Cisco 10GBASE XENPAK Modules

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Product Overview

The range of Cisco® 10GBASE XENPAK modules offers a wide variety of 10 Gigabit Ethernet connectivity options for data center, enterprise wiring closet, and service provider transport applications (Figure 1).

Figure 1. Cisco 10GBASE XENPAK Modules

Main features of Cisco 10GBASE XENPAK modules include:

- Supports 10GBASE Ethernet
- Hot-swappable input/output device plugs into an Ethernet XENPAK port of a Cisco switch or router to link the port with the network
- Provides flexibility of interface choice
- Supports “pay-as-you-populate” model
- Supports the Cisco quality identification feature that enables a Cisco switch or router to identify whether the module is a Cisco certified and tested XENPAK module
- Interoperable with respective Cisco 10-Gigabit X2, XFP and SFP+ modules on the same link

Cisco offers six modules in this product family:

- **Cisco XENPAK-10GB-CX4:** Supports link lengths of up to 15m on CX4 cable.
- **Cisco XENPAK-10GB-LRM:** Supports link lengths 220m on standard FDDI-grade multimode fiber (MMF). To ensure that specifications are met over FDDI-grade, OM1 and OM2 fibers, the transmitter should be coupled through a mode conditioning patch cord. No mode conditioning patch cord is required for applications over OM3. For additional information on mode conditioning patch cord requirements please see: http://www.cisco.com/en/US/prod/collateral/modules/ps5455/product_bulletin_c25-530836.html.

  The Cisco 10GBASE-LRM Module also supports link lengths of 300m on standard single-mode fiber (SMF, G.652).
- **Cisco XENPAK-10GB-SR:** Supports a link length of 26m on standard FDDI grade MMF. Up to 300m link lengths are possible when using 2000 MHz/km MMF (OM3). Up to 400m link lengths are possible when using 4700 MHz/km MMF (OM4).
- **Cisco XENPAK-10GB-LR+:** Supports a link length of 10 km on standard single-mode fiber (SMF) (G.652).

- **Cisco XENPAK-10GB-ER+:** Supports a link length of up to 40 km on SMF (G.652).
- **Cisco XENPAK-10GB-ZR:** Supports link lengths of up to about 80 km on SMF. This interface is not part of the 10 Gigabyte Ethernet standard but is built according to Cisco optical specifications.

Technical Specifications

Platform Support

Cisco XENPAK modules are supported on Cisco switches and routers. For more details, refer to the 10-Gigabit compatibility matrix: http://www.cisco.com/en/US/docs/interfaces_modules/transceiver_modules/compatibility/matrix/OL_6974.pdf

Connectors and Cabling

Connectors:

- XENPAK-10GB-CX4: InfiniBand 4x connector
- All others: Dual SC/PC connector

Note: Only connections with patch cords with PC or UPC connectors are supported. Patch cords with APC connectors are not supported. All cables and cable assemblies used must be compliant with the standards specified in the standards section.

Table 1 provides cabling specifications for the Cisco XENPAK modules.

Table 1. XENPAK Port Cabling Specifications

Product	Wavelength (nm)	Cable Type	Core Size (micron)	Modal Bandwidth (MHz/km)	Cable Distance*
Cisco XENPAK-10GB-CX4	-	CX4 (copper)	-	-	15m
Cisco XENPAK-10GB-LRM	1310	MMF	62.5 50.0 50.0	500 400 500	220m 100m 220m
		SMF	G.652	-	300m
Cisco XENPAK-10GB-SR	850	MMF	62.5 62.5 50.0 50.0 50.0 50.0	160 (FDDI) 200 (OM1) 400 500 (OM2) 2000 (OM3) 4700 (OM4)	26m 33m 66m 82m 300m 400m
Cisco XENPAK-10GB-LR+	1310	SMF	G.652**	-	10 km
Cisco XENPAK-10GB-ER+ ***	1550	SMF	G.652**	-	40 km****
Cisco XENPAK-10GB-ZR	1550	SMF	Operates on any SMF type	-	80 km

* Minimum cabling distance for optical XENPAK modules (-LX4, -SR, -LR, -ER) is 2m, according to the IEEE 802.3ae standard, and minimum cabling distance for -LRM modules is 0.5m, according to IEEE 802.3aq standard.

** Data based on standard G.652 SMF. Even though dispersion-shifted fiber enables reducing signal dispersion to travel longer distances, the signal attenuation still limits its distance.

*** Requires 5 dB 1550 nm fixed loss attenuator for < 20 km. Attenuator is available as a spare. The part number is WS-X6K-5DB-ATT=.

**** Links longer than 30 km are considered engineered links.

Table 2 shows the main optical characteristics for the Cisco XENPAK modules. The Cisco XENPAK-10GB-CX4 is not an optical module and therefore is not listed in the table.

Table 2. Optical Transmit and Receive Specifications for IEEE 802.3 standard compliant modules

Product	Type	Transmit Power (dBm)		Receive Power (dBm)		Transmit and Receive Wavelength range (nm)	
		Maximum	Minimum	Maximum	Minimum	Transmit	Receive
Cisco XENPAK-10GB-LRM	10GBASE-LRM 1300nm MMF	0.5	-6.5	0.5	-8.4 (in average) and -6.4 (in OMA)**	1260 to 1355	
Cisco XENPAK-10GB-SR	10GBASE-SR 850 nm MMF	-1.2*	-7.3	-1.0	-9.9	840 to 860	
Cisco XENPAK-10GB-LR+**	10GBASE-LR 1310 nm SMF	0.5	-8.2	0.5	-14.4	1260 to 1355	1260 to 1565***
Cisco XENPAK-10GB-ER+	10GBASE-ER 1550 nm SMF	4	-4.7	-1.0	-15.8	1530 to 1565	1260 to 1565***

* The launch power shall be the lesser of the class 1 safety limit or the maximum receive power. Class 1 laser requirements are defined by IEC 60825-1: 2001

** Both average and OMA specifications need to be met simultaneously

*** Even though the receiver can tolerate a wide wavelength range, the specifications are guaranteed for a signal within the transmit wavelength range

Table 3 details optical specifications for the Cisco XENPAK-10GB-ZR modules.

Table 3. XENPAK-10GB-ZR Optical Parameters

Parameter	Symbol	Minimum	Typical	Maximum	Units	Notes and Conditions
Transmitter						
Transmitter wavelength		1530		1565	nm	
Side-mode suppression ratio	SMSR	30			dB	
Transmitter extinction ratio	OMI	9			dB	
Transmitter optical output power	Pout	0		4.0	dBm	Average power coupled into single-mode fiber
Receiver						
Receiver optical input wavelength	in	1530		1565	nm	
Receiver damage threshold				-1	dBm	
Dispersion tolerance		0		1600	ps/nm	
Optical input power	Pin	-24.0		-7.0	dBm	At bit error rate (BER) = 10e -12 with IEEE 802.3 test pattern
Dispersion power penalty at 1600 ps/nm				3	dB	At bit error rate (BER) = 10e-12 with IEEE 802.3 test pattern

Note: Parameters are specified over temperature and at end of life unless otherwise noted. When shorter distances of single-mode fiber are used, an inline optical attenuator must be used to avoid overloading and damaging the receiver.

Dimensions

Dimensions (DxWxH): 4.76” x 1.42” x 0.47” (121 x 36 x 18 mm). Cisco XENPAK modules typically weigh less than 300 g.

Environmental Conditions and Power Requirements

- Operating temperature range is between 0 and 40° C (32 to 104° F); storage temperature range is -40 to 75° C (-40 to 167° F).

- Maximum power consumption per Cisco XENPAK module is 8W.

Warranty

- Standard warranty: 90 days
- Extended warranty (optional): Cisco XENPAK modules can be covered in a Cisco SMARTnet® support contract for the Cisco switch or router chassis

Table 4 provides the ordering information for Cisco XENPAK modules and related cables.

Ordering Information

Table 4. Ordering Cisco XENPAK Modules and Respective Cables

Description	Product Number
XENPAK modules	
Cisco 10GBASE-CX4 XENPAK Module for CX4 cable	XENPAK-10GB-CX4
Cisco 10GBASE-LRM XENPAK Module for MMF	XENPAK-10GB-LRM
Cisco 10GBASE-SR XENPAK Module for MMF	XENPAK-10GB-SR
Cisco 10GBASE-LR XENPAK Module for SMF	XENPAK-10GB-LR+
Cisco 10GBASE-ER XENPAK Module for SMF	XENPAK-10GB-ER+
Cisco 10GBASE-ZR XENPAK Module for SMF	XENPAK-10GB-ZR
Cables	
Mode conditioning patch cable 62.5um, dual SC connectors	CAB-GELX-625=
Mode conditioning patch cable 50um, dual SC connectors	CAB-MCP50-SC=
1 m cable for 10GBase-CX4 module	CAB-INF-28G-1=
5 m cable for 10GBase-CX4 module	CAB-INF-28G-5=
10 m cable for 10GBase-CX4 module	CAB-INF-28G-10=
15 m cable for 10GBase-CX4 module	CAB-INF-26G-15=

Regulatory and Standards Compliance

Standards:

- IEEE 802.3ae (-SR, -LR, -ER)
- IEEE 802.3aq (-LRM)
- IEEE 802.3ak (-CX4)
- XENPAK MSA: INF-8474i
- GR-20-CORE: Generic Requirements for Optical Fiber and Optical Fiber Cable
- GR-326-CORE: Generic Requirements for Single-mode Optical Connectors and Jumper Assemblies
- GR-1435-CORE: Generic Requirements for Multi-Fiber Optical Connectors

Safety:

- Laser Class 1 21CFR-1040 LN#50 7/2001
- Laser Class 1 IEC60825-1

For More Information

For more information about Cisco XENPAK modules, contact your local account representative.