

Emulex 4Gb/s HBAs Provide Peak Performance for Microsoft Exchange

AT A GLANCE

The growing importance of Microsoft's Exchange e-mail platform means a rising tide of e-mail message data to store, back up, recover and query. HBAs linking these servers to their storage infrastructure must handle the peak I/O loads. The Emulex LightPulse[®] LPe11002 doubles the performance of 2Gb/s HBAs, providing 30% greater Exchange-like I/O performance and 78% greater throughput than the QLogic 4Gb/s QLE2462.

PRODUCTS

Emulex LightPulse 4Gb/s Fibre Channel HBAs

APPLICATIONS

Microsoft Exchange

Executive Overview

As organizations increasingly rely on e-mail for strategic communications, they must store, manage, back up and restore ever-larger Microsoft Exchange databases. Larger amounts of data must be squeezed into shrinking backup windows, while maintaining e-mail performance despite the naturally "bursty" nature of e-mail traffic. Such requirements stress every part of the storage infrastructure, including host bus adapters (HBAs), which link e-mail servers to the storage area networks (SANs) on which e-mail information is stored.

Emulex has led the industry with HBAs that provide peak performance for the type of traffic generated by Exchange. The LP10000 HBA established itself as the highest performing 2Gb/s HBA for Exchange environments, offering a 35% performance advantage over the QLogic QLA2340 in a Microsoft Exchange environment. Full details are available on the Emulex website.

Emulex extends this leadership with the 4Gb/s LPe11002 HBA which provides greater performance for Exchange-like traffic than its nearest competitor, the QLogic QLE2462, and 78% greater data throughput than the QLE2462 to handle the peak performance requirements imposed by backup, recovery, and real-time data replication.

This white paper explains how a 4Gb/s storage infrastructure provides the most reliable, high-performance infrastructure for Exchange data. It also describes how the unique features of Emulex LightPulse 4Gb/s HBAs make the most of 4Gb/s infrastructures in Exchange environments, helping organizations cope with unpredictable spikes in e-mail traffic, as well as the requirements of increasingly popular disk-to-disk backup and restore solutions for Exchange databases.

Exchange Requirements

As use of Microsoft Exchange rises, so does the need to cost-effectively and reliably store, manage, archive and retrieve e-mail data. Increasing amounts of information sent in e-mails or attachments has caused exponential growth in mail stores. Regulations requiring stronger protection of customer and financial information and the need to quickly retrieve archived e-mail for legal or regulatory purposes have increased the demands on Exchange storage subsystems.

Many Exchange servers are linked to SANs for their higher reliability, greater performance and ability to share unused disk space among servers. This means the HBAs linking the servers to the SAN must handle the highest possible throughput under actual Exchange requirements. These bandwidth demands are inherently “bursty” with long periods of inactivity punctuated by a peak in I/O per second (IOPS) as the user’s e-mail client checks the server for mail. Spikes can also result when many users simultaneously receive an e-mail with a large attachment, or when many users forward an e-mail (such as one announcing major company news) to others at the same time.

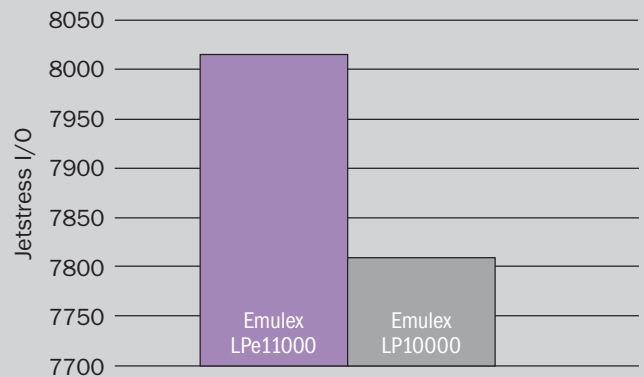
E-mail can also tax a storage subsystem because it contains both small (4k), mostly random, reads and writes to the e-mail database, and larger (64k) sequential writes to the server log file which can potentially block the smaller read/write operations.

We now examine how a 4Gb/s storage infrastructure can meet these demands.

Benefits of 4Gb/s for Exchange

To demonstrate the advantages of a 4Gb/s infrastructure, Emulex simulated 500 heavy users accessing an Exchange database with a Jetstress testing tool. Using a controlled environment, this showed that the Emulex 4Gb/s LPe11000 HBA can process in excess of 200 Exchange I/O transactions per second more than the industry’s fastest 2Gb/s HBA for Exchange-like data, the Emulex LP10000 HBA. (See Figure 1.) This performance level is unsurpassed by any other vendor in the industry. For dual-channel applications, the 4Gb/s LPe11002 HBA delivers benefits similar to adding two more disk drive shelves to a storage array, without the expense of buying, maintaining, upgrading and managing the additional hardware.

Figure 1: 2Gb/s vs. 4Gb/s Exchange performance

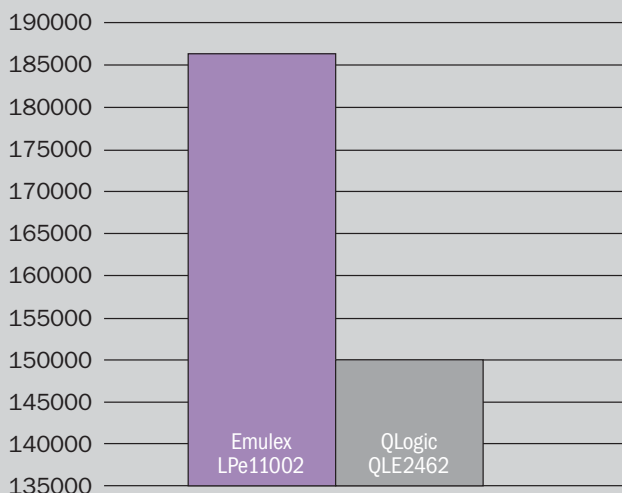


This Jetstress simulation of a 500 heavy user Exchange installation shows that, with all other factors being equal, the Emulex 4Gb/s LPe11000 HBA can process in excess of 200 Exchange I/O transactions per second more than the 2Gb/s LP10000 HBA—a performance level which is unsurpassed by any vendor in the industry.

This improved level of performance will become increasingly necessary due to the I/O performance required for database backups and restores as e-mail volumes, and the size of e-mail databases, continue to increase in coming years. In addition, the inherently “bursty” nature of e-mail traffic, as well as the very high spikes produced by, for example, an ad-hoc search of e-mails for regulatory or legal purposes, will also require greater I/O transactions per second.

To accommodate such peaks without affecting e-mail response times or availability, it's useful to compare the peak number of I/O transactions a 4Gb/s HBA can perform compared to a 2Gb/s HBA. Figure 2 shows the maximum performance possible at the 4K I/O sizes used by Exchange, as measured with an IOmeter test tool configured to place the maximum possible load on the HBA. The Emulex LPe11002 HBA (the industry's performance-leading dual-channel 4Gb/s HBA), boasts a maximum transaction rate for the 4K I/O required for Exchange that is nearly 80% greater than the dual-channel LPe10000DC HBA, the industry's fastest 2Gb/s dual-channel HBA.

Figure 2: 4K block size I/O per second

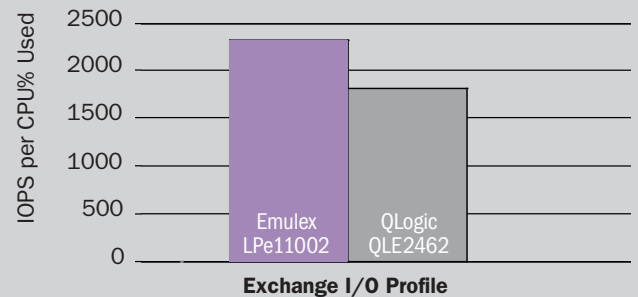


At the 4K block size used most often by Exchange, tests performed using an IOmeter demonstrate that the Emulex LPe11002 HBA is the industry's performance-leading dual-channel 4Gb/s HBA, with a maximum transaction rate nearly 30% greater than the QLogic QLE2462.

CPU Efficiency

Host bus adapters can offload the server CPU from managing I/O, thereby increasing the number of server CPU cycles available for application processing. The Emulex LPe11002 excels at offloading transactional I/O workloads (typified by Microsoft Exchange) by providing 27% greater CPU efficiency over the QLogic QLE2462. This CPU efficiency advantage translates into increased CPU cycles for server applications and cost savings on server configurations.

Figure 3: CPU Effectiveness

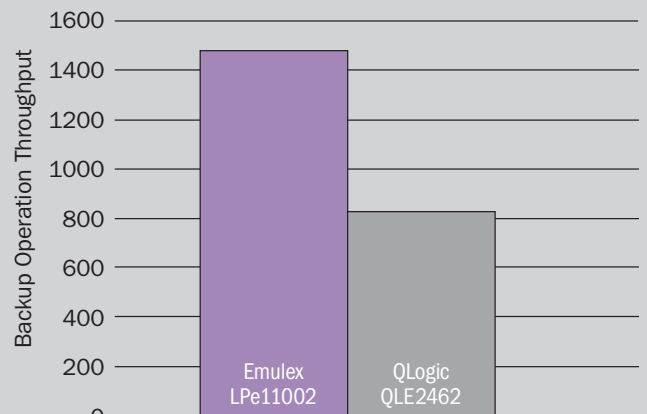


Tests performed using an IOmeter show that the Emulex LPe11002 provides 27% greater CPU efficiency compared to the QLE2462.

Maximum Throughput

When customers purchase a dual-channel HBA, they expect optimum throughput through both channels. Some competing 4Gb/s Fibre Channel HBAs deliver optimum throughput through only one channel, with performance degrading significantly through the second channel. This cripples the performance of the server, as well as wasting space, electrical power and cooling capacity by requiring the use of more HBAs.

Figure 4: Maximum HBA throughput



Tests performed using an IOmeter show that a major advantage of using Emulex 4Gb/s HBAs for Exchange is their greater peak throughput. The Emulex LPe11002 HBA provides 78% greater bandwidth than the closest competitor's product.

Summary

The growing importance of Microsoft's Exchange e-mail platform means a rising tide of e-mail message data to store, back up, recover and query. For peak reliability, organizations often deploy Exchange on clustered servers, meaning one server must handle the entire e-mail load if its companion server fails, and are deploying disk-to-disk backup which requires greater throughput than tape-based backup.

Therefore, the HBAs linking these servers to their storage infrastructure must handle the peak I/O loads created by backup, recovery, failover and ad-hoc e-mail searches, as well as naturally "bursty" e-mail traffic. Emulex continues its industry-leading Exchange performance with its line of 4Gb/s HBAs. The Emulex LPe11002 HBA doubles the performance of 2Gb/s HBAs and provides 30% greater Exchange-like I/O performance, and under identical load and storage conditions, 78% greater throughput than the 4Gb/s QLogic QLE2462.

This performance is the result of unique Emulex features, such as frame-level multiplexing and peak performance through both channels of dual-port HBAs. These advances, along with the unique Emulex management software portfolio and cross-generation driver compatibility, assures organizations can meet their growing needs for Exchange e-mail access, backup and recovery of e-mail, server failover and real-time data replication.

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