



APPENDIX **B**

Transceiver, Chassis Connectors, and Cable and Adapter Specifications

Revised: January 4, 2012

This appendix covers the transceivers supported by the Catalyst 4948E and the Catalyst 4948E-F switches, the connectors on the front panel of the chassis, and the cables and adapters supplied in the accessory kit. The appendix is divided into the following topics:

- [Transceiver Support for Uplink Ports, page B-1](#)
- [Console Port, page B-11](#)
- [Ethernet Management Port, page B-12](#)
- [Cables and Adapters, page B-12](#)



Tip

For additional information about the Cisco Catalyst 4948E and the Catalyst 4948E-F switches (including configuration examples and troubleshooting information), see the documents listed on this page:

http://www.cisco.com/en/US/products/ps6021/tsd_products_support_series_home.html

Transceiver Support for Uplink Ports

Both the Catalyst 4948E and the Catalyst 4948E-F chassis have four uplink ports that support both 1-GB SFP and 10-GB SFP+ transceivers.

1-GB SFP Transceivers

[Table B-1](#) lists the 1-GB SFP transceivers that are supported on the chassis uplink ports.

Table B-1 **1-GB SFP Transceiver Support**

SFP Transceiver	Description
GLC-T	(1000BASE-T)
GLC-SX-MM	(1000BASE-SX)

Table B-1 1-GB SFP Transceiver Support (continued)

SFP Transceiver	Description
GLC-LH-SM	(1000BASE-LH/LX)
GLC-ZX-SM	(1000BASE-ZX)
GLC-BX-D	(1000BASE-BX10)
GLC-BX-U	(1000BASE-BX10)

The four uplink ports also support 1-GB CWDM and 1-GB DWDM SFP transceivers, which are described in separate sections.

Figure B-1 shows a 1000BASE-X (optical) SFP transceiver with the major features of the transceiver identified. Figure B-2 shows a 1000BASE-T (copper) SFP transceiver with the major features of the transceiver identified.

Figure B-1 1-GB Optical SFP Transceiver Features

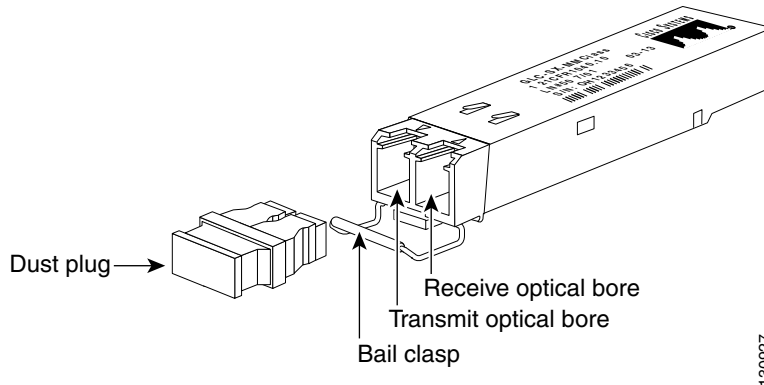
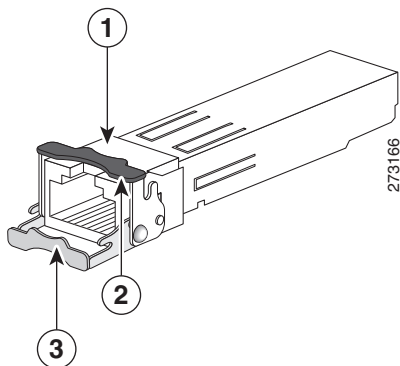


Figure B-2 1-GB Copper SFP Transceiver Features



1	RJ-45 connector	3	Bail-clasp shown in the open (unlocked) position
2	Bail-clasp shown in the closed (locked) position		

Table B-2 lists the specifications for the 1000BASE-T and 1000BASE-X SFP transceivers.

Table B-2 1000BASE-T and 1000BASE-X SFP Transceiver Specifications

SFP Transceiver Module and Product Number	Interface Connector	Nominal Wavelength (nm)	Network Cable Type	Fiber Core Size (micron)	Modal Bandwidth (MHz/km)	Cable Distance ¹
1000BASE-T (GLC-T=)	RJ-45	—	Category 5, 5e, or 6 UTP/FTP	—	—	328 ft (100 m)
1000BASE-SX (GLC-SX-MM=)	LC duplex	850	MMF	62.5 62.5 50.0 50.0	160 200 400 500	722 ft (220 m) 902 ft (275 m) 1640 ft (500 m) 1804 ft (550 m)
1000BASE-LX/LH (GLC-LH-SM=)	LC duplex	1300	MMF ² SMF	62.5 50.0 50.0 G.652 ³	500 400 500 —	1804 ft (550 m) 1804 ft (550 m) 1804 ft (550 m) 6.21 mi (10 km)
1000BASE-ZX (GLC-ZX-SM=)	LC duplex	1550	SMF	G.652 ³	—	43.4 to 62 mi (70 to 100 km) ⁴
1000BASE-BX10 (GLC-BX-D=)	LC single	1490 (downstream)	SMF	G.652 ³	—	6.21 mi (10 km)
1000BASE-BX10 (GLC-BX-U=)	LC single	1310 (upstream)	SMF	G.652 ³	—	6.21 mi (10 km)

1. Cable distances are based on fiber loss. Additional factors, such as the number of splices and the optical quality of the fiber, can affect cabling distances.
2. A mode-conditioning patch cord is required. Using an ordinary patch cord with MMF, 1000BASE-LX/LH SFP transceivers, and a short link distance can cause transceiver saturation, resulting in an elevated bit error rate (BER). When using the LX/LH SFP transceiver with 62.5-micron diameter MMF, you must also install a mode-conditioning patch cord between the SFP transceiver and the MMF cable on both the sending and receiving ends of the link. The mode-conditioning patch cord is required for link distances greater than 984 ft (300 m).
3. ITU-T G.652 SMF as specified by the IEEE 802.3z standard.
4. 1000BASE-ZX SFP modules can reach up to 62 miles (100 km) by using dispersion-shifted SMF or low-attenuation SMF; the actual distance depends on the fiber quality, the number of splices, and the connectors.

Table B-3 lists the fiber loss budgets for the 1000BASE-T and 1000BASE-X SFP transceivers.

Table B-3 Fiber Loss Budgets for the 1-GB SFP Transceivers

1-GB SFP Transceiver Product Number	Transmit Power (dBm)	Receive Power (dBm)	Transmit and Receive Wavelengths (nm)
GLC-SX-MM (1000BASE-SX)	-4 (maximum) -9.5 (minimum)	0 (maximum) -17 (minimum)	770 to 860
GLC-LH-SM (1000BASE-LX/LH)	-3 (maximum) -9.5 (minimum)	-3 (maximum) -20 (minimum)	1260 to 1355
GLC-ZX-SM (1000BASE-ZX)	5 (maximum) 0 (minimum)	-3 (maximum) -23 (minimum)	1500 to 1580
GLC-BX-D (1000BASE-BX-D)	-3 (maximum) -9 (minimum)	-3 (maximum) -19.5 (minimum)	1480 to 1500 (transmit) 1260 to 1360 (receive)
GLC-BX-U (1000BASE-BX-U)	-3 (maximum) -9 (minimum)	-3 (maximum) -19.5 (minimum)	1260 to 1360 (transmit) 1480 to 1500 (receive)



Note

For the GLC-ZX-SM, the minimum attenuation between the transmit bore (TX) and the receive bore (RX) is 8 db. When using short distances of single-mode fiber cable, you might need to insert an inline optical attenuator in the link to avoid overloading the receiver.

Table B-4 lists the physical and environmental specifications for the 1-GB SFP transceivers.

Table B-4 1-GB SFP Transceiver Physical and Environmental Specifications

Item	Specification
Dimensions (H x W x D)	0.04 x 0.53 x 2.22 in. (8.5 x 13.4 x 56.5 mm)
Operating temperature	32° to 122°F (0° to 50°C)
Storage temperature	-40° to 185°F (-40° to 85°C)



Note

You can use any combination of SFP modules that your Cisco device supports. The only restrictions are that each SFP port must match the wavelength specifications on the other end of the cable and that the cable must not exceed the stipulated cable length for reliable communications.

CWDM SFP Transceivers

The four uplink ports on the switches also support CWDM SFP transceivers. The CWDM SFP transceiver uses an LC optical connector to connect to single-mode fiber-optic (SMF) cable. You can connect the CWDM SFPs to CWDM passive optical system optical add/drop multiplexer (OADM) modules or multiplexer/demultiplexer plug-in modules using single-mode fiber-optic cables. The supported CWDM SFP transceivers, their associated wavelengths, and their connector color codes are listed in Table B-5

Table B-5 CWDM SFP Transceivers

CWDM SFP Transceiver Product Number	Description	Connector Color Code
CWDM-SFP-1470=	1000BASE-CWDM, 1470 nm	Gray
CWDM-SFP-1490=	1000BASE-CWDM, 1490 nm	Violet
CWDM-SFP-1510=	1000BASE-CWDM, 1510 nm	Blue
CWDM-SFP-1530=	1000BASE-CWDM, 1530 nm	Green
CWDM-SFP-1550=	1000BASE-CWDM, 1550 nm	Yellow
CWDM-SFP-1570=	1000BASE-CWDM, 1570 nm	Orange
CWDM-SFP-1590=	1000BASE-CWDM, 1590 nm	Red
CWDM-SFP-1610=	1000BASE-CWDM, 1610 nm	Brown

Table B-6 lists the optical specifications for the CWDM SFP transceivers.

Table B-6 CWDM SFP Optical Specifications

Parameter	Minimum	Typical	Maximum	Units	Notes and Conditions
Transmitter Center Wavelength	(x-4)	—	(x + 7)	nm	Available center wavelengths are 1470, 1490, 1510, 1530, 1550, 1570, 1590, and 1610 nm
Side-Mode Suppression Ratio	30	—		dB	
Transmitter Optical Output Power	0	—	5.0	dBm	Average power coupled into single-mode fiber
Receiver Optical Input Power (BER <10 ⁻¹² with PRBS 2-7-1)	-28.0	—	-7.0	dBm	Measured at 2.12 Gbps, 140°F (60°C) case temperature
Receiver Optical Input Power (BER <10 ⁻¹² with PRBS 2-7-1)	-29.0	—	-7.0	dBm	Measured at 1.25 Gbps, 140°F (60°C) case temperature
Receiver Optical Input Wavelength	1450	—	1620	nm	
Transmitter Extinction Ratio	9	—		dB	
Dispersion Penalty at 100 km	—	—	3	dB	Measured at 2.12 Gbps
Dispersion Penalty at 100 km	—	—	2	dB	Measured at 1.25 Gbps

Table B-7 lists the physical and environmental specifications for the CWDM SFP transceivers.

Table B-7 1-GB CWDM SFP Transceiver Physical and Environmental Specifications

Item	Specification
Dimensions (H x W x D)	0.04 x 0.53 x 2.22 in. (8.5 x 13.4 x 56.5 mm)
Operating temperature	32° to 122°F (0° to 50°C)
Storage temperature	-40° to 185°F (-40° to 85°C)

DWDM SFP Transceivers

The four uplink ports on both the Catalyst 4948E and the Catalyst 4948E-F switches also support DWDM SFP transceivers. The DWDM SFP transceiver uses an LC optical connector to connect to single-mode fiber-optic (SMF) cable. You can connect the DWDM SFPs to DWDM passive optical system optical add/drop multiplexer (OADM) modules or multiplexer/demultiplexer plug-in modules using single-mode fiber-optic cables. The supported CWDM SFP transceivers, their associated wavelengths, and their connector color codes are listed in [Table B-8](#).

Table B-8 DWDM SFP Transceiver Product Numbers, Wavelengths, and ITU Channel Numbers

DWDM SFP Product Number	Description	ITU Channel
DWDM-SFP-6061	1000BASE-DWDM 1560.61 nm SFP	21
DWDM-SFP-5979	1000BASE-DWDM 1559.79 nm SFP	22
DWDM-SFP-5898	1000BASE-DWDM 1558.98 nm SFP	23
DWDM-SFP-5817	1000BASE-DWDM 1558.17 nm SFP	24
DWDM-SFP-5655	1000BASE-DWDM 1556.55 nm SFP	26
DWDM-SFP-5575	1000BASE-DWDM 1555.75 nm SFP	27
DWDM-SFP-5494	1000BASE-DWDM 1554.94 nm SFP	28
DWDM-SFP-5413	1000BASE-DWDM 1554.13 nm SFP	29
DWDM-SFP-5252	1000BASE-DWDM 1552.52 nm SFP	31
DWDM-SFP-5172	1000BASE-DWDM 1551.72 nm SFP	32
DWDM-SFP-5092	1000BASE-DWDM 1550.92 nm SFP	33
DWDM-SFP-5012	1000BASE-DWDM 1550.12 nm SFP	34
DWDM-SFP-4851	1000BASE-DWDM 1548.51 nm SFP	36
DWDM-SFP-4772	1000BASE-DWDM 1547.72 nm SFP	37
DWDM-SFP-4692	1000BASE-DWDM 1546.92 nm SFP	38
DWDM-SFP-4612	1000BASE-DWDM 1546.12 nm SFP	39
DWDM-SFP-4453	1000BASE-DWDM 1544.53 nm SFP	41
DWDM-SFP-4373	1000BASE-DWDM 1543.73 nm SFP	42
DWDM-SFP-4294	1000BASE-DWDM 1542.94 nm SFP	43
DWDM-SFP-4214	1000BASE-DWDM 1542.14 nm SFP	44
DWDM-SFP-4056	1000BASE-DWDM 1540.56 nm SFP	46
DWDM-SFP-3977	1000BASE-DWDM 1539.77 nm SFP	47
DWDM-SFP-3998	1000BASE-DWDM 1539.98 nm SFP	48
DWDM-SFP-3819	1000BASE-DWDM 1538.19 nm SFP	49
DWDM-SFP-3661	1000BASE-DWDM 1536.61 nm SFP	51

Table B-8 DWDM SFP Transceiver Product Numbers, Wavelengths, and ITU Channel Numbers (continued)

DWDM SFP Product Number	Description	ITU Channel
DWDM-SFP-3582	1000BASE-DWDM 1535.82 nm SFP	52
DWDM-SFP-3504	1000BASE-DWDM 1535.04 nm SFP	53
DWDM-SFP-3425	1000BASE-DWDM 1534.25 nm SFP	54
DWDM-SFP-3268	1000BASE-DWDM 1532.68 nm SFP	56
DWDM-SFP-3190	1000BASE-DWDM 1531.90 nm SFP	57
DWDM-SFP-3112	1000BASE-DWDM 1531.12 nm SFP	58
DWDM-SFP-3033	1000BASE-DWDM 1530.33 nm SFP	59

Table B-9 lists the DWDM SFP transceiver optical specifications.

Table B-9 DWDM SFP Transceiver Optical Specifications

Specification	Value
Transmitter spectral width	0.2 nm
Transmitter optical output power	<ul style="list-style-type: none"> • 0 dBm (minimum) • 4.0 dBm (maximum)
Receiver optical input wavelength	<ul style="list-style-type: none"> • 1530 nm (minimum) • 1565 nm (maximum)
Receiver optical input power	<ul style="list-style-type: none"> • -28.0 dBm (minimum)¹ • -22.0 dBm (minimum)² • -9.0 dBm (maximum)

1. Power-limited performance.

2. Noise-limited performance.

Table B-10 lists the physical and environmental specifications for the DWDM SFP transceivers.

Table B-10 DWDM SFP Transceiver Physical and Environmental Specifications

Item	Specification
Dimensions (H x W x D)	0.04 x 0.53 x 2.22 in. (8.5 x 13.4 x 56.5 mm)
Operating temperature	32° to 122°F (0° to 50°C)
Storage temperature	-40° to 185°F (-40° to 85°C)

10-GB SFP+ Transceivers

The Small Form-Factor Pluggable, enhanced (SFP+) 10-Gigabit Ethernet transceiver module is a bidirectional transceiver. It has a 20-pin connector on the electrical interface and a duplex LC connector on the optical interface. The following SFP+ transceivers are supported in the uplink ports:

- SFP-10G-SR
- SFP-10G-LR
- SFP-10G-LRM
- SFP-H10GB-CU1M
- SFP-H10GB-CU3M
- SFP-H10GB-CU5M

Figure B-3 shows an SFP+ optical transceiver with the major features identified. Figure B-4 shows a copper (twinax) transceiver.

Figure B-3 SFP+ Optical Transceiver

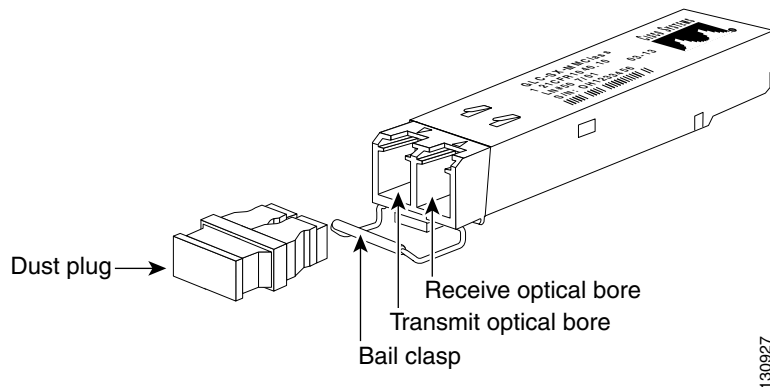
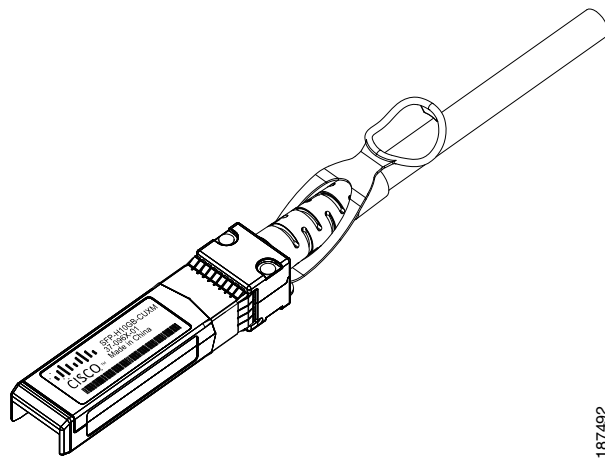


Figure B-4 shows the SFP+ copper (twinax) transceiver.

Figure B-4 SFP+ 10-Gigabit Ethernet Copper (Twinax) Transceiver



**Note**

When switching from 1-GB SFPs to 10-GB SFP+ transceivers or from an SFP+ to an SFP, the chassis recognizes the change in speed and sets the port accordingly.

The 10-GB SFP+ transceiver cabling specifications are listed in [Table B-11](#).

Table B-11 10-GB SFP+ Transceiver Cabling Specifications

SFP+ Transceiver	Wavelength (nm)	Cable Type	Core Size (μm)	Modal Bandwidth (MHz/km)	Cable Distance
SFP-10G-SR (Beige bail-clasp)	850	MMF	62.5	160	85 ft (26 m)
			62.5	200	108 ft (33 m)
			50.0	400	216 ft (66 m)
			50.0	500	269 ft (82 m)
			50.0	2000	984 ft (300 m)
SFP-10G-LR (Blue bail-clasp)	1310	SMF	G.652	—	6.2 miles (10 km)
SFP-10G-LRM	1310	MMF	62.5	500	722 ft (220 m)
			50.0	400	328 ft (100 m)
			50.0	500	722 ft (220 m)
		SMF	G.652	—	984 ft (300 m)
SFP-H10GB-CU1M	—	Twinax cable, 30AWG cable assembly	—	—	3.28 ft (1 m)
SFP-H10GB-CU3M	—	Twinax cable, 30AWG cable assembly	—	—	9.84 ft (3 m)
SFP-H10GB-CU5M	—	Twinax cable, 30AWG cable assembly	—	—	16.4 ft (5 m)

Table B-12 lists the SFP+ transceiver optical transmit and receive specifications.

Table B-12 SFP+ Transceiver Module Optical Transmit and Receive Specifications

SFP+ Transceiver Module Model	Transceiver Type	Transmit Power (dBm)	Receive Power (dBm)	Transmit and Receive Wavelength (nm)
SFP-10G-SR	10GBASE-SR, 850-nm MMF	-1.3 (Max) -7.3 (Min)	-1.0 (Max) -9.9 (Min)	840 to 860
SFP-10G-LR	10GBASE-LR, 1310-nm SMF	0.5 (Max) -8.2 (Min)	0.5 (Max) -14.4 (Min)	1260 to 1355
SFP-10G-LRM	10GBASE-LRM, 1310-nm MMF and SMF	0.5 (Max) -6.5 (Min)	0.5 (Max) -8.4 (Min average) -6.4 (Min in OMA)	1260 to 1355

Table B-13 lists the physical and environmental specifications for the 10-GB SFP+ transceivers.

Table B-13 10-GB SFP+ Transceiver Physical and Environmental Specifications

Item	Specification
Dimensions (H x W x D)	0.04 x 0.53 x 2.22 in. (8.5 x 13.4 x 56.5 mm)
Operating temperature	32° to 122°F (0° to 50°C)
Storage temperature	-40° to 185°F (-40° to 85°C)

Console Port

Both the Catalyst 4948E and the Catalyst 4948E-F switches can be accessed through a serial console port located on the chassis front panel. The console port is 10/100/1000BASE-T port that uses an RJ-45 connector. The console port allows you to access the switch either locally (with a console terminal or PC) or remotely (with a modem).

Table B-14 lists the console port pinouts.

Table B-14 Console Port Pinouts

Pin	Signal	Direction	Description
1	RTS	output	request to send
2	DTR	output	data terminal ready
3	TXD	output	transmit data
4	GND	—	—
5	GND	—	—
6	RXD	input	receive data
7	DSR	input	data set ready
8	CTS	input	clear to send

The two-color LINK LED associated with the console port provides visual status for the port:

- Green—Link is established
- Amber—Administrative disabled
- Off—No link is detected

Ethernet Management Port

The Ethernet management port supports 10/100/1000BASE-T Ethernet. It can autonegotiate to operate at any line speed (10, 100, 1000 Mbps); full and half duplex modes for 10 and 100 Mbps line speed, and only full duplex at 1000 Mbps. The Ethernet management port has an RJ-45 connector with an associated Link Status LED. [Table B-15](#) lists the 10/100BASE-T port pinouts.

Table B-15 10/100/1000BASE-T Ethernet Management Port Pinout

Pin	Signal	Direction	Description
1	RXDP	input	receive data
2	RXDN	input	receive data
3	TXDP	output	transmit data
4	unused	—	—
5	unused	—	—
6	TXDN	output	transmit data
7	unused	—	—
8	unused	—	—

The two-color LINK LED associated with the Ethernet management port provides visual status for the port:

- Green—Link is established.
- Amber—Administrative disabled.
- Off—No link is detected.

Cables and Adapters

One cable adapter plug is supplied in the accessory kit for both switches.



Note

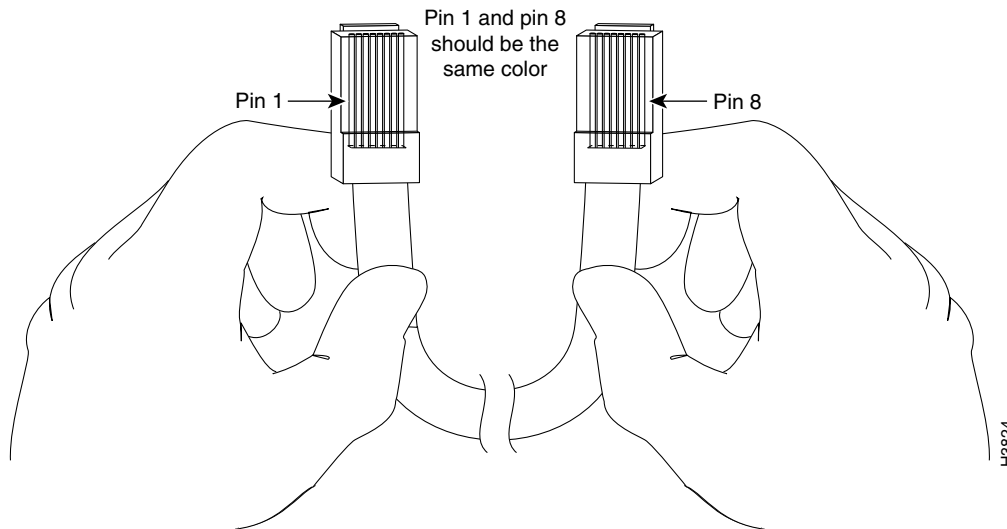
A console cable is not provided in the accessory kit. It can be ordered as an option.

Rollover Cable

You can use an optional RJ-45 rollover cable and the supplied RJ-45/DSUB F/F adapter to connect the chassis console port to a computer running terminal emulation software. [Table C-2](#) lists the pinouts for the console port, the RJ-45 rollover cable, and the RJ-45/DSUB F/F adapter.

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

Figure B-5 Identifying a Rollover Cable



Rollover Cable RJ-45 to DB-9 Adapter (For Connecting to a PC)

Use an RJ-45-to-RJ-45 rollover cable and the RJ-45-to-DB-9 female DTE adapter (labeled Terminal) to connect the console port to a PC running terminal emulation software. [Table B-16](#) lists the pinouts for the asynchronous serial console port, the RJ-45-to-RJ-45 rollover cable, and the RJ-45-to-DB-9 female DTE adapter.

Table B-16 Port Mode 1 Signaling and Pinouts (DB-9 Adapter)

Console Port	RJ-45-to-RJ-45 Rollover Cable		RJ-45-to-DB-9 Terminal Adapter	Console Device
	RJ-45 Pin	RJ-45 Pin	DB-9 Pin	Signal
RTS	1 ¹	8	8	CTS
DTR	2	7	6	DSR
TxD	3	6	2	RxD
GND	4	5	5	GND
GND	5	4	5	GND
RxD	6	3	3	TxD
DSR	7	2	4	DTR
CTS	8 ¹	1	7	RTS

1. Pin 1 is connected internally to Pin 8.

