Lenovo Flex System EN4091 10Gb Ethernet Pass-thru
Product Guide (withdrawn product)

The Lenovo® Flex System™ EN4091 10Gb Ethernet Pass-thru offers easy connectivity of the Flex System 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 (TOR) 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 Lenovo Flex System EN4091 10Gb Ethernet Pass-thru.

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

Did you know?

The Lenovo 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.

Part number information

The Lenovo Flex System EN4091 10Gb Ethernet Pass-thru 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.

Withdrawn: The EN4091 10Gb Ethernet Pass-thru is now withdrawn from marketing.

Table 1. Part numbers and feature codes for ordering

Description	Part number	Feature code
Lenovo Flex System EN4091 10Gb Ethernet Pass-thru	88Y6043	A1QV

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

- One Lenovo Flex System EN4091 10Gb Ethernet Pass-thru module
- Documentation package

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

Supported transceivers and cables

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

- For 1 GbE external links, clients can use RJ-45 SFP transceivers with UTP cables up to 100 m. Clients that need longer distances can use a 1000BASE-SX transceiver, which can drive distances up to 220 meters by using 62.5 µ multi-mode fiber and up to 550 meters with 50 µ multi-mode fiber, or the 1000BASE-LX transceivers that support distances up to 10 kilometers using single-mode fiber (1310 nm).
- For 10 GbE external links, clients can use SFP+ direct attach copper (DAC) cables for in-rack cabling and distances up to 5 m. These DAC cables have SFP+ connectors on each end, and they do not need separate transceivers. For longer distances the 10GBASE-SR transceiver can support distances up to 300 meters over OM3 multimode fiber or up to 400 meters over OM4 multimode fiber. The 10GBASE-LR transceivers can support distances up to 10 kilometers on single mode fiber.

The following table lists the supported transceivers.

Table 1. Supported transceivers

Part number	Feature code	Description
1Gb transceivers		
00FE333	A5DL	SFP 1000Base-T (RJ-45) Transceiver
81Y1622	3269	SFP SX Transceiver
90Y9424	A1PN	SFP LX Transceiver
10Gb transceivers		
46C3447	5053	SFP+ SR Transceiver
90Y9412*	A1PM	SFP+ LR Transceiver

The following table lists the supported fiber optic cables.

Table 2. Optical cables

Part number	Feature code	Description
LC-LC OM3 Fiber Optic Cables (these cables require a 10 GbE SFP+ SR or 25 GbE SFP28 SR transceiver)		
00MN499	ASR5	Lenovo 0.5m LC-LC OM3 MMF Cable
00MN502	ASR6	Lenovo 1m LC-LC OM3 MMF Cable
00MN505	ASR7	Lenovo 3m LC-LC OM3 MMF Cable
00MN508	ASR8	Lenovo 5m LC-LC OM3 MMF Cable
00MN511	ASR9	Lenovo 10m LC-LC OM3 MMF Cable
00MN514	ASRA	Lenovo 15m LC-LC OM3 MMF Cable
00MN517	ASRB	Lenovo 25m LC-LC OM3 MMF Cable
00MN520	ASRC	Lenovo 30m LC-LC OM3 MMF Cable

The following table lists the supported direct-attach copper (DAC) cables.

Table 3. Copper cables

Part number	Feature code	Description
SFP+ 10Gb Passive DAC Cables		
00D6288	A3RG	0.5m Passive DAC SFP+ Cable
90Y9427	A1PH	1m Passive DAC SFP+ Cable
00AY764	A51N	1.5m Passive DAC SFP+ Cable
00AY765	A51P	2m Passive DAC SFP+ Cable
90Y9430	A1PJ	3m Passive DAC SFP+ Cable
90Y9433	A1PK	5m Passive DAC SFP+ Cable
SFP+ 10Gb Active DAC Cables		
95Y0323*	A25A	1m Active DAC SFP+ Cable
95Y0326*	A25B	3m Active DAC SFP+ Cable
95Y0329*	A25C	5m Active DAC SFP+ Cable
SFP+ 10Gb Active DAC Cables		
00VX111	AT2R	Lenovo 1m Active DAC SFP+ Cables
00VX114	AT2S	Lenovo 3m Active DAC SFP+ Cables
00VX117	AT2T	Lenovo 5m Active DAC SFP+ Cables

* Withdrawn from marketing

Benefits

The 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 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 copper (DAC) cables. 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 standards

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

Supported chassis and adapter cards

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

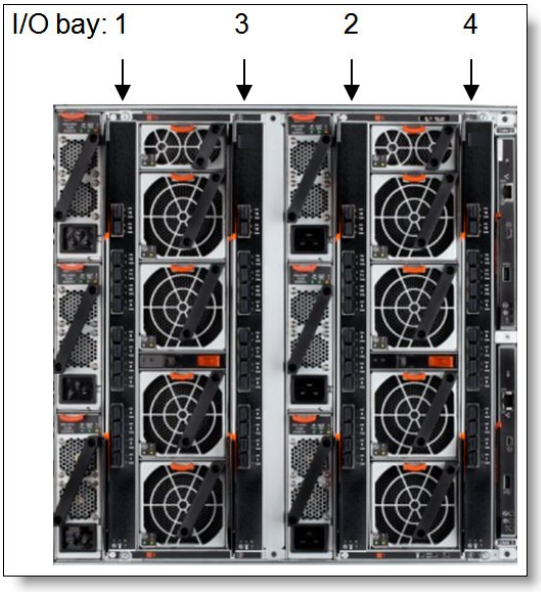

Figure 2. Location of the I/O module bays in the Flex System chassis

The EN4091 10Gb Ethernet Pass-thru Module can be installed in bays 1, 2, 3, and 4 of the chassis. Up to four EN4091 modules are supported in a chassis. A supported Ethernet adapter must be installed in the corresponding slot of the compute node.

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 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 compatibility information for the EN4091 and Flex System chassis.

Table 3. Flex System chassis compatibility

Description	Part number	Enterprise Chassis with CMM	Enterprise Chassis with CMM2	Carrier-grade Chassis with CMM2
Flex System EN4091 10Gb Ethernet Pass-thru	88Y6043	Yes	Yes	No

The connections between the adapters installed in the compute nodes to the EN4091 modules installed 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.

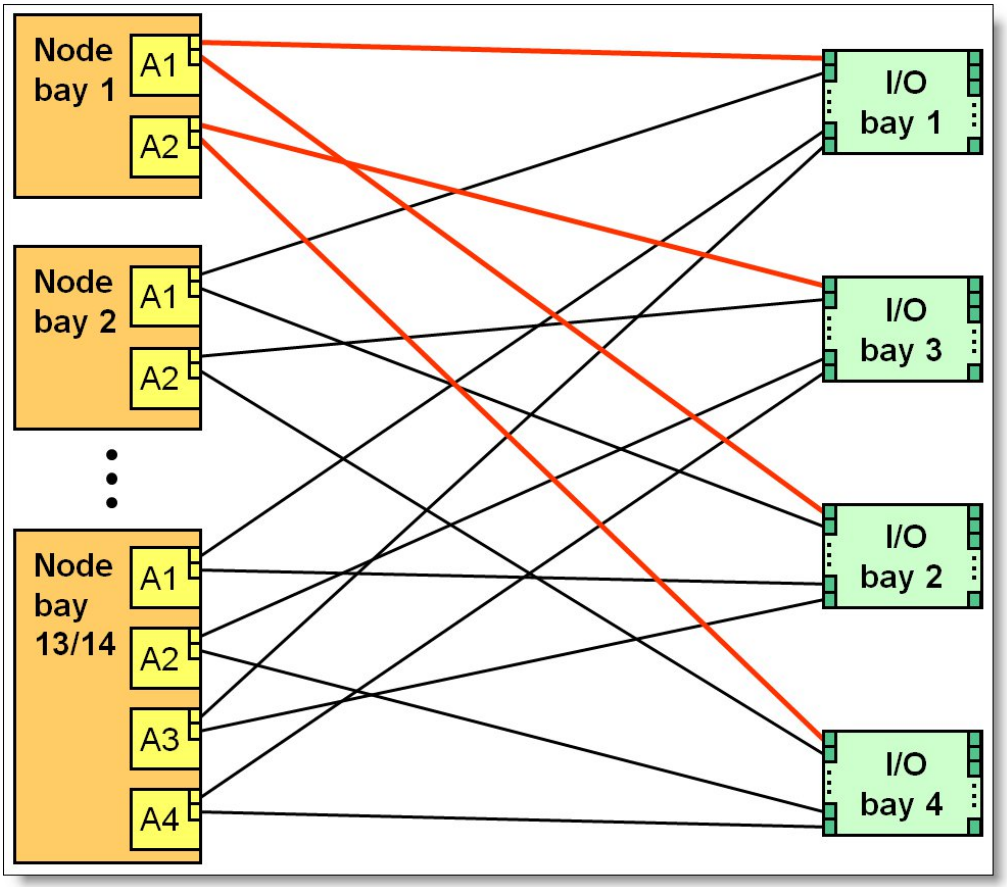

Figure 3. Logical layout of the interconnects between I/O adapters and EN4091 modules

The 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 4. 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 I/O adapters supported by the EN4091 10Gb Ethernet Pass-thru Modules.

Table 5. Network adapters

Description	Part number	Feature code
10 Gb Ethernet		
Embedded 10Gb Virtual Fabric Adapter in the x240	None	None
Embedded 10Gb Virtual Fabric Adapter in the x440	None	None
Flex System CN4022 2-port 10Gb Converged Adapter	88Y5920	A4K3
Flex System CN4052 2-port 10Gb Virtual Fabric Adapter	00JY800	A5RP
Flex System CN4054 10Gb Virtual Fabric Adapter (4-port)	90Y3554	A1R1
Flex System CN4054R 10Gb Virtual Fabric Adapter (4-port)	00Y3306	A4K2
Flex System CN4058S 8-port 10Gb Virtual Fabric Adapter	94Y5160	A4R6
Flex System EN4132 2-port 10Gb Ethernet Adapter	90Y3466	A1QY
1 Gb Ethernet		
EN2024 4-port 1Gb Ethernet Adapter	49Y7900	A10Y
Embedded 1Gb Ethernet in the x220	None	None

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.

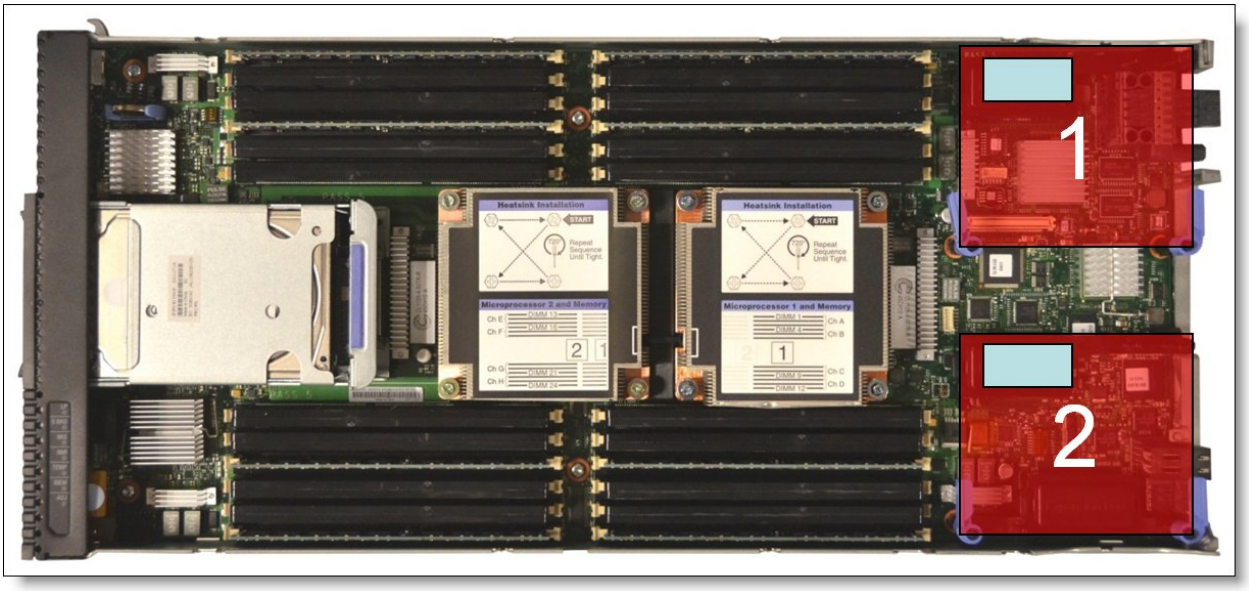

Figure 4. Location of the I/O adapter slots in the Flex System x240 Compute Node

Connectors and LEDs

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

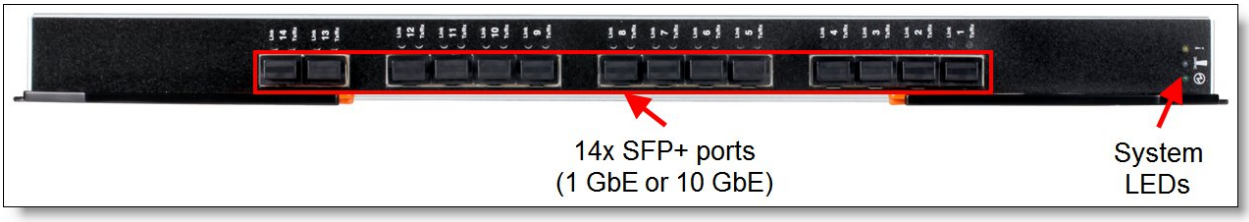

Figure 5. Front panel of the Flex System EN4091 10Gb Ethernet Pass-thru

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/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 Flex System EN4091 10Gb Ethernet Pass-thru Module are shown in the following table.

Table 6. G8052 network cabling requirements

Transceiver	Standard	Cable	Connector
10 Gb Ethernet			
10GBASE-SR SFP+ Transceiver (46C3447)	10GBASE-SR	Up to 30 m with fiber optic cables supplied by Lenovo (see Table 2); 850 nm OM3 multimode fiber cable up to 300 m or up to 400 m with OM4 multimode fiber	LC
10GBASE-LR SFP+ Transceiver (90Y9412)	10GBASE-LR	1310 nm single-mode fiber cable up to 10 km	LC
Direct attach cable	10GSFP+Cu	SFP+ DAC cables up to 5 m (see Table 2)	SFP+
1 Gb Ethernet			
1000BASE-T SFP Transceiver (00FE333)	1000BASE-T	UTP Category 5, 5E, and 6 up to 100 meters	RJ-45
1000BASE-SX SFP Transceiver (81Y1622)	1000BASE-SX	Up to 30 m with fiber optic cables supplied by Lenovo (see Table 2); 850 nm multimode fiber cable up to 550 m (50 µ) or up to 220 m (62.5 µ)	LC
1000BASE-LX SFP Transceiver (90Y9424)	1000BASE-LX	1310 nm single-mode fiber cable up to 10 km	LC

Warranty

The EN4091 carries 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 Lenovo warranty service upgrade.

Physical specifications

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

- 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)

Agency approvals

The Flex System EN4091 10Gb Ethernet Pass-thru conforms to the following regulations:

- 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

Typical configurations

The following usage scenarios are described:

- EN4091 in the traditional 10 Gb Ethernet network
- EN4091 in the converged NAS or iSCSI network
- EN4091 in the converged FCoE network

EN4091 in the traditional 10 Gb Ethernet network

In the traditional 10 GbE network, the EN4091 pass-thru modules are connected to the TOR switches (such as the Lenovo RackSwitch G8272) through the 10 GbE SFP+ ports, as shown in the following figure.

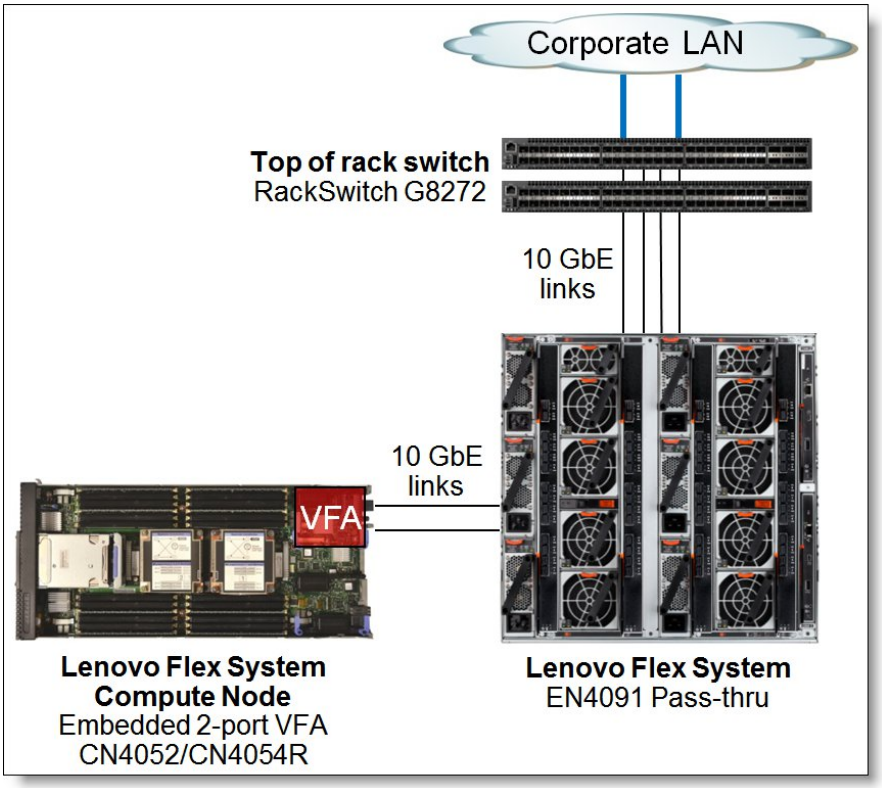

Figure 6. EN4091 in the 10 GbE network

EN4091 in the converged NAS or iSCSI network

The EN4091 pass-thru module can be connected to a TOR switch (such as the Lenovo RackSwitch G8272) that can transport iSCSI and NFS/CIFS data blocks with support for Converged Enhanced Ethernet (CEE). The example scenario with NAS and iSCSI storage protocols is shown in the following figure.

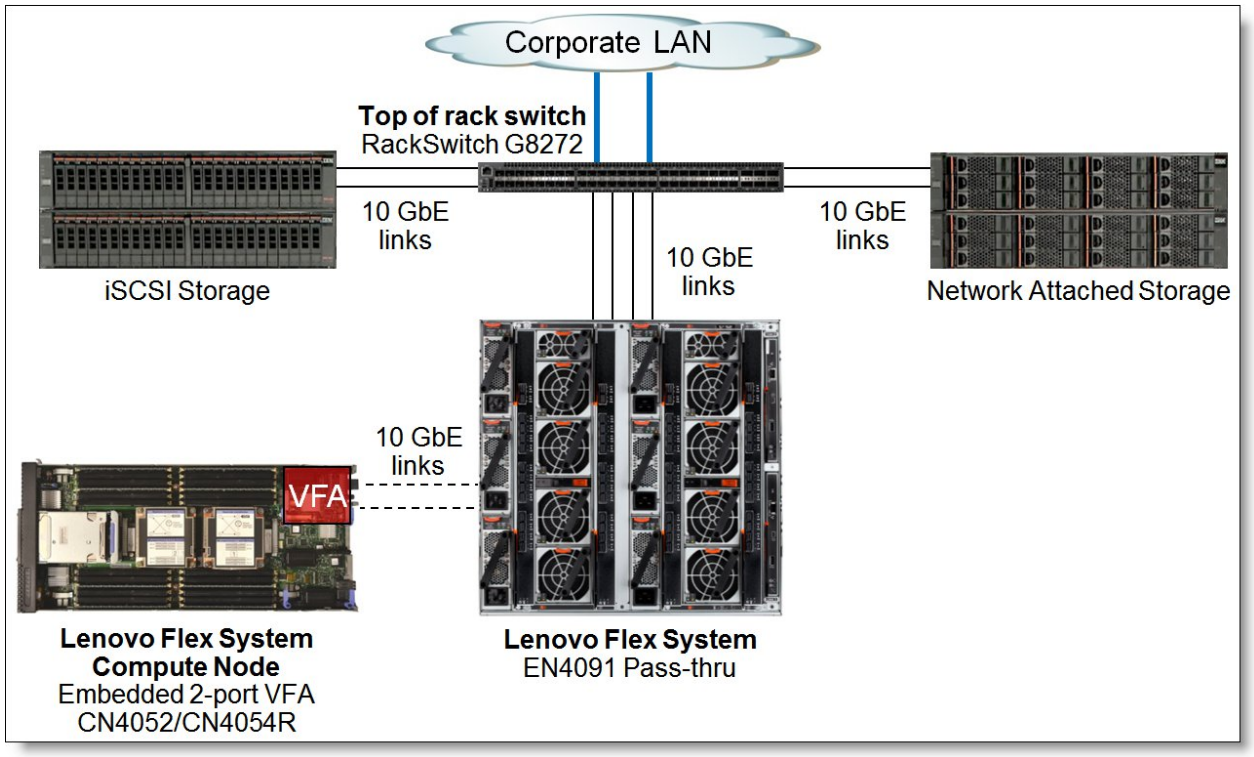

Figure 7. EN4091 in the converged NAS or iSCSI network

EN4091 in the converged FCoE network

With FCoE, the EN4091 pass-thru can be connected to a converged TOR switch that supports Fibre Channel Forwarder (FCF) capability (such as the Lenovo RackSwitch G8264CS). The FCF provides capability to connect FCoE storage targets via native FCoE interfaces (end-to-end FCoE) or through FC/FCoE gateways that break out the FC connections and connect to the SAN switches and then in to the storage devices.

The example scenario with end-to-end FCoE is shown in the following figure.

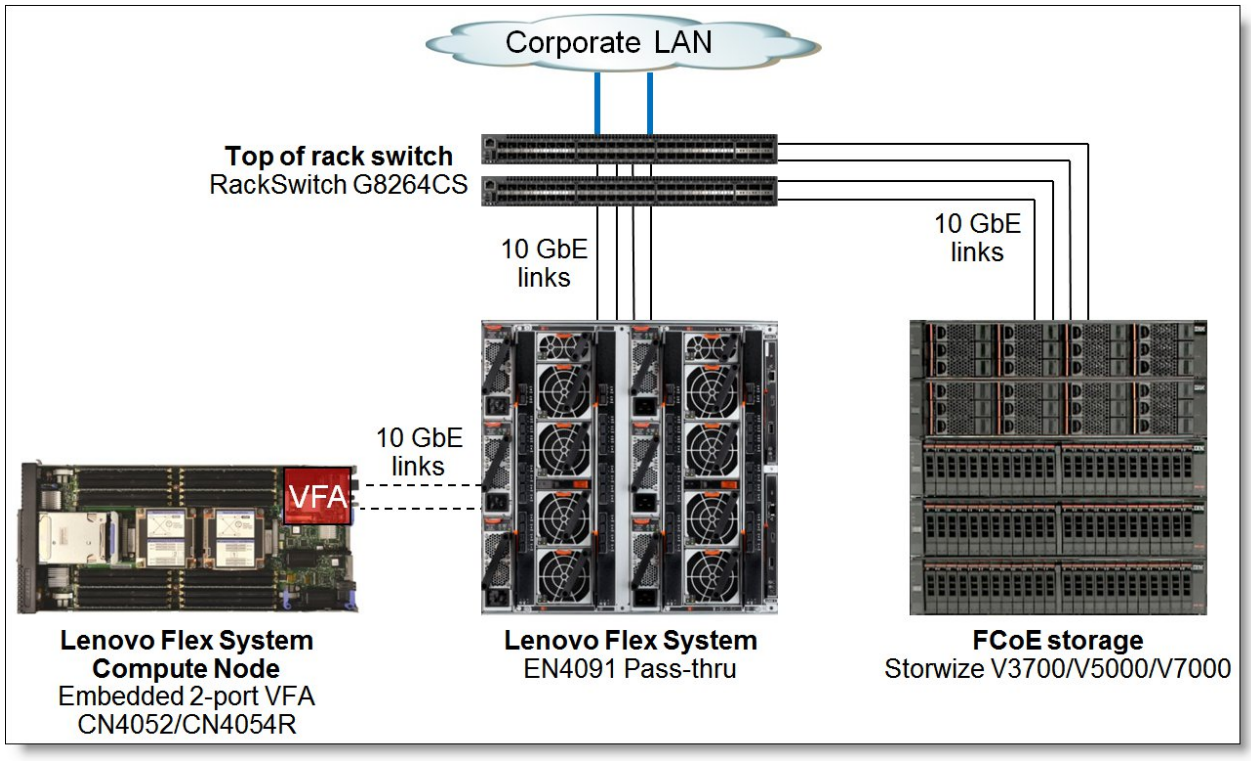

Figure 8. EN4091 in the converged FCoE network: End-to-end FCoE

The example scenario with the FC/FCoE gateway is shown in the following figure.

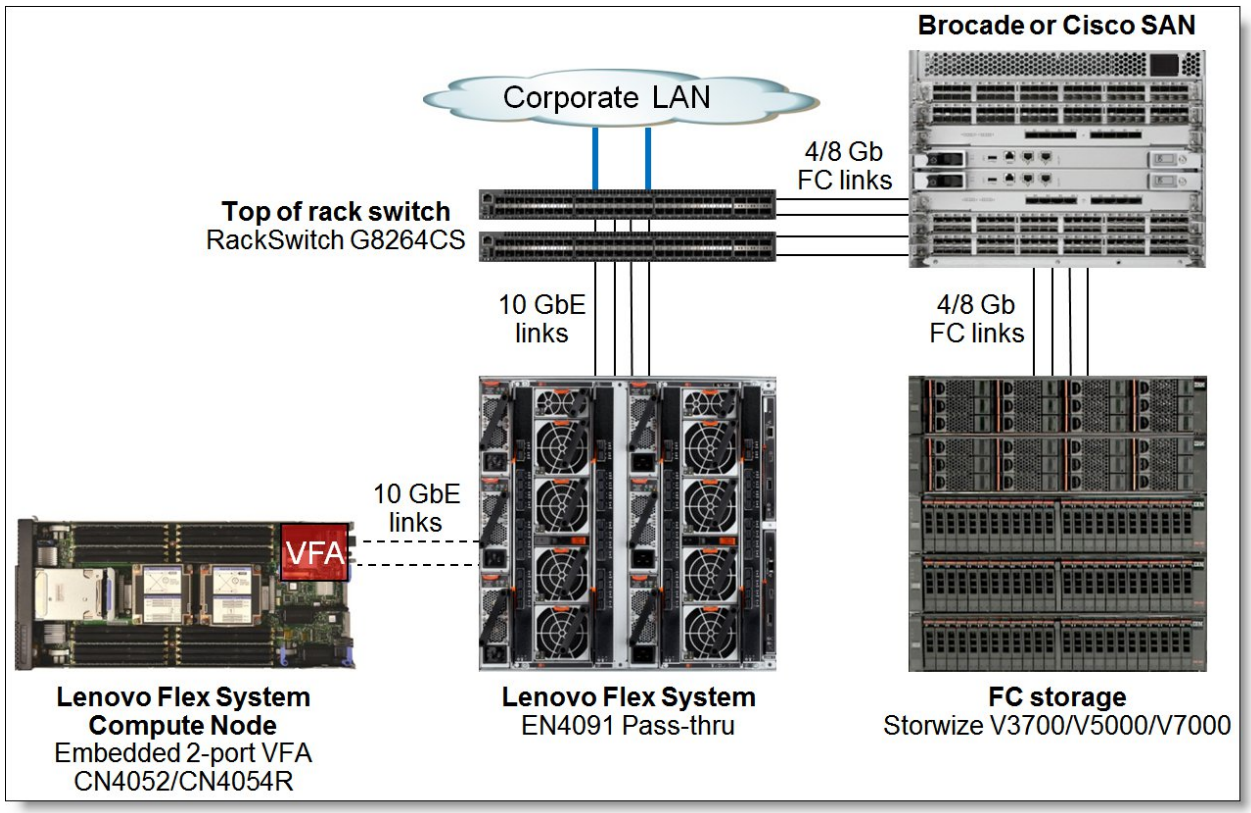

Figure 9. EN4091 in the converged FCoE network: FC/FCoE gateway

Note: For a full listing of supported FCoE and iSCSI configurations, see the System Storage Interoperation Center (SSIC) website at:
http://ibm.com/systems/support/storage/ssic

Related publications and links

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

- *Installation and User's Guide*

Here are other useful references:

- Flex System Information Center
  http://publib.boulder.ibm.com/infocenter/flexsys/information
- *Flex System Interoperability Guide*
  http://lenovopress.com/fsig
- *Flex System Products and Technology*, SG24-8255
  http://lenovopress.com/sg248255
- Product Guides for Flex System
  http://lenovopress.com/flexsystem

Related product families

Product families related to this document are the following:

- 10 Gb Embedded Connectivity
- Blade Networking Modules

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