C H A P T E R 2

Installing the Router

This chapter describes the equipment and the procedures for successfully installing the Cisco 860 series, 880 series, and 890 series Integrated Services Routers (ISRs), and contains the following sections:

- Equipment, Tools, and Connections, page 2-2
- Installing the Router, page 2-3

✎
Note For compliance and safety information, see the *Regulatory Compliance and Safety Information Roadmap* that ships with the router and the *Regulatory Compliance and Safety Information for Cisco 800 Series and SOHO Series Routers.*

⚠
Warning **All wireless LAN products in the 5.2/5.3GHz band cannot be used outdoors. Use the product only indoors.** Statement 372

⚠
Warning **Read the installation instructions before connecting the system to the power source.** Statement 1004

⚠
Warning **Only trained and qualified personnel should be allowed to install, replace, or service this equipment.** Statement 1030

⚠
Warning **Ultimate disposal of this product should be handled according to all national laws and regulations.** Statement 1040

⚠
Warning **Do not locate the antenna near overhead power lines or other electric light or power circuits, or where it can come into contact with such circuits. When installing the antenna, take extreme care not to come into contact with such circuits, because they may cause serious injury or death. For proper installation and grounding of the antenna, please refer to national and local codes (for example, U.S.:NFPA 70, National Electrical Code, Article 810, Canada: Canadian Electrical Code, Section 54).** Statement 1052

⚠
Warning **No user-serviceable parts inside. Do not open.** Statement 1073

Equipment, Tools, and Connections

This section describes the equipment, tools, and connections necessary for installing your Cisco 860 series, 880 series, and 890 series ISRs. It contains the following topics:

Items Shipped with your Router

Unpack the box and verify that all items listed on the invoice were shipped with the router.

Table 2-1 lists the items and their quantities that are shipped with each router model.

Table 2-1   Items and Their Quantities That Are Shipped with the Cisco 860 Series, Cisco 880 Series, and Cisco 890 Series ISRs

Item	Cisco 860 Series Routers	Cisco 860VAE Series Routers[1]	Cisco 880 Series Routers	Cisco 890 Series Routers
Straight-through RJ-45 Ethernet cable	1	—	1	1
ADSL RJ-11-to-RJ-11 straight-through cable	—	—	—	1
RJ-11 DSL[2] cable	1[3]	n/a	1[4]	1
DSL RJ-45-to-dual-RJ-11 breakout cable	—	n/a	1[5]	1
RJ-45-to-DB-9 console cable	1	—	1	1
External 12 VDC power supply adapter	1	1	1	1
AC power supply cable with cable retention clip	1	1	1	1
Cisco Configuration Professional (Cisco CP) CD[6]	1	1	1	1

1. By default, no cables are shipped with Cisco 860VAE models unless requested through the dynamic configuration tool.
2. DSL = digital subscriber line.
3. Shipped with Cisco 867 models only.
4. Shipped with Cisco 886, 887, 887M, and 886-J models only.
5. Shipped with Cisco 888E models only.
6. Cisco CP is optional by order and available only on some SKUs.

Additional Items

The following items are not shipped with the router but are required for installation:

- ESD-preventive cord and wrist strap.
- Screws for mounting the router on a wall:

– Two number-10 wood screws (round- or pan-head) with number-10 washers, or two number-10 washer-head screws, for mounting on a wall stud. The screws must be long enough to penetrate at least 3/4 in. (20 mm) into the supporting wood or metal wall stud.

– Two number-10 wall anchors with washers, for mounting the router on a hollow-wall.

- Wire crimper for chassis grounding.

- Wire for connecting the chassis to an earth ground:

    – AWG 14 (2 mm^2) or larger wire for NEC-compliant chassis grounding.

    – AWG 18 (1 mm^2) or larger wire for EN/IEC 60950–compliant chassis grounding.

- Ring terminal with an inner diameter of 1/4 in. (5 to 7 mm), for NEC-compliant chassis grounding.

- Ethernet cables for connecting to the Fast Ethernet (FE) WAN and LAN ports.

Connections

Obtain a broadband or Ethernet connection from your service provider.

Ethernet Devices

Identify the Ethernet devices that you will connect to the router: hub, servers, and workstations or PCs. Ensure that each device has a network interface card (NIC) for connecting to Ethernet ports.

- If you plan to configure the software using Cisco IOS commands through the console port, provide an ASCII terminal or a PC that is running terminal emulation software to connect to the console port.

- If you plan to connect a modem, provide the modem and modem cable.

- If you plan to use the Data BRI port, provide an NT1 device and an ISDN S/T cable.

- If you plan to use the cable-lock feature, provide a Kensington or equivalent locking cable.

Installing the Router

This section describes how to install the Cisco 860 series, 880 series, and 890 series ISRs. These routers can either be installed on a table top or other flat horizontal surface or be mounted on a wall. The Cisco 890 series ISRs may be mounted in a rack. This section also describes how to attach WLAN antennas to the Cisco 890 series routers. This section contains the following topics:

Warnings

⚠️
Warning   **This equipment needs to be grounded. Use a green and yellow 12 to 14 AWG ground wire to connect the host to earth ground during normal use.** Statement 242

⚠️
Warning   **This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.** Statement 1024

⚠️
Warning   **Read the wall-mounting instructions carefully before beginning installation. Failure to use the correct hardware or to follow the correct procedures could result in a hazardous situation to people and damage to the system.** Statement 378

✎
Note   • Do not stack anything on top of the router.

   • Do not cover or obstruct the router vents located on both sides and top of the routers; otherwise, overheating could occur and cause damage to the router.

   • Place router in ventilated area to avoid local air heating.

⚠️
Caution   Do not cover or obstruct the router vents located on both sides of the router; otherwise, overheating could occur and cause damage to the router.

⚠️
Caution   Do not place anything on top of the router that weighs more than 10 pounds (4.5 kilograms), and do not stack routers on a desktop. Excessive weight on top of the router could damage the chassis.

⚠️
Caution   Do not install the router or power supplies next to a heat source of any kind, including heating vents.

⚠️
Caution   The top surface of the router is hot since heat is dissipated through the top. Do not keep any object in direct contact with the surface for a prolonged period.

Installing Antennas

The Cisco 890 series wireless routers have three reverse-polarity threaded Neill-Concelman (RP-TNC) connectors on the back panel. The antennas that are shipped with the router are dual-band 2.4-GHz to 5-GHz omnidirectional dipole antennas.

⚠️ **Warning**   **All wireless LAN products in the 5.2/5.3GHz band cannot be used outdoors. Use the product only indoors.** Statement 372

📝 **Note**   Before you install the Cisco 890 series wireless router on a table, wall, or rack, connect the antennas to the back panel. It is difficult to attach the antennas after the router is installed.

To attach the radio antennas to your wireless router, follow these steps:

Step 1   Manually screw the antennas tight to the RP-TNC connectors on the back of the router.

Figure 2-1   *Attaching Antennas to the Router*
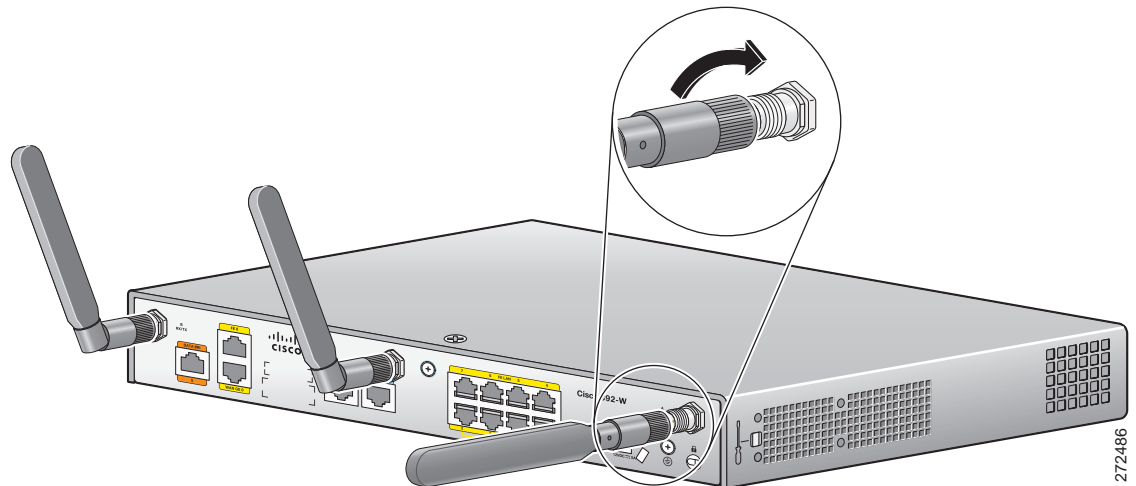
Step 2   Orient the antennas. For optimum wireless performance, the antennas should be perpendicular with respect to the floor.

   a.   If the router is being mounted on a desk, orient the antennas straight up.

   b.   If the router is being mounted on a wall, orient the antennas perpendicular to the floor, as shown in Figure 2-2 and Figure 2-3.

Figure 2-2   Antennas Oriented Vertically Up
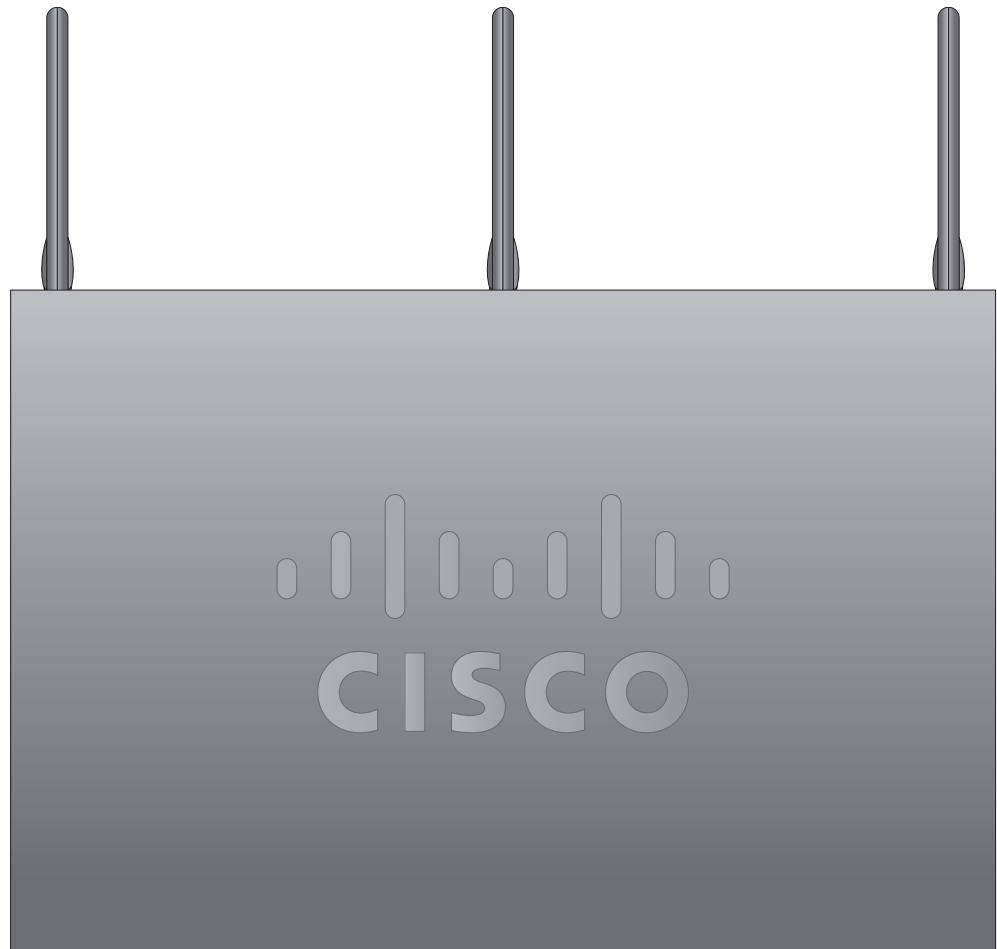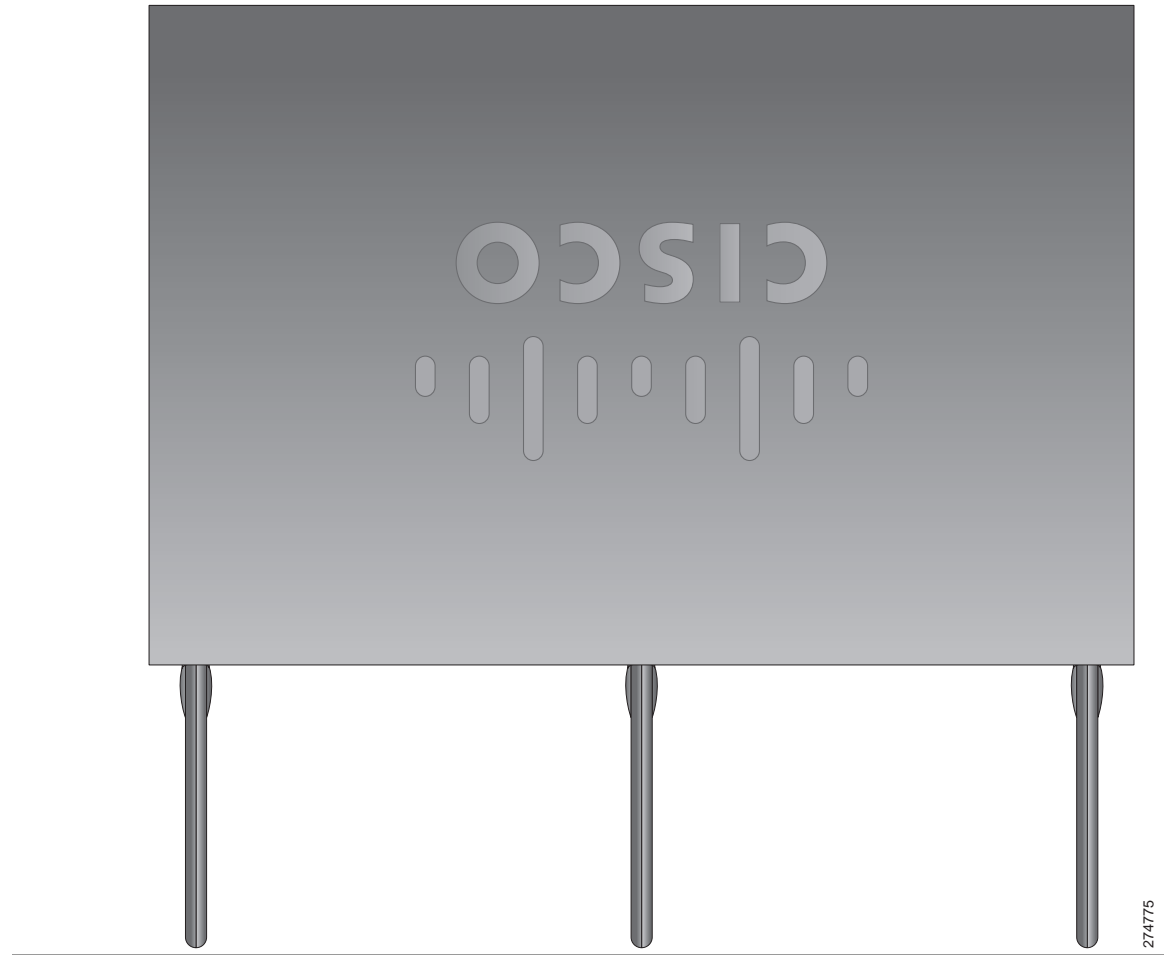
Figure 2-3   Antennas Oriented Vertically Down

Installing on a Table

To install the router on a table or other flat horizontal surface, firmly place the router on a table or other horizontal surface. Keep at least 1 inch (2.5 cm) of clear space beside the cooling inlet and exhaust vents.

Connect the chassis to a reliable earth ground. For the chassis ground connection procedures, see the "Installing the Router Ground Connection" section on page 2-13.

Note   Do not place anything on top of the router.

Mounting on a Wall

The Cisco 860 series, 880 series, and 890 series ISRs have mounting holes on the bottom of the chassis for mounting the unit on a wall or other vertical surface.

The mounting holes are bidirectional. You can hang the router with the front bezel facing upward or downward.

Keep at least 1 inch (2.5 cm) of clear space beside the cooling inlet and exhaust vents.

Tip When choosing a location for wall-mounting the router, consider cable limitations and wall structure.

To mount the router on a wall, follow these steps:

Step 1 Determine the required distance between mounting holes on the router. Figure 2-4 shows the wall-mount holes located on the underside of the router.

Note For most router models, the distance between mounting holes is 8.2 inches (208 mm), as shown in Figure 2-4. For the Cisco 866 and Cisco 867 models, the distance is 7.85 inches (199 mm). Verify the required distance before drilling the holes.

Figure 2-4 *Wall-mount Holes on the Underside of the Router*
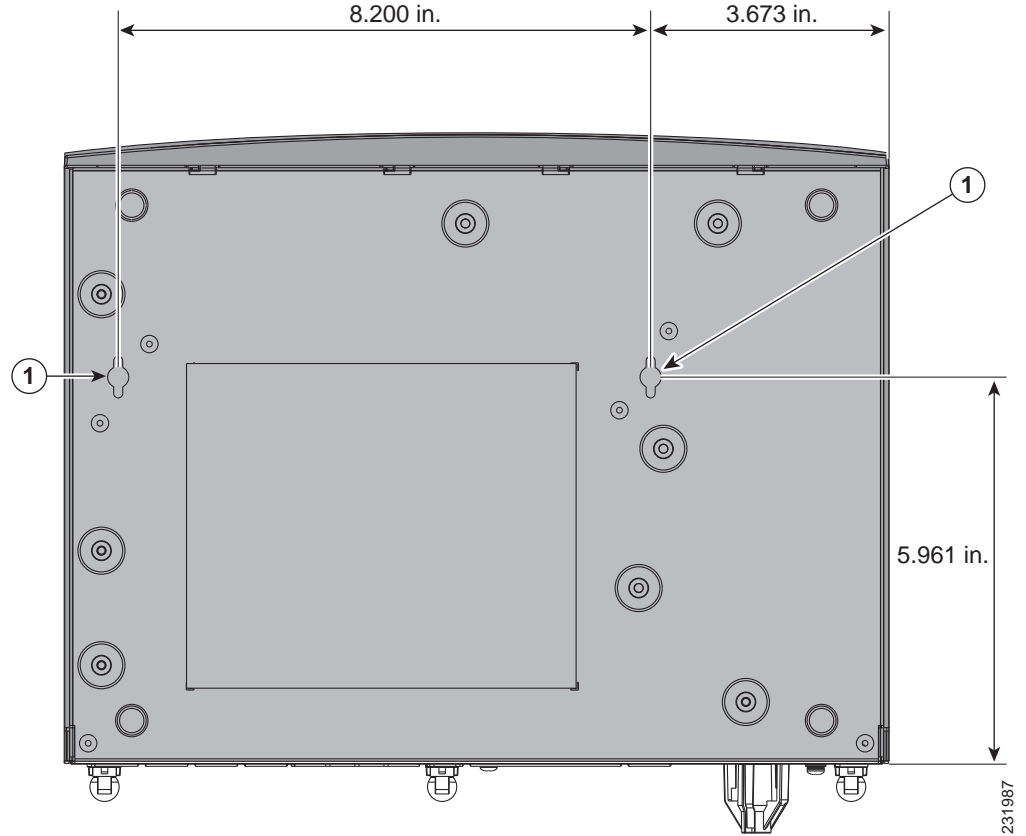
1	Wall-mount holes		

Step 2 Insert the screws, with anchors, into the wall. Leave 1/8 inch (0.32 cm) between the screw head and the wall. See Figure 2-5.

Step 3 Hang the router on the screw without forcibly pushing towards the wall side. The screw head may damage the protection wall inside. Place the power adapter on a nearby horizontal surface. See Figure 2-5.

Figure 2-5   ***Router Mounted on the Wall***
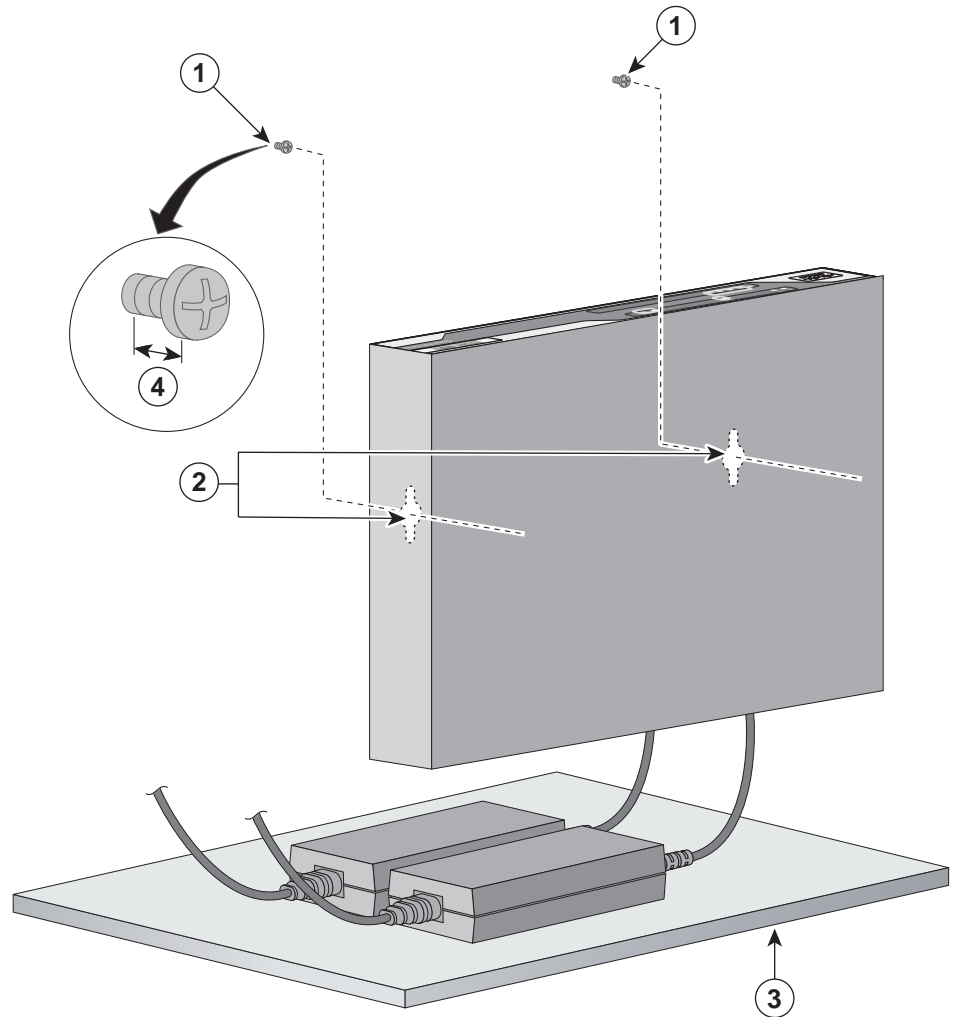
1	Two number-10 wood screws mounted on the wall	3	Horizontal surface on which to place the power adapter
2	Wall-mount holes	4	Distance between the screw head and the wall, 1/8 in. (0.32 cm)

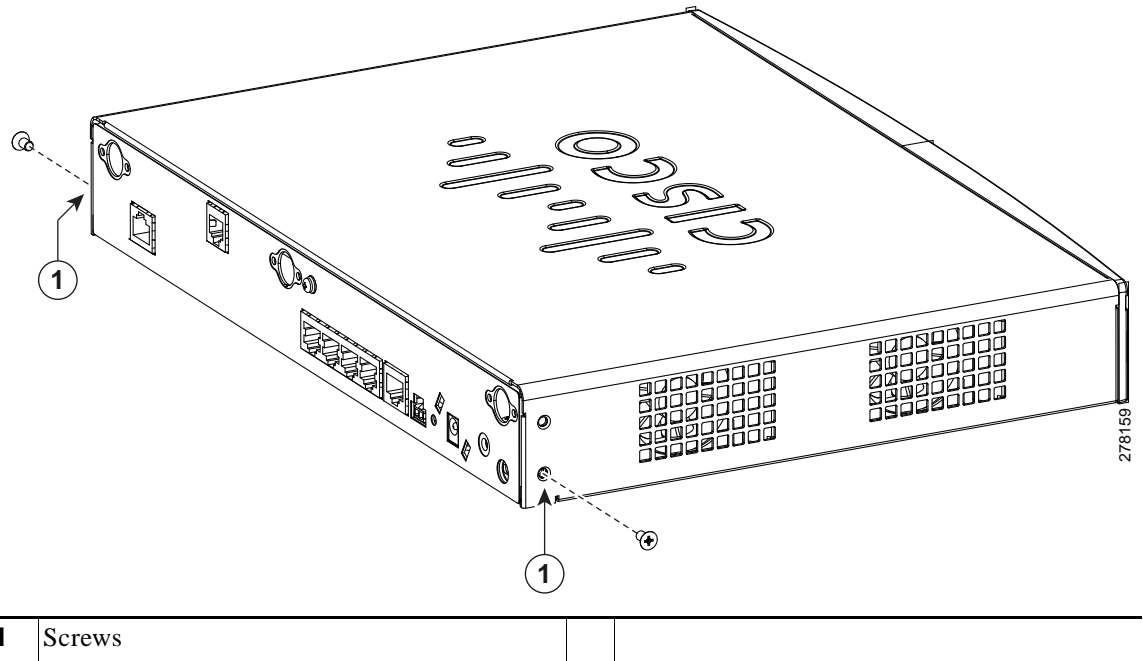**Step 4**   Connect the chassis to a reliable earth ground. For the chassis ground connection procedures, see the

Installing in a Rack

The Cisco 890 series ISRs can be mounted in a rack. To install a Cisco 890 series ISR in a rack, follow these steps:

Step 1 Remove the screws, as shown in Figure 2-6.

*Figure 2-6   Screw Locations*

1	Screws		

Step 2 Using the screws provided, attach the rack-mount brackets to the Cisco 890 series ISR chassis, as shown in Figure 2-7. Use two screws on each side. Use a number 2 Phillips screwdriver to install the bracket screws on both sides of the chassis.

⚠

Caution Do not over torque the screws. The recommended torque is 6 to 8 in-lb (0.7 to 0.9 N-m).

Figure 2-7   Attaching the Rack-mount Brackets to the Cisco 890 Series ISR

⚠
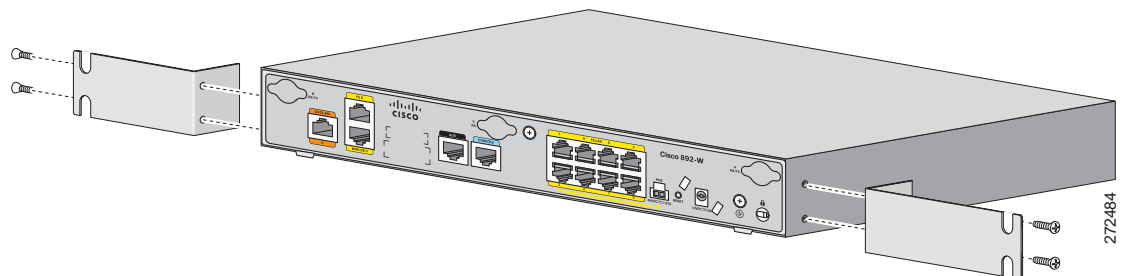
Caution   Chassis installation must allow unrestricted airflow for chassis cooling.

⚠

Warning   **To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:**

- **This unit should be mounted at the bottom of the rack if it is the only unit in the rack.**
- **When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.**
- **If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.** Statement 1006

Step 3   Using two screws for each side (supplied with the rack), attach the Cisco 890 series ISR with rack-mount brackets to a 19-inch rack. Start with the lower pair of screws first, resting the brackets on the lower screws while you insert the upper pair of screws.

✎

Note   Be sure to leave space above and below each unit in a rack to allow for cooling air circulation.

✎

Note   Do not stack equipment directly above the router. Keep at least 1 rack unit of space above the router.

🔎

Tip   The screw slots in the brackets are spaced to line up with every second pair of screw holes in the rack. When the correct screw holes are used, the small threaded holes in the brackets line up with unused screw holes in the rack. If the small holes do not line up with the rack holes, you must raise or lower the brackets to the next rack hole.

Step 4   Place the power adapter on a nearby horizontal surface.

Step 5   Connect the chassis to a reliable earth ground. For the chassis ground connection procedures, see the "Installing the Router Ground Connection" section on page 2-13.
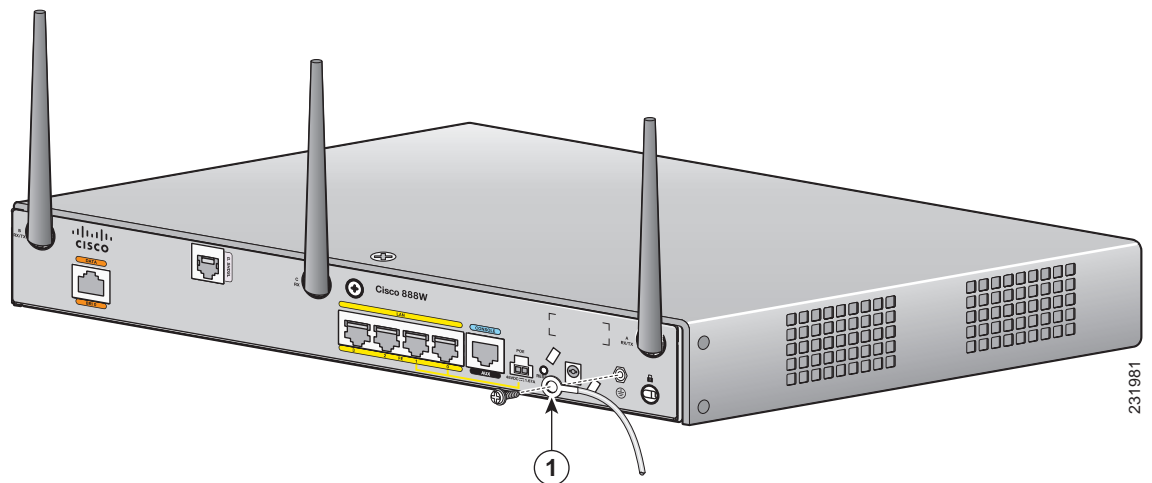
Installing the Router Ground Connection

The router must be connected to a reliable earth ground. Install the ground wire in accordance with local electrical safety standards.

- For NEC-compliant grounding, use size 14 AWG (2 mm^2) or larger copper wire and a ring terminal with an inner diameter of 1/4 in. (5 to 7 mm).

- For EN/IEC 60950–compliant grounding, use size 18 AWG (1 mm^2) or larger copper wire.

To install the ground connection, follow these steps:

Step 1   Strip one end of the ground wire to the length required for the ground lug or terminal.

Step 2   Crimp the ground wire to the ground lug or ring terminal, using the wire crimper.

Step 3   Attach the ground lug or ring terminal to the chassis, as shown in Figure 2-8. For a ground lug, use the two provided screws with captive locking washers. For a ring terminal, use one of the screws provided. Tighten the screws to a torque of 8 to 10 in-lb (0.9 to 1.1 N-m).

Figure 2-8   Chassis Ground Connection Using Ring Terminal

| 1	Ring terminal		

Step 4   Connect the other end of the ground wire to a known reliable earth ground point at your site.

After you install and properly ground the router, you can connect the power wiring, the WAN and LAN cables, and the cables for administrative access as required for your installation.
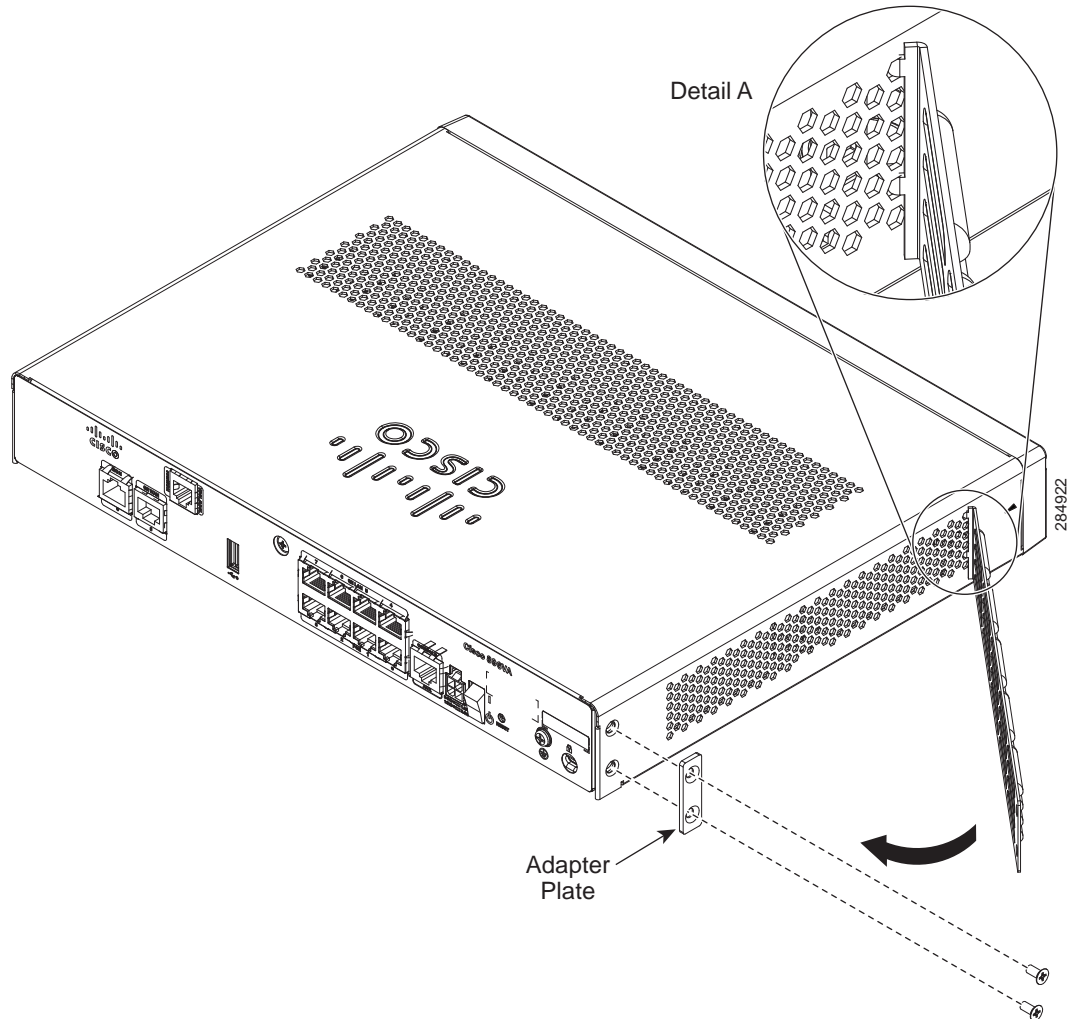
Installing the FIPS Cover

Perform the following steps to install the FIPS cover in the router:

Step 1   Remove the four mounting screws of the top cover.
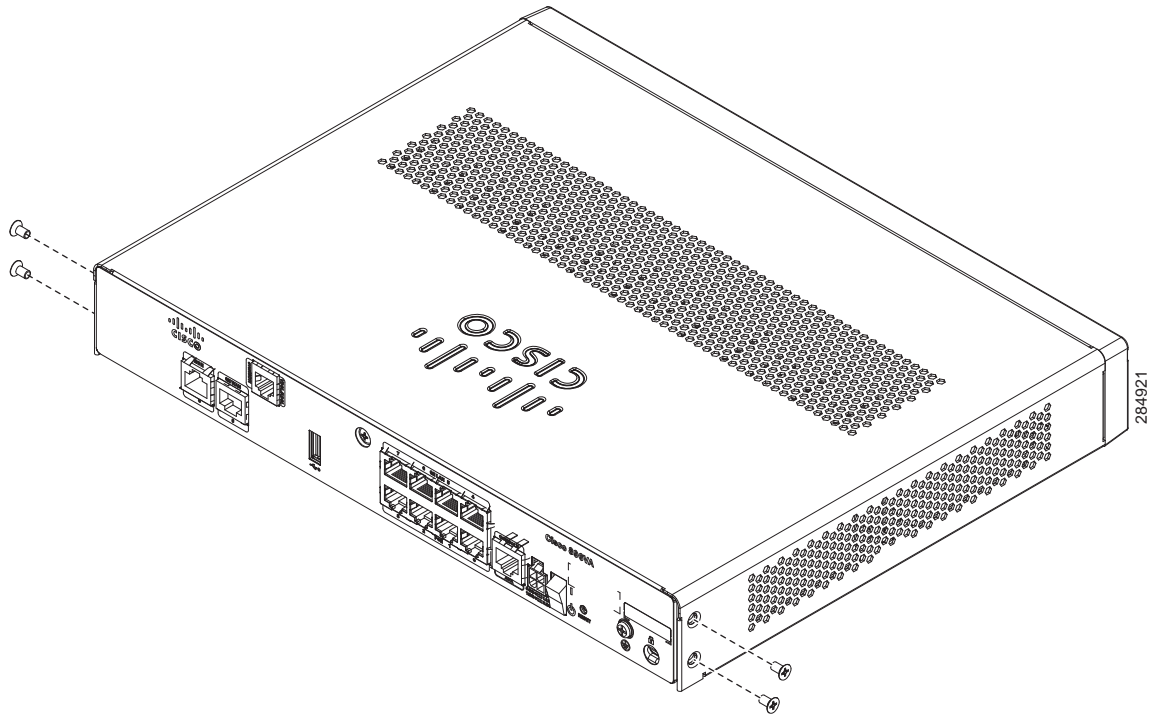
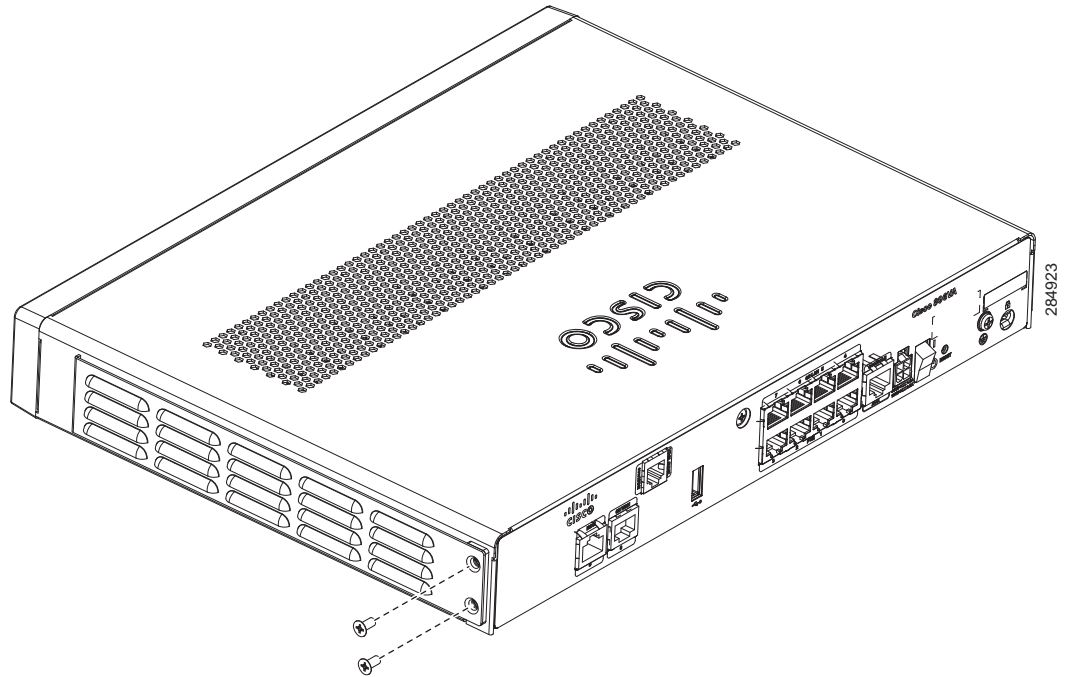**Step 2**   Install the left-side FIPS cover, as shown in detail A.

Detail A

Adapter
Plate

284922

Step 3   Rotate and bring into the close position to hinge to the correct hexagon.

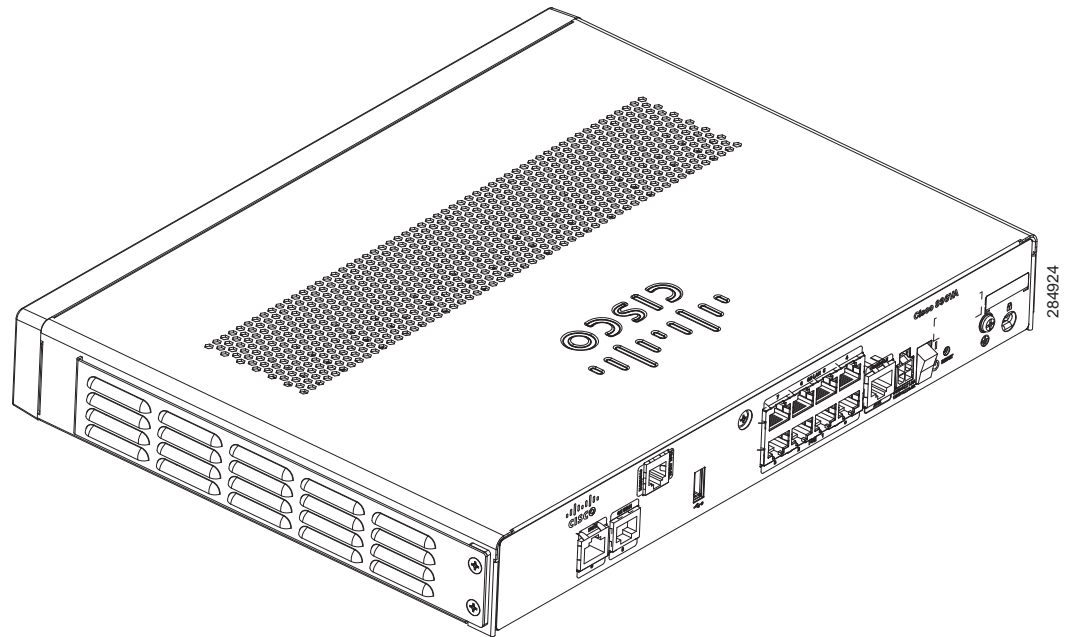**Step 4**   Place the adapter plate before closing by aligning the mounting holes.

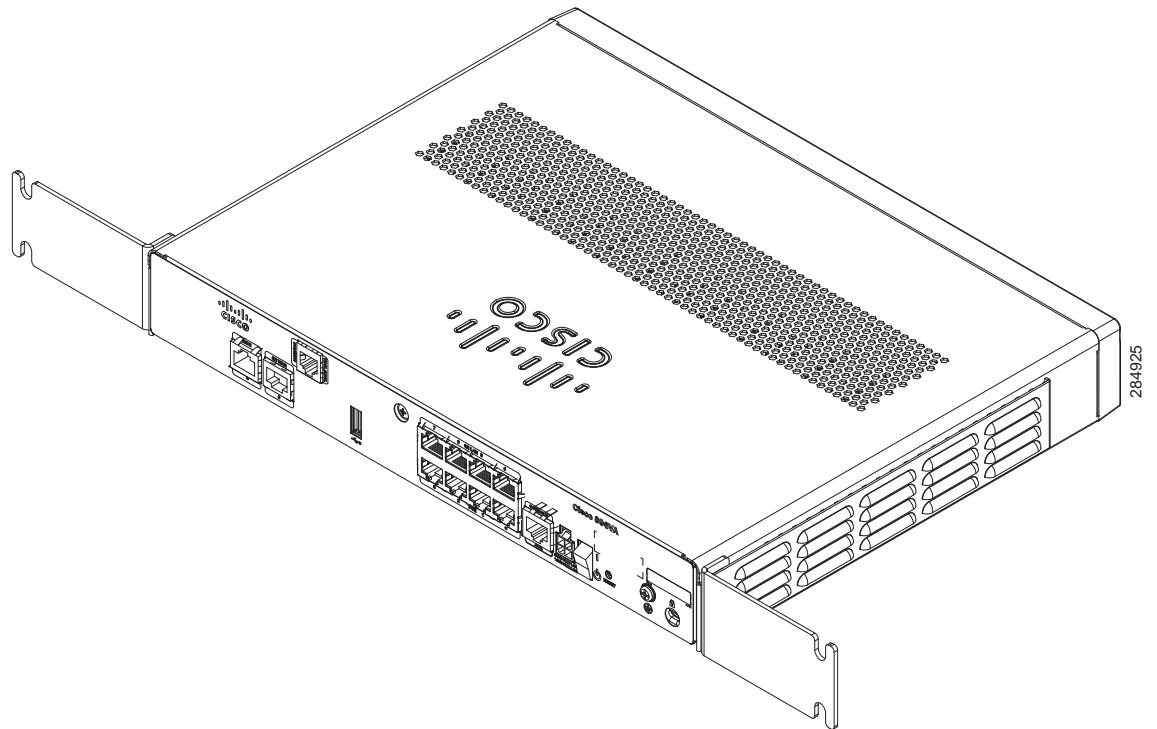**Step 5**   Secure the FIPS cover with two mounting screws.

Step 6   Install the right-side FIPS cover the same way as the left-side FIPS cover.

Step 7   View after both covers are installed.

Step 8   If the FIPS covers are installed with the rack mount brackets, the adapter plates are not required in the installation.

Connecting the Router

This chapter describes how to connect Cisco 860 series, Cisco 880 series, and Cisco 890 series Integrated Services Routers (ISRs) to Ethernet devices, Power over Ethernet (PoE), and a network. The chapter contains the following sections:

Note   For compliance and safety information, see *Regulatory Compliance and Safety Information Roadmap* that ships with the router and *Regulatory Compliance and Safety Information for Cisco 800 Series and SOHO Series Routers.*

Note The illustrations in this chapter show a wireless router with antennas attached. Non-wireless routers do not have antennas or antenna connectors on the back panel. However, the procedures for connecting devices to the router are the same for both wireless and non-wireless routers.

Note Depending on the features available for your router, some content in this chapter may not apply to your router.

Safety Warnings

Warning **When installing the product, please use the provided or designated connection cables/power cables/AC adaptors/batteries. Using any other cables/adaptors could cause a malfunction or a fire. Electrical Appliance and Material Safety Law prohibits the use of UL-certified cables (that have the "UL" or "CSA" shown on the cord), not regulated with the subject law by showing "PSE" on the cord, for any other electrical devices than products designated by CISCO.** Statement 371

Warning **Do not work on the system or connect or disconnect cables during periods of lightning activity.** Statement 1001

Warning **This equipment has been designed for connection to TN and IT power systems.** Statement 1007

Warning **There is the danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.** Statement 1015

Warning **Take care when connecting units to the supply circuit so that wiring is not overloaded.** Statement 1018

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.** Statement 1021

Warning **Hazardous network voltages are present in WAN ports regardless of whether power to the unit is OFF or ON. To avoid electric shock, use caution when working near WAN ports. When detaching cables, detach the end away from the unit first.** Statement 1026

Warning **Only trained and qualified personnel should be allowed to install, replace, or service this equipment.** Statement 1030

Warning   **Do not use this product near water; for example, near a bath tub, wash bowl, kitchen sink or laundry tub, in a wet basement, or near a swimming pool.** Statement 1035

Warning   **Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.** Statement 1036

Warning   **Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.** Statement 1037

Warning   **Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.** Statement 1038

Warning   **To report a gas leak, do not use a telephone in the vicinity of the leak.** Statement 1039

Warning   **Before opening the unit, disconnect the telephone-network cables to avoid contact with telephone-network voltages.** Statement 1041

Warning   **This equipment contains a ring signal generator (ringer), which is a source of hazardous voltage. Do not touch the RJ-11 (phone) port wires (conductors), the conductors of a cable connected to the RJ-11 port, or the associated circuit-board when the ringer is active. The ringer is activated by an incoming call.** Statement 1042

Warning   **Do not locate the antenna near overhead power lines or other electric light or power circuits, or where it can come into contact with such circuits. When installing the antenna, take extreme care not to come into contact with such circuits, because they may cause serious injury or death. For proper installation and grounding of the antenna, please refer to national and local codes (for example, U.S.:NFPA 70, National Electrical Code, Article 810, Canada: Canadian Electrical Code, Section 54).** Statement 1052

Warning   **No user-serviceable parts inside. Do not open.** Statement 1073

Warning   **Installation of the equipment must comply with local and national electrical codes.** Statement 1074

Preparing to Connect the Router

Before you connect the router to the devices, install the router according to the instructions in "Installing the Router" section on page 2-1

Preventing Damage to the Router

To prevent damage to your router, follow these guidelines when connecting devices to your router:

- Turn off power to the devices and to the router until all connections are completed.

⚠
Caution   Do not turn on the devices until after you have completed all connections to the router.

- Connect the color-coded cables supplied by Cisco to the color-coded ports on the back panel.
- If you must supply your own cable, see "Technical Specifications" section on page A-1 for cabling specifications. If this appendix does not provide specifications for a particular cable, we strongly recommend ordering the cable from Cisco.

Connecting a PC, Server, or Workstation

To connect a PC (or other Ethernet devices) to an Ethernet switch port, follow these steps:

Step 1   Connect one end of the yellow Ethernet cable to an Ethernet switch port on the router. Figure 3-1 shows a Cisco 888W router connected to a PC.

Figure 3-1   Connecting a Server, PC, or Workstation
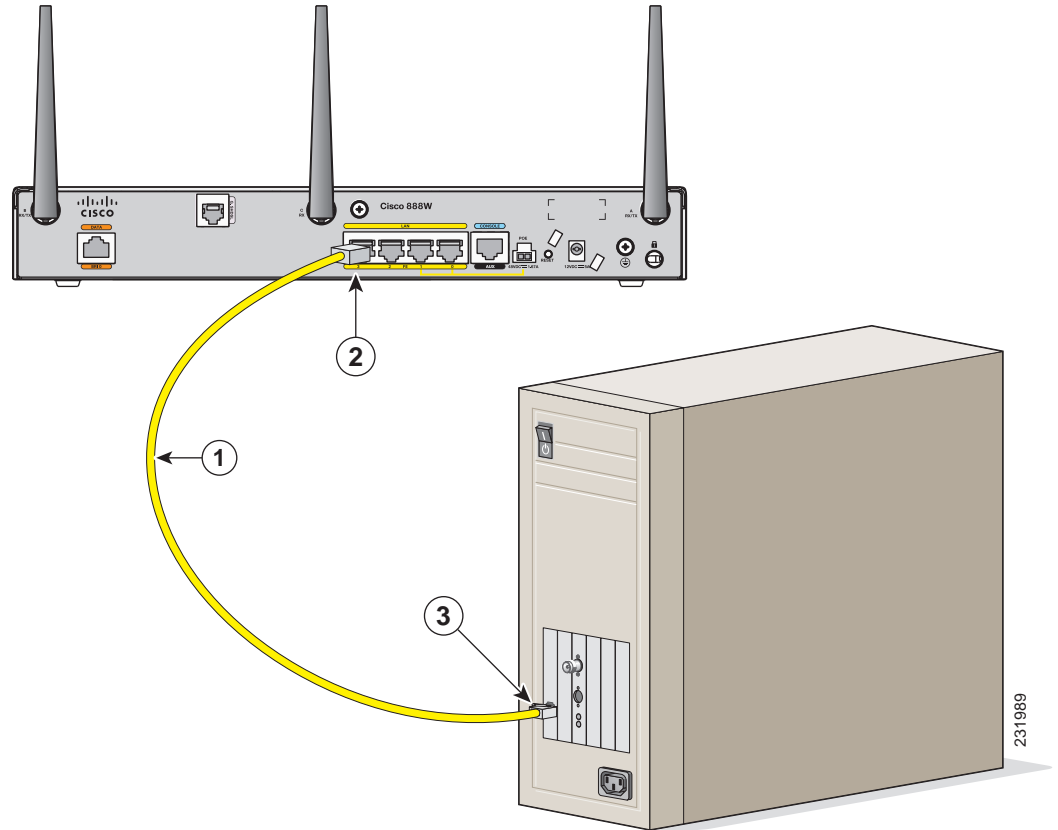
1	Yellow Ethernet cable supplied with the router	**3**	RJ-45 port on the network interface card
2	Ethernet switch port on the router		

Step 2   Connect the other end of the cable to the RJ-45 port on the network interface card (NIC) that is installed in the PC, server, or workstation.

Step 3   (Optional) Connect additional servers, PCs, or workstations to the other Ethernet switch ports.

Note   Use the Cisco Configuration Express to configure the Internet connection settings. See *Cisco Configuration Professional Quick Start Guide* for more information.

Connecting a Phone

To connect an 802.3af-compliant phone to an Ethernet switch port, follow these steps:

Note   A power source must be provided for the phone to function. This can be done in two ways: the phone can be powered via the PoE function using the PoE enabled Ethernet ports, or by using an external AC power source connected to the phone.

Step 1   Connect one end of the yellow Ethernet cable to Ethernet switch port 0 or port 1 on the router. Figure 3-2 shows a Cisco 888W router connected to a phone.

Figure 3-2   Connecting a Phone
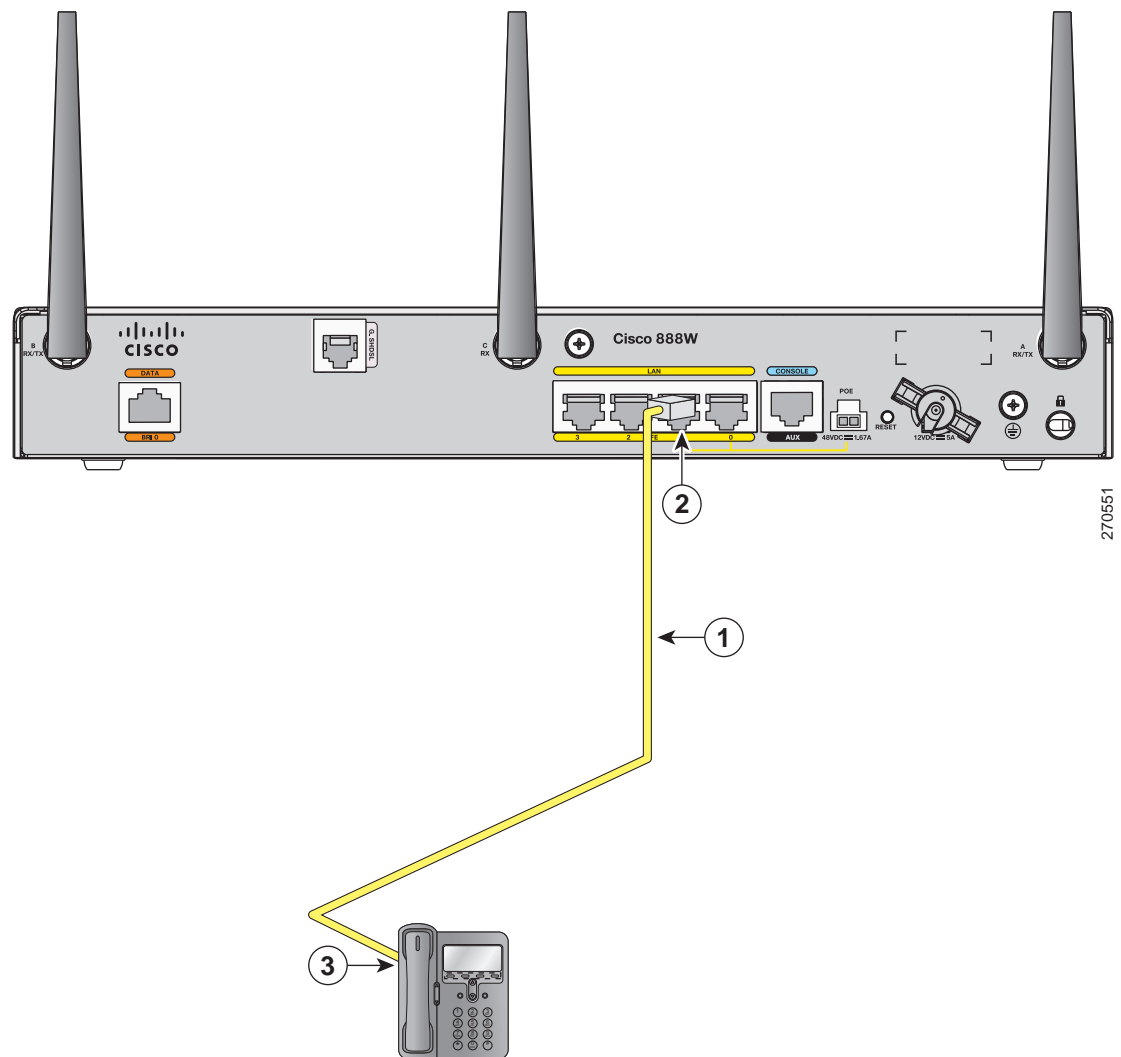
1	Yellow Ethernet cable	3	RJ-45 port on a phone
2	Ethernet switch port 1 on the router		

Step 2   Connect the other end of the cable to the RJ-45 port on the phone.

Connecting an External Ethernet Switch

If more than four PCs in an office must be connected to each other, you can add Ethernet connections to the router by connecting an external Ethernet switch to the Ethernet switch on the router.

To connect an external Ethernet switch to an Ethernet switch port on the router, complete the following steps:

Step 1   Connect one end of the yellow Ethernet cable to an Ethernet switch port on the router. Figure 3-3 shows a Cisco 888W router connected to an Ethernet switch.

Figure 3-3   Connecting to an Ethernet Switch
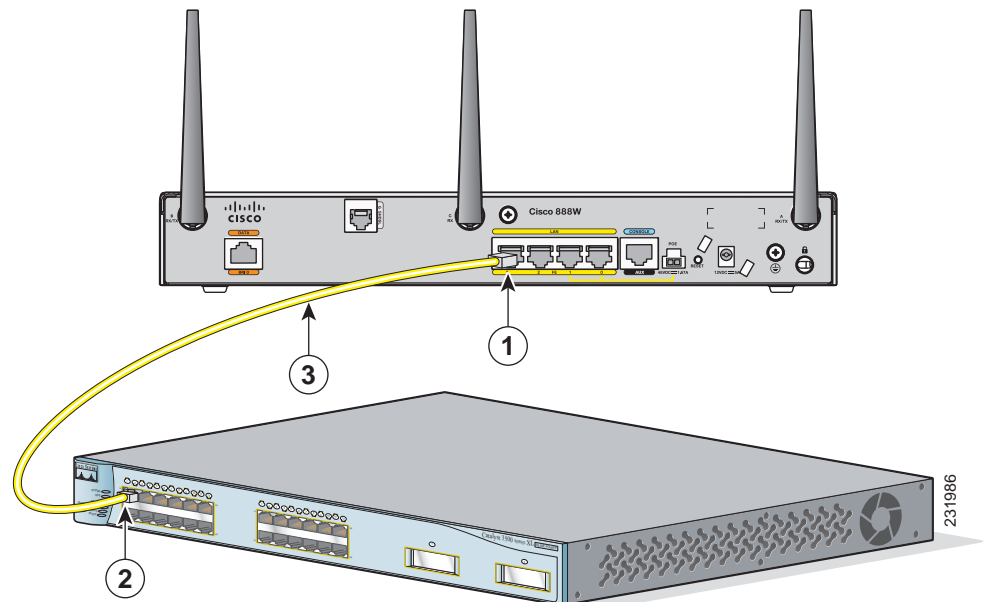
1	Ethernet switch port on the router	**3**	Yellow CAT5 Ethernet cable, RJ-45–to–RJ-45, connecting to an external Ethernet switch port
2	Available port on the external Ethernet switch		

Step 2   Connect the other end of the cable to the available port on the Ethernet switch to add additional Ethernet connections.

Step 3   Turn on the Ethernet switch.

Connecting the V.92 modem Port

Warning   **Hazardous network voltages are present in WAN ports regardless of whether power to the unit is OFF or ON. To avoid electric shock, use caution when working near WAN ports. When detaching cables, detach the end away from the unit first.** Statement 1026

For dialup connection to your service provider network through the V.92 port, follow the steps given after Figure 3-4, which show this connection.

Figure 3-4   Connecting to Your Service Provider Through the V.92 port
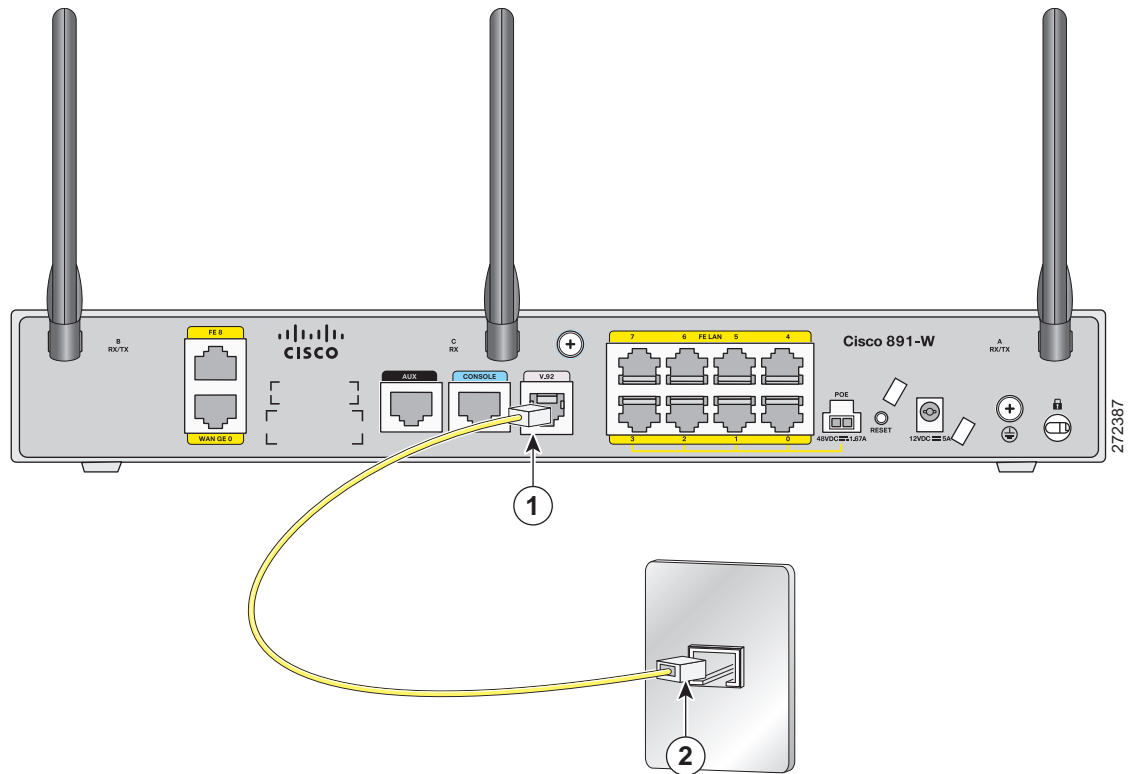
1	V.92 port on the router	2	Telephone wall outlet

To connect the router to your service provide network through the V.92 port, follow these steps:

Step 1   Connect one end of the straight-through R-J11 cable to the V.92 port.

Step 2   Connect the other end of the straight through R-J11 cable to an RJ-11 telephone wall outlet.

Cisco 860 Series, Cisco 880 Series, and Cisco 890 Series Integrated Services Routers Hardware Installation Guide

Connecting a Terminal or PC to the Console Port

Connect a terminal or PC to the Console Auxiliary (Aux) port either to configure the software by using the CLI or to troubleshoot problems with the router.

To connect a terminal or PC to the console port on the router and access the CLI, follow these steps:

Step 1   Connect the RJ-45 end of a DB-9–to–RJ-45 serial cable to the RJ-45 Console Aux port on the router. Figure 3-5 shows the RJ-45 end of the serial cable connected to the Console Aux port on the router.

Figure 3-5   Connecting a Terminal or PC to the Console Port
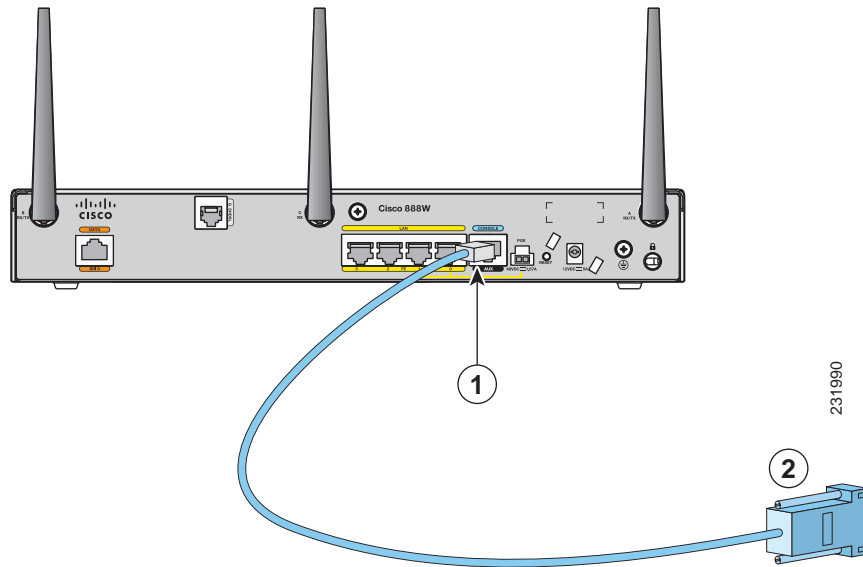
1	RJ-45 connector to the Console Aux port on the router	**2**	DB-9 connector

Step 2   Connect the DB-9 end of the DB-9–to–RJ-45 serial cable to the to the COM port on your laptop or PC.

✎

Note   Some laptops and PCs do not come with DB-9 serial port connectors and may require a USB-to-serial port adapter.

Step 3   To communicate with the router, start a terminal emulator application.

Terminal Emulator Settings

Use the following settings for the terminal emulator connection:

- 9600 baud
- 8 data bits, no parity
- 1 stop bit
- No flow control

When the terminal emulator establishes communications, the router prompt is displayed.

For more information on terminal emulation settings, see *Applying Correct Terminal Emulator Settings for Console Connections.*

Connecting a Modem to the Auxiliary Port

To connect a modem to the router, follow these steps:

Step 1   Connect the RJ-45 end of the adapter cable to the Aux port on the router as shown in Figure 3-6.

Figure 3-6   Connecting a Modem to the Aux Port
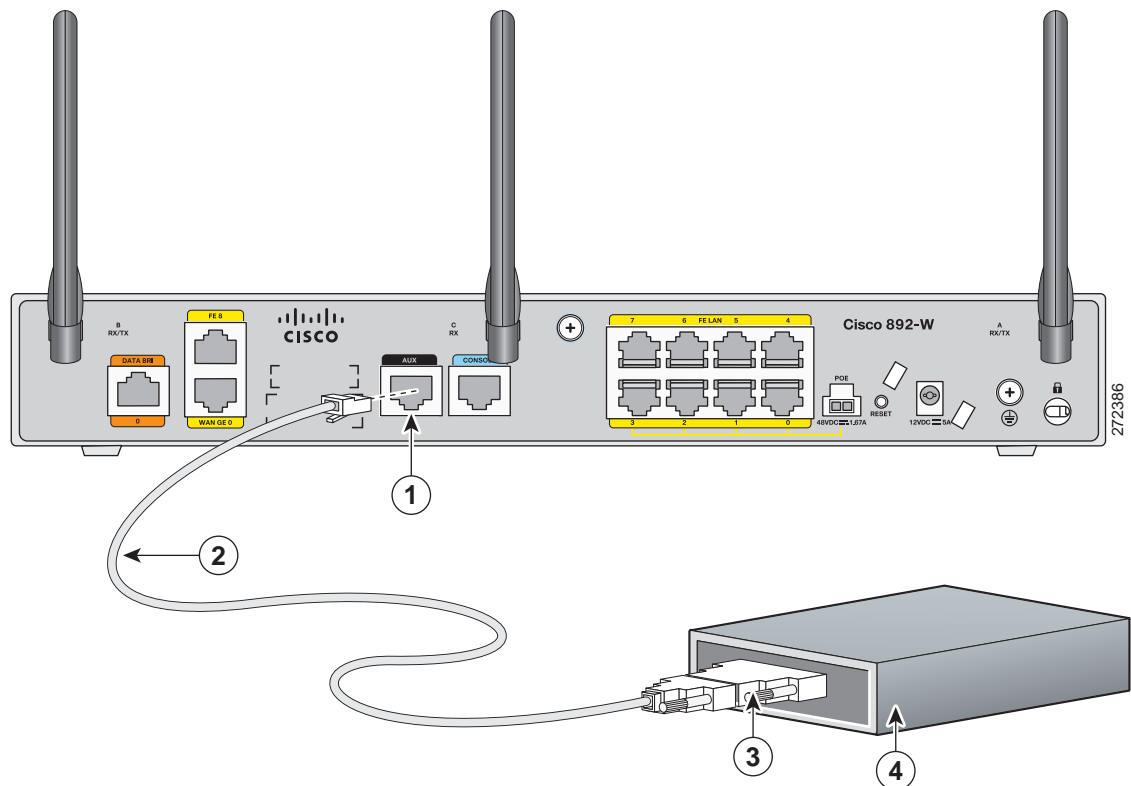
1	Aux port (RJ-45)	3	DB-9 to DB-25 modem adapter (if required)
2	Light blue console cable	4	Modem

Step 2   Connect the DB-9 end of the console cable to the DB-9 end of the modem adapter.

Step 3   Connect the DB-25 end of the modem adapter to the modem.

Step 4   Make sure that your modem and the router auxiliary port are configured for the same transmission speed (up to 115200 bits per second [b/s] is supported) and support mode control with data carrier detect (DCD) and data terminal ready (DTR).

Connecting the 3G Card

Note   For information on embedded multiband, multiservice WAN modems, see *Configuring Cisco EHWIC and 880G for 3G (EV-DO Rev A)* and *Configuring Cisco EHWIC and 880G for 3.7G (HSPA+)/3.5G (HSPA)*.

Note   The Cisco 880G router does not support online insertion and removal (OIR) of the third-generation (3G) card. You must enter the **shutdown** command on the cellular interface before you remove the 3G card from the router.

To connect and secure the 3G card, follow these steps:

Step 1   Align the 3G card to the 3G express card slot, as shown in Figure 3-7. Keep the card parallel to the surface and firmly push the card into the slot.

Tip   Holding the 3G card on the flat metal surface makes it easier to align and insert the 3G card.

Note   When inserting the card into the 3G express card slot, you may hear a metal-on-metal sound as the 3G card rubs against the internal metal cage. The 3G card is designed to fit tightly into the 3G express card slot. Firm pressure may be required to insert the card.

Note   Global System for Mobile Communications (GSM) customers need to insert a SIM card, provided by their network carrier, into the 3G card.

Figure 3-7   *Inserting the 3G Card*
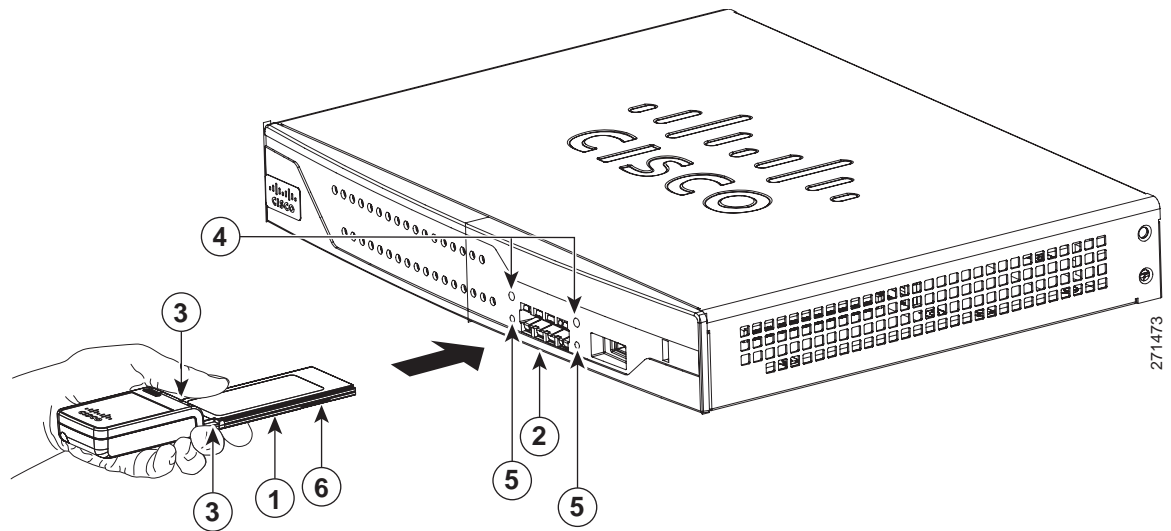
1	3G card with the Cisco logo facing up	**4**	Screw holes for locking bracket
2	3G express card slot	**5**	Pin holes for aligning the locking bracket
3	Notches on the 3G card	**6**	SIM slot (in HSPA[1] cards only)

1. HSPA = High-Speed Packet Access.

Step 2   Open the top of the anti-theft locking bracket, as shown in Figure 3-8.

Figure 3-8   *Opening the Anti-theft Locking Bracket*
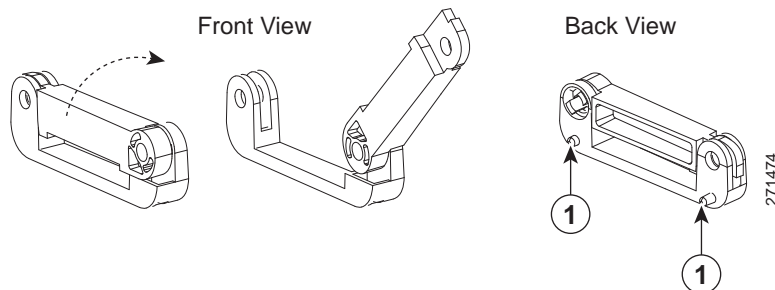
1	Pins on the locking bracket for alignment		

Step 3   Slide the opened locking bracket under the 3G card. The locking bracket should align with the notches
on either side of the 3G card, as shown in Figure 3-9, and the pins on the locking bracket should be
inserted into the corresponding holes in the router.

Figure 3-9   *Installing the Locking Bracket*
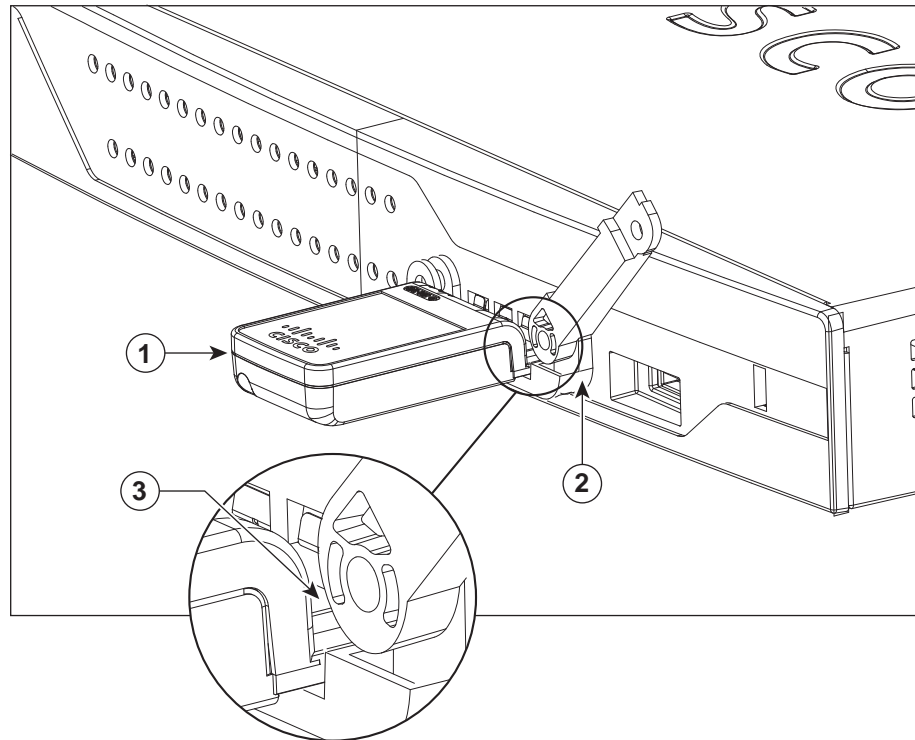
1	3G card	**3**	Notch on the 3G card
2	Locking bracket		

Step 4   Close the locking bracket, as shown in Figure 3-10.

Figure 3-10   Closing the Locking Bracket
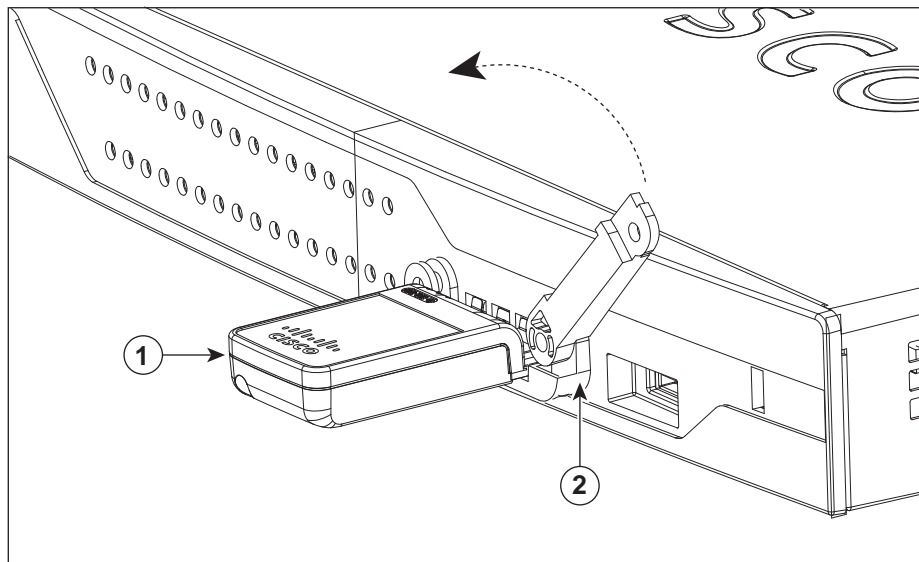
1	3G card	**2**	Locking bracket

Step 5   Insert the screws, as shown in Figure 3-11, and tighten with a number 2 Phillips screwdriver.

Figure 3-11   Inserting the Screws
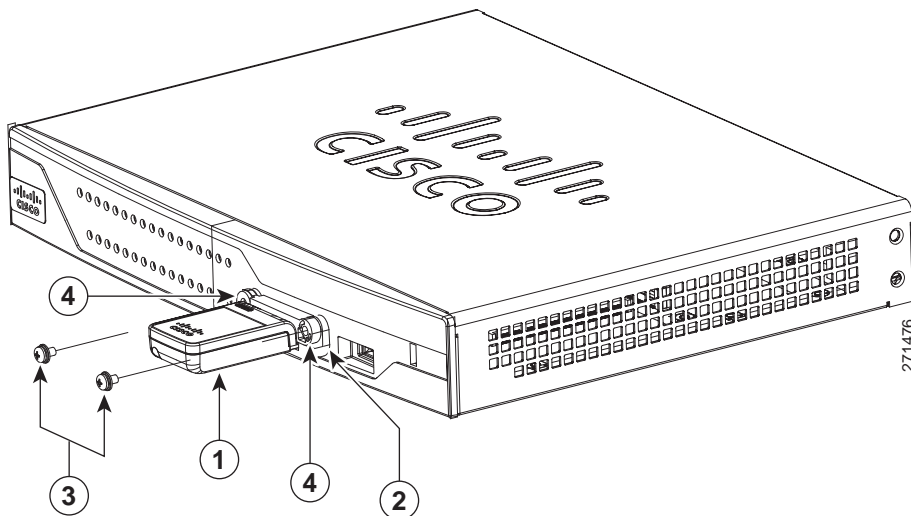
1	3G card	**3**	Screws
2	Locking bracket	**4**	Screw holes on the locking bracket

Step 6   To connect the antenna to the 3G card, insert the antenna connector into the antenna connector receptacle on the 3G card.

> **Note** The antenna connector receptacle may be located on the left, right, or front of the 3G card, depending on your card.

Figure 3-12 shows the antenna connected to the 3G card with an SSMB type plug, and Figure 3-13 shows the antenna with the SMK-TS-9 connector.

Figure 3-12   Antenna connected to the 3G Card with SSMB connector
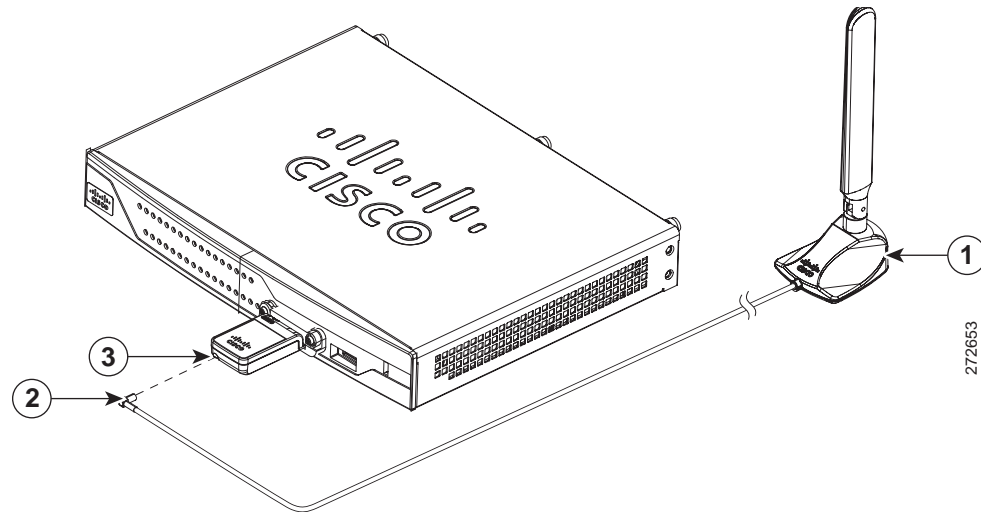
1	Antenna on a cradle	**3**	Antenna connector receptacle[1]
2	Antenna SSMB connector		

1. The antenna connector receptacle is located on either the left, right or front of the card for different SKUs. Please locate the receptacle of your card before plugging in the cable.

Figure 3-13   Antenna with the SMK-TS- 9 Connector
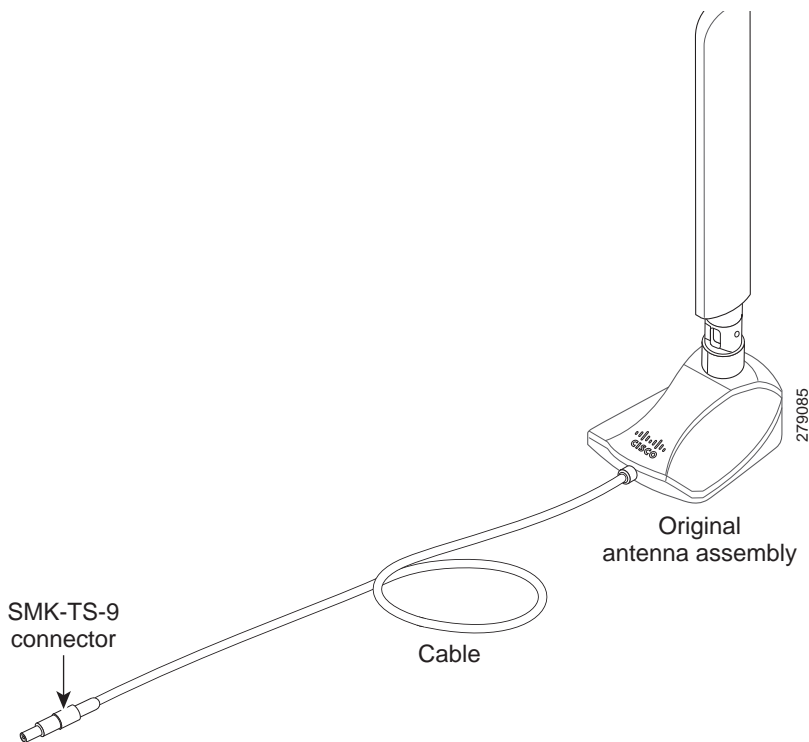
If you are using an extension cable, you must attach the 3G adapter for extended cable antenna to the body of the router. Depending on the SKU ordered, the adapters come with different connectors. Table 3-1 lists the different adapters and SKUs supported by each adapter. For instructions on how to install the adapter, see the "Installing the 3G Adapter for Extended Cable/Antenna" section on page 3-17. Otherwise, follow Step 7.

Table 3-1   3G Adapters and Supported SKUs

3G Adapter SKU	Description	SKUs Supported
3G-ACC-SMKTS9-TNC	3G adapter for extended cable/antenna with an SMK-TS-9 to TNC connector. Use this with the pentaband dipole indoor antenna (3G-ANTM-SMKTS9).	PCEX-3G-HSPA-R6, CISCO881G-G-K9
3G-ACC-SSMB-TNC	3G adapter for extended cable/antenna with an SSMB to TNC connector. Use this with the pentaband dipole indoor antenna shipped with your product.	PCEX-3G-HSPA, PCEX-3G-HSPA-A, PCEX-3G-CDMA-S, PCEX-3G-CDMA-V, PCEX-3G-CDMA-B, CISCO881G-A-K9, CISCO881G-S-K9, CISCO881G-V-K9

Step 7   Clean the flat surface to which you will affix the antenna.

Step 8   Remove the protective tape from the adhesive on the bottom of the antenna cradle, then firmly press the cradle to the flat surface.

Installing the 3G Adapter for Extended Cable/Antenna

For better signal and reception, if you are using the Cisco 3G Adapter for Extended Cable/Antenna, 3G-ACC-SMKTS9-TNC, follow these steps to install it:

Step 1   Locate and remove the Phillips screw on the left side of the router as shown in Figure 3-14. Keep the screw aside for Step 4.

Figure 3-14   Locating the Phillips Screw
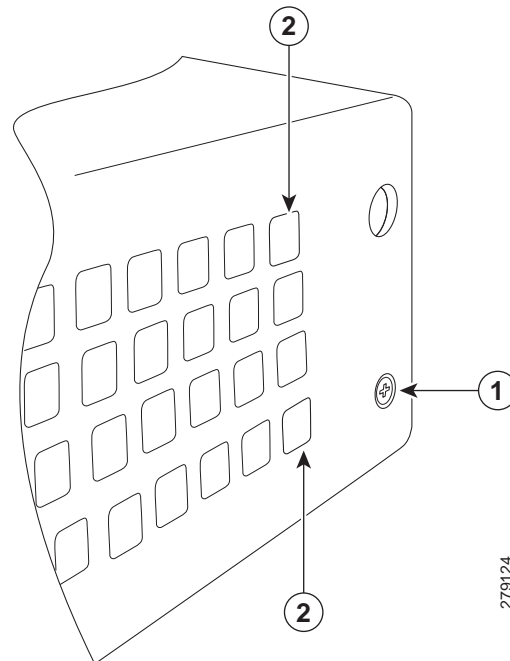
1	Phillips screw on the left side of router	**2**	Air vent holes to be aligned with adapter

Step 2 Locate the hooks on the adapter as shown in Figure 3-15.

Figure 3-15   *Locating the Hooks on the Adapter*
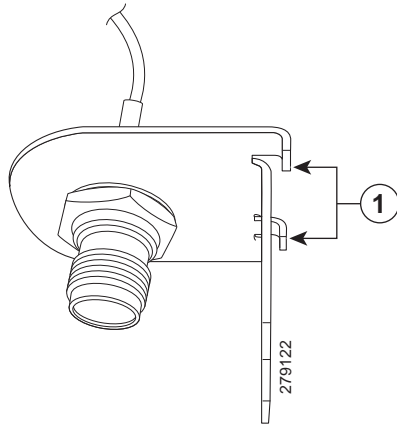
| **1** | Hooks on the adapter |

Step 3 Align and insert the hooks of the adapter into the air vent holes on the left side router body as shown in Figure 3-16.

Figure 3-16   *Inserting the Hooks*
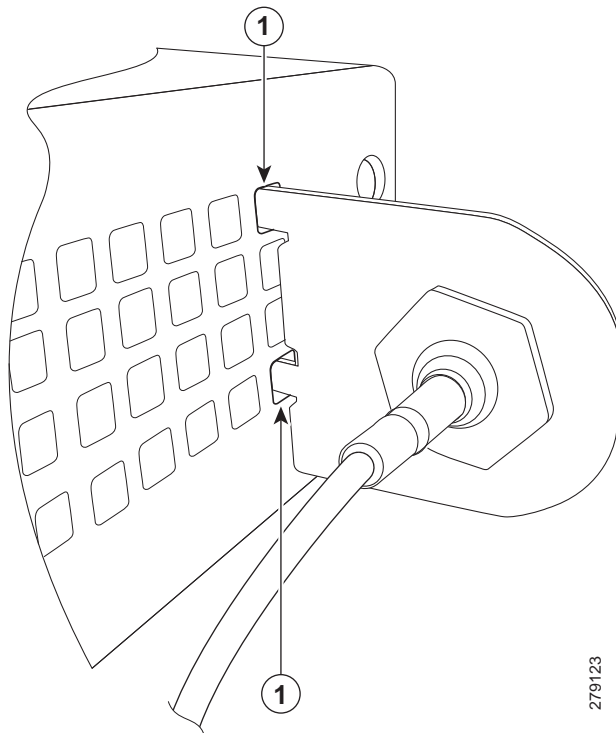
| **1** | Hooks aligned and inserted into the router. |

Step 4   Align the circular adapter hole with the hole on the router chassis from where you removed the screw in Step 1 and use the screw to attach the adapter to the router as shown in Figure 3-17.

Figure 3-17   Attaching the Adapter
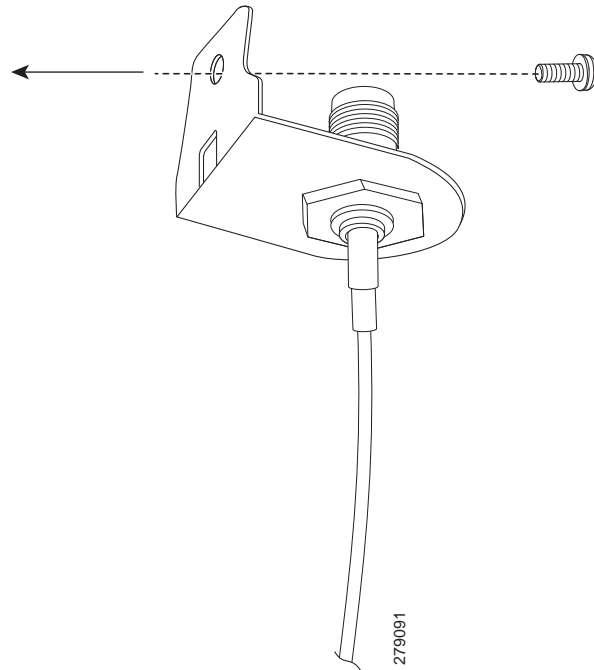
Step 5 Connect the extension cable to the 3G card, as described in the "Connecting the 3G Card" section on page 3-11. The complete assembly is shown in Figure 3-18.

Figure 3-18   *Adapter Connected to 3G Card and Router Chassis*
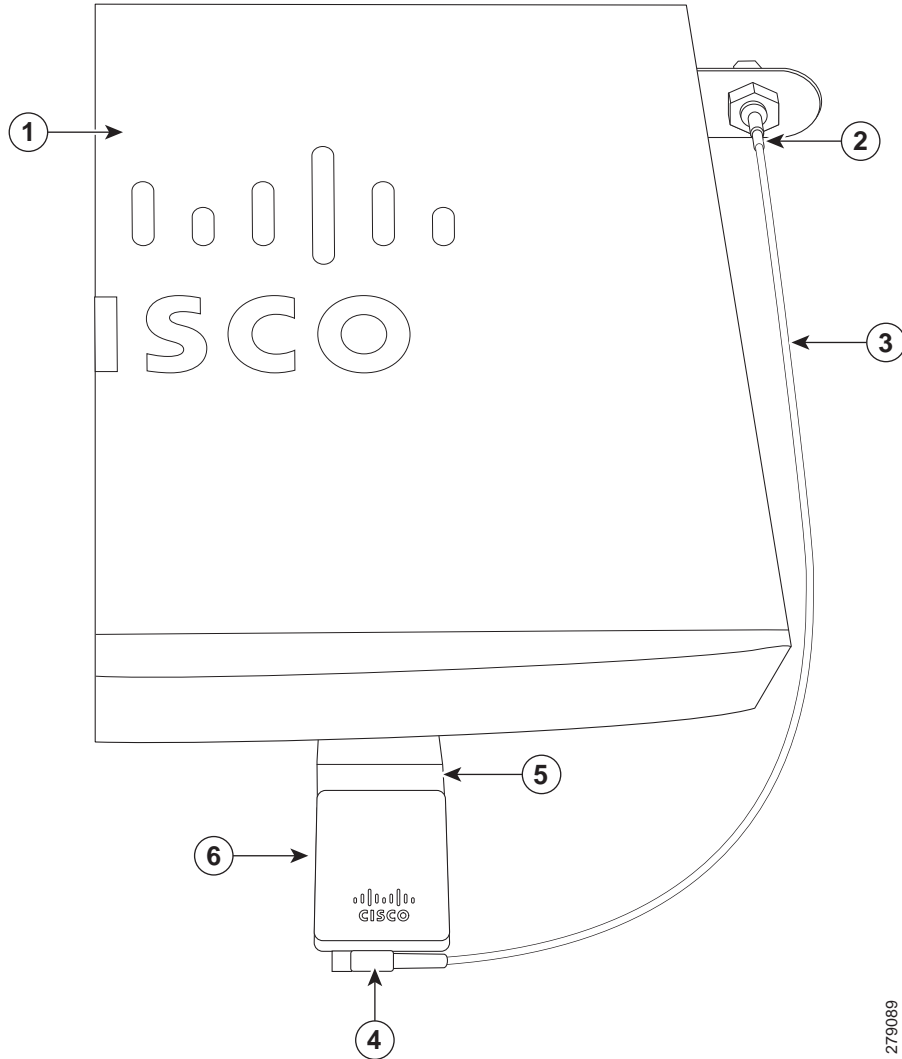
1	Router chassis	**4**	SSMB or SMK-TS-9 connector
2	3G adapter for extended cable/antenna	**5**	3G card inserted into the router
3	Cable	**6**	3G card

Now the adapter is ready for use with the extension cable. Table 3-2 lists the loss information for the ultra-low-loss (ULL) LMR 400 cables available with the adpater for the 3G fixed platforms.

Table 3-2   Cisco Adapter Cables for Use with 3G Fixed Routers

Cisco Product Number	Antenna Adapter Length	Insertion Loss	Frequency (MHz)
3G-ACC-SSMB-TNC	14.5 inches	0.66 dB	2100
3G-ACC-TS9-TNC	13.5 inches	0.62 dB	2100

Note   Antenna orientation can increase or decrease signal reception due to polarization. Typically, an SP's transmitting antenna on the BTS is a vertically polarized omnidirectional antenna, which means the electromagnetic waves are transmitted from it in a vertical plane. Hence, the receiving antenna needs to be vertically oriented too in order to receive the best signal. As the angle of the antenna orientation is changed from vertical to horizontal, only an angular component of the signal is picked up by the antenna. Therefore, if the antenna orientation is horizontal, the antenna picks up the least signal. The signal is received by the antenna as a result of it bouncing off of reflective surfaces. Hence, depending on where the antenna is placed, it may receive different signal strengths. However, the recommended position is *vertical*.

For additional information on all the available cables and antennas available for 3G, go to: http://www.cisco.com/en/US/docs/routers/access/1800/1861/software/feature/guide/mrwlsgsm.html#wp1262730

Connecting a Data BRI Port

You can connect the Data BRI port to the ISDN service provider as a backup link to the WAN port in case the primary xDSL (general term referring to various forms of DSL, including global industry standard symmetrical high-speed DSL [G.SHDSL]) WAN service fails. The Data BRI connection is not available on the third-generation (3G) models.

The cabling requirements for the ISDN S/T connection are as follows:

- You must provide two unshielded Category 5 cables. The first cable connects the NT1 box to the splitter, and the second cable connects the splitter to the wall jack.

- There are RJ-45 connectors at both ends of the default orange ISDN S/T cable. However, an RJ-45–to–RJ-11 ISDN S/T cable is available upon request if the wall jack at the site requires an RJ-11 connector. Contact your router reseller for the appropriate cable.

Caution   Both LAN and WAN ports use RJ-45 connectors. Use caution when connecting cables to these connectors. To avoid damage to the router, do not connect telephone-network voltage (TNV) circuits (such as ISDN or DSL circuits) to safety extra-low voltage (SELV) circuits (such as LAN circuits).

Although the following procedure shows a Cisco 888W data router, this procedure applies to all Cisco 880 series router with a Data BRI port.

To connect the Data BRI port to the ISDN service provider, follow these steps:

Step 1   Connect one end of the orange ISDN S/T cable to the Data BRI port on the router. Figure 3-19 shows a Data BRI connection.

Figure 3-19   Connecting the Data BRI Port to the ISDN Line
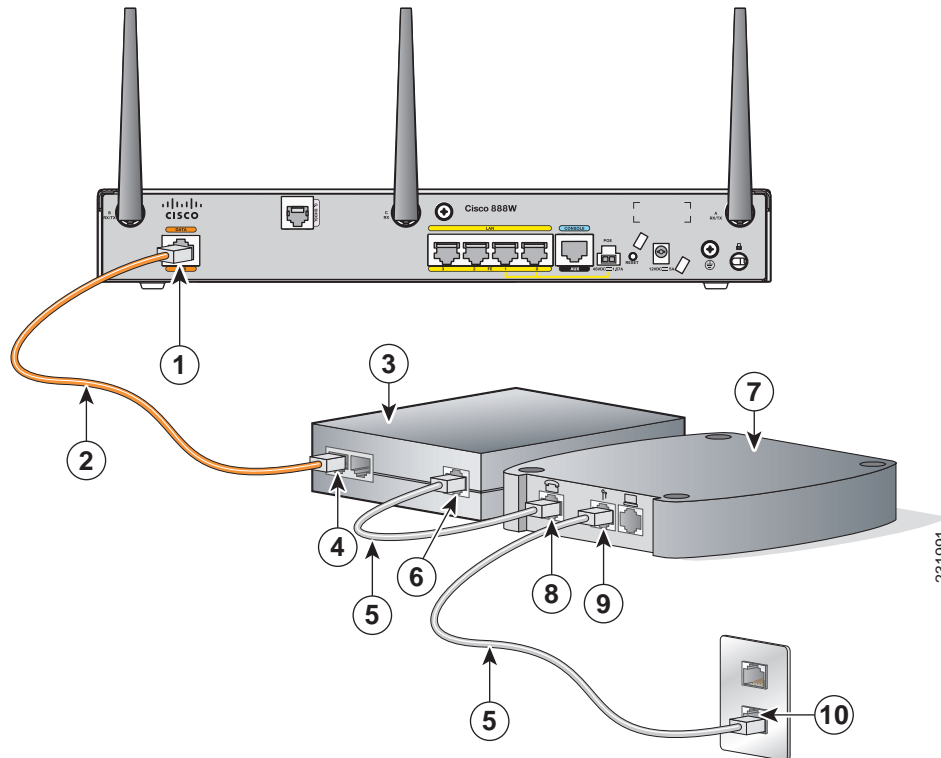
1	Data BRI port on the router	**6**	U-port on the NT1 box
2	ISDN S/T cable	**7**	xDSL splitter (provided by the xDSL service provider)
3	Network termination 1 (NT1) box	**8**	Telephone line port on the splitter
4	S/T port on the NT1 box	**9**	Telecommunication service port on the splitter
5	Unshielded CAT 5 cable	**10**	Wall jack

Step 2   Connect the other end of the orange ISDN S/T cable to the S/T port on the NT1 box.

Step 3   Connect the first unshielded CAT 5 cable from the U-port on the NT1 box to the telephone line port on the splitter.

Step 4   Connect the second unshielded Category 5 cable from the telecommunication service port on the splitter to the wall jack to allow a link to the network service provider.

Connecting an FE Line to an FE WAN Port

To connect the Fast Ethernet (FE) WAN port on the router, follow these steps:

Step 1   Connect one end of the yellow cable to the FE WAN port as shown in Figure 3-20.

Figure 3-20   *Connecting the FE WAN Port*
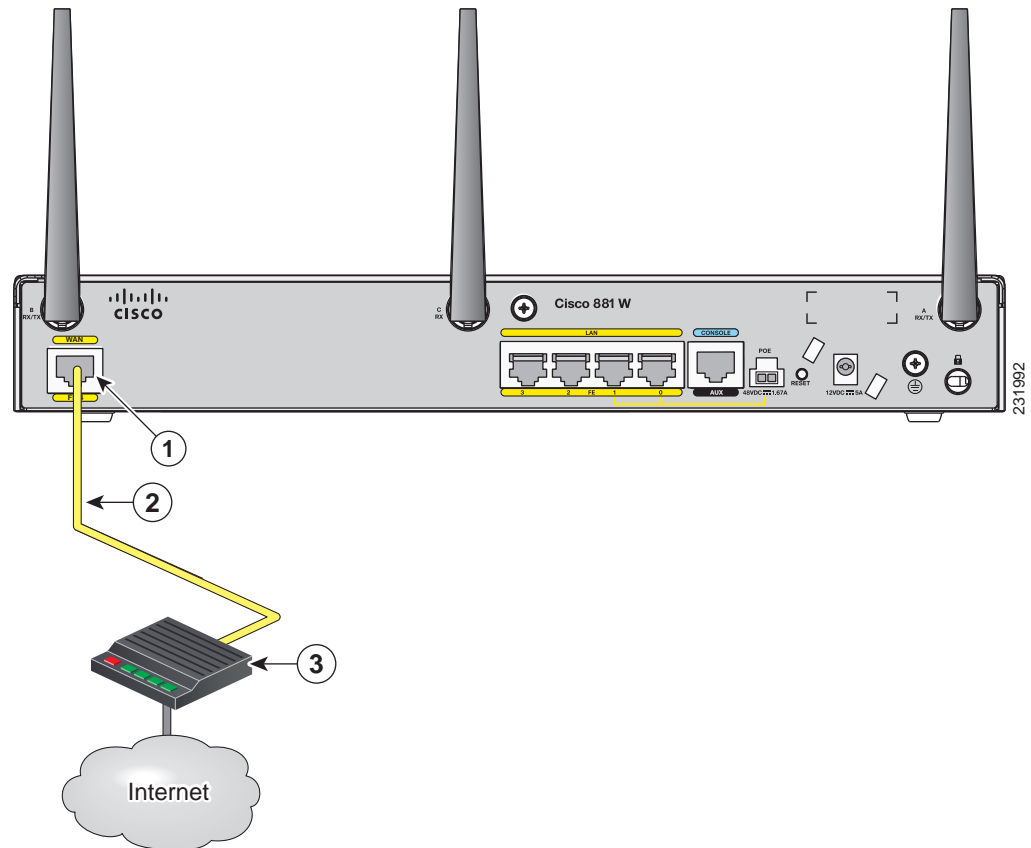
1	FE WAN port	**3**	Modem connected to the Internet
2	CAT 5 cable		

Step 2   Connect the other end of cable to an available port on the modem.

Connecting a GE Line to an GE WAN Port

To connect the Gigabit Ethernet (GE) WAN port on the router, follow these steps:

Step 1   Connect one end of the yellow cable to the GE WAN port as shown in Figure 3-21.

Figure 3-21   Connecting the GE WAN Port
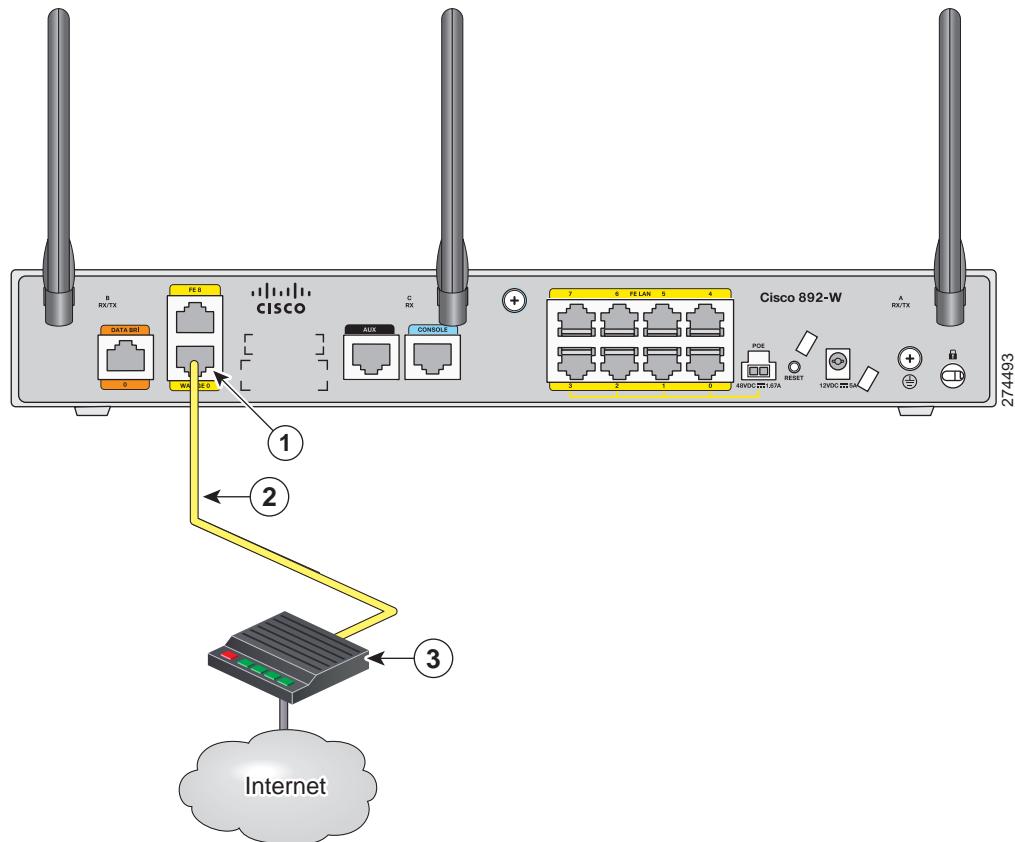
1	GE WAN port	**3**	Modem connected to the Internet
2	CAT 5 cable		

Step 2   Connect the other end of cable to an available port on the modem.

Connecting an xDSL Line

Warning   **Hazardous network voltages are present in WAN ports regardless of whether power to the unit is OFF or ON. To avoid electric shock, use caution when working near WAN ports. When detaching cables, detach the end away from the unit first.** Statement 1026

Caution   Cisco Systems DSL WAN Interfaces are tested for compliance with regulatory standards such as FCC Part 68, ITU-T K.21, IEC 61000-4-5, and CSA/EN/IEC/UL 60950-1. These standards assume Primary Protection devices protect the Customer Premise Equipment (CPE). These devices are normally installed by the service provider, local exchange carrier or qualified service person and are located at the telecom service provider entrance, network interface box, or demarcation point. See Figure 3-22 for the likely location of the primary protection device. The primary protection device must be suitable for the xDSL interface employed. Please contact your sales team or qualified service person for further information and installation.

Caution   To reduce the risk of fire, use only No. 26 AWG or larger (e.g., 24 AWG) UL Listed or CSA Certified Telecommunication Line Cord.

Warning   **Do not use this product near water; for example, near a bath tub, wash bowl, kitchen sink or laundry tub, in a wet basement, or near a swimming pool.** Statement 1035

Warning   **Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.** Statement 1038

Warning   **To report a gas leak, do not use a telephone in the vicinity of the leak.** Statement 1039

Warning   **There is the danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.** Statement 1015

Figure 3-22   ***Primary Protection Device Location***
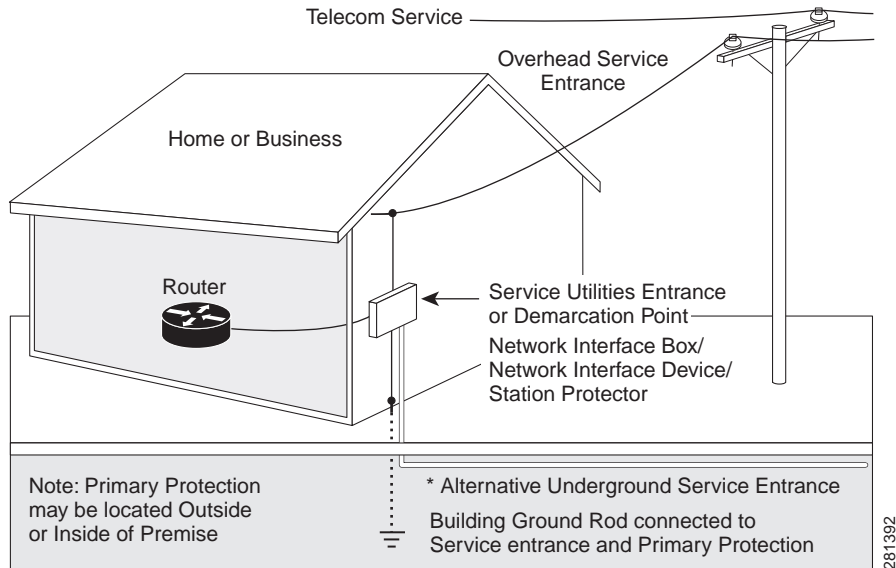
To connect the router to a global industry standard symmetrical high-speed DSL (G.SHDSL) line, very-high-speed digital subscriber line 2 (VDSL2) port, or an ADSL2+ line, follow these steps:

Step 1   Connect one end of an RJ-11 (RJ-45 on 880 E models) cable to the port on the router. See Figure 3-23.

Figure 3-23   ***Connecting the xDSL Line***
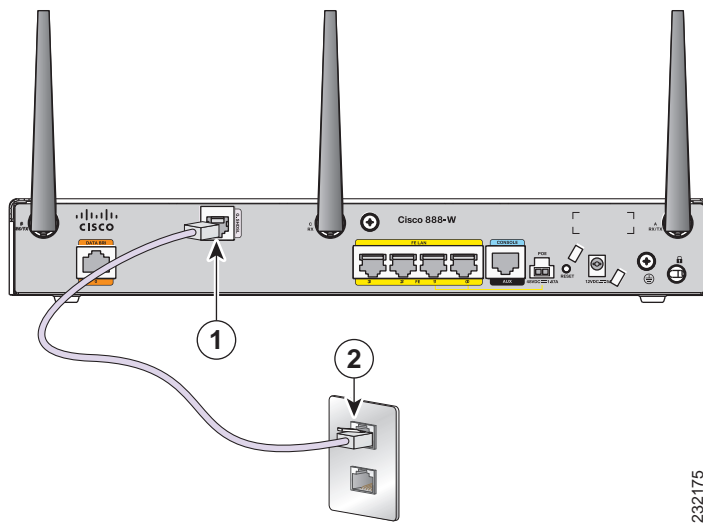
1	G.SHDSL port, VDSL2oPOTs port, or ADSL2+ port	**2**	DSL wall jack

Step 2   Connect the other end of the cable to the DSL wall jack.

⚠️

Caution   The primary WAN port is designed for an RJ-45 connector only. Damage to the primary WAN port may occur if a non-RJ-45 connector is inserted

✎

Note   The DSL line must be provisioned by your service provider and correctly configured so that the LED shows the carrier detect (CD) status. On Cisco 860VAE routers, check the DSL Link LED.

Connecting Power over Ethernet

⚠️

Warning   This unit might have more than one power supply connection. All connections must be removed to de-energize the unit. Statement 1028

⚠️

Warning   This product must be connected to a power-over-ethernet (PoE) IEEE 802.3af compliant power source or an IEC60950 compliant limited power source. Statement 353

Figure 3-24 shows how to connect the 48-VDC Power over Ethernet (PoE) power adapter to your router. The PoE adapter provides power to ports 0 and 1 of the 4-port 10/100 FE switch on the Cisco 880 series routers and ports 0,1, 2, and 3 of the 8-port 10/100 FE switch on the Cisco 890 series routers.

✎

Note   The router must also be connected to an AC power outlet through a 12-VDC adapter. To connect the router to an AC outlet, see the"Connecting the AC Adapter" section on page 3-28.

✎

Note   Be sure that the internal PoE is enabled for this connection procedure to work.

Figure 3-24   Connecting PoE for the Cisco 880 and the Cisco 890 Series Routers
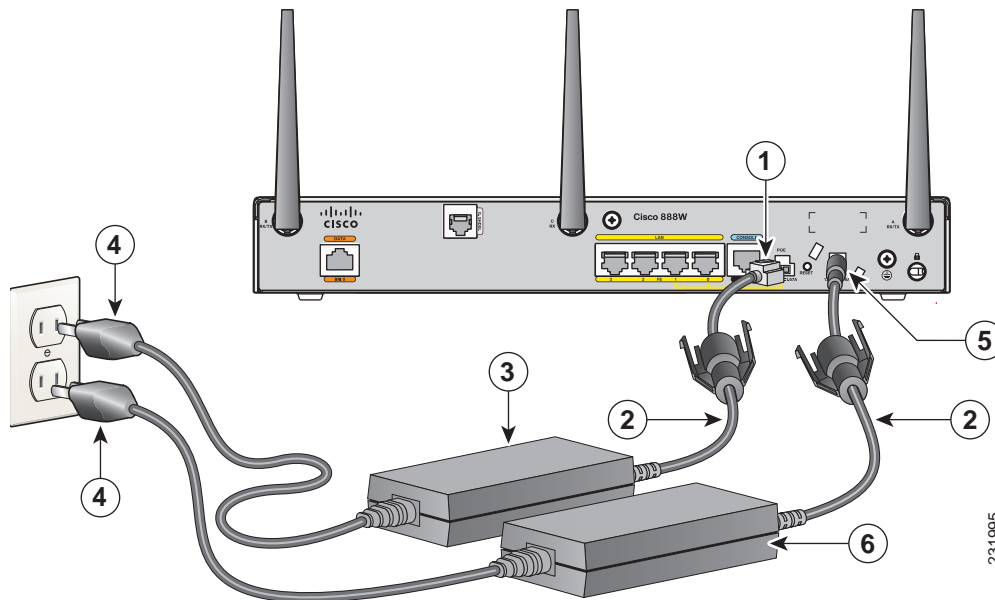
1	48-VDC PoE input jack	4	AC plug
2	Power cord	5	12-VDC input power-jack plug
3	Power adapter—48 VDC	6	Power adapter—12 VDC

The Cisco 880 series ISRs with embedded WLAN antennas require a single external power supply: a 30-W power supply for non-POE-enabled routers or a 60-W power supply for POE-enabled routers. For the back panels of some of these routers, see Figure 1-17 and Figure 1-19.

Connecting the AC Adapter

Warning   **The device is designed to work with TN power systems.** Statement 19

Warning   **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than:
120 VAC, 20 A U.S. (240 VAC, 16 to 20 A international).** Statement 1005

Warning   **This unit might have more than one power supply connection. All connections must be removed to de-energize the unit.** Statement 1028

Note   The Cisco 892FSP utilizes a single 4-pin power connector type. Figure 3-27 shows the pin number assignment of the Cisco 892FSP Power Adapter Connector.

To connect your Cisco 860 series, Cisco 880 series, or the Cisco 890FSP ISR to an AC power outlet, follow these steps:

Step 1   Connect the router to an AC power outlet as shown in Figure 3-25.To connect the Cisco 892FSP router, see Figure 3-26.

Figure 3-25   *Connecting the AC Adapter*
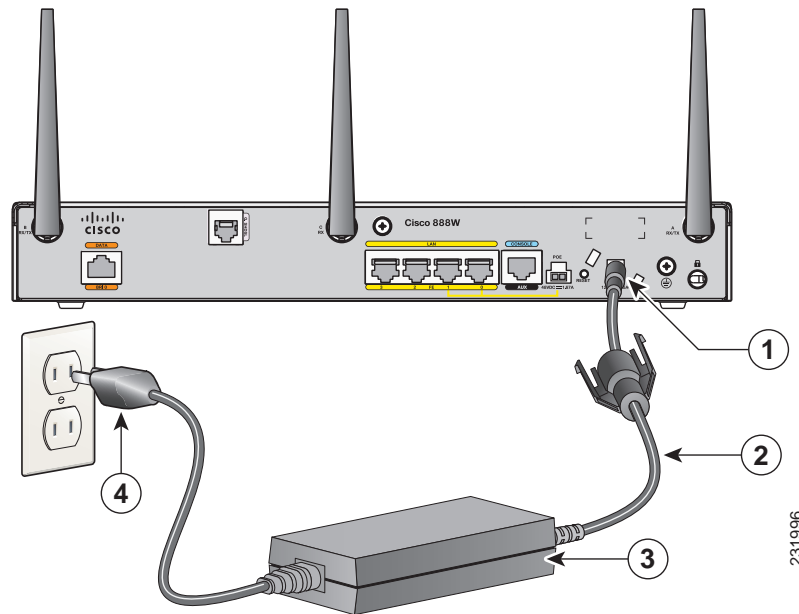
1	12-VDC plug	**3**	Power adapter—12 VDC
2	Power cord	**4**	AC plug

Figure 3-26   *Connecting the AC Adapter for the Cisco 892FSP*
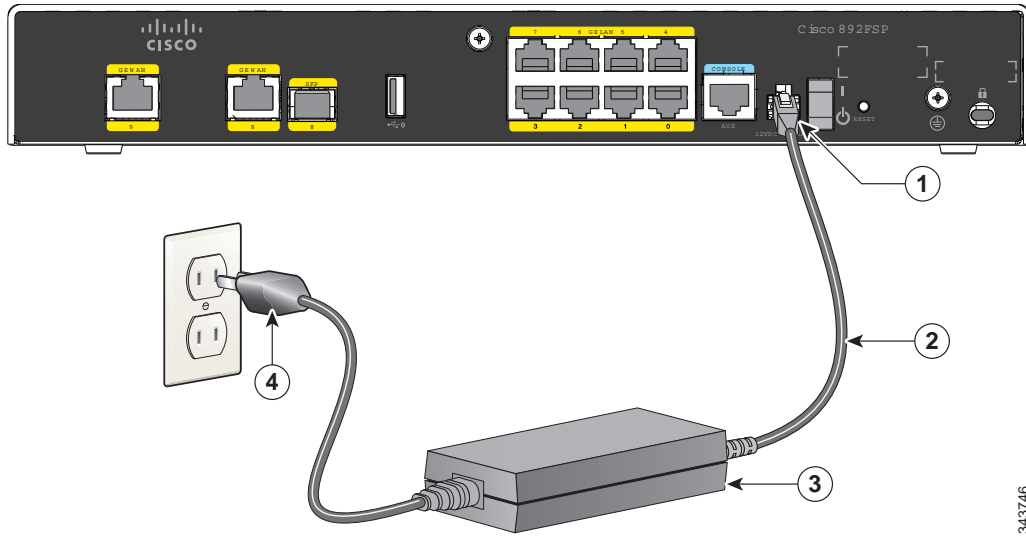
1	12-VDC plug	3	Power adapter—12 VDC
2	Power Adapter Cord	4	AC Plug

Figure 3-27   *Cisco 892FSP, 896VA, 897VA, and 898EA Power Adapter Connector Pin Assignment*
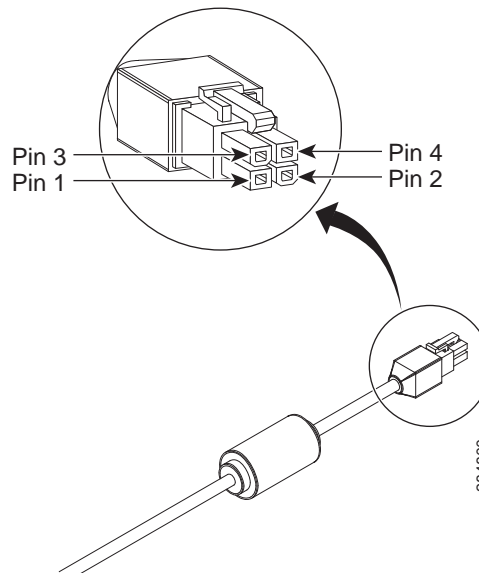
Pin 1	Ground	Pin 3	+12 V
Pin 2	NC[1]	Pin 4	NC

1. NC = No Connection.

Step 2   To secure the power cord to the router, attach the power lock clip to the power cord, slide the clip to the end of the DC plug, and secure the retaining clip into the router chassis. See Figure 3-28.

Figure 3-28   *Securing the Power Cord*
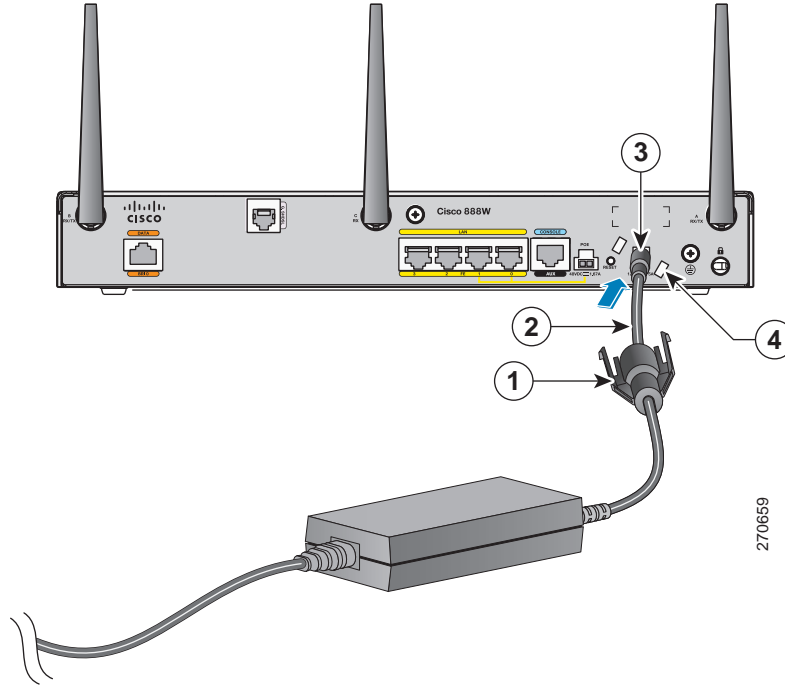
1	Power lock clip	**3**	DC plug
2	Power cord	**4**	Lock holes on either side of the power connector

Step 3   Snap the latches into the holes on either side of the power connector. See Figure 3-29.

Figure 3-29   Power Lock Clip Latched Into the Holes on Either Side of the Power Connector
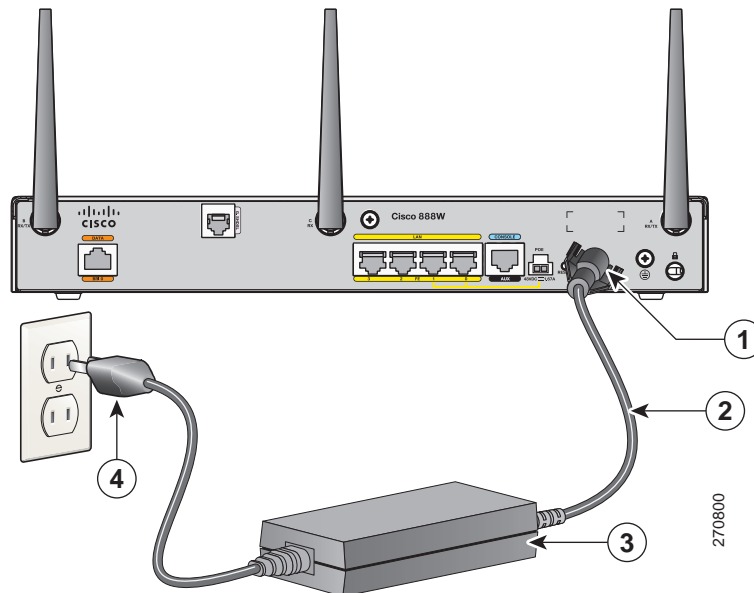
1	Power lock clip	**3**	Power adapter
2	Power cord	**4**	AC plug

Note   Figure 3-26 shows how to connect the AC power outlet for the Cisco 892FSP.

Connecting an FXS Line

Use a standard straight-through RJ-11 modular telephone cable to connect a Foreign Exchange Service (FXS) port to a telephone or fax machine.

Warning   **This equipment contains a ring signal generator (ringer), which is a source of hazardous voltage. Do not touch the RJ-11 (phone) port wires (conductors), the conductors of a cable connected to the RJ-11 port, or the associated circuit-board when the ringer is active. The ringer is activated by an incoming call.** Statement 1042

Warning   **Hazardous network voltages are present in WAN ports regardless of whether power to the unit is OFF or ON. To avoid electric shock, use caution when working near WAN ports. When detaching cables, detach the end away from the unit first.** Statement 1026

⚠ **Warning**   **For connections outside the building where the equipment is installed, the following ports must be connected through an approved network termination unit with integral circuit protection: FXS.** Statement 1044

To connect the FXS line, follow these steps:

Step 1   Connect one end of the straight-through RJ-11 cable to the FXS port. Figure 3-30 shows an FXS line connection.

Figure 3-30   *Connecting an FXS Line*
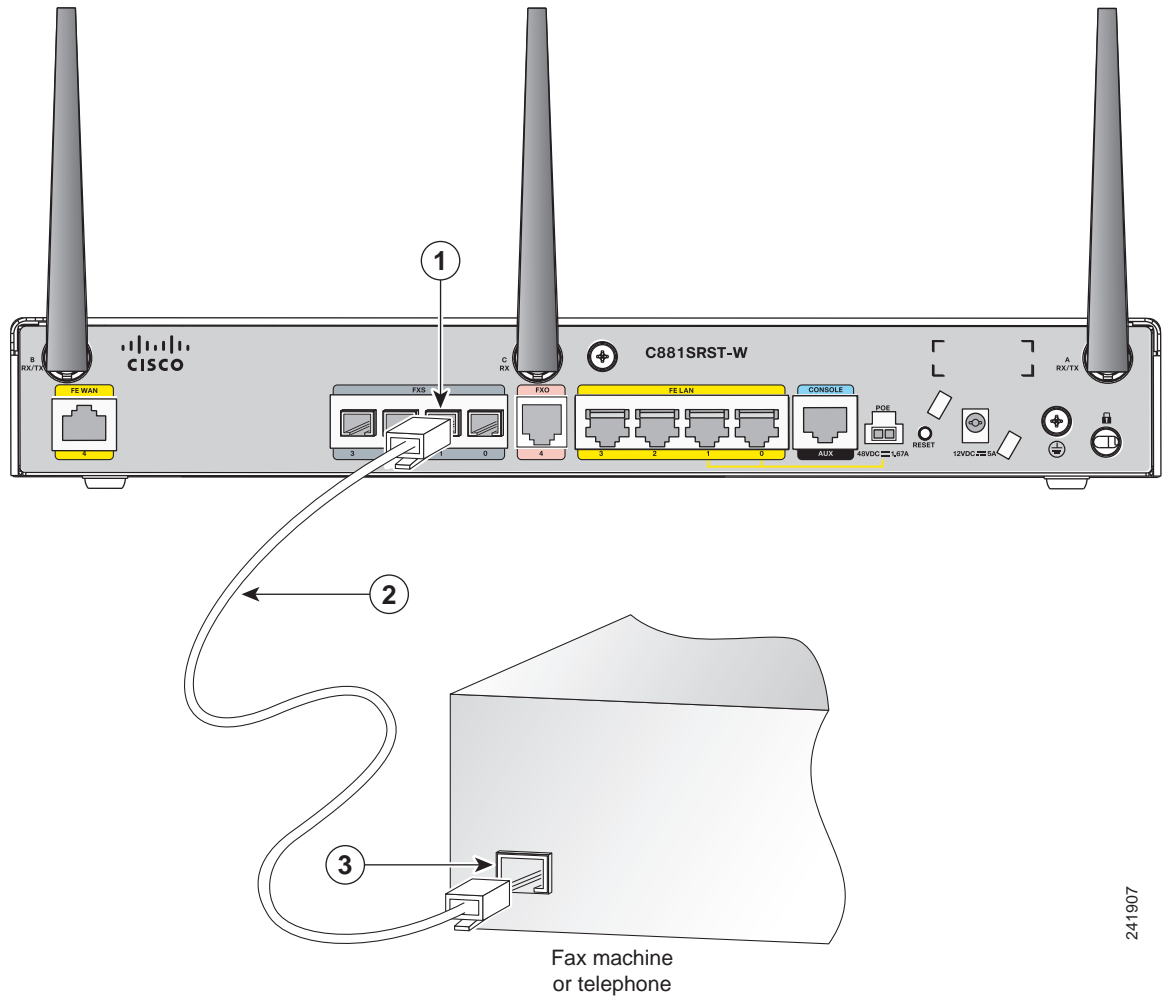
1	FXS port	**3**	RJ-11 port
2	RJ-11 cable		

Step 2   Connect the other end of the cable to the RJ-11 port on the fax machine or telephone.

Connecting an FXO Line

Use a straight-through RJ-11 cable to connect the FXO voice port to the PSTN or PBX through a telephone wall outlet.

⚠

Warning   **Hazardous network voltages are present in WAN ports regardless of whether power to the unit is OFF or ON. To avoid electric shock, use caution when working near WAN ports. When detaching cables, detach the end away from the unit first.** Statement 1026

To connect the FXO line, follow these steps:

Step 1   Connect one end of the straight-through RJ-11 cable to the FXO port. See Figure 3-31.

Figure 3-31   Connecting an FXO Line
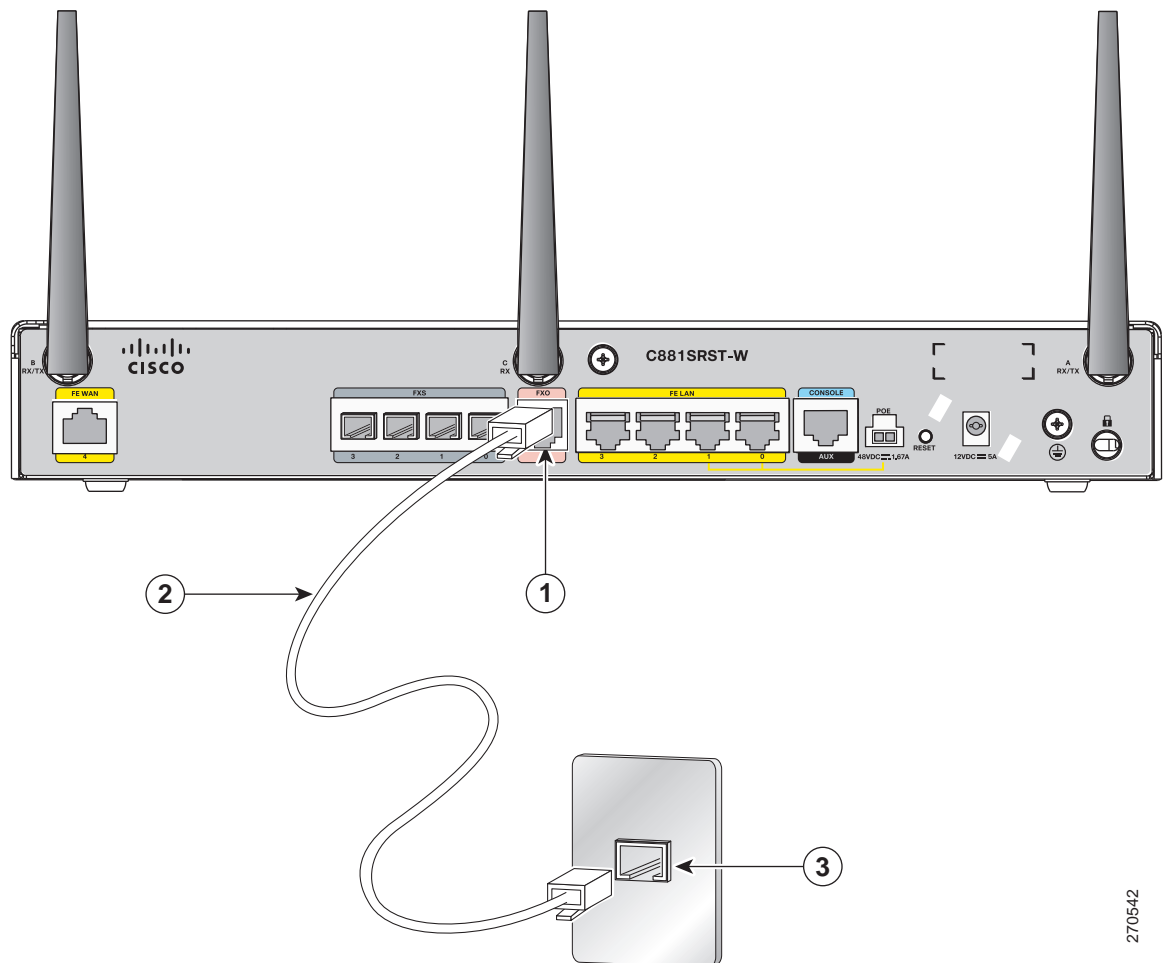
1	FXO port	**3**	Telephone outlet
2	RJ-11 cable		

Step 2   Connect the other end of the RJ-11 cable to a telephone wall outlet.

Note   If you have specified the use of a private line automatic ringdown (PLAR) off-premises extension (OPX) connection mode for an FXO voice port (with loop resistance less than 8000 Ohm), you must ensure that the soft-offhook option is enabled on the port.

This option allows a stepped offhook resistance during seizure, which avoids overloading the circuit during offhook in the event that ringing voltage is present on the circuit at the same time as the trunk seizure. The stepped offhook resistance is initially set to 800 Ohms, then adjusts to 50 Ohms when ringing voltage is not present.

To enable the **soft-offhook** command on the port, and to access the **connection** command with plar opx syntax, see the Cisco Command Lookup Tool.

Connecting a Voice ISDN BRI Line

Use a straight-through RJ-45 cable to connect the voice BRI port to the ISDN network through a telephone outlet or other device.

Caution   To prevent damage to the router, be sure to connect the BRI cable to the BRI connector only and not to any other RJ-45 connector.

To connect the voice BRI line, follow these steps:

Step 1   Connect one end of a straight-through RJ-45–to–RJ-45 cable to the Voice BRI port.

Note   When the interface is configured as NT and is connecting to a TE device, use a crossover cable. See Table A-13.

Figure 3-32 shows a voice BRI line connection.

Figure 3-32   *Connecting a Voice BRI Line*
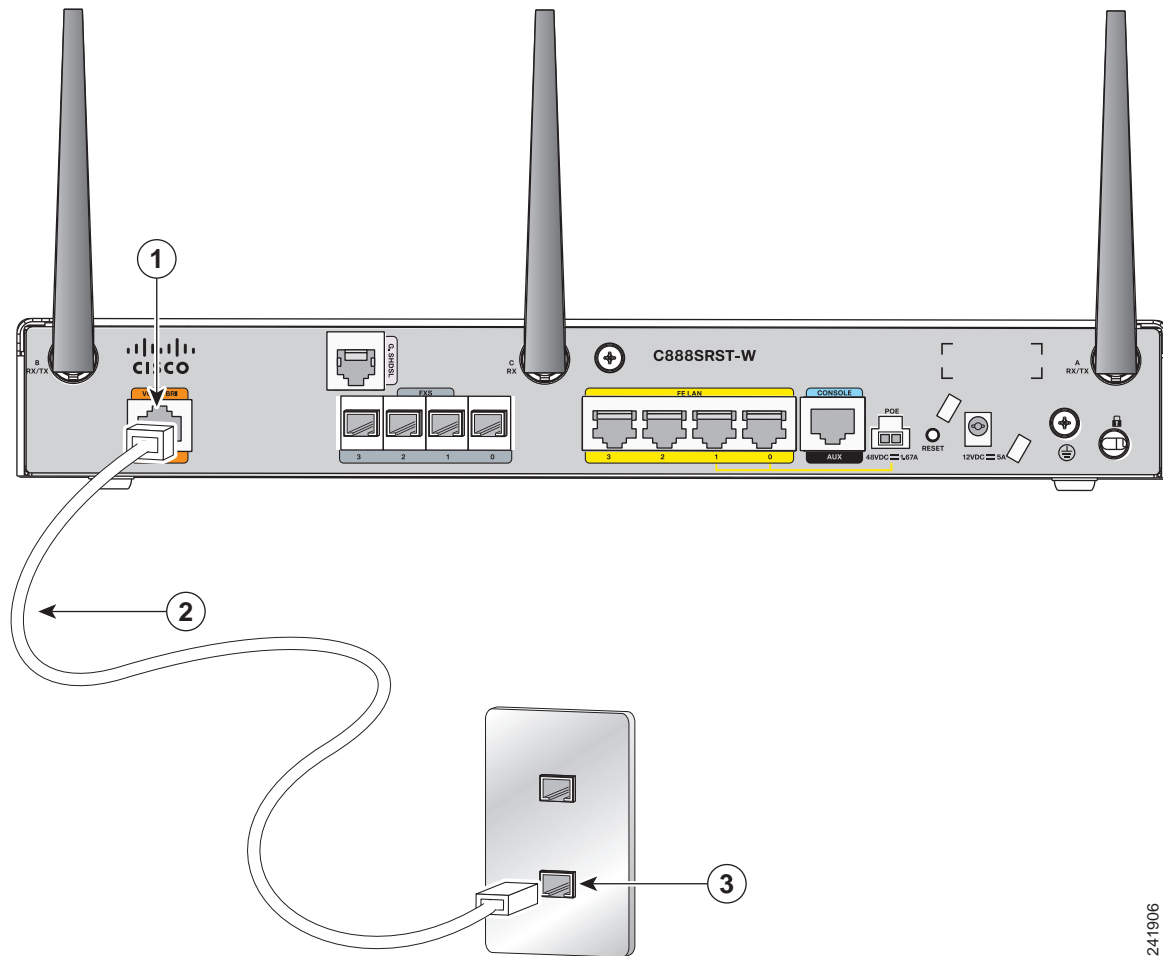
1	Voice BRI port	**3**	Telephone outlet
2	RJ-45 cable		

Step 2   Connect the other end of the cable to the RJ-45 telephone outlet or other device.

Connecting a Small Form-Factor Pluggable Module

This section describes how to connect and remove a small form-factor (SFP) module and contains the following information:

Safety Warnings

Laser Safety Warnings

Optical SFPs use a small laser to generate the fiber-optic signal. Keep the optical transmit and receive ports covered whenever a cable is not connected to the port.

Warning   **Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.** Statement 1051

Warning   **Do not stare into the laser beam.** Statement 1010

Warning   **Invisible laser radiation present.** Statement 1016

Warning   **Ultimate disposal of this product should be handled according to all national laws and regulations.** Statement 1040

Warning   **Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.** Statement 1056

Warning   **Use of controls, adjustments, or performing procedures other than those specified may result in hazardous radiation exposure.** Statement 1057

Installing an SFP Module

To connect and secure the SFP module, follow these steps:

Step 1   Slide the SFP into the SFP port connector until it locks into position (see Figure 3-33).

Tip   If the SFP uses a bale-clasp latch (see Figure 3-33), the handle should be on top of the SFP module.

Figure 3-33   *Installing an SFP Module*
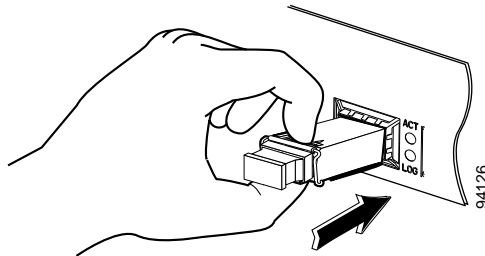
Caution   Do not remove the optical port plugs from the SFP until you are ready to connect cabling.

Step 2   Connect the network cable to the SFP module.

Removing an SFP Module

Follow these steps to remove the SFP module from a Cisco 892F series router:

Step 1   Disconnect all cables from the SFP.

Warning   **Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.** Statement 1051

Caution   The latching mechanism used on many SFPs locks the SFP into place when cables are connected. Do not pull on the cabling in an attempt to remove the SFP.

Step 2   Disconnect the SFP latch. See Figure 3-34.

Note   SFP modules use various latch designs to secure the module in the SFP port. Latch designs are not linked to SFP model or technology type. For information on the SFP technology type and model, see the label on the side of the SFP.

Figure 3-34   *Figure 5-42 Disconnecting SFP Latch Mechanisms*
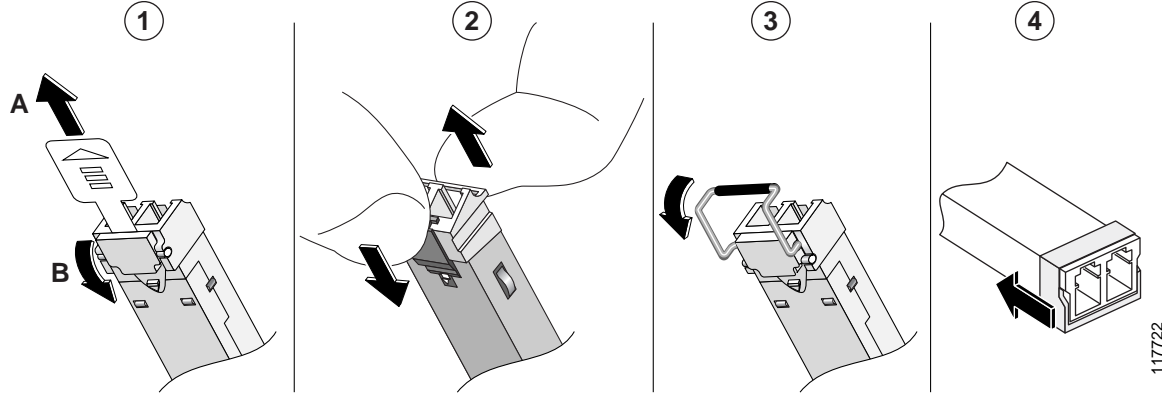
1	Sliding latch	3	Bale-clasp latch
2	Swing and slide latch	4	Plastic collar latch

Tip   Use a pen, screwdriver, or other small straight tool to gently release a bale-clasp handle if you cannot reach it with your fingers.

Step 3   Grasp the SFP on both sides and remove it from the router.

Online Insertion and Removal

Online insertion and removal (OIR) of the SFP module is supported on the Cisco 892F ISRs.

Note   If an SFP module is inserted with auto-failover or SFP media-type already configured, the port is forced to the speed and duplex capability of the SFP. For a 100 base SFP, the speed is set to 100 and duplex can be configured to either half or full. For a 1000 base SFP, the speed is set to 1000 and duplex is set to full.

Verifying Connections

To verify that all devices are properly connected to the router, first turn on all the connected devices, then check the LEDs. To verify router operation, refer to Table 3-3.

For the full LED descriptions, see the "LEDs" section on page 1-30.

Table 3-3   Verifying the Router Operation

Power and Link	LEDs to Check	Normal Patterns
Power	OK	On when power is supplied to the router.
To servers, PCs, workstations, or an external Ethernet switch connected to the LAN ports (FE0[1], FE1, FE2, or FE3)	LAN 0, LAN 1, LAN 2, or LAN 3	On when the FE LAN port is physically connected to a server, PC, workstation, or external Ethernet switch.
To FE WAN line	WAN FE4	On when the WAN Ethernet carrier has detected status. Blinks when receiving or transmitting data.
To xDSL[2] line	xDSL CD	Green when the line is connected to the xDSL DSLAM[3].
	xDSL Data	Green when receiving or sending data. Blinks when line is in training mode.
ATM	898EA only	Green when ATM mode is selected.
EFM	898EA only	Green when EFM mode is selected.
To ISDN line	Data BRI LNK	Green when the ISDN line is connected.
	Data BRI B1 and B2	Green when the channel is connected.
3G[4]	WWAN[5]	Green when service is established. Slow blinking when searching for service.
	RSSI[6]	Amber when service is not established. Green when signal strength is high. Off or slow blinking when signal strength is low. Fast blinking when signal strength is medium.
	CDMA[7]	Green when service is established.
	GSM[8]	Green when service is established.
To PPP[9] clients	PPP	Green when either a PPPoE[10] or PPPoA[11] client is running.
To VPN[12] tunnel	VPN	Green when a crypto session is running.

Table 3-3   Verifying the Router Operation (continued)

Power and Link	LEDs to Check	Normal Patterns
To wireless LAN	WLAN LINK	Wireless LAN link status: • Green if at least one client is associated. • Off if no client is associated.
	WLAN 2.4 GHz	Wireless LAN 2.4-GHz status: • Green when radio is connected, SSID[13] is configured, signal is being transmitted, and client is associated. • Slow blinking when radio is connected, SSID is configured, and signal is being transmitted.
	WLAN 5.0 GHz	Wireless LAN 5.0-GHz status: • Green when radio is connected, SSID is configured, signal is being transmitted, and client is associated. • Slow blinking when radio is connected, SSID is configured, and signal is being transmitted.
PoE[14]	PoE 0 (880 and 890 series only)	PoE power status: • Green when connected and powered. • Amber when there is a fault with the inline power supply.
	PoE 1 (880 and 890 series only)	
	PoE 2 (890 series only)	
	PoE 3 (890 series only)	
SFP[15]	EN	Green when the interface is up.
	S	Blinking green indicates port speed. Slow blinking for 100Base SFPs and fast blinking for 1000Base SFPs.
To LAN GE/FE line (860VAE models only)	LAN	Blinking when there is LAN activity (traffic in either direction). Off when the link is down.

Table 3-3   Verifying the Router Operation (continued)

Power and Link	LEDs to Check	Normal Patterns
To DSL line (860VAE models only)	DSL LINK	On when DSL WAN mode is selected and DSL training complete.
		Blinking when DSL WAN mode is selected but incomplete DSL LinkUp state such as in-training (slow initially, fast when almost connected), or controller "OFF", or no cable attached to DSL connector.
		Off when the device is powered off; or GE WAN mode is selected.
	DSL ACT	On when the DSL interface is up.
		Blinking when there is DSL WAN activity (traffic in either direction).
		Faster blinking when there is heavier traffic.
		Off when the device is powered off or the DSL WAN interface is down.
To WAN GE line (860VAE models only)	GE Mode	On when GE WAN mode is selected.
		Off when the device is powered off or when DSL WAN mode is selected.
	GE ACT	On when the GE WAN interface is up.
		Blinking when there is GE WAN activity (traffic in either direction).
		Off when the device is powered off or when the GE WAN interface is down.

1. FE = Fast Ethernet.
2. xDSL = General term referring to various forms of DSL, including ADSL (asymmetric digital subscriber line), VDSL (very-high-data-rate digital subscriber line), and G.SHDSL.
3. DSLAM = digital subscriber line access multiplexer.
4. 3G = Third-Generation.
5. WWAN = wireless WAN.
6. RSSI = Received Signal Strength Indicator.
7. CDMA = code division multiple access.
8. GSM = Global System for Mobile Communications.
9. PPP = Point-to-Point Protocol.
10. PPPoE = PPP over Ethernet.
11. PPPoA = PPP over ATM.
12. VPN = Virtual Private Network.
13. SSID = service set identifier.
14. PoE = Power over Ethernet.
15. SFP = small-form-factor pluggable.

C H A P T E R **4**

Initial Configuration

This chapter provides instructions for initial configuration of the Cisco 860 series, 880 series, and 890 series Integrated Services Routers (ISRs). For the initial configuration, we recommend using Cisco Configuration Professional (CP) Express. Cisco CP Express is a web-based graphical user interface that guides you through initial configuration.

You may also initially configure your router by using the Cisco IOS command-line interface (CLI) or by using the setup command facility. To create the initial configuration, the setup command facility prompts you for basic information about your router and network.

This chapter contains the following sections:

- Cisco Configuration Professional Express, page 4-1
- Cisco IOS CLI, page 4-1
- Setup Command Facility, page 4-3
- Verifying the Initial Configuration, page 4-5
- Initial Configuration of the Wireless Access Point, page 4-6

Note Some SKUs may not include a default configuration file. If your router does not have a default configuration file, go to the "Setup Command Facility" section on page 3 to configure the initial router settings.

Cisco Configuration Professional Express

After you connect the cables and power up the router, we recommend that you use the Cisco CP Express web-based application to configure the initial router settings.

For instructions on how to use Cisco CP Express to configure the router see *Cisco CP Express User's Guide*.

Cisco IOS CLI

To configure the initial router settings by using the Cisco IOS CLI, you must set up a console connection. For instructions on how to set up a console connection, see the "Connecting a Terminal or PC to the Console Port" section on page 3-9.

To configure the initial router settings using the Cisco IOS CLI, follow these steps:

Step 1   Set up a console connection to your router. The following message is displayed:

```
...
router con0 is now available
```

Step 2   Press **Return**. The following message is displayed:

```
Cisco Configuration Professional Express (Cisco CP Express) is installed on this device.
This feature requires the one-time use of the username "username1"
with the password "password1." The default username and password have a privilege level of
15.

Please change these publicly known initial credentials using Cisco CP Express or the Cisco
IOS CLI.

Here are the Cisco IOS commands.

username <myuser>  privilege 15 secret 0 <mypassword>
no username username1

Replace <myuser> and <mypassword> with the username and password you want to use.

For more information about Cisco CP please follow the instructions in the QUICK START
GUIDE for your router...
...
User Access Verification
Username:
```

Step 3   Enter the username **username1,** and press **Return** or **Enter**. The following prompt is displayed:

```
Password:
```

Step 4   Enter the password **password1,** and press **Return** or **Enter**. The following prompt is displayed:

```
Router#
```

A message is displayed that is similar to the first warning message. The message directs you to change the username and password.

You are now in privileged EXEC mode.

> ✎
>
> **Note**   You must change the username and password before you log off the router. You cannot use the username **username1** or password **password1** after you log off from this session.

Step 5   Enter configuration mode using the following commands.

```
Router#
Router#config t
Router(config)#
Router(config)#username username privilege 15 secret 0 password
```

Step 6   To change the username and password, enter the following at the prompt:

username *username* **privilege 15 secret 0** *password*

The *username* and *password* are the username and password that you determine.

To continue using the Cisco IOS CLI for initial configuration, see the applicable configuration procedures in *Cisco 860 Series, Cisco 880 Series, and Cisco 890 Series Integrated Services Routers Software Configuration Guide*.

> **Note** Save your configuration changes regularly to avoid losing them during resets, power cycles, or power outages. Use the **copy running-config startup-config** command at the privileged EXEC mode prompt (Router#) to save the configuration to NVRAM.

Step 7 Verify the initial configuration. See the "Verifying the Initial Configuration" section on page 4-5.

Setup Command Facility

The setup command facility guides you through the configuration process by prompting you for the specific information that is needed to configure your system. Use the setup command facility to configure a hostname for the router, to set passwords, and to configure an interface for communication with the management network.

To use the setup command facility, you must set up a console connection with the router and enter the privileged EXEC mode.

> **Note** For instructions on how to set up a console connection, see the "Connecting a Terminal or PC to the Console Port" section on page 3-9.

To configure the initial router settings by using the setup command facility, follow these steps:

Step 1 Set up a console connection to your router, and enter privileged EXEC mode. For instructions on how to enter privileged EXEC mode, see Step 1 through Step 4 in the "Cisco IOS CLI" section on page 4-1.

Step 2 In privileged EXEC mode, at the prompt, enter **setup**.

```
yourname# setup
```

The following message is displayed:

```
--- System Configuration Dialog ---

Continue with configuration dialog? [yes/no]:
```

You are now in the setup command facility.

The prompts in the setup command facility vary, depending on your router model, on the installed interface modules, and on the software image. The following steps and the user entries (in **bold**) are shown as examples only.

> **Note** If you make a mistake while using the setup command facility, you can exit and run the setup command facility again. Press **Ctrl-C**, and enter the **setup** command at the privileged EXEC mode prompt (Router#). For more information on using the setup command facility, see "The Setup Command" chapter in *Cisco IOS Configuration Fundamentals Command Reference, Release 12.2T*.

Step 3 To proceed using the setup command facility, enter **yes.**

```
Continue with configuration dialog? [yes/no]: yes
```

Step 4   When the following messages appear, enter **yes** to enter basic management setup.

```
At any point you may enter a question mark '?' for help.
Use ctrl-c to abort configuration dialog at any prompt.

Default settings are in square brackets '[]'.

Basic management setup configures only enough connectivity
for management of the system, extended setup will ask you
to configure each interface on the system

Would you like to enter basic management setup? [yes/no]: yes
```

Step 5   Enter a hostname for the router (this example uses Router).

```
Configuring global parameters:
Enter host name [Router]: Router
```

Step 6   Enter an enable secret password. This password is encrypted (more secure) and cannot be seen when viewing the configuration.

```
The enable secret is a password used to protect access to
privileged EXEC and configuration modes. This password, after
entered, becomes encrypted in the configuration.
Enter enable secret: xxxxxx
```

Step 7   Enter an enable password that is different from the enable secret password. This password is *not* encrypted (less secure) and can be seen when viewing the configuration.

```
The enable password is used when you do not specify an
enable secret password, with some older software versions, and
some boot images.
Enter enable password: xxxxxx
```

Step 8   Enter the virtual terminal password, which prevents unauthenticated access to the router through ports other than the console port.

```
The virtual terminal password is used to protect
access to the router over a network interface.
Enter virtual terminal password: xxxxxx
```

Step 9   Respond to the following prompts as appropriate for your network.

```
Configure SNMP Network Management? [yes]:
    Community string [public]:
```

A summary of the available interfaces is displayed.

Step 10   Choose one of the available interfaces for connecting the router to the management network.

```
Enter interface name used to connect to the
management network from the above interface summary: fastethernet4
```

Step 11   Respond to the following prompts as appropriate for your network.

```
Configuring interface FastEthernet4:
Use the 100 Base-TX (RJ-45) connector? [yes]: yes
Operate in full-duplex mode? [no]: yes
Configure IP on this interface? [yes]: yes
    IP address for this interface: 172.1.2.3
    Subnet mask for this interface [255.255.0.0] : 255.255.0.0
    Class B network is 172.1.0.0, 26 subnet bits; mask is /16
```

The configuration is displayed:

```
The following configuration command script was created:

hostname Router
enable secret 5 $1$D5P6$PYx41/lQIASK.HcSbfO5q1
enable password xxxxxx
line vty 0 4
password xxxxxx
snmp-server community public
!
no ip routing
!
interface FastEthernet4
no shutdown
speed 100
duplex auto
ip address 172.1.2.3 255.255.0.0
!
```

Step 12 Respond to the following prompts. Enter **2** to save the initial configuration.

```
[0] Go to the IOS command prompt without saving this config.
[1] Return back to the setup without saving this config.
[2] Save this configuration to nvram and exit.

Enter your selection [2]: 2
Building configuration...
Use the enabled mode 'configure' command to modify this configuration.

Press RETURN to get started! RETURN

The user prompt is displayed.
Router>
```

Step 13 Verify the initial configuration. See the for verification procedures.

After the initial configuration file is created, you can use the Cisco IOS CLI to perform additional configuration.

Verifying the Initial Configuration

To verify that the new interfaces are operating correctly, perform the following tests:

- To verify that the interfaces and line protocol are in the correct state—up or down—enter the **show interfaces** command.
- To display a summary status of the interfaces configured for IP, enter the **show ip interface brief** command.
- To verify that you configured the correct hostname and password, enter the **show configuration** command.

After you complete and verify the initial configuration, you can configure your Cisco router for specific functions.

Initial Configuration of the Wireless Access Point

The embedded wireless access point (AP) runs its own IOS. You can initially configure the embedded wireless AP by using one of the following methods:

- Cisco Configuration Professional (CP) Express
- Setup command facility on the embedded wireless device

For information on how to do basic wireless configuration on your router see the *"Basic Wireless Device"* chapter of the *Cisco 860 Series, Cisco 880, and Cisco 890 Series Integrated Services Routers Software Configuration Guide*.

APPENDIX A

Technical Specifications

This appendix provides router, port, and cabling specifications for the Cisco 860 series, Cisco 880 series, and Cisco 890 series Integrated Services Routers (ISRs). It contains the following sections:

- Router Specifications, page A-2
- Wireless Access Point, page A-3
- FE and GE Port Pinouts, page A-3
- Console and Auxiliary Port Connector Pinouts, page A-4
- FXS and FXO Port Connector Pinouts, page A-5
- VDSL2 Port Connector Pinouts, page A-5
- ADSL2+ Port Connector Pinouts, page A-5
- V.92 Port Connector Pinouts, page A-6
- G.SHDSL Port Connector Pinouts, page A-6
- Data BRI Port Connector Pinouts, page A-7
- Voice ISDN BRI Interface Pin Numbers and Functions, page A-7
- SFP Port Connector Pinouts, page A-8
- Cable Specifications, page A-8

Warning **Ultimate disposal of this product should be handled according to all national laws and regulations.** Statement 1040

Note For compliance and safety information, see *Regulatory Compliance and Safety Information Roadmap* that was shipped with the router and *Regulatory Compliance and Safety Information for Cisco 800 Series and SOHO Series Routers*.

Note The product has some color variation on the Power Pin. This will not impact product performance or reliability.

Router Specifications

Table A-1 lists the system specifications for the routers.

Table A-1   Router Specifications

Description	Design Specification (all models except Cisco 860VAE series)	Design Specification Cisco 860VAE series
Physical Dimensions		
Dimensions with antenna and rubber feet (H x W x D)	1.9 x 12.8 x 10.4 in.	1.75 x 9.5 x 9 in.
Weight (not including desktop power supply)	5.5 lb (2.5 kg), maximum	3 lb (1.4 kg) The total weight depends on customer-selected options.
Environmental Operating Ranges		
Nonoperating temperature	–4 to 149°F (–20 to 65°C)	–4 to 149°F (–20 to 65°C)
Nonoperating humidity	5 to 95% relative humidity	5 to 95% relative humidity
Nonoperating altitude	0 to 15,000 ft (4570 m)	0 to 15,000 ft (4570 m)
Operating temperature	32 to 104°F (0 to 40°C)	32 to 104°F (0 to 40°C)
Operating humidity	10 to 85% relative humidity	10 to 85% relative humidity
Operating altitude	0 to 10,000 ft (3000 m)	0 to 10,000 ft (3000 m)
Acoustic		
Acoustic: Sound Pressure (Typical/Maximum)	Low speed 31.4 dBa High speed 44.1 dBa	N/A, no fan
Acoustic: Sound Power (Typical/Maximum)	Low speed 38.9 dBA High speed 51.7 dBa	N/A, no fan
Router Power Adapter		
Input voltage	100 to 240 VAC Nominal	100 to 240 VAC Nominal
Input frequency	47 to 63 Hz	47 to 63 Hz
Power output	60 W, maximum	30 W, maximum
Output voltages	+12 VDC	+12 VDC
Inline Power-over-Ethernet Adapter		
Input voltage	85 to 264 VAC	not supported
Input frequency	47 to 63 Hz	
Power output	80 W, maximum	
Output voltage	–48 VDC	

Wireless Access Point

Table A-2 lists the specifications for the wireless access point (AP).

Table A-2   Wireless Access Point Specifications

Description	Design Specification
Radio technology	IEEE 802.11n draft 2.0 standard compliant. 2x3 MIMO[1] radio. Backward compatible with 802.11b/g and 802.11a (Cisco 890 series routers).
Operating frequency	**Cisco 860 series and 880 series ISRs** 2.4-GHz radio band **Cisco 890 series ISRs** 2.4 and 5-GH radio bands
Channels	Country-specific 20 and 40 MHz
PHY Data rate	802.11b up to 11 Mb/s 802.11g up to 54 Mb/s 802.11n up to 300 Mb/s

1. MIMO = Multiple Input/Multiple Output.

FE and GE Port Pinouts

Table A-3 describes the RJ-45 connector pinouts for Fast Ethernet (FE) ports with Power over Ethernet (PoE). Some models support PoE using an optional module, and some models do not support PoE. For ports that do not support PoE, pins 4, 5, 7, and 8 are not connected.

- Cisco 860VAE and 860VAE-K9 ISRs do not support PoE.
- Cisco 880 series ISRs can include an optional PoE module that provides power to 802.3af-compliant devices connected to FE ports 0 and 1.
- Cisco 890 series ISRs can include an optional PoE module that provides power to 802.3af-compliant devices connected to FE ports 0, 1, 2, and 3.

Table A-3   Ethernet FE LAN Port Pinouts

Pin	Function
1	RX+[1]
2	RX–
3	TX+[2]
4	PoE—optional
5	PoE—optional
6	TX–
7	PoE—optional
8	PoE—optional

1. RX = Receive

2. TX = Transmit

Table A-4 describes the RJ-45 connector pinouts for the Gigabit Ethernet (GE) ports of the Cisco 860VAE and 860VAE-K9 ISRs.

Table A-4   Ethernet GE Port Pinouts

Pin	GE Signal (LAN and WAN)
1	Tx A+[1]
2	Tx A-
3	Rx B+[2]
4	Tx C+
5	Tx C-
6	Rx B-
7	Rx D+
8	Rx D-

1. TX = Transmit

2. RX = Receive

Console and Auxiliary Port Connector Pinouts

Table A-5 lists the pinouts for the console and auxiliary port connectors.

Table A-5   Console and Auxiliary Port Connector Pinouts

RJ-45 Pin	Function
1	RTS
2	DTR
3	TXD
4	GND
5	GND
6	RXD
7	DSR
8	CTS

FXS and FXO Port Connector Pinouts

Table A-6 lists the FXS and FXO connector pinouts.

Table A-6   FXS and FXO Connector Pinouts (RJ-11-to-RJ-45)

Pin	Signal
1	NC
2	NC
3	TIP
4	RING
5	NC
6	NC

VDSL2 Port Connector Pinouts

Table A-7 lists the VDSL2 connector pinouts.

Table A-7   VDSL2 Connector Pinouts (RJ-11-to-RJ-45)

RJ-11 Pin	Function
1	Unused
2	Unused
3	TIP
4	RING
5	Unused
6	Unused

ADSL2+ Port Connector Pinouts

Table A-8 lists the ADSL2+ connector pinouts.

Table A-8   ADSL2+ Connector Pinouts (RJ-11)

RJ-11 Pin	Function
1	Unused
2	Unused
3	TIP
4	RING
5	Unused
6	Unused

V.92 Port Connector Pinouts

Table A-9 lists the V.92 connector pinouts.

Table A-9   V.92 Connector Pinouts (RJ-11-to-RJ-45)

RJ-11 Pin	Function
1	Unused
2	Unused
3	TIP
4	RING
5	Unused
6	Unused

G.SHDSL Port Connector Pinouts

Table A-10 lists the pinouts for the symmetrical high-speed DSL (G.SHDSL) WAN port for two-pair products, including the following router model(s):

- C888

Table A-10   G.SHDSL WAN Port Pinouts for Two-Pair Products

Pin	Function
1	Unused
2	TIP (Port1)
3	TIP (Port0)
4	RING (Port0)
5	RING (Port1)
6	Unused

Table A-11 lists the pinouts for the symmetrical high-speed DSL (G..SHDSL) WAN port for four-pair products, including the following router models:

- C888E
- C888EW
- C888EA

Table A-11   G.SHDSL WAN Port Pinouts for Four-Pair Products

Pin	Function
1	TIP (Port1)
2	RING (Port1)
3	TIP (Port2)

Table A-11   G.SHDSL WAN Port Pinouts for Four-Pair Products (continued)

Pin	Function
4	TIP (Port0)
5	RING (Port0)
6	RING (Port2)
7	TIP (Port3)
8	RING (Port3)

Data BRI Port Connector Pinouts

Table A-12 lists the pinouts for the Data BRI port.

Table A-12   Data BRI Port Pinouts

Pin	Function
1	Unused
2	Unused
3	TXP
4	RXP
5	TXN
6	TXN
7	Unused
8	Unused

Voice ISDN BRI Interface Pin Numbers and Functions

Table A-13 lists the interface pin numbers and functions for the voice ISDN BRI port.

Table A-13   Interface Pin Numbers and Functions

ISDN BRI NT/TE Card	NT Interface[1]	TE Interface[2]
Pin 3/T+	Pin 3/R+	Pin 3/T+
Pin 4/R+	Pin 4/T+	Pin 4/R+
Pin 5/R-	Pin 5/T-	Pin 5/R-
Pin 6/T-	Pin 6/R-	Pin 6/T-

1. Use a straight-through cable for NT interfaces.
2. Use a crossover cable for TE interfaces.

SFP Port Connector Pinouts

Table A-14 lists the pinouts for the SFP port.

Table A-14   SFP Port Pinouts

Pin	Function
1	TX Ground
2	TX Fault
3	TX disable
4	Module definition 2
5	Module definition 1
6	Module definition 0
7	Rate Select
8	Loss of signal
9	Receiver ground
10	Receiver ground
11	Receiver ground
12	Inverted received data out
13	Received data out
14	Receiver ground
15	Receiver power
16	Transmitter power
17	Transmitter ground
18	Transmit data in
19	Inverted transmit data in
20	Transmitter ground

Cable Specifications

This section provides specifications for the following Ethernet cables:

- Straight-through cable
- Crossover cable

Because of the autocrossover (autosensing) function, both straight-through and crossover cables can be used for the Ethernet LAN port.

Ethernet Cable Specifications

Table A-15 lists the specifications that apply to both straight-through and crossover Ethernet cables.

Table A-15   Ethernet Cable Specifications

Type	Category
10BASE-T	Category 3 or 5
100BASE-T	Category 5 or higher
1000BASE-T	Category 5 or higher

Maximum Cable Length

The maximum length for the Ethernet cables that connect equipment to the router is 328 feet (100 meters). This length is also the maximum distance between the router and the equipment connected to it.