



# Rack-Mounting, Tabletop Installation, and Cabling

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This chapter explains how to install a Cisco 7401ASR router in a rack in a general tabletop or workbench installation, how to attach cables, and how to power on the router.

This chapter contains the following sections:

- [Preparing to Install the Cisco 7401ASR Router, page 2-1](#)
- [Installing the Router, page 2-5](#)
- [Attaching a Chassis Ground Connection, page 2-11](#)
- [Connecting Port Adapter Cables, page 2-13](#)
- [Connecting I/O Cables, page 2-14](#)
- [Attaching the Alarm Port Cable, page 2-22](#)
- [Using the Cable-Management Bracket, page 2-22](#)
- [Connecting Power, page 2-23](#)

The Cisco 7401ASR router operates as either a tabletop or a rack-mounted unit. A rack-mount kit is standard equipment included with the Cisco 7401ASR router when it is shipped from the factory. The kit provides the hardware needed to mount the router in a standard 19-inch equipment rack or a two post rack or a 21–23-inch equipment rack.

If you are not rack-mounting your Cisco 7401ASR router, place it on a sturdy tabletop or platform.

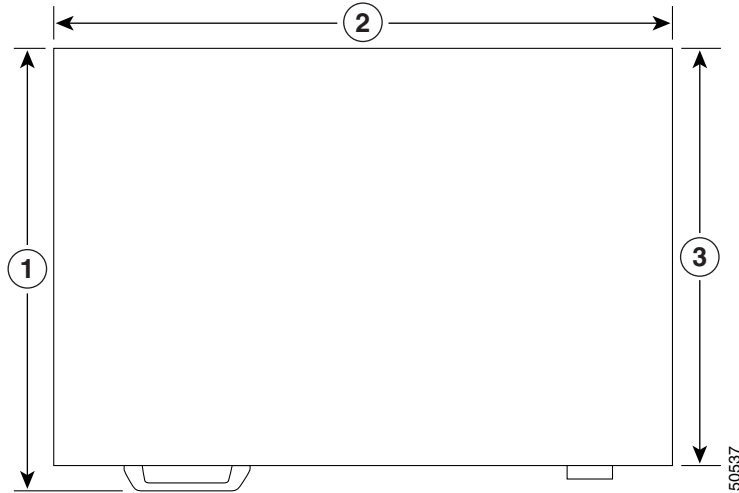
## Preparing to Install the Cisco 7401ASR Router

Before installing your Cisco 7401ASR router, you should consider the power and cabling requirements that must be in place at your installation site, the equipment you need to install the router, and the environmental conditions your installation site must meet to maintain normal operation. This section guides you through the process of preparing for your router installation and the installation in a rack.

This section contains the following topics:

- [Tools and Parts Required, page 2-2](#)
- [Electrical Equipment Guidelines, page 2-3](#)
- [Preventing Electrostatic Discharge Damage, page 2-4](#)
- [Site Requirement Guidelines, page 2-4](#)

Figure 2-1 Dimensions of Cisco 7401ASR Router



<b>1</b>	12.875 in. (32.7cm)	<b>3</b>	11.8 in. (30 cm)
<b>2</b>	17.3 in. (43.9 cm)		

Table 2-1 provides dimensions and weight information.

Table 2-1 Cisco 7401ASR Dimensions and Weight

Cisco 7401ASR	
Dimensions (H x W x D)	1.72 in. x 17.3 in. x 11.80 in. (4.37 cm x 43.9 cm x 30 cm)
Weight	Chassis fully configured with a port adapter ~ 10.5 lb (4.76 kg)

## Tools and Parts Required

Your Cisco 7401ASR chassis is fully assembled at the factory; no assembly is required. However, you need the following tools and equipment to install the chassis and the rack-mount and cable-management kit:

- Number 2 Phillips screwdriver
- A 3/16-inch flat-blade screwdriver
- Tape measure (optional)
- Level (optional)

The rack-mount and cable-management kit includes the following parts:

- Two rack-mount brackets for mounting the chassis in the rack
- One cable-management bracket
- Four 12-24 x 0.5-in. screws to secure the rack-mount brackets to the chassis
- Four 8-18 x .37-in. screws to secure the rack-mount brackets to a 19-inch rack
- Four 8 x .375-in. screws to secure the rack-mount brackets to a 21–23-inch rack
- One M4 x 20-mm screw to attach the cable-management bracket to the rack-mount bracket

- Grounding lug and wires:
  - A grounding lug with two number-10 screw holes with a 0.63-inch (16.002-mm) spacing between them
  - A wire receptacle large enough to accept a 6-AWG multistrand, copper wire
  - Two Phillips machine screws with locking washers—M5 (metric), 0.031-inch (.08-mm) pitch, 0.315-inch (8-mm) length
  - A crimping tool to fit the grounding lug wire receptacle
  - One grounding wire—6-AWG, 0.162-inch (4.115-mm) diameter, with approximately 0.108-inch (2.743-mm) insulation, for a total wire diameter of approximately 0.27 inches (6.858 mm). The wire length depends on your router location and site environment.

In addition, you might need the following external equipment:

- Data service unit (DSU) to connect each serial port to an external network
- T1 channel service unit/data service unit (CSU/DSU) that converts the High-Level Data Link Control (HDLC) synchronous serial data stream into a T1 data stream with the correct framing and ones density to connect a serial port to a T1 network. (Some telephone systems require a minimum number of 1 bits per time unit in a data stream, called *ones density*.) Several T1 CSU/DSU devices are available as additional equipment, and most provide a V.35, EIA/TIA-449, or EIA-530 electrical interface.
- Ethernet transceiver
- Token Ring multistation access unit (MSAU)
- ESD-preventative wrist strap
- Power cord
- Appropriate cables to connect the router to the console and auxiliary ports

## Electrical Equipment Guidelines

The port adapter is designed to be removed and replaced while the system is operating without presenting an electrical hazard or damage to the system.

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 moving 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 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.

# Safety Guidelines

Following are safety guidelines that you should follow when working with any equipment that connects to electrical power, or which might be sensitive to electrostatic discharge (ESD) damage.

## Preventing Electrostatic Discharge Damage

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

## Electrostatic Discharge Prevention

Electrostatic discharge (ESD) damage, which can occur when electronic cards or components are improperly handled, results in complete or intermittent failures.

Use the following guidelines for preventing ESD damage:

- Always use an ESD wrist or ankle strap and ensure that it makes good skin contact; connect the equipment end of the strap to an unfinished chassis surface.
- Avoid contact between the printed circuit boards and clothing. The wrist strap only protects components from ESD voltages on the body; ESD voltages on clothing can still cause damage.

**Caution**

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

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## Site Requirement Guidelines

**Warning**

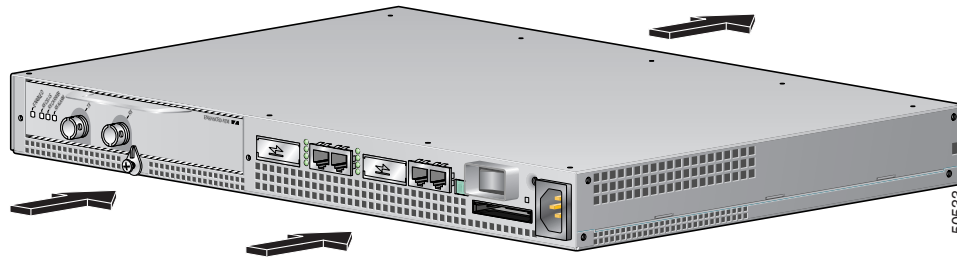
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**Before you install, operate, or service the system, read the *Site Preparation and Safety Guide*. This guide contains important safety information you should know before working with the system.**

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The environmental monitoring functionality in the Cisco 7401ASR router protects the system and components from potential damage from overvoltage and overtemperature conditions. To ensure normal operation and avoid unnecessary maintenance, plan your site configuration and prepare your site *before* installation. After installation, make sure the site maintains an ambient temperature of 32°F through 104°F (0°C through 40°C), and keep the area around the chassis as free from dust as is practical.

Planning a proper location for the Cisco 7401ASR router and the layout of your equipment rack or wiring closet is essential for successful system operation. Equipment placed too close together or inadequately ventilated can cause system overtemperature conditions. In addition, chassis panels made inaccessible by poor equipment placement can make system maintenance difficult. Following are precautions that can help avoid problems during installation and ongoing operation.

**Figure 2-2** Airflow Through the Chassis

When you plan the location and layout of your equipment rack or wiring closet, you need to consider how air flows through your router. The Cisco 7401ASR router draws cooling air in through the intake vents on the front of the chassis and moves the air across the internal components and out the exhaust vents on the rear of the chassis. [Figure 2-2](#) shows airflow through the router.

Temperature sensors on the system board monitor the internal air temperature and send warning messages when the internal air temperature approaches a specified threshold. If the internal temperature exceeds the specified threshold, the system environmental monitor shuts down all internal power to prevent equipment damage from excessive heat. (See the [“Environmental Monitoring and Reporting Functions”](#) section on [page 3-4](#) for temperature threshold information.)

## Installing the Router

This section explains how to install a Cisco 7401ASR router in a general tabletop or workbench installation and in a rack, and how to attach I/O, port adapter, and power cables. This section contains the following topics:

- [General Tabletop or Workbench Installation, page 2-5](#)
- [Rack-Mounting a Cisco 7401ASR Router, page 2-6](#)
- [Attaching the Chassis Rack-Mount and Cable-Management Brackets, page 2-7](#)
- [Installing the Chassis in the Rack, page 2-9](#)

## General Tabletop or Workbench Installation

The router should already be in the area where you will install it, and your installation location should already be determined. If not, see the [“Preparing to Install the Cisco 7401ASR Router”](#) section on [page 2-1](#), the [“Site Requirement Guidelines”](#) section on [page 2-4](#), and the [“Site Preparation and Safety”](#) section of the *Cisco 7401ASR Regulatory Compliance and Safety Information* document.

When installing a Cisco 7401ASR router on a workbench or tabletop, ensure that the surface is clean and in a safe location and that you have considered the following:

- The router requires at least 3 inches (7.62 cm) of clearance at the inlet and exhaust vents (the front and rear of the router).
- The router should be installed off the floor. (Dust that accumulates on the floor is drawn into the interior of the router by the cooling fans. Excessive dust inside the router can cause overtemperature conditions and component failures.)
- There must be approximately 19 inches (48.3 cm) of clearance at the front and rear of the router for installing and replacing router parts—such as the port adapter, GBIC, or CompactFlash Disk—or accessing network cables or equipment.

- A port adapter filler panel is installed if a port adapter or service adapter is not in place.
- The router will receive adequate ventilation (it is not being installed in an enclosed cabinet where ventilation is inadequate).
- If you plan to install the cable-management bracket, unpack and have handy the cable-management bracket and one M4 x 20-mm screw.
- An adequate chassis ground (earth) connection exists for your router chassis.



**Note** We strongly recommend that you provide a chassis ground connection. See the [“Attaching a Chassis Ground Connection”](#) section on page 2-11 for instructions.

Following are the steps for installing a Cisco 7401ASR router on a workbench or tabletop:

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- Step 1** Remove any debris and dust from the tabletop or workbench, as well as the surrounding area. Also make sure your path between the router and its new location is unobstructed.
  - Step 2** On the chassis, ensure that the port adapter latch is in the locked position.
  - Step 3** Lift the chassis by placing your hands around the chassis sides and lifting the chassis from underneath. To prevent injury, avoid sudden twists or moves.
  - Step 4** Place the router on the tabletop or workbench.
  - Step 5** Ensure that there is at least 3 inches (7.62 cm) of clearance at the inlet and exhaust vents of the router and no exhaust air from other equipment will be drawn into the chassis. Also, ensure that there is approximately 19 inches (48.3 cm) of clearance at the front and rear of the chassis.
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This completes the general tabletop or workbench installation.

## Rack-Mounting a Cisco 7401ASR Router

The chassis mounts to two rack posts with brackets that attach to either the front or the rear sides of the chassis. The inside width between the two posts or mounting strips (left and right) must be at least 17.3 inches (43.9 cm).

Some equipment racks provide a power strip along the length of one of the mounting strips. [Figure 2-7](#) shows a typical four-post equipment rack with a power strip along one of the back posts. If your rack has this feature, consider the position of the strip when planning fastener points to ensure that you will be able to pull the port adapter, a GBIC, or CompactFlash Disk straight out of their respective slots.

The inlet and exhaust ports for cooling air are located on the front and rear of the chassis, respectively, so multiple routers can be stacked in a rack with little or no vertical clearance.

Before beginning the installation, determine the type of rack you are using and whether or not you want the chassis front- or rear-mounted.



**Note** If you are rear-mounting the chassis and want to use the cable-management bracket, you must purchase a second rack-mount kit. You need another rack-mount bracket to attach to the front of the chassis. After it is attached to the chassis, install the cable-management bracket to the rack-mount bracket.

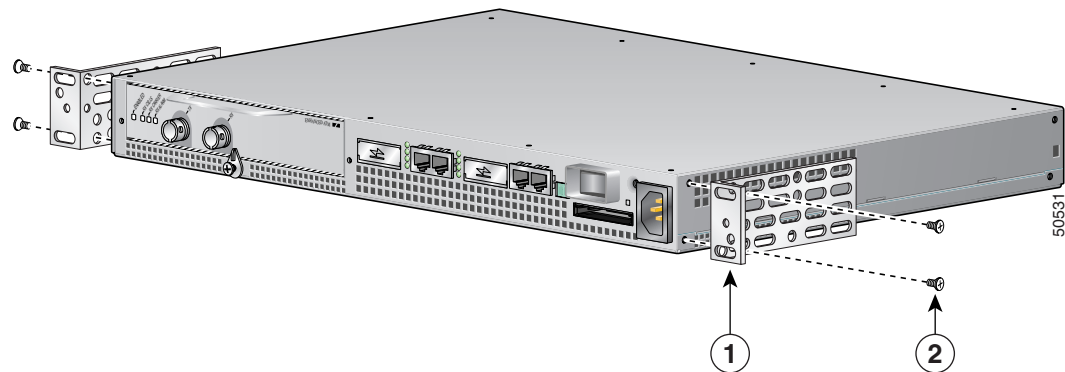
## Attaching the Chassis Rack-Mount and Cable-Management Brackets

This section explains how to install the rack-mount and cable-management brackets at the front and the rear of a Cisco 7401ASR router. Before installing the chassis in the rack, you must install a rack-mount bracket on each side of the front or rear of the chassis.

The parts and tools required for installing the rack-mount brackets and cable-management bracket are listed in the “Tools and Parts Required” section on page 2-2.

### Installing Rack-Mount Brackets on the Front of the Chassis

**Figure 2-3** Attaching the Rack-Mount Brackets to the Front of the Chassis



<b>1</b>	Rack-mount bracket	<b>2</b>	4 screws, 8-18 x .37 in., for use with a 19-inch rack 4 screws, 8 x .375 in., for use with a 21–23-inch rack
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Determine whether you want the chassis to be flush-mounted or recessed. [Figure 2-3](#) shows the brackets being attached for a front rack-mount. Depending on the bracket holes you use, the router will protrude or be recessed in the rack.

To install the rack-mount and cable-management brackets on a Cisco 7401ASR router for a front rack-mount configuration, complete the following steps:

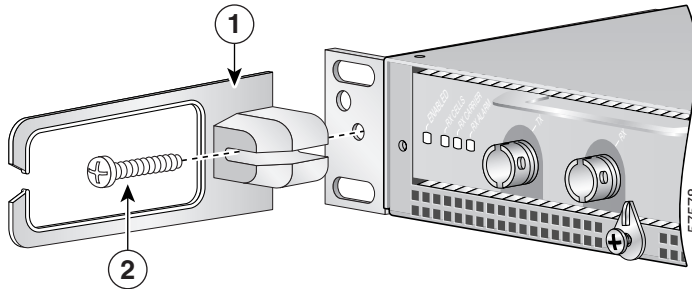
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- Step 1** Locate the threaded holes in the front sides of the chassis.
  - Step 2** Align the rack-mount bracket (1) to the side of the router. Depending on which set of rack-mount bracket holes you choose to use to attach the rack-mount bracket to the router, the chassis will either be recessed in the rack or protrude from the rack.
  - Step 3** Insert and tighten two screws (2).
  - Step 4** Repeat Step 1 through Step 3 on the other side of the router.
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This completes the steps for attaching the rack-mount brackets to the Cisco 7401ASR router.

To install the cable-management bracket, go to “[Attaching the Cable-Management Bracket](#)” section on page 2-8. If you are not installing the cable-management bracket, go to the “[Installing the Chassis in the Rack](#)” section on page 2-9.

## Attaching the Cable-Management Bracket

Figure 2-4 Installing the Cable-Management Bracket



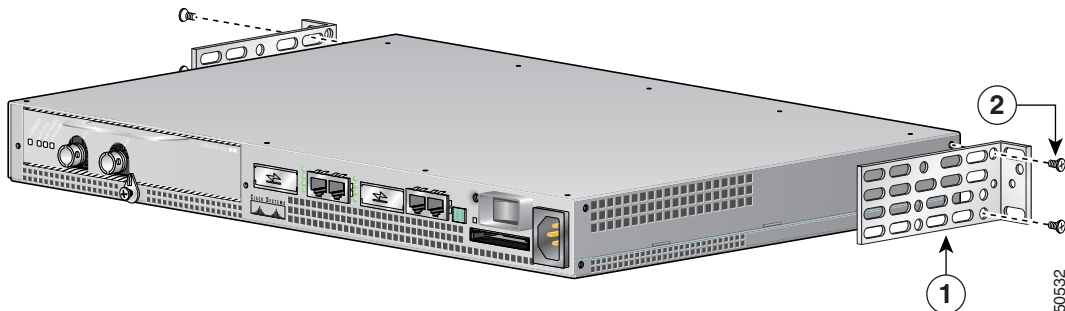
<b>1</b>	Cable-management bracket	<b>2</b>	M4 x 20-mm screw
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- Step 1** Align the cable-management bracket to the rack-mount bracket on the left side of the Cisco 7401ASR router.
- Step 2** Using a Phillips screwdriver and the M4 x 20-mm screw, thread and tighten the screw to the cable-management bracket.

This completes the procedure for installing the cable-management bracket on a Cisco 7401ASR router for a front rack-mount configuration. Go to the [“Installing the Chassis in the Rack”](#) section on page 2-9.

## Installing Rack-Mount Brackets on the Rear of the Chassis

Figure 2-5 Attaching the Rack-Mount Brackets to the Rear of the Chassis



<b>1</b>	Rack-mount bracket	<b>2</b>	4 screws, 8-18 x .37 in., for use with a 19-inch rack 4 screws, 8 x .375 in., for use with a 21–23-inch rack
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To install the rack-mount and cable-management brackets on a Cisco 7401ASR router for a rear rack-mount configuration, complete the following steps:

- Step 1** Locate the threaded holes in the rear sides of the chassis.

- Step 2** Align the rack-mount bracket to the side of the router. Depending on which set of holes on the rack-mount bracket that you use, the router will either be recessed in the rack or protrude from the rack.
- Step 3** Insert and tighten the screws.
- Step 4** Repeat Step 1 through Step 3 on the other side of the router.

**Note**

To use the cable-management bracket with the Cisco 7401ASR router rear-mounted, you must purchase a second rack-mount kit, attach a rack-mount bracket to the left front of the chassis, and attach the cable-management bracket to it. See the [“Attaching the Cable-Management Bracket”](#) section on page 2-8 for cable-management bracket installation instructions.

This completes the procedure for installing the rack-mount on a Cisco 7401ASR router for a rear rack-mount configuration. Go to the [“Installing the Chassis in the Rack”](#) section on page 2-9.

## Installing the Chassis in the Rack

**Caution**

To prevent injury, review the safety precautions in this chapter before installing the router in a rack.

After installing the brackets on the chassis, you mount the router by securing the rack-mount brackets to two posts or mounting strips in the rack using the four screws provided. Because the brackets support the weight of the entire chassis, be sure to use all four screws to fasten the two rack-mount brackets to the rack posts. [Figure 2-6 on page 2-10](#) and [Figure 2-7 on page 2-11](#) show typical installations in two-post and four-post equipment racks.

We recommend that you allow at least 1 or 2 inches (2.54 or 5.08 cm) of vertical clearance between the router and any equipment directly above and below it.

To install the chassis in the rack, complete the following steps:

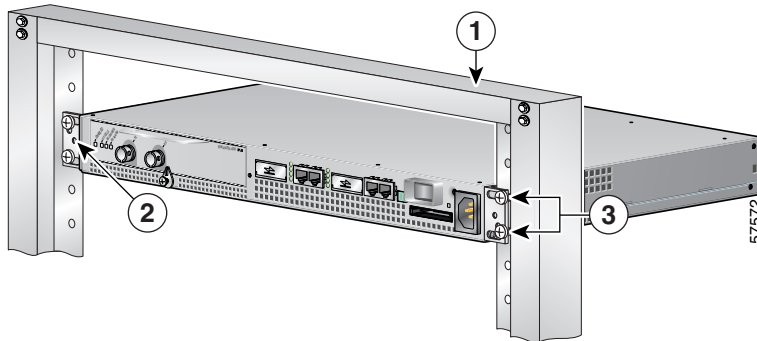
- Step 1** On the chassis, ensure that the port adapter latch is in the locked position and tightened, and that the CompactFlash Disk and any GBICs are installed.
- Step 2** Make sure that your path to the rack is unobstructed. If the rack is on wheels, ensure that the brakes are engaged or that the rack is otherwise stabilized.
- Step 3** Position the chassis so that the front end is closest to you. Lift the chassis and move it to the rack. To prevent injury, avoid sudden twists or moves.
- Step 4** Slide the chassis into the rack, pushing it back until the brackets (installed at the front or rear of the chassis) meet the mounting strips or posts on both sides of the equipment rack.

For two-post rack installation, go to the [“Two-Post Rack Installation”](#) section on page 2-10.

For four-post rack installation, go to the [“Four-Post Rack Installation”](#) section on page 2-11.

## Two-Post Rack Installation

**Figure 2-6** Installing the Cisco 7401ASR Router in a Two-Post Rack



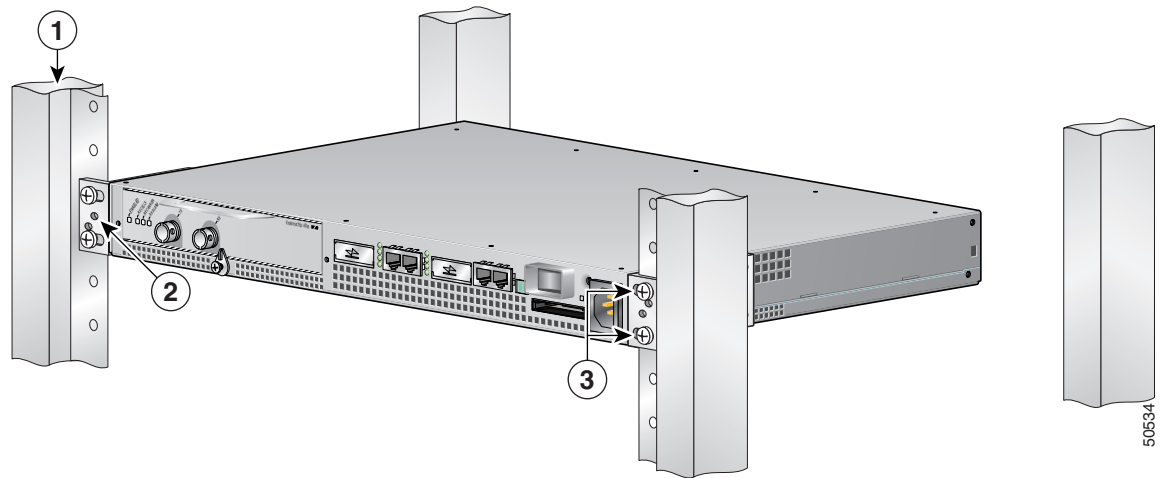
<b>1</b>	Two-post or four-post rack	<b>3</b>	Four 12-24 x 0.5-inch screws
<b>2</b>	Screw hole for the cable-management bracket		

- 
- Step 1** Make sure that the port adapter latch is in the locked position and the screw is tightened.
- Step 2** Make sure the rack brakes are locked or the rack is stabilized.
- Step 3** Position the router so the front is closest to you and lift it carefully into the rack. To prevent injury, avoid any sudden twists or moves.
- Step 4** Slide the chassis into the rack, pushing it back until the brackets meet the mounting strips or posts on both sides of the rack.
- Step 5** Keeping the brackets flush against the posts or mounting strips, align the holes in the brackets with the holes on the rack or mounting strip.
- Step 6** For each bracket, insert and tighten two 12-24 x 0.5-inch screws to the rack.
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This completes the procedure for installing the chassis in the rack. Proceed to the [“Attaching a Chassis Ground Connection”](#) section on page 2-11 to continue the installation.

## Four-Post Rack Installation

Figure 2-7 Installing the Cisco 7401ASR Router in a Four-Post Rack



<b>1</b>	Four-post rack	<b>3</b>	Four 12-24 x 0.5-inch screws
<b>2</b>	Screw hole for the cable-management bracket		

- 
- Step 1** Make sure that the port adapter latch is in the locked position and the screw is tightened.
- Step 2** Make sure the rack brakes are locked or the rack is stabilized.
- Step 3** Position the router so the front is closest to you and lift it carefully into the rack. To prevent injury, avoid any sudden twists or moves.
- Step 4** Slide the chassis into the rack, pushing it back until the brackets meet the mounting strips or posts on both sides of the rack.
- Step 5** Keeping the brackets flush against the posts or mounting strips, align the holes in the brackets with the holes on the rack or mounting strip.
- Step 6** For each bracket, insert and tighten two 12-24 x 0.5-inch screws to the rack.
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This completes the procedure for installing the chassis in the rack. Proceed to the [“Attaching a Chassis Ground Connection”](#) section on page 2-11 to continue the installation.

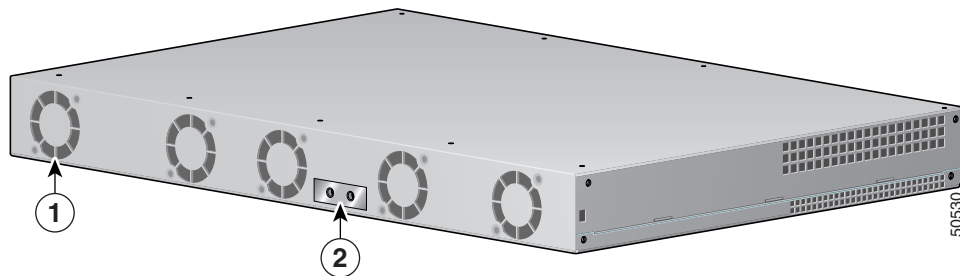
## Attaching a Chassis Ground Connection

Before you connect power or turn on power to your router, we strongly recommend that you provide an adequate chassis ground (earth) connection for the router chassis. Chassis grounding connectors are provided on each Cisco 7401ASR router chassis. (See [Figure 2-8](#) on page 2-12.)

To ensure the chassis grounding connection that you provide is adequate, you will need the following parts and tools:

- One grounding lug—Must have two number-10 screw holes that have a 0.63-inch (16.002-mm) spacing between them, and a wire receptacle large enough to accept a 6-AWG multistrand, copper wire. This grounding lug is not available from Cisco Systems; electrical-connector vendors provide this type of grounding lug.
- Two Phillips machine screws with locking washers—M5 (metric), 0.031-inch (0.8-mm) pitch, 0.315-inch (8-mm) length. These screws are not available from Cisco Systems; they are available from a commercial hardware vendor.
- One grounding wire—6-AWG, 0.162-inch (4.115-mm) diameter, with approximately 0.108-inch (2.743-mm) insulation, for a total wire diameter of approximately 0.27 inches (6.858 mm). The wire length is dependent on your router location and site environment. This wire is not available from Cisco Systems; it is available from a commercial cable vendor.
- Number 2 Phillips screwdriver
- Crimping tool large enough to accommodate the diameter of the wire receptacle on your grounding lug
- Wire stripper

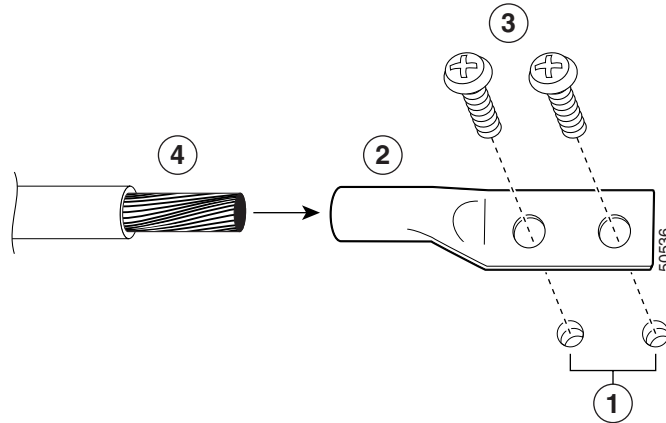
**Figure 2-8** Locating the Chassis Grounding Connector



<b>1</b>	Fan vents	<b>2</b>	Ground connector
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Use the following procedure to attach the grounding lug to the chassis grounding connector on your router chassis:

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- Step 1** Locate the chassis grounding connector on your router chassis.

**Figure 2-9 Attaching a Grounding Lug to the Chassis Grounding Connector**

<b>1</b>	Chassis grounding connector	<b>3</b>	Screws
<b>2</b>	Grounding lug	<b>4</b>	Wire

- Step 2** Use the wire stripper to strip one end of the 6-AWG wire approximately 0.75 inches (19.05 mm).
- Step 3** Insert the 6-AWG wire into the wire receptacle on the grounding lug.
- Step 4** Use the crimping tool to carefully crimp the wire receptacle around the wire; this step is required to ensure a proper mechanical connection.
- Step 5** Insert the two screws through the holes in the grounding lug. (See [Figure 2-9](#).)
- Step 6** Use the Number 2 Phillips screwdriver to carefully tighten the screws until the grounding lug is held firmly to the chassis. Do not overtighten the screws.
- Step 7** Connect the opposite end of the grounding wire to the appropriate grounding point at your site to ensure an adequate chassis ground.

This completes the procedure for attaching a chassis ground connection. Go to the following cabling sections for information on attaching cables.

## Connecting Port Adapter Cables

The instructions for connecting the cables for the port adapter installed in the Cisco 7401ASR router are contained in the respective configuration note for each port adapter. For example, if you are connecting the optical fiber cables for the PA-POS-OC3 port adapter, refer to the configuration note *PA-POS-OC3 Packet OC3 Port Adapter Installation and Configuration* at [http://www.cisco.com/univercd/cc/td/doc/product/core/7206/port\\_adp/sonet\\_pa/paposoc3/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/core/7206/port_adp/sonet_pa/paposoc3/index.htm). Port adapter documents are also available on the Documentation CD-ROM.



### Note

There are no cable connections to the VPN Acceleration Module (.)

# Connecting I/O Cables

This section contains connection equipment information for the Fast Ethernet/Ethernet, Gigabit Ethernet, console, and auxiliary ports.

## Connecting Console and Auxiliary Port Cables

The Cisco 7401ASR router has a DCE-mode console port for connecting a console terminal, and a DTE-mode auxiliary port for connecting a modem or other DCE device (such as a CSU/DSU or other router) to your router.



### Note

Both the console and the 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.)

The Cisco 7401ASR router uses RJ-45 ports for both the auxiliary and console ports.

Before connecting a terminal to the console port, configure the terminal to match the router console port as follows: 9600 baud, 8 data bits, no parity, 2 stop bits (9600 8N2). After you establish normal router operation, you can disconnect the terminal.

**Table 2-2 Pinouts for the RJ-45-to-DB-25 Adapters**

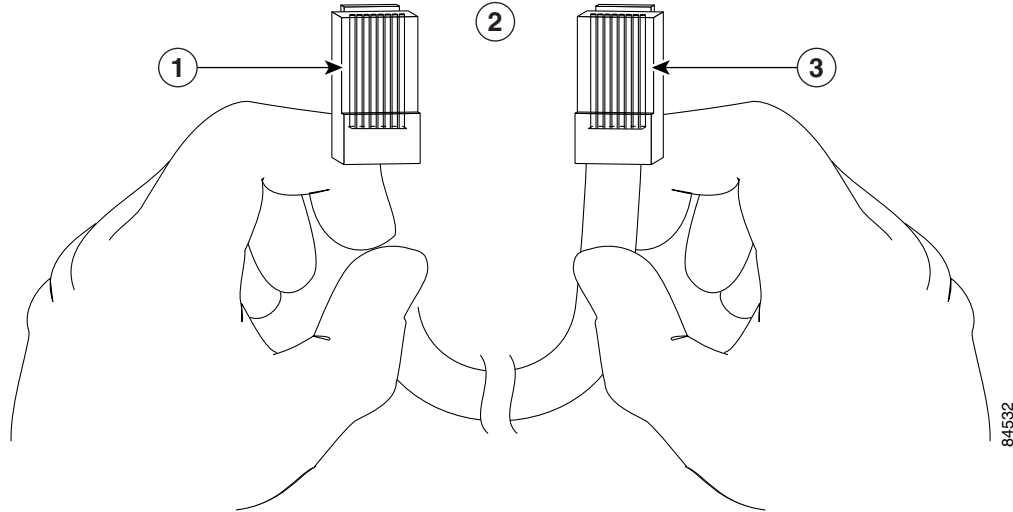
Adapter	DTE M/F Pins <sup>1</sup>	DCE M/F Pins	MMOD Pins <sup>2</sup>
1	4	5	5
2	20	6	8
3	2	3	3
4	7	7	7
5	7	7	7
6	3	2	2
7	6	20	20
8	5	4	4

1. The female data terminal equipment (FDTE) adapter that is available from Cisco is labeled "Terminal".
2. The MMOD adapter that is available from Cisco is labeled "Modem".

Refer to [Table 2-2](#) for a list of the pins used on the RJ-45-to-DB-25 adapters, used with an RJ-45 cable, to connect terminals and modems to the Cisco 7200 series routers. The cable you use may be a roll-over cable or a straight cable.

A roll-over cable can be detected by comparing the two modular ends of the cable. Holding the cables in your hand, side-by-side, with the tab at the back, the wire connected to the pin on the outside of the left plug should be the same color as the pin on the outside of the right plug. If your cable was purchased from Cisco, pin 1 will be white on one connector, and pin 8 will be white on the other (a roll-over cable reverses pins 1 and 8, 2 and 7, 3 and 6, and 4 and 5). (See [Figure 2-10](#).)

Figure 2-10 Identifying a Roll-Over Cable



<b>1</b>	Pin 1	<b>3</b>	Pin 8
<b>2</b>	Pin 1 and pin 8 should be the same color		

The Cisco 7200 series routers ships with a rolled cable. Connection to a terminal or a modem will require an RJ-45-to-DB-25 adapter, and possibly a DB-25-to-DB9 adapter. Refer to [Table 2-3](#) for the cable and adapter configurations that can be used to connect terminals and modems to the Cisco 7200 series routers.

Table 2-3 Asynchronous Device Cabling Options

Access Server Port	RJ-45 Cable Type	DB-25 Adapter	End Device
Console or auxiliary	Rolled	FDTE <sup>1</sup>	Terminal
Console or auxiliary	Straight	FDCE	Terminal
Auxiliary or console	Rolled	MMOD <sup>2</sup>	Modem

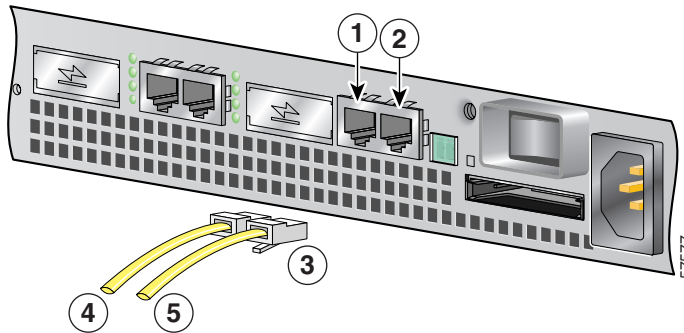
1. The FDTE RJ-45-to-DB-25 adapter is labeled “Terminal”.

2. The MMOD RJ-45-to-DB-25 adapter is labeled “Modem”.

Both ports are configured as asynchronous serial ports. [Figure 2-11](#) shows the RJ-45 console and auxiliary port connections.

For console and auxiliary port pinouts for the RJ-45 connector, see [Appendix A, “Specifications,”](#) the uckers3cat.

Figure 2-11 Console and Auxiliary Port RJ-45 Connectors



1	Auxiliary port	4	Cable to modem or DCE
2	Console port	5	Cable to console terminal or DTE
3	RJ-45 connector		

## Connecting Native Gigabit Ethernet and Fast Ethernet/Ethernet Cables



### Note

See [Chapter 3, “Starting and Configuring,”](#) the “[Configuring the Native Gigabit Ethernet and Fast Ethernet/Ethernet Interfaces](#)” section on page 3-15, for information on configuring and troubleshooting the Gigabit Ethernet and Fast Ethernet/Ethernet interfaces.

The Cisco 7401ASR router has two Ethernet interfaces and four physical Ethernet ports, two RJ-45 (10/100 Mbps) ports and two Gigabit Ethernet (1000 Mbps) ports. Only two of the four ports can be in use at any one time.

There are two PCI buses. One Gigabit Ethernet (1000) port and one Fast Ethernet RJ-45 (10/100) port are on the PCI bus 1. The port adapter slot, one Gigabit Ethernet (1000) port, and one Fast Ethernet RJ-45 (10/100) port are on PCI bus 0.

## Attaching the Fast Ethernet/Ethernet 10/100 Cables

The RJ-45 ports support IEEE 802.3 (Ethernet) and IEEE 802.3u (Fast Ethernet) interfaces compliant with 10BASET and 100BASETX specifications.

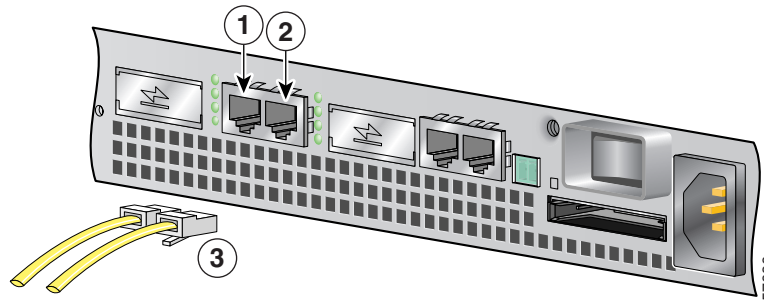
The RJ-45 port supports standard straight-through and crossover Category 5 unshielded twisted-pair (UTP) cables with RJ-45 connectors. Cisco Systems does not supply Category 5 UTP cables; these cables are available commercially.

See [Appendix A, “Specifications,”](#) for Fast Ethernet RJ-45 port specifications.

## Intra-Building Lightning Protection

Shielded cables, which are grounded at both ends are required to be used on the 10/100 Ethernet port in order to be in compliance with requirement R4-11 in GR-1089-Core for a Central Office environment. This is not a requirement for customer premise installations.

Figure 2-12 Attaching the Fast Ethernet/Ethernet Cables



1	Fast Ethernet/Ethernet port 0 (RJ-45 connector)	3	Fast Ethernet cables
2	Fast Ethernet/Ethernet port 1 (RJ-45 connector)		

Attach either one or two Fast Ethernet/Ethernet 10/100 cables to the Fast Ethernet/Ethernet port 0 or port 1.

**Warning**

To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Some LAN and WAN ports both use RJ-45 connectors. Use caution when connecting cables.

## Attaching the GBIC Interface Cables

The GBIC ports support IEEE 8092.3z (optical Gigabit Ethernet) interfaces compliant with 1000BASESX and 1000BASELX specifications.

After you install the GBIC in the Gigabit Ethernet port, you must attach the cables to the GBIC. The instructions that follow apply to all supported platforms.

See [Appendix A, “Specifications,”](#) for more information on GBIC cabling and cabling specifications.

**Note**

Optical fiber cables are commercially available; they are not available from Cisco Systems.

## Attaching Multimode and Single-Mode Optical Fiber Cables

If you ordered a Gigabit Interface Converter (GBIC) with your Cisco 7401ASR router, it is one of three types listed in [Table 2-4](#):

**Table 2-4 GBIC Products, Description, and Operating Distance**

<b>Product Number</b>	<b>GBIC</b>	<b>Description</b>	<b>Operating Distance</b>
GBIC-SX= or WS-G5484=	Short wavelength (1000BASESX)	Contains a Class 1 laser of 850 nm for 1000BASESX (short wavelength) applications.	Operates on standard multimode fiber-optic link spans of up to 1804 ft (550 m).
GBIC-LX/LH= or WS-G5486=	Long wavelength/ long haul (1000BASELX/LH)	Contains a Class 1 laser of 1300 nm for 1000BASELX/LH (long wavelength) applications.	Operates on single-mode and multimode fiber-optic link spans of up to 6.2 miles (10 km).
GBIC-ZX= or WS-G5487=	Extended distance (1000BASEZX)	Contains a Class 1 laser of 1550 nm for 1000BASEZX (extended wavelength) applications.	Operates on ordinary single-mode fiber-optic link spans of up to 43.5 miles (70 km). Link spans of up to 62.1 miles (100 km) are possible using premium single-mode fiber or dispersion-shifted single-mode fiber.

For cabling specifications, including specific cable maximum distances, see [Appendix A, “Specifications.”](#)

**Caution**

If you plan to use a GBIC-LX/LH or WS-G5486 at distances greater than 984.25 feet (300 meters) over 50/125-micron or 62.5/125-micron multimode fiber, you must use the mode-conditioning patch cord to prevent data transmission problems. (See the [“Attaching the Mode-Conditioning Patch Cord”](#) section on page 2-21.)

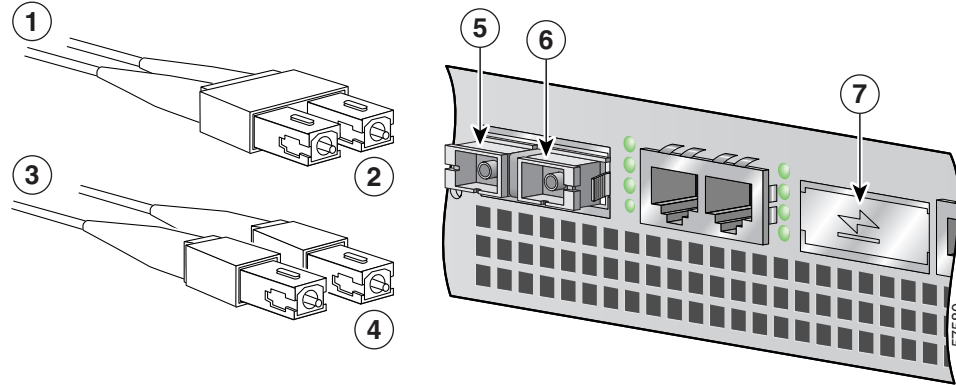
**Warning**

**Class 1 laser product.**

**Warning**

**Class 1 LED product.**

Figure 2-13 GBIC Port Connections



1	To external 1000BASEX network	5	TX (GE port 0)
2	1 duplex connector (TX and RX)	6	RX (GE port 0)
3	To external 1000BASEX network	7	GE port 1
4	2 simplex connectors		

**Step 1** Remove the plug from the GBIC so that you can insert the cables. Keep the plug for use should you ever disconnect the optical fiber cables.



**Warning** Because invisible laser radiation may be emitted from the aperture of the port when no fiber cable is connected, avoid exposure to laser radiation and do not stare into open apertures.

**Step 2** Attach the appropriate optical fiber cable directly to the SC-type receptacle on the GBIC. You can use either simplex or duplex connectors for most devices. (Figure 2-13 shows a GBIC installed in GE port 0.)

- For simplex connectors, two cables are required, one cable for transmit (TX) and a second cable for receive (RX).
- For duplex connectors, only one cable that has both TX and RX connectors is required.

A mode-conditioning patch cord can be used with the GBIC-LX/LH or WS-G5486 to allow reliable laser transmission between the single-mode laser source on the GBIC and a multimode optical fiber cable. See the “Attaching the Mode-Conditioning Patch Cord” section on page 2-21 for installation instructions.

### Mode-Conditioning Patch Cord Description

A mode-conditioning patch cord can be used with the GBIC-LX/LH or WS-G5486 to allow reliable laser transmission between the single-mode laser source on the GBIC and a multimode optical fiber cable.

When an unconditioned laser source designed for operation on single-mode optical fiber is directly coupled to a multimode optical fiber cable, an effect known as *differential mode delay* (DMD) might result in a degradation of the modal bandwidth of the optical fiber cable.

This degradation results in a decrease in the link span (the distance between a transmitter and a receiver) that can be supported reliably. The effect of DMD can be overcome by conditioning the launch characteristics of a laser source. A practical means of performing this conditioning is to use a device called a mode-conditioning patch cord.

A mode-conditioning patch cord is an optical fiber cable assembly that consists of a pair of optical fibers terminated with connector hardware. Specifically, the mode-conditioning patch cord is composed of a single-mode optical fiber permanently coupled off-center (see Offset in [Figure 2-14](#)) to a graded-index multimode optical fiber. [Figure 2-14](#) shows a diagram of the mode-conditioning patch cord assembly.

A mode-conditioning patch cord assembly is composed of duplex optical fibers, including a single-mode-to-multimode offset launch fiber connected to the transmitter, and a second conventional graded-index multimode optical fiber connected to the receiver. The use of a plug-to-plug patch cord maximizes the power budget of multimode 1000BASELX and 1000BASELH links.

**Note**

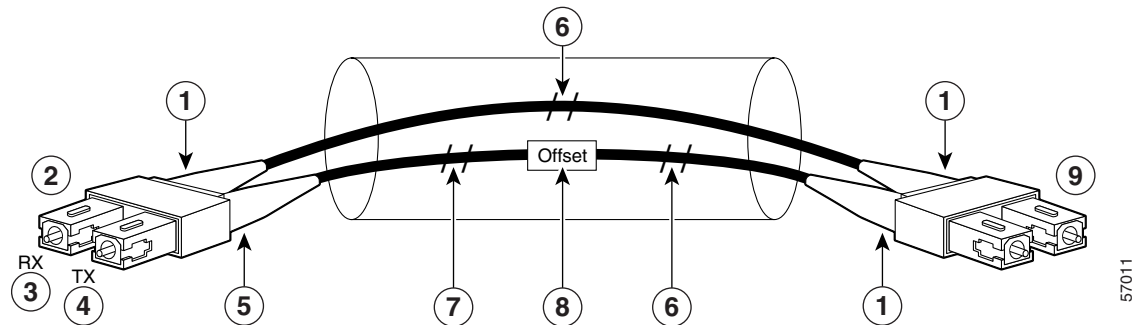
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The mode-conditioning patch cord is required to comply with IEEE standards. The IEEE found that link distances could not be met with certain types of fiber-optic cable cores. The solution is to launch light from the laser at a precise offset from the center, which is accomplished by using the mode-conditioning patch cord. At the output of the patch cord, the GBIC is compliant with the IEEE 802.3z standard for 1000BASELX.

---

## Attaching the Mode-Conditioning Patch Cord

Figure 2-14 GBIC Mode-Conditioning Patch Cord



1	Beige color identifier	6	Multimode bar
2	To GE interface	7	Single-mode bar
3	RX	8	Offset
4	TX	9	To cable plant
5	Blue color identifier		

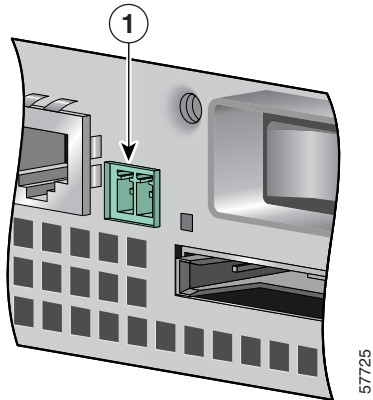
To use the mode-conditioning patch cord, follow these steps:

- 
- Step 1** Attach the patch cord to the SC-type receptacle on the GBIC. (See [Figure 2-13](#).)
- Step 2** Attach the network ends of your patch cord to the appropriate 1000BASEX equipment in your building cable plant.
- Ensure that you connect the TX and RX ports on one end of the patch cord to the RX and TX ports (respectively) on the other end. Connect TX to RX and RX to TX.
- 

This completes the procedures for connecting the I/O cables.

## Attaching the Alarm Port Cable

Figure 2-15 Connecting the Alarm Port Cable



1	Alarm port	
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If you have an alarm system, attach the alarm cable to the Cisco 7401ASR router alarm port. The alarm port cable is not provided by Cisco Systems. Insert the cable connector into the alarm port. The cable connector cannot be incorrectly inserted into the alarm port.

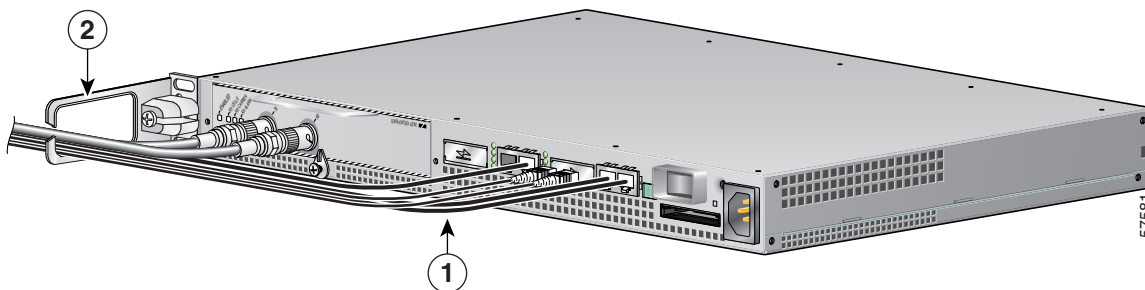
The alarm port is used to monitor fatal or severe errors that cause Cisco IOS to crash. The alarm port is connected to a normally closed solid state relay. Cisco IOS writes to a hardware port and the relay contact opens. If the system enters into a ROMmon or watchdog reset state, the relay contacts close. The closing contacts alert the alarm annunciator or monitor that a Cisco IOS crash has occurred.

If interfaces fail or other non-fatal errors occur, the alarm port does not respond. Continue to use SNMP to manage these types of errors.

For alarm port specifications, see [Appendix A, “Specifications,”](#) the “Alarm Port” section on page A-9.

## Using the Cable-Management Bracket

Figure 2-16 Securing Interface Cables through the Cable-Management Bracket



1	Input/output cables	2	Cable-management bracket
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Secure port adapter interface cables and input/output cables by placing them through the cable-management bracket.

Proceed to the “[Connecting Power](#)” section on page 2-23 to complete the installation.

## Connecting Power

This section provides the procedures for connecting AC-input and DC-input power to your Cisco 7401ASR router.



**Warning**

This unit might have more than one power cord. To reduce the risk of electric shock, disconnect the two power supply cords before servicing the unit.

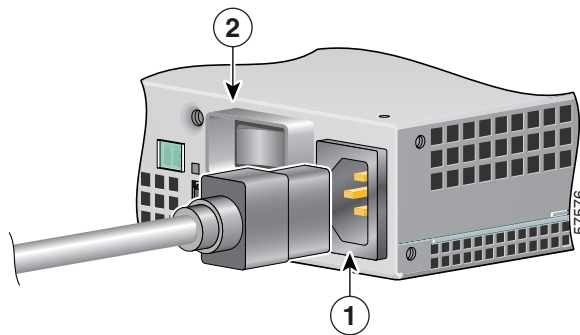


**Warning**

The AC power supply has double pole/neutral fusing.

## Connecting AC-Input Power

*Figure 2-17 Connecting AC-Input Power*



<b>1</b>	AC power connector	<b>2</b>	Power switch
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Connect an AC-input power supply as follows:

- Step 1** At the front of the router, check that the power switch is in the off (O) position.
- Step 2** Plug the power cable into the AC connector on the router.
- Step 3** Plug the AC power supply cable into the AC power source.



**Note**

After powering off the router, wait at least 30 seconds before powering it on again.

This completes the procedure for connecting AC-input power. Your installation is complete. Proceed to [Chapter 3, “Starting and Configuring,”](#) to start the router and to perform a basic configuration.

## Connecting DC-Input Power



### Note

The color coding of the DC-input power supply leads depends on the color coding of the DC power source at your site. Make certain the lead color coding you choose for the DC-input power supply matches lead color coding used at the DC power source.



### Warning

**When you install the unit, the ground connection must always be made first and disconnected last.**



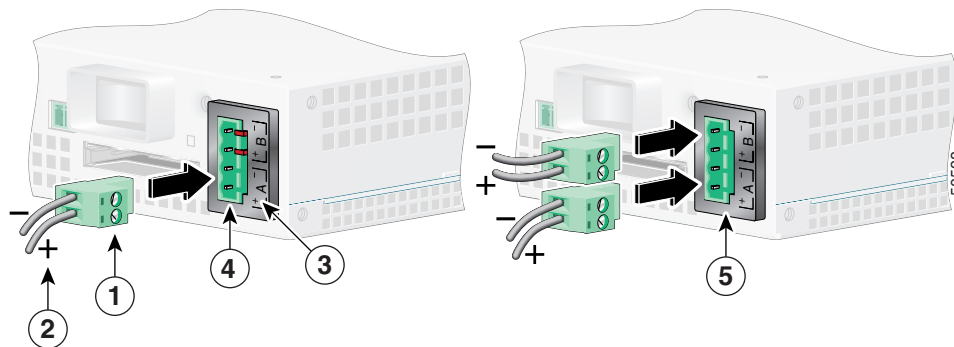
### Warning

**Before completing any of the following steps, and to prevent short-circuit or shock hazards, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.**

Connect a DC-input power supply as follows:

- Step 1** At the front of the router, check that the power switch is in the off (O) position.
- Step 2** Ensure that no current is flowing through the DC power supply leads. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.
- Step 3** Using a wire stripper, strip approximately 0.55 inch (14 mm) from the –V and +V leads.

**Figure 2-18 Attaching the Leads to the DC Plug and the DC Plug to the DC Connector**



1	DC plug	4	Single DC power connector
2	Lead	5	Dual DC power connector
3	+ and – embossed on connector		

- Step 4** Insert the –V and +V leads into the DC plug that ships with the Cisco 7401ASR router. The plug allows you to unplug the DC wires from the power supply without having to unscrew the leads.
  - a.** Orient the plug (1) to the connector (4) as shown in [Figure 2-18](#). The plug inserts only one way. Notice the symbols, + A –, embossed on the connector (3). Use the symbols and the orientation of the plug to guide you when inserting the leads into the plug.

- b. Insert the +V lead (2) into the plug as shown in [Figure 2-18](#), and tighten the screw to hold the lead to the plug.
- c. Insert the –V into the plug as shown in [Figure 2-18](#), and tighten the screw to hold the lead to the plug.

**Step 5** If you have a dual DC power supply, repeat Step 4 for the second plug.

**Step 6** Insert the DC plug into the DC power connector on the chassis. If you have a dual DC power supply, insert the second DC plug into the DC power connector.

**Step 7** Switch the circuit breaker to the on position.

**Note**

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After powering off the router, wait at least 30 seconds before powering it on again.

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This completes the procedure for connecting DC-input power. Your installation is complete. Proceed to [Chapter 3, “Starting and Configuring,”](#) to start the router and to perform a basic configuration.

