

Emulex 16Gb Gen 5 Fibre Channel Adapters

Product Guide (withdrawn product)

The Emulex 16Gb Fibre Channel (FC) host bus adapters (HBAs) are part of a family of high-performance FC HBA solutions. These Generation 5 HBAs deliver exceptional performance, enabling small and medium businesses to experience unsurpassed robustness and reliability for a wide spectrum of servers, storage, and SANs. These adapters provide an ideal solution for all System x servers requiring high-speed data transfer in disk connectivity for virtualized environments and data-backup, mission-critical applications.

Emulex Generation 5 16Gb HBAs now seamlessly supports Brocade ClearLink diagnostics through Emulex HBA Manager (formerly named OneCommand Manager), ensuring the reliability and management of storage network configurations when connected to Brocade Gen 5 FC SAN fabrics. In addition, the adapters can offer end-to-end Quality of Service (QoS) application prioritization with ExpressLane technology.

The following figure shows the single-port adapter (SFP+ is not present).



Figure 1. Emulex 16Gb FC Single-port HBA (with 3U bracket attached; SFP+ is not present)

Did you know?

The highly integrated multiprocessor design of the Emulex 16 Gb FC HBA minimizes onboard components and improves host performance and efficiency. Advanced error-checking features ensure the integrity of block data passing through the storage area network (SAN). The Emulex HBA Manager enterprise class management application features a multiprotocol and cross-platform architecture that provides centralized management of all Emulex HBAs. The unique Emulex HBA Manager plug-in for VMware vCenter enables HBAs to be managed directly within the VMware environment, simplifying management.

Part number information

The following table shows the part number and feature codes for ordering the Emulex 16Gb FC HBAs.

Table 1. Ordering part numbers and feature codes

Part number	Feature code	Description
81Y1655	A2W5	Emulex 16Gb FC Single-port HBA
81Y1662	A2W6	Emulex 16Gb FC Dual-port HBA

The part numbers for the Emulex 16Gb FC Single-port and Dual-port HBAs include the following items:

- An FC HBA adapter with one or two short-wave (SWL) 16 Gb (16/8/4 Gb support) SFP+ installed and 3U bracket attached
- Low profile (2U) bracket
- Documentation package

The following figure shows the dual-port adapter (SFP+ are not present).



Figure 2. Emulex 16Gb FC Dual-port HBA (with 3U bracket attached; SFP+ are not present)

Features

The Emulex 16Gb Fibre Channel HBAs have the following features:

- Maximum performance with over 1 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, and faster server host bus architectures.
- Supports new Generation 5 technology:
 - Seamlessly supports Brocade ClearLink diagnostics through Emulex HBA Manager (formerly named Emulex OneCommand Manager), ensuring the reliability and management of storage network configurations when connected to Brocade Gen 5 FC SAN fabrics.
 - Offers end-to-end Quality of Service (QoS) application prioritization with ExpressLane technology.
- Frame-level multiplexing and out-of-order frame reassembly increases link efficiency and maximizes HBA performance.
- vScale performance and scalability: Multicore ASIC engine with eight cores supports 255 VFs, 1024 MSI-X, and 8192 logins/open exchanges for maximum VM density.
- 2x management functionality, which takes half the time to manage with Emulex HBA Manager.
- Unique HBA Manager plug-in for VMware vCenter for centralized management of adapters within a VMware environment.
- GreenState power efficiency reduces data center power consumption and associated operational expenses by delivering exceptional power to port ratios.
- End-to-end data protection with hardware parity, CRC, ECC, and other advanced error checking and correcting algorithms, which ensures that data is safe from corruption.
- BlockGuard data integrity offload ensures high performance and end-to-end data integrity.
- vEngine CPU offload lowers the processor burden on the host server, enabling support for more VMs.
- Rock-solid reliability and thermal characteristics, which are essential for mission-critical, cloud and virtualized applications.
- Support for Message Signaled Interrupts eXtended (MSI-X) improves host utilization and enhances application performance.
- Support for 16 Gb, 8 Gb, and 4 Gb FC devices.
- Comprehensive virtualization capabilities with support for N_Port ID Virtualization (NPIV) and Virtual Fabric.
- Host-to-fabric Fibre Channel Security Protocol (FC-SP) authentication.
- A common driver model allows a single driver to support all Emulex HBAs on a given OS.
- Reduces the number of cards, cables, and PCIe slots required.
- Exceptional performance per watt and price/performance ratios.
- Integrates seamlessly into existing SANs.
- Allows application of SAN best practices, tools, and processes with virtual server deployments.
- Ensures data availability and data integrity.
- Universal boot capability allows the appropriate boot environment to be automatically selected for any given hardware.
- Boot from SAN capability reduces the system management costs and increases uptime.
- Detailed and real-time event logging and tracing enables quick diagnosis of SAN problems.
- The beaconing feature flashes the HBA LEDs, simplifying their identification within server racks.
- The environmental monitoring feature helps optimize SAN availability.

Technical specifications

The Emulex 16Gb FC Single-port and Dual-port HBAs have the following specifications:

- Based on the Emulex LPe16000 (single port) and LPe16002 (dual port) adapters
- Host interface: PCIe 3.0 x8
- Single-port or dual-port SFP+ based adapters
- 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), 4.25 Gbps (400 MBps), and 2.125 Gbps (200 MBps) autosensing (per port), with full duplex
- Performance: Over 500,000 IOPS per port (over 1,000,000 IOPS per dual-port adapter)
- Industry standards
 - Current ANSI/IETF standards: FC-PI-4, FC-PI-5, FC-FS-2 with amendment 1, FC-AL-2 with amendments 1 and 2, FC-LS-2, FC-GS-6, FC-DA, FC-SP-2, FCP-4, FC-MJS, FC-SB-4, FC-SP, SPC-4, SBC-3, SSC-3, and RFC4338
 - Legacy ANSI/IETF standards: FC-PH, FC-PH-2, FC-PH-3, FC-PI, FC-PI-2, FC-FS, FC-AL, FC-GS-2/3/4/5, FCP, FCP-2, FC-SB-2, FC-FLA, FC-HBA, FC-PLDA, FC-TAPE, FC-MI, SPC-3, SBC-2, SSC-2, and RFC2625
- Topology: Point-to-point and switched fabric
- Supported media: 16 Gbps Fibre Channel LC SFP+ short wave optical transceivers (850 nm), hot-pluggable
- Distance support:
 - 15 m at 16 Gbps on 62.5/125 μ m OM1 Multi-Mode Fiber (MMF).
 - 35 m at 16 Gbps on 50/125 μ m OM2 MMF.
 - 100 m at 16 Gbps on 50/125 μ m OM3 MMF.
 - 125 m at 16 Gbps on 50/125 μ m OM4 MMF.
- Management software:
 - Emulex AutoPilot Installer automates the HBA installation process and reduces time to deployment and administrative costs. Automated installation and configuration of driver and management tools simplifies deployment of multiple adapters within Windows environments. A single installation of driver and management application eliminates multiple reboots and ensures that each component is installed correctly and the HBA is ready to use.
 - The Emulex HBA Manager application enables centralized discovery, monitoring, reporting, and administration of Emulex HBAs and UCNAs on local and remote hosts. Powerful automation capabilities facilitate remote driver parameter, firmware, and boot code upgrades. In addition to the GUI interface, management functions can also be performed through a scriptable command-line interface (CLI) and a web browser.
 - Emulex management instrumentation complies to Open Management Standards, such as SMI-S and common HBA API support, which enables seamless upward integration into enterprise storage and server management solutions.

Server support

The Emulex 16Gb FC Single-port and Dual-port HBAs are supported in the servers that are listed in the following tables.

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

Table 2. 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)
81Y1655	Emulex 16Gb FC Single-port HBA	N	N	Y	Y	Y	Y	N
81Y1662	Emulex 16Gb FC Dual-port HBA	N	N	Y	Y	Y	Y	N

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

Table 3. 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)
81Y1655	Emulex 16Gb FC Single-port HBA	Y	Y	Y	Y	Y	Y	Y
81Y1662	Emulex 16Gb FC Dual-port HBA	Y	Y	Y	Y	Y	Y	Y

Support for servers with Intel Xeon v2 processors

Table 4. Support for servers with Intel Xeon v2 processors

Part number	Description	x3300 M4 (7382)	x3500 M4 (7383, E5-2600 v2)	x3550 M4 (7914, E5-2600 v2)	x3630 M4 (7158, E5-2400 v2)	x3650 M4 (7915, E5-2600 v2)	x3650 M4 BD (5466)	x3750 M4 (8753)	x3850 X6/x3950 X6 (6241, E7 v2)
81Y1655	Emulex 16Gb FC Single-port HBA	Y	Y	Y	Y	Y	Y	Y	Y
81Y1662	Emulex 16Gb FC Dual-port HBA	Y	Y	Y	Y	Y	Y	Y	Y

For the latest information about the System x servers that support each adapter, see ServerProven: <http://www.lenovo.com/us/en/serverproven/xseries/sharedstorage/samatrix.shtml>

Operating system support

The following tables list the supported operating systems:

- [Emulex 16Gb FC Single-port HBA, 81Y1655](#)
- [Emulex 16Gb FC Dual-port HBA, 81Y1662](#)

Tip: These tables are automatically generated based on data from [Lenovo ServerProven](#).

Table 5. Operating system support for Emulex 16Gb FC Single-port HBA for Lenovo System x, 81Y1655

Operating systems	x3850/3950 X6 (3837)	x3850/3950 X6 (6241, E7 v2)	x3850/3950 X6 (6241, E7 v3)	x3850/3950 X6 (6241, E7 v4)	nx360 M5 (5465)	x3500 M5 (5464)	x3550 M5 (5463)	x3550 M5 (8869)	x3650 M5 (5462)	x3650 M5 (8871)	x3100 M5 (5457)	x3250 M5 (5458)
Microsoft Windows Server 2008 R2	Y	Y	Y	N	N	Y	Y ⁴	Y	Y	Y	Y	Y
Microsoft Windows Server 2012	Y	Y	Y	Y	Y	Y	Y ⁴	Y	Y	Y	Y	Y
Microsoft Windows Server 2012 R2	Y	Y	Y	Y	Y	Y	Y ⁴	Y	Y	Y	N	N
Microsoft Windows Server 2016	N	Y ¹	Y ¹	Y ¹	Y	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2019	N	N	N	Y	N	N	N	Y	N	Y	N	N
Microsoft Windows Server version 1709	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Microsoft Windows Server version 1803	N	N	N	N	N	N	N	Y	N	Y	N	N
Red Hat Enterprise Linux 5 Server Edition	N	N	N	N	N	N	N	N	N	N	N	Y
Red Hat Enterprise Linux 5 Server with Xen x64 Edition	N	N	N	N	N	N	N	N	N	N	N	Y
Red Hat Enterprise Linux 5 Server x64 Edition	N	N	N	N	N	N	N	N	N	N	N	Y
Red Hat Enterprise Linux 6 Server Edition	N	N	N	N	N	N	N	N	N	N	N	Y
Red Hat Enterprise Linux 6 Server x64 Edition	Y	Y	N	N	Y	Y	Y ⁴	Y	Y	Y	N	Y
Red Hat Enterprise Linux 7	Y	Y	Y	Y	Y	Y	Y ⁴	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.0	N	N	N	Y	N	N	N	N	N	N	N	N
SUSE Linux Enterprise Server 11 for AMD64/EM64T	Y	Y	Y	Y	Y	Y	Y ⁴	Y	Y	Y	Y	N
SUSE Linux Enterprise Server 11 for x86	N	N	N	N	N	N	N	N	N	N	Y	N
SUSE Linux Enterprise Server 11 with Xen for AMD64/EM64T	Y	Y	Y	Y	Y	Y	Y ⁴	Y	Y	Y	N	N
SUSE Linux Enterprise Server 12	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12 with Xen	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15	N	N	Y	Y	Y	N	N	Y	N	Y	N	N
SUSE Linux Enterprise Server 15 with Xen	N	N	Y	Y	Y	N	N	Y	N	Y	N	N
VMware vSphere 5.1 (ESXi)	Y	Y	N	N	Y	Y	Y ⁴	N	Y	N	Y	Y
VMware vSphere Hypervisor (ESXi) 5.5	Y	Y	N	N	N	Y	N	Y	Y	Y	N	N
VMware vSphere Hypervisor (ESXi) 6.0	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	N	Y
VMware vSphere Hypervisor (ESXi) 6.5	Y	N	Y	Y ²	Y	Y	Y ²	Y ²	Y ²	Y ²	Y	Y
VMware vSphere Hypervisor (ESXi) 6.7	N	N	N	Y ²	Y	Y ³	N	Y ²	N	Y ²	N	N

¹ [in box driver support only]

² Please refer LSIC (interop site) for latest Lenovo External Storage support configuration.
<https://datacentersupport.lenovo.com/ca/en/lpic/>

³ Detail information please refer to [Support Tip HT506708](#)

⁴ [Emulex 16G FC adapter can't concurrent work with IBM iboot on legacy mode. Retain Tip H213415 :
<https://www-947.ibm.com/support/entry/portal/docdisplay?brandind=5000008&Indocid=MIGR-5096509>]

Table 6. Operating system support for Emulex 16Gb FC Dual-port HBA for Lenovo System x, 81Y1662

Operating systems	x3850/3950 X6 (3837)	x3850/3950 X6 (6241, E7 v2)	x3850/3950 X6 (6241, E7 v3)	x3850/3950 X6 (6241, E7 v4)	nx360 M5 (5465)	x3500 M5 (5464)	x3550 M5 (5463)	x3550 M5 (8869)	x3650 M5 (5462)	x3650 M5 (8871)	x3100 M5 (5457)	x3250 M5 (5458)
Microsoft Windows Server 2008 R2	Y	Y	Y	N	N	Y	Y ⁴	Y	Y	Y	Y	Y
Microsoft Windows Server 2012	Y	Y	Y	Y	Y	Y	Y ⁴	Y	Y	Y	Y	Y
Microsoft Windows Server 2012 R2	Y	Y	Y	Y	Y	Y	Y ⁴	Y	Y	Y	N	N
Microsoft Windows Server 2016	N	Y ¹	Y ¹	Y ¹	Y	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2019	N	N	N	Y	N	N	N	Y	N	Y	N	N
Microsoft Windows Server version 1709	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Microsoft Windows Server version 1803	N	N	N	N	N	N	N	Y	N	Y	N	N
Red Hat Enterprise Linux 5 Server Edition	N	N	N	N	N	N	N	N	N	N	N	Y
Red Hat Enterprise Linux 5 Server with Xen x64 Edition	N	N	N	N	N	N	N	N	N	N	N	Y
Red Hat Enterprise Linux 5 Server x64 Edition	N	N	N	N	N	N	N	N	N	N	N	Y
Red Hat Enterprise Linux 6 Server Edition	N	N	N	N	N	N	N	N	N	N	N	Y
Red Hat Enterprise Linux 6 Server x64 Edition	Y	Y	N	N	Y	Y	Y ⁴	Y	Y	Y	N	Y
Red Hat Enterprise Linux 7	Y	Y	Y	Y	Y	Y	Y ⁴	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.0	N	N	N	Y	N	N	N	N	N	N	N	N
SUSE Linux Enterprise Server 11 for AMD64/EM64T	Y	Y	Y	Y	Y	Y	Y ⁴	Y	Y	Y	Y	N
SUSE Linux Enterprise Server 11 for x86	N	N	N	N	N	N	N	N	N	N	Y	N
SUSE Linux Enterprise Server 11 with Xen for AMD64/EM64T	Y	Y	Y	Y	Y	Y	Y ⁴	Y	Y	Y	N	N
SUSE Linux Enterprise Server 12	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12 with Xen	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15	N	N	Y	Y	Y	N	N	Y	N	Y	N	N
SUSE Linux Enterprise Server 15 with Xen	N	N	Y	Y	Y	N	N	Y	N	Y	N	N
VMware vSphere 5.1 (ESXi)	Y	Y	N	N	Y	Y	Y ⁴	N	Y	N	Y	Y
VMware vSphere Hypervisor (ESXi) 5.5	Y	Y	N	N	N	Y	N	Y	Y	Y	N	N
VMware vSphere Hypervisor (ESXi) 6.0	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	N	Y
VMware vSphere Hypervisor (ESXi) 6.5	Y	N	Y	Y ²	Y	Y	Y ²	Y ²	Y ²	Y ²	Y	Y
VMware vSphere Hypervisor (ESXi) 6.7	N	N	N	Y ²	Y	Y ³	N	Y ²	N	Y ²	N	N

¹ [in box driver support only]

² Please refer LSIC (interop site) for latest Lenovo External Storage support configuration.
<https://datacentersupport.lenovo.com/ca/en/lpic/>

³ Detail information please refer to [Support Tip HT506708](#)

⁴ [Emulex 16G FC adapter can't concurrent work with IBM iboot on legacy mode. Retain Tip H213415 :
<https://www-947.ibm.com/support/entry/portal/docdisplay?brandind=5000008&Indocid=MIGR-5096509>]

Physical specifications

The Emulex 16Gb FC Single-port and Dual-port HBAs have the following physical specifications.

Dimensions and weight (approximate):

- Height: 69 mm (2.7 in.)
- Width: 168 mm (6.6 in.)
- Depth: 25 mm (1.0 in.)
- Weight: 113 g (0.25 lb)

Shipping dimensions and weight (approximate):

- Height: 48 mm (1.9 in.)
- Width: 217 mm (8.5 in.)
- Depth: 140 mm (5.5 in.)
- Weight: 450 g (1.0 lb)

Operating environment

The adapters are supported in the following environment:

- Temperature:
 - Operating: 0 - 55 °C (32 - 131 °F)
 - Storage: -40 - 70 °C (-40 - 158 °F)
- Relative humidity:
 - 5 - 95% (relative, non-condensing)

Warranty

One-year limited warranty. When installed in a System x server, these cards assume the system's base warranty and any Lenovo warranty service upgrade.

Agency approvals

The adapter conforms to the following standards:

- 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-IV

Related product families

Product families related to this document are the following:

- [Host Bus Adapters](#)

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This document, TIPS0848, was created or updated on September 8, 2019.

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