



QLogic Enhanced Gen 5 16 Gb Fibre Channel HBAs Product Guide

The QLogic Enhanced Generation 5 (Gen 5) 16 Gb Fibre Channel (FC) Single and Dual-port Host Bus Adapters (HBAs) for Lenovo ThinkSystem and System x servers offer industry leading native FC performance with extremely low CPU usage with full hardware offloads.

Enhanced Gen 5 FC technology provides advanced storage networking features capable of supporting the most demanding virtualized and private cloud environments, while fully leveraging the capabilities of high-performance 16 Gb FC (16GFC) and all-flash arrays (AFAs). Powerful management tools automate and simplify SAN provisioning to help reduce cost and complexity, while the unmatched 16 Gbps performance eliminates potential I/O bottlenecks in today's powerful multiprocessor, multicore servers.

The QLogic Enhanced Gen 5 16 Gb FC HBAs are shown in the following figure.



Figure 1. QLogic Enhanced Gen 5 16 Gb FC Single-port and Dual-port HBAs (shown without the included SFP+ modules)

Did you know?

The QLogic StorFusion architecture delivers ultimate reliability to meet the needs of mission-critical enterprise applications with lower power and fewer CPU cycles, all while maintaining peak performance.

The QLogic Enhanced 16 Gb FC HBAs are based on our 32 Gbps Architecture, which delivers higher IOPS and performance with lower power consumption compared to previous generation.

QLogic QConvergeConsole provides unified, single-pane-of-glass management across generations of QLogic FC adapters.

Part number information

The following table lists the ordering information for the QLogic Enhanced 16 Gb FC HBAs.

Table 1. Ordering information

| Description | Part number | Feature code |
|---|-------------|--------------|
| QLogic 16Gb FC Single-port HBA (Enhanced Gen 5) | 01CV750 | ATZB |
| QLogic 16Gb FC Dual-port HBA (Enhanced Gen 5) | 01CV760 | ATZC |

The part numbers for the QLogic Enhanced Gen 5 16 Gb FC HBAs include the following items:

- An FC HBA adapter with one or two 16 Gb (16/8/4 Gbps speeds) FC SW SFP+ installed
- 3U (standard) and 2U (low-profile) adapter brackets
- Publications package

Fiber optic cables

The following table lists the fiber optic cables that are available from Lenovo.

Table 2. Fiber optic cables

| Part number | Feature code | Description |
|----------------------------------|--------------|---------------------------------|
| LC-LC OM3 MMF Fiber Optic Cables | | |
| 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 |

Key features

The QLogic Enhanced Gen 5 16 Gb FC HBAs have the following features:

- Maximum performance with up to 1.3 million input/output operations per second (IOPS) to support larger server virtualization deployments and scalable cloud initiatives, and performance to match new multicore processors, SSDs/flash storage, and faster server host bus architectures.
- Independent function, transmit and receive buffers, an on-chip CPU, DMA channels, and a firmware image for each port enable complete port-level isolation, prevent errors and firmware crashes from propagating across all ports, and provide predictable and scalable performance across all ports.
- Support forward error correction (FEC) to enhance reliability of transmission and thereby performance.
- Industry-standard class-specific control (CS_CTL)-based frame prioritization Quality of Service (QoS) helps alleviate network congestion by prioritizing traffic for time-sensitive mission critical workloads for optimized performance.
- T10-PI data integrity with high performance offload provides end-to-end data corruption protection.
- Support for Message Signaled Interrupts eXtended (MSI-X) improves host utilization and enhances application performance.

- Fabric-assigned port worldwide name (FA-WWN) and fabric-based boot LUN discovery (F-BLD) pre-provisioning services allow servers to be quickly deployed, replaced, and moved across the SAN; the creation of zones, LUNs, and other services can be completed before the servers arrive on site.
- Using the Brocade ClearLink diagnostic port (D_Port) available on the Brocade Gen 5 switches, administrators can quickly run automated diagnostic tests to assess the health of links and fabric components.
- Read diagnostic parameters (RDP) feature provides detailed port, media, and optics diagnostics to easily discover and diagnose link-related errors and degrading conditions on any N_Port-to-F_Port link.
- Link cable beacon (LCB) enables administrators to visually identify both ends of a physical link by flashing HBA's LEDs, simplifying identification of the connection peers within server racks without tracing the cable.
- Single-pane-of-glass management across generations of QLogic FC adapters with QLogic QConvergeConsole (QCC).
- Deployment flexibility and integration with third-party management tools, including the VMware® vCenter™ and Brocade Network Advisor.
- Support for 16 Gb, 8 Gb, and 4 Gb FC devices.
- Comprehensive virtualization capabilities with support for N_Port ID Virtualization (NPIV).
- A common driver model allows a single driver to support all QLogic HBAs on a given OS.
- Reduce the number of cards, cables, and PCIe slots required.
- Exceptional performance per watt and price/performance ratios.
- Backward compatibility with existing 4GFC and 8GFC infrastructure, leveraging existing SAN investments.
- Allow application of SAN best practices, tools, and processes with virtual server deployments.
- Ensure data availability and data integrity.
- Boot from SAN capability reduces the system management costs and increases uptime.

The following table compares features of QLogic Enhanced Gen 5 16 Gb, Gen 5 16 Gb, and 8 Gb FC HBAs.

Table 3. QLogic Enhanced Gen 5 16 Gb, Gen 5 16 Gb, and 8 Gb FC HBAs feature comparison

| Feature | Enhanced Gen 5 16 Gb FC | Gen 5 16 Gb FC | 8 Gb FC |
|---------------------------|-------------------------|---|-----------------------|
| Part numbers | 01CV750 01CV760 | 00Y3337 00Y3341 | 42D0501 42D0510 |
| Host interface | PCIe 3.0 x8 | PCIe 3.0 x4, PCIe 2.0 x8 (x8 physical connector) | PCIe 2.0 x8 |
| IOPS performance | 1.3 M IOPS | 1.2 M IOPS | 0.2 M IOPS (per port) |
| 16 Gb FC SFP+ transceiver | Yes | Yes | No |
| 8 Gb FC SFP+ transceiver | No | No | Yes |
| 16 Gbps speed support | Yes | Yes | No |
| 8 Gbps speed support | Yes | Yes | Yes |
| 4 Gbps speed support | Yes | Yes | Yes |
| ClearLink support | Yes | Yes | No |
| Concurrent logins | 2,048 | 2,048 | 2,048 |
| Active exchanges | 2,048 | 2,048 | 2,048 |

Technical specifications

The QLogic Enhanced Gen 5 16 Gb FC HBAs have the following specifications:

- Based on the QLogic QLE2690 (single port) and QLE2692 (dual port) adapters
- Host interface: PCIe 3.0 x8
- Ports: Single-port and dual-port SFP+ based adapters
- Link speed: Support for 16 Gb, 8 Gb and 4 Gb FC link speeds, which are automatically negotiated
- Data rate: 14.025 Gbps (1600 MBps), 8.5 Gbps (800 MBps), and 4.25 Gbps (400 MBps) autosensing (per port), with full duplex
- Performance: Up to 1,300,000 IOPS (up to 650,000 IOPS per port)
- Fibre Channel standards: FC-PI-5, FC-GS-2, FC-GS-3, SCSI-FCP, FCP-2, FC-TAPE
- Topology: Point-to-point and switched fabric
- Hot-pluggable 16 Gbps Fibre Channel SFP+ short wave optical transceivers (850 nm) with LC connectors (included with the adapters). Note: Other transceivers are not supported.
- Distance support:
 - Operating at 16 Gbps:
 - Up to 35 m on 50/125 μ m OM2 Multi-Mode Fiber (MMF)
 - Up to 100 m on 50/125 μ m OM3 MMF
 - Up to 125 m on 50/125 μ m OM4 MMF
 - Operating at 8 Gbps:
 - Up to 21 m on 62.5/125 μ m OM1 MMF
 - Up to 50 m on 50/125 μ m OM2 MMF
 - Up to 150 m on 50/125 μ m OM3 MMF
 - Up to 190 m on 50/125 μ m OM4 MMF
 - Operating at 4 Gbps:
 - Up to 70 m on 62.5/125 μ m OM1 MMF
 - Up to 150 m on 50/125 μ m OM2 MMF
 - Up to 380 m on 50/125 μ m OM3 MMF
 - Up to 400 m on 50/125 μ m OM4 MMF
- Management software:
 - The QLogic unified management application, QLogic QConvergeConsole (QCC), provides single-pane-of-glass management across generations of QLogic FC adapters.
 - QLogic supports all major APIs for deployment flexibility and integration with third-party management tools, including the VMware vCenter and Brocade Network Advisor.

Server support - ThinkSystem

The following table lists the ThinkSystem servers that are compatible.

Table 4. ThinkSystem server support

| Part number | Description | 1S Rack & Tower | | | | 2S Rack & Tower | | | | | | | | 4S Rack | | | Dense/ Blade | | | |
|-------------|--|------------------|-------------------|--------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------------|-------------------|-------------------|--------------------|--------------|--------------|--------------|--------------|
| | | ST50 (7Y48/7Y50) | ST250 (7Y45/7Y46) | SR150 (7Y54) | SR250 (7Y51/7Y52) | ST550 (7X09/7X10) | SR530 (7X07/7X08) | SR550 (7X03/7X04) | SR570 (7Y02/7Y03) | SR590 (7X98/7X99) | SR630 (7X01/7X02) | SR650 (7X05/7X06) | SR670 (7Y36/7Y37/7Y38) | SR850 (7X18/7X19) | SR860 (7X69/7X70) | SR950 (7X11/12/13) | SD530 (7X21) | SD650 (7X58) | SN550 (7X16) | SN850 (7X15) |
| 01CV760 | QLogic 16Gb Enhanced Gen5 FC Dual-port HBA | N | N | N | N | Y | Y | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | N | N | N |
| 01CV750 | QLogic 16Gb Enhanced Gen5 FC Single-port HBA | N | N | N | N | Y | Y | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | N | N | N |

Server support - System x

The following tables list the System x servers that are compatible.

Support for System x and dense servers with Xeon E5/E7 v4 and E3 v5 processors

Table 5. Support for System x and dense servers with Xeon E5/E7 v4 and E3 v5 processors

| Part number | Description | x3250 M6 (3943) | x3250 M6 (3633) | x3550 M5 (8869) | x3650 M5 (8871) | x3850 X6/x3950 X6 (6241, E7 v4) | nx360 M5 (5465, E5-2600 v4) | sd350 (5493) | nx360 M5 WCT (5467, E5-2600 v4) |
|-------------|--|-----------------|-----------------|-----------------|-----------------|---------------------------------|-----------------------------|--------------|---------------------------------|
| 01CV760 | QLogic 16Gb Enhanced Gen5 FC Dual-port HBA | N | N | Y | Y | Y | Y | N | N |
| 01CV750 | QLogic 16Gb Enhanced Gen5 FC Single-port HBA | N | N | Y | Y | Y | Y | N | N |

Support for System x and dense servers with Intel Xeon v3 processors

Table 6. Support for servers with Intel Xeon v3 processors

| Part number | Description | x3100 M5 (5457) | x3250 M5 (5458) | x3500 M5 (5464) | x3550 M5 (5463) | x3650 M5 (5462) | x3850 X6/x3950 X6 (6241, E7 v3) | nx360 M5 (5465) |
|-------------|--|-----------------|-----------------|-----------------|-----------------|-----------------|---------------------------------|-----------------|
| 01CV760 | QLogic 16Gb Enhanced Gen5 FC Dual-port HBA | N | N | Y | Y | Y | Y | Y |
| 01CV750 | QLogic 16Gb Enhanced Gen5 FC Single-port HBA | N | N | Y | Y | Y | Y | Y |

Operating systems

The adapters support the following operating systems:

- Microsoft Windows Server 2012 R2
- Microsoft Windows Server 2016
- Microsoft Windows Server 2019
- Microsoft Windows Server version 1709
- Microsoft Windows Server version 1803
- Red Hat Enterprise Linux 6.10
- Red Hat Enterprise Linux 6.9
- Red Hat Enterprise Linux 7.3
- Red Hat Enterprise Linux 7.4
- Red Hat Enterprise Linux 7.5
- SUSE Linux Enterprise Server 11 SP4
- SUSE Linux Enterprise Server 11 SP4 with Xen
- SUSE Linux Enterprise Server 12 SP2
- SUSE Linux Enterprise Server 12 SP2 with Xen
- SUSE Linux Enterprise Server 12 SP3
- SUSE Linux Enterprise Server 12 SP3 with Xen
- SUSE Linux Enterprise Server 15
- SUSE Linux Enterprise Server 15 with Xen
- VMware vSphere Hypervisor (ESXi) 6.0 U3
- VMware vSphere Hypervisor (ESXi) 6.5
- VMware vSphere Hypervisor (ESXi) 6.5 U1
- VMware vSphere Hypervisor (ESXi) 6.5 U2
- VMware vSphere Hypervisor (ESXi) 6.7
- VMware vSphere Hypervisor (ESXi) 6.7 U1

Operating system support may vary by server. For more information, see ServerProven at <http://www.lenovo.com/us/en/serverproven/>. Select the server in question, scroll down to the adapter, and click the + icon in that row to show the supported operating systems.

SAN switches

The following table lists the Fibre Channel SAN switches that are offered by Lenovo and can be used with this system.

Table 7. Fibre Channel SAN switches

| Part number | Description |
|-------------|---|
| 8 Gb FC | |
| 3873AR3 | Lenovo B300, 8 ports licensed, 8x 8Gb SWL SFPs, 1 PS, Rail Kit, 3Yr FW |
| 3873AR6 | Lenovo B300, E_Port License, 8 ports licensed, 8x 8Gb SWL SFPs, 1 PS, Rail Kit, 1Yr FW |
| 16 Gb FC | |
| 6559F2A | Lenovo ThinkSystem DB610S, 8 ports licensed, 8x 16Gb SWL SFPs, 1 PS, Rail Kit, 1Yr FW |
| 6559F1A | Lenovo ThinkSystem DB610S, ENT Bundle, 24 ports licensed, 24x 16Gb SWL SFPs, 1 PS, Rail Kit, 1Yr FW |
| 6559D1Y | Lenovo ThinkSystem DB610S, ENT Bundle, 24 ports licensed, 24x 16Gb SWL SFPs, 1 PS, Rail Kit, 3Yr FW |
| 3873ER1 | Lenovo B6505, 12 ports licensed, 12x 16Gb SWL SFPs, 1 PS, Rail Kit, 1Yr FW |
| 3873AR5 | Lenovo B6505, 12 ports licensed, 12x 16Gb SWL SFPs, 1 PS, Rail Kit, 3Yr FW |
| 3873IR1 | Lenovo B6510, 24 ports licensed, 24x 16Gb SWL SFPs, 2 PS, Rail Kit, 1Yr FW |
| 3873BR3 | Lenovo B6510, 24 ports licensed, 24x 16Gb SWL SFPs, 2 PS, Rail Kit, 3Yr FW |
| 32 Gb FC | |
| 6559F3A | Lenovo ThinkSystem DB610S, 8 ports licensed, No SFPs, 1 PS, Rail Kit, 1Yr FW |
| 6559D3Y | Lenovo ThinkSystem DB610S, 8 ports licensed, No SFPs, 1 PS, Rail Kit, 3Yr FW |
| 6415G3A | Lenovo ThinkSystem DB620S, 24 ports licensed, No SFPs, 2 PS, Rail Kit, 1Yr FW |
| 6415H11 | Lenovo ThinkSystem DB620S, 24 ports licensed, 24x 32Gb SWL SFPs, 2 PS, Rail Kit, 1Yr FW |
| 6415G11 | Lenovo ThinkSystem DB620S, 24 ports licensed, 24x 32Gb SWL SFPs, 2 PS, Rail Kit, 3Yr FW |
| 6415H2A | Lenovo ThinkSystem DB620S, ENT Bundle, 48 ports licensed, 48x 32Gb SWL SFPs, 2 PS, Rail Kit, 1Yr FW |
| 6684D2A | Lenovo ThinkSystem DB400D 32Gb FC Director, ENT. Feature set, 4 Blade slots, 8U, 1Yr FW |
| 6684B2A | Lenovo ThinkSystem DB400D 32Gb FC Director, ENT. Feature set, 4 Blade slots, 8U, 3Yr FW |
| 6682D1A | Lenovo ThinkSystem DB800D 32Gb FC Director, ENT. Feature set, 8 Blade slots, 14U, 1Yr FW |

For more information, see the list of Product Guides in the Rack SAN Switches category:

<http://lenovopress.com/storage/switches/rack#rt=product-guide>

For information about interoperability with storage servers, see the Lenovo Storage Interoperability Links article, available from:

<https://lenovopress.com/lp0584-lenovo-storage-interoperability-links>

Warranty

The QLogic Enhanced Gen 5 16 Gb FC HBAs carry a one-year limited warranty. When installed in a supported server, the adapters assume the server's base warranty and any Lenovo Services warranty upgrade.

Physical specifications

The QLogic Enhanced Gen 5 16 Gb FC HBAs have the following dimensions (approximate):

- Low profile form factor card
- 168 mm x 69 mm (6.60 in. x 2.7 in.)
- Standard (3U) and low-profile (2U) brackets included

Operating environment

The QLogic Enhanced Gen 5 16 Gb FC HBAs are supported in the following environment:

- Temperature:
 - Operating: 0 - 55 °C (32 - 131 °F)
 - Storage: -20 - 70 °C (-4 - 185 °F)
- Relative humidity:
 - Operating: 10 - 90% (non-condensing)
 - Storage: 5 - 95% (non-condensing)

Agency approvals

The QLogic Enhanced Gen 5 16 Gb FC HBAs conform to the following regulations:

- AS/NZS CISPR22:2009+A1, Class A
- CSA 22.2, No. 60950-1-07 (2nd Edition)
- EN55022:2010, Class A
- EN55024:2010
- EU (CE Mark)
- FCC Rules, Part 15, Class A
- Industry Canada, ICES-003, Class A
- Japan VCCI, Class A
- Korea KC-RRR, Class A
- TUV EN60950-1:2006+A11+A1+A12 (2nd Edition)
- Taiwan BSMI, Class A
- UL60950-1 (2nd Edition)

Related publications and links

For more information, see the following resources:

- Lenovo ThinkSystem networking options product page
<https://lenovopress.com/lp0765-networking-options-for-thinksystem-servers>
- Lenovo System x Fibre Channel options product page
<https://www3.lenovo.com/us/en/data-center/servers/server-options/system-x-options/networking-adapters/fibre-channel-host-bus-adapters/c/fibre-channel-hba>
- Lenovo Storage Interoperability Links
<https://lenovopress.com/lp0584-lenovo-storage-interoperability-links>
- Lenovo support
<http://support.lenovo.com>
- Lenovo ServerProven
<http://static.lenovo.com/us/en/serverproven/xseries/sharedstorage/samatrix.shtml>

Related product families

Product families related to this document are the following:

- [Host Bus Adapters](#)

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