

Cisco 10000 Series Gigabit Ethernet Half-Height Line Card

Figure 1. Cisco 10000 Series Gigabit Ethernet Half-Height Line Card



In order to continue to meet customers' increasing needs for modularity and density, Cisco® introduces a new Cisco 10000 Series Gigabit Ethernet Line Card that provides customers with double the Gigabit Ethernet density in a Cisco 10000 Series. Benefits of the new line card include the following:

- Provides maximum modularity for flexible deployment options
- Doubles the Gigabit Ethernet density of the Cisco 10000 Series to maximize slot utilization and decrease system cost per port
- Supports modular Gigabit Ethernet optics for deployment flexibility
- Supports standards-based Gigabit Ethernet implementation for compatibility and interoperability

Table 1 gives the features and benefits of the Cisco 10000 Series Gigabit Ethernet Half-Height Line Card.

Table 1. Features and Benefits of Cisco 10000 Series Gigabit Ethernet Half-Height Line Card

Features	Benefits
Provides maximum modularity to enable flexible deployment options	With the implementation of a half-height line card, the Cisco 10000 Series doubles its modularity as well as its density for LAN interfaces.
Doubles the Gigabit Ethernet density of the Cisco 10000 Series to maximize slot utilization and decrease system cost per port	Doubling its Gigabit Ethernet density enables customers to insert dual Gigabit Ethernet uplinks without taking up an additional line card slot.
Supports modular Gigabit Ethernet optics for deployment flexibility	The Cisco 10000 Series Gigabit Ethernet Half-Height Module supports modular small form-factor pluggable (SFP) transceivers to ensure that customers have maximum flexibility in configuring physical network interfaces. The 1000BASE-SX and 1000BASE-LX SFP transceivers available in these modules are hot-swappable, providing a quick and easy method of changing physical interfaces.
Supports standards-based Gigabit Ethernet implementation for compatibility and interoperability	The Cisco 10000 Series Gigabit Ethernet Half-Height Module is based on the IEEE 802.3z industry standard—ensuring interoperability and compatibility with other standards-based Gigabit Ethernet products in the customer's network. Gigabit Ethernet standards compliance along with Cisco manageability and standard Cisco IOS Software ensures high-speed interoperability with existing Gigabit Ethernet products in the Cisco 12000 Series and Cisco Catalyst switches.

Hardware Features

- Single-port Gigabit Ethernet line card running at 1 Gbps, full duplex
- Support for jumbo frames (up to 9180 bytes in size)
- Support for online insertion and removal (OIR)
- Functionality in any Cisco 10000 Series interface card slot with a Cisco 10000 Series Carrier (product number ESR-HH-CARRIER)
- Hot-swappable SFP optical modules (SFP transceivers)
- 16-MB receive packet memory
- Error-Correction Code (ECC) protection for the processor local memory and packet memory
- Support for the following SFP transceivers:
 - 1000BASE-SX multimode, compliant with IEEE 802.3z specifications
 - 1000BASE-LX and LH compliant with IEEE 802.3z specifications
 - 1000BASE-ZX compliant with IEEE 802.3z specifications
 - 1000BASE-T compliant with IEEE 802.3z specifications
- 256 pairs of packet and byte performance counters based on the source address of received frames
- 256 pairs of packet and byte performance counters based on the destination address of transmitted frames [ECS1]

Ethernet Features

- Media Access Control (MAC) with full-duplex operation
- Hardware address filtering on received frames of up to 4096 address entries
- 802.3x flow control
- Ethernet encapsulation formats:
 - Ethernet V2

- 802.2 Service Advertising Protocol (SAP)
- 802.2 Subnetwork Access Protocol (SNAP)

Software Features

- Autonegotiation
- 64-bit counters
- 802.1Q virtual LANs (VLANs)
- Hot Standby Router Protocol (HSRP)

Table 2 describes the SFP transceiver specifications.

Table 2. Gigabit Ethernet SFP Transceivers

SFP Transceiver	Wavelength (nm)	Fiber Type	Core Size (microns)	Modal Bandwidth (MHz/km)	Cable Distance
1000BASE-SX SFP-GE-S= (previously GLC-SX-MM=)	850	Multimode fiber (MMF)	62.5 62.5 50.0 50.0	160 200 400 500	722 ft (220m) 902 ft (275m) 1,640 ft (500m) 1,804 ft (550m)
1000BASE-LX/LH SFP-GE-L= (previously GLC-LH-SM=)	1300	MMF ¹ Single-mode fiber (SMF)	62.5 50.0 50.0 8 to 10	500 400 500 –	1,804 ft (550m) 1,804 ft (550m) 1,804 ft (550m) 32,808 ft (10 km)
1000BASE-ZX GLC-ZX-SM=	1550	Single-mode fiber (SMF)	9, 10	–	43.4 to 62 miles (70 to 100 km) ²
1000BASE-T SFP-GE-T=	–	–	–	–	328 ft (100m)

Environmental Conditions

- Storage temperature: –38 to 150°F (–40 to 70°C)
- Operating temperature, nominal: 41 to 104°F (5 to 40°C)
- Operating temperature, short term: 23 to 131°F (–5 to 55°C)
- Storage relative humidity: 5 to 95% relative humidity (RH)
- Operating humidity, nominal: 5 to 85% RH
- Operating humidity, short term: 5 to 90% RH
- Operating altitude: –60 to 4000m

Physical Specifications

- Height: 7.8 in. (19.8 cm)
- Width: 1.3 in. (3.3 cm)
- Depth: 11 in. (27.9 cm)

¹ A mode-conditioning patch cord (part number CAB-GELX-625 or equivalent) is required. If you use an ordinary patch cord with MMF, 1000BASE-LX SFPs, and a short link distance (tens of meters), this can cause transceiver saturation, resulting in an elevated bit error rate (BER). In addition, when you use the long-reach 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.

- Weight: 2 lb (0.9 kg)

LEDs

- Link status (green, one per port)
- Transmit activity (green, one per port)
- Receive activity (green, one per port)
- Fail (yellow, one per card)

Network Management

- Network management via
 - Telnet (command-line interface [CLI])
 - Console port (CLI)
 - Simple Network Management Protocol (SNMP)
- Management Information Base II (MIB-II)
- RFC 1213
- RFC 1573

Half-Height Line Card Power Budget

- Unit power: 15.98W

SFP Transceiver Specifications

- 1000BASE-SX transceiver
 - Wavelength: 850 nm
 - Power budget: 7.5 dB
 - Transmit power: -9.5 to 0 dBm
 - Receive power: -17 to 0 dBm
 - Connector: LC
- 1000BASE-LX or LH transceiver
 - Wavelength: 1310 nm
 - Power budget: 7.5 dB (multimode fiber), 8 dB (single mode)
 - Transmit power: -11.5 to -3 dBm (multimode fiber), -11 to -3 dBm (single mode)
 - Receive power: -19 to -3 dBm (multimode and single-mode fiber)
 - Connector: LC
- 1000BASE-ZX transceiver
 - Wavelength: 1550 nm
 - Power budget: 8 dB (single mode)
 - Transmit power: 0 to +5 dBm (single mode)
 - Receive power: -23 to 0 dBm (single-mode fiber)
 - Connector: LC
- 1000BASE-T transceiver
 - Connector: RJ-45

Product Regulatory Approvals

- UL60950/CAN/CSA-C22.2 No. 60950-00, third edition, dated December 1, 2000, with no deviation considered to be less stringent than IEC 60950
- EN60950 with Amendments 1-4, for CE Marking to the LVD directive
- IEC 60950 third edition with Amendments 1-4, including all national/group deviations
- AS/NZS 60950:2000
- AS/NZS 3260-1993 with Amendments 1-4
- ACA TS001-1997

Laser Safety

- 21 CFR 1040, Subchapter J
 - EN60825-1
 - EN60825-2

Product Regulatory Compliance

Electromagnetic Emissions Certification

- AS/NZ 3548:1995 (including Amd I + II) Class B
- EN55022:1998 Class B
- CISPR 22:1997
- EN55022:1994 (including Amd I + II)
- 47 CFR Part 15:2000 (FCC) Class B
- VCCI V-3/01.4 Class 2
- CNS-13438:1997 Class B
- GR1089:1997 (including Rev1: 1999)

Immunity

- EN300386:2000-TNE EMC requirements, product family standard, high priority of service, central office and noncentral office locations
- EN50082-1:1992/1997
- EN50082-2:1995-Generic Immunity Standard, Heavy Industrial
- CISPR24:1997
- EN55024:1998-Generic ITE Immunity Standard
- EN61000-4-2:1995+AMD I + II-ESD, Level 4, 8-kV contact, 15-kV air
- IEC-1000-4-3:1995+AMD 1-Radiated Immunity, 10 V/m
- IEC-1000-4-4:1995-Electrical Fast Transients, Level 4, 4 kV/B
- IEC-1000-4-5:1995+AMD 1-DC Surge Class 3, AC surge Class 4
- EN61000-4-6:1996+AMD 1-RF Conducted Immunity, 10V rms
- EN61000-4-11:1995-Voltage Dips and Sags
- ETS300 132-2:1996+corregendum, Dec. 1996
- GR1089:1997 (including Rev1: 1999)

Network Equipment Building Systems

- Level 3 compliant
- Bellcore SR-3580 Criteria Levels, issued November 1995
- GR1089-Core: Electromagnetic Compatibility & Electrical Safety, issued December 1997
- GR63-Core: Physical Protection Requirements, issued October 1995
- SBC equipment requirements: TP76200 MP and TP76400 MP
- Verizon equipment requirements: SIT.NEBS.TE.NPI.2000.004 Rev. 1

Product System Requirements And Compatibility

Hardware Requirements

- Chassis—The Cisco 10000 Series Gigabit Ethernet Half-Height Line Card is supported in all Cisco 10000 Series chassis.
- Performance routing engines (PREs)—The line card is supported with all PREs available on the Cisco 10000 Series.
- Line cards—The line card is supported with all line cards available on the Cisco 10000 Series as of October 1, 2002.
- Carrier—The Cisco 10000 Series Gigabit Ethernet Half-Height Line Card requires a carrier (part number ESR-HH-CARRIER) for compatibility with the Cisco 10000 Series Chassis. For more information about the carrier, refer to:
http://www.cisco.com/en/US/products/hw/routers/ps133/products_data_sheets_list.html.

Software Requirements

- Initial Cisco IOS Releases—The Cisco 10000 Series Gigabit Ethernet Half-Height Line Card is supported in 12.0(23)S and later Cisco IOS releases for PRE1s and in 12.2(15)BX and later Cisco IOS releases for PRE2s. For the latest Cisco IOS release information, refer to: <http://www.cisco.com/pcgi-bin/front.x/Support/HWSWmatrix/hwswwmatrix.cgi>.

Ordering Information

Visit <http://www.cisco.com/en/US/ordering/index.shtml> to place an order.

Table 3 gives product part numbers for the Cisco 10000 Series Gigabit Ethernet Half-Height Line Card.

Table 3. Part Numbers for Cisco 10000 Series Gigabit Ethernet Half-Height Line Card

Product Number	Product Description
ESR-HH-1GE	1-port Gigabit Ethernet half-height line card
ESR-HH-1GE=	1-port Gigabit Ethernet half-height line card, spare
ESR-HH-CARRIER	Full-length base carrier for half-height line card
ESR-HH-1GE-4PACK=	Four ESR-HH-1GE Upgrade Bundle
ESR-HH-CARRIER=	Full-length base carrier for half-height line card, spare
ESR-HH-COVER	Blank filler for half-height line card
ESR-HH-COVER=	Blank filler for half-height line card, spare
SFP-GE-S	1000BASE-SX pluggable transceiver
SFP-GE-S=	1000BASE-SX pluggable transceiver, spare
SFP-GE-L	1000BASE-LX pluggable transceiver

SFP-GE-S=	1000BASE-LX pluggable transceiver, spare
GLC-ZX-SM	1000BASE-ZX pluggable transceiver
GLC-ZX-SM =	1000BASE-ZX pluggable transceiver, spare
SFP-GE-T	1000BASE-T pluggable transceiver
SFP-GE-T=	1000BASE-T pluggable transceiver, spare

All Cisco 10000 Series half-height line cards require a carrier (product number ESR-HH-CARRIER). Because each carrier holds two half-height line cards, a blank (product number ESR-HH-COVER) is shipped with any carrier with open half-height line card slots.

Cisco recommends that customers who order spare carrier or half-height line cards also order enough blanks to ensure that the configured system has no empty slots.

Migration Program

A Cisco Technology Migration Plan (TMP) has been established for this product.

The Cisco TMP is a sales program that allows customers to trade in Cisco products to receive a trade-in credit toward the purchase of any new Cisco product. The program underscores Cisco's commitment to the customer in terms of end-to-end product solutions as well as emphasizing to the customer Cisco's commitment to provide effective migration options in the face of ever-changing network requirements.

More specifics about this program can be found at <http://www.cisco.com/go/tradein>.

Service and Support

Cisco Systems® offers a wide range of service and support options for its customers. More information on Cisco service and support programs and benefits can be found at <http://www.cisco.com/en/US/support/index.html>.



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