IBM Flex System EN4091 10Gb Ethernet Pass-thru Module

Lenovo Press Product Guide

The IBM Flex System™ EN4091 10Gb Ethernet Pass-thru Module offers easy connectivity of the IBM Flex System Enterprise Chassis to any external network infrastructure. This unmanaged device enables direct Ethernet connectivity of the compute node in the chassis to an external top-of-rack data center switch. This module can function at both 1 Gb and 10 Gb Ethernet speeds. It has fourteen internal 1 Gb or 10 Gb links, and fourteen external 1 Gb or 10 Gb SFP+ uplinks.

The following figure shows the IBM Flex System EN4091 10Gb Ethernet Pass-thru Module.

Figure 1. IBM Flex System EN4091 10Gb Ethernet Pass-thru Module

Did you know?

The IBM Flex System EN4091 10Gb Ethernet Pass-thru Module provides 14 internal and 14 external 10 Gb Ethernet ports, and it supports 1 Gb and 10 Gb Ethernet signaling for Converged Enhanced Ethernet (CEE), Fibre Channel over Ethernet (FCoE), and other Ethernet-based transport protocols.

IBM Flex System, a new category of computing and the next generation of Smarter Computing, offers intelligent workload deployment and management for maximum business agility. This chassis delivers high-speed performance complete with integrated servers, storage, and networking for multi-chassis management in data center compute environments. Furthermore, its flexible design can meet the needs of varying workloads with independently scalable IT resource pools for higher utilization and lower cost per workload. While increased security and resiliency protect vital information and promote maximum uptime, the integrated and easy-to-use management system reduces setup time and complexity, providing a quicker path to return on investment (ROI).

Part number information

The IBM Flex System EN4091 10Gb Ethernet Pass-thru Module has 14 internal and 14 external ports that can operate at 1 Gb or 10 Gb Ethernet speeds. The following table shows the part numbers for ordering the Pass-thru Module.

Table 1. Part numbers and feature codes for ordering

Description	Part number	Feature codes*
IBM Flex System EN4091 10Gb Ethernet Pass-thru Module	88Y6043	A1QV / 3700

* The first feature code listed is for configurations ordered through the IBM® System x® sales channel. The second feature code is for configurations ordered through the IBM Power Systems™ sales channel.

The part number for the IBM Flex System EN4091 10Gb Ethernet Pass-thru Module, 88Y6043, includes the following items:

- One IBM Flex System EN4091 10Gb Ethernet Pass-thru Module
- *IBM Important Notices* flyer and Warranty Flyer
- Documentation CD-ROM

Note: QSFP and SFP+ transceivers or cables are not included with the module.

Benefits

The IBM Flex System EN4091 10Gb Ethernet Pass-thru Module is particularly suited for the following clients:

- Clients who require direct connectivity of the compute nodes in the chassis to an external TOR data center switch
- Clients who are implementing a converged environment
- Clients who want to reduce total cost of ownership (TCO) and improve performance, while maintaining high levels of availability and security
- Clients who want to avoid oversubscription, which can result in congestion and loss of performance

Features and specifications

The IBM Flex System EN4091 10Gb Ethernet Pass-thru Module has the following features and specifications:

- Internal ports: Fourteen internal full-duplex Ethernet ports that can operate at 1 Gb or 10 Gb speeds.

- External ports: Fourteen ports for 1 Gb or 10 Gb Ethernet SFP+ transceivers (support for 1000BASE-SX, 1000BASE-LX, 1000BASE-T, 10GBASE-SR, or 10GBASE-LR) or SFP+ copper direct-attach cables (DAC). SFP+ modules and DAC cables are not included and must be purchased separately.

- An unmanaged device that has no internal Ethernet management port, but is able to provide its vital product data (VPD) to the secure management network in the Chassis Management Module.

Supported transceivers and cables

The following table lists the supported cables and transceivers.

Table 2. Supported transceivers and DAC cables

Part number	Feature code*	Description
SFP transceivers - 1 GbE		
81Y1618	3268 / EB29	IBM SFP RJ-45 Transceiver (does not support 10/100 Mbps)
00FE333	A5DL / EB29	IBM SFP 1000Base-T (RJ-45) Transceiver (does not support 10/100 Mbps)
81Y1622	3269 / EB2A	IBM SFP SX Transceiver
90Y9424	A1PN / None	IBM SFP LX Transceiver
SFP+ transceivers - 10 GbE		
46C3447	5053 / EB28	IBM SFP+ SR Transceiver
90Y9412	A1PM / ECB9	IBM SFP+ LR Transceiver
44W4408	4942 / 3382	10GbE 850 nm Fiber SFP+ Transceiver (SR)
SFP+ Direct-attach copper (DAC) cables - 10 GbE		
81Y8295	A18M / EN01	1m 10GE Twinax Act Copper SFP+
81Y8296	A18N / EN02	3m 10GE Twinax Act Copper SFP+
81Y8297	A18P / EN03	5m 10GE Twinax Act Copper SFP+
95Y0323	A25A / None	1m IBM Active DAC SFP+ Cable
95Y0326	A25B / None	3m IBM Active DAC SFP+ Cable
95Y0329	A25C / None	5m IBM Active DAC SFP+ Cable
90Y9427**	A1PH / None	1m IBM Passive DAC SFP+
90Y9430**	A1PJ / None	3m IBM Passive DAC SFP+
90Y9433**	A1PK / ECB6	5m IBM Passive DAC SFP+

* The first feature code listed is for configurations ordered through System x sales channels. The second feature code is for configurations ordered through the Power Systems sales channel.
** The EN4091 10Gb Pass-Thru supports Passive DAC cables as of firmware 2.0.2.0

With the flexibility of the IBM Flex System EN4091 10Gb Ethernet Pass-thru Module, clients can take advantage of the technologies that they require for multiple environments:

- For 1 GbE links, you can use SFP transceivers plus RJ-45 cables or LC-to-LC fiber cables, depending on the transceiver.
- For 10 GbE, you can use direct-attached copper (DAC, also known as Twinax) cables, which come in lengths between 1 m and 5 m. These DAC cables are a cost-effective and low-power alternative to transceivers, and are ideal for all 10 Gb Ethernet connectivity to the Top-of-the-Rack (TOR) switches. For longer distances, you can use SFP+ transceivers (SR or LR) plus LC-to-LC fiber optic cables.

Supported chassis and adapter cards

The pass-thru modules are installed in I/O bays in the rear of the IBM Flex System Enterprise Chassis, as shown in the following figure. I/O modules are normally installed in pairs because I/O adapter cards installed in the compute nodes route to two I/O bays for redundancy and performance.

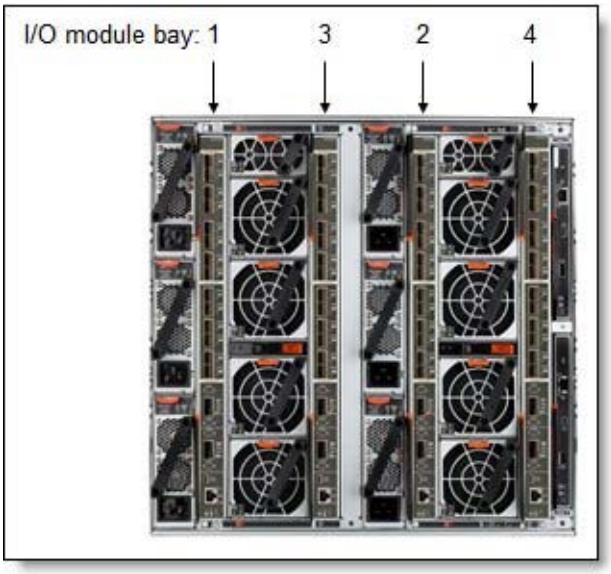

Figure 2. Location of the I/O module bays in the IBM Flex System Enterprise Chassis

The connections between the adapters installed in the compute nodes to the switch bays in the chassis are shown in the following figure. The figure shows both half-wide servers, such as the x240 with two adapters, and full-wide servers, such as the x440 with four adapters.

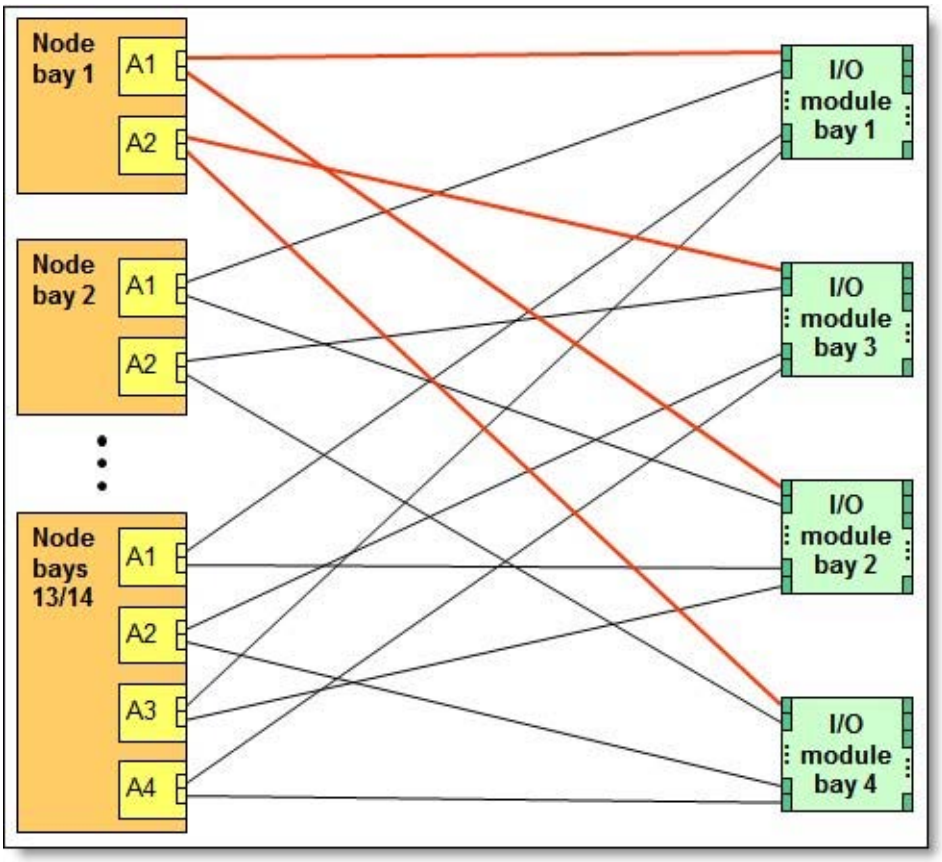

Figure 3. Logical layout of the interconnects between I/O adapters and EN4091 modules

The EN4091 10Gb Ethernet Pass-thru Module can be installed in bays 1, 2, 3, and 4 of the chassis. A supported Ethernet adapter must be installed in the corresponding slot of the compute node (slot A1 when modules are installed in bays 1 and 2 or slot A2 when modules are in bays 3 and 4).

In compute nodes that have an integrated dual-port 10 GbE network interface controller (NIC), NIC ports are routed to bays 1 and 2 with a specialized periscope connector, and the adapter card in slot A1 is not required. However, when needed, the periscope connector can be replaced with the adapter card. In that case, an integrated NIC is disabled.

The following table shows the connections between the adapters installed in the compute nodes to the I/O module bays in the chassis.

4-port and 8-port adapters: With 4-port 1 GbE or 10 GbE or 8-port 10 GbE adapters, only up to two adapter ports can be used with the EN4091 pass-thru modules (one port per pass-thru module).

Table 3. Adapter to I/O bay correspondence

I/O adapter slot in the server	Port on the adapter	Corresponding I/O module bay in the chassis			
		Bay 1	Bay 2	Bay 3	Bay 4
Slot 1	Port 1	Yes			
	Port 2		Yes		
Slot 2	Port 1			Yes	
	Port 2				Yes
Slot 3 (full-wide compute nodes only)	Port 1	Yes			
	Port 2		Yes		
Slot 4 (full-wide compute nodes only)	Port 1			Yes	
	Port 2				Yes

The following table lists the compatibility information for the I/O adapters and EN4091 10Gb Ethernet Pass-thru Modules.

Table 4. Network adapters

Description	Part number	System x feature code	Power Systems feature code	Support for EN4091 10Gb Ethernet Pass-thru Module
40 Gb Ethernet				
EN6132 2-port 40Gb Ethernet Adapter	90Y3482	A3HK	A3HK	No
10 Gb Ethernet				
Embedded 10Gb Virtual Fabric Adapter in the x240	None	None	None	Yes
Embedded 10Gb Virtual Fabric Adapter in the x222	None	None	None	No
Embedded 10Gb Virtual Fabric Adapter in the x440	None	None	None	Yes
IBM Flex System CN4022 2-port 10Gb Converged Adapter	88Y5920	A4K3	A4K3	Yes
IBM Flex System CN4052 2-port 10Gb Virtual Fabric Adapter	00JY800	A5RP	None	Yes
IBM Flex System CN4054 10Gb Virtual Fabric Adapter (4-port)	90Y3554	A1R1	1759	Yes
IBM Flex System CN4054R 10Gb Virtual Fabric Adapter (4-port)	00Y3306	A4K2	A4K2	Yes
IBM Flex System CN4058 8-port 10Gb Converged Adapter	None	None	EC24	Yes
IBM Flex System CN4058S 8-port 10Gb Virtual Fabric Adapter	94Y5160	A4R6	None	Yes
IBM Flex System EN4054 4-port 10Gb Ethernet Adapter	None	None	1762	Yes
IBM Flex System EN4132 2-port 10Gb Ethernet Adapter	90Y3466	A1QY	EC2D	Yes
IBM Flex System EN4132 2-port 10Gb RoCE Adapter	None	None	EC26	Yes
1 Gb Ethernet				
EN2024 4-port 1Gb Ethernet Adapter	49Y7900	A10Y	1763	Yes
Embedded 1Gb Ethernet in the x220	None	None	None	Yes

The adapters are installed in slots in each compute node. The following figure shows the locations of the slots in the x240 Compute Node. The positions of the adapters in the other supported servers are similar.

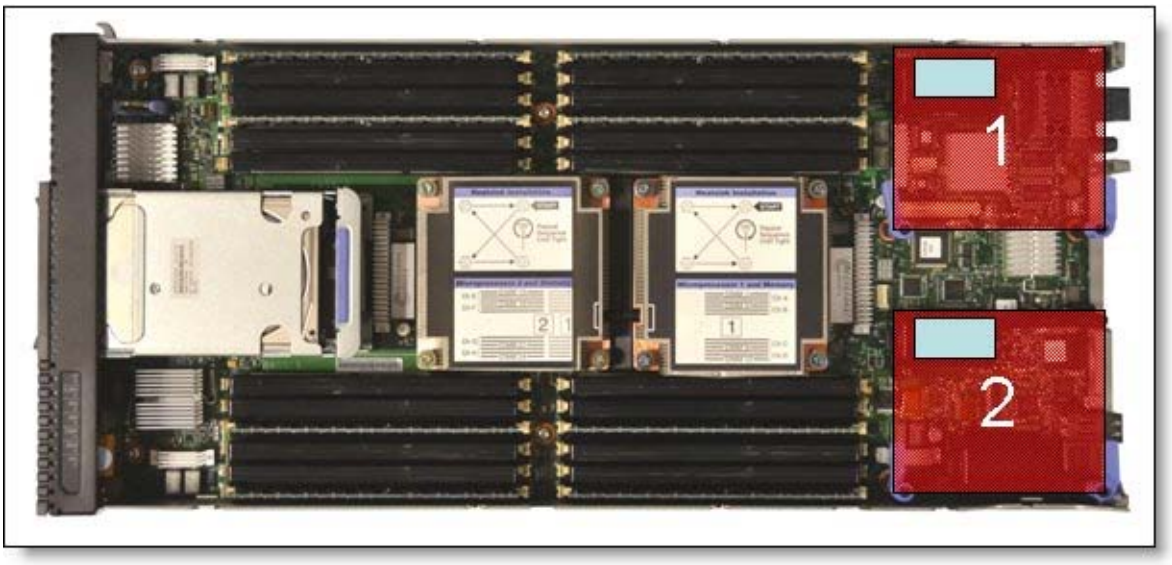

Figure 4. Location of the I/O adapter slots in the IBM Flex System x240 Compute Node

Standards supported

The module supports the following IEEE standards:

- IEEE 802.3ab 1000BASE-T copper twisted pair Gigabit Ethernet
- IEEE 802.3z 1000BASE-SX short range fiber optics Gigabit Ethernet
- IEEE 802.3z 1000BASE-LX long range fiber optics Gigabit Ethernet
- IEEE 802.3ae 10GBASE-SR short range fiber optics 10 Gb Ethernet
- IEEE 802.3ae 10GBASE-LR long range fiber optics 10 Gb Ethernet
- 10GSFP+Cu SFP+ Direct Attach copper

Connectors and LEDs

The following figure shows the front panel of the IBM Flex System EN4091 10Gb Ethernet Pass-thru Module.

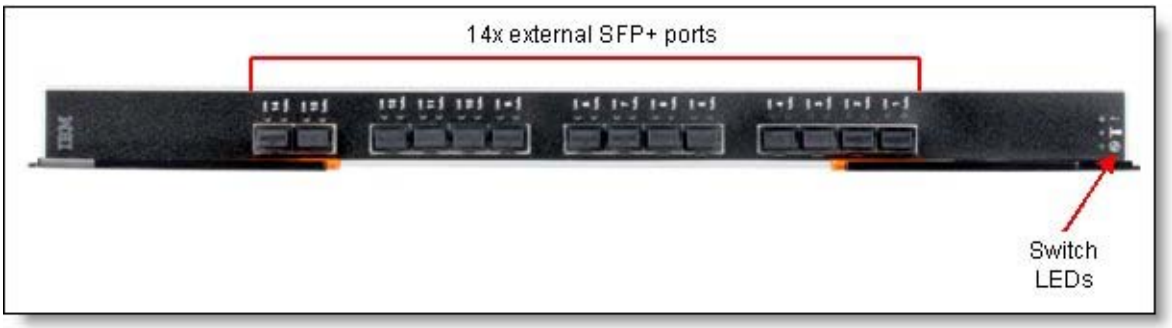

Figure 5. Front panel of the IBM Flex System EN4091 10Gb Ethernet Pass-thru Module

The front panel has the following components:

- LEDs that show the status of the module and the network:
  - The OK LED indicates that the module has passed the power-on self-test (POST) with no critical faults and is operational.
  - The blue Identify LED is used to identify the module physically by using the management software to illuminate it.
  - The error LED (pass-thru module error) indicates that the module has failed the POST or detected an operational fault.
- Fourteen external SFP+ ports for 1 Gb or 10 Gb connections to external Ethernet devices.
- An Ethernet link OK LED and an Ethernet Tx/Rx LED for each external port on the module.

Network cabling requirements

The network cables that can be used with the IBM Flex System EN4091 10Gb Ethernet Pass-thru Module are as follows:

- 10GBASE-SR (requires the optional 10 GbE SFP transceivers listed in Table 2)
  - 850 nm communication using multimode fiber cable (50 µ or 62.5 µ) up to 300 m, LC duplex connector
- 10GBASE-LR (requires the optional 10 GbE SFP+ transceivers listed in Table 2)
  - 1310 nm communication using single-mode fiber cable up to 10 km, LC duplex connector
- 1000BASE-SX (requires the optional 1 GbE SFP transceivers listed in Table 2)
  - 850 nm communication using multimode fiber cable (50 µ or 62.5 µ) up to 550 m, LC duplex connector
- 1000BASE-LX (requires the optional 1 GbE SFP transceivers listed in Table 2)
  - 1310 nm communication using single-mode fiber cable up to 10 km, LC duplex connector
- 1000BASE-T (requires the optional RJ-45 SFP transceivers)
  - UTP Category 6
  - UTP Category 5e (100 m maximum)
  - UTP Category 5 (100 m maximum)
  - EIA/TIA-568B 100-ohm STP (100 m maximum)
- 10GSFP+Cu (requires the optional SFP+ DAC cables listed in Table 2)
  - SFP+ copper direct attach cables (which can be up to 5 m) listed in Table 2

Warranty

There is a 1-year, customer-replaceable unit (CRU) limited warranty. When installed in a chassis, these I/O modules assume your system's base warranty and any IBM ServicePac® upgrades.

Physical specifications

These are the approximate dimensions and weight of the IBM Flex System EN4091 10Gb Ethernet Pass-thru Module:

- Height: 30 mm (1.2 in.)
- Width: 401 mm (15.8 in.)
- Depth: 317 mm (12.5 in.)
- Weight: 3.7 kg (8.1 lb)

Shipping dimensions and weight (approximate):

- Height: 114 mm (4.5 in.)
- Width: 508 mm (20.0 in.)
- Depth: 432 mm (17.0 in.)
- Weight: 4.1 kg (9.1 lb)

Regulatory compliance

The IBM Flex System EN4091 10Gb Ethernet Pass-thru Module conforms to the following standards:

- United States FCC 47 CFR Part 15, Subpart B, ANSI C63.4 (2003), Class A
- IEC/EN 60950-1, Second Edition
- Canada ICES-003, issue 4, Class A
- Japan VCCI, Class A
- Australia/New Zealand AS/NZS CISPR 22:2006, Class A
- Taiwan BSMI CNS13438, Class A
- CE Mark (EN55022 Class A, EN55024, EN61000-3-2, EN61000-3-3)
- CISPR 22, Class A
- China GB 9254-1998
- Turkey Communique 2004/9; Communique 2004/22
- Saudi Arabia EMC.CVG, 28 October 2002

Popular configurations

The following figure shows the usage of the IBM Flex System EN4091 10Gb Ethernet Pass-thru Module to route two integrated 10 GbE ports and two 10 GbE ports on the dual-port expansion card installed in slot 2 of the compute node. Each compute node has a total of four 10 GbE ports, and four IBM Flex System EN4091 10Gb Ethernet Pass-thru Module are installed in bays 1, 2, 3, and 4 of the Enterprise Chassis. The connections between the adapter card and the modules are internal to the chassis. No cabling is needed.

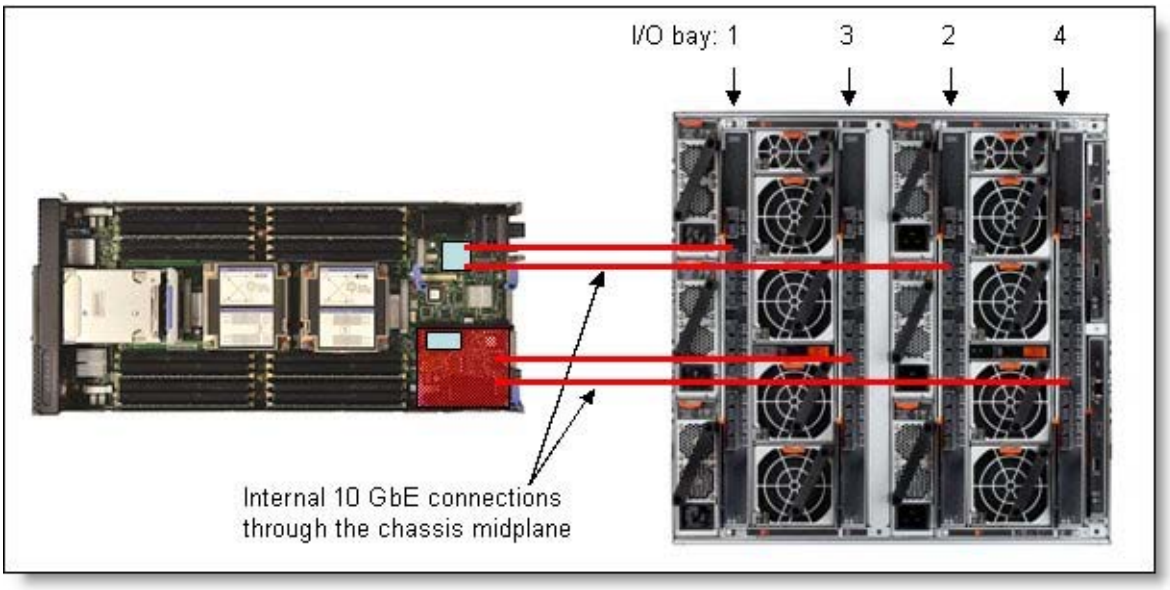

Figure 5. Using the IBM Flex System EN4091 10Gb Ethernet Pass-thru Module with integrated 10 GbE NICs and dual-port 10 GbE adapter cards

The following table lists the solution components.

Table 5. Components used when connecting the adapter to the 10Gb Ethernet Pass-thru Modules

Part number/machine type	Description	Quantity
8737-x2x	IBM Flex System x240 Compute Node with Embedded 10Gb Virtual Fabric Adapter	1 to 14
90Y3466	IBM Flex System EN4132 2-port 10Gb Ethernet Adapter	1 per server
8721-A1x	IBM Flex System Enterprise Chassis	1
88Y6043	IBM Flex System EN4091 10Gb Ethernet Pass-thru Module	4
Varies	DAC cables or SFP+ modules (See Table 2 for details.)	Up to 14 per pass-thru module (one cable or SFP+ module per server's network port connected to the EN4091 is required)

Related publications

For more information, see the following IBM Flex System EN4091 10Gb Ethernet Pass-thru Module product publications, available from the IBM Flex System Information Center:
http://publib.boulder.ibm.com/infocenter/flexsys/information/index.jsp

- *Installation and User's Guide*

Here are other useful references:

- US Announcement Letter 112-053
  http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS112-053
- *IBM Flex System Enterprise Chassis Product Guide*
  http://www.redbooks.ibm.com/abstracts/tips0865.html
- IBM Flex System Information Center (User's Guides for servers and options)
  http://publib.boulder.ibm.com/infocenter/flexsys/information
- *IBM Flex System Interoperability Guide*
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- IBM System x Configuration and Options Guide:
  http://ibm.com/systems/xbc/cog/
- ServerProven for IBM Flex System
  http://ibm.com/systems/info/x86servers/serverproven/compat/us/flexsystems.html

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This document was created or updated on November 26, 2014.

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