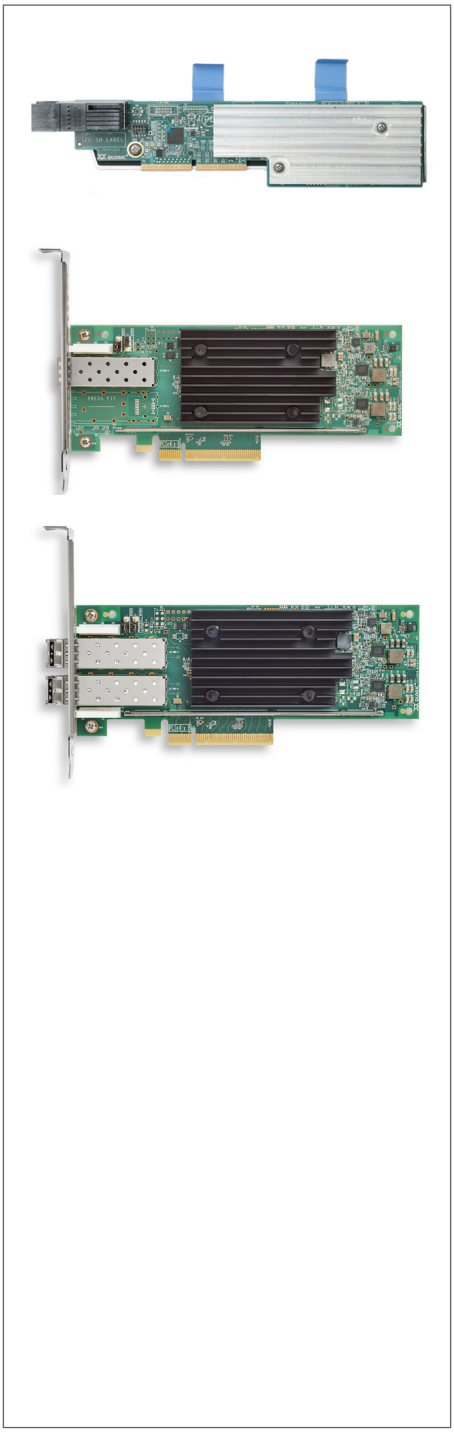
Dell and Marvell—True End-to-End 32Gb Fibre Channel Connectivity

Increase Reliability and Performance Using Marvell High- Speed Interconnects Throughout the Fibre Channel SAN



Dell selected Marvell technology to create the industry's first true end-to-end 32Gb Fibre Channel Storage Area Network (SAN), providing native 32GFC connectivity at both critical ends—the server and the storage array—doubling bandwidth for business-critical applications, eliminating potential bottlenecks, and driving higher data center performance for physical, virtual, and private cloud environments.

Introduction

By developing 32Gb Fibre Channel (FC) products, Dell® and Marvell® have introduced the industry's first true end-to-end 32Gb Fibre Channel (FC) SAN. Marvell has uniquely enabled the solution at both ends of the Dell SAN. Dell selected the proven Marvell FC stack to provide the native 32GFC connectivity for Dell's SC9000 Storage Array Controller.

Data center administrators can select the same battle-hardened Marvell FC stack with the Marvell 2700 Series 32GFC Adapter connection for Dell 15th Generation Poweredge® Servers (QME2742/QLE2770/QLE2772). The Dell/Marvell solution provides administrators the ultimate in performance: 32GFC required for today's modern data center, delivering up to 4 million IOPS for physical, virtual, and private cloud environments, and up to 25,600 Mbps of aggregate throughput.

As a result, backup and restore operations can be completed much faster. In addition, the unique port isolation architecture from Marvell ensures reliability and stability. The Marvell and Dell solution offers a powerful approach to server I/O, providing a compelling reason to choose Dell and Marvell—the proven leaders in FC SANs.

SAN Challenges in the Modern Data Center

The importance of I/O performance and reliability in SANs has never been greater. The explosive growth of server virtualization drives the need for higher performance I/O, flexibility of deployment, and ease of use within traditional FC SANs. Data center administrators need to address increased performance requirements and ever-changing workload demands. A SAN with 32GFC will enable enterprise businesses to resolve these challenges.

Explosive growth in the number and complexity of Web 3.0, Artificial Intelligence, machine learning, Kubernetes containers, virtualized environments, business continuity, disaster recovery, replication, databases, backups, Big Data, cloud computing, and other enterprise applications is 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, converged networks, the next generation of server virtualization, and cloud computing.

In addition, there are technology shifts such as new OS implementations and server refresh cycles; the growing adoption of all-flash storage and solid-state drives; and increased memory and larger server workloads. These shifts enable greater agility and increased optimization using new architectures. At the same time, IT administrators continue to experience spending pressures.

For these reasons, data center managers need to deliver reliable, highperformance, easy-to-manage infrastructure that reduces costs.

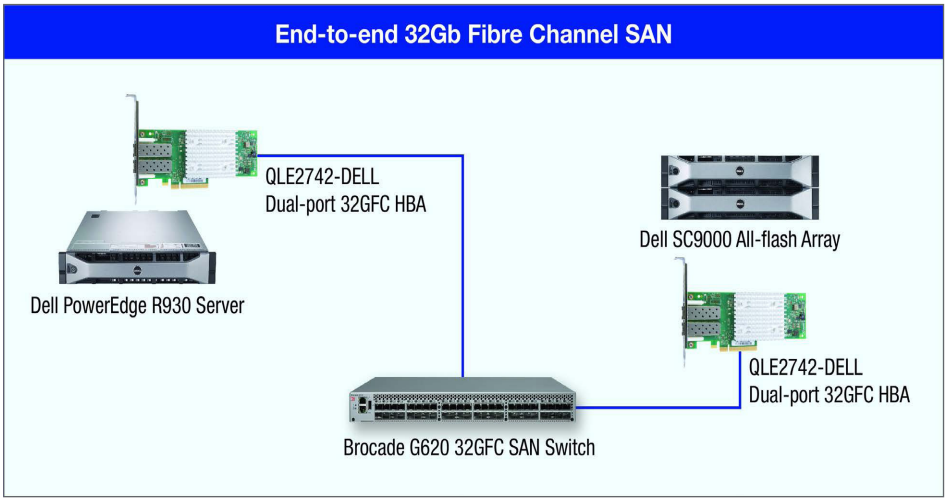


Figure 1. Marvell and Dell End-to-end 32GFC SAN

- Dell PowerEdge Rack Servers: The 15th generation of PowerEdge servers is Dell's most advanced platform designed for a wide range of web, enterprise and hyperscale applications. One-, two-, and four-socket PowerEdge rack servers pack up to 18 processing cores per socket, large amounts of memory, and a tremendous amount of internal storage.
- Marvell 2700 Series 32Gb Fibre Channel Adapters: The QLE2742-DEL/QLE2772-DEL Dual-port and QLE2770-DEL Single-port 32GFC HBAs boast exceptional native FC performance with extremely low CPU usage with full hardware offloads. The adapters are powered by StorFusion™ technology with Brocade® integration that improves availability, accelerates deployment, and increases network performance. Marvell 32GFC adapters can accelerate mission-critical enterprise applications by delivering up to 4 million IOPS and up to 25,600Mbps of aggregate throughput for physical, virtual, and private cloud environments.
- Brocade G620 Switch: The Brocade G620 Switch with 32GFC, Brocade Fabric Vision technology, and IO Insight delivers unmatched 32/128 Gbps performance, industry-leading port density, and integrated network sensors.

- Dell SC9000 Array Controller: The SC9000 provides an ideal solution for large-scale storage, high-end workloads, and distributed enterprise environments. It offers all the industry-leading capabilities of the SC Series line in a fully upgraded, more scalable system leveraging Dell's server platform. Enhancements include 40% more IOPS[1] and over 110% more throughput[1].

32GFC Ensures Future-Ready I/O

Organizations with enterprise SANs continue to rely heavily on FC as a trusted storage technology in virtualized server environments. For those businesses, 32GFC increases performance and functionality when compared with 16GFC:

- 31% more throughput processed on existing server investments
- 36% improvement in power efficiency measured by data moved/Watt
- 50-80% increase in database I/O

Additionally, the backward compatibility of 32GFC with 16GFC and 8GFC environments ensures investment protection and future-ready I/O. Marvell's architecture offers complete port-level isolation across its dual-port ASIC by providing independent processors, memory, and firmware images. Administrators can reset, delete, and recover each port independently, which gives the data center 100% secure, predictable performance with unparalleled stability.

End-To-End Fabric Integration with Marvell Storfusion

The Marvell 2700 Series of 32GFC Adapters deliver so much more than speed. They also deliver simplified and smarter SAN management through Marvell StorFusion, the fusion of technologies for Brocade fabric and Marvell adapters that simplify deployment, streamline management, and guarantee QoS.

StorFusion automates and simplifies SAN deployment and orchestration using software-defined dynamic fabric provisioning and centrally-assigned FC node assignments, which are vital in high-density server virtualization and cloud architectures with demanding, mission-critical workloads. New features were developed in conjunction with Brocade to maximize the industry's leading 32GFC SAN fabric and are integrated with Marvell QConvergeConsole® (QCC) management tools and integration with Brocade Fabric OS and Fabric Vision.

Marvell QCC Management Utilites	
QCC CLI	Linux/Windows
QCC Plugin for ESXCLI	VMware
QCC PowerKit CLI extensions to PowerShell	Linux/VMware/Windows
QCC Plugin for vSphere GUI	VMware
QCC for Windows Admin Center GUI	Windows

Table 1: Marvell QCC Management Utilities

[1] Based on Dell internal testing.

When used in conjunction with a Brocade 32GFC switch, StorFusion technology provides the following key features:

- Diagnostic port (D_Port), read diagnostic parameters (RDP) and link cable beacon (LCB) for easy, remote troubleshooting of the SAN infrastructure
- Fabric-assigned port worldwide name (FA-WWN) and fabric-based boot LUN discovery (F-BLD) for simplified deployment and reduced fabric reconfiguration
- Forward error correction (FEC) and automatic buffer-to-buffer credit recovery (BB-CR) to improve performance, resiliency, and link integrity
- Enhanced fabric device management interface (FDMI), Fibre Channel Ping (FC ping), and Fibre Channel traceroute (FC traceroute) for checking the connectivity of SAN devices
- Integration with Brocade Network Advisor (BNA) and Fabric OS

Marvell FC Stack:

Marvell is the owner of the most established, proven FC stack in the industry and has been the most trusted FC HBA for over 20 years.

Marvell FC Stack Stability

Marvell has the world's largest installed base of FC adapters with more than 22 million ports shipped. Customers deploying the Marvell FC stack benefit from its enterprise-class stability, which provides low TCO, high uptime, and investment protection.

The Marvell FC stack has matured and hardened with decades 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 Marvell FC stack:

- Extensive Internal Test Programs: With multiple interconnected and geographically distributed internal test sites that deploy automated test suites for 24x7 quality assurance, Marvell testing methodologies are rigorous and extensive. This approach translates into a highly reliable stack.
- High-stability Engineering: Marvell's development practices provide a complete set of design and instrumentation techniques that enable higher code coverage, efficient error handling, and resolution.
- Marvell Intellectual Property: The Marvell FC stack leverages patented Marvell IP, such as Overlapping Protection Domains (OPD), StorFusion, Non-Volatile Memory express over Fibre Channel (FC-NVMe), Virtual Machine ID (VMID), and Marvell Universal SAN Congestion Mitigation (USCM) technologies that which can significantly enhance the integrity and reliability of the FC stack.

Customer Benefit—Improved Workload Performance

The Marvell 2700 Series of 32GFC Adapters with unmatched 32Gbps line rate performance eliminate potential I/O bottlenecks in today's multiprocessor and multicore servers, and are capable of supporting the most demanding enterprise workloads.

Relational databases, such as online transaction processing (OLTP) and data warehousing applications, as well as database maintenance activities, are examples of enterprise workloads that are I/O-intensive and require high-performance bandwidth. Within a Microsoft® SQL Server database environment, for example, performance improvements can be provided for enterprise workloads using the Marvell 2700 Series 32GFC Adapter connected to a high-speed storage device such as a Dell SC-9000:

- 38% faster response times for OLTP workloads as compared to 16GFC
- 1.9 times faster data mining with data warehousing queries as compared to 16GFC
- 32% cut in snapshot replication times as compared to 16GFC

In Windows® Server® environments, Marvell delivers fine-grained QoS for N_Port ID virtualization (NPIV) and improved VHDX performance with 32GFC using the QCC Management Utilities. In VMware environments, Marvell simplifies management using the QCC plug-in for vCenter. The plug-in enables visual management of storage and network components, remote deployment of patches and firmware, and dynamic allocation and setting of bandwidth and protocol type, resulting in saved time, reduced administrative costs, and optimal utilization of network infrastructure.

Summary

Marvell is an FC industry leader, bringing high-performance I/O solutions to data center customers. The performance of the Marvell 2700 Series 32GFC Adapter is best-in-class and provides unparalleled flexibility and enhanced reliability to fuel high-performance all-flash and hybrid SC9000 solutions and next-generation Dell 15th generation PowerEdge Servers. Choosing the industry-leading Marvell FC stack for both server and storage connectivity ensures consistent performance and reliability. Additionally, Marvell and Brocade have innovated StorFusion technology to make this generation of FC a purpose-built protocol for connecting servers to shared storage, which ensures that today's Dell SAN is smarter than ever before.

By selecting Marvell technology at both ends of the FC SAN, Dell has created the industry's first true end-to-end 32GFC SAN, providing native 32GFC connectivity at both critical ends—the server and the storage array—doubling bandwidth for

business-critical applications, eliminating potential bottlenecks, and driving higher data center performance for physical, virtual, and private cloud environments.

For more information:

- Marvell/Dell microsite
- QME2742-DEL 32Gb Fibre Channel Blade Mezzanine
- QLE2772N-DEL/QLE2772NL-DEL 32Gb Fibre Channel Adapters
- Dell Storage SC9000 Array Controller
- Brocade G620 32Gb Fibre Channel Switch
- Marvell QLogic Fibre Channel Adapters and Controllers
- Marvell StorFusion Technology

MARVELL

To deliver the data infrastructure technology that connects the world, we're building solutions on the most powerful foundation: our partnerships with our customers. Trusted by the world's leading technology companies for over 20 years, we move, store, process and secure the world's data with semiconductor solutions designed for our customers' current needs and future ambitions. Through a process of deep collaboration and transparency, we're ultimately changing the way tomorrow's enterprise, cloud, automotive, and carrier architectures transform—for the better.

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