

Lower Energy Consumption with Server and HBA Virtualization

AT A GLANCE

This white paper shows how data centers can reduce their power consumption by over 90% with server virtualization and Emulex Virtual host bus adapter (HBA) technology.

PRODUCTS

Emulex LightPulse® LPe12000 8Gb/s
Fibre Channel HBA Family

APPLICATIONS

Virtual Server Deployments

The Data Center Energy Crisis

With the rising cost of energy, it is no wonder Gartner Group reported that server virtualization is one of three “disruptive technologies” that will change the face of IT. Server virtualization greatly reduces the number of physical servers required to support the ever-growing data center. Fewer physical servers results in savings throughout the data center, and in particular lowers energy costs associated with operating and cooling the servers.

HBA virtualization is a key component to any server virtualization project. By implementing server virtualization with Emulex Virtual HBA technology, energy and management costs are reduced, while asset utilization and total cost of ownership (TCO) are improved.

The Emulex Host to Fabric Virtualization Solution

Emulex has been at the forefront of host to fabric virtualization technology. Emulex worked with IBM to define and develop N_Port ID Virtualization (NPIV), the standard which is now ubiquitous across all SAN products designed to deliver virtualization capabilities. Emulex’s technological depth in virtualization, SAN management and performance, as well as proven reliability track record, places its Fibre Channel HBA solutions squarely in the middle of any data center’s project to reduce energy costs through server and HBA virtualization.

Server and HBA Virtualization Savings

Table 1 shows the power consumption specifications for the Hewlett-Packard DL360 G5 and DL580 G5 rack mounted servers.

Table 1—Server Configurations and Power Requirement

System Configuration	Proliant DL360 G5	Proliant DL580 G5
CPU per system	1	2
Cores per CPU	2	4
Power supply	1	2
PCI slots	1	6
Emulex Fibre Channel HBA (LPe12002)	1	2
System memory (GB)	2	32
Internal storage (72GB hard disk drive)	2	0
System input power requirements at max. system utilization ^A	288 watts	414 watts

^A Server power requirement data obtained from HP.com

Table 2 summarizes the power savings that are achieved through deployment of server virtualization and Emulex Virtual HBA technology. A total of 16 DL360's are needed to support the number of application workloads that a single DL580 server can support through server and HBA virtualization.

Table 2—Power Savings with DL580: Server virtualization enables 90 percent power savings

Virtual Machine Support and Total Power Requirement	Proliant DL360 G5	Proliant DL580 G5
Number of production virtual machines supported (RDM)	0	16
Number of servers required to support 16 application workloads	16	1
Total power required to support 16 application workloads	4,608 watts	414 watts

Based on the power requirements of the DL server configurations, a data center manager can reduce electrical power consumption by over 90 percent through server and HBA virtualization, in addition to other “green” benefits, as shown in Table 3.

Table 3—Results of Server and HBA Virtualization

Energy Consumption and other “Green” Savings	
Savings realized by combining Emulex Virtual HBA technology with virtual server technology (DL360 vs. DL580)	<ul style="list-style-type: none"> • Energy consumption reduced by over 90% • Annual energy cost reduced by \$5,100 ^B • Annual carbon emissions reduced by approximately 50,000 lbs. / 23,000Kg ^C

^B Assumes cost of \$0.14 per kilowatt hour (kWh)

^C Data extrapolated from “Green Calculator” on VMware.com

Industry Leader and Innovator: Developed NPIV

Emulex and IBM co-developed NPIV, the method for virtualizing a Fibre Channel port, giving each virtual machine a unique virtual data path across a single shared physical Fibre Channel port. NPIV is a key feature of Emulex Virtual HBA technology, enabling each HBA port to register multiple “virtual ports” (Vport) identified by unique Worldwide Port Name (WWPN) within the fabric. In fact, Emulex delivers support for more Vports than any other Fibre Channel HBA on the market. This means that more virtual machines are supported per physical server, thereby requiring fewer physical servers in the data center. From a financial perspective, Emulex Virtual HBA technology and server virtualization help reduce capital costs, energy consumption and management requirements, for an overall reduction in TCO.

SAN Best Practices

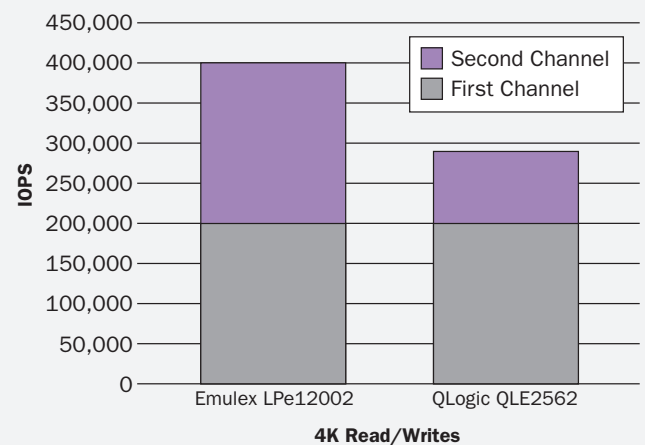
By leveraging Emulex Virtual HBA technology, data centers can implement SAN best practices such as Logical Unit Number (LUN) masking and zoning in a virtual server environment. This allows them to follow existing SAN management processes, leverage powerful SAN management tools and access enterprise-class SAN storage resources from a virtual server deployment. Some examples of the types of activities possible when using Emulex Virtual HBA technology in combination with a Virtual Server deployment include:

- ▶ Creating individual zones for each application server. Zoning allows a greater degree of management and control while protecting data from unauthorized access.
- ▶ Performance tuning and trouble-shooting capabilities for optimized SAN performance and SAN availability.
- ▶ Customizing storage resources capabilities for improved virtual server performance.
- ▶ Leveraging quality of service (QoS) to improve operation of business critical applications as well as meeting service level agreement (SLA) commitments.

Dual-Channel Performance

Emulex LightPulse Dual-Channel 8Gb/s Fibre Channel HBAs deliver higher overall throughput and transaction rates for server virtualization projects than the nearest competitor. Chart 1 compares the IOPS capabilities of the available Fibre Channel 8Gb/s HBAs. The vertical bars represent the HBA's overall IOPS performance, while the bottom segments show IOPS performance of the first channel and the top segments show IOPS performance of the second channel. It is clear to see that the Emulex LightPulse Fibre Channel 8Gb/s HBA is effectively using its second channel to outperform a similar HBA by 127%.

Chart 1—Dual-Channel Scalability



As I/O traffic is consolidated from multiple virtual machines onto a single HBA, greater per port performance is required. Emulex LPe12002 8Gb/s PCIe 2.0 Fibre Channel HBAs offer the highest performance for critical business applications over the QLogic QLE2562:

- ▶ 127% better second channel scalability as measured in IOPS
- ▶ 37% greater total IOPS when saturating both channels
- ▶ 33% more effective CPU utilization
- ▶ 15% greater transaction performance
- ▶ 115MB/s more bandwidth

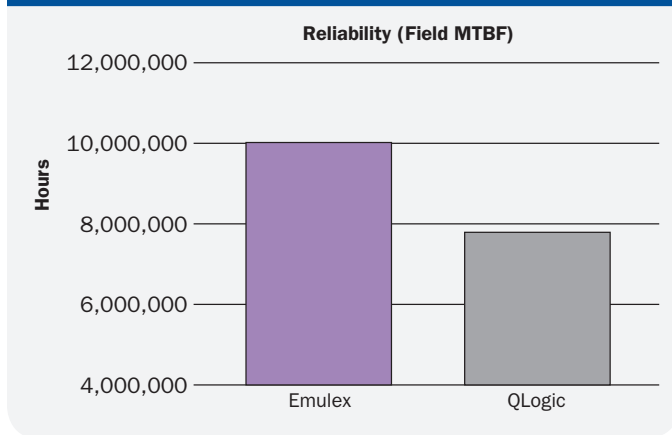
For detailed information on Emulex HBA dual-channel capabilities, go to:

<http://www.emulex.com/white/hba/excellence.pdf>

Reliability

Historically, Emulex HBAs lead the industry in reliability, or mean time between failure (MTBF). Using a combined six years of field data for 2Gb/s and 4Gb/s products, Emulex HBAs averaged 10 million hours of field MTBF, which is more than 30 percent greater than the nearest competitor (see Chart 2). By using Emulex HBAs, data center administrators are assured the availability of critical server connections to reliably access stored data.

Chart 2—Emulex 2Gb/s and 4Gb/s HBAs Average 10 Million Hours Field MTBF: 30% greater than QLogic's



Conclusion

Data Centers are challenged by driving down power costs. Server virtualization is one of the key technologies being deployed to reduce capital, management and operating costs. Emulex LightPulse 8Gb/s Fibre Channel HBA performance, reliability and virtualization technology empower administrators to more effectively deploy server virtualization, follow SAN best practices such as zoning and storage masking, and seamlessly leverage popular storage management applications. Leveraging server and HBA virtualization technologies yields more efficient use of assets and a noticeable reduction in TCO.

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