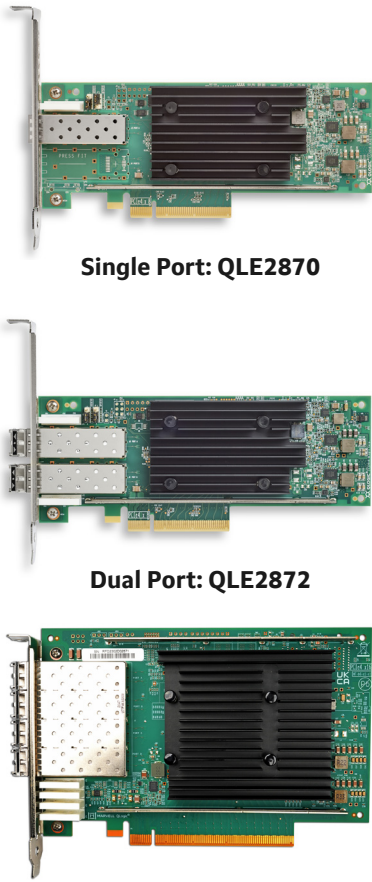


# Marvell® QLogic® 2870 Series

High Performance, Secure, 64GFC PCIe 4.0 to Fibre Channel Adapters



**Single Port: QLE2870**

**Dual Port: QLE2872**

**Quad Port: QLE2874**

- Up to 50% higher IOPS and twice the throughput of total full duplex over previous generations
- Up to 2x faster data mining improves database transactional performance and enables faster business decisions
- Advanced security features for Zero Trust Architecture, including secure boot and signed drivers
- Silicon Root of Trust ensures SAN Integrity with Cryptographically Secured Firmware

The Marvell QLogic 2870 Series Adapters are high performance and low latency PCIe 4.0, 64-Gigabit Fibre Channel (GFC) Host Bus Adapters (HBAs) that secure mission critical data with silicon Root of Trust. These adapters are available in single, dual, and quad ports across PCIe standard form factors with industry leading performance, high bandwidth, and low latency.

Leveraging over 20 years of Fibre Channel (FC) expertise, the Marvell QLogic 2870 Series FC HBAs are designed from the ground up for customers looking to accelerate databases, host more virtual machines (VMs), and reduce total cost of ownership (TCO), while leveraging their investment in nonvolatile memory express (NVMe™)-based all flash arrays. Marvell QLogic 2870 Series FC Adapters provide full backward compatibility with previous generations of 32GFC and 16GFC SANs.

## Firmware Integrity with Silicon Root of Trust

Marvell, the pioneers in security and data encryption was the first to address the silicon Root of Trust issue with the Marvell QLogic 2870 Series Adapters which prevent malicious firmware from hijacking the FC HBA.

Security threats continue to evolve, driving CIOs to secure data center infrastructure from application software all the way down to firmware and hardware components of the server platform, where malicious attacks are the most difficult to detect. To address this issue, the Marvell QLogic QLE2870 Series Adapters offer advanced security features including silicon Root of Trust, secure boot, and digitally signed drivers. The Marvell QLogic QLE2870 Series Adapters Root of Trust provides both integrity and authenticity checks during adapter firmware updates by validating firmware embedded signatures with hardware embedded keys to ensure that only trusted firmware executes, and protecting firmware updates applied over public networks.

The Marvell QLogic QLE2870 Series Adapters feature immutable silicon Root of Trust operations:

- Verify firmware signatures prior to firmware load and execution
- Securely recover firmware to known good state and authentic state on detection of compromised firmware
- Anti-Rollback of unauthorized firmware

## 64Gb Fibre Channel Technology

Standardized by the INCITS T11, 64GFC creates the fastest single-lane Fibre Channel networking speed, delivering real world storage performance of up to 12,800MBps full duplex over a single lane serial SFP+ cable interface. Marvell QLogic's 2870 Series of

- Improve scale out NVMe efficiencies by delivering concurrent support for FCP and FC-NVMe on the same port
- Automated SAN Congestion Mitigation (USCM) helps pinpoint and prevent SAN Congestion utilizing Fabric Performance Indication Notification (FPIN) technology
- Port isolation design delivers deterministic and scalable performance on each port while improving reliability
- Marvell StorFusion™ technology accelerates deployment, simplifies diagnostics, enhances reliability, and optimizes performance
- Supports PCIe 4.0 systems

64GFC HBAs deliver standards compliant line rate performance for connecting NVMe, flash, and legacy disk storage to business critical applications running in the private cloud, telco, and mega data center.

## NVMe® Over Fibre Channel (FC-NVMe)

Workloads that demand higher throughput, IOPS, and lower latency are moving to flash. The NVMe protocol has been designed from the ground up for flash and features deep parallelism, random access, and flash access over PCI Express (PCIe) to maximize bandwidth.

NVMe works best when coupled with a network that can provide lossless, low-latency, and high-performing transport. FC-NVMe extends these benefits over a Fibre Channel fabric.

The 2870 Series Adapters support low-latency access to scale out NVMe with full support for the FC-NVMe protocol. The 2870 Series Adapters can simultaneously support FC-NVMe and FCP-SCSI storage traffic on the same physical port, enabling customers to migrate to NVMe at their own pace.

The 2870 Series FC Adapters bring the best of both worlds by offering up to 4 million IOPS and line rate 64GFC performance, while delivering low-latency access to NVMe and SCSI storage over a Fibre Channel network.

## Fully Featured FC Technology

Marvell QLogic FC technology provides a featured 64GFC adapter product line, designed to meet and exceed the requirements of modern SANs. Marvell's FC solution offers industry leading performance, while its power-efficient, port-isolated design enables data centers to reduce their carbon footprint.

Marvell QLogic 2870 Series FC HBAs resolve data center complexities by enabling a storage network infrastructure that supports powerful virtualization features like N\_Port ID virtualization (NPIV), application-aware services with standards based quality of service (QoS), on-the-fly firmware updates (no reboot), and simplified management.

Marvell StorFusion technology delivers streamlined provisioning, improved resiliency with built-in forward error correction (FEC). These features address the needs of agile IT organizations that run hybrid cloud infrastructures and require mission-critical reliability, guaranteed network performance, and the ability to scale their SANs to business needs.

## Innovations that Improve Business Productivity and Integrity

Marvell QLogic Fibre Channel Adapters powered by StorFusion technology include advanced capabilities when deployed with supported Brocade® or Cisco® switches. By implementing Marvell QLogic Fibre Channel Adapters with these industry-leading FC switches together, SAN administrators can take advantage of enhanced features that improve availability, accelerate deployment, and increase network performance.

### **High Performance Automated SAN Congestion Mitigation**

Modern SANs, especially those with a mix of Fibre Channel endpoint speeds can be susceptible to congestion. Additionally, when modern and legacy applications are consolidated to increase utilization while new workloads and VMs are added, these conditions can create SAN congestion. SAN congestion occurs when high speed initiators produce frames at a faster rate than slower Fibre Channel endpoints can drain. As these slower endpoints lag behind in processing, frames start to queue up. This slow-drain situation also termed over-subscription or over-utilization can quickly spread, impairing application performance, and potentially affect many systems on the network. A misbehaving Fibre Channel device can also lead to SAN congestion when it is unable to replenish credits which is key to reliable Fibre Channel transmissions. Early identification of these issues is crucial. SAN congestion when timely detected, can be isolated and decisive actions applied. A Fibre Channel standard, Fabric Performance Impact Notifications (FPINs) bring congestion awareness to Fibre Channel endpoints.

Utilizing FPINs, the Marvell QLogic QLE2870 Series Adapters implement automated Universal SAN Congestion Mitigation Technology (USCM). Marvell QLogic USCM uniquely works independently and in coordination with Brocade and Cisco SAN fabrics to keep applications running at peak performance by providing an in-band and zero touch SAN congestion detection, notification, and avoidance system.

Marvell QLogic QLE2870 Series Adapters interact with Cisco and Brocade SANs using both the more reliable FC primitive signaling as well as protocol events to bring awareness of the presence of congestion, peer congestion, link integrity, lost frames, etc. Marvell QLogic QLE2870 Series Adapters also have the ability to enable decisive actions such as fine-grained I/O throttling, automatic path failover, load balancing, and flow quarantining to ensure that SAN congestion is mitigated with minimum impact to application performance.

Marvell QLogic USCM technology, offered at no additional cost, brings strong awareness of SAN congestion and implements decisive actions to prevent application degradation. It is highly recommended for modern SANs.

### **Ease of Mangement with QConvergeConsole (QCC)**

The Marvell unified management application, QConvergeConsole® (QCC), provides single-pane-of-glass management across generations of Marvell QLogic FC adapters. In addition, Marvell supports all major APIs for deployment flexibility and integration with third-party management tools, including the VMware vCenter™ and Brocade Network Advisor.

### **Unparalleled Insight and QoS for Virtualized Deployments**

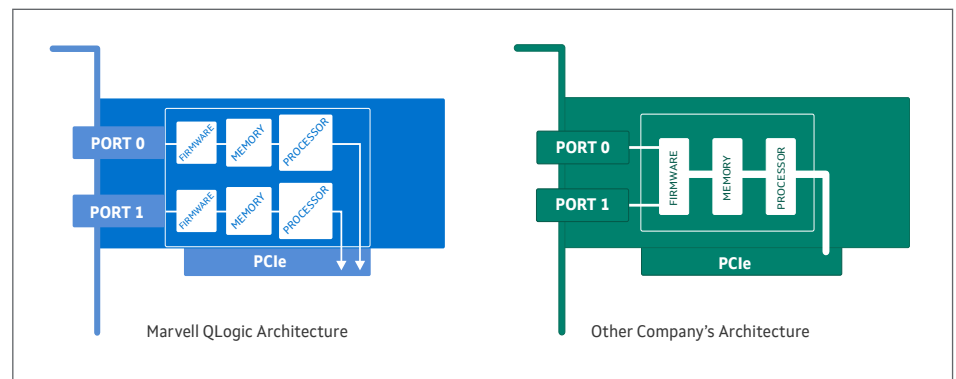
The Marvell 2870 Series Adapters support several standards-based virtualization features that optimize virtual server efficiency, troubleshooting, and application performance.

Marvell QLogic virtual machine ID (VM-ID) technology seamlessly integrates with Brocade and Cisco switches to allow customers to effectively monitor and manage QoS in their Fibre Channel storage networks; for example, load balancing VM clusters with storage to ensure efficient use of the storage resources. Supported for VMware ESXi 8.0 or later, I/O requests and responses can be tagged with the VM-ID of the appropriate virtual machine, providing end-to-end visibility at the VM level.

Additionally, support for NPIV enables a single FC adapter port to provide multiple virtual ports for increased network scalability. Standard class-specific control (CS\_CTL)-based QoS technology per NPIV port allows multi-level bandwidth controls and guarantees per VM. As a result, mission-critical workloads can be assigned a higher priority than less time-sensitive storage traffic for optimized performance.

### Superior Reliability, High Performance, and High Availability

Marvell QLogic Fibre Channel Adapters provide complete port-level isolation across the FC controller architecture. This unique architecture provides an on-chip processor, DMA channels, transmit and receive buffers, firmware image, and independent protocol handling function for each port. These features enable complete port-level isolation while preventing errors and firmware crashes from propagating across all ports.



**Figure 1: Superior Reliability and High Availability with Marvell QLogic Port-Level Isolation Architecture**

The Marvell QLogic Fibre Channel Adapter architecture delivers superior reliability, high performance bandwidth, and high-availability to exceed the needs of mission critical enterprise applications with fewer CPU cycles.

The Marvell QLogic 2870 Series Adapters also provide end-to-end data integrity with support for T10 Protection Information (T10 PI), which prevents the risk of silent data corruption in environments running Oracle® Linux® with the Unbreakable Enterprise Kernel.

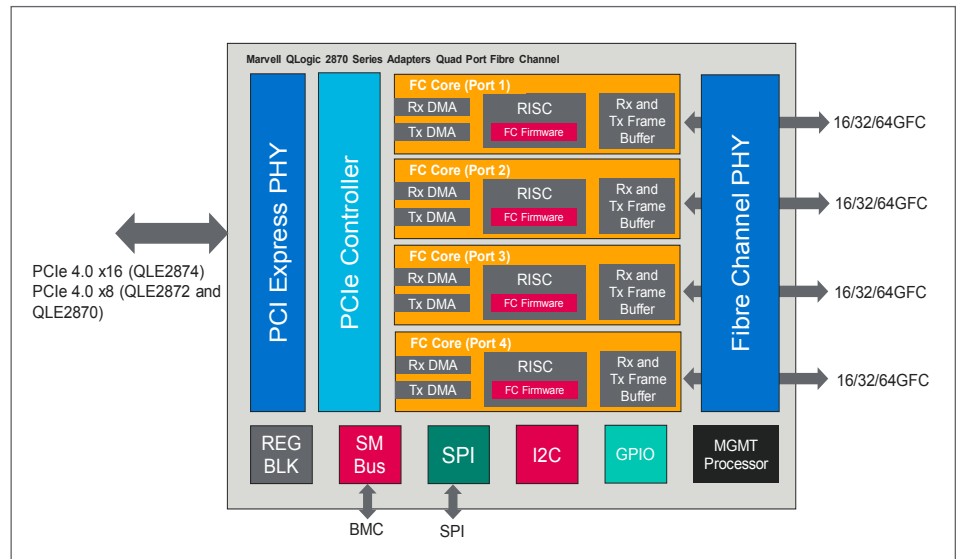


Figure 2. Marvell QLogic 2870 Series Adapters Block Diagram

## Pioneer and Leader in Fibre Channel Security, Data Encryption, and FC-NVMe

The Marvell QLogic 2870 Series Adapters are compatible with the same FC software driver stack that has been tested and validated across all major hardware platforms, all major hypervisors, and operating systems. Operating at 64GFC, these adapters are backward compatible with existing 32/16GFC infrastructure, leveraging existing SAN investments.

Marvell QLogic is the undisputed leader in FC adapters, with over 20 years of Fibre Channel expertise, more than 22 million ports shipped, and multiple generations of FC products that have been qualified by all major server and storage OEMs. Marvell owns the most established, proven FC stack in the industry with more FC ports shipped than any other vendor.

## Host Bus Interface Specifications

### Bus Interface

- QLE2870: PCIe 4.0 ×8 (single-port)
- QLE2872: PCIe 4.0 ×8 (dual-port)
- QLE2874: PCIe 4.0 ×16 (quad-port)

### Host Interrupts

- INTx and MSI-X

### Compliance

- *PCIe Base Specification, rev. 4.0*
- *PCIe Card Electromechanical Specification, rev. 4.0*
- *PCI Bus Power Management Interface Specification, rev. 1.2*
- *PCI Hot Plug Specification, rev. 1.1*

## Fibre Channel Specifications

### Negotiation

- 64/32/16GFC auto-negotiation

### Throughput

- 12,800MBps full duplex line rate per port (maximum)

### Logins

- Support for 2,048 concurrent logins and 2,048 active exchanges per port

### Port Virtualization

- NPIV

### Compliance

- *SCSI Fibre Channel Protocol-4 (FCP-4)*
- *Fibre Channel Tape (FC-TAPE) Profile*
- *Fibre Channel Generation Services-8 (FC-GS-8)*
- *Fibre Channel-Physical Interface-5 (FC-PI5)*
- *Fibre Channel-Physical Interface-6 (FC-PI6)*
- *Fibre Channel Link Services 4 (FC-LS-4)*
- *Fibre Channel Framing and Signalling-4 (FC-FS-4)*
- *Fibre Channel-NVMe-2 (FC-NVMe-2)*

## Zero Trust Architecture Security Features

- Silicon Root-of-Trust hardware based firmware authentication . Compliance with NIST 800-193 framework
- Secure boot and signed drivers

## Tools and Utilities

### Management Tools and Device Utilities

- QConvergeConsole CLI: a unified management tool that supports multiple generations of Marvell FC adapters
- MCTP/PLDM
- ESXCLI Plug-in for vSphere
- MRVLFC PowerKit (cmdlets for Windows PowerShell)
- QCC Plug-ins for vSphere
- Marvell QLogic FC QCC Extension for Windows Admin Center

### Boot Support

- Unified Extensible Firmware Interface (UEFI)

### APIs

- SNIA HBA API V2
- SMI-S

### Operating Systems

- For the latest applicable operating system information, see [Marvell.com](http://Marvell.com)

## End-to-End Provisioning and Management Features

**The following features require a supported Brocade or Cisco switch.**

### Performance

- QoS CS\_CTL
- FEC for 16GFC
- BB-CR: automatic buffer credit loss detection and recovery
- FPIN and hardware signaling for Congestion Management

### Diagnostics

- Diagnostics Port
- LCB
- RDP

### Deployment and Management

- FA-WWN
- F-BLD
- FC ping
- FC traceroute
- VM-ID
- Fabric device management interface (FDMI) enhancements

## Physical Specifications

### Ports

- QLE2870: single-port FC
- QLE2872: dual-port FC
- QLE2874: quad-port FC

### Form Factor

- Single port: low profile PCIe card (6.6 inches × 2.731 inches)
- Dual port: low profile PCIe card (6.6 inches × 2.731 inches)
- Quad port: standard height PCIe card (6.6 inches × 4.38 inches)

## Environment and Equipment Specifications

### Temperature

- Operating: 0°C to 55°C (32°F to 131°F)
- Storage: -20°C to 70°C (-4°F to 158°F)

### Humidity

- Relative (noncondensing): 10% to 90%
- Storage: 5% to 95%

### Cable Distances

- Multimode optic:

Rate	Cable and Distance (m)		
	OM2	OM3	OM4/OM5
16GFC	35	100	125
32GFC	20	70	100
64GFC	N/A	70	100

## Agency Approvals—Safety

### US and Canada

- UL 60950-1
- CSA C22.2

### Europe

- TUV EN60950-1
- TUV IEC 60950-1
- CB Certified
- EN IEC 62368 2nd, 3rd Edition

**Agency Approvals—EMI and EMC  
(Class A)**

**US and Canada**

- FCC Rules, CFR Title 47, Part 15, Subpart Class A
- Industry Canada, ICES-003: Class A

**Europe**

- EN55032
- EN55024
- EN61000-3-2
- EN61000-3-3

**Japan**

- VCCI: Class A

**New Zealand and Australia**

- AS/NZS: Class A

**Korea**

- KC-RRA Class A

**Taiwan**

- BSMI CNS 13438

**UK**

- UKCA

**Ordering Information**

**QLE2870-SR-SP (Single Port)**

**QLE2870-SR-BK (Single Port)**

- Ships with a standard-height bracket installed
- Ships with 64GFC SR optical transceiver installed

**QLE2872-SR-SP (Dual Port)**

**QLE2872-SR-BK (Dual Port)**

- Ships with a standard-height bracket installed
- Ships with 64GFC SR optical transceivers installed

**QLE2874-SR-SP (Quad Port)**

**QLE2874-SR-BK (Quad Port)**

- Ships with a standard-height bracket installed
- Ships with 64GFC SR optical transceivers installed



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 over 25 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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