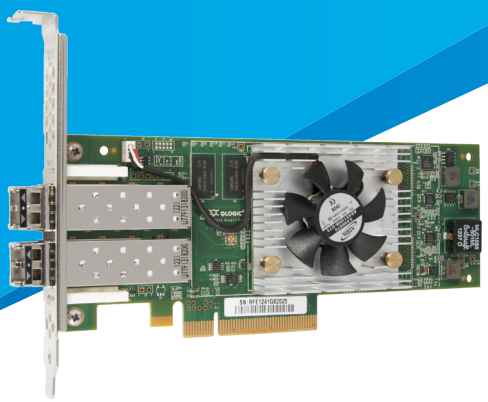
# QLogic 2600 Series 16Gb Gen 5 FC HBAs Double Performance and Flexibility



## Accelerate Virtualization and Cloud Deployments While Eliminating I/O Bottlenecks

### KEY FINDINGS

Support for increased workloads, acceleration of application performance, and meeting the growing demands placed on the enterprise data center is key in the selection and deployment of a 16Gb Gen 5 Fibre Channel Adapter with the right architecture to scale and support robust databases, mail servers, and secondary storage.

- **Performance:** QLogic® adapters from Cavium™ deliver double the performance of previous-generation adapters with up to 1.2 million IOPS and 3200 MBps bidirectional throughput.
- **Superior Virtual Scalability and Lower Costs:** Greater performance, VM density, and cost savings compared to Emulex adapters in VMware® vSphere® 5 and Microsoft® Hyper-V® environments.
- **Unparalleled Flexibility:** QLogic I/OFlex™ technology—any I/O, any network.
- **Integrated Brocade Fabric Features:** QLogic adapters deliver improved availability, streamlined deployment, and increased network performance.

### EXECUTIVE SUMMARY

Enterprise businesses are under increasing pressure to expand IT services while maintaining low infrastructure 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 adapters deliver the performance, flexibility, scalability, and investment protection to meet the needs of the enterprise data center. QLogic is the trusted market leader of Fibre Channel adapters.

QLogic compared the performance of the QLogic 2600 Series 16Gb Gen 5 Fibre Channel Adapters with Emulex® adapters in VMware vSphere® 5 and Microsoft® Hyper-V® environments. Test results show the QLogic 2600 Series Adapter enables higher levels of virtual machine density and superior server scalability, along with lower power, cooling, capital, and operating expenses.

QLogic I/OFlex™ technology provides a free, field-configurable firmware upgrade, enabling IT administrators to define personality [16Gb Fibre Channel, 10Gb Ethernet, or Fibre Channel over Ethernet (FCoE)] on a single adapter with the highest flexibility and investment protection.

Integrated support for key Brocade® fabric features enables data center managers to reduce operating expenses and total cost of ownership by accelerating deployment, increasing performance, and simplifying management of Gen 5 Fibre Channel SANs featuring Brocade Fabric Vision™ technology and QLogic 2600 Series Adapters.

## INDUSTRY ENVIRONMENT

Explosive growth in the number and complexity of Web 2.0, databases, backup, big data, cloud computing, and other enterprise applications are driving workloads exponentially in the data center. There are more users, more devices, and more data than ever before.

The infrastructure in the data center is becoming increasingly complex due to mixed deployment models: discrete, virtual, and cloud. For these reasons, data center managers need to deliver a high-performance, reliable infrastructure that is simple to manage and cost-effective.

### Application and Technology Advancements

Data center managers face tremendous application growth and increased use of server virtualization. Enterprise applications that require high-performance bandwidth include database, backup, cloud computing, data migration, disaster recovery, and virtual desktop infrastructure (VDI). Additional technology advancements include multi-core processors, more memory, server workloads, solid state drives, and PCIe® 3.0. These advancements allow greater agility and increased optimization using new architectures. Networked storage is a key component to solving the demand for higher bandwidth. Enterprise businesses can meet these challenges with converged networks and traditional Fibre Channel SANs using 16Gb adapters.

### Integrated Brocade Fabric Features

QLogic 16Gb Gen 5 Fibre Channel Adapters include advanced capabilities that are enabled when deployed with supported Brocade switches. By implementing these industry-leading solutions together, IT administrators can take advantage of enhanced features that improve availability, streamline deployment, and increase network performance.

Support for Brocade ClearLink™ diagnostics, a key Brocade Fabric Vision™ technology, improves availability and support for high-performance fabrics. By utilizing the ClearLink diagnostic port (D_Port), administrators can quickly run a battery of automated diagnostic tests to assess the health of links and fabric components. This reduces fabric deployment time and eliminates tedious, manual troubleshooting methods—saving thousands of man-hours in enterprise environments.

Fabric pre-provisioning enables IT administrators to quickly deploy, replace, and move servers across the SAN. Utilizing Brocade's fabric assigned port world wide name (FA-WWN) and fabric-based boot LUN discovery (F-BLD) capabilities lets administrators complete creation of zones, LUNs, and other services before the servers arrive on site—eliminating time consuming, manual tasks that typically delay server deployment.

Network performance can be dramatically improved by utilizing industry standard Quality of Service (QoS) Class-Specific Control (CS_CTL) based frame prioritization, which alleviates network congestion by prioritizing the bandwidth usage from the fabric to the host.

When connected to Brocade Gen 5 FC SAN fabrics, traffic is classified as it arrives at the switch, and then processed on the basis of configured priorities. Traffic can be dropped, prioritized for delivery, or subjected to limited delivery options. As a result, mission-critical workloads can be assigned a higher priority than less time-sensitive network traffic for optimized performance.

## QLOGIC I/OFLEX TECHNOLOGY

The QLogic FlexSuite™ network adapter platform has the flexibility to power native 16Gb Gen 5 Fibre Channel or 10Gb Ethernet converged networks from the same hardware. QLogic I/OFlex technology enables IT administrators to build out the infrastructure of their data centers at their own pace. QLogic technology provides the versatility to handle any protocol, any host, any storage, and any fabric—addressing the demands of the rapidly evolving enterprise. I/OFlex is a free, field-configurable firmware upgrade that enables IT administrators to define personality (16Gb Gen 5 Fibre Channel, 10GbE, or FCoE) on a single adapter.

### QLogic FlexSuite Adapter Advantages

QLogic 2600 Series FlexSuite Adapters offer unprecedented advantages:

- The ultimate in performance
- Unparalleled flexibility
- Investment protection
- Simplified management
- Leadership, confidence, and trust

### The Ultimate in Performance

- Up to 1.2 million IOPS
- PCIe 3.0
- Enterprise server scalability
- Enhanced QoS CS_CTL prioritizes SAN traffic for end-to-end high performance

### Unparalleled Flexibility

- QLogic I/OFlex technology—any I/O, any network (dual personality)
- Industry's only adapter supporting fully offloaded concurrent multiprotocol support (QLogic ConvergeFlex® technology)
- Granular QoS through QLogic VMflex® technology (NPIV and NIC partitioning)
- Optimized for virtualization
- Cloud computing deployment—provides granular QoS and bandwidth allocation
- Heterogeneous infrastructure

### Investment Protection

- QLogic SecureFlex technology ensures the highest data integrity [with overlapping protection domains (OPD) and T10-PI]
- Backward compatible—auto-negotiate 16/8/4Gb Fibre Channel (same stack)
- Future proofed for converged networking (FCoE, iSCSI, and TCP/IP)
- Multiprotocol
- Qualified with major OEMs
- Certified with more than 10,000 products

### Simplified Management

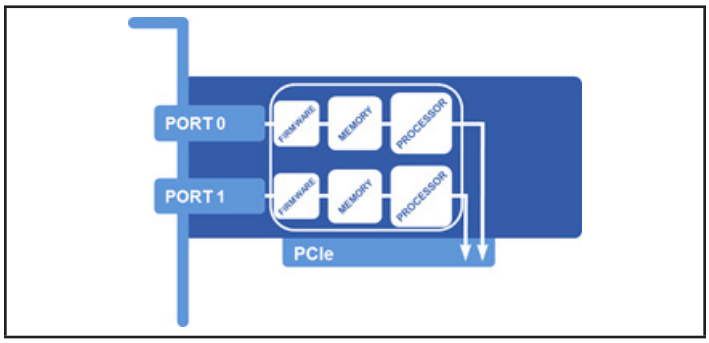
- Pervasive interoperability—any form factor, any protocol, any operating system, any hypervisor
- Simplified adapter management
  - QConvergeConsole® (QCC) GUI and CLI
  - QCC vCenter™ plug-in
  - APIs
- Simplified deployment and management with fabric pre-provisioning
- QLogic adapter management integrated into Brocade Network Advisor (BNA)
- Improved reliability and diagnostics with support for Brocade ClearLink®

### Leadership, Confidence, and Trust

- Proven field-hardened stack
- Over 15 million Fibre Channel/FCoE ports deployed in data centers
- Market leader in Fibre Channel host bus adapters since 2003
- Reliability, availability, and serviceability (RAS)
- Industry's longest warranty—5 years

### QLOGIC'S HIGH AVAILABILITY ARCHITECTURE

QLogic 2600 Series 16Gb Gen 5 Fibre Channel architecture continues to provide complete port-level isolation across its dual-port ASIC. The architecture, unlike other vendor solutions, provides an independent function, transmit/receive buffers, on chip CPU, DMA channels, and firmware image for each port. This enables complete port-level isolation, eliminates errors and firmware crashes from propagating across both ports, and provides deterministically predictive and scalable performance across both ports. This is extremely essential for enterprise data centers—assuring five nines availability for mission-critical applications.




QLogic's Multi-Port Isolation Architecture Provides Unparalleled Stability and Scalability

### QLOGIC ADAPTERS OUTPERFORM EMULEX ADAPTERS

Organizations value the benefits of server virtualization and seek to optimize virtual machine density in order to improve performance and lower total costs. QLogic technology delivers scalable, high-performance adapters that address the needs of virtualized VMware vSphere 5 and Microsoft Hyper-V environments.

To assist IT administrators in selecting the best host bus adapter when migrating their Fibre Channel infrastructure from 4Gb or 8Gb to the latest 16Gb technology, QLogic performed a series of head-to-head performance benchmark tests. The results document the I/O performance, scalability, and power consumption advantages of the QLogic Fibre Channel Adapters from QLogic over Emulex.

### QLOGIC TECHNOLOGY DELIVERS GREATER VM DENSITY AND REDUCED COSTS

The test results document that the QLogic QLE2672 delivers superior performance and scalability, along with lower capital and operating expenses compared to the Emulex LPe16002B adapter.

The following key findings show test results when running QLogic adapters in VMware vSphere 5 and Microsoft Hyper-V environments.

## KEY FINDINGS

- In vSphere 5 environments[1], extensive testing shows that for virtual machine scalability:
  - QLogic 2600 Series Adapters from Cavium outperform the Emulex LPe16000 Series in small block transactions—server capital expenditures (CAPEX) are reduced as much as 27%.
  - QLogic 2600 Series Adapters consume up to 42% less power than the Emulex LPe16000 Series, reducing operating expenses (OPEX).
- In Microsoft Hyper-V environments[2], extensive testing showed that for virtual machine scalability:
  - QLogic 2600 Series Adapters outperform the Emulex LPe16000 Series in small block transactions—server capital expenditures (CAPEX) are reduced as much as 14 percent.
  - QLogic 2600 Series Adapters consume up to 42 percent less power than the Emulex LPe16000 Series, reducing operating expenses (OPEX).

1. See QLogic Fibre Channel Advantages in VMware vSphere 5.
2. See QLogic Fibre Channel Advantages in Microsoft Hyper-V Environments.

## SUMMARY

QLogic continues to be the industry leader in high-performance I/O solutions, enabling enterprise organizations to meet the requirements of next-generation data centers. Head-to-head benchmark tests show the QLogic 2600 Series Adapters provide superior I/O performance, greater server scalability and VM density, along with lower total costs compared to Emulex LPe16002B 16Gb FC adapters in VMware vSphere 5 and Microsoft Hyper-V environments.

## TRUSTED SOLUTIONS

Cavium is a global leader and technology innovator in high-performance server and storage networking connectivity and application acceleration solutions. The company's leadership in QLogic product design and maturity of software stack make it the top choice of leading OEMs, including Cisco®, Dell, EMC®, Hitachi Data Systems, HPE®, IBM®, Lenovo®, NetApp®, and Oracle®, as well as channel partners worldwide for their virtualized, converged, and cloud environment solutions.

## ABOUT CAVIUM

Cavium, Inc. (NASDAQ: CAVM), offers a broad portfolio of infrastructure solutions for compute, security, storage, switching, connectivity and baseband processing. Cavium's highly integrated multi-core SoC products deliver software compatible solutions across low to high performance points enabling secure and intelligent functionality in Enterprise, Data Center and Service Provider Equipment. Cavium processors and solutions are supported by an extensive ecosystem of operating systems, tools, application stacks, hardware reference designs and other products. Cavium is headquartered in San Jose, CA with design centers in California, Massachusetts, India, Israel, China and Taiwan.

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