End-to-End 16Gb Gen 5 Fibre Channel Enhances Application Performance

Efficiency, Flexibility, and Reliability from QLogic Accelerate Dell-Compellent Fibre Channel SANs

Key Benefits of an End-to-End Solution
- Same field-hardened Fibre Channel stack
- Consistent I/O path
- Single vendor for troubleshooting

EXECUTIVE SUMMARY

Enterprise businesses are under increasing pressure to expand IT services while maintaining low infrastructure expenses and service costs. Challenging IT environments and changes in both technology and application delivery make it imperative that IT administrators choose their infrastructure to maximize the return on investment.

QLogic® delivers the performance, scalability, flexibility, and reliability necessary to meet the needs of the enterprise data center. QLogic is the trusted market leader of Fibre Channel adapters. QLogic has been chosen by Dell® Compellent Storage for the target side. Having QLogic technology pervasively throughout the storage network brings extraordinary benefits to the SAN. For example, a consistent I/O path is delivered end to end, which improves reliability and allows IT administrators to deploy with confidence.

QLogic compared the overall performance of the 2600 Series 16Gb Fibre Channel Adapter to the 8Gb Fibre Channel Adapter in a true Dell end-to-end 16Gb Fibre Channel SAN environment with maximum throughput workloads. Test results demonstrate the Dell and QLogic solution from the host connection all the way to the storage array. The evaluation also highlights the advantage delivered by the joint 16Gb Fibre Channel architecture in both Microsoft® Exchange Server® and Oracle® environments. In addition, the test results show the benefits of having an end-to-end connection for 16Gb Fibre Channel.

KEY FINDINGS

Dell and QLogic have the industry’s first true end-to-end 16Gb Gen 5 Fibre Channel SAN. The solution is uniquely enabled by QLogic at both ends of the Dell SAN. QLogic’s Fibre Channel stack was selected by Dell to provide the native Gen 5 connectivity for Dell Compellent Storage Arrays because of its proven reliability, flexibility, and efficiency. The same field-proven QLogic Fibre Channel stack can be selected with the QLogic 2600 Series Gen 5 Fibre Channel Adapter connection for Dell 12th Generation PowerEdge Servers. The Dell/QLogic solution provides data center administrators with the ultimate in performance, highest levels of application performance, and superior business scalability. The QLogic and Dell solution offers a powerful approach for server I/O connectivity, a compelling reason to choose Dell and QLogic—the proven leaders in Fibre Channel SANs—together.

- **Performance**: QLogic delivers double the performance of previous-generation adapters with more than 1.2 million IOPS and 6100 MBps bidirectional throughput.
- **Application Throughput**: QLogic offers best-in-class performance for Oracle RAC and Microsoft Exchange Server environments.
- **Superior Business Scalability**: The QLogic 2600 Series Fibre Channel Adapter has high-performance scalability in Microsoft Windows® 2012.

Dell PowerEdge Server

Dell Compellent Array

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**END-TO-END GEN 5 PERFORMANCE EVALUATION**

**Configuration**

Figure 1 shows the test configuration. The Dell PowerEdge® R720 Server with the QLogic QLE2672 Gen 5 Fibre Channel Adapter was connected to a Dell Compellent SC50 Storage Array using a Gen 5 Fibre Channel Switch. The QLogic QLE2672 Adapter is used for the target controller in the Compellent SC50. Six target LUNs were created, each with 25GB of storage space. The initiator and target ports were configured in a zone on the Gen 5 Fibre Channel Switch, the host was mapped to the six LUNs, and traffic was passed between the host server and the Compellent array. Separate runs were performed to compare the I/O performance of the QLogic QLE2562 8Gb Fibre Channel Adapter to the QLogic QLE2672 Gen 5 Fibre Channel Adapter in a Microsoft Windows 2012 environment. The performance testing followed the QLogic Common Platform methodology to collect the I/O performance results within the test configuration.¹

**Test Results**

The test results demonstrate the superior performance of Gen 5 Fibre Channel in an end-to-end Dell and QLogic configuration. The following graphs compare the QLogic Gen 5 Fibre Channel Adapter’s IOPS and the QLogic 8Gb Fibre Channel Adapter’s IOPS while performing sequential read operations. The I/Ometer measured the IOPS and throughput values for both Gen 5 and 8Gb Fibre Channel environments across a range of block sizes. The tests show that Gen 5 Fibre Channel brings added performance and functionality.


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Figure 2 shows the IOPS improvement over a range of block sizes. The advantage over 8Gb Fibre Channel, especially at smaller block sizes supporting enterprise applications, demonstrates the improvements to be gained in application performance.

Figure 3 shows that Gen 5 Fibre Channel is two times faster in throughput.
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Tier-One Application Workloads
Real-world deployments for the various block sizes are: database on-line transaction processing (OLTP); data warehousing, data recovery and backups (use sequential reads); data backup, data de-duplication, file transfer or day-to-day operating system (OS) operations (use sequential write workload types); and Microsoft Exchange Server, database, and OLTP transaction workloads (use random read-write).

The data gathered in this performance comparison shows the benefits of using Gen 5 Fibre Channel for tier-one applications. Figure 4 shows that for key block sizes—4kB and 8kB—Gen 5 Fibre Channel delivers up to twice the I/O performance.

Figure 4. Application Workload Performance Comparison

Figure 5 shows the result for 32kB—the typical block size for Microsoft Exchange Server data transfer rates—again, Gen 5 delivers twice the performance.

Figure 5. Gen 5 Versus 8Gb Application Performance Comparison

SOLUTION
QLogic’s architecture offers complete port-level isolation across its dual-port ASIC by providing independent processors, memory, and firmware images. Each port can be independently reset, deleted, and recovered, which means that you get 100 percent secure, predictable performance with unparalleled stability.

QLOGIC FIBRE CHANNEL STACK STABILITY
QLogic has the world’s largest installed base of Fibre Channel adapters with more than 13 million ports shipped. Customers deploying the QLogic Fibre Channel stack benefit from its enterprise-class stability, which provides a lower total cost of ownership, higher uptime, and investment protection.

The QLogic Fibre Channel stack has matured and hardened over 15 years of technology leadership and a relentless focus on delivering quality products that meet and exceed the stability and reliability requirements of business-critical enterprise systems. The following are a few of the key contributors to the stability and reliability of the QLogic Fibre Channel stack:

- **Extensive Internal Test Programs:** With multiple interconnected and geographically distributed internal test sites that deploy automated test suites for 24x7 quality assurance, QLogic testing methodologies are rigorous and extensive. This approach translates to a highly reliable stack.

- **High-Stability Engineering:** QLogic’s development practices provide a complete set of design and instrumentation techniques that enable higher code coverage, efficient error handling, and resolution.

- **QLogic Intellectual Property:** The QLogic Fibre Channel stack leverages patented QLogic IP, such as Overlapping Protection Domains (OPD) and Out of Order Frame Reassembly (OoOFR), that can significantly enhance the integrity and reliability of the Fibre Channel stack.
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SUMMARY
QLogic is the industry leader in delivering high-performance I/O solutions to data center customers. The IOPS and throughput of the QLogic 2600 Series Gen 5 Fibre Channel Adapter provides best-in-class efficiency, superior flexibility, and enhanced reliability that exceed the requirements for next-generation data centers. The results of the end-to-end benchmark tests shown in this paper demonstrate the I/O performance and scalability advantages of the QLogic 2600 Series Gen 5 Fibre Channel Adapter over 8Gb Fibre Channel in tier-one application workload environments.

The QLogic 2600 Series Gen 5 Fibre Channel Adapter technology provides better IOPS and throughput in virtualized servers and application workloads, making QLogic the clear choice to support Gen 5 Fibre Channel traffic in workloads such as Oracle 11g database applications and Microsoft Exchange Server 2010. Having QLogic at both ends of the Gen 5 Fibre Channel SAN increases reliability and performance, and delivers the utmost flexibility. Building with Dell and QLogic together gives you the assurance that your SAN will meet all your business requirements.