

Cisco Small Form-Factor Pluggable Gigabit Interface Converter

The Cisco® industry-standard Small Form-factor Pluggable (SFP) Gigabit Interface Converter is a hot-swappable input/output device that plugs into a Gigabit Ethernet port or slot, linking the port with the network. SFPs can be used and interchanged on a wide variety of Cisco products and can be intermixed in combinations of 1000BASE-SX, 1000BASE-LX/LH, or 1000BASE-ZX on a port-by-port basis.

As additional capabilities are developed, these modules make it easy to upgrade to the latest interface technology, maximizing investment protection. SFP shown in Figure 1.

Figure 1

Cisco 1000BASE-SX, 1000BASE-LX/LH, and 1000BASE-ZX SFPs



Cisco 1000BASE-SX SFP

The GLC-SX-MM, 1000BASE-SX SFP operates on ordinary multimode fiber optic link spans of up to 550 meters in length.

Cisco 1000BASE-LX/LH SFP

The GLC-LH-SM, 1000BASE-LX/LH SFP operates on ordinary single-mode fiber optic link spans of up to 10,000 meters in length.

Cisco 1000BASE-ZX SFP

The GLC-ZX-SM, 1000BASE-ZX SFP operates on ordinary single-mode fiber optic link spans of up to 70 kilometers (km) in length. Link spans of up to 100 km are possible using premium single-mode fiber or dispersion-shifted single-mode fiber. The SFP provides an optical link budget of 23 dB—the precise link span length will depend on multiple factors such as fiber quality, number of splices, and connectors.



- When shorter distances of single-mode fiber are used, it may be necessary to insert an inline optical attenuator in the link, to avoid overloading the receiver. A 5-decibel (dB) or 10-dB inline optical attenuator should be inserted between the fiber optic cable plant and the receiving port on the GLC-ZX-SM at each end of the link whenever the fiber optic cable span is less than 25 km.

Technical Specifications

Platform Support

The Cisco SFPs are supported across a variety of Cisco switches, routers, and optical transport devices. For more details see the document *Compatibility Matrix for Small Form-Factor Pluggable Modules* at:

<http://www.cisco.com/univercd/cc/td/doc/product/lan/cat2950/sfpmod/sfpcomp.pdf>

Connectors and Cabling

Connectors: Dual LC connector

Table 1 provides cabling specifications for the SFPs that you install in the Gigabit Ethernet port. Note that all SFP ports have LC-type connectors, and the minimum cable distance for all SFPs listed (multimode fiber [MMF] and single-mode fiber [SMF]) is 6.5 feet (2 m).

Table 1 SFP Port Cabling Specifications

SFP	Wavelength (nm)	Fiber Type	CoreSize (micron)	Modal Bandwidth (MHz/km)	Cable Distance
Cisco 1000BASE-SX	850	MMF	62.5	160	220 m (722 ft)
			62.5	200	275 m (902 ft)
			50.0	400	500 m (1640 ft)
			50.0	500	550 m (1804 ft)
Cisco 1000BASE-LX/LH	1300	MMF ¹	62.5	500	550 m (1804 ft)
			50.0	400	550 m (1804 ft)
		SMF	50.0	500	550 m (1804 ft)
			9/10	—	10 km (32,810 ft)
Cisco 1000BASE-ZX	1550	SMF	9/10	—	43.4 to 62 miles (70 to 100 km) ²

1. Mode-conditioning patch cord is required. Using an ordinary patch cord with MMF, 1000BASE-LX/LH SFPs, and a short link distance (10s of meters) can cause transceiver saturation resulting in an elevated bit error rate (BER). In addition, when using the LX/LH SFP with 62.5-micron diameter MMF, you must install a mode-conditioning patch cord between the SFP and the MMF cable on both the transmit and receive ends of the link. The mode-conditioning patch cord is required for link distances greater than 984 ft (300m).

2. 1000BASE-ZX SFP can reach up to 100 km by using dispersion-shifted SMF or low attenuation SMF; the distance depends on fiber quality, number of splices, and connectors.

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



Standards

Compatible with standard as specified in IEEE 802.3z.

Table 2 Fiber Loss Budgets for 1000BASE-SX, 1000BASE-LX, and 1000BASE-ZX

SFP	Type	Transmit (dBm)		Receive (dBm)	
		Max	Min	Max	Min
GLC-SX-MM	1000BASE-SX	-4	-9.5	0	-17
GLC-LH-SM	1000BASE-LX/LH	-3	-9.5	-3	-19
GLC-ZX-SM	1000BASE-ZX	5	0	-3	-23 ¹

1. The GLC-ZX-SM 1000BASE-ZX SFP provides a minimum optical power budget of 23 dB. To determine the supported link distance you should measure your cable plant with an optical loss test set to verify that the optical loss of the cable plant (including connectors and splices) is less than or equal to this figure. The optical loss measurement must be performed with a 1550-nanometer (nm) light source.

Dimensions

Dimensions (H x W x D): 8.5 mm x 13.4 mm x 56.5 mm

Environmental Conditions and Power Requirements

Operating temperature range: 32 to 122°F (0 to 50°C)

Storage temperature range: -40 to 185°F (-40 to 85°C)

Table 3 Electrical Power Interface

Parameter	Symbol	Minimum	Typical	Maximum	Units
Supply Current	I _S	—	200	300	mA
Surge Current	I _{SURGE}	—	—	30	mA
Input Voltage	V _{CC}	3.1	3.3	3.5	V

Warranty

- Standard warranty: 90 days
- Extended warranty (option): Available under a Cisco SMARTnet™ support contract for the Cisco switch or router chassis

Ordering Information

Table 4 Ordering Cisco SFP

SFP	Product Number
Short wavelength (1000BASE-SX)	GLC-SX-MM
Long wavelength/long haul (1000BASE-LX/LH)	GLC-LH-SM
Extended distance (1000BASE-ZX)	GLC-ZX-SM

Regulatory and Standards Compliance

Safety

- Laser Class I 21CFR1040
 - United States and Canada: 800 553-NETS (6387)
 - Europe: 32 2 778 4242
 - Australia: 612 9935 4107
 - Other: 408 526-7209
 - <http://www.cisco.com/>



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(0301R) KC/LW4172 02/03