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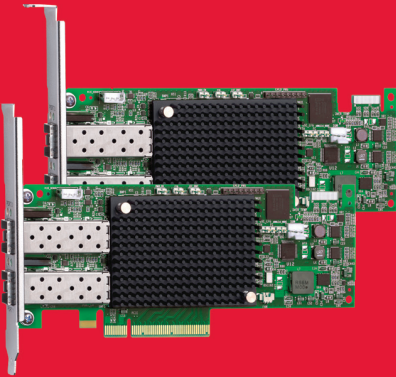
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# Emulex® LPe16000B/LPe16002B Gen 5 Fibre Channel HBAs

Data Sheet



## Key benefits

- Emulex Dynamic Multi-core Architecture delivers maximum performance—up to 1.2 million IOPS on a single port, 20% more than other Gen 5 HBAs
- Simplified and time-saving diagnostics by using Brocade ClearLink supported Switches and Emulex HBAs
- Ability to meet SLAs and ensure Quality of Service for prioritized traffic with ExpressLane
- Improves IT staff productivity through simplified deployment and management
- 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
- Assures data availability and data integrity

Emulex Gen 5 Fibre Channel (16GFC) Host Bus Adapters (HBAs) by Broadcom provide up to 1.2 million IOPS on a single-port, 2x bandwidth and lightning fast response times\*, making it ideal for deployment with solid state disks (SSDs) and new multi-core processors.

The Emulex Dynamic Multi-core Architecture delivers optimum I/O performance by dynamically applying ASIC resources to either a single active port or across both active ports, as demanded by the workload. This ensures that performance is delivered when and where needed, to meet service level agreements (SLAs).

In high-density virtual environments with mixed storage, scaling to meet business needs can be complex and often results in performance degradation. Emulex ExpressLane provides QoS and application performance between servers and across the fabric by tackling congestion in storage environments. ExpressLane is easily enabled from Emulex OneCommand Manager extending into Brocade's fabric QoS.

LPe16000B-series HBAs feature the Emulex bullet-proof driver-stack, backward compatibility to 4GFC and 8GFC HBAs and rock-solid reliability with a heritage that spans back to the first generation of Fibre Channel to today's Gen 5 FC HBAs.

## Proven design, architecture and interface

Advanced error-checking features ensure the integrity of block data as it traverses the storage area network (SAN). The firmware-based architecture enables feature and performance upgrades without costly hardware changes. The unique 4th Generation Service Level Interface (SLI) allows use of a common driver across all models of Emulex HBAs on a given operating system (OS) platform. Installation and management facilities are designed to minimize server reboots and further simplify deployment.

\*compared to the previous generation HBAs.





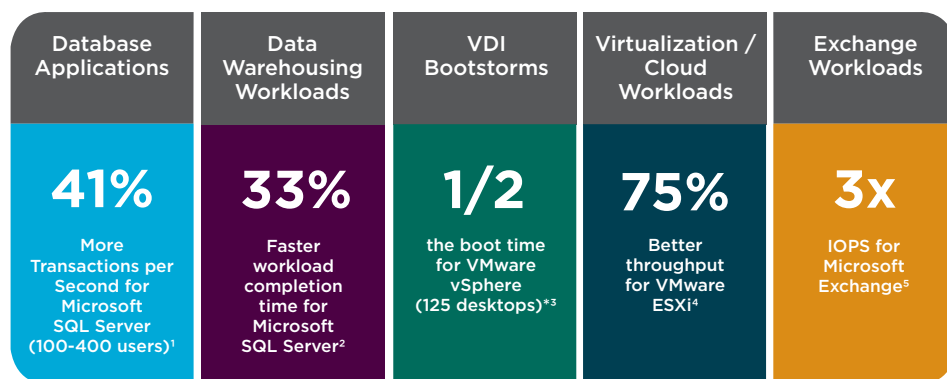
## Key features

- Dynamic Multi-core Architecture features eight cores that support 255 virtual functions (VFs), 1024 Message Signaled Interrupts extended (MSI-X) and 8192 logins/open exchanges for maximum virtual machine (VM) density—up to 4x more than other Gen 5 adapters
- Reduces data center power consumption and associated OPEX by delivering up to 4x better IOPS performance/watt
- Data integrity offload— high performance T10 Performance Information (T10 PI) end-to-end data integrity protects against silent data corruption
- Rock-solid reliability and thermal characteristics, essential for mission-critical, cloud and virtualized applications
- Support for MSI-X, improves host utilization and enhances application performance
- Comprehensive virtualization capabilities with support for N\_Port ID Virtualization (NPIV) and Windows virtual HBAs
- Secure management with role-based administration integrated with Light Directory Access Protocol (LDAP) and Active Directory (AD) services
- Common driver model, allows a single driver to support all Emulex HBAs on a given OS

## Powerful management software for maximum data center efficiency

The OneCommand® Manager enterprise-class management application provides centralized management of all Emulex HBAs provided by Broadcom. This enables IT administrators to manage network connectivity with one tool for maximum efficiency. The OneCommand Manager plug-in for VMware vCenter Server enables comprehensive control of Fibre Channel HBAs from VMware's vCenter Server management console. It supports both the Web Client and the desktop client with an identical feature set.

## Emulex Gen 5 HBAs accelerate application performance vs. 8GFC HBAs



\* vs QLogic QLE2672

To view the complete test reports, please visit:

1. [Emulex SQL Server Test Report](#)
2. [Demartek 16Gb Fibre Channel HBA Evaluation](#)
3. [Demartek LPe16002B VMware VDI Bootstorm Evaluation](#)
4. [VMware- vSphere 16Gb Storage IO Performance Report](#)
5. [ESG Lab Validation Report- 16Gb Fibre Channel HBAs](#)

## Standards

### General specifications

- The LPe16000B series is powered by the XE201 converged fabric controller and consists of 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 up to 1.2 million IOPS on a single-port

### Industry standards

- Current ANSI/ITF 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; FCP-4; FC-MJS; FC-SB-4; FC-SP; SPC-4; SBC-3; SSC-3; RFC4338
- Legacy ANSI/ITF standards: FC-PH; FC-PH-2; FC-PH-3; FC-PI; FC-PI-2; FC-FS; FC-AL (2GFC/4GFC/8GFC speeds); 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; RFC2625
- PCIe base spec 3.0
- PCIe card electromechanical spec 3.0
- Fibre Channel class 2 and 3
- PHP hot plug-hot swap

### Architecture

- Single-port (LPe16000B) or dual-port (LPe16002B)
- Supports 16GFC, 8GFC and 4GFC link speeds, automatically negotiated
- Supports up to 2 FC ports at 16GFC max (dual-port model)
- Integrated data buffer and code space memory

### Comprehensive OS and hypervisor support

- Windows Server
- Linux
- Solaris
- VMware vSphere
- Windows Hyper-V
- Additional support is available from OEMs and partners

### Hardware environments

- PowerPC, SPARC, x86, x64 and Intel Itanium 64-bit processor family

### Optical

- Data rates: 14.025 Gb/s (1600Mb/s); 8.5 Gb/s (800Mb/s); 4.25 Gb/s (400 Mb/s) (auto-detected)
- Optics: Short wave lasers with LC type connector
- Cable: Operating at 16Gb
  - 15m at 16Gb on 62.5/125  $\mu$ m OM1 MMF
  - 35m at 16Gb on 50/125  $\mu$ m OM2 MMF
  - 100m at 16Gb on 50/125  $\mu$ m OM3 MMF
  - 125m at 16Gb on 50/125  $\mu$ m OM4 MMF

### Physical dimensions

- Short, low profile MD2 form factor card
- 167.64mm x 68.91mm (6.60" x 2.71")
- Standard bracket (low profile available)

### Power and environmental requirements

#### Power supply 1.8V, 1.2V, 0.9V

- Volts: +3.3, +12
- Operating temperature: 0° to 55°C (32° to 131°F)
- Storage temperature: -40° to 70°C (-40° to 158°F)
- Relative humidity: 5% to 95% non-condensing
- 23°C wet bulb

### Agency and safety approvals

#### North America

- FCC Class A
- UL/CSA Recognized

#### Europe

- CE Mark
- EU RoHS compliant
- TUV Bauart Certified

#### Japan

- VCCI Class A

#### Taiwan

- BSMI Class A

#### Korea

- MSIP (formally KCC/MIC) Class A

#### China

- China RoHS Compliant (Please refer to the product page on [www.emulex.com](http://www.emulex.com) for further details)

### Ordering information

#### LPe16000B-M6

- 1 Port 16GFC Short Wave Optical - LC SFP+

#### LPe16002B-M6

- 2 Ports 16GFC Short Wave Optical - LC SFP+

### Options

Certified Spare Optic Kits for Emulex Gen 5 HBAs

#### LPe16100-OPT

- 16GFC optic kit (QTY 1 optic per kit)
- 16GFC short wave lasers with LC-type connector SFP+ optic

#### LPe16100-OPTx2

- 16GFC optics kit (QTY 2 optics per kit)
- 16GFC short wave laser with LC-type connector SFP+ optic
- Compatible with all Emulex Gen 5 Host Bus Adapters
- For use as an on-site spare optic

### Added features

#### Performance features

- Doubling the maximum FC link rate from 8GFC to 16GFC and enhanced virtualization capabilities, help support IT "green" initiatives.

- Frame-level multiplexing and out-of-order frame reassembly increases link efficiency and maximizes HBA performance.

#### Data protection features

- End-to-end data protection with hardware parity, CRC, ECC and other advanced error checking and correcting algorithms ensure data is safe from corruption.
- Enhanced silent data corruption protection provided by T10 PI with high-performance offload. T10 PI provides additional protection against corruption in Oracle Unbreakable Linux environments.

#### 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.
- Beaconing feature flashes the HBA LEDs, simplifying their identification within server racks.
- Environmental monitoring feature helps optimize SAN availability.

### Management features

- The OneCommand Manager application enables centralized discovery, monitoring, reporting, and administration of HBAs provided by Broadcom 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) as well as a web browser.
- Troubleshoot optics and cables before critical errors affect your system with Brocade ClearLink supported Switches and Emulex HBAs.
- Meet SLAs and QoS with ExpressLane application prioritization on hosts. ExpressLane is fully compatible with majority of switches offering QoS features.
- OneCommand 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.