BROADCOM

Product Brief

Emulex® Gen 6 Fibre Channel HBAs

LPe31000/LPe32000-Series

Faster Flash. Better Virtualization. Lossless Networking.

Faster Flash

- Completes data warehousing transactions in 1/4 of the time[1]
- Meet the massive bandwidth requirements of flash storage arrays with up to 32GFC throughput and enable next-gen 128GFC SANs
- Maximize the performance of flash-based systems by prioritizing mission-critical traffic in congested networks with the exclusive ExpressLane feature
- NVMe-enabled capability delivers an additional 55% lower latency and supports NVMe over Fibre Channel and traditional SCSI over Fibre Channel concurrently

Better Virtualization

- Near limitless scalability to support maximum VM density with 2X more on-chip resources & bandwidth
- Improved VDI experience with low-latency HBAs providing noticeable improvements during boot storms
- Simplified management & installation with OneCommand® Manager plug-in for VMware vCenter server

Lossless, Reliable Networking

- Near zero downtime— FC's lossless design ensures no dropped packets and maximum uptime
- Industry Leader for Reliability—Emulex HBAs can provide up to 1,141 years of uninterrupted service![2]

The Emulex Gen 6 (16/32G) Fibre Channel (FC) Host Bus Adapters (HBAs) by Broadcom are designed to address the demanding performance, reliability and management requirements 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.

Fibre Channel is the gold standard for network storage connectivity in enterprise and cloud deployments. The latest Emulex Gen 6 FC HBAs offer higher performance, lower latency, enhanced diagnostics and manageability that benefit both 16GFC and 32GFC environments and next-gen 128GFC SANs. Emulex LPe31000-series HBAs are available with single, dual or quad 16GFC optics that can be upgraded with 32GFC optics to utilize the full performance of Gen 6 FC technology. A second quad-port 16GFC model is available that features a low-profile design. It provides the highest port density within a low-profile form factor. The LPe32000-series HBAs are available with single, dual or quad 32GFC optics.

Unique to Fibre Channel technology is its deep ecosystem support making it ideal for large scale, easy-to-manage storage deployments. Users can count on a complete suite of management software, in-box drivers for mainstream server operating systems, software-defined storage APIs and tools, and the strength to support high service- level agreement (SLA) applications.

Accelerate

The unique Emulex Dynamic Multi-core Architecture delivers unparalleled performance and more efficient port utilization than other HBAs by applying all ASIC resources to any port that needs it.

Compared to the previous generation, Emulex Gen 6 HBAs deliver 2x greater bandwidth — 12,800 MBps (2 ports 32G, or 4 ports 16GFC, full duplex), less than half the latency, and support an industry-leading 1.6 million IOPS on a single port, ensuring SLAs are met. The quad-port LPe32004 supports SANs of up to 128GFC by quadrupling throughput from 32GFC to 128GFC to deliver full-duplex speeds of 25,600 MBps and up to 3.2M IOPS per adapter. 128GFC and 32GFC provide seamless backward compatibility to 16GFC and 8GFC networks.

1. Demartek TPC-H testing performed with Emulex Gen 6 FC HBAs in a Microsoft SQL Server environment vs. the previous generations of HBAs
2. Based on published FIELD MTBF of 10 million hours for the Emulex family of FC HBAs.

EMULEX Gen 6 Fibre Channel

Emulex Gen 6 HBAs are an excellent choice for database applications as recent TPC-H testing in a data warehousing environment have demonstrated up to 71% faster completion times vs. the previous generations of HBAs. To enable the highest Virtual Machine density, Gen 6 HBAs provide support for up to 255 virtual functions, 1,024 Message Signaled Interrupts and expansive on-board context for exchanges and logins.

NVM Express (NVMe) is a relatively new protocol for solid-state storage devices built with non-volatile memory technologies. NVMe provides substantially lower latency for storage I/O operations and significantly higher IOPS per device. NVMe scales-up the number of devices it can address by adopting NVMe over Fabrics technology.

Emulex Gen 6 HBAs are NVMe over Fibre Channel-enabled, providing an additional 55% lower latency for storage I/O operations versus SCSI. Gen 6 NVMe-enabled HBAs support NVMe over Fibre Channel and SCSI over Fibre Channel concurrently, allowing datacenters to transition to all-flash storage at their own pace.

Protect

Emulex Gen 6 FC HBAs deliver enhanced security via the new secure firmware update feature which protects and ensures the authenticity of device firmware.

Forward Error Correction (FEC) is a Gen 6 Fibre Channel standard feature that provides enhanced data reliability and performance by automatically detecting and recovering from bit errors. It is especially useful in diverse and complex user environments such as blade system implementations. FEC is a digital signal processing technique that introduces redundant data, called an error correcting code, prior to data transmission. FEC then provides the receiver with the ability to correct errors without a reverse channel to request the retransmission of data, which improves performance.

T10 Protection Information (T10-PI) data integrity with high performance hardware offload provides data protection from the server to the storage array. As one of the founders of the Data Integrity Initiative (DII), Emulex, along with Oracle and Seagate, was instrumental in defining the T10-PI standard, which, along with the Data Integrity Extensions (DIX) standard, delivers full end-to-end data integrity. T10-PI assures the validity of I/O operations through the exchange of verification information during data transmissions.

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).

Control

The flagship OneCommand Manager enterprise-class management application features a multiprotocol, cross-platform architecture that provides centralized management of all current and previous generations of Emulex FC HBAs. This enables IT administrators to manage network connectivity with one tool for maximum efficiency.

Emulex HBA troubleshooting is simplified with OneCapture, an Emulex device driver utility that gathers system, adapter, device driver, and applications information. Data collected by OneCapture is compressed into a single file and can be sent to Broadcom Technical Support for analysis when debugging system issues or for diagnostic purposes.

The LPe31000/LPe32000-series HBAs support Brocade I/O Insight for Gen 6 FC, which proactively and non-intrusively monitors device and application-level IO to gain insights into performance and availability, ensuring predictable performance and operational stability.

Additionally Emulex HBAs support the following Brocade features:

- ClearLink (D_Port)- automated end-to-end signal integrity checks help identify any cabling, optics or port issues in minutes versus hours.
- Link Cable Beaconing- locates a connection on either the Brocade switch port or the Emulex HBA port by making the LED port blink for easy end-to-end identification.
- Host Name Registration- eliminates the need to manually associate worldwide port names with servers, with automated capture of information from Emulex HBA ports.
- Read Diagnostic Parameters- Brocade switches and Emulex HBA ports will self-report diagnostic information, including port speed, link errors, and SFP information (temperature, Tx and Rx power, etc.).

Standards

General Specifications

- The LPe31000/32000-series FC HBAs are powered by the XE501 controller and utilizes an eight-lane (x8) PCIe 3.0 bus (backward compatibility to PCIe 2.0 supported)—the architecture enables all resources to be applied to any port that needs it, delivering over 1.6M IOPS on a single-port
- The quad-port LPe32004 utilizes a 16 lane (x16) PCIe 3.0 bus and delivers 3.2M IOPS per adapter.

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-DA-2; FCP-4; SPC-4; SBC-3; 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; SSC-3
- PCIe base spec 3.0
- PCIe card electromechanical spec 3.0
- Fibre Channel Class 3
- PHP hot plug-hot swap

Architecture

Single-port LPe32000, dual-port LPe32002 or quad-port LPe32000

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

Single-port LPe31000, dual-port LPe31002 or quad-port LPe31004

- Supports 16GFC, 8GFC and 4GFC link speeds, automatically negotiated

Comprehensive OS and Hypervisor Support

- Microsoft Windows
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server
- Oracle Solaris
- VMware vSphere
- Additional support is available from OEMs and partners

Hardware Environments

- PowerPC, SPARC, Intel x86, x64

Optical

- Data rates: 28.05 Gb/s (32GFC); 14.025 Gb/s (16GFC); 8.5 Gb/s (8GFC); 4.25 Gb/s (4GFC) automatically negotiated
- Optics: Short wave lasers with LC type connector
- Cable: Operating at 32 Gb
  - 20m at 32 Gb on 50/125 µm OM2 MMF
  - 70m at 32 Gb on 50/125 µm OM3 MMF
  - 100m at 32 Gb on 50/125 µm OM4 MMF

Physical Dimensions

- Short, low profile PCIe card
- 167.64 mm x 68.91 mm (6.60" x 2.71")
- Standard bracket (low profile bracket ships in box)
- LPe31004-M6-SIO & LPe32004-M2-SIO are full-height PCIe cards: 167.64 mm x 111.15 mm (6.60" x 4.38"), with a standard bracket

Environmental Requirements

- Operating temperature: 0° to 55°C (32° to 131°F); 150 LFM required
  - 200 LFM required for LPe31004-M6 model
  - 250 LFM required for full-height "-SEO" models
- Storage temperature: -20° to 85°C (-4° 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
- TUV Bauart Certified

Australia

- RCM

Japan

- VCCI Class A

Taiwan

- BSMI Class A

Korea

- MSIP (formerly KCC/MIC) Class A

China

- China RoHS Compliant