



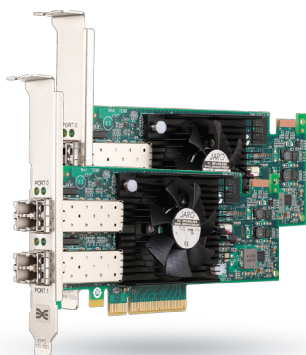
DATASHEET

CONNECTIVITY

LightPulse[®] LPe16000B/LPe16002B

16Gb Fibre Channel PCIe 3.0 Host Bus Adapter For Dell PowerEdge™ Servers

**SIMPLIFIED
NETWORKING,
MAXIMUM
PERFORMANCE
AND INCREASED
BUSINESS
AGILITY**



The PCI Express (PCIe) 3.0 LPe16000B 16Gb Fibre Channel (16GFC) Host Bus Adapter (HBA) provides outstanding input/output operations per second (IOPS) performance—20% more than other 16GFC HBAs, plus lightning fast response times and 4x better IOPS performance per watt make Dell 16Gb Fibre Channel (16GFC) host bus adapters (HBAs) the clear choice for the toughest virtualized, cloud and mission critical deployments. With almost 1.2 million IOPS, it is ideally suited for FC connectivity to solid state disks (SSDs) and new multi-core processors. Its advanced management functionality can shave days off installing and managing adapters. The LightPulse[®] single-port LPe16000B and dual-port LPe16002B feature the Emulex bullet-proof driver-stack, backward compatibility to 8GFC HBAs and rock-solid reliability with a heritage that spans back to the first generation of Fibre Channel to today's 16GFC HBAs. Emulex is trusted by data centers the world-over, with more than 12 million HBA ports shipped and installed to date.

Key Benefits

- Maximum performance—up to 1.2 million IOPS to support larger server virtualization deployments and scalable cloud initiatives, as well as performance to match new multi-core processors, SSDs and faster PCIe 3.0 server host bus architectures
- 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



LightPulse®

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Powerful Management Software for Maximum Data Center Efficiency

Emulex 16GFC HBAs are compatible with the integrated Dell Remote Access Controller (iDRAC™) with Lifecycle Controller systems management solution. iDRAC7 with Lifecycle Controller technology allows administrators to deploy, monitor, manage, configure, update, troubleshoot and remediate Dell servers from any location, and without the use of agents. It accomplishes this regardless of operating system, hypervisor presence or state. Dell and Emulex further extend this technology by including support for the 16GFC HBAs; allowing administrators to configure, update, and monitor the adapters without the use of additional tools or agents. The Emulex OneCommand® Manager enterprise-class management application features a multi-protocol, cross-platform architecture, that provides centralized management of all adapters provided by Emulex. This enables IT administrators to manage network connectivity with one tool for maximum efficiency.

The LPe16000B also features:

- **OneCommand® Manager plug-in for VMware vCenter Server**—enables comprehensive control of Fibre Channel HBAs and network (FCoE, iSCSI and TCP/IP NIC) connectivity solutions provided by Emulex from VMware's vCenter Server management console.

The Dell single-port LPe16000 and dual-port LPe16002 feature the bullet-proof driver-stack provided by Emulex, backward compatibility to 8GFC HBAs and rock-solid reliability with a heritage that spans back to the first generation of Fibre Channel HBAs to today's 16GFC HBAs. Emulex is trusted by data centers the world-over, with more than 12 million HBA ports shipped and installed to date.

Proven Design, Architecture and Interface

The Emulex LightPulse highly integrated multicore processor minimizes onboard components to improve host performance and efficiency. Advanced error-checking features ensure the integrity of block data as it traverses the storage area network (SAN). This 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 adapters provided by Emulex on a given operating system (OS) platform. Installation and management facilities are designed to minimize server reboots and further simplify deployment.

Key Features

- PCIe 3.0 bus
- vScale™ performance and scalability—multicore ASIC engine with eight cores supports 255 virtual functions (VFs), up to 1024 Message Signaled Interrupts eXtended (MSI-X) and 8192 logins/open exchanges for maximum virtual machine (VM) density—up to 4x more than other adapters
- 2x management functionality, and takes half the time to manage with OneCommand Manager
- BlockGuard® data integrity offload—high performance T10 PI end-to-end data integrity protects against silent data corruption
- vEngine™ CPU offload—lowers CPU burden on host server, enabling support for more VMs
- 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
- Support for 16GFC and 8GFC devices
- Comprehensive virtualization capabilities with support for N_Port ID Virtualization (NPIV) and Virtual Fabric
- Host-to-fabric Fibre Channel Security Protocol (FC-SP) authentication
- Common driver model, allows a single driver to support all HBAs provided by Emulex on a given OS

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SPECIFICATIONS

Industry Standards

- Current ANSI/IEEE Standards: FC-P1-4; FC-P1-5; 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; RFC4338
- Legacy ANSI/IEEE standards: FC-PH; FC-PH-2; FC-PH-3; FC-P1; FC-P1-2; 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; 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 and 8GFC 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 Support

- Windows Server 2012
- Windows Server 2008 SP2
- Windows Server 2008 R2 SP1
- Windows Small Business Server 2011
- RHEL 5.7 and RHEL 5.8
- RHEV 3.0 and RHEV 3.1
- RHEL6.2 and RHEL6.3
- SLES10 SP4
- SLES11 SP2
- ESX/ESXi Server 4.1 U3
- ESXi 5.0 U2
- ESXi 5.1

Hardware Environments

- PowerPC, SPARC, x86, x64 and Intel Itanium 64-bit processor family
- Dell PowerEdge™ Servers: R520, R620, R720, R720xd, R820, R715, R815, R910, R920

Optical

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

- FCC Part 15, Subpart B, Class A (U.S.)
- ICES-003 Class A (Canada)
- VCCI Class A (Japan)
- CE Mark (EU), consisting of:
 - EN55022:2010 +A1, Class A
 - EN55024:2010 +A1+A2
- C-Tick (Australia)
- AS/NZS CISPR22:2006 Class A
- CISPR 22:2005+A1 (International)
- KCC (formally MIC), Class A with latest RRL notices (Korea)
- BSMI Class A (Taiwan)
- UL 60950-1:2001 (cURus – U.S.)
- CSA 22.2 No 60950-1-03 (cURus - Canada)
- TUV Bauart certified to EN60950-1:2001
- CB Report and Certificate to IEC 60950-1:2001 (International)
- Dimethyl Fumarate (DMF) restrictions in packaging, ref. EU Decision 2010/251/EC:
 - EU RoHS Compliant (Directive 2002/95/EC)
 - China RoHS Compliant

Ordering Information

Dell 16GFC HBAs are available from Dell.

To order use the following part numbers:

- LPe16000B-M6-D
 - 1Port 16GFC Short Wave Optical – LC SFP+
- LPe16002B-M6-D
 - 2 Ports 16GFC Short Wave Optical – LC SFP+

Options

Emulex Certified Spare Optic Kit for LightPulse 16GFC HBAs

- LPe16100-OPT
 - 16Gb optic kit (QTY 1 optic per kit)
 - 16GFC short wave lasers with LC-type connector SFP+ optic
 - Compatible with all Emulex LightPulse
- 16GFC Host Bus Adapters
 - For use as an on-site spare optic

Added Features

Performance Features

- Doubling the maximum Fibre Channel 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 Protection Information (T10 PI). T10 PI provides additional protection against corruption in Oracle Unbreakable Enterprise 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 Emulex OneCommand® Manager application enables centralized discovery, monitoring, reporting, and administration of adapters 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) as well as a web browser.
- 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.



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