



4Gb/s Infrastructure is Better with Emulex 8Gb/s HBAs

Enhance your 4Gb/s data center with Emulex 8Gb/s HBAs—minimal cost, higher performance and larger SANs

At a Glance

The transition to 8Gb/s Host Bus Adapters (HBAs) is upon us. With server virtualization and new Intel® Xeon® 5500-based servers on the market, industry experts report that this year there will be more 8Gb/s HBAs purchased than 4Gb/s HBAs. You can take advantage of performance, reliability and scalability benefits of Emulex LightPulse® Fibre Channel 8Gb/s HBAs by beginning your transition now, with your next HBA purchase. This Solution Brief describes how even one Emulex LightPulse Fibre Channel 8Gb/s HBA will enhance your 4Gb/s infrastructure.

Product

- Emulex LightPulse LPe12000 Fibre Channel 8Gb/s HBA

8Gb/s HBA Benefits for 4Gb/s Infrastructure

- Higher performance
- Industry's highest number of virtual ports (vPorts)
- Supports bigger Storage Area Network (SAN)
- Provides enhanced diagnostics for great reliability

8Gb/s HBAs Will Outsell 4Gb/s HBAs This Year

Data center administrators with a SAN based on 4Gb/s pipe face a purchasing decision as they look to expand their existing SAN. While their 4Gb/s infrastructure works well, the time to transition to 8Gb/s HBAs makes a lot of sense. In fact, the latest Dell'Oro forecast shows that the transition from 4Gb/s Fibre Channel to 8Gb/s Fibre Channel continues to progress and 2010 is the year that 8Gb/s HBAs begin to outsell 4Gb/s HBAs (Figure 1).

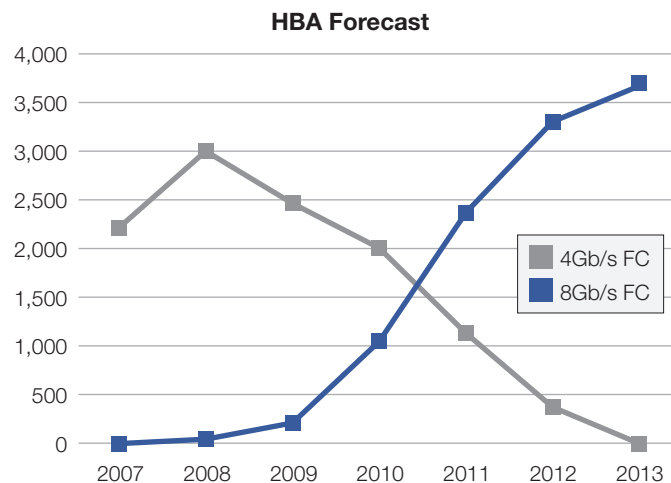


Figure 1 HBA forecast (Dell'Oro).

Part of the market shift is being driven by lower prices for 8Gb/s Fibre Channel. For example, Emulex has been offering some pricing incentives that make the choice between 4Gb/s HBAs and 8Gb/s HBAs an easy decision. The market shift is also a reflection of the need to “future proof” the SAN. For example, arrays are moving to 8Gb/s so it is just a matter of time before the whole SAN should be upgraded.

Upgrading your entire SAN at one time is not feasible, but improving it with 8Gb/s HBAs can be done quite easily and will enhance your 4Gb/s infrastructure with higher performance, greater reliability and increased support for virtualization and bigger SANs.

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Enhance 4Gb/s Infrastructure Performance with 8Gb/s HBA

High performance 8Gb/s HBAs are necessary for not only server virtualization, but also for data warehousing and rich media. Enhancing your 4Gb/s infrastructure with 8Gb/s HBAs results in increased performance as documented in a recent benchmark by Emulex Labs. This benchmark compared Emulex 4Gb/s HBAs with Emulex 8Gb/s HBAs using the Oracle Orion I/O calibration tool and the SwingBench load generator to profile an order entry and data warehousing workload. For a complete description of this study, go to www.emulex.com.

The Emulex LPe12002 8Gb/s Fibre Channel HBA was compared to the Emulex LPe11002 4Gb/s Fibre Channel HBA with storage arrays that only support 4Gb/s port connections. With these benchmarks, 8Gb/s HBAs in 4Gb/s environments showed:

1. Nearly double data warehousing throughput (Figure 2)
2. 15 percent greater IOPS (Figure 3)
3. 16 percent improvement in I/O latency (Figure 4)

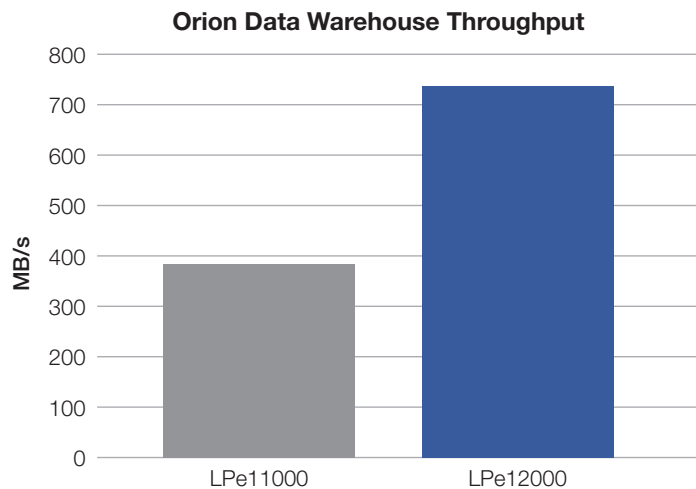


Figure 2 The 8Gb/s LPe12000 data warehousing throughput performance is nearly twice that of the 4Gb/s LPe11000 HBA.

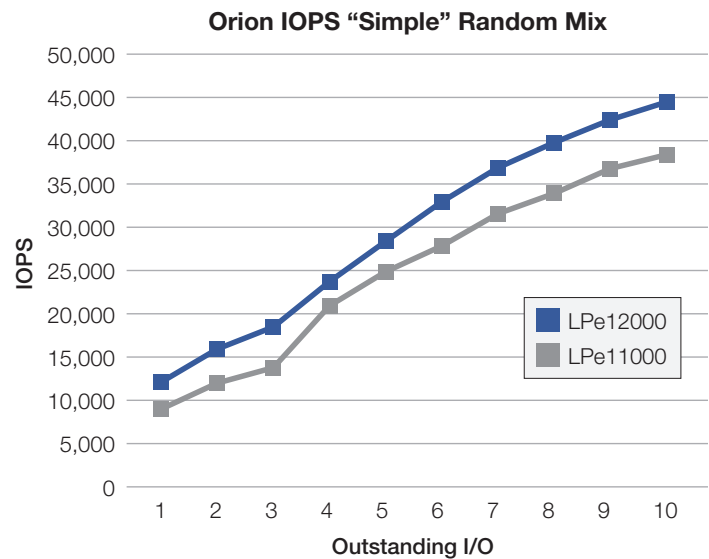


Figure 3 Orion test results showing greater IOPS with the LPe12000.

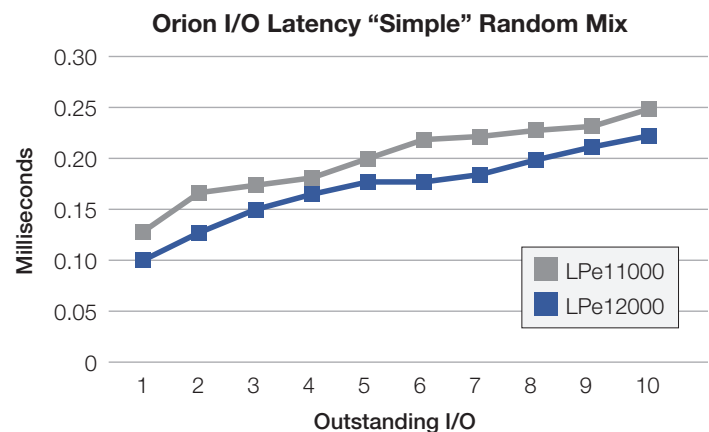


Figure 4 Orion test results showing lower latency with the LPe12000 over the entire load range.

4Gb/s Infrastructure is Better with Emulex 8Gb/s HBAs

Emulex Fibre Channel HBAs include the following features that enable scalable performance:

- Dynamic interrupt coalescing uses specially developed algorithms that monitor, adjust and manage I/O interrupt processes. By leveraging I/O interrupt models, dynamic interrupt coalescing improves CPU efficiency and I/O performance.
- Frame-level multiplexing continuously determines the optimum use of the Fibre Channel network to ensure maximum link utilization.
- Out-of-order frame reassembly reorders data frames in the proper sequence, minimizing data retransmissions and enhancing overall network performance.
- Auto-negotiated link speed optimizes performance based on available network connections, ensuring Emulex 8Gb/s Fibre Channel HBAs can communicate with Fibre Channel switches at the highest supported speed.
- Support for multiple concurrent DMA reads scales up I/O performance for high-transaction applications.
- MSI-X is an interrupt handling mechanism that's used to allocate a separate set of interrupts for each adapter port on a server. This allows interrupts from each port to be processed in parallel, eliminating the delays with a single interrupt process.
- Non-Uniform Memory Access (NUMA) is supported with next-generation, multi-processor servers that have local, dedicated memory for each processor. When supported by the operating system, interrupts are directed back to the CPU that initiated an I/O process, using memory that's local to the processor to provide optimum performance.

Using the Emulex LightPulse 8Gb/s Fibre Channel HBAs with a Xeon 5500 processor in the Emulex Lab, a single two-socket server was able to generate over a million IOPS! Now that's complementary technology ideal for I/O-intensive applications and virtualized server environments.

8Gb/s HBA for Your 4Gb/s SAN

Better performance

- Improved host CPU utilization, I/O scalability and application performance through support for Message Signaled Interrupts eXtended (MSI-X)
- Enhanced I/O performance by supporting next generation PCIe 2.0 systems (at 2.5GT/s or 5.0GT/s)

Superior virtualization capabilities

- Supports the most vPorts in the industry, more than double the amount supported by 4Gb/s HBA

Reduce total cost of ownership (TCO) through enhanced maintainability

- Better maintainability with advanced diagnostics on optical transceivers and extended non-volatile error logging

Bigger SAN support

- Increased Login Remote Port indicator (4096 versus 512) and greater exchanges (XRI) per port (4096 versus 1000)

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Summary

When you decide to replace your 4Gb/s infrastructure is immaterial to the decision to make your next HBA purchase an Emulex LightPulse Fibre Channel 8Gb/s HBA. By adding 8Gb/s HBAs to your existing SAN, you will benefit from the technology enhancements that deliver higher performance and greater reliability while allowing you to build a bigger SAN. Figure 5 summarizes the main differences between an Emulex LightPulse Fibre Channel 4Gb/s HBA and an Emulex LightPulse Fibre Channel 8Gb/s HBA.

| Feature | 8Gb/s | 4Gb/s |
|--|-------------------|------------------|
| Performance: more IOPS | 200K | 150K |
| Improved latency | 16% faster | — |
| Greater throughput | 1600Mb/s per port | 800Mb/s per port |
| Server architecture: MSI-X | Yes | No |
| PCIe | 2.0 | 1.0a |
| Virtualization: vPorts | 255 | 100 |
| Bigger SANs: login remote port indicator | 4096 | 512 |
| Exchanges (XRI) per port | 4096 | 1000 |
| Enhanced diagnostics: thermal | Yes | No |
| Non-volatile data | Yes | No |

Figure 5 8Gb/s HBA versus 4Gb/s HBA.



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