

Emulex® Gen 7 Fibre Channel HBAs

LPe35000-Series for Cisco UCS C-Series and MDS 9000 Product Family

Next-Gen HBAs for the Modern Data Center

The Emulex® LPe35000 Gen 7 Fibre Channel (FC) host bus adapters (HBAs) by Broadcom are designed for demanding mission-critical workloads and emerging applications. Applications continue to grow in size and scale, and to support them, enterprises are increasingly turning to new server technologies that contain hundreds of processor cores as well as high-performance storage solutions including low-latency NVMe, all-flash arrays (AFAs). NVMe can significantly increase the performance of storage area networks (SANs), making the selection of high-speed networking technology the critical element for achieving maximum system-wide performance. Fibre Channel is purpose-built for storage networks, meeting the requirements for high availability, scalability, predictable performance, and low latency.

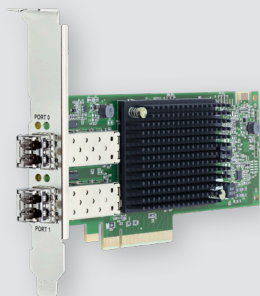
Compared to the previous generation, Emulex Gen 7 FC HBAs offer up to 2x higher bandwidth, 3x better latency, enhanced security, and operational efficiency. Emulex LPe35000-series HBAs are available with dual 32GFC optics to tackle the toughest workloads and future NVMe deployments. Gen 7 32GFC provides seamless backward compatibility to 16GFC and 8GFC networks.

Accelerate Workload Performance for NVMe Data Centers

- Accelerate workloads with up to 3x better latency than the previous generation.
- Speed up applications and AFAs and handle peak workload I/O spikes with over 5M IOPS—3x more than the previous generation.
- Get faster data transfer speed with the industry's first single- and dual-port PCIe 4.0 HBAs delivering 2x more bandwidth per lane.

Easily Deploy, Manage, and Upgrade SANs

- Save time with no server reboots for firmware updates, queue depth changes, and optics replacements.
- Meet SLAs with industry-leading HBA reliability—10M hours MTBF.
- Utilizes industry standard INCITS/T11 specification, including Fabric Performance Impact Notifications (FPINs) and signaling to collaborate with the fabric, identifying and addressing performance problems.



Performance

The Emulex Dynamic Multi-core architecture delivers unparalleled performance and the most efficient port utilization with 8 processing cores and 16 threads that dynamically apply ASIC resources to any port that requires them, ensuring that SLAs are met. LPe35000-series delivers 12,800 MB/s (two 32GFC ports) full duplex, it delivers 3x better hardware latency, and it supports an industry-leading over 5 million IOPS.

The fastpath design provides hardware acceleration for Emulex's Dynamic Multi-core architecture, reducing latency for each transaction by processing I/O requests in hardware, thereby operating significantly faster than software-based solutions. These performance advances enable Emulex Gen 7 HBAs to handle demanding workloads and I/O spikes experienced under peak workload conditions like no other Fibre Channel HBA in the industry.

Emulex Gen 7 HBAs support NVMe over Fibre Channel (NVMe/FC), providing significantly lower latency versus the traditional Fibre Channel SCSI protocol (SCSI FCP). Recent testing by independent performance labs has shown that NVMe/FC can deliver up to 50% more IOPS, 30% lower latency, and up to 3.4x higher online transaction processing (OLTP) transactions per minute¹ than traditional SCSI FCP. Emulex Gen 7 HBAs also support NVMe/FC and SCSI FCP concurrently, providing investment protection and allowing data centers to transition to end-to-end NVMe over FC SANs at their own pace.

¹Tolly Test Report # 220122, 2020.

Fully Protect Data

- Thwart malicious firmware with a Silicon Root of Trust and digitally signed firmware.
 - Complies with the NIST 800-193 framework.
 - Verifies the digital signature during firmware download and power-on.
- Guarantee driver security with Broadcom digitally signed drivers.
- Secure Boot guarantees UEFI boot code security with digitally signed boot code.
- Data Integrity Field (T10 DIF) protects data from corruption.

Operational Efficiency

Emulex Gen 7 HBAs offer enhanced reliability, availability, and serviceability (RAS) including port isolation and port-based error isolation that enables users to easily detect, isolate, and recover from errors.

Emulex Gen 7 HBAs are easy to manage and save administrators time and operating costs with features, such as no reboots for firmware updates, queue depth changes, or optics replacements. Emulex Gen 7 hot-plug (hot-swappable) optics enable optics to be removed and replaced without shutting down the system, allowing for uninterrupted service.

The LPe35000-series utilizes the industry standard INCITS/T11 specification, including Fabric Performance Impact Notifications (FPINs) and signaling to collaborate with the fabric, identifying and addressing performance problems.

The Emulex HBA Manager application, formerly known as Emulex OneCommand Manager®, provides centralized management of current and previous generations of Emulex FC HBAs. Emulex HBA troubleshooting is simplified with Emulex HBA Capture, an Emulex utility that gathers system, adapter, and device driver information. Data collected by HBA Capture is compressed into a single file and can be sent to Broadcom Technical Support for analysis when debugging system issues or for diagnostic purposes.

Security

One of the key initiatives for enterprises is to safeguard their infrastructure from network attacks. Fibre Channel has field-proven security in protecting the world's most sensitive data in banking, finance, health care, government, and military for over 20 years. Fibre Channel is protected from threats

coming from IP networks because there is no direct connectivity for an attack from the IP network. This makes Fibre Channel a very strong link in the security chain.

Emulex Gen 7 HBAs provide unmatched security features for Fibre Channel environments. They feature Silicon Root of Trust security embedded into the hardware itself. Firmware digital signatures are verified each time the system is booted as well as before installing any new firmware, providing a tamper-proof solution.

Emulex's digitally signed drivers are integrated with all the major enterprise operating systems. Drivers are digitally signed and are verified to be authentic code written by Broadcom before they can be installed.

Standards

General Specifications

- The LPe35000-series FC HBAs are powered by the XE601 controller and use an eight-lane (x8) PCIe 4.0 bus (with backward compatibility to PCIe 3.0 supported). The architecture enables resources to be applied to any port that needs them, delivering over 5M IOPS.

Industry Standards

- Current ANSI/IETF standards: FC-PI-7; FC-FS-5; FC-LS-3; FC-GS-7; FC-PI-5; FC-PI-6; FC-DA; FC-DA-2; FCP-4; SPC-4; SBC-3; SSC-4; FC-NVMe; FC-NVMe/AM1
- Legacy ANSI/IETF standards: FC-PI-4; FC-FS-3; FC-FS-4; FC-LS-2; FC-GS-6; 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; SSC-3
- PCIe base spec 4.0
- PCIe card electromechanical spec 4.0
- Fibre Channel Class 3
- PCI Hot Plug (PHP)
- UEFI 2.5

HBA Port Virtualization

- NPIV

Architecture

Dual-Port LPe35002

- Supports 32GFC, 16GFC, and 8GFC link speeds, automatically negotiated.

Comprehensive OS and Hypervisor Support

- Microsoft Windows
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server
- VMware vSphere
- Oracle Linux; Oracle Linux with the Unbreakable Enterprise Kernel (UEK)
- Oracle Solaris
- Citrix
- Ubuntu

For the latest operating system support, visit www.Broadcom.com/support. Additional support is available from OEMs and partners.

Cisco UCS Compatibility

- Cisco C220, C240, M6
- Visit the Cisco Hardware Compatibility list for the latest compatibility information.¹

Cisco MDS Compatibility

- MDS 9148T 32G
- MDS 9132T 32G
- MDS 9396T 32G
- Visit the Interoperability Matrix for Cisco Nexus and MDS 9000 Products for the latest compatibility information²

Optical

- Data rates: 28.05 Gb/s (32GFC), 14.025 Gb/s (16GFC), 8.5 Gb/s (8GFC), automatically negotiated
- Optics: Short wave lasers with LC-type connector (two optical transceivers ship with the HBA)
- Cable:
 - 0.5m to 70m at 64GFC/32GFC on 50/125 µm OM3 MMF
 - 0.5m to 100m at 64GFC/32GFC on 50/125 µm OM4 MMF
 - 0.5m to 100m at 64GFC/32GFC on 50/125 µm OM5 MMF
 - 10 km at 32GFC/16GFC on 9/125 µm single-mode fiber when Emulex approved longwave transceivers are used

Physical Dimensions

- Short, low profile PCIe card
- 167.64 mm x 68.91 mm (6.60 in. x 2.71 in.)
- Standard bracket (low-profile bracket ships in box)

Environmental Requirements

- Operating temperature: 0°C to 55°C (32°F to 131°F); 150 LFM for PCIe 3.0 and 200 LFM for PCIe 4.0 required
- Storage temperature: -20°C to 85°C (-4°F to 185°F)
- Relative humidity: 5% to 95% non-condensing

Agency and Safety Approvals

North America

- FCC/ICES Class A
- UL/CSA Recognized

Europe

- CE Mark
- EU RoHS Compliant
- EU Low Voltage Directive

Australia

- RCM Class A

Japan

- VCCI Class A

Korea

- KCC Class A

China

- China RoHS Compliant

Taiwan

- BSMI Class A
- BSMI RoHS Compliant

Ordering Information

Cisco

The LPe35002 2-Port 32GFC Short Wave Optical LC SFP+ HBA (two optical transceivers included), is available from Cisco using the Cisco Product ID (PID): UCSC-P-B7D32GF.

Options

Only Emulex approved options are warranted and fully supported by Technical Support. Emulex options are denoted by a '-ELX', '-EM', or '-EL5' in the transceiver part number.

- **LP32-LW-OPT-2** 32GFC Optics (long-wave laser with LC connector SFP+ transceiver): 2 pieces (note that the HBA ships with two *short wave* optical transceivers)

Additional Features

Performance Features

- Doubling of the maximum FC link rate from 16GFC to 32GFC.
- Support for NVMe/FC for low-latency, high-performance, end-to-end NVMe/FC storage networks.
- Frame-level multiplexing increases link efficiency and maximizes HBA performance.
- N_Port ID Virtualization (NPIV) increases network scalability by enabling a single FC adapter port to provide multiple virtual ports.

Data Protection Features

- End-to-end data protection using hardware parity, CRC, ECC, and other advanced error checking and correction algorithms ensures that data is safe from corruption.
- Enhanced data protection is provided by T10 PI with high-performance offload. T10 PI provides additional data protection in environments such as Oracle Unbreakable Linux.

Deployment and Management Features

- Universal boot capability allows the appropriate boot environment to be automatically selected for any given hardware.
- Boot from SAN capability reduces system management costs and increases uptime.
- Detailed, 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.

¹ Information in this document is valid as of the date of its publication. For up-to-date compatibility information, please check the Cisco Hardware Compatibility list at: <https://ucshcltool.cloudapps.cisco.com/public/>

² Interoperability Matrix for Cisco Nexus and MDS 9000 Products: <https://www.cisco.com/c/en/us/td/docs/switches/datacenter/mds9000/interoperability/matrix/intmatrx/Matrix1.html>

Management Features

- The Emulex HBA Manager application³ enables centralized discovery, monitoring, reporting, and administration of HBAs provided by Emulex on local and remote hosts. Powerful automation capabilities facilitate remote driver parameter, firmware, and boot code upgrades.
- Advanced diagnostic features, such as adapter port beaconing and adapter statistics, help optimize management and network performance, while the environmental monitoring feature helps to maintain optimum host-to-fabric connections. In addition to the GUI interface, management functions can also be performed using a scriptable command line interface (CLI).
- Emulex HBA Manager supports role-based management to facilitate administration of adapters throughout the data center without compromising security. Management privileges can be assigned based on LDAP and AD group memberships.
- Emulex's 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.

³The Emulex OneCommand Manager application has been renamed the Emulex HBA Manager application.

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