

Connecting the Router

This chapter describes how to install the Cisco 860, 880, 890 ISRs and the Cisco 819 ISR.

- Cisco 810 Series, page 3-1
- Cisco 860, 880, 890 Series, page 3-8

Cisco 810 Series

Cisco 819 Series

This section describes how to connect Cisco 819 ISRs to Ethernet devices and a network. The section contains the following topics:

- Preparing to Connect the Router, page 3-1
- Connecting a PC, Server, or Workstation, page 3-2
- Connecting an External Ethernet Switch, page 3-3
- Connecting a Terminal or PC to the Console Port, page 3-4
- Connecting a Modem to the Console Port, page 3-5
- Connecting the AC Adapter, page 3-5
- Connecting the DC Adapter, page 3-6
- Verifying Connections, page 3-7



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

Preparing to Connect the Router

Before you connect the router to the devices, install the router according to the instructions in the "Installing the Router" section on page 2-22.

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.



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

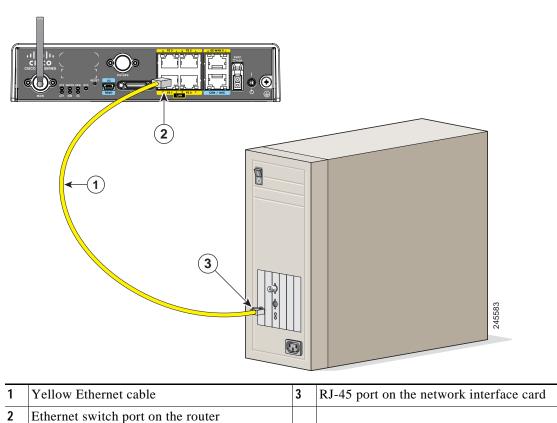
• If you must supply your own cable, see the "Cisco 860, 880, 890 Series" section on page A-11 for cabling specifications. If this appendix does not provide specifications for a particular cable, we strongly recommend ordering the cable from Cisco.

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. See Figure 3-1.

Figure 3-1 Connecting a Server, PC, or Workstation



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.



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

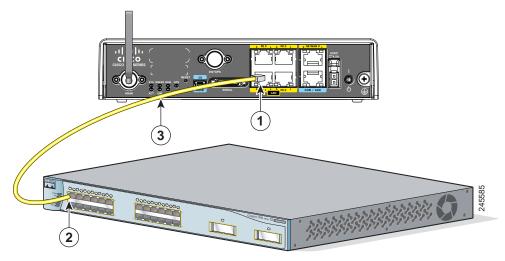
Connecting an External Ethernet Switch

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, perform these steps:

Step 1 Connect one end of the yellow Ethernet cable to an Ethernet switch port on the router. (See Figure 3-2.)

Figure 3-2 Connecting to an Ethernet Switch



1	Ethernet switch port on the router	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.

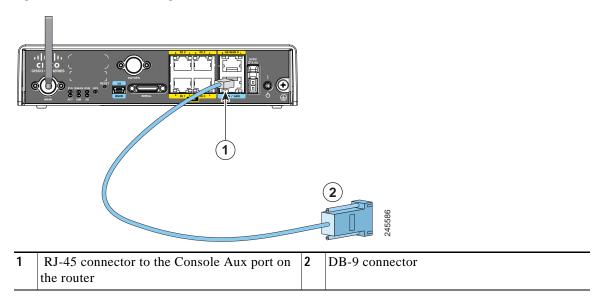
Connecting a Terminal or PC to the Console Port

Connect a terminal or PC to the Console 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 port on the router. Figure 3-3 shows the RJ-45 end of the serial cable connected to the Console port on the router.

Figure 3-3 Connecting a Terminal or PC to the Console Port



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



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.

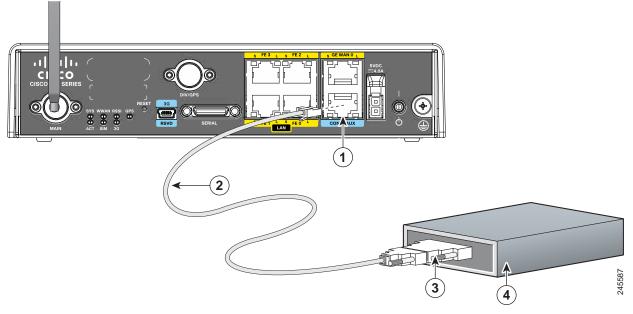
For more information, see the Terminal Emulator Settings, page 3-16, and Applying Correct Terminal Emulator Settings for Console Connections.

Connecting a Modem to the Console Port

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

Step 1 Connect the RJ-45 end of the adapter cable to the Console port on the router as shown in Figure 3-4.

Figure 3-4 Connecting a Modem to the Console Port



- 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 console port are configured for the same transmission speed (up to 115200 b/s is supported) and support mode control with data carrier detect (DCD) and data terminal ready (DTR).

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: 120VAC, 20A U.S (240VAC, 16 to 20A international).

Statement 1005



This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations. Statement 1045

To connect your Cisco 819 ISR to an AC power outlet, follow these steps:

Step 1 Connect the AC adapter to an AC power outlet.

Step 2 Plug the adapter cord into the router.

Connecting the DC Adapter



This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than 36 VDC, 5A Statement 1005



This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations. Statement 1045



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

To connect the DC power on your Cisco 819 ISR, follow these steps:

Step 1 Connect the black and white lead wires to a 12 VDC source.

The black lead is negative or ground and the white lead is positive. The output cable is 1.3 meters while the input cable is 1 meter in length. (See Figure 3-5 and Figure 3-6.). For the complete list of supported power adapters, see the "Supported Power Adapters" section on page A-9.

Figure 3-5 DC Power Supply PWR1-20W-12VDC and PWR1-20W-24VDC

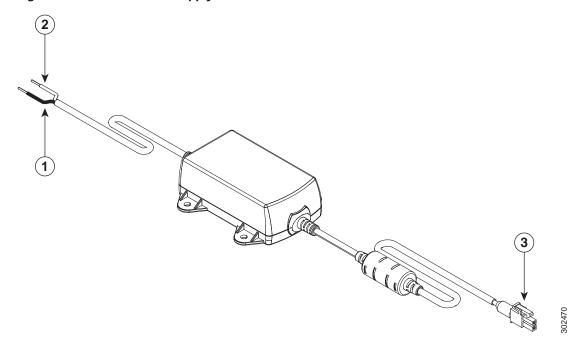


Figure 3-6 DC Power Supply PWR2-20W-12VDC and PWR2-20W-24VDC

1	Black wire (negative)	3	Adapter
2	White wire (positive)		

Step 2 Plug the adapter cord into the router.



Note

The power adapters have 18 AWG wires for the input connection. Tinned bare wires are used for the input connection as there is no standard established for connector type. Screw terminal blocks are most often used.

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 3-1.

For full LED description, see Table 1-45.

Table 3-1 Verifying the Router Operation

Power and Link	LEDs to Check	Normal Patterns			
SYS Yellow		FPGA download is complete.			
Green (blinking)		ROMMON is operational.			
	Off	After powering up, when FPGA is being downloaded (in ROMMON).			

Table 3-1 Verifying the Router Operation (continued)

Power and Link	LEDs to Check	Normal Patterns		
ACT		Network activity on FE Switch ports, GE WAN port, 3G cellular interface, and serial interfaces.		
Off		No network activity.		

Cisco 860, 880, 890 Series

This section describes how to connect Cisco 860 series, Cisco 880 series, and Cisco 890 series ISRs to Ethernet devices, Power over Ethernet (PoE), and a network.



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

The section contains the following topics:

- Safety Warnings, page 3-9
- Preparing to Connect the Router, page 3-1
- Connecting a PC, Server, or Workstation, page 3-2
- Connecting a Phone, page 3-13
- Connecting an External Ethernet Switch, page 3-3
- Connecting the V.92 modem Port, page 3-15
- Connecting a Terminal or PC to the Console Port, page 3-4
- Connecting a Modem to the Console Port, page 3-5
- Connecting the 3G Card, page 3-18
- Installing the 3G Adapter for Extended Cable/Antenna, page 3-24
- Connecting a Data BRI Port, page 3-28
- Connecting an FE Line to an FE WAN Port, page 3-30
- Connecting a GE Line to an GE WAN Port, page 3-31
- Connecting an xDSL Line, page 3-31
- Connecting Power over Ethernet, page 3-34
- Connecting the AC Adapter, page 3-5
- Connecting an FXS Line, page 3-39
- Connecting an FXO Line, page 3-40
- Connecting a Voice ISDN BRI Line, page 3-42
- Verifying Connections, page 3-7



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 Routers*.



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.

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



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



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



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



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 Cisco 860, 880, 890 ISR" section on page 2-40.

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.



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

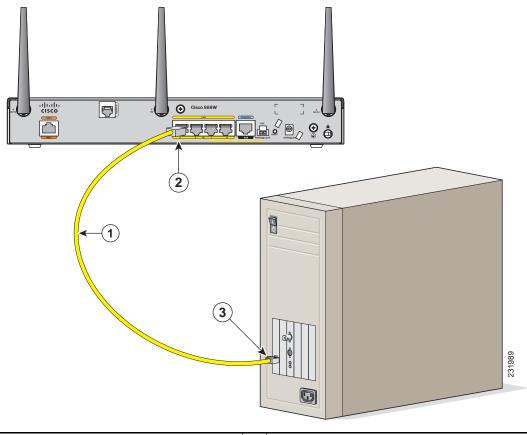
- Connect the color-coded cables supplied by Cisco to the color-coded ports on the back panel.
- If you must supply your own cable, see "Cable Specifications" section on page A-28 for cabling specifications. If this appendix does not provide specifications for a particular cable, we strongly recommend 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 3-7 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.



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

Connecting a Phone

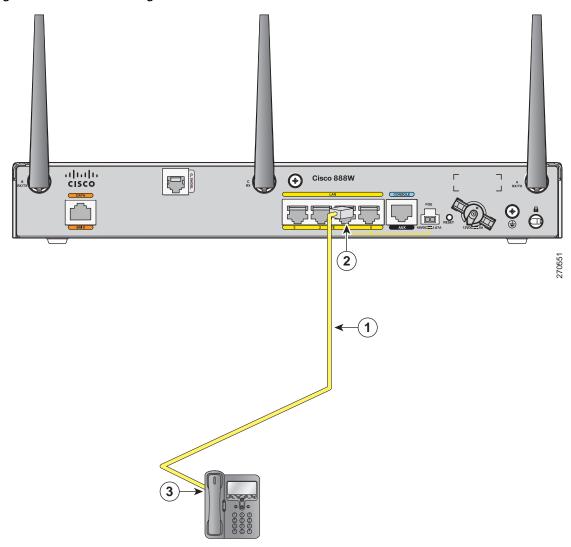
To connect an 802.3af-compliant phone to an Ethernet switch port, follow these steps:



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 3-8 shows a Cisco 888W router connected to a phone.

Figure 3-8 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.

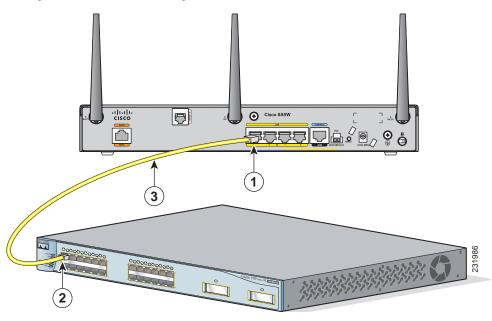
Connecting an External Ethernet Switch

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, perform these steps:

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

Figure 3-9 Connecting to an Ethernet Switch



1	Ethernet switch port on the router	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



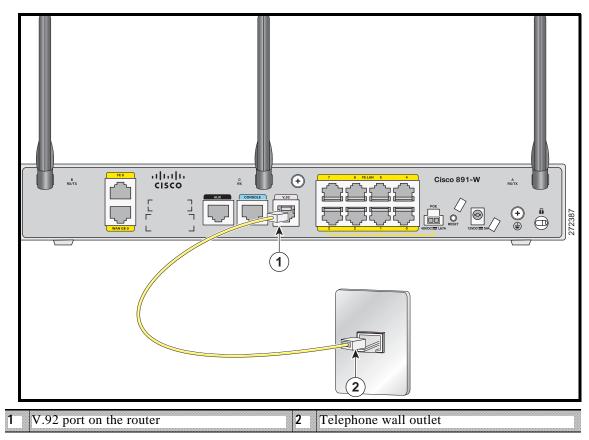
Hazardous network voltages are present in WAN ports regardless of whether power to the unit is OFF or ON. To avoid electric shock, use caution when working near WAN ports. When detaching cables, detach the end away from the unit first. Statement 1026

To connect the 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.

Figure 3-10 shows how to connect the router to the service provide through the V.92 port.

Figure 3-10 Connecting to Your Service Provider Through the V.92 port



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

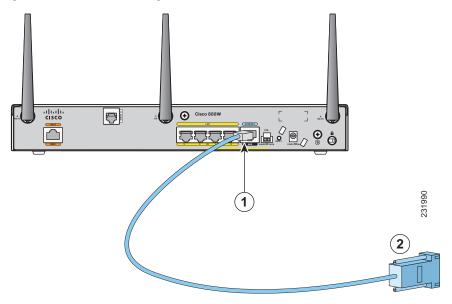
Connecting a Terminal or PC to the Console Port

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 3-3 shows the RJ-45 end of the serial cable connected to the Console Aux port on the router.

Figure 3-11 Connecting a Terminal or PC to the Console Port



1 RJ-45 connector to the Console Aux port on the router 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.



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.

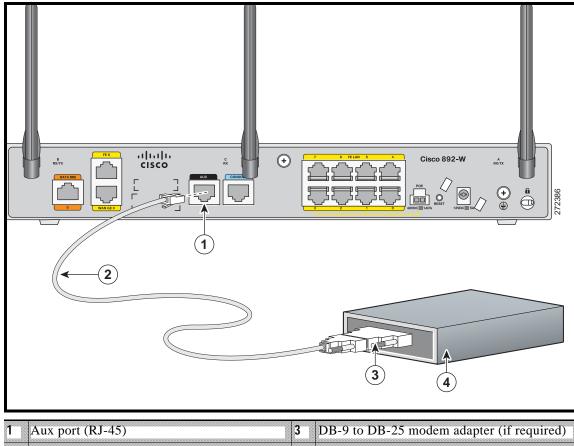
For more information on terminal emulation settings, see Applying Correct Terminal Emulator Settings for Console Connections.

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 3-4.

Figure 3-12 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.
- Connect the DB-25 end of the modem adapter to the modem. Step 3
- 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



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).



The Cisco 880G router does not support online insertion and removal (OIR) of the 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 3-13. Keep the card parallel to the surface and firmly push the card into the slot.



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



Note

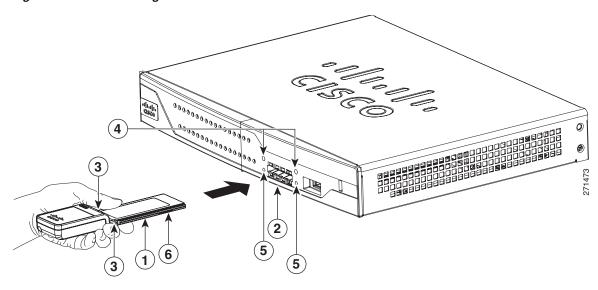
When inserting the card into the 3G express card slot, you may hear a metal-on-metal sound as the 3G card rubs against the internal metal cage. The 3G card is designed to fit tightly into the 3G express card slot. Firm pressure may be required to insert the card.



Note

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

Figure 3-13 Inserting the 3G Card

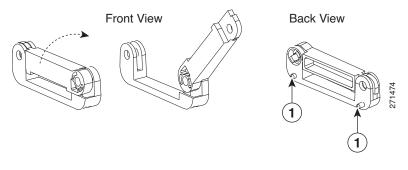


1	3G card with the Cisco logo facing up	4	Screw holes for locking bracket
2	3G express card slot	5	Pin holes for aligning the locking bracket
3	Notches on the 3G card	6	SIM slot (in HSPA ¹ cards only)

^{1.} HSPA = High-Speed Packet Access.

Step 2 Open the top of the anti-theft locking bracket, as shown in Figure 3-14.

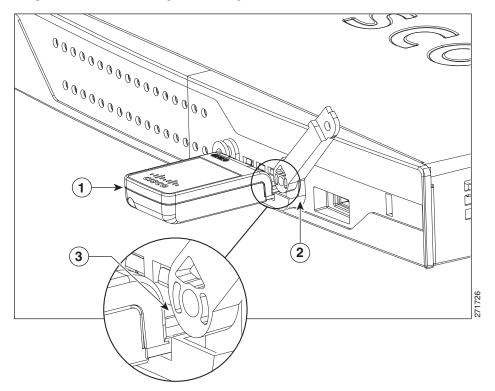
Figure 3-14 Opening the Anti-theft Locking Bracket



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 3-15, and the pins on the locking bracket should be inserted into the corresponding holes in the router.

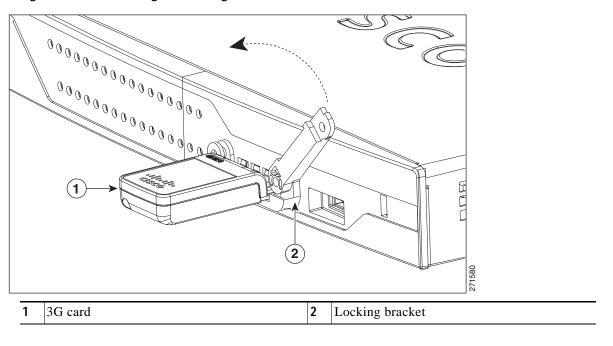
Figure 3-15 Installing the Locking Bracket



1	3G card	3	Notch on the 3G card
2	Locking bracket		

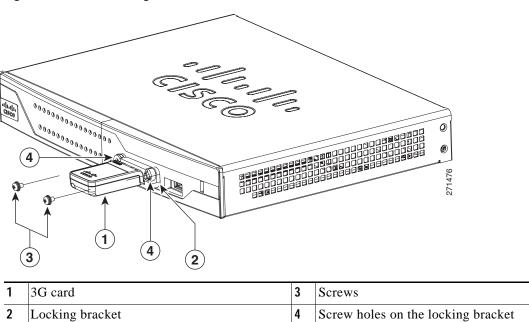
Step 4 Close the locking bracket, as shown in Figure 3-16.

Figure 3-16 Closing the Locking Bracket



Step 5 Insert the screws, as shown in Figure 3-17, and tighten with a number 2 Phillips screwdriver.

Figure 3-17 Inserting the Screws



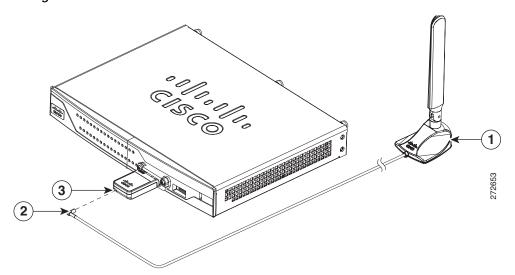
Step 6 To connect the antenna to the 3G card, insert the antenna connector into the antenna connector receptacle on the 3G card.



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

Figure 3-18 and Figure 3-19 show the antenna connected to the 3G card with an SSMB type plug, and the antenna with the SMK-TS-9 connector.

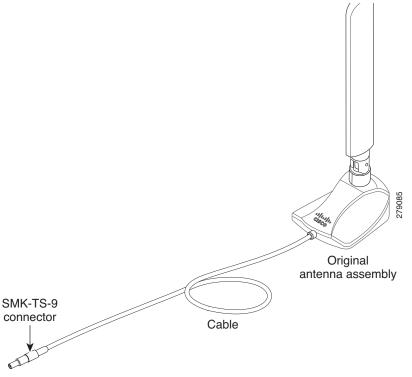
Figure 3-18 Antenna connected to the 3G Card with SSMB connector



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 3-19 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 3-2 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 3-24. Otherwise, follow Step 7.

Table 3-2 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.

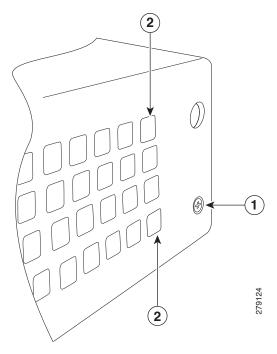
Step 8 Remove the protective tape from the adhesive on the bottom of the antenna cradle, then firmly press the cradle to the flat surface.

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 3-20. Keep the screw aside for Step 4.

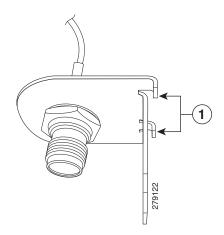
Figure 3-20 Locating the Phillips Screw



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 3-21.

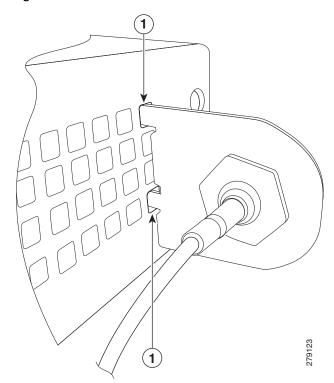
Figure 3-21 Locating the Hooks on the Adapter



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 3-22.

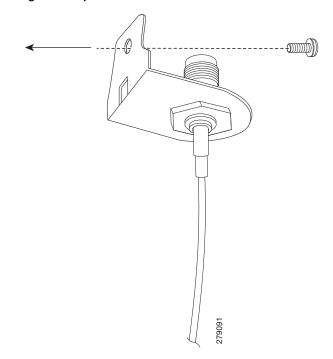
Figure 3-22 Inserting the Hooks



1 Hooks aligned and inserted into the router.

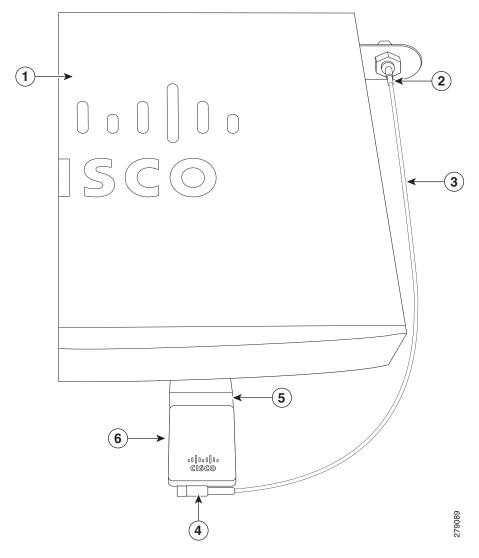
Step 4 Align the circular adapter hole with the hole on the router chassis from where you removed the screw in Step 1 and use the screw to attach the adapter to the router as shown in Figure 3-23.

Figure 3-23 Attaching the Adapter



Step 5 Connect the extension cable to the 3G card, as described in the "Connecting the 3G Card" section on page 3-18. The complete assembly is shown in Figure 3-24.

Figure 3-24 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 3-3 lists the loss information for the ultra-low-loss (ULL) LMR 400 cables available with the adapter for the 3G fixed platforms.

Table 3-3 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



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#w p1262730

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.



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).

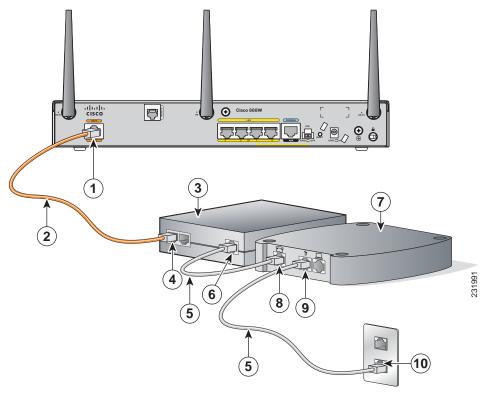
To connect the Data BRI port to the ISDN service provider, follow these steps:



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

Step 1 Connect one end of the orange ISDN S/T cable to the Data BRI port on the router. Figure 3-25 shows a Data BRI connection.

Figure 3-25 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 3-26.

Figure 3-26 Connecting the FE WAN Port

Cisco 881 W

Cisco 881 W

Internet

1FE WAN port3Modem connected to the Internet2CAT 5 cable

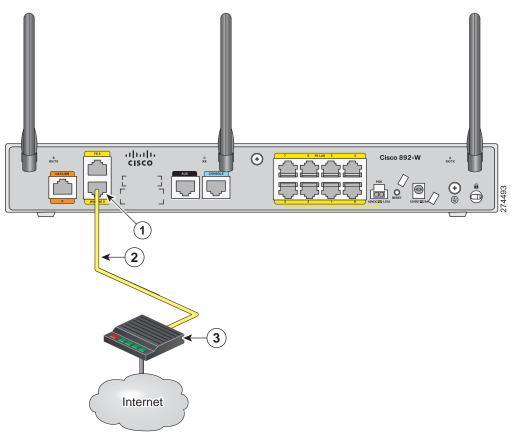
Step 2 Connect the other end of cable to an available port on the modem.

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 3-27.

Figure 3-27 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



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



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 3-28 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.



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.



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



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



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



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

Telecom Service Overhead Service Entrance Home or Business Router Service Utilities Entrance or Demarcation Point Network Interface Box/ Network Interface Device/ Station Protector Note: Primary Protection * Alternative Underground Service Entrance may be located Outside Building Ground Rod connected to 281392 or Inside of Premise Service entrance and Primary Protection

Figure 3-28 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:

2

Step 1 Connect one end of an RJ-11 (RJ-45 on 880 E models) cable to the port on the router. See Figure 3-29.

Figure 3-29 Connecting the xDSL Line

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

G.SHDSL port, VDSL2oPOTs port, or

ADSL2+ port

DSL wall jack



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.



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



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



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 3-30 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.



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 3-5.



Note

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

4

CISCO CISCO SSBW

CISCO SSB

Figure 3-30 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 1-33 and Figure 1-35.

Connecting the AC Adapter



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



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



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



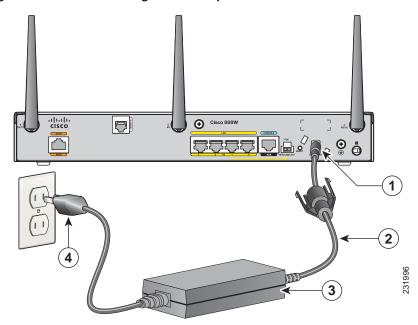
The Cisco 892FSP utilizes a single 4-pin power connector type. Figure 3-33 shows the pin number assignment of the Cisco 892FSP Power Adapter Connector.

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 3-31.

To connect the AC power outlet for the Cisco 892FSP router, see Figure 3-32.

Figure 3-31 Connecting the AC Adapter



1	12-VDC plug	3	Power adapter—12 VDC
2	Power cord	4	AC plug

Figure 3-32 Connecting the AC Adapter for the Cisco 892FSP

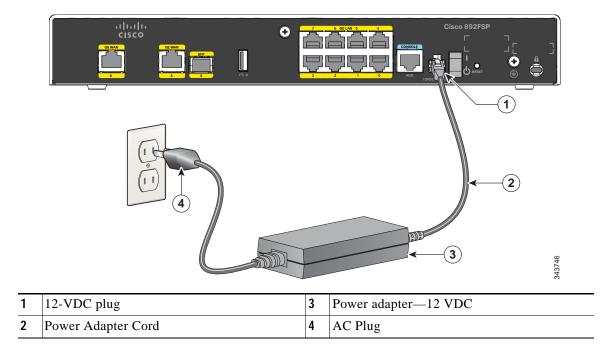
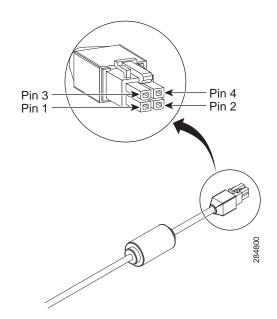


Figure 3-33 Cisco 892FSP, 896VA, 897VA, and 898EA Power Adapter Connector Pin Assignment

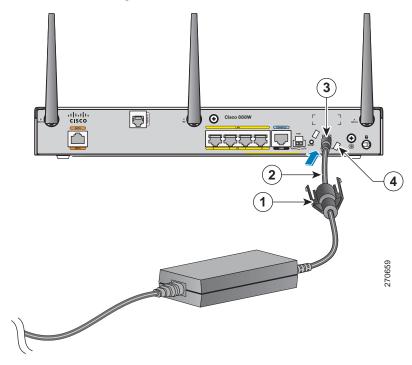


Pin 1	Ground	Pin 3	+12 V
Pin 2	NC ¹	Pin 4	NC

^{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 3-34.

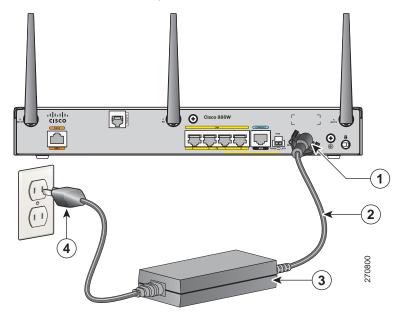
Figure 3-34 Securing the Power Cord



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 3-35.

Figure 3-35 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

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.



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



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 3-36 shows an FXS line connection.

Figure 3-36 Connecting an FXS Line $(\mathbf{1})$ عالماله C881SRST-W igoplusCISCO **3** Fax machine or telephone 1 FXS port 3 RJ-11 port

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

Connecting an FXO Line

2

RJ-11 cable

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

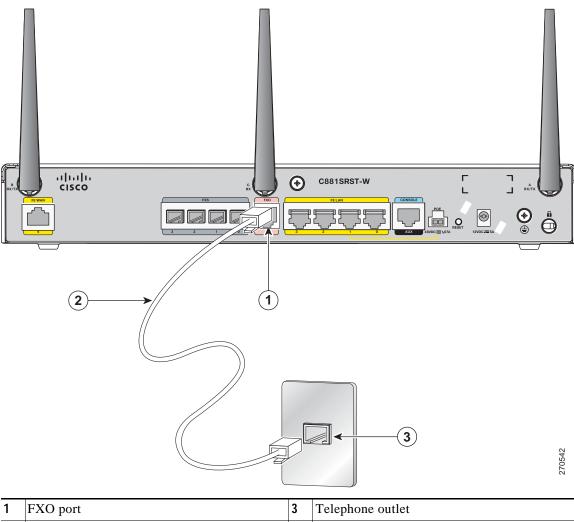


Hazardous network voltages are present in WAN ports regardless of whether power to the unit is OFF or ON. To avoid electric shock, use caution when working near WAN ports. When detaching cables, detach the end away from the unit first. Statement 1026

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 3-37.

Figure 3-37 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.



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:

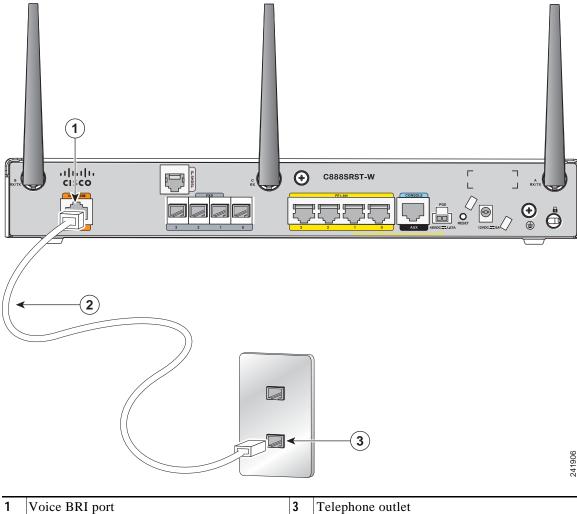
Step 1 Connect one end of a straight-through RJ-45-to-RJ-45 cable to the Voice BRI port.



When the interface is configured as NT and is connecting to a TE device, use a crossover cable. See Table A-27.

Figure 3-38 shows a voice BRI line connection.

Figure 3-38 Connecting a Voice BRI Line



	oice BRI port	J	Telephone outlet
2 RJ-	J-45 cable		

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



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



Do not stare into the laser beam. Statement 1010



Invisible laser radiation present. Statement 1016



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



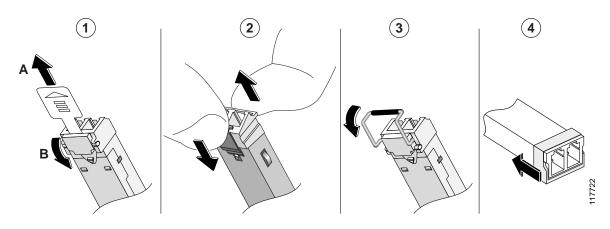
Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye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



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



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



1	Sliding latch	3	Bale-clasp latch
2	Swing and slide latch	4	Plastic collar latch

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 3-1.

For the full LED descriptions, see the "LEDs" section on page 1-135.

Table 3-4 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 3-4 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	PoE power status:			
	890 series only)	Green when connected and powered.			
	PoE 1 (880 and 890 series only)	Amber when there is a fault with the inline power supply.			
	PoE 2 (890 series only)				
	PoE 3 (890 series				
	only)				
To LAN GE/FE line (860VAE models	LAN	Blinking when there is LAN activity (traffic in either direction).			
only)		Off when the link is down.			
To DSL line (860VAE models	DSL LINK	On when DSL WAN mode is selected and DSL training complete.			
only)		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.			

Table 3-4 Verifying the Router Operation (continued)

Power and Link	LEDs to Check	Normal Patterns
To WAN GE line	GE Mode	On when GE WAN mode is selected.
(860VAE models only)		Off when the device is powered off or when DSL WAN mode is selected.
		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.

Cisco 860, 880, 890 Series