

QLogic 10Gb Virtual Fabric Adapter and CNA for IBM BladeCenter

IBM Redbooks Product Guide

The QLogic 10Gb Virtual Fabric Adapter and Virtual Fabric CNA for IBM® BladeCenter® are based on the third-generation QLogic Converged Network Adapter (CNA) 8200 ASIC, which supports simultaneous LAN (TCP/IP) and SAN (Fibre Channel over Ethernet (FCoE), iSCSI) traffic at line-rate, 10 Gbps Ethernet speed. This convergence of networking traffic can lower data center costs by eliminating the need for separate LAN and SAN infrastructure. Data centers now need fewer adapters, cables, and switches, which also means reduced management, power, and cooling costs.

The QLogic 10Gb Virtual Fabric Adapter is shown in the following figure.



Figure 1. QLogic 10Gb Virtual Fabric Adapter for IBM BladeCenter

Did you know

QLogic 10Gb Virtual Fabric Adapters can operate in pNIC mode as regular 10Gb Ethernet adapters, or in switch-independent vNIC mode (NIC partitioning - NPAR) where they can be divided into up to eight virtual adapters each (up to four vNICs per physical port).

When QLogic 10Gb Virtual Fabric Adapters operate as CNA, they can concurrently support multiple protocols, such as running IP, iSCSI, and FCoE on the same port at the same time.

QLogic 10Gb Virtual Fabric Adapters support full hardware offload for IP, FCoE, and iSCSI protocol processing. This feature frees up the server's CPU to perform other tasks. Consequently, the server's applications can run faster and virtualized servers can support more virtual machines.

Part number information

The following table shows the ordering part numbers and feature codes for QLogic 10Gb Virtual Fabric Adapters.

Table 1. Ordering part numbers and feature codes

Description	Part number	Feature code
Adapter		
QLogic 10Gb Virtual Fabric Adapter for IBM BladeCenter	00Y3332	A4AC
QLogic 10Gb Virtual Fabric CNA for IBM BladeCenter	00Y5618	A4AD
Features on Demand upgrade		
QLogic 10Gb Virtual Fabric Advanced FoD Upgrade for IBM BladeCenter	00Y5622	A4AE

The standard QLogic 10Gb Virtual Fabric Adapter can be upgraded to the same features as the QLogic Virtual Fabric CNA with the addition of the QLogic 10Gb Virtual Fabric Advanced FOD Upgrade option, part number 00Y5622.

The adapter part numbers (00Y3332 and 00Y5618) include the following items:

- One QLogic adapter (VFA or Advanced VFA)
- Quick install guide
- Documentation CD
- Important notices flyer

Features on Demand (FoD) upgrade option part number (00Y5622) includes the following items:

- Feature authorization code
- Feature activation instructions

Features

The QLogic 10Gb Virtual Fabric Adapters have the following features:

- 10 Gb converged adapters
The QLogic 10 Gb Virtual Fabric CNAs support simultaneous LAN (TCP/IP) and SAN (FCoE, iSCSI) traffic at line-rate, 10 Gbps Ethernet speed. These adapters interface to the host server with a PCIe Gen2 x8 bus, designed to ensure that internal performance bottlenecks do not occur.
- FCoE and iSCSI hardware offload
When operated as a CNA, the 10 Gb adapters support full hardware offload for FCoE and iSCSI protocol processing. The QLogic FlexOffload features free up the server CPU to perform other tasks. Consequently, server applications can run faster and virtualized servers can support more virtual machines (VMs).
- Convergence
The 10 Gb Virtual Fabric CNAs can reduce data center costs by converging data and storage networking. This convergence can result in buying fewer adapters, cables, and switches. In addition, convergence can offer lower power consumption, reduced cooling, and easier LAN and SAN management.
- Common drivers
The 10 Gb Virtual Fabric CNAs are compatible with the same Fibre Channel and iSCSI software driver stacks that have been deployed in millions of previous installations. These drivers are common across QLogic's lineup of Fibre Channel and iSCSI adapters, simplifying revision management in heterogeneous environments.
- Management
Networking, FCoE, and iSCSI management can be easy with the new unified management application from QLogic, QConvergeConsole (QCC). QCC provides single-pane-of-glass management for QLogic's broad product line of storage and networking adapters. The 10 Gb VFA also has API support so that it can be managed by other popular third-party management tools, including native OS management tools for networking.
- Diskless boot
The 10 Gb Virtual Fabric CNAs support booting the server from remote storage over both the LAN and SAN. Consequently, data centers can deploy thinner servers, centralize OS image management, increase system availability, and simplify image redeployment.
- Enhanced Ethernet
Numerous additions to the Ethernet standard enable it to transport lossless, converged LAN, and SAN traffic. The QLogic Virtual Fabric Adapters support all of the new Ethernet standards, including 802.1Qbb (Priority-based Flow Control) and 802.1Qaz (Enhanced Transmission).
- Unmatched expertise
QLogic has an unparalleled advantage in delivering this new Converged Network Adapter technology. QLogic is one of the leaders in both Fibre Channel and iSCSI adapters, with years of experience providing Fibre Channel and Ethernet-based products.
- IBM Features on Demand
The QLogic Advanced FoD upgrade for IBM BladeCenter (00Y5622) enables support for full FCoE and iSCSI hardware offload through the Features on Demand (FoD) license upgrade. This support enables flexibility and investment protection by offering the FCoE/iSCSI license when you need it.

Technical specifications

The QLogic 10Gb Virtual Fabric Adapters have the following specifications.

Host interface

- Operate at full 10 Gbps line rate on both ports.
- 10 Gbps per-port maximum throughput.
- Based on the QLogic 8200 ASIC.
- PCI Express 2.0 x8 host interface.
- CFFh form factor.
- 10 Gb ports operating either in a virtual NIC (vNIC) or physical NIC (pNIC) mode:
 - vNIC mode: Up to eight vNICs (up to four vNICs per one 10 Gb port):
 - Switch Independent mode of operation.
 - Virtual port bandwidth allocation in 100 Mbps increments.
 - Up to four vNICs can be configured as a NIC, iSCSI, or FCoE vNICs (up to four NIC vNICs, one FCoE vNIC, and one iSCSI vNIC per port) with optional Advanced Upgrade (00Y5622) or with QLogic 10Gb Virtual Fabric CNA (00Y5618).
 - pNIC mode: dual-port 10 Gb Ethernet adapter
With optional Advanced Upgrade (00Y5622) or with QLogic 10Gb Virtual Fabric CNA (00Y5618), the pNIC mode enables two LAN (10 GbE) ports and four storage ports (2 iSCSI and 2 FCoE).
- Supports Serial over LAN (SoL) and concurrent KVM (cKVM).
- IBM Fabric Manager support.
- Preboot Execution Environment (PXE) support.

Switch Independent vNIC mode is also known as NIC Partitioning or NPAR, where each physical port appears to the server as four virtual NICs. Bandwidth for each vNIC can be configured from 100 Mbps to 10 Gbps. This vNIC mode extends the existing VLANs to the virtual NIC interfaces. It uses IEEE 802.1Q VLAN tags to separate data traffic; the VLAN tags are added to the packet by the applications or drivers rather than by the switch.

Note: The adapter only supports fixed 10 GbE connectivity (no auto-negotiation). 1 Gb Ethernet connectivity is not supported.

Ethernet specifications

- Throughput: 10 Gbps full-duplex line rate per port
- Ethernet frame: 1500 byte or 9600 byte (jumbo frame)
- Stateless offload:
 - IP, TCP, and UDP checksum offloads
 - Large and giant send offload (LSO and GSO)
 - Large receive offload (LRO)
 - Receive side scaling (RSS)
 - Header-data split
 - Interrupt coalescing
 - VMware NetQueue and Microsoft VMQ

- Wake on LAN
- Enhanced Ethernet:
 - Priority-Based Flow Control (802.1Qbb)
 - Enhanced Transmission Selection (802.1Qaz)
 - DCBX Protocol (802.1Qaz)
- Protocols:
 - IEEE 802.3ae (10 Gb Ethernet)
 - IEEE 802.3ap (10GBASE-KR)
 - IEEE 802.1Q (VLAN)
 - IEEE 802.3ad (Link Aggregation)
 - IEEE 802.1p (Priority Encoding)
 - IEEE 802.3x (Flow Control)
 - IPv4 (RFQ 791)
 - IPv6 (RFC 2460)

FCoE specifications

- Logins: Support for 2,048 concurrent logins and 2,048 active exchanges
- Port virtualization: N_Port ID virtualization (NPIV)
- Protocols:
 - SCSI-3 Fibre Channel Protocol (SCSI-FCP)
 - Fibre Channel Tape (FC-TAPE) Profile
 - SCSI Fibre Channel Protocol-2 (FCP-2)
 - Second Generation FC Generic Services (FC-GS-2)
 - Third Generation FC Generic Services (FC-GS-3)
 - FCoE and FIP (FC-BB-5)

iSCSI Specifications

- Protocols:
 - RFC 3347 (iSCSI Requirements and Design Considerations)
 - CHAP
 - iSNS
 - SLP

Tools and utilities

- Management tools and device utilities:
 - QConvergeConsole: A unified management tool (GUI and CLI) for Fibre Channel/FCoE, iSCSI, and networking
 - Native OS management tools for networking
- Boot support:
 - Pre-execution environment (PXE), FCoE, and iSCSI boot
- APIs:
 - SNIA HBA API V2, SMI-S

Supported servers

The QLogic Virtual Fabric Adapters are supported in the BladeCenter servers listed in the following table.

Table 2. Supported BladeCenter and Flex System servers

Part number	Product description	HS12 (8028)	HS22 (7870)	HS22V (7871)	HS23 (7875)	HS23E (8038)	HX5 (7872)	HX5 (7873)
00Y3332	QLogic 10Gb Virtual Fabric Adapter	N	N	N	Y	Y	Y	Y
00Y5618	QLogic 10Gb Virtual Fabric CNA	N	N	N	Y	Y	Y	Y
00Y5622	QLogic 10Gb Virtual Fabric Advanced FoD Upgrade	N	N	N	Y	Y	N	N

The QLogic 10Gb Virtual Fabric Adapters are also supported in the I/O expansion units when the expansion unit is attached to the supported blade server, as shown in the following table.

Table 3. Supported I/O expansion units

Part number	Description	QLogic 10Gb Virtual Fabric Adapter, 00Y3332	QLogic 10Gb Virtual Fabric CNA, 00Y5618
PCI expansion units			
46M6730	IBM BladeCenter PCI Express Gen 2 Expansion Blade	Yes	Yes
68Y7484	IBM BladeCenter PCI Express Gen 2 Expansion Blade II	Yes	Yes
GPU expansion units			
46M6740#	IBM BladeCenter GPU Expansion Blade with NVIDIA Tesla M2070	Yes	Yes
46M6771	IBM BladeCenter GPU Expansion Blade with NVIDIA Tesla M2075	Yes	Yes
46M6772	IBM BladeCenter GPU Expansion Blade with NVIDIA Tesla M2070Q	Yes	Yes
68Y7478	IBM BladeCenter GPU Expansion Blade II with NVIDIA Tesla M2075	Yes	Yes
68Y7479	IBM BladeCenter GPU Expansion Blade II with NVIDIA Tesla M2070Q	Yes	Yes

This expansion unit is available only via CTO.

See the IBM ServerProven® website for the latest compatibility information for BladeCenter servers:
<http://ibm.com/servers/eserver/serverproven/compat/us/eserver.html>

Supported BladeCenter chassis and I/O modules

The following table lists the supported chassis and I/O module combinations that the QLogic 10Gb Virtual Fabric Adapters support (in both pNIC and vNIC modes).

Table 4. Chassis I/O modules supported with the QLogic 10Gb Virtual Fabric Adapters

Part number	Description	BC S (8886)	BC E (8677)	BC H (8852)	BC T (8720, 8730)	BC HT (8740, 8750)	MSIM	MSIM-HT
46C7191	IBM Virtual Fabric 10Gb Switch Module	N	N	Y	N	Y	N	N
46M6181	10Gb Ethernet Pass-Thru Module	N	N	Y	N	Y	N	N
46M6071	Cisco Nexus 4001I Switch Module	N	N	Y	N	Y	N	N
69Y1909	Brocade Converged 10GbE Switch Module	N	N	Y	N	Y	N	N

In BladeCenter H, the ports of QLogic 10Gb Virtual Fabric Adapters are routed through the midplane to I/O bays 7 and 9 (Figure 2). The BladeCenter HT is similar in that the QLogic VFA card ports are also routed through the midplane to I/O bays 7 and 9.

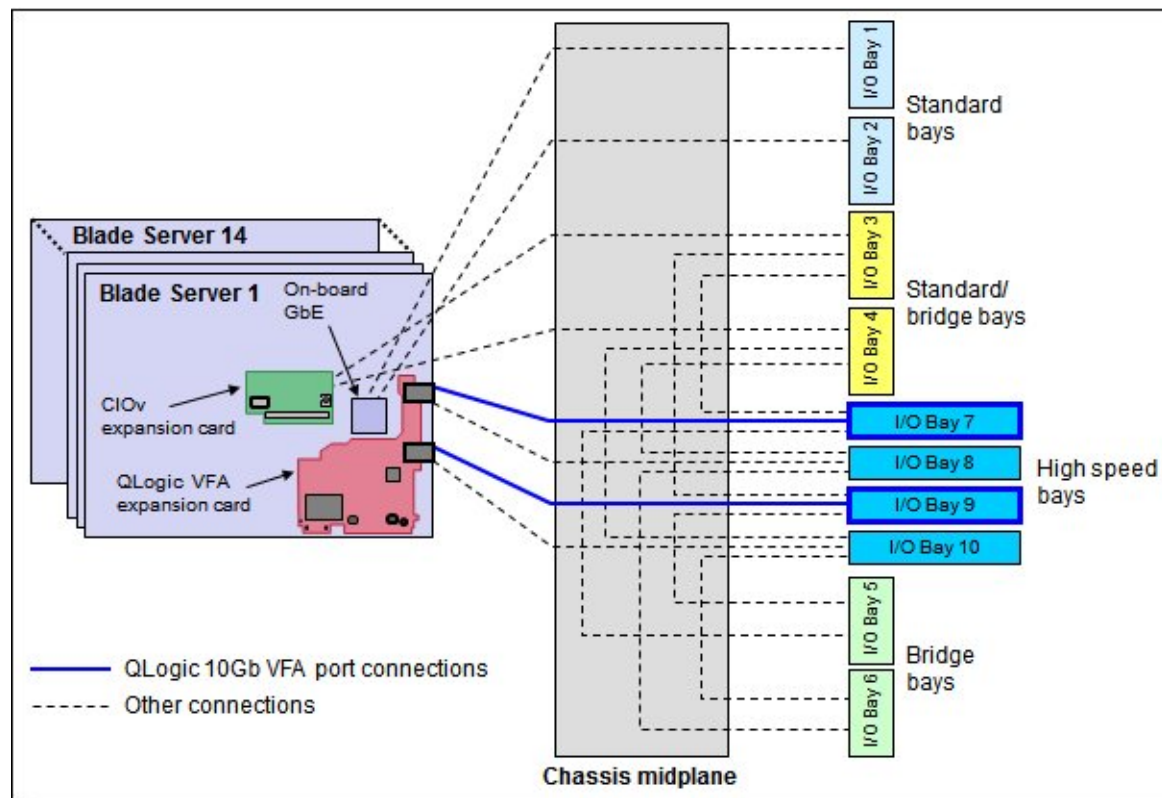


Figure 2. IBM BladeCenter H I/O topology showing the I/O paths from QLogic 10Gb VFA

The QLogic 10Gb Virtual Fabric Adapters require I/O modules to be installed in bays 7 and 9 of the BladeCenter H or HT chassis (Table 5).

Table 5. Locations of I/O modules required to connect to the expansion card

Expansion card	I/O bay 7	I/O bay 8	I/O bay 9	I/O bay 10
QLogic 10Gb Virtual Fabric Adapter	Supported I/O module	Not used	Supported I/O module	Not used
QLogic 10Gb Virtual Fabric CNA	Supported I/O module	Not used	Supported I/O module	Not used

Supported operating systems

The adapters support the following operating systems:

- Microsoft Windows Server 2012
- Microsoft Windows Server 2008 R2
- Microsoft Windows Server 2008, Datacenter x64 Edition
- Microsoft Windows Server 2008, Datacenter x86 Edition
- Microsoft Windows Server 2008, Enterprise x64 Edition
- Microsoft Windows Server 2008, Enterprise x86 Edition
- Microsoft Windows Server 2008, Web x64 Edition
- Red Hat Enterprise Linux 6 Server Edition
- Red Hat Enterprise Linux 6 Server x64 Edition
- Red Hat Enterprise Linux 5 Server Edition
- Red Hat Enterprise Linux 5 Server x64 Edition
- Red Hat Enterprise Linux 5 Server with Xen x64 Edition
- SUSE Linux Enterprise Server 11 for x86
- SUSE Linux Enterprise Server 11 for AMD64/EM64T
- SUSE Linux Enterprise Server 11 with Xen for AMD64/EM64T
- SUSE Linux Enterprise Server 10 for x86
- SUSE Linux Enterprise Server 10 for AMD64/EM64T
- SUSE Linux Enterprise Server 10 with Xen for x86
- SUSE Linux Enterprise Server 10 with Xen for AMD64/EM64T
- VMware vSphere 5.1
- VMware vSphere 5.0
- VMware ESX 4.1
- VMware ESXi 4.1

For the latest information about the specific versions and service packs supported, see the IBM ServerProven website at:

<http://ibm.com/servers/eserver/serverproven/compat/us/>

Warranty

The adapters carry a 1-year, customer-replaceable unit (CRU) limited warranty. When installed in a supported IBM blade server, these adapters assume your system's base warranty and any IBM ServicePac® upgrade.

Physical specifications

The QLogic 10Gb Virtual Fabric Adapters have the following physical specifications.

Dimensions and weight (approximate):

- Height: 167 mm (6.6 in)
- Width: 69 mm (2.7 in)
- Depth: 17 mm (0.7 in)
- Weight: 95 g (0.2 lb)

Shipping dimensions and weight (approximate):

- Height: 189 mm (7.5 in)
- Width: 90 mm (3.5 in)
- Depth: 38 mm (1.5 in)
- Weight: 450 g (1.0 lb)

Operating environment

The adapter is supported in this environment:

- Temperature:
 - Operating: 0°C - 55°C (32°F - 131°F)
 - Storage: -20°C - 70°C (-4°F - 158°F)
- Relative humidity: 10% - 90% (non-condensing)

Agency approvals

The adapters have the following agency approvals:

- Safety: US, Canada, Europe
- EMI
- EMC
- EN55022
- EN55024
- EN60950 / CE
- EN 61000-3-2
- EN 61000-3-3
- IEC 950 CB Scheme
- FCC Part 15 Class A
- UL 1950
- CSA C22.2 950-95
- VCCI
- NZ AS3548 / C-tick
- RRL for MIC (KCC)
- BSMI
- UL 94-/V

Configuration examples

This section illustrates how the QLogic 10Gb Virtual Fabric Adapters and CNAs can be used in 10 Gb Ethernet and converged configurations.

10 Gb Ethernet configuration

The QLogic 10Gb Virtual Fabric Adapters can be used in the 10 GbE data center network. In the example below, we use QLogic 10Gb Virtual Fabric Adapters connected to the IBM Virtual Fabric 10Gb Switch Modules (as shown in the following figure).

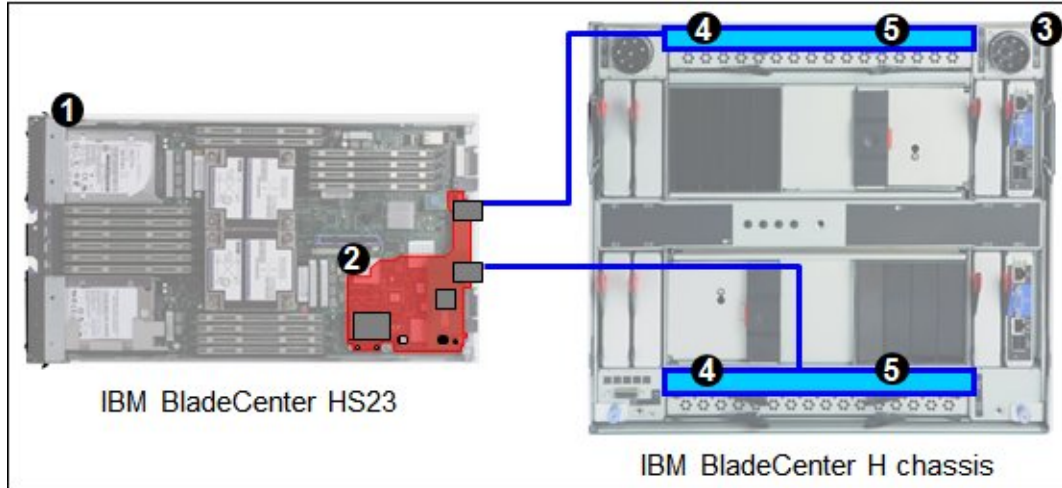


Figure 3. IBM Virtual Fabric 10 GbE networking solution with QLogic 10Gb adapters

The solution components used in the scenario described in Figure 3 are shown in the following table.

Table 6. IBM Virtual Fabric 10 GbE networking solution with QLogic 10Gb adapters

Diagram reference	Part number	Description	Quantity
1	Varies	IBM BladeCenter HS23 or other supported server	1 - 14
2	00Y5618	QLogic 10Gb Virtual Fabric CNA	1 per server
3	8852	IBM BladeCenter H chassis	1
4	46C7191	IBM Virtual Fabric 10 Gb Switch Module (installed in bays 7 and 9)	2
5	44W4408	IBM 10GBase-SR SFP+ Transceiver	Up to 20

FCoE converged networking

The QLogic 10Gb Virtual Fabric CNAs can be used to deliver the converged data center solution. In the example below, we use QLogic 10Gb Virtual Fabric CNAs connected to the IBM Virtual Fabric 10Gb Switch Modules, and the IBM switches are connected to the QLogic Virtual Fabric Extension Modules (as shown in Figure 4). QLogic Extension Modules can be connected directly to Fibre Channel storage systems or to FC SAN.

IBM provides extensive FCoE testing to deliver network interoperability. For a full listing of IBM supported FCoE and iSCSI configurations, see the IBM System Storage® Interoperation Center (SSIC) website at: <http://ibm.com/systems/support/storage/ssic>

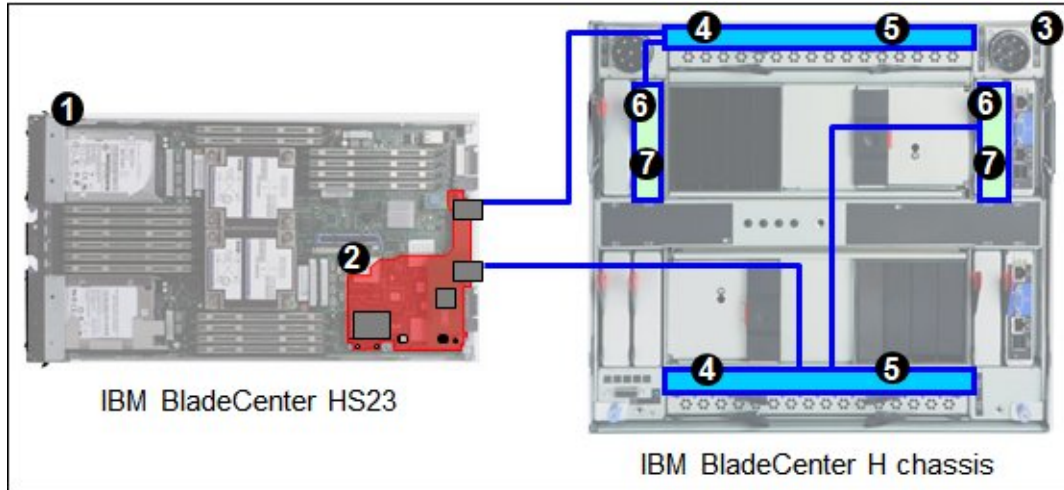


Figure 4. Converged IBM Virtual Fabric solution with QLogic 10Gb CNAs

The solution components used in the scenario described in Figure 4 are shown in the following table.

Table 7. Converged IBM Virtual Fabric solution with QLogic 10Gb CNAs

Diagram reference	Part number	Description	Quantity
1	Varies	IBM BladeCenter HS23 or other supported server	1 - 14
2	00Y5618	QLogic 10Gb Virtual Fabric CNA	1 per server
3	8852	IBM BladeCenter H chassis	1
4	46C7191	IBM Virtual Fabric 10 Gb Switch Module (installed in bays 7 and 9)	2
5	44W4408	IBM 10GBase-SR SFP+ Transceiver	Up to 16*
6	46M6172	QLogic Virtual Fabric Extension Module (installed in bays 3 and 5)	2
7	44X1964	IBM 8 Gb SFP+ SW Optical Transceiver	Up to 12

* While IBM Virtual Fabric 10 Gb Switch Module has ten external 10 Gb ports, the configuration described above allows use of only up to eight external ports on each IBM switch because two 10 Gb external ports on each switch are remapped to two internal connections to each of QLogic Virtual Fabric Extension Modules as shown in Figure 4.

Related publications

For more information, refer to these documents:

- Product web page
<http://ibm.com/systems/bladecenter/hardware/openfabric/ethernet.html>
- Announcement letter for the QLogic 10Gb Virtual Fabric Adapter and CNA
<http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS113-099>
- *IBM System x Configuration and Options Guide*
<http://www.ibm.com/systems/xbc/cog/>
- IBM ServerProven
<http://ibm.com/servers/eserver/serverproven/compat/us/>
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<http://ibm.com/systems/support/storage/ssic>

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