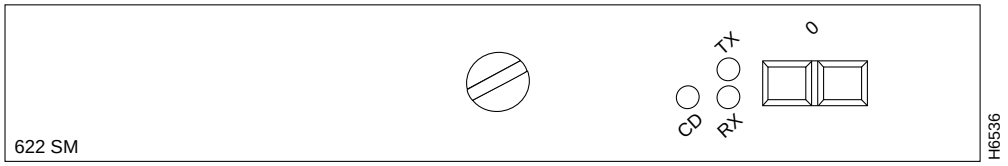


Table 2 622 SM Port Adapter Module LED Descriptions

LED	Description
CD (Carrier Detect)	Off—Carrier detect signal not received. Green—Carrier detect signal received.
RX (Receive)	Off—No cells received. Flashing green—Cells being received: pulse rate increases with data rate. Red—Alarm (LOF[1], LCD[2], AIS[3]).
TX (Transmit)	Off—No cells received. Flashing green—Cells being transmitted: pulse rate increases with data rate. Flashing yellow—Loopback. Steady yellow—Alarm FERF[4].

1. LOF = loss of frame
2. LCD = loss of cell delineation
3. AIS = alarm indication signal
4. FERF = far-end receive failure

Warning Class 1 laser product. To see translated versions of this warning, refer to the appendix "Translated Safety Warnings" in the *LightStream 1010 ATM Switch User Guide*.

Warning Do not stare into the laser beam. To see translated versions of this warning, refer to the appendix "Translated Safety Warnings" in the *LightStream 1010 ATM Switch User Guide*.

The LEDs on the 622 MM PAM provide status information for the SC fiber-optic interface connection. The LEDs are shown in Figure 7 and described in Table 3.

Figure 7 622 MM Port Adapter Module LEDs

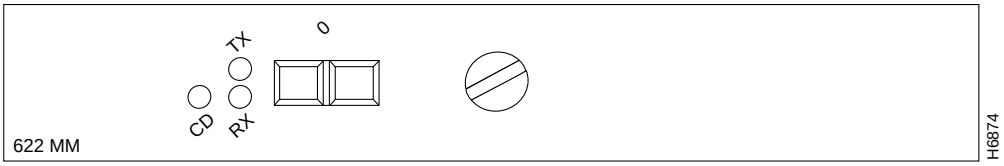


Table 3 622 MM Port Adapter Module LED Descriptions

LED	Description
CD (Carrier Detect)	Off—Carrier detect signal not received. Green—Carrier detect signal received.
RX (Receive)	Off—No cells received. Flashing green—Cells being received: pulse rate increases with data rate. Red—Alarm (LOF[1], LCD[2], AIS[3]).
TX (Transmit)	Off—No cells received. Flashing green—Cells being transmitted: pulse rate increases with data rate. Flashing yellow—Loopback. Steady yellow—Alarm FERF[4].

1. LOF = loss of frame
2. LCD = loss of cell delineation
3. AIS = alarm indication signal
4. FERF = far-end receive failure

Preparing Network Connections

When preparing your site for network connections to the switch, you need to consider a number of factors related to each type of interface:

- Type of cabling required for each type (fiber-optic, coaxial, or twisted-pair cabling).
- Distance limitations for each signal type.
- Specific cables you need to connect each interface.
- Any additional interface equipment you need, such as transceivers, modems, channel service units (CSUs), or data service units (DSUs). Before installing the switch, have all additional external equipment and cables on hand. If you intend to build your own cables, refer to the cable pinouts in the section “Installing the LightStream 1010 Switch” in the *LightStream 1010 ATM Switch User Guide* publication. For ordering information, contact a customer service representativ

Distance Limitations

The length of your networks and the distances between connections depend on the type of signal, the signal speed, and the transmission media (the type of cabling used to transmit the signals). For example, fiber-optic cable has a greater channel capacity than twisted-pair cabling. The following distance limits are provided as guidelines for planning your network connections before installation.

ATM Connections

The maximum distances for ATM network segments and connections depend on the type of transmission cable used, for example, unshielded twisted-pair (UTP), single-mode, or multimode fiber-optic cable.

Networking standards set the maximum distances between stations using fiber-optic and UTP cable. The maximum cable lengths are listed in Table 4.

Table 4 ATM Maximum Transmission Distances

Transceiver Speed	Cable Type	Maximum Distance between Stations
622 Mbps	Single-mode fiber	9 miles (15 km)
622 Mbps	Multimode fiber	.31 miles (500 m)

For Further Reference

The following publications contain information on determining attenuation and power budget:

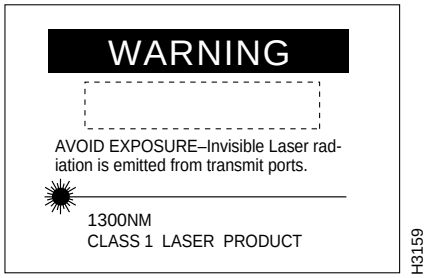
- T1E1.2/92-020R2 ANSII, the Draft American National Standard for Telecommunications entitled “Broadband ISDN Customer Installation Interfaces: Physical Layer Specification.”
- *Power Margin Analysis*, AT&T Technical Note, TN89-004LWP, May 1989.

ATM Connection Equipment

All ATM interfaces are full duplex. You must use the appropriate ATM interface cable to connect the ATM multimode PAM with an external ATM network.

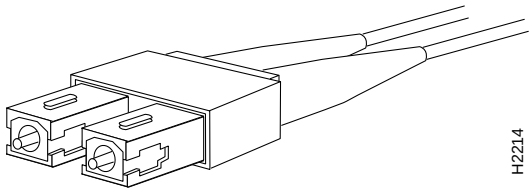
For fiber-optic traffic over SM or MM, use the SC-type connector (Figure 8) to connect the 622 SM PAM and 622 MM PAM with the external ATM switch.

Warning Invisible laser radiation may be emitted from the aperture ports of the SM Fiber Distributed Data Interface (FDDI) card when no cable is connected. *Avoid exposure and do not stare into open apertures.* Following is an example of the warning label that appears on the product:



To see translated versions of this warning, refer to the appendix “Translated Safety Warnings” in the *LightStream 1010 ATM Switch User Guide*.

Figure 8 Fiber-Optic Network Interface Connector (SC Type)



Safety Recommendations

The following guidelines will help to ensure your safety and protect the equipment. This list is not inclusive of all potentially hazardous situations that you may be exposed to as you install the module, so *be alert*.

- Never try to lift the chassis by yourself; *two people are required* to lift the switch.
- Always turn off all power supplies and unplug all power cords before removing the chassis front panel.
- Always unplug all power cords before installing or removing a chassis.
- Keep the chassis area clear and dust free during and after installation.
- Keep tools and chassis components away from walk areas.
- Do not wear loose clothing, jewelry (including rings and chains), or other items that could get caught in the chassis. Fasten your tie or scarf and sleeves.

Warning Metal objects heat up when connected to power and ground, and can cause serious burns.

Safety with Electricity

The supervisor engine, modules, and redundant (second) power supplies are designed to be removed and replaced while the system is operating without presenting an electrical hazard or damage to the system. Before removing a redundant power supply, ensure that the first supply is powered on. However, you must shut down the system before removing or replacing any of the replaceable components inside the front panel, for example, the backplane. Never install equipment that appears damaged.

Follow these basic guidelines when working with any electrical equipment:

- Before beginning any procedures requiring access to the chassis interior, locate the emergency power-off switch for the room in which you are working.
- Disconnect all power and external cables before installing or removing a chassis.
- Do not work alone when potentially hazardous conditions exist.
- Never assume that power has been disconnected from a circuit; always check.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.
- Carefully examine your work area for possible hazards such as moist floors, ungrounded power extension cables, and missing safety grounds.

In addition, use the guidelines that follow when working with any equipment that is disconnected from a power source but still connected to telephone wiring or other network cabling.

Warning Do not work on the system or connect or disconnect cables during periods of lightning activity.

- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.

Preventing Electrostatic Discharge Damage

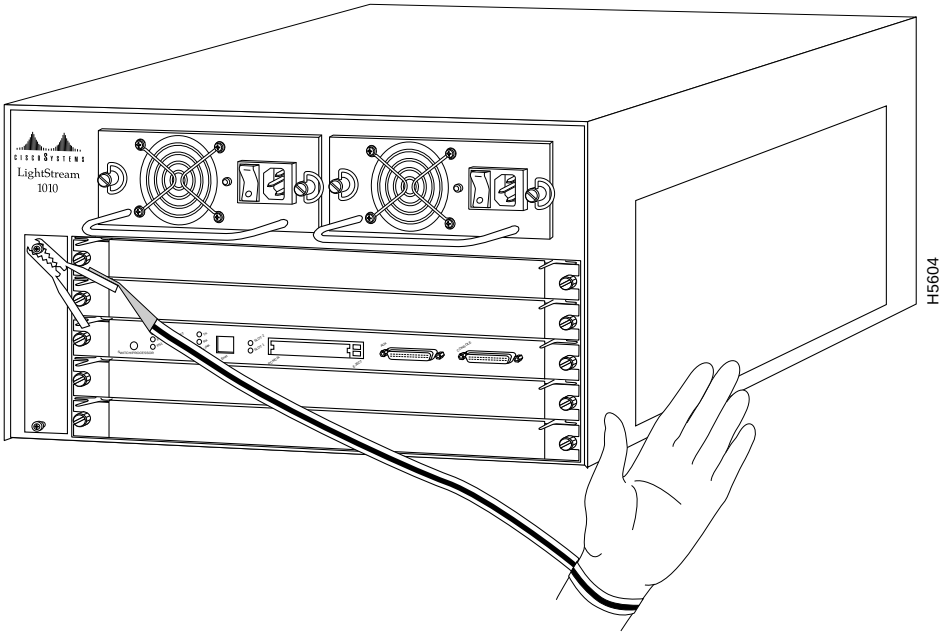
Electrostatic discharge (ESD) damage, which occurs when electronic cards or components are improperly handled, can result in complete or intermittent failures. Each PAM consists of a printed circuit card that is fixed in a metal carrier. Electromagnetic interference (EMI) shielding, connectors, and a handle are integral components of the carrier. Although the metal carrier helps to protect the cards from ESD, use a preventive antistatic strap whenever you handle the PAMs. Handle the carriers by the handles and the carrier edges only; never touch the cards or connector pins.

Caution Always tighten the captive installation screws on the PAMs when you are installing them. These screws prevent accidental removal of the PAMs, provide proper grounding for the system, and help to ensure that the bus connectors are properly seated in the backplane.

Following are guidelines for preventing ESD damage:

- Always use an ESD-preventive wrist or ankle strap and ensure that it makes good skin contact.
- When removing any module, connect the equipment end of the strap to one of the captive installation screws on an installed PAM or power supply. (See Figure 9.)

Figure 9 Placement of Electrostatic Discharge Wrist Strap



- Handle carriers by the faceplates and carrier edges only; avoid touching the card or any connector pins.
- When removing a module, place the removed module component-side up on an antistatic surface or in a static shielding bag. If the module will be returned to the factory, immediately place it in a static shielding bag.
- Avoid contact between the modules and clothing. The wrist strap protects only the card from ESD voltages on the body; ESD voltages on clothing can still cause damage.

Caution For safety, periodically check the resistance value of the antistatic strap. The measurement should be between 1 and 10 megohms (Mohms).

Installing and Replacing PAMs

All PAMs support hot-swapping, which allows you to install, remove, replace, and rearrange the PAMs without turning off the system power. When the system detects that a PAM has been installed or removed, it automatically runs diagnostic and discovery routines, acknowledges the presence or absence of the PAM, and resumes system operation without any operator intervention.

Caution The ASP is a required system component. Removing an ASP while the system is operating causes the system to shut down and may damage the processor.

What is Hot-Swapping?

The hot-swap feature allows you to remove and replace modules while the system is operating; you do not need to notify the software or shut down the system power. All CAMs and PAMs (except for the ASP) support hot-swapping.

Each CAM contains a bus-type connector that mates with the system backplane. Each card connector consists of a set of tiered pins, in three lengths. The pins send specific signals to the system as they make contact with the backplane. The system assesses the signals it receives and the order in which it receives them to determine what event is occurring and what task it needs to perform, such as reinitializing new interfaces or shutting down removed ones.

For example, when inserting a CAM, the longest pins make contact with the backplane first, and the shortest pins make contact last. The system recognizes the signals and the sequence in which it receives them. The system expects to receive signals from the individual pins in this logical sequence, and the ejector levers help to ensure that the pins mate in this sequence.

When you remove or insert a PAM, the backplane pins send signals to notify the system, which then performs as follows:

1. Rapidly scans the backplane for configuration changes.
2. Initializes all newly inserted PAMs, noting any removed interfaces and placing them in the administratively shutdown state.
3. Brings all previously configured interfaces on the PAM back to the state they were in when they were removed. If a PAM, similar to the one that was removed, has been reinserted into a slot, then its ports are configured and brought online up to the port count of the original PAM.

   Unconfigured PAMs installed for the first time start up in the shutdown state. The system identifies them as present but unconfigured. Each must be manually configured from the command line.[1]

Hot-swap functionality enables you to add, remove, or replace PAMs with the system online, which provides a seamless method to users on the network, maintains all routing information, and ensures session preservation.

When you insert a new PAM, the system runs a diagnostic test on the new interfaces and compares them to the existing configuration. If this initial diagnostic fails, the system remains offline for another 15 seconds while it performs a second set of diagnostic tests to determine whether or not the PAM is faulty and if normal system operation is possible.

If the second diagnostic test passes, which indicates that the system is operating normally and the new PAM is faulty, the system resumes normal operation but leaves the new interfaces disabled.

If the second diagnostic test fails, the system crashes, which usually indicates that the new PAM has created a problem in the bus and should be removed.

Caution To avoid erroneous failure messages, allow at least 15 seconds for the system to reinitialize and note the current configuration of all interfaces before you remove or insert another PAM.

Tools Required

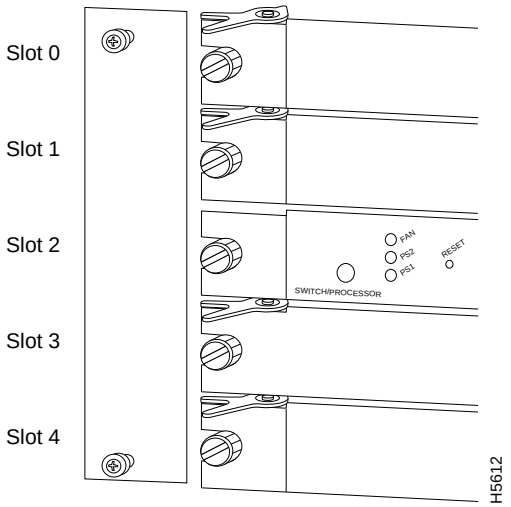
You need a 3/16-inch flat-blade screwdriver to remove any filler (blank) PAMs and to tighten the captive installation screws that secure the CAMs and PAMs in their slots. Whenever you handle CAMs and PAMs, you should use a wrist strap or other grounding device to prevent electrostatic discharge (ESD) damage. See the section “Preventing Electrostatic Discharge Damage” in the chapter “Preparing for Installation” in the *LightStream 1010 ATM Switch User Guide.*

1. Instructions for initial interface configurations are in the publication *LightStream 1010 ATM Switch Software Configuration Guide*.

Installing CAMs or PAMs

You can install CAMs in any of the four CAM slots numbered 0 through 4 from top to bottom when viewing the chassis from the front as shown in Figure 10. (The middle slot (number 2) contains the ASP, which is a required system component.) Blank CAM and PAM fillers are installed in CAMs or PAM slots without CAMs or PAMs to maintain consistent airflow through the module compartment. Refer to the *LightStream 1010 ATM Switch User Guide* for information about installing the CAM.

Figure 10 Slot Numbers

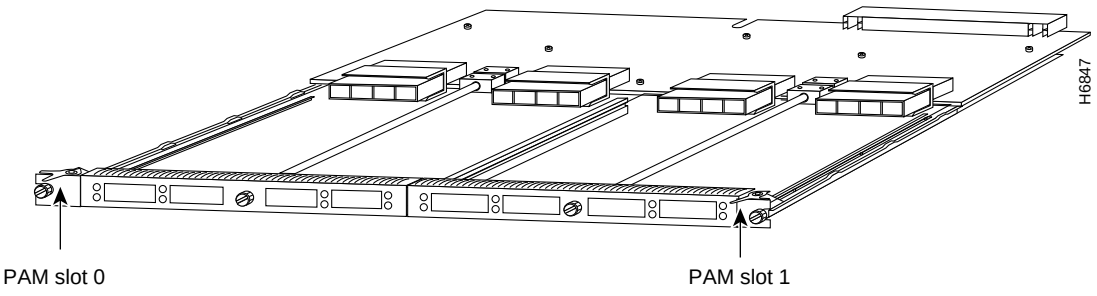


Following are detailed steps for removing PAMs and successfully performing hot-swap.

Caution Handle PAMs by the carrier edges only to prevent ESD damage.

Step 1 Choose a PAM slot (shown in Figure 11) in a CAM and make sure there is enough clearance to accommodate any interface equipment you connect directly to the PAM ports. If possible, place PAMs between empty slots that contain only PAM filler plates.

Figure 11 PAM Slot Numbers

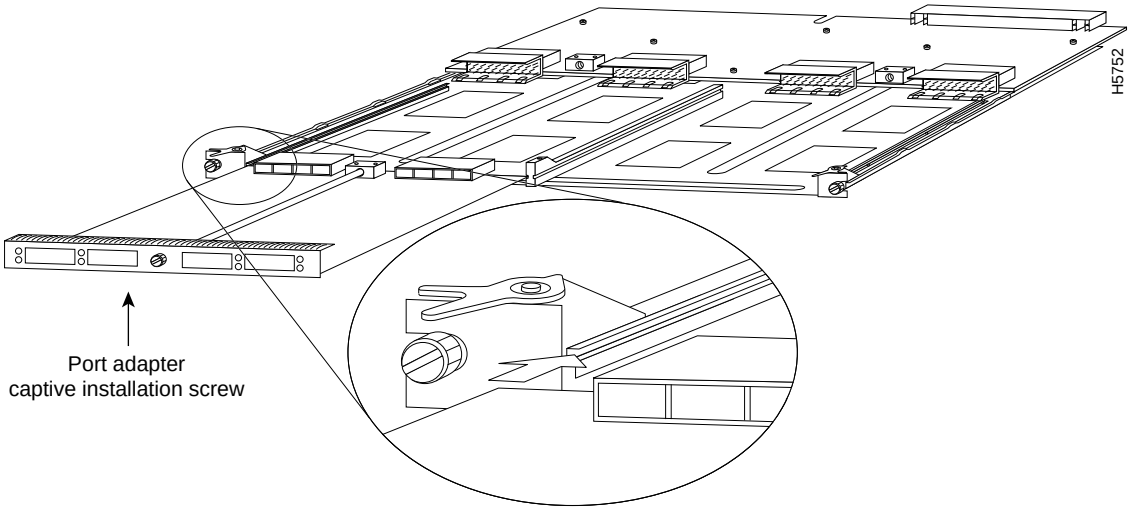


Step 2 PAMs are secured with one captive installation screw in the center of the faceplate. Use a 1/4-inch flat-blade screwdriver to loosen the captive installation screw and remove the PAM filler (or the existing PAM) from the PAM slot you want to use.

Step 3 Place the back of the PAM in the slot and align the notch on the sides of the module carrier with the groove in the slot. (See Figure 12.)

Step 4 Hold the PAM by both sides and guide it into the slot. Avoid touching the PAM's components.

Figure 12 PAM Carrier Installation



Step 5 Keep the PAM at a 90-degree orientation to the backplane, carefully slide the PAM into the slot until the faceplate makes contact with the CAM faceplate.

Step 6 Tighten the captive installation screw in the center of the PAM faceplate, using a 1/4-inch flat-blade screwdriver, and draw the PAM into the CAM connector until the PAM faceplate is flush with the CAM faceplate and the CAM is fully seated in the connector. (See Figure 12.)

Note Always use the captive screw to install or remove PAMs. A module that is partially seated in the CAM connector causes the system to halt and subsequently crash.

Step 7 Attach network interface cables or other devices to the interface ports.

Step 8 Check the status of the interfaces as follows:

- If this installation is a replacement PAM, use the **show configuration** or **show atm interface** [*card*/*subcard*/*port*] command to verify that the system has acknowledged the new interfaces and brought them up.
- See the publication *LightStream 1010 ATM Switch Software Configuration Guide* and *LightStream 1010 ATM Switch Command Reference* for all software instructions and information.

Caution All PAMs support hot-swapping. The ASP is a required system component. Removing an ASP while the system is operating will cause the system to shut down.

Sample Screen Display for Hot-Swapping Procedure

When you remove and replace CAMs and PAMs, the system provides status messages on the console screen. The messages are for information only. In the following sample display, you can follow the events logged by the system when a PAM was removed from slot 3/0. When the PAM is reinserted, the system marks the module as *ready* again.

```
Switch#
%OIR-6-REMCARD: Card removed from slot 3/0, interfaces disabled
%LINK-5-CHANGED: Interface 155UTP 3/0, changed state to administratively down
%LINK-5-CHANGED: Interface 155UTP 3/0, changed state to administratively down

Switch#

%OIR-6-INSCARD: Card inserted in slot 3/0, interfaces administratively shut down
%LINK-5-CHANGED: Interface 155UTP 3/0, changed state to up
%LINK-5-CHANGED: Interface 155UTP 3/0, changed state to up
```

Port Adapter Module Configurations

The PAMs support different media and interface types. The configuration commands used with these different PAMs vary according to PAM type. For complete PAM configuration information, refer to the publications *LightStream 1010 ATM Switch Configuration Guide* and *LightStream 1010 ATM Switch Command Reference.*

Configuring the Interfaces

After you install the module, use the following information to configure the module and the individual interfaces on the 622 MM/SM modules. In the *LightStream 1010 ATM Switch User Guide* the section “LightStream 1010 ATM Switch Hardware” contains an overview of the port and module numbering scheme used to configure the 622 PAMs. The section “Configuring the LightStream 1010 ATM Switch” describes how to configure the ports on the FDDI or CDDI module. The section “Confirming the Installation” describes the procedures you should use to confirm that the 622 PAMs are configured correctly.

Port Addresses

Each interface (or port) in the switch is designated by several different types of addresses. The *physical* interface address is the actual physical location (*card/subcard/port*) of the interface connector within the chassis. The system software uses the physical addresses to control activity within the switch and to display status information. These physical card/subcard/port addresses are not used by other devices in the network; they are specific to the individual switch and its internal components and software.

The following sections describe how the LightStream 1010 switch assigns and controls both the physical (card/subcard/port) and Media Access Control (MAC)-layer addresses for interfaces within the chassis.

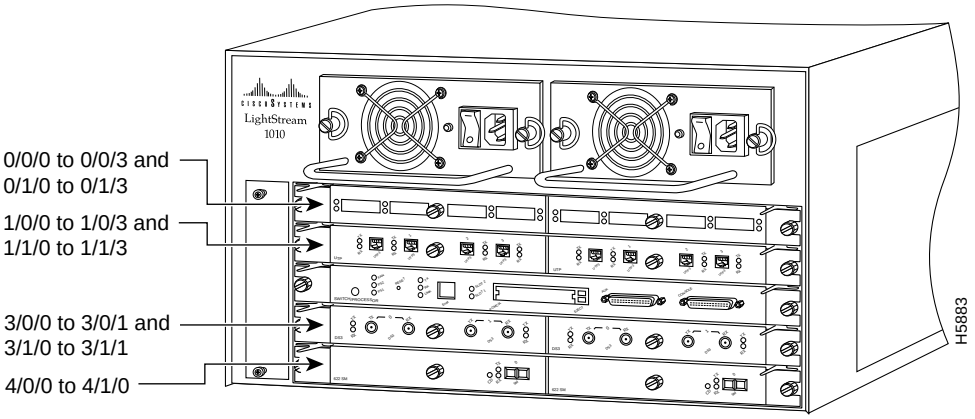
Port IDs

In the LightStream 1010 switch, the port ID specify the actual physical location of each PAM port on the front of the switch. (See Figure 13.) The address is composed of a three-part number in the format *card/subcard/port*. The first number identifies the slot in which the module is installed. Module slots are numbered 0 to 4 from top to bottom. The second number identifies the subcard or PAM number. The PAMs are numbered 0 and 1 with 0 being the left PAM facing the front of the switch. The third number identifies the physical port number on the module. The port numbers

always begin at 0 and are numbered from the left port to the right port, facing the front of the switch. The number of additional ports (/1, /2, and so on) depends on the number of ports available on the module.

Interface ports maintain the same port ID regardless of whether other modules are installed or removed. However, when you move a module to a different slot, the first number in the address changes to reflect the new slot number. For example, on a 4-port 155 UTP PAM in chassis slot 1 in PAM slot 0, the address of the left port is 1/0/0 and the address of the right port is 1/0/3. If you remove the 4-port 155 UTP PAM from slot 1 and install it in slot 4, the addresses of those same ports become 4/0/0 and 4/0/3.

Figure 13 ATM Interface Port ID Address Examples



You can identify module ports by physically checking the card/subcard/port location on the front of the switch. You can also use software commands to display information about a specific interface, or all interfaces, in the switch. To display information about every interface, use the **show interface** command without parameters. To display information about a specific interface, use the **show interface** command with the interface type and port address in the format **show interface atm** *card/subcard/port*. This command is described in the *LightStream 1010 ATM Switch Command Reference* publication.

622 SM/MM Configuration Defaults

When the switch is powered on initially without any previous configuration data, the ATM interfaces are configured automatically on the physical ports. ILMI and the physical card type are used to automatically derive the ATM interface type, UNI version, maximum VPI and 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 defaults apply to the OC12 PAM:

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

You can accept the default ATM interface configuration or overwrite the default interface configuration using the command line interface commands. These commands are described in the section “Configuring Virtual Connections” in the *LightStream 1010 ATM Switch Software Configuration Guide*.

To test the configuration refer to the section “Confirming the Installation” in the *LightStream 1010 ATM Switch User Guide*.

Cisco Connection Online

Cisco Connection Online (CCO), formerly Cisco Information Online (CIO), is Cisco Systems' primary, real-time support channel. Maintenance customers and partners can self-register on CCO to obtain additional content and services.

Available 24 hours a day, 7 days a week, CCO provides a wealth of standard and value-added services to Cisco's customers and business partners. CCO services include product information, software updates, release notes, technical tips, the Bug Navigator, configuration notes, brochures, descriptions of service offerings, and download access to public and authorized files.

CCO serves a wide variety of users through two interfaces that are updated and enhanced simultaneously—a character-based version and a multimedia version that resides on the World Wide Web (WWW). The character-based CCO supports Zmodem, Kermit, Xmodem, FTP, Internet e-mail, and fax download options, and is excellent for quick access to information over lower bandwidths. The WWW version of CCO provides richly formatted documents with photographs, figures, graphics, and video, as well as hyperlinks to related information.

You can access CCO in the following ways:

- WWW: `http://www.cisco.com`.
- Telnet: `cco.cisco.com`.
- Modem: From North America, 408 526-8070; from Europe, 33 1 64 46 40 82. Use the following terminal settings: VT100 emulation; databits: 8; parity: none; stop bits: 1; and baud rates up to 14.4 kbps.

For a copy of CCO's Frequently Asked Questions (FAQ), contact `cco-help@cisco.com`. For additional information, contact `cco-team@cisco.com`.

Note If you are a network administrator and need personal technical assistance with a Cisco product that is under warranty or covered by a maintenance contract, contact Cisco's Technical Assistance Center (TAC) at 800 553-2447, 408 526-7209, or `tac@cisco.com`. To obtain general information about Cisco Systems, Cisco products, or upgrades, contact 800 553-6387, 408 526-7208, or `cs-rep@cisco.com`.

This document is to be used in conjunction with the *LightStream 1010 ATM Switch User Guide and the LightStream 1010 ATM Switch Command Reference* publication.