Emulex 16 Gb Gen 6 Fibre Channel Host Bus Adapters for Lenovo System x Servers

Product Guide

The Emulex 16 Gb (Generation 6) Fibre Channel (FC) host bus adapters (HBAs) are an ideal solution for all Lenovo System x servers requiring high-speed data transfer in storage connectivity for virtualized environments, data backup, and mission-critical applications. They are designed to meet the needs of modern networked storage systems that utilize high performance and low latency solid state storage drives for caching and persistent storage as well as hard disk drive arrays.

The Emulex 16 Gb Gen 6 FC HBAs feature ExpressLane™, which prioritizes mission-critical traffic in congested networks ensuring maximum application performance on flash storage arrays. They also seamlessly support Brocade ClearLink™ diagnostics through Emulex OneCommand® Manager, ensuring the reliability and management of storage network when connected to Brocade Gen 5 FC SAN fabrics.

Figure 1. Emulex 16 Gb Gen 6 FC Single-port (right) and Dual-port (left) HBAs (without SFP+ modules)

Did you know?

The Emulex 16 Gb Gen 6 FC HBAs have an advanced ASIC which can achieve 1.6M IOPS on a single port by using Emulex's Dynamic Multicore architecture, which dynamically scales HBA resources to any port that needs it. This is essential when ports are used in active-standby mode.

The Emulex 16 Gb Gen 6 FC HBAs can provide near limitless scalability to support maximum VM density, with 2x more on-chip resources and bandwidth. These low latency HBAs can also improve your VDI experience, providing noticeable improvements during boot storms, and allow faster data warehousing and meet the massive bandwidth requirements of flash storage arrays.

Part number information

The following table lists the ordering information for the Emulex 16 Gb Gen 6 FC HBAs.

Table 1. Part number information

Description	Part number	Feature code
Emulex 16Gb Gen6 FC Single-port HBA	01CV830	ATZU
Emulex 16Gb Gen6 FC Dual-port HBA	01CV840	ATZV

The part numbers for the Emulex 16 Gb Gen 6 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

Key features

The Emulex 16 Gb Gen 6 FC HBAs have the following features:

- Maximum performance with up to 1.6 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.
- Supports Brocade Clearlink diagnostics, which helps ensure optical and signal integrity for Fibre Channel cables and optics by validating the health, reliability and performance of the network prior to, and after, deployment. Allows the IT administrator to detect faulty cables and optics in minutes versus hours. Brocade ClearLink is also seamlessly integrated into Emulex OneCommand.
- Offer end-to-end Quality of Service (QoS) application prioritization with ExpressLane technology, which allows customers to prioritize faster storage traffic (such as SSDs) ahead of slower traffic (such as spinning hard drives), alleviating potential bottlenecks from slow storage.
- 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 16127 logins/open exchanges for maximum VM density.
- The Emulex OneCommand Manager enterprise class management application features a multiprotocol and cross-platform architecture that provides centralized management of all Emulex HBAs. VMware vCenter plug-in provides OneCommand support 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.
- Support forward error correction (FEC), a new Gen 6 standard feature that provides enhanced data reliability and performance by automatically detecting and recovering from bit errors.
- T10-PI data integrity with high performance offload provides end-to-end data corruption protection.
- Rock-solid reliability and thermal characteristics, which are essential for mission-critical, cloud, and virtualized applications.
- Emulex HBAs are renowned for reliability, ensuring maximum SAN uptime. Their "it just works" reputation is based on 17 million installed ports with proven industry-leading reliability of 10 million hours field Mean Time Between Failures (MTBF).
- 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).
- 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.

The following table compares features of Emulex 16 Gb Gen 6, 16 Gb (Gen 5), and 8 Gb FC HBAs.

Table 2. Emulex 16 Gb Gen 6, 16 Gb (Gen 5), and 8 Gb FC HBAs feature comparison

Feature	**16 Gb FC Gen 6**	**16 Gb FC (Gen 5)**	**8 Gb FC**
Part numbers	01CV830 01CV840	81Y1655 81Y1662	42D0485 42D0494
Host interface	PCIe 3.0 x8	PCIe 3.0 x8	PCIe 2.0 x8
IOPS performance	1.6 M IOPS	1.2 M IOPS	0.2 M IOPS (per port)
16 Gb FC SFP+ transceiver support	Yes	Yes	No
8 Gb FC SFP+ transceiver support	No	Yes	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
ExpressLane support	Yes	Yes	No
Logins and Exchanges	16,127	8,192	4,096
SR-IOV support	255 VFs	255 VFs	No

Important: Emulex 16 Gb Gen 6 FC HBAs offer better performance and scalability with lower power consumption, while fitting into the same price band, compared to Emulex 16 Gb (Gen 5) FC HBAs.

Technical specifications

The Emulex 16 Gb Gen 6 FC HBAs have the following specifications:

- I/O controller: Emulex Engine 501 (XE501) I/O Controller (IOC)
- 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 1,600,000 IOPS
- Industry standards:
    - Current ANSI/IETF standards: FC-PI-4, FC-PI-5, FC-PI-6 , FC-FS-3, FC-LS-2, FC-GS-6, FC-DA, FC-DA2, FCP-4, SPC-4, SBC-3, and SSC-4
    - Legacy ANSI/IETF standards: FC-PH, FC-PH-2, FC-PH-3, FC-PI, FC-PI-2, FC-PI-3, FC-FS, FC-GS-2/3/4/5, FCP-2/3, FC-HBA, FC-TAPE, FC-MI, SPC-3, SBC-2, SSC-2, and SSC-3
- Topology: Point-to-point and switched fabric
- Supported media: Hot-pluggable 16 Gbps Fibre Channel SFP+ short wave optical transceivers (850 nm) with LC connectors (included with the adapters)
- Distance support:
    - Operating at 16 Gbps:
        - Up to 15 m on 62.5/125 µm OM1 Multi-Mode Fiber (MMF)
        - Up to 35 m on 50/125 µm OM2 MMF
        - Up to 100 m on 50/125 µm OM3 MMF
        - Up to 125 m on 50/125 µm OM4 MMF
    - Operating at 8 Gbps:
        - Up to 21 m on 62.5/125 µm OM1 MMF
        - Up to 50 m on 50/125 µm OM2 MMF
        - Up to 150 m on 50/125 µm OM3 MMF
    - Operating at 4 Gbps:
        - Up to 70 m on 62.5/125 µm OM1 MMF
        - Up to 150 m on 50/125 µm OM2 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 OneCommand Manager application enables centralized discovery, monitoring, reporting, and administration of Emulex HBAs and CNAs 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 with Open Management Standards, such as SMI-S and common HBA API support, which enables seamless upward integration into enterprise storage and server management solutions.

Servers

The Emulex 16 Gb Gen 6 FC HBAs are supported on the following Lenovo servers:

- System x3500 M5 Type 5464
- System x3550 M5 Type 5463
- System x3550 M5 Type 8869
- System x3650 M5 Type 5462
- System x3650 M5 Type 8871
- System x3750 M4 Type 8753
- System x3850 X6 Type 6241 (E7 v2, E7 v3, and E7 v4)
- System x3950 X6 Type 6241 (E7 v2, E7 v3, and E7 v4)
- NeXtScale nx360 M5 Type 5465 (E5-2600 v3 and E5-2600 v4)

For Emulex 16 Gb Gen 6 FC HBAs support details for a particular server, refer to a Lenovo Press product guide for the server, found at: http://lenovopress.com

Operating systems

The Emulex 16 Gb Gen 6 FC HBAs support the following operating systems:

- Microsoft:
  - Microsoft Windows Server 2012 R2
  - Microsoft Windows Server 2012
- Red Hat:
  - Red Hat Enterprise Linux 7 Update 2
  - Red Hat Enterprise Linux 7 Update 1
  - Red Hat Enterprise Linux 6 Update 7 Server x64 Edition
- SUSE:
  - SUSE Linux Enterprise Server 12 SP1
  - SUSE Linux Enterprise Server 12
  - SUSE Linux Enterprise Server 11 SP4 for AMD64/EM64T
  - SUSE Linux Enterprise Server 11 SP3 for AMD64/EM64T
- VMware:
  - VMware vSphere 6.0 Update 2
  - VMware vSphere 6.0 Update 1
  - VMware vSphere 5.5 Update 3
  - VMware vSphere 5.5 Update 2

SAN switches

The following table lists the FC SAN switches that are currently offered by Lenovo that can be used with the Emulex 16 Gb Gen 6 FC HBAs in Lenovo FC SAN solutions.

Table 3. FC SAN switches

Description	Part number
Rack-mount switches - 8 Gb FC	
Lenovo B300, 8 ports activated w/ 8Gb SWL SFPs, 1 PS, Rail Kit	3873AR3
Lenovo B6505, 12 ports activated w/ 8Gb SWL SFPs, 1 PS, Rail Kit	3873AR4
Lenovo B6510, 24 ports activated w/ 8Gb SWL SFPs, 2 PS, Rail Kit	3873BR2
Rack-mount switches - 16 Gb FC	
Lenovo B6505, 12 ports activated w/ 16Gb SWL SFPs, 1 PS, Rail Kit	3873AR5
Lenovo B6510, 24 ports activated w/ 16Gb SWL SFPs, 2 PS, Rail Kit	3873BR3

For more information, see the list of Product Guides in the Rack-mount SAN switches category: http://lenovopress.com/storage/switches/rack

Warranty

The Emulex 16 Gb Gen 6 FC HBAs carry a one-year limited warranty. When installed in a supported server, the adapters assume your system's base warranty and any Lenovo Services warranty upgrade.

Physical specifications

The Emulex 16 Gb Gen 6 FC HBAs have the following dimensions (approximate):

- Short, low profile MD2 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 Emulex 16 Gb Gen 6 FC HBAs are supported in the following environment:

- Temperature:
  - Operating: 0 - 55 °C (32 - 131 °F)
  - Storage: -20 - 85 °C (-4 - 185 °F)
- Relative humidity: 5 - 95% (non-condensing)

Agency approvals

The Emulex 16 Gb Gen 6 FC HBAs conform to the following regulations:

- AS/NZS CISPR22:2009+A1, Class A
- Australian EMC Framework (RCM)
- China RoHS compliant
- cUR recognized to CSA 22.2, No. 60950-1-07
- EN55022:2010, Class A
- EN55024:2010
- EN55032:2012
- EU (CE Mark)
- FCC Rules, Part 15, Class A
- Industry Canada, ICES-003, Class A
- Japan VCCI, Class A
- Korea MSIP, Class A
- RoHS Compliant (Directive 2011/65/EU)
- TUV certified to EN60950-1+A11+A1+A12+A2
- Taiwan BSMI, Class A
- UL recognized to UL60950-1 2nd Edition

Related publications and links

For more information, see the following resources:

- Lenovo Fibre Channel Host Bus Adapters
  http://shop.lenovo.com/us/en/systems/servers/options/systemx/storage/raid-adapters/fibre-channel-hba/
- Lenovo support
  http://support.lenovo.com
- Lenovo ServerProven
  http://www.lenovo.com/us/en/serverproven

Related product families

Product families related to this document are the following:

- Host Bus Adapters

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