

# The 8Gb Fibre Channel of Choice in Oracle Environments

## QLogic's 8Gb Adapters Outperform Emulex—QLogic's IOPS Up to 106 Percent Higher with Oracle Workloads

### Key Findings

For demanding enterprise database applications such as Oracle, choosing the QLogic 2500 Series 8Gb Fibre Channel Adapter provides:

- **OLTP: Up to 106 percent higher IOPS than Emulex**
- **OLAP: Up to 23 percent higher IOPS than Emulex**



## Executive Summary

It is imperative to deploy a scalable architecture to meet the ever-growing requirements of SANs. The QLogic 2500 Series 8Gb Fibre Channel Host Bus Adapters meet the need for high performance at power levels that are unprecedented in the industry. Today's mission-critical Online Transaction Processing (OLTP) and Online Analytical Processing (OLAP) applications demand the highest levels of performance from their database servers and storage infrastructure.

A critical element of overall SAN performance is the selection and deployment of an adapter with the right architecture. With the introduction of multi-processor CPUs coupled with virtualization technologies, high performance Oracle® database solutions need to be complemented with high performance and scalable I/O connectivity. Choosing the wrong adapter can complicate SAN management and

limit the flexibility of an organization to meet continually evolving business needs.

To help IT decision makers make the best, most informed adapter choice, QLogic has performed a series of head-to-head performance benchmarks showing the I/O performance and scalability advantages of the QLogic 2500 Series 8Gb Fibre Channel Adapter over the Emulex® 8Gb LightPulse® adapter in a variety of real-world OLTP and OLAP scenarios using SAN-attached Oracle databases.

QLogic compared the overall performance of the 8Gb adapters when configured to emulate a real-world SAN with maximum throughput workloads. These tests highlight the advantage delivered by the QLogic 2500 Series architecture in Oracle environments.

## Introduction

The tests discussed in this paper analyzed and compared the I/O performance of QLogic and Emulex 8Gb Fibre Channel Adapters in a representative selection of database-driven workloads, such as the following:

- **An OLTP Workload.** OLTP applications are high throughput, insert/update-intensive. This workload is typical for companies that have large transaction processing applications, such as airline ticketing, large order-entry, and banking applications.
- **An OLAP Workload.** The purpose of an OLAP workload is to quickly provide answers to analytical queries that are multi-dimensional and part of the broader category of business intelligence. OLAP workloads are typically used in relational reporting and data mining.

To make the benchmarks relevant to today's businesses, QLogic selected the market-leading **Oracle Relational Database Management System (RDBMS)** running on Microsoft® Windows® Server 2008 R2. This is a very popular, highly scalable enterprise configuration in wide production use for all two workloads described in the previous paragraphs. The tool used for predicting the performance of the Oracle database under-load was ORION from Oracle. Oracle's ORION benchmark tool enabled us to effectively present a workload that mimics and stresses a storage adapter in the same manner as applications will within an Oracle backend database.

**Testing performance.** To test and compare the I/O performance, QLogic used a Texas Memory Systems RamSan®-325 solid-state storage subsystem as the target. Solid-state storage dramatically reduces the latency that comes from using disk-based storage. This latency reduction allows for measuring the true capability of the adapter.

## Test Setup

The test setup (Figure 1) consisted of the latest 8Gb adapters from QLogic and Emulex, running on current commercially available drivers and installed in a Intel® Nahalem Quad Core (dual socket) server running the Windows Server 2008 R2 operating system. The Intel Nahalem server was connected to a RamSan-325 (with 32GB total capacity) through a QLogic 5000 Series Stackable Fibre Channel Switch. Using a solid-state disk allows for removing the latency introduced by a slower disk driver, and provides the performance benchmark expected from next-generation storage arrays.

Eight LUNs were created on the RamSan, and each were visible through four different ports. The switch was configured with one initiator to the QLogic 5000 Series Stackable Fibre Channel Switch in a zone with four target RamSan ports.

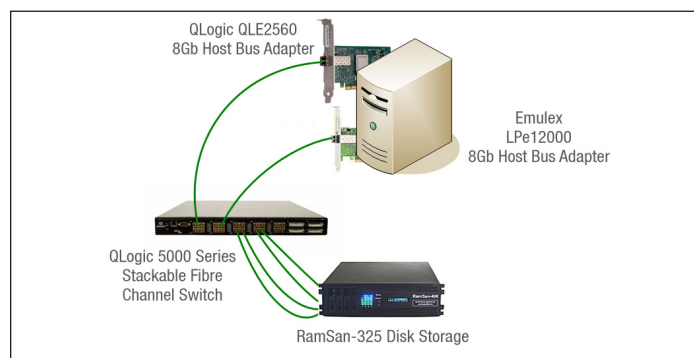


Figure 1. 8Gb Test Setup

The tests were performed using the latest commercially available hardware, software, and drivers. All measurements were made with default settings of the adapters from both companies.

### Test Procedure

The tests were executed on the configuration in Figure 1 as follows:

1. A QLogic 8Gb single-channel PCI Express to Fibre Channel Adapter (QLE2560) was installed on the test server using the appropriate miniport driver.
2. Eight LUNs were created and mapped to four target ports.
3. The Windows device manager was used to verify that the LUN(s) were visible. Each LUN was then formatted and assigned a drive letter that could be used by the ORION tool.
4. The ORION commands were executed to simulate OLTP and OLAP workloads.
5. These steps were repeated for the Emulex 8Gb single-channel PCI Express to Fibre Channel Adapter (LPe12000).

### Test Results

The performance of the QLogic adapter and Emulex adapter was tested and measured based on critical parameters as part of OLTP and OLAP application testing. The performance was measured against an increasing load on the adapters determined by the number of outstanding I/O requests.

**TP Workloads.** OLTP is the most common workload in the enterprise, so it provides a good indication of the adapter’s scalability in a production setting. Figure 2 shows an up to 106 percent performance advantage of QLogic over Emulex in overall IOPS in the OLTP application environment.

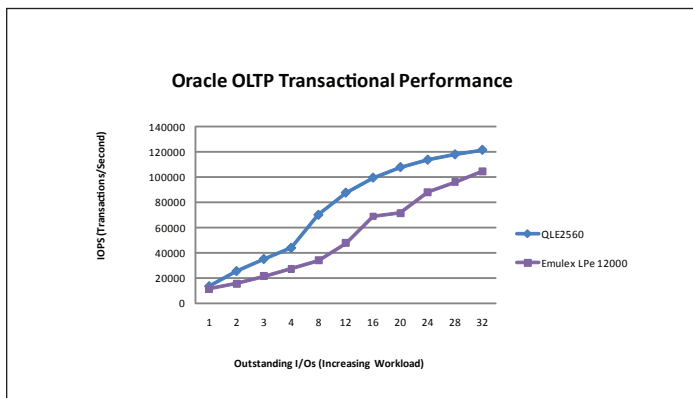


Figure 2. OLTP Application Performance

**OLAP Workloads.** Oracle implements OLAP within an Oracle database environment. The typical applications of OLAP are in business reporting for sales, marketing, Business Performance Management (BPM), budgeting and forecasting, financial reporting, and planning. Figure 3 shows an up to

23 percent performance advantage of QLogic over Emulex, with QLogic supporting higher overall IOPS for Oracle OLAP.

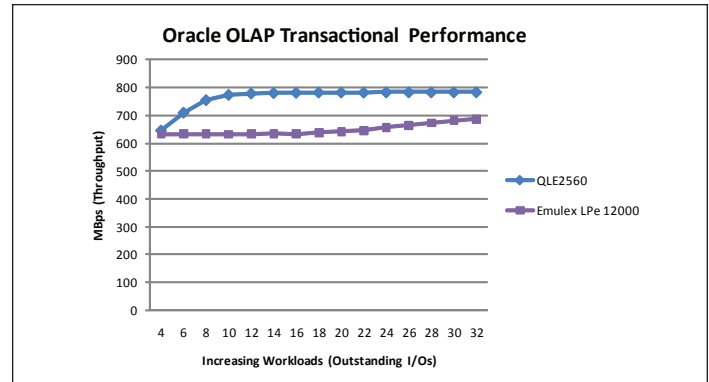


Figure 3. OLAP Application Performance

The QLogic 2500 Series 8Gb Fibre Channel Adapter provides a critical element of overall performance in the selection and deployment of the storage solution.

### Summary and Conclusion

QLogic continues to be the industry leader in delivering high-performance I/O solutions to data center customers. The IOPS and throughput of the QLogic 2500 Series 8Gb Fibre Channel Adapter is the best in class and provides an unprecedented level of high performance, superior scalability, and enhanced reliability that exceeds the requirements for next-generation data centers. As 2Gb and 4Gb transition to 8Gb, increasing performance is required to meet the ever-increasing application requirements in SAN environments.

IT managers know that choosing the right adapter for their SAN infrastructure can have a strong impact on the performance, agility, and scalability of their enterprise storage environments. The results of this study demonstrate that QLogic 2500 Series 8Gb Fibre Channel Adapters consistently outperform Emulex LightPulse 12000 Adapters in today’s real-world environments and provide significant headroom for future scalability.

Oracle Applications demand the highest levels of performance. Selecting the QLogic 2500 Series 8Gb Fibre Channel Adapters translates to a clear performance benefit, enabling enterprises to do more with less and drive more value from their SAN infrastructure investments. When executing OLTP applications that require high throughput, data warehousing that requires an increase in data volume, or OLAP to support business reporting, QLogic continues to demonstrate and deliver the highest performing adapter product.

## Appendix A

### Server Configuration

Intel Server	
<b>Processor type and speed</b>	Intel Nahalem Quad Processor (dual socket) – total 8 cores
<b>Memory</b>	24GB RAM
<b>OS type</b>	Windows Server 2008 R2

### Fibre Channel Adapter Hardware

Fibre Channel Adapters	
<b>QLogic</b>	QLE2560
<b>Emulex</b>	LPe12000

### Fibre Channel Adapter Configuration

QLogic and Emulex Fibre Channel Adapters	
<b>QLogic driver</b>	STOR miniport
<b>QLogic driver version</b>	9.1.8.25
<b>Emulex driver</b>	STOR miniport
<b>Emulex driver version</b>	7.2.32.002

### External Storage Configuration

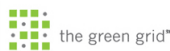
Storage	
<b>Solid state disk</b>	RamSan-325 solid state storage
<b>LUNs</b>	8 LUNs, 4 target ports

### Fibre Channel Switch Hardware

Switch	
<b>8Gb switch</b>	QLogic 5000 Series Stackable Fibre Channel Switch

**Disclaimer**

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