EMULEX

SOLUTIONS BRIEF

CONNECTIVITY

Maximize Virtualization Consolidation and QoS with Emulex 16GFC HBAs

Increased performance with vScale,™ lower power requirements with GreenState,™ more virtual ports with vEngine,™ streamlined management and backward compatibility

At a Glance

Most virtualization deployments rely on storage area networks (SANs) for flexible shared storage solutions to meet mobility, performance, scalability and efficiency requirements. As many data centers take the next steps in virtualizing big I/O applications, like databases, and move to more scalable private clouds, storage networking has become the primary bottleneck for Quality of Service (QoS) and scalability. The new Emulex LightPulse® 16Gbps Fibre Channel (16GFC) host bus adapters (HBAs) fix that bottleneck, enabling the best QoS for the highest virtual machine (VM) density with the fewest ports and cables and the lowest power footprint. Moreover, the entire SAN fabric benefits from higher availability and reduced power requirements with the faster HBA. Because of better performance as well as streamlined management and backward compatibility, the Emulex 16GFC HBA is the best solution for virtualization environments.

Product

- Emulex LightPulse 16GFC HBA (LPe16000 and LPe16002)
- Emulex OneCommand™ Manager for VMware® vCenter™ (OCM for VMware)
- Emulex OneCommand Manager
- Emulex OneCommand Vision

Solution Benefits

- Next-generation performance allows for faster I/O, lower latency, and superior CPU efficiency
- Maximum VM density with increased N_Port ID Virtualization (NPIV) virtual ports (vPorts) and Storage I/O Control scalability
- True cloud scalability, with support for up to 255 virtual functions and 1024 MSI-X and 8192 logins and open exchanges for maximum VM density—up to 4x more than other adapters
- Unmatched native manageability with Emulex OneCommand Manager for VMware vCenter (OCM for VMware) enables adapter management directly from the vCenter console, delivering 2x adapter management functionality and taking half the time to install and manage compared to other adapters
- Backward compatibility with 8GFC and 4GFC infrastructure, with single driver and management solution, ensures highest ROI and flexibility, and minimizes qualification overhead
- GreenState power efficiency delivers reduced power footprint to lower operational expense (OpEx)—up to 3x the IOPS per watt
- End-to-end data integrity with BlockGuard™ hardware offload supports the T10 Protection Information (T10-PI) standard to protect against silent data corruption, without the 30-40% performance tax incurred by other firmware-based T10-PI solutions

16GFC for Virtualization and Cloud Architectures

In 2009, the ANSI INCITS T11 committee completed work on the 16GFC standard. 16GFC accelerates high-density virtualization by doubling the number of ports that can be virtualized and reducing the number of physical ports and cables required by half. In fact, 16GFC is required for a properly balanced solution stack combining the latest multi-core processors, expanded memory and high-speed storage such as solid-state disk (SSD) drives. With its bullet-proof reliability and over 11 million FC ports deployed, Emulex delivers the benefits of 16GFC with its LightPulse LPe16000 series Fibre Channel HBAs, built to meet the needs of both virtualized business critical applications and the cloud.

Higher performance

IT organizations turn to virtualization technologies, such as VMware, Microsoft® Hyper-V, Citrix® XenServer, or Oracle® VM, as a means to transform data centers into “service-centric” or cloud resources which can be dynamically aggregated, tiered, provisioned and accessed. The higher performance of the Emulex 16GFC HBA is ideal for both virtualization and emerging cloud environments, especially as more I/O-intensive applications are deployed. The new Emulex 16GFC HBAs can deliver dramatically higher Input/Output Operations per Second (IOPS)—with a peak of 1 million IOPS through a single port—enabling maximum VM consolidation with superior QoS.

Emulex lab tests comparing 8GFC HBAs with the LightPulse16GFC HBAs reveal substantial benefits for virtualization and cloud environments, including data that shows the LPe16000 delivers a maximum of:

- Up to five times IOPS improvement over 8GFC HBAs
- Twice the data throughput (MB/s) compared to 8GFC HBAs
- Half the application response time compared to 8GFC HBAs

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Emulex OneCommand Manager for VMware vCenter (OCM for VMware)

The Emulex 16GFC HBA is fully supported by OCM for VMware, a native software plug-in that integrates real-time scale-out lifecycle management of Emulex LightPulse HBAs and OneConnect™ Universal Converged Network Adapters (UCNAs) into the VMware vCenter console. This comprehensive integration builds on Emulex Common Information Model (CIM) providers and established OneCommand Manager features to proactively address key data center issues and improve operational efficiency across VMware hosts and clusters. The core functionality delivered with OCM for VMware includes multi-protocol management (FC, Fibre Channel over Ethernet [FCoE], iSCSI and network interface card [NIC]), online firmware flashing, configuration updates, adapter diagnostics, plus flexible graphical and command line interfaces. IT administrators can use OCM for VMware to help accelerate adapter and network deployments, optimize configurations, increase availability and lower costs for VMware host systems.

Emulex proven reliability

In survey after survey, the number one concern of end users is *reliability*. Emulex is synonymous with quality. With over 11 million ports installed worldwide and partnerships will all the leading server and storage vendors, Emulex is the clear choice for reliable, quality connectivity. In a recent survey of 710 Fibre Channel customers,* greater than 97% of the IT organizations stated that they were either satisfied or very satisfied with the initial product quality and the long-term reliability of Emulex HBAs. Emulex was the first company to deliver a Fibre Channel HBA, is the choice of large enterprise organizations worldwide and has a solid adapter architecture, software stack and industry-leading management application.

End-to-end data integrity offload

In response to customer and regulatory compliance requirements, most hypervisors are developing application/VM-to-disk data integrity solutions around the T10-PI (DIF) standard. Designed to prevent silent data corruption through end-to-end check sums, the full ecosystem of T10-PI enabled storage, HBAs, operating systems (OS)/hypervisors and applications is quickly emerging.

Emulex has implemented the T10-PI standard on its LightPulse 16GFC HBA with its BlockGuard feature. With unique hardware-offload support for T10-PI, Emulex HBAs provide data integrity without the 30-40% performance tax that current firmware-based solutions provide today. With Emulex, virtualization users are future-proofed for the time when they may choose to enable data integrity.

Increased ROI with Emulex

ROI is increased for virtualization and cloud users with the Emulex 16GFC HBAs since cable and device management is much easier and fewer are required with support for more applications and VMs. With structured cabling costs up to $300/port, each cable reduction saves money and reduces OpEx and the amount of infrastructure to manage. This is especially important to cloud service providers who need to maximize their infrastructure usage.

Emulex OneCommand Manager further increases ROI by reducing the overhead of managing multiple generations of HBAs as well as OneConnect UCNAs running different protocols (FC, FCoE, iSCSI, and Ethernet NIC). Through a single console, OneCommand Manager controls all Emulex HBAs and UCNAs within the virtualization environment. Moreover, the unique OneCommand Manager plug-in for VMware vCenter enables adapters to be managed directly within the VMware environment, further simplifying the management process.

In the recent Emulex customer satisfaction survey, 60% of the end users who use OneCommand Manager use it at least once a month, if not daily. It is no wonder that OneCommand Manager is so popular, as virtualization customers can get twice as much done in half the time compared to other I/O management applications.

Lower power consumption

Power efficiency is an integral part of all Emulex Fibre Channel HBA designs. Emulex has embraced maximum performance through efficient cooling by designing its high performance LightPulse 16GFC HBAs with passive cooling devices for optimum performance in a broad range of server environments. By upgrading to the Emulex 16GFC HBA, data center managers see up to three times improvement in application throughput per watt (IOPS/W).

Emulex delivers:

Superior historical HBA performance[1] for faster transaction processing

- 37% better dual-port scalability, delivering the highest data throughput on both channels for optimum server performance, as well as power and cooling efficiency
- Advanced CPU utilization for better application and system performance—chosen to power 8 of the top 10 (including the #1) of the fastest database systems in latest Transaction Processing Performance Council-C reports[2]

Higher availability for reliable application uptime

- Industry's most reliable HBA based on actual field return data
- 30% higher reliability over nearest competitor
- More than 10 million hours mean time between failure (MTBF) with over 11 million ports shipped

Extensive knowledge of virtualization and security for piece of mind

- Support for more vPorts that are centrally managed with OneCommand Manager
- End-to-end data integrity with support for the T10-PI standard, protecting against silent data corruption as data traverses the system from the system all the way to the disk array

[1] Based on competitive tests with the 8GFC HBA. 16GFC HBA testing is underway.
[2] TPC-C Benchmark Report, December 2010

* Emulex Customer Satisfaction Survey, September, 2011, with participation by 710 companies with Fibre Channel environments.

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Key HBA Features

Table 1 provides a summary of the key features of the Emulex 16GFC HBA and how virtualization and cloud environments take advantage of the feature.

LPe16000 Feature	Virtualization and Cloud Benefit
vScale	**High performance**—Performance and scalability supports 255 VFs, 1024 Message Signaled Interrupts eXtended (MSI-X) and 8192 logins/open exchanges for maximum VM density—4x more than other adapters.
vEngine	**Increased ROI**—CPU offload lowers CPU burden on the host server, enabling support for more VMs.
Reduced latency	**High performance**—Since most high transaction processing is not a constant stream of data, but rather bursty segments of data, the computer is actually doing multiple things. It's trying to process data, moving data in and out of memory, and it's trying to update it to and from the storage devices. By reducing the time it takes to get data in and out of the storage device, Emulex 16GFC HBAs help the computer spend more time on processing the data, thus helping the overall transactions per second just due to lower latency of the length of storage. With Emulex 16GFC HBAs, virtualization environments can move typical high transaction bursty data much more quickly.
GreenState power efficiency	**High availability and reliability**—There is a direct correlation between heat and device longevity. Overheated parts generally exhibit a shorter lifespan and lower system performance. The 16GFC HBA enables low power breakthroughs, including GreenState power management, allowing selective dynamic hibernation, advanced thermal and power instrumentation, and a configuration with less than 3 watts per port. **Reduced OpEx**—Cooling costs are reduced.
Scalable	**Investment protection**—SAN and virtualization environments are dynamic. To that end, Emulex Fibre Channel HBAs, management tools, device drivers and firmware are designed to provide the greatest degree of scalability and flexibility. Increases in the numbers of virtual HBAs and simultaneous transaction contexts (XRIs) provide a safe growth environment for organic growth and cloud transition.
Common driver model	**Investment protection and reduced OpEx**—A single driver binary works with all supported generations of Emulex LightPulse Fibre Channel HBAs for a given OS platform. This approach simplifies management, requiring IT administrators to only deploy a single driver across Emulex 4GFC, 8GFC and 16GFC HBAs.
Single management console	**Reduced OpEx**—Comprehensive control of Emulex Fibre Channel HBAs within a centralized, cross-platform framework, combining flexible remote-management options with secure access control is a hallmark of OneCommand Manager. Through a single console, SAN administrators can manage all Emulex Fibre Channel HBAs, leveraging either in-band (over the Fibre Channel link, an exclusive feature of Emulex) or out-of-band (over the LAN) options and a host of automation features that reduce deployment and management costs significantly over other HBAs. With support for iSCSI, FCoE and NIC protocols, OneCommand Manager also manages Emulex OneConnect UCNAs for the converged network environment. With OCM for VMware, OpEx is further reduced through operational efficiencies.
Fast deployment	**Reduced OpEx**—Historical testing on the 8GFC HBAs show that administrators can get twice the adapter management functionality, deploying HBAs in half the time compared to other management solutions. In an enterprise setting with hundreds, or even thousands, of adapters, this productivity advantage is significant.
Reduced cabling	**Increased ROI**—Enables more applications and VMs to run on a single server and Fibre Channel port
BlockGuard offload support	**High performance data integrity**—Emulex's exclusive BlockGuard technology provides end-to-end data integrity with 40% higher performance than typical firmware implementations of T10-P1 due to hardware offload capability.
SSD support	**High performance**—For SSDs attached to a SAN, Emulex delivers reliable and high performance connectivity to enable fast and reliable storage tiering and burst caching with its LightPulse 16GFC HBA.
Certified stack	**Investment protection**—With certification with leading virtualization vendors, data center managers are assured of a no-risk, high availability and supported solution.

Maximizing Virtualization Consolidation and QoS with Emulex 16GFC HBAs

Maximize Virtualization and Cloud Consolidation, QoS and Availability

The award-winning Emulex OneCommand Vision I/O Management application helps data centers maintain the highest level of application performance and availability while maximizing utilization of existing resources. I/O Performance and Availability Service (IPAS) takes OneCommand Vision to the next level—essential for virtualization and cloud environments.

Summary

The LightPulse 16GFC HBA continues Emulex's tradition of delivering reliable, high performance, scalable and manageable connectivity for virtualization environments. Having won virtually every 16GFC design win at OEMs across the world, data centers will take advantage of the Emulex LPe16000 series Fibre Channel HBAs on any platform in any country. As data centers migrate business critical applications, like databases, into virtualized environments, Emulex will ensure maximum performance and QoS. And as cloud environments become mainstream across the globe, Emulex will be powering them.

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