Connecting Gigabit Ethernet High-Speed WAN Interface Cards

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Overview

This document describes the Cisco Gigabit Ethernet enhanced high-speed WAN interface card (EHWIC) and how to connect a Cisco Gigabit Ethernet EHWIC to the network. This document contains the following sections:

For an overview of installing internal modules in Cisco integrated services routers (ISR) see *Cisco Interface Cards for Cisco Access Routers*.

Cisco Gigabit Ethernet Enhanced High-Speed WAN Interface Cards

The Cisco Gigabit Ethernet WAN EHWIC (EHWIC-1GE-SFP-CU) is an enhanced high-speed interface card providing copper and optical Gigabit Ethernet ports and connectivity of T1/E1 and T3/E3 over copper for Cisco ISR.

The Cisco Gigabit Ethernet enhanced high-speed WAN interface card provides copper and optical Gigabit Ethernet connectivity through a dual-purpose uplink (DPU).

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Supported Platforms

The EHWIC-1GE-SFP-CU interface card supports the following Cisco ISRs:

- Cisco 1921 ISR
- Cisco 1941 ISR
- Cisco 2901 ISR
- Cisco 2911 ISR
- Cisco 2921 ISR
- Cisco 2951 ISR
- Cisco 3925 ISR
- Cisco 3925E ISR
- Cisco 3945 ISR
- Cisco 3945E ISR

Dual-Purpose Uplink Small Form-Factor Pluggable Module

This section describes DPU small form-factor pluggable modules (SFPs).

For installation instructions to install SFPs in EHWIC-1GE-SFP-CU interface cards, see the *Cisco 3900 Series and Cisco 2900 Series Hardware Installation Guide*.

Note SFPs can be installed or removed without powering down the router and interface card.

Note The Cisco Gigabit Ethernet EHWIC itself is not hot-swappable. Removal or insertion of the Cisco Gigabit Ethernet EHWIC requires powering down the router.

Warning **Warning To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the Gigabit Ethernet T1/E1 or T3/E3 interface ports only to intra-building or unexposed wiring or cable. The intrabuilding cable must be shielded and the shield must be grounded at both ends. The intra-building port(s) of the equipment or subassembly must not be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 4) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.** Statement 7003

The Cisco Gigabit Ethernet EHWIC supports the SFPs shown in Table 1.

Table 1 SFPs Supported on the Cisco Gigabit Ethernet EHWIC (EHWIC-1GE-SFP-CU)

GE SFP Transceiver Type	Cisco Part Number	Wavelength	Maximum Distance
1000BASE-T (copper)	GLC-T=	—	100 m
1000BASE-SX	GLC-SX-MM=	850 nm	500 m

Table 1 SFPs Supported on the Cisco Gigabit Ethernet EHWIC (EHWIC-1GE-SFP-CU)

GE SFP Transceiver Type	Cisco Part Number	Wavelength	Maximum Distance
1000BASE-LX/LH	GLC-LH-SM=	1310 nm	10 km
1000BASE-ZX	GLC-ZX-SM=	1550 nm	70 km
1000BASE-BX-D	GLC-BX-D-SM=	1490 nm	10 km
1000BASE-BX-U	GLC-BX-U-SM=	1310 nm	10 km
1000BASE-CWDM	CWDM-SFP-1470=	1470 nm	100 km
	CWDM-SFP-1490=	1490 nm	
	CWDM-SFP-1510=	1510 nm	
	CWDM-SFP-1530=	1530 nm	
	CWDM-SFP-1550=	1550 nm	
	CWDM-SFP-1570=	1570 nm	
	CWDM-SFP-1590=	1590 nm	
	CWDM-SFP-1610=	1610 nm	

Table 1 SFPs Supported on the Cisco Gigabit Ethernet EHWIC (EHWIC-1GE-SFP-CU)

GE SFP Transceiver Type	Cisco Part Number	Wavelength	Maximum Distance
1000BASE-DWDM	DWDM-SFP-6061=	6061 nm	100 km
	DWDM-SFP-5979=	5979 nm	
	DWDM-SFP-5898=	5898 nm	
	DWDM-SFP-5817=	5817 nm	
	DWDM-SFP-5655=	5655 nm	
	DWDM-SFP-5575=	5575 nm	
	DWDM-SFP-5494=	5494 nm	
	DWDM-SFP-5413=	5413 nm	
	DWDM-SFP-5252=	5252 nm	
	DWDM-SFP-5172=	5172 nm	
	DWDM-SFP-5092=	5092 nm	
	DWDM-SFP-5012=	5012 nm	
	DWDM-SFP-4851=	4851 nm	
	DWDM-SFP-4772=	4772 nm	
	DWDM-SFP-4692=	4692 nm	
	DWDM-SFP-4612=	4612 nm	
	DWDM-SFP-4453=	4453 nm	
	DWDM-SFP-4373=	4373 nm	
	DWDM-SFP-4294=	4294 nm	
	DWDM-SFP-4214=	4214 nm	
	DWDM-SFP-4056=	4056 nm	
	DWDM-SFP-3977=	3977 nm	
	DWDM-SFP-3898=	3898 nm	
	DWDM-SFP-3819=	3819 nm	
	DWDM-SFP-3661=	3661 nm	
	DWDM-SFP-3582=	3582 nm	
	DWDM-SFP-3504=	3504 nm	
	DWDM-SFP-3425=	3425 nm	
	DWDM-SFP-3268=	3268 nm	
	DWDM-SFP-3190=	3190 nm	
	DWDM-SFP-3112=	3112 nm	
	DWDM-SFP-3033=	3033 nm	
1000BASE-PX20-U			

When switching from one type of SFP to another, connection problems, including connection failure, may result. Use the **show controller** command at the Cisco IOS CLI to determine whether you are using an SFP certified by Cisco.

Different SFPs have different cabling requirements; see *Cisco 3900 Series and Cisco 2900 Series Hardware Installation Guide* for more information on SFP cabling.

Laser Safety Guidelines

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 **Because invisible laser radiation may be emitted from the aperture of the port when no fiber cable is connected, avoid exposure to laser radiation and do not stare into open apertures.** Statement 125

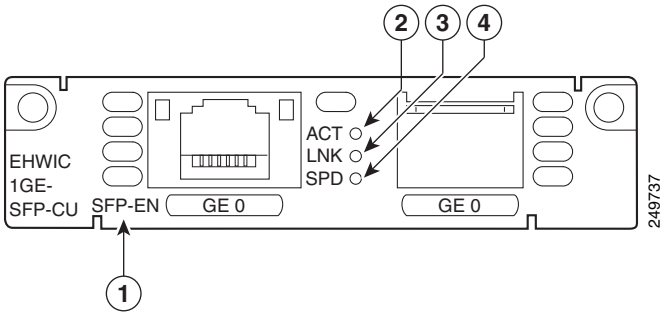
Warning **Ultimate disposal of this product should be handled according to all national laws and regulations.** Statement 1040

Cisco Gigabit Ethernet High-Speed WAN Interface Card LEDs

The Cisco Gigabit Ethernet EHWIC uses LEDs to indicate card status and activity. (See Figure 1.)

Note ACT LED, LNK LED, and SPD LED are common LEDs for SFP and RJ45 media.

Figure 1 Cisco Gigabit Ethernet Enhanced High-Speed WAN Interface Card Faceplate (EHWIC-1GE-SFP-CU)



1	SFP EN LED, which shows connectivity to the router.	**2**	ACT LED, which shows TX/RX activity.
3	LNK LED, which shows link status.	**4**	SPD LED, which shows transmission speed.

Note From Cisco IOS Release 15.3(2)T onwards, Cisco recognizes both Cisco-certified SFPs and third-party SFPs on the Cisco Gigabit Ethernet enhanced high-speed WAN interface card (EHWIC). However, Cisco does not provide any kind of support for the third-party SFPs because they are not validated by Cisco.

Table 2 LED Indicators

LED	Color	Description
SFP EN	Off	Not present.
	Green	Present and enabled.
	Amber	Present with failure.
ACT	Solid or blinking green	Blinks proportional to valid Ethernet traffic.
	Off	No packet transfers are occurring.
LNK	Green	Solid green indicates the Ethernet port has a link partner.
SPD	Off	No link.
	Green	**Note** Blink indicates port speed.
	blinking	1 blink before pause—10 Mbps link speed. 2 blinks before pause—100 Mbps link speed. 3 blinks before pause—1000 Mbps link speed.

Cabling for Small Form-Factor Pluggable Modules

Cisco Gigabit Ethernet EHWICs connect to the network through various supported small form-factor pluggable modules (SFPs). Cabling requirements vary by SFP.

For information on cabling requirements for various SFPs supported by the Cisco Gigabit Ethernet EHWIC. (See Table 3.)

Note For information on installing SFP modules, see *Cisco SFP and SFP+ Transceiver Module Installation Notes*.

Warning **Class 1 laser product.** Statement 1008

Warning **Because invisible radiation may be emitted from the aperture of the port when no fiber cable is connected, avoid exposure to radiation and do not stare into open apertures.** Statement 125

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 **Class I (CDRH) and Class 1M (IEC) laser products.**. Statement 1055

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

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.**

T1 SFP Statement 1044

Table 3 Cabling Requirements for Gigabit Ethernet Small Form-Factor Pluggable Modules

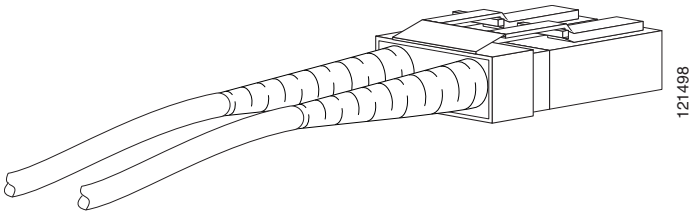
GE SFP Transceiver Type	Cisco Part Number	Maximum Distance	Cabling Required	Connector Type
1000BASE-T	GLC-T=	100 m	Category 5, 5e, 6	RJ-45
1000BASE-SX	GLC-SX-MM=	300 m	62.5/125 micrometer MMF[1]	Dual LC connector
		500 m	50/125 micrometer MMF	
1000BASE-LX/LH	GLC-LH-SM=	550 m	50/125 micrometer or 62.5/125 micrometer MMF	Dual LC connector
		10 km	9/125 micrometer SMF[2]	
1000BASE-ZX	GLC-ZX-SM=	80 km	9/125 micrometer SMF	Dual LC connector
1000BASE-BX-D	GLC-BX-D-SM=	10 km	9/125 micrometer SMF	Single LC connector
1000BASE-BX-U	GLC-BX-U-SM=	10 km	9/125 micrometer SMF	Single LC connector
1000BASE-CWDM[3]	CWDM-SFP-1470= CWDM-SFP-1490= CWDM-SFP-1510= CWDM-SFP-1530= CWDM-SFP-1550= CWDM-SFP-1590= CWDM-SFP-1610=	100 km	9/125 micrometer SMF	LC connector **Note** To view the LC connector, see Figure 2.

Table 3 Cabling Requirements for Gigabit Ethernet Small Form-Factor Pluggable Modules

GE SFP Transceiver Type	Cisco Part Number	Maximum Distance	Cabling Required	Connector Type
1000BASE-DWDM[4]	DWDM-SFP-6061= DWDM-SFP-5979= DWDM-SFP-5898= DWDM-SFP-5817= DWDM-SFP-5655= DWDM-SFP-5575= DWDM-SFP-5494= DWDM-SFP-5413= DWDM-SFP-5252= DWDM-SFP-5172= DWDM-SFP-5092= DWDM-SFP-5012= DWDM-SFP-4851= DWDM-SFP-4272= DWDM-SFP-4692= DWDM-SFP-4612= DWDM-SFP-4453= DWDM-SFP-4373= DWDM-SFP-4294= DWDM-SFP-4214= DWDM-SFP-4056= DWDM-SFP-3977= DWDM-SFP-3898= DWDM-SFP-3819= DWDM-SFP-3661= DWDM-SFP-3582= DWDM-SFP-3504= DWDM-SFP-3425= DWDM-SFP-3268= DWDM-SFP-3190= DWDM-SFP-3112= DWDM-SFP-3033=	100 km	9/125 micrometer SMF	LC connector **Note** To view the LC connector, see Figure 2.
1000BASE-MiRIC-E1/T1				
1000BASE-MiRIC-E3/T3				
1000BASE-PX20-U				

1. MMF = multimode fiber.
2. SMF = singlemode fiber.
3. To view the CWDM data sheet, see http://www.cisco.com/en/US/prod/collateral/modules/ps5455/ps6575/product_data_sheet09186a00801a557c_ps4999_Products_Data_Sheet.html
4. To view the DWDM data sheet, see http://www.cisco.com/en/US/prod/collateral/modules/ps5455/ps6576/product_data_sheet0900aecd80582763.html

Figure 2 LC Connector



Note Coarse wavelength-division multiplexing (CWDM) SFP transceivers are color-coded based on wavelength: gray (1470), violet (1490), blue (1510), green (1530), yellow (1550), orange (1570), red (1590), and brown (1610).

Connecting Cisco Gigabit Ethernet Enhanced High-Speed WAN Interface Cards to the Network

This section describes how to properly connect to SFPs. For information on how to install SFPs, see *Cisco 3900 Series and Cisco 2900 Series Hardware Installation Guide*.

To connect the Cisco Gigabit Ethernet EHWIC to the network, perform the following steps:

Step 1 Confirm successful insertion of the SFP.

Warning **Because invisible laser radiation may be emitted from the aperture of the port when no fiber cable is connected, avoid exposure to laser radiation and do not stare into open apertures.** Statement 125

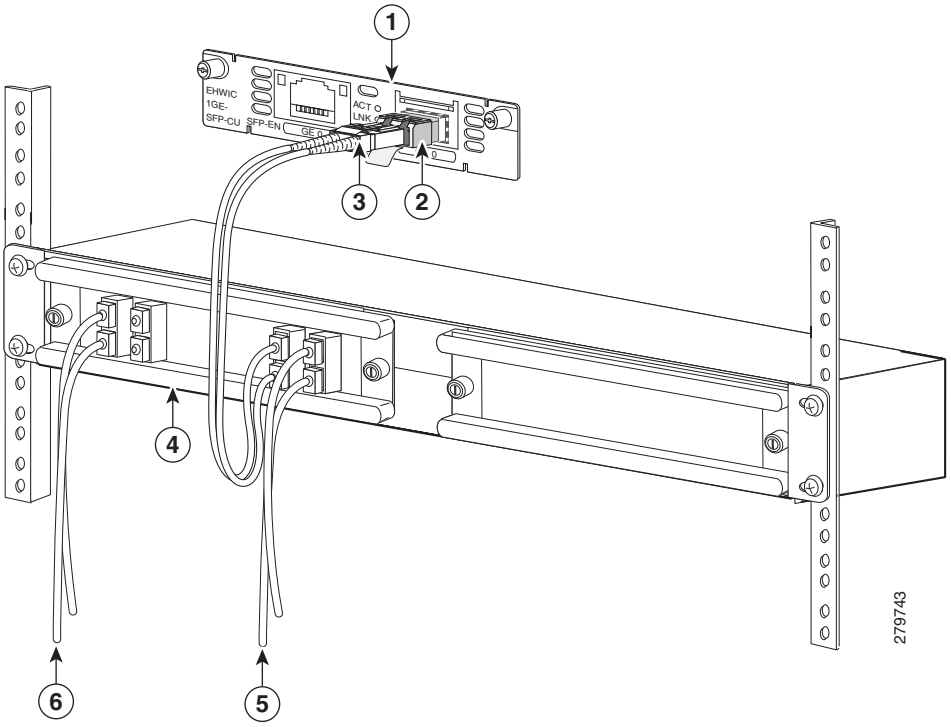
Step 2 Remove optical port plugs from the installed SFP.

Step 3 Use the appropriate cable (See Table 3.) to connect to the installed SFP.

Note For short distances or loopbacks, network installations using 1000BASE-CWDM and 1000BASE-ZX SFPs may require 15-dBm attenuators to avoid over-powering the connection. Calculate the power budget for the connection to determine which attenuator to use.

Step 4 For network installations that use 1000BASE-CWDM SFPs, connect the SFP to a Cisco CWDM optical add-drop multiplexing (OADM) interface card. (See Figure 3.) For information on the Cisco CWDM OADM, see *Installation Note for the Cisco CWDM Passive Optical System*.

Figure 3 Using a Cisco CWDM OADM Card to Connect the Cisco Gigabit Ethernet High-Speed WAN Interface Card to the Network



1	EHWIC-1GE-SFP-CU	**2**	CWDM SFP (partially installed)
3	LC connector	**4**	Dual single-channel OADM module
5	To network	**6**	To network

Step 5 Connect the other end of the appropriate cable (See Table 3.) to your network.

Step 6 Continue router startup and configuration tasks.

Related Documentation

Related documentation is available on Cisco.com.

- *Cisco 3900 Series and Cisco 2900 Series Hardware Installation Guide*
- *Troubleshooting Cisco 3900 Series, 2900 Series, and 1900 Series ISRs*
- *Regulatory Compliance and Safety Information for Cisco 3900 Series Integrated Services Routers*
- *Cisco 3900 Series, 2900 Series, and 1900 Series Software Configuration Guide*

Obtaining Documentation, Support, and Security Guidelines

For information on obtaining documentation, support, documentation feedback, security guidelines, and recommended aliases and general Cisco documents, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html