CHAPTER 3

Installing the Router

This chapter provides the following procedures for installing the router, making all external cable connections, turning on the system power, and verifying that the system initializes properly:

- Installing the chassis in an equipment rack (optional, but strongly recommended) or on a tabletop
- Installing the cable management bracket (optional, but recommended)
- Making external connections
- Starting the router

The rack-mount kit provides the hardware for mounting the chassis in a standard 19-inch-wide equipment rack or in a Telco-type rack. If you are installing an equipment shelf or using mounting hardware other than that supplied with the chassis, review the guidelines in the section "Equipment Racks" in the chapter "Preparing for Installation," then proceed to "General Installation" in this chapter after the router is installed in the rack.

A cable management bracket is also included with the chassis. Install these fixtures to keep network interface cables untangled and orderly, and to maintain clear access to interface processors in the lower interface processor slots.

Rack-Mounting the Chassis

The procedures for rack-mounting the router are included in the configuration note *Cisco 7513 Rack-Mount Kit Installation Instructions* (Document Number 78-2023-xx, where xx is the latest version). A printed copy of this configuration note ships with the rack-mount kit. Follow the procedures included in the configuration note to rack-mount your Cisco 7513.

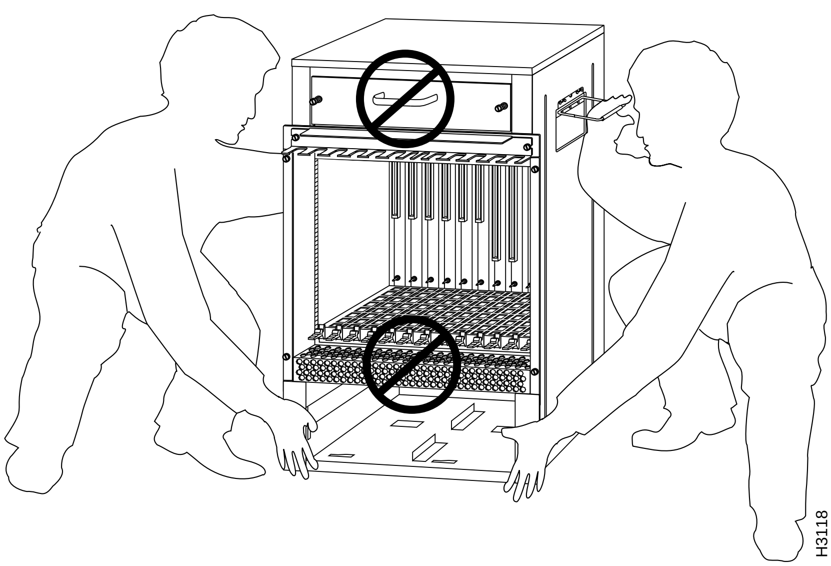
Note If you do not plan to rack-mount your chassis, proceed to the following section "General Installation."

Warning The chassis weighs approximately 160 pounds (72.6 kg) fully configured. To prevent injury, have someone help you lift the chassis.

Note We recommend that you reduce the weight of the chassis by removing the blower module, processor modules, and card cage assembly; however, this is not required.

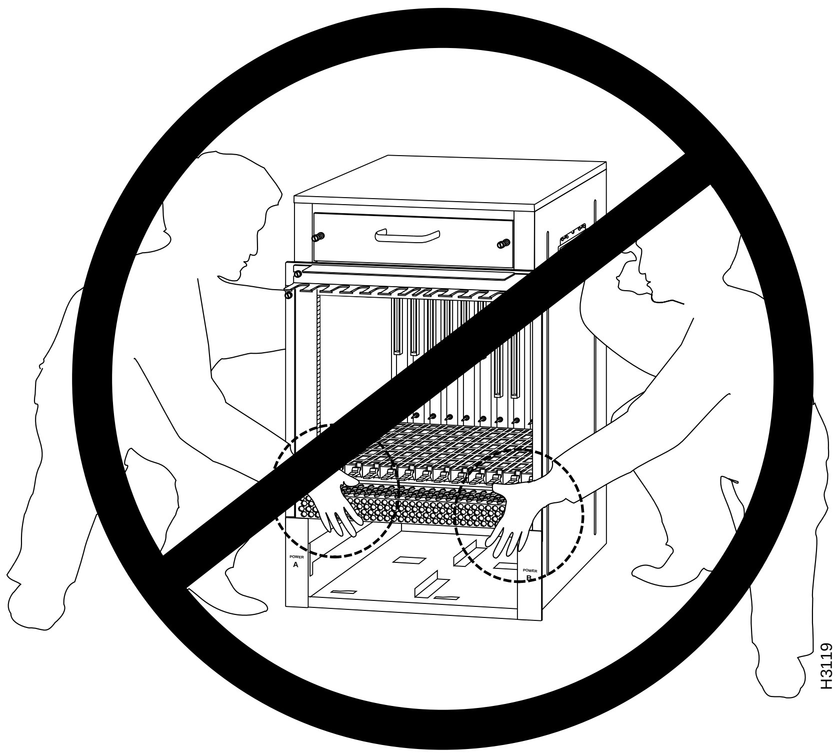
When you get ready to place the chassis into a rack or onto a tabletop, you should lift the chassis by grasping the handle with one hand and the bottom of the chassis with the other, and lift with your legs, as shown in Figure 3-1. (Do *not* lift the chassis using the blower module handle or the air intake vent below the card cage.)

Figure 3-1 Correct Way to Lift the Cisco 7513



Caution To prevent damage to the air intake vent below the card cage, do *not* lift the chassis by grasping the handle with one hand and the bottom of the card cage with the other, as shown in Figure 3-2. The air intake vent is not designed to support the weight of the chassis.

Figure 3-2 Incorrect Way to Lift the Cisco 7513



General Installation

The router should already be in the area where you will install it, and your installation location should already be determined; if not, refer to the section "Site Requirements" in the chapter "Preparing for Installation."

When installing the router on a tabletop, ensure that you have planned a clean, safe location for the chassis and have considered the following:

- The location does not block the chassis front and rear, where the exhaust and intake vents for cooling air are located; allow at least six inches of clearance.
- Multiple chassis can be installed in equipment racks with only an inch or more of vertical clearance.
- Do not place the router on the floor. Floors accumulate dust, which would be drawn into the chassis interior by the fans. Excessive dust inside the chassis interior can cause overtemperature conditions and component failures. A raised platform or sturdy table provides a cleaner environment than the floor.
- When deciding where to install any equipment, consider future maintenance requirements. Allow approximately 19 inches behind the chassis for installing or replacing processor modules, the blower module, power supplies, or making/adding network connection cables or equipment.

If you do not mount the router in a rack, follow these steps to install the router on a bench or tabletop:

Step 1 Make sure that the area in which you will install the router is free of debris and dust. Also make sure your path between the router and its new location is unobstructed.

Step 2 On the chassis, ensure that all captive screws (on the processor modules and on the access cover) are tightened and the components are secure.

Warning To prevent damage to the chassis or personal injury, never attempt to lift or tilt the chassis with the interface processor handles, which are not designed to support the weight of the chassis.

Step 3 Lift the chassis by placing your hands around the chassis sides and lifting the chassis from underneath. (See Figure 3-1.) Avoid sudden twists or moves to prevent injury.

Step 4 Place the router in a location where the air inlet vents on the front and rear of the chassis are not obstructed, nor are the air inlet vents drawing in exhaust air from other equipment.

Step 5 Ensure that the new location allows adequate clearance around the chassis for maintenance.

Step 6 After the router is in place, proceed to the next section to connect the interface cables.

Installing the Cable Management Bracket

The cable management bracket attaches to the interface processor end of the chassis just above the card cage and below the blower module. Use the bracket to keep network interface cables untangled and orderly, and to prevent cables from hindering access to interface processors in the interface processor slots.

Install the bracket before connecting network interface cables to the interface processor ports; otherwise, you will probably need to disconnect the cables to install the screws that secure the brackets. Route interface cables through the cable management bracket as you connect them to the interface processor ports. If necessary, wrap cable ties through the holes provided to secure small-gauge cables.

Tools and Equipment

You will need the following tools and parts to install the cable management brackets; the brackets and panhead screws are included with the chassis:

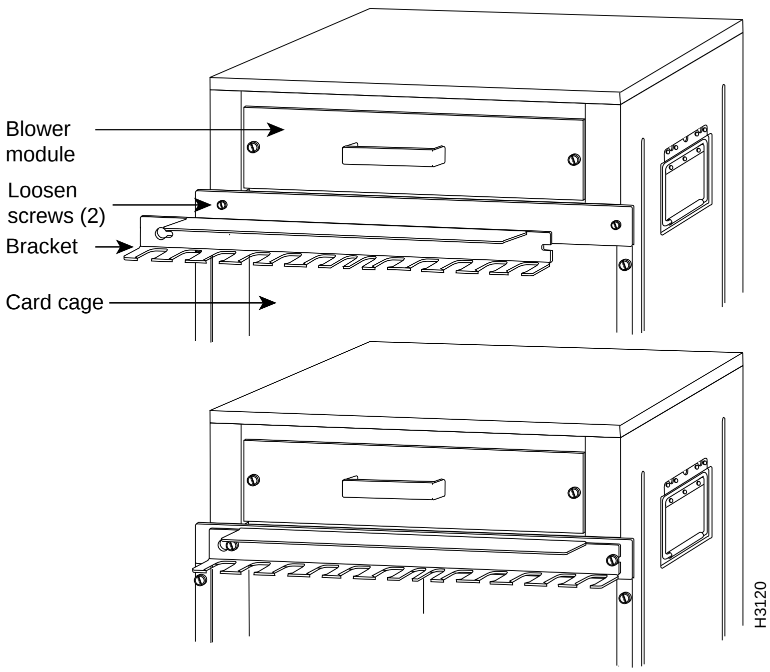
- Large flat-blade screwdriver
- One cable management bracket and two slotted panhead screws (already attached to the chassis)

Installing the Bracket

Follow these steps to install the cable management bracket on the router:

Step 1 On the interface processor end of the chassis, locate the two slotted screws positioned below the blower module and above the card cage. (See Figure 3-3.)

Figure 3-3 Cable Management Bracket



Step 2 Use a flat-blade screwdriver to loosen the two slotted screws approximately 1/8-inch.

Step 3 Place the bracket over the screws (see Figure 3-3), and slide the bracket to the right.

Step 4 Use a flat-blade screwdriver to tighten the screws.

Step 5 When installing the network interface cables, route the cables to the cable management bracket as shown in Figure 3-3. If you are using very thin cables that slip through the bracket openings, insert cable ties through the holes in the bracket and wrap them around the cables to secure them.

It might be necessary to bundle longer cables to avoid tangling them. Do this at the cable management bracket or at the rack, but leave enough room to remove processor modules and change cables as required. Also, do not block the power supply air vents with cables.

This completes the procedure for installing the cable management bracket.

Proceed to the next section to connect the power cables.

Connecting Power

Connect a 1200W, AC-input power supply as follows:

Step 1 Plug the power cable into the AC receptacle on the power supply.

Note Wiring codes prevent 20A plugs from being used with most equipment rack power strips. The installation must comply with all applicable codes. The ground bond fastening hardware should be of compatible material and preclude loosening, deterioration, and electro-chemical corrosion of hardware and joined material. Installation is approved for use with copper conductors only. Attachment of the chassis ground receptacles to the central office or other interior ground system should be made with a Number 6 AWG copper ground conductor as a minimum. The Cisco 7513 chassis employs two threaded, M4 x .7 chassis ground receptacles. These receptacles are intended to be bonded directly to the central office or other interior ground system, and are located on each side of the rear of the chassis as shown in Figure 1-1. The chassis ground receptacles require M4 bolts and locking hardware, which are not included.

Step 2 To secure the cable in the power supply AC receptacle, screw the cable-retention band until it tightens around the connector. The cable-retention band provides strain relief for the AC power cable.

Step 3 Connect the power supply cable to the AC source.

Connect a 1200W, DC-input power supply as follows:

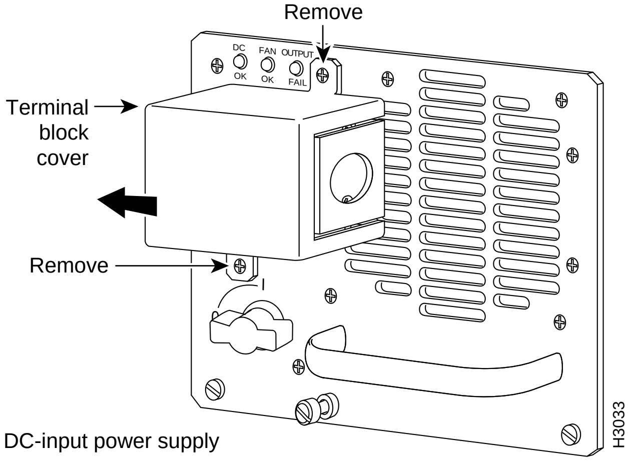
Step 1 Disconnect the DC-input power cable from the DC power source.

Step 2 Disconnect the conduit, through which the DC-input cable runs, from the terminal cover. This step is dependent on your site and how this conduit is attached.

Step 3 Loosen or remove the screws on the terminal block cover so the cover can slide free of the terminal block. (See Figure 3-4.)

Step 4 Slide the terminal block cover away from the terminal block, in the direction shown by the large arrow in Figure 3-4.

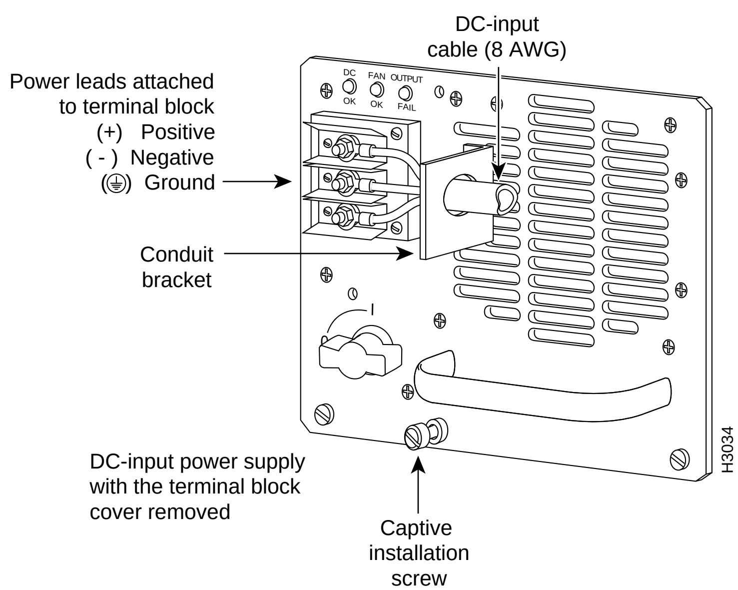
Figure 3-4 Removing and Replacing the Terminal Block Cover



Caution To maintain agency compliance requirements and meet EMI emissions standards in Cisco 7513 chassis with a single power supply, the power supply blank must remain in the power supply bay adjacent to the power supply. *Do not* remove this blank from the chassis unless you do so to install a redundant power supply. To prevent system problems, do not mix AC-input and DC-input power supplies in the same chassis.

Step 5 Using a hex-head nut driver or equivalent socket, attach the ground wire to the ground terminal. This connection *must* be made before connecting the other terminals. (See Figure 3-5.)

Figure 3-5 Removing and Replacing the DC-Input Power Cable



Step 6 Attach and tighten the positive (+) and negative (–) leads to the terminal block. (See Figure 3-5.) Verify that you are connecting the appropriate leads to the correct terminal block posts.

Step 7 Check the power supply's wiring and color code to verify that they match the wiring and color code at the DC source.

Step 8 If not already done, route the DC-input power cable through the conduit from your power source, through the conduit bracket on the power supply (see Figure 8), and make a sufficient length of wire available to attach to the three terminal block connections.

Step 9 Attach and tighten the conduit to the conduit bracket. How this conduit is attached depends on your site; its attachment is beyond the scope of this documentation.

Warning Incorrectly wiring the terminal block could create a shock hazard and could damage the power supply, power source, and the Cisco 7513 chassis components. Make certain there are no loose strands that could cause a short circuit of the power supply and power source.

Step 10 Replace the terminal block cover. (See Figure 3-4.)

Warning To prevent a short circuit or shock hazard after wiring the DC-input power supply, replace the terminal block cover.

Step 11 Verify that the power switch is in the OFF (O) position, and connect the DC-input power cable to the DC power source.

This completes the power connections.

Connecting Interface Cables

The following sections describe the basic network connections you will make to the router. Using the Port and Slot Configuration Worksheet in Table 2-18 will help you to make connections and later configure each interface without having to access the rear of the chassis to check port addresses. Complete the Port and Slot Configuration Worksheet in Table 2-18 if you have not already done so.

External Cabling Guidelines

The following guidelines will assist you in properly connecting the external network cables to the router interface ports.

Warning Invisible laser radiation may be emitted from the aperture ports of the single-mode FDDI and Synchronous Optical Network (SONET) products when no fiber cable is connected. *Avoid exposure and do not stare into open apertures.* This product meets the Class 1 Laser Emission Requirement from the Center for Devices and Radiological Health (CDRH) FDDI.

- Make certain that you connect the correct interface types.

  All FSIP serial ports are a high-density 60-pin receptacle. Each port requires a serial port adapter cable to connect to the external network. The cable determines both the electrical interface type and mode of the port to which it is connected. The network end of each adapter cable type is the industry-standard connector normally used for the interface type. (For example, the EIA/TIA-232 port adapter cable has a standard DB-25 connector at the network end.) Following are guidelines for connecting serial interface cables:

  — A label that identifies the electrical interface type and mode is molded into the cable connectors.

  — EIA/TIA-232 and EIA-530 are the only interface types that use the same type of connector, a DB-25. If you are using both EIA/TIA-232 DTE mode and EIA-530, check the labels carefully.

  — Generally, cables for DTE mode use a plug at the network end, and cables for DCE mode use a receptacle at the network end. An exception is the V.35 cables, which are available with either a plug or receptacle in either mode.

- Verify the interface numbers (also called *port numbers*) on the rear of the chassis and the cables you will connect to each.

  Each port has a unique address composed of the interface processor slot number and the port number on the interface processor. For a description of interface addresses, refer to the section “Addresses and Port Numbers” in the chapter “Product Overview.”

- Avoid crossing high-power cables with interface cables.

  Crossing high-power cables with interface cables can cause interference in some interface types. It will not always be possible to avoid this, but try to prevent it whenever possible.

- Install and use the cable management brackets.
- We recommend that you install and use the cable management brackets that are included with the router; these brackets will help keep your cables organized and untangled, and will enable access to interface processors without having to disconnect interface cables from adjacent interface processors unnecessarily. (See "Rack-Mounting the Chassis" in this chapter.)
- Use all available cable strain-relief systems.

  Most interfaces provide some type of strain relief to prevent the cables from being accidentally disconnected. Among these types of strain relief are the slide fasteners on Ethernet cables, the cable retention clip on the power supply cord, and the screw-type fasteners on serial cables. The cable management brackets can also help to provide strain relief, especially when you use cable ties to secure the cables to the brackets. Use all strain-relief devices provided to prevent potential problems caused by inadvertent cable disconnection.

- Verify proper interface cabling before starting the system.

  Before applying power to the system, prevent unnecessary problems or component damage by double-checking your cabling.

- Verify all cabling limitations before applying power to the system.

  When setting up your system, you must consider a number of factors related to the cabling required for your connections. For example, when using EIA/TIA-232 connections, be aware of the distance and electromagnetic interference limitations. For cabling distances and other requirements, refer to the section "Site Requirements" in the chapter "Preparing for Installation."

- Check the power cord and power supply for compatibility with your power service.

  Check the labels on the equipment and ensure that the power service at your site is suitable for the chassis you are connecting. If you are not sure, refer to the section "AC and DC Power" in the chapter "Preparing for Installation."

Warning A voltage mismatch can cause equipment damage and may pose a fire hazard. If the voltage indicated on the label is different from the source power voltage, *do not connect the chassis to that power source*.

Tools and Equipment

Have the following tools on hand to secure interface cables and complete the installation:

- Number 1 Phillips screwdriver
- 3/16-inch flat-head screwdriver
- Cable management kit
- Nylon cable ties

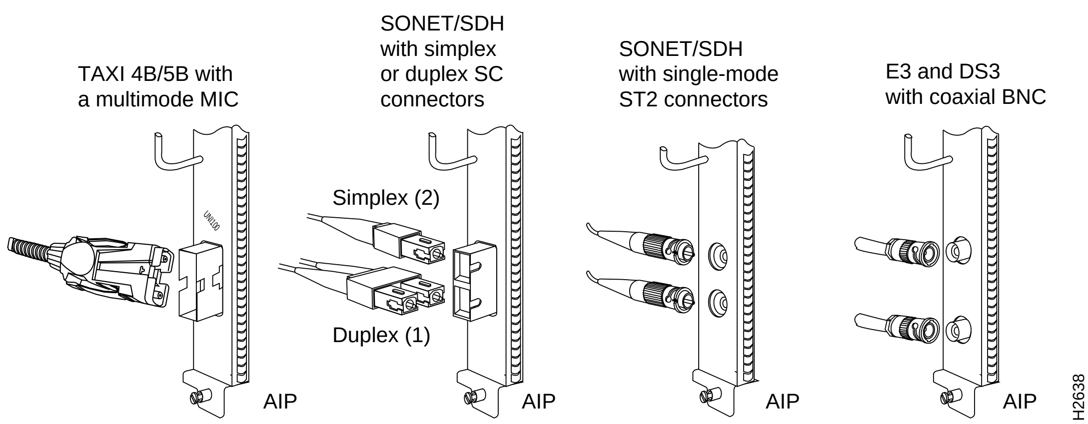
The sections that follow provide illustrations of the connections between the router interface ports and your network(s). Network interface equipment, such as Ethernet transceivers, MAUs, and CSUs, should be available and in place already. If they are not, refer to the section "Preparing Network Connections" in the chapter "Preparing for Installation" for descriptions of the equipment you need for each interface type to complete the connection to your network.

ATM Connections

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

The AIP provides an interface to ATM switching fabrics for transmitting and receiving data at rates of up to 155 Mbps bidirectionally; the actual rate is determined by the physical layer interface module (PLIM). Figure 3-6 illustrates the types of connections available for the AIP.

Figure 3-6 ATM Connections to the AIP—Partial Views of the AIP



Note The PLIM in your AIP determines which connection you can use.

The AIP can support the following physical layers:

- TAXI 4B/5B 100 Mbps multimode fiber optic
- SONET/SDH 155 Mbps multimode fiber optic—STS-3C or STM-1
- SONET/SDH 155 Mbps single-mode fiber optic—STS-3C or STM-1
- E3 34 Mbps coaxial cable
- DS3 45 Mbps coaxial cable

Caution To ensure compliance with EMI standards, the E3 PLIM connection requires an EMI filter clip (CLIP-E3-EMI) on the receive port (RCVR); the DS3 PLIM connection does not require this clip. Figure 3-7 shows the EMI filter clip assembly that is required for the E3 PLIM. Do *not* operate the E3 PLIM without this assembly.

Note The E3 and DS3 PLIMs require cable CAB-ATM-DS3/E3. If you have an E3 PLIM, you must follow Steps 1 through 3 to install the CAB-ATM-DS3/E3 cable and EMI filter assembly. If you do not have an E3 PLIM, proceed to the appropriate section for your configuration.

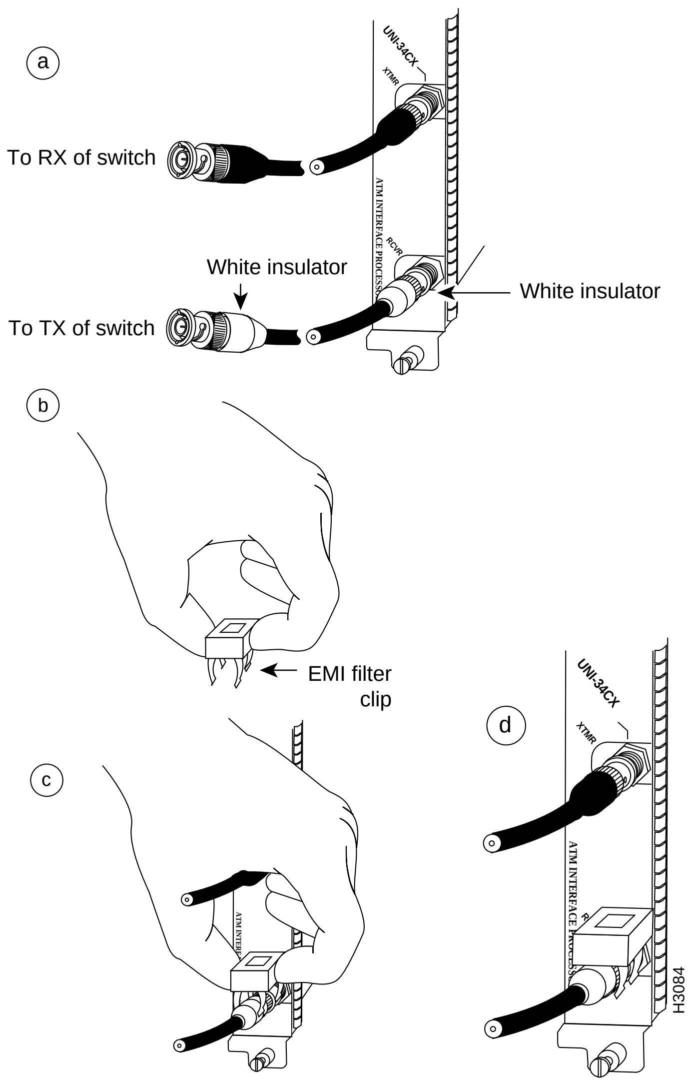
Step 1 Attach the CAB-ATM-DS3/E3 cable to the transmit (XMTR) and receive (RCVR) ports on the E3 PLIM. (See Figure 3-7a.)

One portion of the cable has a white insulator on both ends to ensure that the receive-to-transmit and transmit-to-receive relationship is maintained between the E3 PLIM and your ATM switch. The portion of the cable with the white insulators should attach between receive and transmit ports *or* transmit and receive ports of the E3 PLIM and your ATM switch, respectively.

Step 2 Hold the EMI filter clip as shown in Figure 3-7b and attach it to the receive cable as shown in Figure 3-7c.

Step 3 To ensure that the clip is not pulled off when adjacent interface processors are removed, position the clip parallel to the orientation of the AIP. (See Figure 3-7d.)

Figure 3-7 Installing the CAB-ATM-DS3/E3 Cable and EMI Filter Clip Assembly



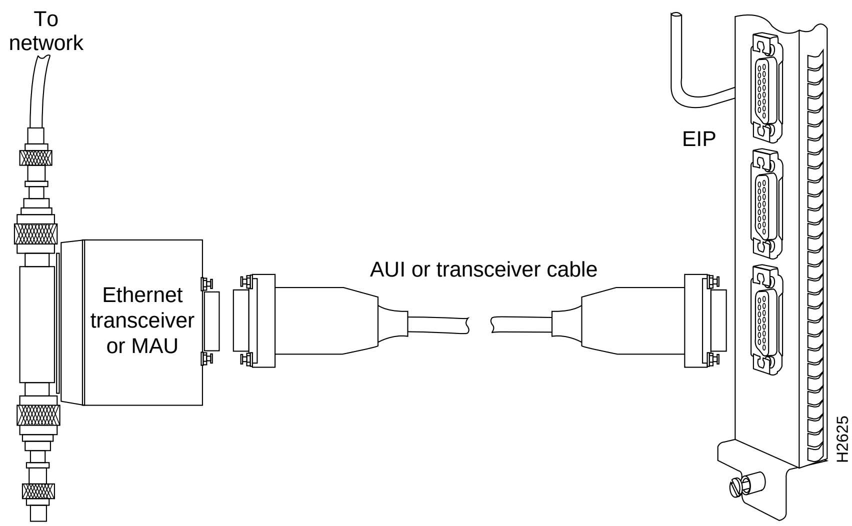
For more information on the AIP, refer to the sections “Distance Limitations and Interface Specifications” and “ATM Connection Equipment” in the chapter “Preparing for Installation” and the section “Configuring the AIP” in the chapter “Maintaining the Router.”

Also refer to the *Asynchronous Transfer Mode (ATM) Interface Processor (AIP) Installation and Configuration* publication (Document Number 78-1214-xx), which is available on UniverCD or in print.

Ethernet Connections

An Ethernet transceiver or MAU should already be connected to your network. Connect each Ethernet port on the EIP to an Ethernet transceiver with a transceiver cable, or to an attachment unit with an attachment unit interface (AUI). Figure 3-8 shows an example of a typical connection. Some transceivers connect directly to the Ethernet port on the EIP (usually the 10BaseT type) and do not require an interface cable. On each EIP port, slide the metal bracket up over two posts on the cable connector, or tighten the thumbscrews to secure the cable in the port and provide strain relief. For descriptions of the connection equipment and connector locks, refer to the section “Ethernet Connection Equipment” in the chapter “Preparing for Installation.”

Figure 3-8 Ethernet Connections



Fast Ethernet Connections

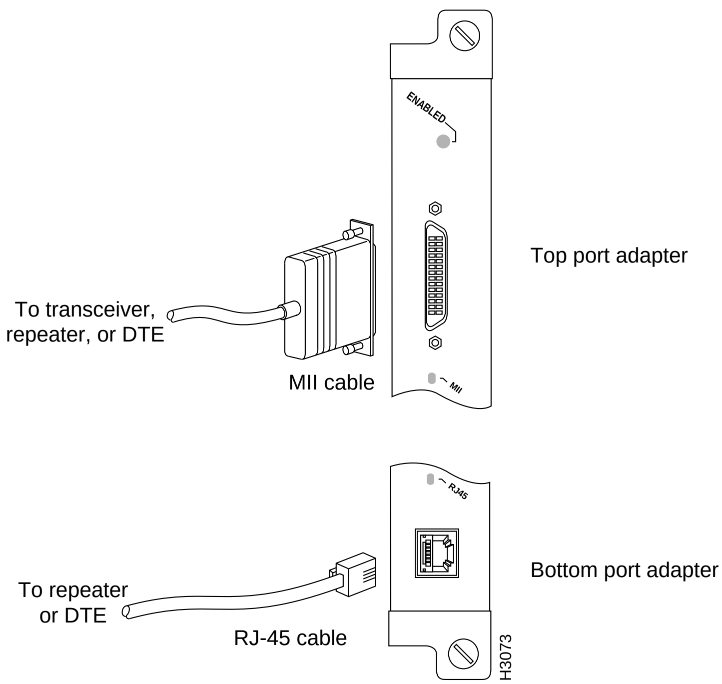
For an MII connection, a 100BASE-T transceiver or MAU should already be connected to your network. The RJ-45 connection does not require an external transceiver.

On a single 100BASE-T port adapter, you can use *either* the RJ-45 connection *or* the MII connection. If you have two 100BASE-T port adapters on your FEIP, you can use the RJ-45 connection on one and the MII connection on the other.

Note D*o not* simultaneously connect MII *and* RJ-45 cables to one 100BASE-T port adapter. RJ-45 and MII cables are not available from Cisco Systems.

If you have RJ-45 connections, attach the Category 5 UTP cable directly to the RJ-45 port on the FEIP. (See Figure 3-9.) If you have MII connections, attach an MII cable directly to the MII port on the FEIP or attach a 100BASE-T or 100BASE-F transceiver, with the media appropriate to your application, to the MII port on the FEIP.

Figure 3-9 Fast Ethernet Connections



Attach the network end of your RJ-45 or MII cable to your 100BASE-T or 100BASE-F transceiver, switch, hub, repeater, DTE, or whatever external 100BASE-T equipment you have.

Caution To prevent problems on your FEIP and network, do not simultaneously connect RJ-45 and MII cables to one 100BASE-T port adapter. On a single 100BASE-T port adapter, only one network connection can be used at one time. Only connect cables that comply with EIA/TIA-588 standards.

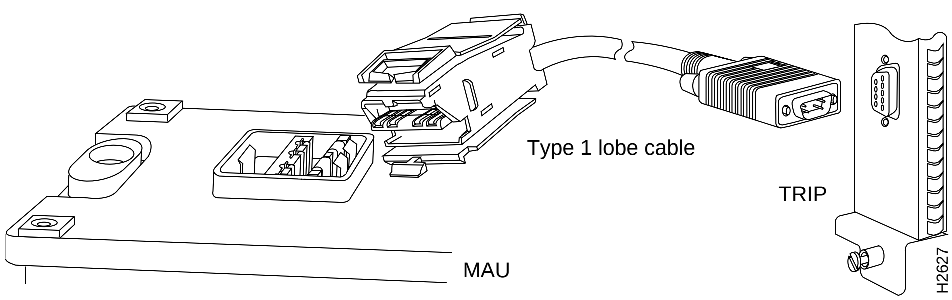
Channel Attachment Connections

Connecting bus and tag or Enterprise System Connection (ESCON) cables between the CIP, or CIP2, and a host processor is beyond the scope of this publication. The specific connection requirements are discussed in detail in the *Channel Interface Processor (CIP) Installation and Configuration* (Document Number 78-1342-xx) or *Second-Generation Channel Interface Processor (CIP2) Installation and Configuration* (Document Number 78-3335-xx) publications. These configuration notes, which ship with the CIP and CIP2 (respectively) installed in your chassis, are available on UniverCD or in print.

Token Ring Connections

Each Token Ring interface connects to the ring through a MAU or a multistation access unit (MSAU), which should already be connected to the ring. (See Figure 3-10.) Connect the Type 1 or Type 3 lobe cables to the appropriate TRIP ports and tighten the thumbscrews to secure the cable in the port and provide strain relief. Then connect the network end of each lobe cable to the MAU or MSAU. For descriptions of the connection equipment, refer to the section "Token Ring Connection Equipment" in the chapter "Preparing for Installation."

Figure 3-10 Token Ring Connections



The speed of each Token Ring port must match the speed of the ring to which it is connected. The default speed for all TRIP ports is 4 Mbps, which you can change to 16 Mbps on any port with the configuration command **ring-speed** *n*, where *n* is the speed (4 or 16) in Mbps. Before you enable the Token Ring interfaces, ensure that each is set for the correct speed, or it can bring the ring down. The following sample session changes the ring speed on Token Ring port 1/2 from the default 4 Mbps to 16 Mbps:

```
Router# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# int tokenring 1/2
Router(config-if)# ring-speed 16
Router(config-if)# ^Z
Router# copy running-config startup-config
[OK]
Router#
```

Caution To prevent problems on the ring, each TRIP port must be configured for the same ring speed as the ring to which it is connected: either 4 or 16 Mbps. If the port is set for a different speed, it will cause the ring to beacon, which effectively brings the ring down and makes it inoperable.

FDDI Connections

Both single-mode and multimode connections are available and can be combined on one FIP. The fiber-optic cable connects directly to the FIP ports. Single-mode uses separate transmit and receive cables. You will need two single-mode cables for a single attachment connection or four cables for a dual attachment connection. Multimode uses one integrated transmit/receive cable for each physical interface (one for PHY A and one for PHY B). You will need one multimode cable for a single attachment connection, and two cables for a dual attachment connection. Figure 3-16, which shows the connections for a dual attachment connection that uses both single-mode and multimode fiber, illustrates the types of connections used for both fiber modes. For cable and connector descriptions, refer to the section “FDDI Connection Equipment” in the chapter “Preparing for Installation.”

Note Each station in a ring refers to its neighbor stations as *upstream* or *downstream* neighbors. The *stream* is based on the signal flow on the primary ring. A station receives the primary signal from its upstream neighbor and transmits the primary signal to its downstream neighbor.

This section also provides instructions for connecting an optical bypass switch to a dual attachment multimode network connection. Because the method of connecting optical bypass switches varies between different manufacturer’s models, refer to the documentation for your particular bypass switch for correct connection instructions. If you are installing an optical bypass switch, proceed to “Installing an Optical Bypass Switch” in this chapter.

Warning Invisible laser radiation may be emitted from the aperture ports of the single-mode FDDI products (CX-FIP-SS, CX-FIP-SM, and CX-FIP-MS) when no fiber cable is connected. *Avoid exposure and do not stare into open apertures*. This product meets the Class 1 Laser Emission Requirement from CDRH FDDI.

Single Attachment Connections

A FIP that is connected as a single attachment station (SAS) typically is connected to the ring through a concentrator. The FIP receives and transmits the signal through the same physical interface, usually PHY A. Depending upon whether you are connecting to a single-mode or multimode fiber network, connect the FIP as follows:

- Single-mode—Connect one single-mode interface cable to the PHY A transmit port and one to the PHY A receive port. (See Figure 3-11.) Connect the opposite end of each cable to the concentrator transmit and receive ports as specified by the concentrator manufacturer.
- Multimode—Connect the multimode interface cable between one of the M ports on the concentrator and the PHY A port on the FIP. (See Figure 3-12.) Be sure to observe and match the port labels on the MIC and the FIP ports; connect the receive side of the cable to the PHY A receive port. Follow the concentrator manufacturer’s instructions for connecting the opposite end of the cable.

If you are connecting other FIPs as dual attachment stations (DASs), proceed to the following section.

Figure 3-11 Single Attachment Station, Single-Mode Fiber Network Connections

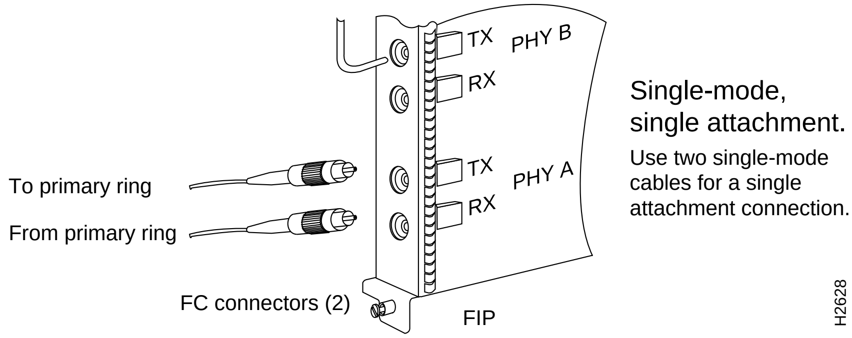
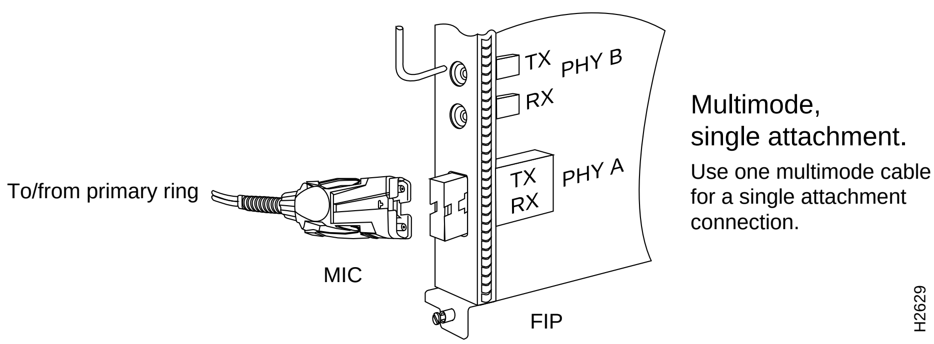


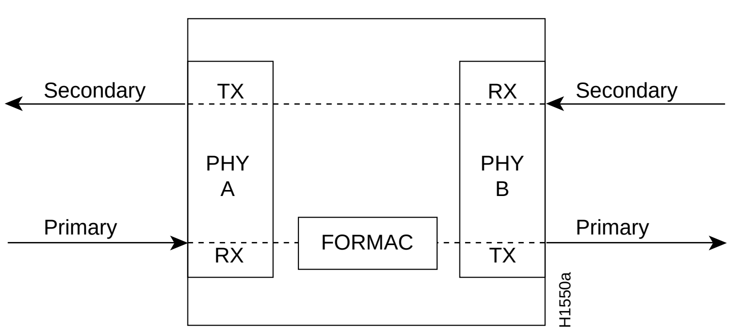
Figure 3-12 Single Attachment Station, Multimode Fiber Network Connections



Dual Attachment Connections

A FIP that is connected as a DAS connects to both the primary and secondary rings. The signal for each ring is received on one physical interface (PHY A or PHY B) and transmitted from the other. The standard connection scheme (which is shown in Figure 3-13) for a DAS dictates that the primary ring signal comes into the FIP on the PHY A receive port and returns to the primary ring from the PHY B transmit port. The secondary ring signal comes into the FIP on the PHY B receive port and returns to the secondary ring from the PHY A transmit port. Failure to observe this relationship will prevent the FDDI interface from initializing. Figure 3-16 shows the connections for a dual attachment that uses both multimode and single-mode fiber.

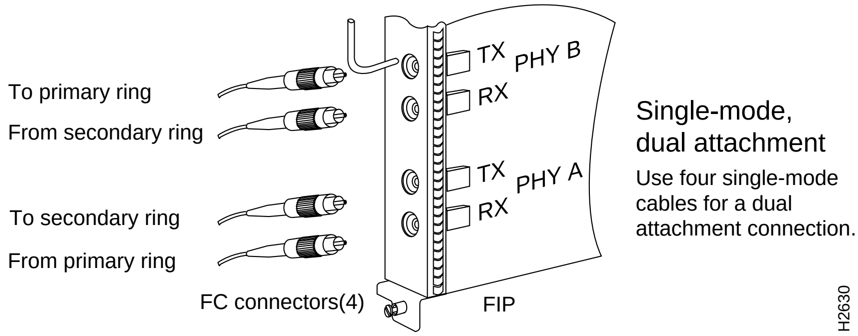
Figure 3-13 FDDI DAS Ports



Depending upon whether you are connecting to a single-mode or multimode fiber network, connect the FIP as follows:

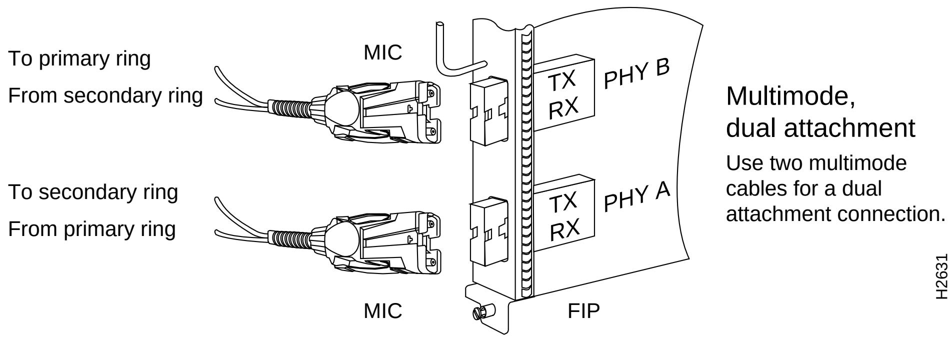
- Single-mode—Observe the standard connection scheme described previously and refer to Figure 3-14 while you connect the interface cables as follows:
  - — Connect the cable coming in from the primary ring (*from* PHY B at the primary ring upstream station) to the FIP PHY A receive port.
  - — Connect the cable going out to the primary ring (*to* PHY A at the primary ring downstream station) to the FIP PHY B transmit port.
  - — Connect the cable coming in from the secondary ring to the FIP PHY B receive port.
  - — Connect the cable going out to the secondary ring to the FIP PHY A transmit port.

Figure 3-14 Dual Attachment Station, Single-Mode Fiber Network Connections



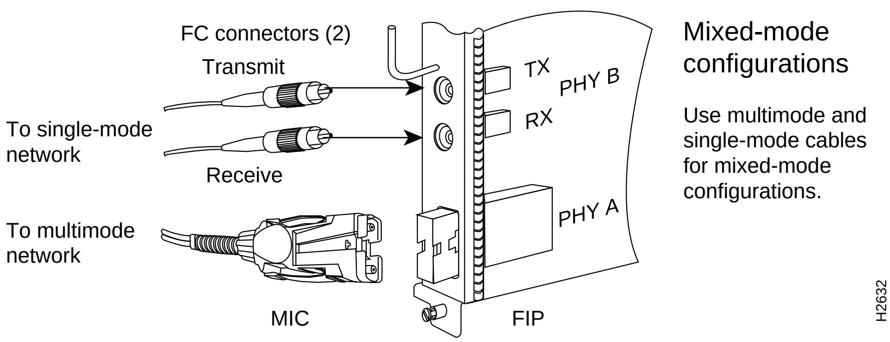
- Multimode—Each of the integrated transmit/receive multimode interface cables attaches to both the primary and secondary ring; each one receives the signal from one ring and transmits to the other ring. (See Figure 3-15.) To help avoid confusion, use the receive label on the cable MIC as a key, and connect the cables to the FIP ports as follows:
  - — Connect the cable coming in from the primary ring to the PHY A receive port. This also connects the signal going out to the secondary ring to the PHY A transmit port.
  - — Connect the cable coming in from the secondary ring to the PHY B receive port. This also connects the signal going out to the primary ring to the PHY B transmit port.

Figure 3-15 Dual Attachment Station, Multimode Fiber Network Connections



- Mixed mode—Follow the cabling guidelines described in the sections “Single Attachment Connections” and “Dual Attachment Connections” to connect the multimode and single-mode interface cables. Figure 3-16 shows that the primary ring signal is received on the multimode PHY A receive port and transmitted from the single-mode PHY B transmit port. Your configuration may be opposite, with multimode on PHY B and single-mode on PHY A. Connect the cables to the FIP ports as follows:
  - — Connect the cable coming in from the primary ring to the PHY A receive port, and connect the signal going out to the secondary ring to the PHY A transmit port.
  - — Connect the cable coming in from the secondary ring to the PHY B receive port. This also connects the signal going out to the primary ring to the PHY B transmit port.

Figure 3-16 FDDI Dual Attachment Network Connections, Single-Mode and Multimode



If you are connecting an optical bypass switch, proceed to the next section. Otherwise, proceed to “Connecting the Console Terminal” in this chapter.

Installing an Optical Bypass Switch

An optical bypass switch is a device installed between the ring and the station that provides additional fault tolerance to the network. If a FIP that is connected to a bypass switch fails or shuts down, the bypass switch activates automatically and allows the light signal to pass directly through it, bypassing the FIP completely. A port for connecting an optical bypass switch is provided only on the multimode/multimode FIP, called the CX-FIP-MM, and shown in Figure 3-17, and the single-mode/single-mode FIP, called the CX-FIP-SS, and shown in Figure 3-18.

Figure 3-17 Optical Bypass Switch Connections for the CX-FIP-MM

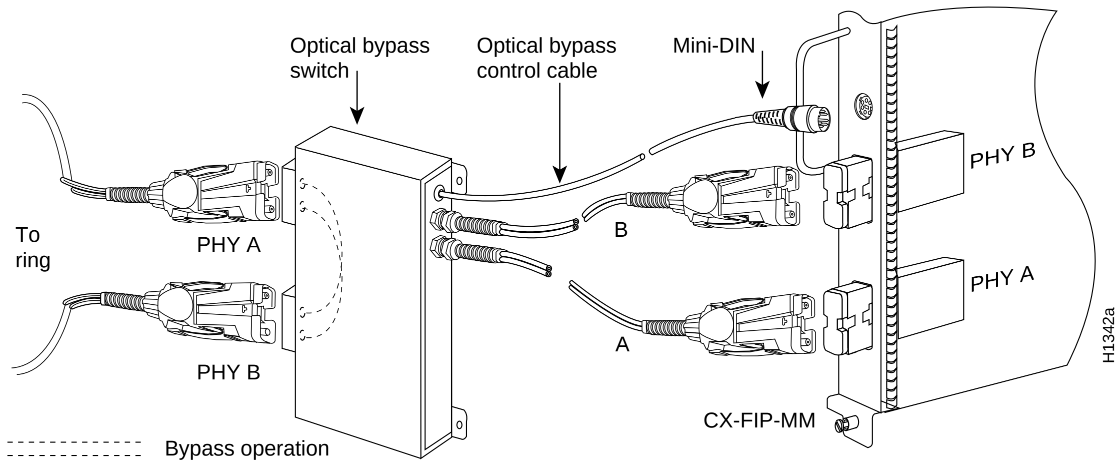
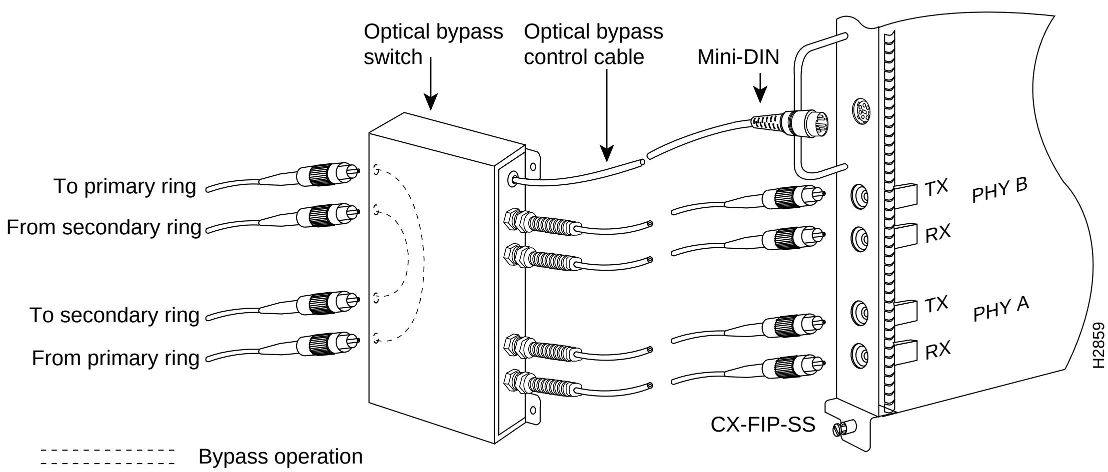


Figure 3-18 Optical Bypass Switch Connection for the CX-FIP-SS



The optical bypass control port on the FIP is a six-pin mini-DIN receptacle. Some optical bypass switches use DIN connectors, and some use a mini-DIN. A DIN-to-mini-DIN cable is included with the FIP to connect optical bypass switches that use the larger DIN connector. Up to 100 milliamperes (mA) of current can be supplied to the bypass switch.

Following are general instructions for connecting an optical bypass switch to the FIP; however, your particular bypass switch may require a different connection scheme. Use these steps as a general guideline, but refer to the instructions provided by the manufacturer of the switch for specific connection requirements.

- Connect the bypass switch to the ring. Unless the documentation that accompanies the bypass switch instructs otherwise, observe the same guidelines for connecting the A/B ports on the bypass switch that you would to connect the ring directly to the FIP ports. Use the receive label on the multimode and single-mode cables as a key, and connect the cables to the network (ring) side of the bypass switch as follows:
    - — Connect the cable coming in from the primary ring (*from* PHY B at the preceding station) to the PHY A receive port on the network (ring) side of the bypass switch. This also connects the signal going out to the secondary ring to the PHY A transmit port.
    - — Connect the cable coming in from the secondary ring (*from* PHY A at the preceding station) to the PHY B receive port on the network (ring) side of the bypass switch. This also connects the signal going out to the primary ring to the PHY B transmit port.
- Connect the bypass switch to the FIP. Unless the documentation that accompanies the bypass switch instructs otherwise, consider the bypass an extension of the FIP ports and, connect A to A and B to B. The network cables are already connected to the bypass switch following the standard B-to-A/A-to-B scheme.
    - — Connect an interface cable between the PHY A port on the station (FIP) side of the bypass switch and the FIP PHY A port.
    - — Connect an interface cable between the PHY B port on the station (FIP) side of the bypass switch and the FIP PHY B port.
- Connect the bypass switch control cable. If the control cable on your optical bypass switch uses a mini-DIN connector, connect the cable directly to the mini-DIN optical bypass port on the FIP. If the switch uses a standard DIN connector, use the optical bypass adapter cable supplied with each FIP. Connect the DIN end of the adapter cable to the DIN end of the control cable, and connect the mini-DIN end of the adapter cable to the mini-DIN optical bypass port on the FIP.

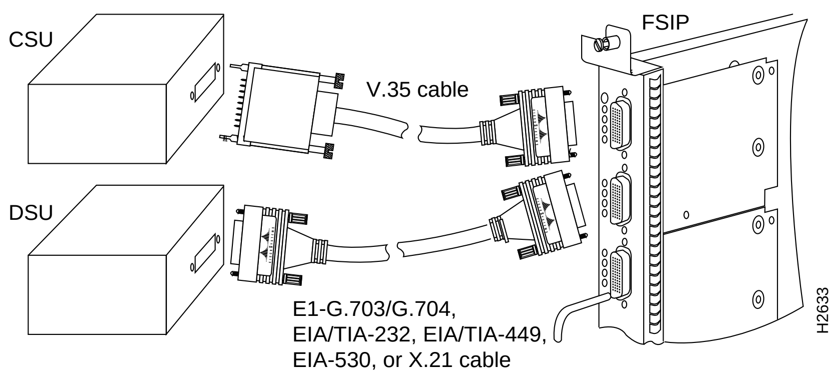
Serial Connections

All FSIP ports support any available interface type and mode. The serial adapter cable determines the electrical interface type and mode of the port to which it is connected. EIA/TIA-232, EIA/TIA-449, V.35, and X.21 interfaces are available in DTE mode with a plug at the network end and in DCE mode with a receptacle at the network end. EIA-530 is available only in DTE mode with a plug. For descriptions and illustrations of each connector type, refer to the section "Serial Connection Equipment" in the chapter "Preparing for Installation." For cable pinouts, refer to the appendix "Cabling Specifications."

Connecting DTE and DCE Devices

When connecting serial devices, consider the adapter cables as an extension of the router for external connections; therefore, use DTE cables to connect the router to remote DCE devices such as modems or DSUs, and use DCE cables to connect the router to remote DTE devices such as a host, PC, or another router. (See Figure 3-19.) The optional or additional connection equipment required depends on the interface type of each port.

Figure 3-19 Serial Port Adapter Cable Connections



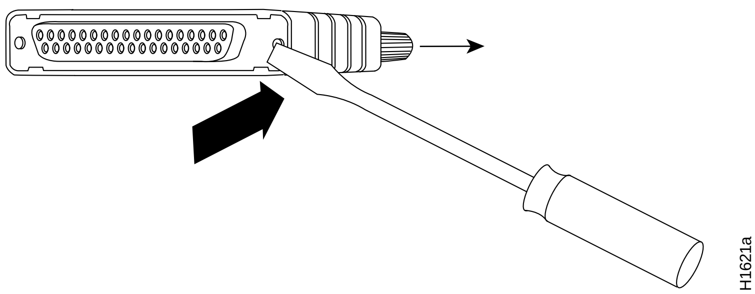
Note The serial port adapter cable determines the electrical interface type and mode of the FSIP port. When connecting a remote DTE device (which means that the FSIP port is a DCE interface), you must set the clock rate with the **clockrate** command. For an example configuration using this command, refer to the section "Configuring Timing (Clock) Signals" in the chapter "Maintaining the Router." For complete command descriptions and instructions, refer to the related software documentation.

Caution To prevent system problems, do not install a Serial Interface Processor (SIP), also called the SX-SIP or PRE-FSIP, in your Cisco 7513 chassis. This early interface processor is not supported on the CyBus and cannot be used in the Cisco 7513 chassis.

Connecting to Metric-Based Devices

A pair of metric thumbscrews is included with each port adapter cable except V.35. If you will connect serial cables to a remote device that uses metric hardware, replace the standard 4-40 thumbscrews at the network end of the cable with the M3 thumbscrews. To remove thumbscrews, use the flat side of a large (1/4-inch) flat-blade screwdriver to push the tip of the screw into the connector housing and out the other side. (See Figure 3-20.) If the screw resists, use pliers to pull it out. Insert the new thumbscrew and push it into the connector housing until it pops into place.

Figure 3-20 Replacing Standard 4-40 Thumbscrews with M3 Metric Thumbscrews

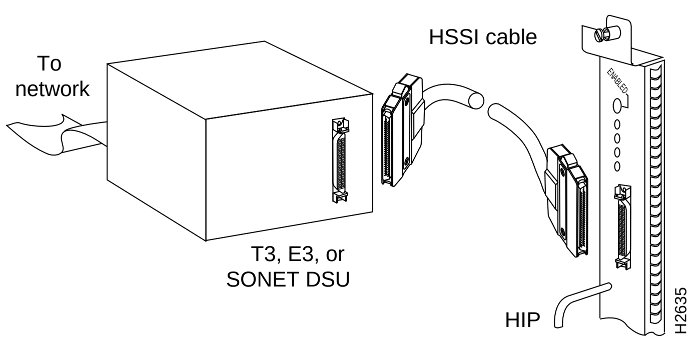


HSSI Connections

The HIP HSSI port functions as a DTE when it is connected to a DSU for a standard HSSI connection, and it can also be connected to a collocated router with a null modem cable.

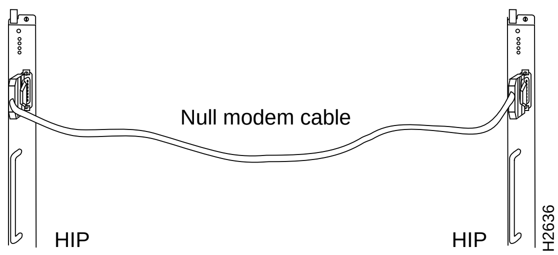
To connect the router to a HSSI network, use a HSSI interface cable between the HIP port and the DSU. Both ends of the HSSI interface cable are the same, so you can connect either end to the HIP or DSU. (See Figure 3-21.)

Figure 3-21 HSSI Network Connection



To connect two routers back to back in order to verify the operation of the HSSI port or to build a larger node, use a null modem cable between available HSSI ports in two separate routers. (See Figure 3-22.) The two routers must be in the same location, and can be two Cisco 7513s, two Cisco 7000s, or one of each. When you configure the ports, you must enable the internal transmit clock on in the HSSI interface in *both* routers with command **hssi internal-clock**. To negate the command when you disconnect the cable, use the command **no hssi internal-clock**. For complete command descriptions and instructions, refer to the related software documentation.

Figure 3-22 HSSI Null Modem Connection



MultiChannel Connections

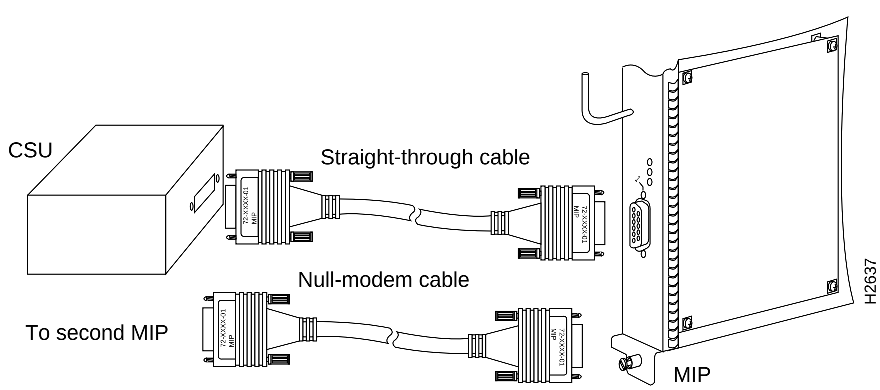
Two standard T1 serial cables are available from Cisco Systems and other vendors for use with the MIP: null-modem and straight-through. These interface cables are used to connect your MIP to additional MIP s or external CSUs.

You must use null-modem cables for MIP-to-MIP connections and straight-through cables for MIP-to-CSU connections. The T1 cables used to connect the MIP with external T1 equipment have DB-15 male connectors on each end.

Four E1 cables are available from Cisco Systems and other vendors for use with the MIP: BNC, Twinax, DB-15, and RJ-45. The E1 cables used to connect the MIP with external equipment have a DB-15 male connector on the MIP end.

Connect the MIP cables as shown in Figure 3-23.

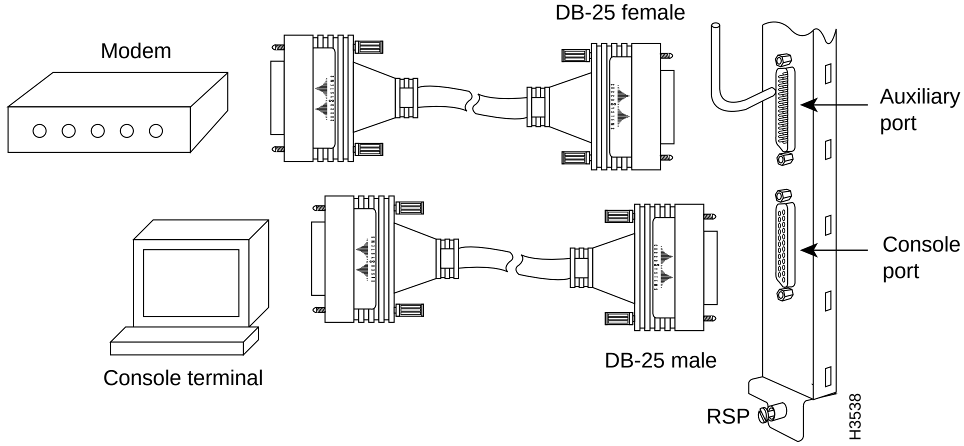
Figure 3-23 MultiChannel Network Connection



Connecting the Console Terminal

The system console port on the RSP2 is a DCE DB-25 receptacle for connecting a data terminal, which you will need to configure and communicate with your system. (See Figure 3-24.) The console port is located on the RSP2 below the auxiliary port.

Figure 3-24 Console and Auxiliary Port Connections



Before connecting the console port, check your terminal's documentation to determine the baud rate of the terminal you will be using. The baud rate of the terminal must match the default baud rate (9600 baud). Set up the terminal as follows: 9600 baud, 8 data bits, no parity, and 2 stop bits (9600,8N2).

Use the console cable provided to connect the terminal to the console port on the RSP2, then follow the steps in the section "Starting the Router" in this chapter.

Note Both the console and auxiliary ports are asynchronous serial ports; any devices connected to these ports must be capable of asynchronous transmission. (Asynchronous is the most common type of serial device; for example, most modems are asynchronous devices.)

Connecting Auxiliary Port Equipment

The auxiliary port is a DB-25 plug DTE port for connecting a modem or other DCE device (such as a CSU/DSU or other router) to the router. The port is located on the RSP2 above the console port. An example of a modem connection is shown in Figure 3-24.

Using the Y Cables for Console and Auxiliary Connections

For systems with two RSP2s installed (one as master and one as slave in RSP slots 6 and 7), you can simultaneously connect console or auxiliary ports on both RSP2s using a special Y cable (CAB-RSP2CON= and CAB-RSP2AUX=). The master/slave switch on the RSP2 designates it as either the system master or slave. RSP2s ship as system masters by default. Figure 3-25 shows the console Y cable and Figure 3-26 shows the auxiliary Y cable.

Note Although the dual-RSP2 functionality is not available with the initial release of the RSP2 processor, console and auxiliary Y cables are shipped for future implementations.

Figure 3-25 Console Y Cable

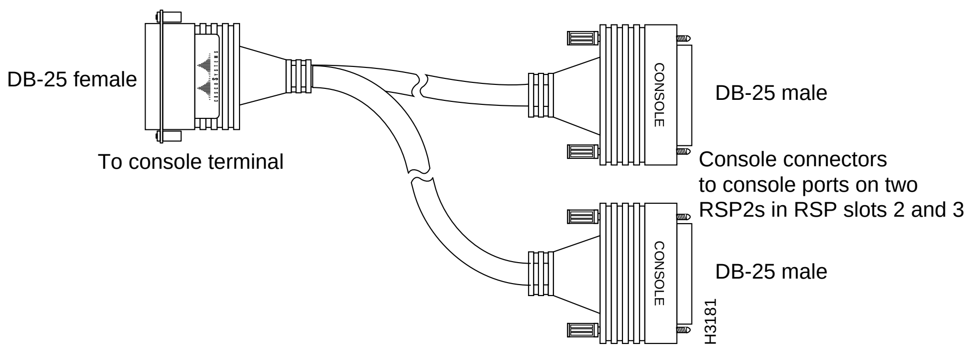
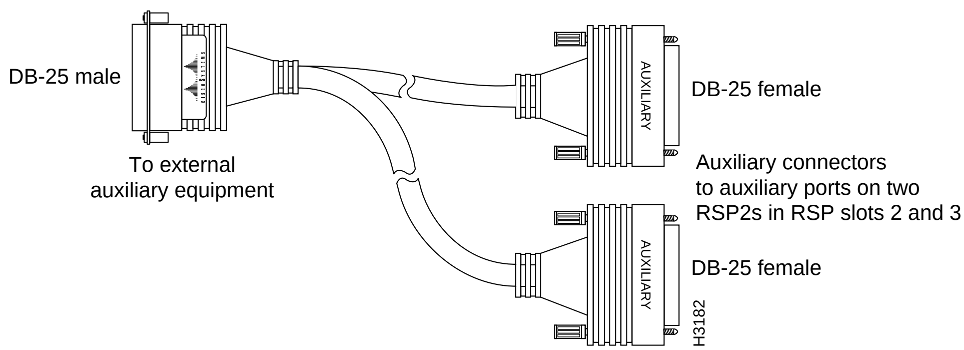


Figure 3-26 Auxiliary Y Cable



Starting the Router

When all interfaces are connected, perform a final check of all connections, then power up the router as follows:

Step 1 Check the following components to make sure they are secure:

- Each interface processor is inserted all the way into its slot, and all of the captive installation screws are tightened.
- All interface cable connections are secured.
- Any installed Flash memory cards are secure in their PCMCIA slots.
- Each system power cable is connected and secured with the cable retention band or appropriate strain relief.

Step 2 Check the console terminal and make sure it is turned on.

Step 3 When you have checked all of the connection points above, turn on the power supply by turning the power switch clockwise, to the ON position (|). The green, AC (or DC) OK and fan OK LEDs on each power supply should go on. After a few seconds, the red, out fail LED will turn OFF.

Step 4 Listen for the system blower; you should immediately hear it operating.

Step 5 On the RSP2, the normal LED indicator goes ON. If this indicator is not on after system initialization, an error occurred. Refer to the chapter "Troubleshooting the Installation" for troubleshooting procedures.

Step 6 During the boot process, the LED indicators on most of the interfaces go ON and OFF in irregular sequence. Some may go ON, go OFF, and go ON again for a short time. If an interface is already configured and brought on line, some LEDs will stay on during the entire boot process, such as the EIP receive LED, which stays on as it detects traffic on the line. Wait until the system boot is complete before attempting to verify the status of interface processor indicators.

Step 7 When the system boot is complete (a few seconds), the RSP2 begins to initialize the interface processors. During this initialization, the indicators on each interface processor behave differently (most flash ON and OFF). The enabled LED on each interface processor goes on when initialization has been completed, and the console screen displays a script and system banner similar to the following:

```
GS Software (RSP-K), Version 10.3(571)
Copyright (c) 1986-1995 by Cisco Systems, Inc.
Compiled Wed 10-May-95 11:06
```

Step 8 When you start up the router for the first time, the system automatically enters the **setup** command facility, which determines which interfaces are installed and prompts you for configuration information for each one. On the console terminal, after the system displays the system banner and hardware configuration, you will see the following System Configuration Dialog prompt:

```
         --- System Configuration Dialog ---
At any point you may enter a questions mark ‘?’ for help.
Refer to the ‘Getting Started’ Guide for additional help.
Default settings are in square brackets ‘[]’. continue with
configuration dialog? [yes]:
```

You have the option of proceeding with the **setup** command facility to configure the interfaces, or exiting from setup and using configuration commands to configure global (system-wide) and interface-specific parameters. You do not have to configure the interfaces immediately; however, you cannot enable the interfaces or connect them to any networks until you have configured them.

Many of the interface processor LEDs will not go on until you have configured the interfaces. In order to verify correct operation of each interface, complete the first-time startup procedures and configuration, then refer to the LED descriptions in the appendix “Reading LED Indicators” to check the status of the interfaces.

Your installation is complete. Proceed to the appropriate software publications to configure your interfaces.

Note If the system does not complete each of these steps, proceed to the chapter “Troubleshooting the Installation,” for troubleshooting recommendations and procedures.

Formatting a Flash Memory Card

The Flash memory card that shipped with your Cisco 7513 contains the Cisco IOS software image you need to boot your router. In some cases, you might need to insert a new Flash memory card and copy images or backup configuration files onto it. Before you can use a new Flash memory card, you must format it.

Note The following procedure assumes you have already booted your router.

Caution The following formatting procedure erases all information on the Flash memory card. To prevent the loss of important data that might be stored on a Flash memory card, proceed carefully. If you want to save the data on a Flash memory card, upload the data to a server before you format the card.

Use the following procedure to format a new Flash memory card:

Step 1 Using the procedure in the section "Installing and Removing a Flash Memory Card" in the chapter "Maintaining the Router," insert the Flash memory card into Slot 0. (If Slot 0 is not available, use Slot 1.)

Step 2 To format the Flash memory card, use the **format slot0:** (or **format slot1:**) command as follows. (Use only Intel Series 2+ Flash memory cards.)

```
Router# format slot0:
All sectors will be erased, proceed? [confirm]
Enter volume id (up to 30 characters): MyNewCard
Formatting sector 1
Format device slot0 completed
Router#
```

Note For this example, an 8-MB Flash memory card was used, and at the line "Formatting sector," the system counted the card's sectors backwards from 64 to 1 as it formatted them. For 16-MB Flash memory cards, the system counts backwards from 128 to 1, and for 20-MB Flash memory cards, the system counts backwards from 160 to 1.

The new Flash memory card is now formatted and ready to use.

Note For complete command descriptions and configuration information, refer to the *Router Products Command Reference* and the *Router Products Configuration Guide* .

Copying a Bootable Image into a Flash Memory Card

With the Flash memory card formatted, you can now copy a bootable image into it. To copy an image, use the following procedure, which assumes the following:

- You have an RSP2 with a good image in the onboard Flash SIMM so you can start the router.
- The bootable image you want to copy to the Flash memory card exists on a TFTP server to which you have access (meaning you know its name and have connectivity to it), and at least one interface is available over which you can access this server.

Note To assure access to a TFTP sever, you will need to configure at least one interface using the **setup** command facility. For instructions on using this procedure, refer to the *Router Products Configuration Guide* (for Cisco IOS Release 11.0) or *Router Products Getting Started Guide* (for Cisco IOS Release 11.0) publications.

- You know the filename of the image you wantyou want to copy into the Flash memory card

Following is the procedure for copying a bootable file (called new.image) into the Flash memory card:

Step 1 Boot the router and allow it to initialize.

Step 2 Insert an unformatted Flash memory card and format it using the procedure in the section "Formatting a Flash Memory Card" in this chapter, and then proceed to Step 3.

Note If you have already formatted a Flash memory card, you can use it instead; however, you cannot boot from a Flash memory card formatted on another type of system. You must reformat it to use it as a boot source.

Step 3 To enable the router, copy the image new.image to the Flash memory card, make this image in the Flash memory card (in Slot 0) the default boot image, and reboot the router, using the following series of commands:

```
Router> en
Password:
Router# copy tftp:new.image slot0:new.image
20575008 bytes available on device slot0, proceed? [confirm]
Address or name of remote host [1.1.1.1]?
Loading new.image from 1.1.1.1 (via Ethernet1/0): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
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!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 7799951/15599616 bytes]
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Router#
```

Note In the preceding example, the exclamation points (!!!) appear as the file is downloaded and the "C" characters signify calculation of the checksum, which is a verification that the file has been correctly downloaded to the Flash memory card.

```
Router# config terminal
Router(config)# no boot system
Router(config)# boot system flash slot0:new.image
Router(config)# ^z
Router# copy running-config startup-config
Router# reload
```

When the system reloads it will boot the image new.image from the Flash memory card in Slot 0.

Copying Bootable Images between Flash Memory Cards

As future releases of Cisco IOS images become available, you will receive these images either as a file booted from a network server, a file on floppy disk, or a file on a Flash memory card.

The following scenario describes how to use a newly released image on a Flash memory card, in a system that has an older image on a Flash memory card in Slot 0 and a default boot image in the onboard Flash SIMM.

For this scenario, the filenames are as follows:

- The new image on the new Flash memory card is image.new.
- The old image in the Flash memory card in Slot 0 is image.old.
- The bootable image in onboard Flash memory is image.boot.

You will copy the new image from the new Flash memory card onto the Flash memory card that contains the old image.

Note The scenario assumes that the new image will fit on the Flash memory card in Slot 0, alongside the old image. If there is not enough available space, use the **delete** command to delete files from the Flash memory card to make sufficient room for the new image; however, do *not* delete the image.old file. Then use the **squeeze** command to remove these deleted files from the Flash memory card. If, after you have deleted files and used the **squeeze** command, the two files cannot coexist on the Flash memory card in Slot 0, remove this card (place it in an anti-static bag and store it in a safe place), then insert the new Flash memory card (with the file image.new) in Slot 0. Proceed to Step 5 and use the command **boot system flash slot0:image.new** to designate the file image.new as the default boot image.

Step 1 Boot the router. By default, the file image.boot will be used.

Step 2 Enable the router as follows:

```
Router> en
Password:
Router#
```

Step 3 Insert the new Flash memory card in Slot 1.

Step 4 Use the following command to copy the file image.new in Slot 1 to the Flash memory card in Slot 0, *only if* there is enough memory space for the two images to coexist. If there is not enough memory space, proceed to Step 5.

```
Router# copy slot1:image.new slot0:image.new
```

Note The preceding command can also be entered as **copy slot1:image.new slot0:**.

Step 5 Use the following series of commands to designate the file image.new (which is in the Flash memory card in Slot 0) as the default boot image:

```
Router# config t
Router(config)# no boot system
Router(config)# boot system flash slot0:image.new
Router(config)# ^z
Router# copy running-config startup-config
Router# reload
```

When the system reloads, it will boot the file image.new from the Flash memory card in Slot 0.