

# Emulex Gen 7 Fibre Channel LPe35000/LPe36000-Series

for Lenovo ThinkSystem Servers

Setting a new standard in speed and low latency performance for mission-critical enterprise workloads and emerging applications

## Highlights

### 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 up to 10M IOPS—over 6x more than the previous generation.
- Get faster data transfer speed with the industry's first PCIe 4.0 HBA 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.
- Utilize the industry-standard INCITS/T11 specification, which includes full FPINs and signaling support to collaborate with the fabric to identify and address performance problems.

### Fully Protect Data

- Thwart malicious firmware with a Silicon Root of Trust and digitally signed firmware. Complies with NIST 800-193 framework and Digital signature verification 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.

## Next-Gen HBAs for the Modern Data Center

Lenovo's Emulex® 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 for 32GFC and 64GFC SANs. Emulex LPe35000-series HBAs are available with single or dual 32GFC optics and provides seamless backward compatibility to 16GFC and 8GFC networks. Emulex LPe36000-series HBAs are available with dual 64GFC optics and provide seamless backward compatibility to 32GFC and 16GFC networks.

Emulex fully supports new industry standards, including Fabric Performance Impact Notifications (FPINs) that further enhance Broadcom's autonomous SAN<sup>1</sup> innovations to self-learn, self-optimize, and self-heal, proactively keeping the SAN running at maximum speed and avoiding downtime. The Emulex SAN Manager application is the first application in the industry to automatically identify, minimize, and mitigate application performance problems caused by SAN congestion by utilizing the FPIN-CN standard.

## 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. Compared to Gen 6 HBAs, Emulex Gen 7 HBAs can support 64GFC to deliver up to 2x greater bandwidth. The Gen 7 HBAs deliver 12,800 MB/s (two 32GFC ports) or 25,600 MB/s (two 64GFC ports) full duplex, they deliver 3x better hardware latency, and the 64GFC LPe36000-series HBAs deliver industry-leading performance up to 10 million IOPS.<sup>2</sup>

Emulex Gen 7 solutions have achieved this unprecedented performance by enhancing their Emulex Dynamic Multi-core architecture with Fast Path hardware acceleration, reducing latency for each transaction. This enhancement results in significantly increased performance compared to legacy 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 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). Testing by independent performance labs has shown that NVMe/FC can deliver up to 50% more IOPS, 30% lower latency,<sup>4</sup> and up to 3.4x higher online transaction processing (OLTP) transactions per minute<sup>5</sup> 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.

## 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 managed HBAs—intelligent adapters designed to work with Emulex SAN Manager<sup>3</sup> to reduce the complexity of managing enterprise-class SANs. Unlike other adapters, managed HBAs are designed to perform many operational tasks without the intervention of the host on which they reside.

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 without shutting down the system, allowing for uninterrupted service. Emulex HBAs also fully support the Fabric Vision suite of features, facilitating a solution from the switch to the server endpoints that have Emulex HBAs installed. Some of the supported features include ClearLink® (D\_Port), Link Cable Beaconing, BB\_Credit Recovery, FC Trace Route, FC Ping, Rest APIs, and more.

## 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 offers "air gap" protection with no connectivity to vulnerable IP networks. For this reason, IT managers continue to rely on FC for their most sensitive data.

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.



## Additional Features

### Performance Features

- Support for NVMe/FC for low-latency, high-performance, end-to-end NVMe/FC storage networks.
- Registration and support for FPINs and congestion signaling.
- Buffer-to-buffer credit recovery—automatic buffer credit loss detection and recovery for reliable performance.
- 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 data is safe from corruption.
- Enhanced data protection 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.
- Beacons feature flashes the HBA LEDs, simplifying their identification within server racks.
- Environmental monitoring feature helps optimize SAN availability.

### Management Features

- The Emulex HBA Manager application<sup>6</sup> 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 via a scriptable command line interface (CLI).
- Troubleshoot optics and cables before critical errors affect your system with ClearLink-supported switches (Lenovo/Brocade) and Emulex HBAs.
- 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.

Description	Part Number
ThinkSystem Emulex LPe35000 32Gb 1-port PCIe Fibre Channel Adapter	4XC7A76498
ThinkSystem Emulex LPe35002 32Gb 2-port PCIe Fibre Channel Adapter	4XC7A76525
ThinkSystem Emulex LPe36002 64Gb 2-port PCIe 4 Fibre Channel Adapter	4XC7A77485



1. <https://docs.broadcom.com/docs/broadcom-autonomous-self-healing-sans>

2. [Tolly Test Report document # 221134](#), August 2021

3. The Emulex SAN Manager application is available separately. Contact Broadcom sales.

4. [Emulex labs/Demartek, 2018](#)

5. [Tolly Test Report Gen7 LPe35000-series, #220122, 2020](#)

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

**Emulex® HBAs set a new standard in speed and low latency performance for mission-critical enterprise workloads and emerging applications**



Emulex®  
**GEN7**  
FIBRE CHANNEL

## Why Lenovo

Lenovo is a US\$57 billion revenue global technology powerhouse, ranked #248 in the Fortune Global 500, and serving millions of customers every day in 180 markets. Focused on a bold vision to deliver Smarter Technology for All, Lenovo has built on its success as the world's largest PC company with a pocket-to-cloud portfolio of AI-enabled, AI-ready, and AI-optimized devices (PCs, workstations, smartphones, tablets), infrastructure (server, storage, edge, high performance computing and software defined infrastructure), software, solutions, and services. Lenovo's continued investment in world-changing innovation is building a more equitable, trustworthy, and smarter future for everyone, everywhere..

## For More Information

To learn more, contact your Lenovo Business Partner or read the [Lenovo Press Product Guide](#).