

VMware and Emulex: Storage Connectivity for the Virtual Age

AT A GLANCE

VMware users deploy more Emulex Fibre Channel HBAs than any other brand, based on full mutual support and superior performance. Emulex is blazing the virtualization trail with technology innovations like N-Port ID Virtualization (NPIV) and is working closely with VMware to integrate virtualization solutions with corporate storage management best practices.

PRODUCTS

Emulex LightPulse® Fibre Channel HBAs

APPLICATIONS

Mission-critical VMware-based enterprise and midrange environments

Emulex is the dominant supplier of Fibre Channel HBAs for VMware installations. For the past four years, Emulex and VMware have worked closely to deliver best-in-class solutions, with complete interoperability and full product support. Emulex is leading storage connectivity for virtualized environments with technological innovations like N-Port ID Virtualization (NPIV) and is working closely with VMware to provide breakthrough technology for mission-critical environments.

VMware Is Supported across the Emulex HBA Product Line

All Emulex enterprise and midrange host bus adapters are supported by VMware Infrastructure 3 including:

- ▶ 4Gb/s Emulex LightPulse PCI-X 2.0 and PCI Express host bus adapters, with drivers included in ESX 3.0 and ESX 3.0.1
- ▶ 2Gb/s Emulex LightPulse PCI host bus adapters, with drivers included in all successive generations of ESX 2.0, 2.1, 2.5 and 3.0 including 3.0.1
- ▶ OEM-branded equivalent models (traditional form factor and blade server models) from Dell, HP, IBM, Network Appliance, Sun and others.

A reference list is provided by VMware at:
www.vmware.com/pdf/vi3_io_guide.pdf.

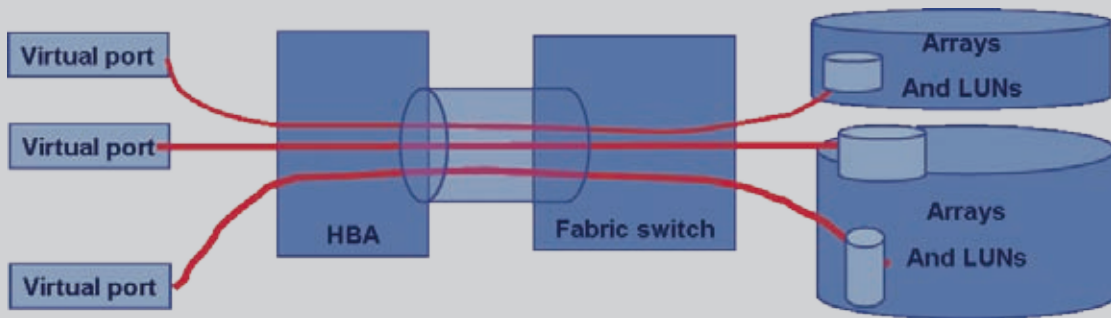
In addition, Emulex provides an HBA API library and the "lputil" administrative utility available on Emulex's website at:
www.emulex.com/vmware/support/index.jsp.



Best-in-class performance

Emulex provides the fastest Fibre Channel HBAs on the market (the LPe11002 dual-channel, 4Gb/s PCI Express adapter offers the highest I/O per second [IOPS] and data throughput), leveraging the award-winning LightPulse firmware-based architecture and the highest-density FC ASIC. The drivers were developed with an intimate understanding of the

Figure 1: This figure illustrates how the virtualization of the HBA and the switch using NPIV technology is the foundation for SAN-aware virtual machine implementations on VMWare.



VMware architecture, storage stack, and memory usage model and provide the same kernel synergy Emulex has achieved with powerful drivers for Windows, Linux, Solaris and HP-UX environments.

For the VMware user, this translates into concrete benefits:

- ▶ Greater scalability and server performance through lower memory usage. No Fibre Channel driver uses less ESX memory than the latest Emulex 7.3 driver. Additionally, the extra memory required for each connected storage device is half of the requirement of other vendors' drivers. This means more memory and better performance for your ESX 3.0 applications.
- ▶ Delivering the utmost in Fibre Channel 4Gb/s data throughput. Benchmark measurements using the latest LightPulse 4Gb/s HBAs with the drivers shipped as part of ESX 3.0, and the latest available firmware, show Emulex LightPulse HBAs can deliver the full 4Gb/s I/O link throughput.

Raw performance alone is not enough. Emulex host bus adapters and drivers have consistently topped user satisfaction surveys and OEM supplier ratings for hardware and software quality, fewest incidents and rapid, proactive problem resolution. This goes a long way to explain why:

- ▶ Over ninety of the FORTUNE 100 companies are running their mission-critical applications using Emulex adapters
- ▶ Emulex estimates over 60% of VMware installations implement Emulex HBAs, and this number is growing!

Emulex is also the ideal choice when migrating physical servers to virtual (P2V), as Emulex adapters can be readily unplugged from legacy servers and reinserted in virtualization platforms. Since the same firmware supports legacy environments as well as the latest ESX 2.5 or 3.0, and Emulex adapters are pre-loaded with the boot codes for all major architectures (x86 BootBIOS, EFIBoot and OpenBoot), ease of redeployment is assured. Emulex HBAs and drivers fully support boot from SAN in the VMware environment, and uniquely enable up to eight alternate boot paths for greater continuity of service. Boot from SAN support means improved availability and manageability, while reducing total cost of ownership.

Blazing new trails in virtualization

Emulex has pioneered SAN integration of virtual servers:

- ▶ Three years ago, Emulex co-sponsored the N-Port ID Virtualization (NPIV) standard through ANSI's T11 committee, resulting in support by today's leading fabric switches from Cisco, Brocade and McDATA.
- ▶ In October 2005 Emulex and VMware jointly demonstrated an NPIV standard implementation enabling fabric and storage optimization and management for each individual virtual machine.
- ▶ Emulex and VMware are working together to deliver this capability as part of a joint Community Source project.
- ▶ LightPulse Virtual HBA technology is now available, with plans by VMware and Emulex to support it as a standard feature integrated with the advanced capabilities of VMotion and Virtual Center.

Virtual HBA technology brings virtual servers to the mission-critical environment by offering:

- ▶ Corporate storage best practices such as single-initiator zoning
- ▶ SLA-oriented optimization such as VM-level guaranteed fabric bandwidth and array caching
- ▶ VM and LOB-level fabric and storage accounting and chargeback
- ▶ Faster, no-reconfiguration server, storage and HBA provisioning
- ▶ Integration with fabric virtualization architectures such as Cisco's VSAN.

Additional information and white papers on LightPulse Virtual HBA technology and its benefits are available at www.emulex.com.

Emulex and VMware: Partners for the Future

Emulex and VMware have established a strong partnership, leveraging VMware virtualization software and Emulex industry leading Fibre Channel HBAs to deliver greater IT resource utilization and flexibility. This relationship is demonstrated by:

- ▶ Four years of close partnership focused on data center excellence
- ▶ A ground-breaking Community Source virtual HBA project
- ▶ Emulex lead on driver porting and joint qualification as early partner in the IOV program

Together, Emulex and VMware are bringing virtualization to the core of enterprise information technology.

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