White Paper

The Performance and Efficiency of 32GFC Fibre Channel

Accelerate Database Applications and Improve Server Efficiency in All-flash Deployments

Marvell® QLogic® 32Gb Fibre Channel Performance Benefits vs. Gen 5 (16Gb) Fibre Channel

December 2020

Key Benefits

- **Accelerate Databases:** With up to an 80% increase in IOPS for typical database block sizes, the QLogic® 32Gb Fibre Channel (FC) family of adapters from Marvel are capable of hosting larger, more demanding databases, reducing time to query and providing faster business decisions when compared to 16GFC/Gen 5 (16Gb) FC

- **Improve Server Efficiency:** Providing a 31% increase in utilization from existing server investments compared to 16GFC/Gen 5 FC, QLogic 32GFC adapters increase virtual machine (VM) density by allowing physical servers to host more VMs

- **Reduce Data Center Power and Cooling:** Build greener data centers with up to a 36% better power-to-performance ratio with QLogic 32GFC technology, moving more data per watt

- **Increase Asset Utilization:** The full offload, lossless and zero copy capabilities of QLogic 32GFC architecture helps free server CPU cycles from moving data versus alternative software-based block storage transports

Executive Summary

Enterprise organizations rely on their Fibre Channel SAN (Storage Area Network) for fast, reliable access to critical applications and data. To keep up with growing business demands and exponential data growth, IT administrators deploy the latest servers, solid state storage (SSS) devices, and storage network components to meet performance and service level agreement (SLA) objectives.

QLogic 2700 Series 32GFC Adapters from Marvell deliver up to 2.6 million IOPS and 24,000 MBps of throughput to fuel high performance in all-flash array (AFA) and high-density virtualized server environments.

QLogic 32GFC adapters from Marvell deliver significantly higher performance than 16GFC/Gen 5 FC adapters at a favorable power profile, helping to accelerate databases, improve VM density, and build a greener data center.

This paper details the results of extensive performance and power analysis studies conducted by Marvell that clearly demonstrate that QLogic 32GFC technology resolves data center complexities by enabling a storage network infrastructure that supports peak performance of mission-critical business applications while delivering application-aware services, and simplified management.
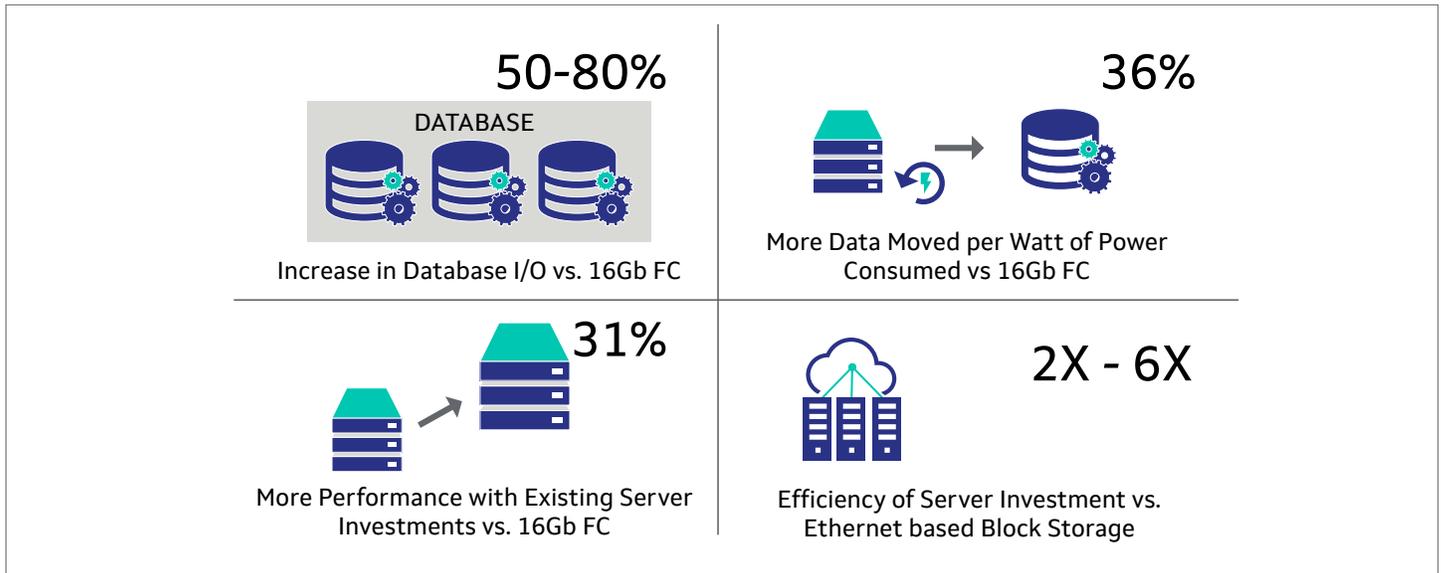
50-80%

DATABASE

Increase in Database I/O vs. 16Gb FC

36%

More Data Moved per Watt of Power Consumed vs 16Gb FC

31%

More Performance with Existing Server Investments vs. 16Gb FC

2X - 6X

Efficiency of Server Investment vs. Ethernet based Block Storage

Figure 1. QLogic 32GFC – The Most Efficient Application Accelerator

Accelerate Transaction Processing Databases

IT requirements are changing! CIOs and IT administrators are demanding a high-performance, dynamic FC infrastructure that can support hosting larger, more demanding databases while reducing time to query and providing faster business decisions.

QLogic 2700 Series 32GFC Adapters from Marvell deliver 50-80% more IOPS for typical database block sizes (8KB) when compared with 16GFC.

Figure 2 illustrates how 32GFC can accelerate Oracle Database and SQL Server online transaction processing (OLTP) workloads when compared with 16GFC across both read and write operations at typical database block sizes of 8KB, which can increase I/O for a typical database by 50-80%.
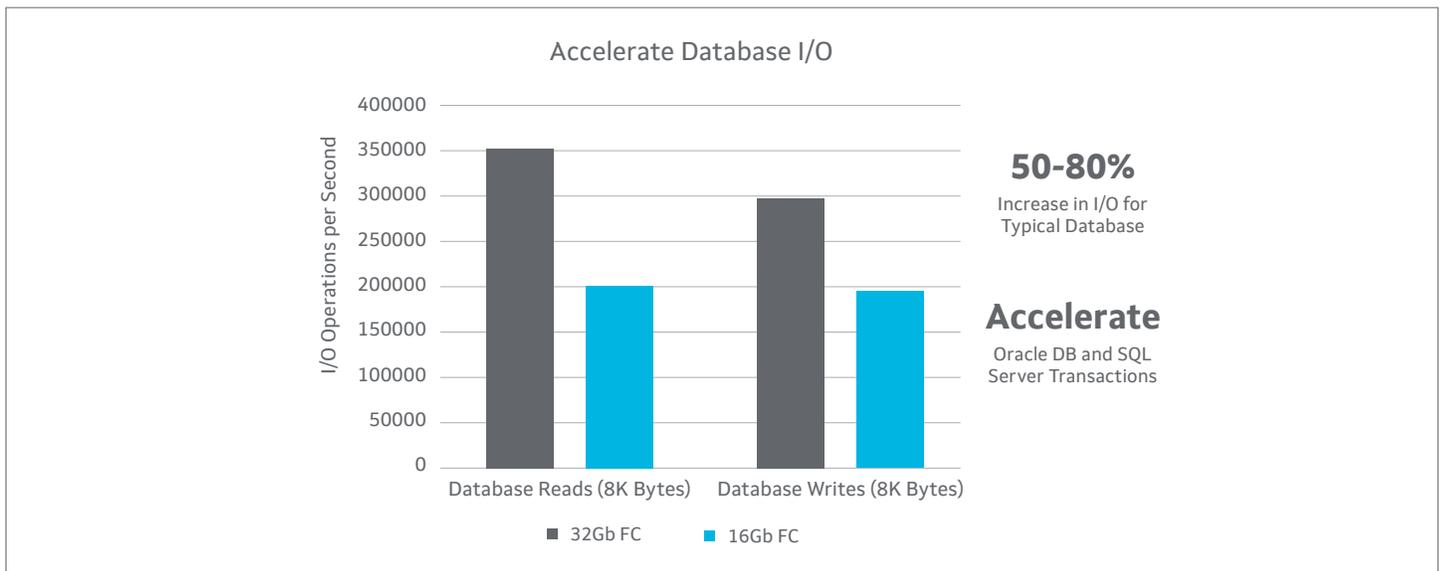

Figure 2. Databases Can Run Faster on Gen 6 Fibre Channel

Improve Server Efficiency

Enterprises are under increasing pressure to expand IT services while maintaining low infrastructure and service costs. Evolving IT environments in both technology and application delivery make it imperative that IT administrators choose a storage infrastructure that can maximize the potential and return on investment (ROI) from their compute resources.

QLogic 32GFC adapters from Marvell deliver a high-performance connectivity option to AFAs that can help drive more performance from existing compute resources when compared with 16GFC. With the ability to move more data across the wire to high-speed external storage without additional tax on critical CPU resources, it is virtually guaranteed that applications will continue to scale without a forklift upgrade to more powerful servers.

Figure 3 illustrates the performance results from Marvell's performance analysis on how QLogic 2700 Series 32GFC Adapters from Marvell can process 31% more throughput on existing server investments when compared with 16GFC.
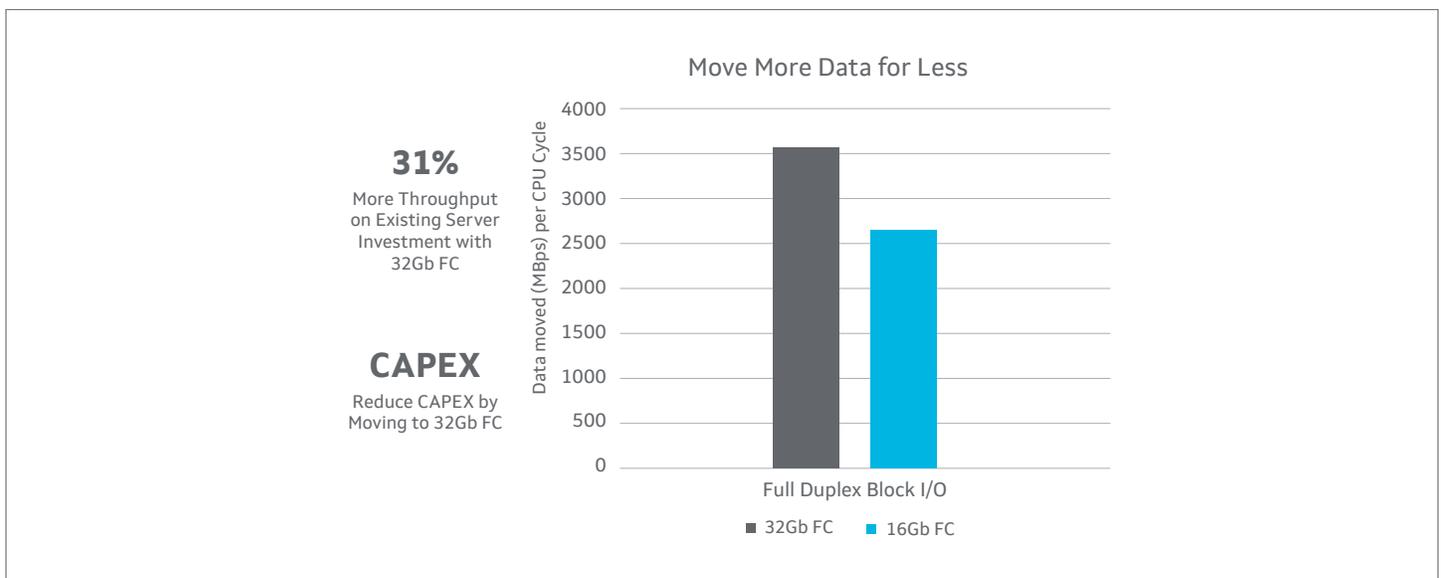

Figure 3. 32GFC – Most Efficient Use of Server CPU

More Throughput Per Watt, Greener Data Center

All around the globe, people are sharing more and more data every day, while also becoming more environmentally responsible. The significant increase in the amount of data means that more energy is required to power and cool the enterprise data center. Therefore, data centers play an important role in reducing the amount of energy used to run large infrastructure complexes.

QLogic StarPower™ technology is revolutionizing the power-to-performance ratio by delivering an extremely low power 32GFC adapter. QLogic 32GFC Adapters are capable of moving 36% more data per watt as compared to 16GFC adapters.

Figure 4 shows how 32GFC can move 36% more data per watt and two times more throughput when compared to 16GFC.
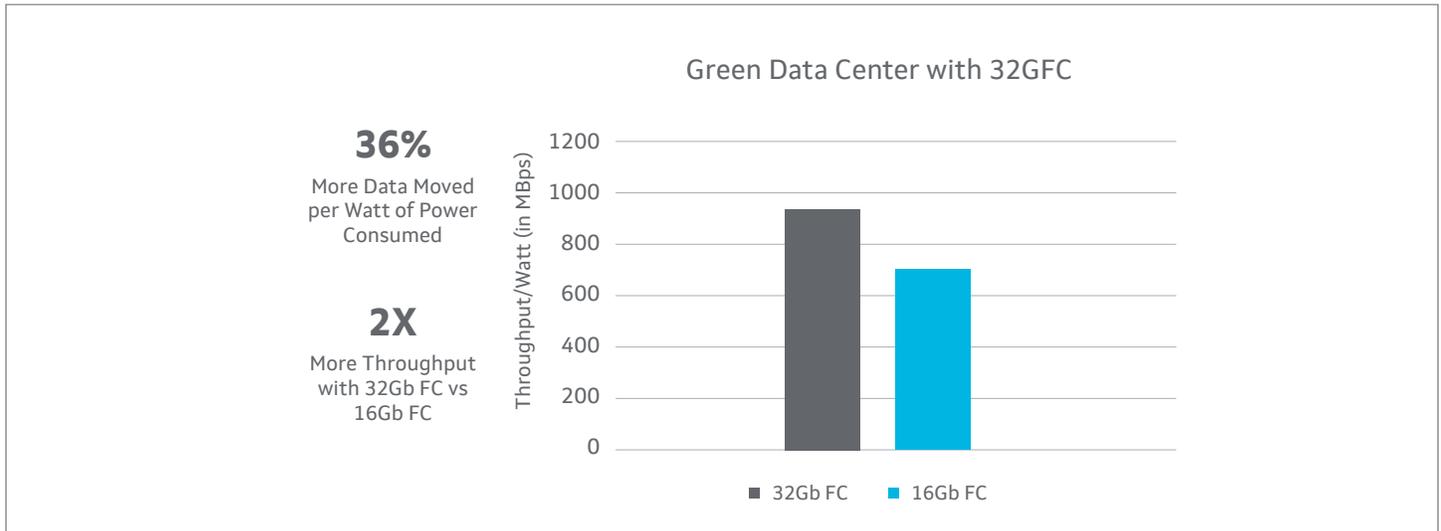
Green Data Center with 32GFC

36%
More Data Moved per Watt of Power Consumed

2X
More Throughput with 32Gb FC vs 16Gb FC

Throughput/Watt (in MBps)

■ 32Gb FC ■ 16Gb FC

Figure 4. Gen 6 Fibre Channel – Most Efficient Use of Server CPU

Comparison with Alternative Block Storage Transports

Enterprise IT data center decision makers have a wide choice of technologies and underlying protocols that they can leverage to connect servers to external block storage—Fibre Channel and iSCSI are often among the choices.

Software-based iSCSI initiators consume CPU cycles when handling I/O-intensive workloads, leaving little headroom for growing applications and virtual environments. Unlike software based solutions, Fibre Channel is a fully offloaded, zero-copy, lossless transport mechanism that does not compete for CPU processing cycles with upper-layer applications such as e-mail or Web applications. The head-to-head performance comparisons (Figure 5) of 32GFC with Intel XL710 40GbE software iSCSI indicates a 2x-6x higher efficiency of Fibre Channel vs. software iSCSI.
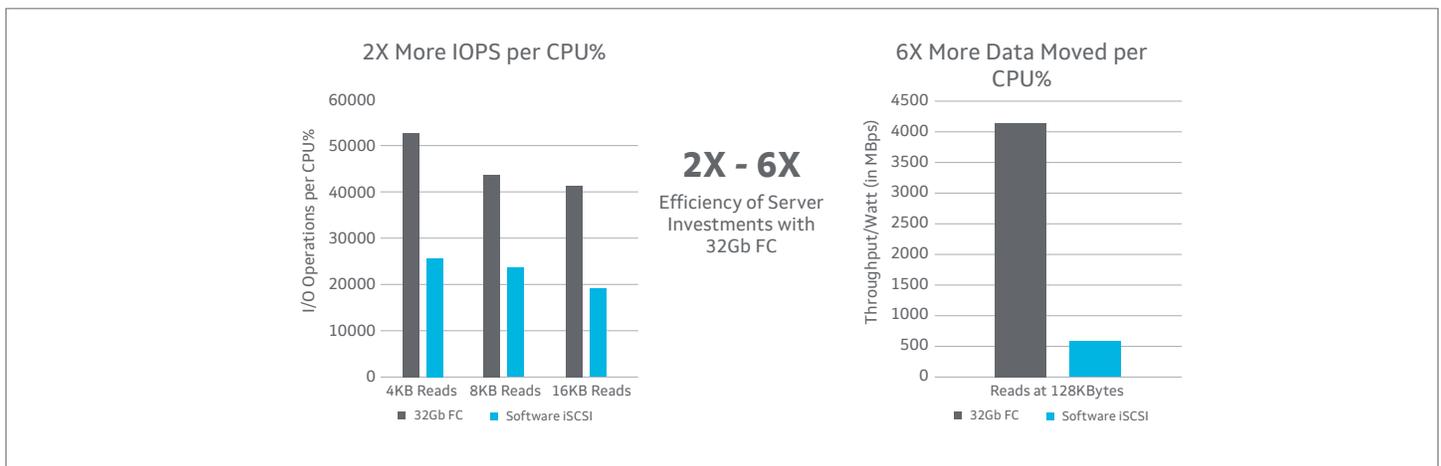
2X More IOPS per CPU%

I/O Operations per CPU%

4KB Reads 8KB Reads 16KB Reads
■ 32Gb FC ■ Software iSCSI

2X - 6X
Efficiency of Server Investments with 32Gb FC

6X More Data Moved per CPU%

Throughput/Watt (in MBps)

Reads at 128KBytes
■ 32Gb FC ■ Software iSCSI

Figure 5. 100% Offloads – 100% of the Time – with 32GFC

Summary

QLogic 32GFC technology from Marvell resolves data center complexities by enabling a storage network infrastructure that supports peak performance of mission-critical business applications, enables efficient use of server resources, and delivers a highly efficient block storage transport mechanism. QLogic Fibre Channel remains the clear choice of customers wanting the most advanced and reliable Fibre Channel solution to drive enterprise applications.