Lenovo ThinkServer Advanced 8 Gb and 16 Gb (Gen 5) Fibre Channel HBAs by Emulex

Product Guide (withdrawn product)

The Lenovo® ThinkServer® Advanced 8 Gb and 16 Gb (Generation 5) Fibre Channel (FC) host bus adapters (HBAs) by Emulex are an ideal solution for all ThinkServer systems servers requiring high-speed data transfer in storage connectivity for virtualized environments, data backup, and mission-critical applications.

The ThinkServer 16 Gb (Gen 5) FC HBAs by Emulex seamlessly support 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. These 16 Gb (Gen 5) FC adapters also support Emulex ExpressLane™ technology, which accelerates application performance between servers and across the fabric.

The ThinkServer Advanced 8 Gb FC HBAs by Emulex feature a 16 Gb adapter coupled with 8 Gb optical transceivers. This combination allows to realizing a significant performance boost over a standard 8 Gb FC adapter without the cost of 16 Gb optics. When you are ready to upgrade to a full 16 Gb solution, you can replace the 8 Gb optics with 16 Gb optics.

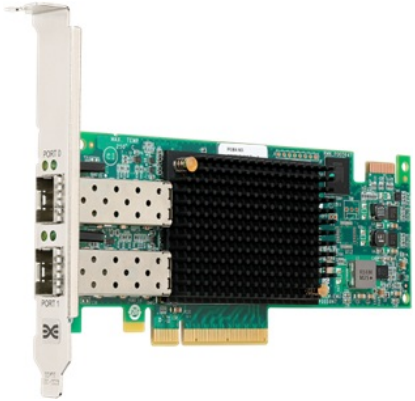

Figure 1. ThinkServer Dual-port 16 Gb (Gen 5) FC HBA by Emulex without SFP+ modules

Did you know?

The highly integrated multiprocessor design of the ThinkServer 16 Gb (Gen 5) FC HBAs by Emulex minimizes onboard components and improves host performance and efficiency.

The Advanced 8 Gb FC HBAs by Emulex are the only 8 Gb FC HBAs that feature a PCIe 3.0 bus.

The Emulex HBA Manager enterprise class management application features a multiprotocol and cross-platform architecture that provides centralized management of all Emulex HBAs.

Part number information

The following table lists the ordering part numbers for the ThinkServer Advanced 8 Gb and 16 Gb (Gen 5) FC HBA family by Emulex.

Table 1. Ordering part numbers

Description	Part number
Advanced 8 Gb FC PCIe 3.0 HBAs	
ThinkServer LPe16000B-M8 Single Port 8Gb Fibre Channel HBA by Emulex	4XB0F28652
ThinkServer LPe16002B-M8 Dual Port 8Gb Fibre Channel HBA by Emulex	4XB0F28643*
ThinkServer LPe16002B-M8-L PCIe 8Gb 2 Port Fibre Channel Adapter by Emulex	4XB0F28704
ThinkServer LPe15004B-M8-L PCIe 8Gb 4 Port Fibre Channel Adapter by Emulex	4XB0F28682
Advanced 8 Gb FC AnyFabric HBAs	
ThinkServer LPm15004-M8-L AnyFabric 8Gb 4 Port Fibre Channel Adapter by Emulex	4XB0F28707
16 Gb (Gen 5) FC PCIe 3.0 HBAs	
ThinkServer LPe16000B-M6 Single Port 16Gb Fibre Channel HBA by Emulex	4XB0F28653
ThinkServer LPe16002B-M6 Dual Port 16Gb Fibre Channel HBA by Emulex	4XB0F28650*
ThinkServer LPe16002B-M6-L PCIe 16Gb 2 Port Fibre Channel Adapter by Emulex	4XB0F28705
ThinkServer LPe16004B-M6-L PCIe 16Gb 4 Port Fibre Channel Adapter by Emulex	4XB0F28681
16 Gb (Gen 5) FC AnyFabric HBAs	
ThinkServer LPm16002-M6-L AnyFabric 16Gb 2 Port Fibre Channel Adapter by Emulex	4XB0F28706

* Withdrawn, no longer available for ordering.

The part numbers for the HBAs include the following items:

- Advanced 8 Gb FC HBAs: An FC HBA adapter with one, two, or four 8 Gb (8/4 Gbps speeds) FC SW SFP+ installed
- 16 Gb (Gen 5) FC HBAs: An FC HBA adapter with one, two, or four 16 Gb (16/8/4 Gbps speeds) FC SW SFP+ installed
- 3U (standard) and 2U (low-profile) adapter brackets (PCIe HBAs only).

  Note: The LPe16004B-M6-L adapter is a full-height adapter with the standard bracket only.

- Publications package

The following figure shows the ThinkServer LPe15004B-M8-L PCIe 8Gb 4 Port Fibre Channel Adapter by Emulex.

Figure 2. ThinkServer LPe15004B-M8-L PCIe 8Gb 4 Port Fibre Channel Adapter by Emulex

The following figure shows the ThinkServer LPm15004-M8-L AnyFabric 8Gb 4 Port Fibre Channel Adapter by Emulex.

Figure 3. ThinkServer LPm15004-M8-L AnyFabric 8Gb 4 Port Fibre Channel Adapter by Emulex

The following figure shows the ThinkServer LPm16002-M6-L AnyFabric 16Gb 2 Port Fibre Channel Adapter by Emulex.

Figure 4. ThinkServer LPm16002-M6-L AnyFabric 16Gb 2 Port Fibre Channel Adapter by Emulex

Key features

The ThinkServer Advanced 8 Gb and 16 Gb (Gen 5) FC HBAs by Emulex have the following features:

- Maximum performance with up to 1.2 million input/output operations per second (IOPS) per port and up to 2.4 million IOPS per 4-port HBA to support larger server virtualization deployments and scalable cloud initiatives, and performance to match new multicore processors, SSDs, and faster server host bus architectures.
- Support Generation 5 technology (16 Gb Gen 5 FC HBAs only):
    - Seamlessly support Brocade ClearLink diagnostics through Emulex HBA Manager, ensuring the reliability and management of storage network configurations when connected to Brocade Gen 5 FC SAN fabrics. With ClearLink, you can now pinpoint faulty cables and optics in minutes versus hours.
    - Offer end-to-end Quality of Service (QoS) application prioritization with ExpressLane technology, which allows you 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 8192 logins/open exchanges for maximum VM density.
- 2x management functionality, which takes half the time to manage with 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).
- 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.

The following table compares features of 16 Gb (Gen 5), Advanced 8 Gb, and traditional 8 Gb Fibre Channel HBAs by Emulex.

Table 2. 16 Gb (Gen 5), Advanced 8 Gb, and traditional 8 Gb FC feature comparison

Feature	**16 Gb FC (Gen 5)**	**Advanced 8 Gb FC**	**Traditional 8 Gb FC**
Part numbers	4XB0F28653 4XB0F28650 4XB0F28705 4XB0F28681 4XB0F28706	4XB0F28652 4XB0F28643 4XB0F28704 4XB0F28682 4XB0F28707	0C19476 0C19478
Host interface	PCIe 3.0 x8	PCIe 3.0 x8	PCIe 2.0 x8
IOPS performance	1.2 M IOPS per adapter**	1.2 M IOPS per adapter	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

* Requires a 16 Gbps FC SFP+ transceiver.
** 2.4 M IOPS per adapter for ThinkServer LPe16004B-M6-L PCIe 16Gb 4 Port FC Adapter, 4XB0F28681

Important: ThinkServer Advanced 8 Gb FC HBAs by Emulex offer almost twice higher host interface bandwidth and up to six times more IOPS, while fitting into the same price band, compared to traditional ThinkServer 8 Gb FC HBAs by Emulex.

Technical specifications

The ThinkServer 16 Gb (Gen 5) FC and Advanced 8 Gb FC HBAs by Emulex have the following specifications:

- I/O controller: Emulex Engine 201 (XE201) I/O Controller (IOC)
- Host interface: PCIe 3.0 x8
- Ports: Single-port, dual-port, and quad-port SFP+ based adapters
- Link speed: Support for 16 Gb, 8 Gb and 4 Gb FC link speeds (16 Gb FC HBAs) or 8 Gb and 4 Gb FC link speeds (8 Gb FC HBAs), 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 1,200,000 IOPS per port
  - Up to 2,400,000 IOPS per quad-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:
  - Hot-pluggable 8 Gbps Fibre Channel SFP+ short wave optical transceivers (850 nm) with LC connectors (included with Advanced 8 Gb FC adapters)
  - Hot-pluggable 16 Gbps Fibre Channel SFP+ short wave optical transceivers (850 nm) with LC connectors (included with 16 Gb (Gen 5) FC 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 HBA 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 ThinkServer 8 Gb and 16 Gb FC AnyFabric HBAs by Emulex are supported on the following ThinkServer systems:

- ThinkServer RD550 (E5-2600 v3 and E5-2600 v4)
- ThinkServer RD650 (E5-2600 v3 and E5-2600 v4)

The ThinkServer 8 Gb FC (except 4XB0F28643 and 4XB0F28682) and 16 Gb FC (except 4XB0F28650 and 4XB0F28681) PCIe HBAs by Emulex are supported on the following ThinkServer systems:

- ThinkServer RD350 (E5-2600 v3 and E5-2600 v4)
- ThinkServer RD450 (E5-2600 v3 and E5-2600 v4)
- ThinkServer RD550 (E5-2600 v3 and E5-2600 v4)
- ThinkServer RD650 (E5-2600 v3 and E5-2600 v4)
- ThinkServer TD350 (E5-2600 v3 and E5-2600 v4)

The ThinkServer 8 Gb FC (4XB0F28652, 4XB0F28643, and 4XB0F28682) and 16 Gb FC (4XB0F28653, 4XB0F28650, and 4XB0F28681) PCIe HBAs by Emulex are supported on the following ThinkServer systems:

- ThinkServer TD340

For 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 ThinkServer 8 Gb and 16 Gb FC HBA family by Emulex supports the following operating systems:

- Microsoft:
  - Microsoft Windows Server 2012 R2
  - Microsoft Windows Server 2012 R2 (Hyper-V)
  - Microsoft Windows Server 2012
  - Microsoft Windows Server 2012 (Hyper-V)
  - Microsoft Windows Server 2008 R2
  - Microsoft Windows Server 2008 R2 (Hyper-V)
  - Microsoft Windows Server 2008
- Red Hat:
  - Red Hat Enterprise Linux 7
  - Red Hat Enterprise Linux 6
  - Red Hat Enterprise Linux 5
- SUSE:
  - SUSE Linux Enterprise Server 12

- SUSE Linux Enterprise Server 11
- SUSE Linux Enterprise Server 10

- VMware:
  - VMware vSphere 6.0
  - VMware vSphere 5.5
  - VMware vSphere 5.1
  - VMware vSphere 5.0

External storage systems

The following table lists the external storage systems that are offered by Lenovo that can be used with the ThinkServer Advanced 8 Gb FC and 16 Gb (Gen 5) FC HBAs by Emulex in Lenovo FC SAN solutions.

Table 3. FC SAN storage systems

Description	Part number
Lenovo Storage S2200	
Lenovo Storage S2200 LFF Chassis FC/iSCSI Single Controller, Rack Kit, 9x5NBD	64114B1
Lenovo Storage S2200 LFF Chassis FC/iSCSI Dual Controller, Rack Kit, 9x5NBD	64114B2
Lenovo Storage S2200 SFF Chassis FC/iSCSI Single Controller, Rack Kit, 9x5NBD	64114B3
Lenovo Storage S2200 SFF Chassis FC/iSCSI Dual Controller, Rack Kit, 9x5NBD	64114B4
Lenovo Storage S3200	
Lenovo Storage S3200 LFF Chassis FC/iSCSI Single Controller, Rack Kit, 9x5NBD	64116B1
Lenovo Storage S3200 LFF Chassis FC/iSCSI Dual Controller, Rack Kit, 9x5NBD	64116B2
Lenovo Storage S3200 SFF Chassis FC/iSCSI Single Controller, Rack Kit, 9x5NBD	64116B3
Lenovo Storage S3200 SFF Chassis FC/iSCSI Dual Controller, Rack Kit, 9x5NBD	64116B4
IBM Storwize	
IBM Storwize V3500 3.5-inch Dual Control Storage Controller Unit	6096CU2
IBM Storwize V3500 2.5-inch Dual Control Storage Controller Unit	6096CU3
IBM Storwize V3700 3.5-inch Storage Controller Unit	6099L2C
IBM Storwize V3700 2.5-inch Storage Controller Unit	6099S2C
IBM Storwize V3700 2.5-inch DC Storage Controller Unit	6099T2C
IBM Storwize V5000 LFF Control Enclosure	6194L2C
IBM Storwize V5000 SFF Control Enclosure	6194S2C
IBM Storwize V7000 2.5-inch Storage Controller Unit	6195SC5

For more information, see the list of Product Guides in the following categories:

- Lenovo Storage
  https://lenovopress.com/storage/san/lenovo
- IBM Storage
  https://lenovopress.com/storage/san/ibm

Tape backup units

The following table lists the external Fibre Channel tape backup units that are offered by Lenovo that can be used with the ThinkServer Advanced 8 Gb FC and 16 Gb (Gen 5) FC HBAs by Emulex in Lenovo FC SAN solutions. Other tape backup units might be supported, refer to the tape backup unit vendor's interoperability matrix for details.

Table 4. External backup options

Description	Part number
External tape backup libraries	
IBM TS3100 Tape Library Model L2U	61732UL
IBM TS3200 Tape Library Model L4U	61734UL
Fibre Channel backup drives for TS3100 and TS3200 Tape Libraries	
6173 LTO Ultrium 5 Fibre Channel Drive	00NA107
6173 LTO Ultrium 5 Half High Fibre Drive Sled	00NA113
6173 LTO Ultrium 6 Fibre Channel Drive	00NA115
6173 LTO Ultrium 6 Half High Fibre Drive Sled	00NA119
6173 LTO Ultrium 7 Fibre Channel Drive	00WF765
6173 LTO Ultrium 7 Half High Fibre Drive Sled	00WF769

For more information, see the list of Product Guides in the Backup Units category:
http://lenovopress.com/servers/options/backup

FC SAN switches

The following table lists the FC SAN switches that are offered by Lenovo that can be used with the ThinkServer Advanced 8 Gb FC and 16 Gb (Gen 5) FC HBAs by Emulex in Lenovo FC SAN solutions.

Table 5. FC SAN switches

Description	Part number
Rack-mount switches - 8 Gb FC	
Brocade 300 FC SAN Switch	3873AR1
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	
Brocade 6505 FC SAN Switch	3873AR2
Brocade 6510 FC SAN Switch	3873BR1
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 ThinkServer Advanced 8 Gb FC and 16 Gb (Gen 5) FC HBAs by Emulex carry a one-year limited warranty. When installed in a supported ThinkServer system, the adapter assumes your system's base warranty and any Lenovo Services warranty upgrade.

Physical specifications

The ThinkServer Advanced 8 Gb FC and 16 Gb (Gen 5) FC HBAs by Emulex have the following dimensions (approximate):

- PCIe HBAs:
  - 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
- AnyFabric HBAs: AnyFabric mezzanine card form factor (does not consume a standard PCIe slot)

Operating environment

The ThinkServer Advanced 8 Gb FC and 16 Gb (Gen 5) FC HBAs by Emulex 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)

Agency approvals

The ThinkServer 8 Gb and 16 Gb FC HBAs by Emulex conform to the following regulations:

- FCC Class A
- UL/CSA Recognized
- CE Mark
- EU RoHS compliant
- TUV Bauart Certified
- VCCI Class A
- BSMI Class A
- MSIP (formally KCC/MIC) Class A
- China RoHS Compliant

Related publications and links

For more information, see the following documents:

- Lenovo ThinkServer support:
  http://support.lenovo.com/products/servers
- Lenovo Options Compatibility Matrix
  http://www.lenovo.com/accessoriesguide

Related product families

Product families related to this document are the following:

- Host Bus Adapters

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