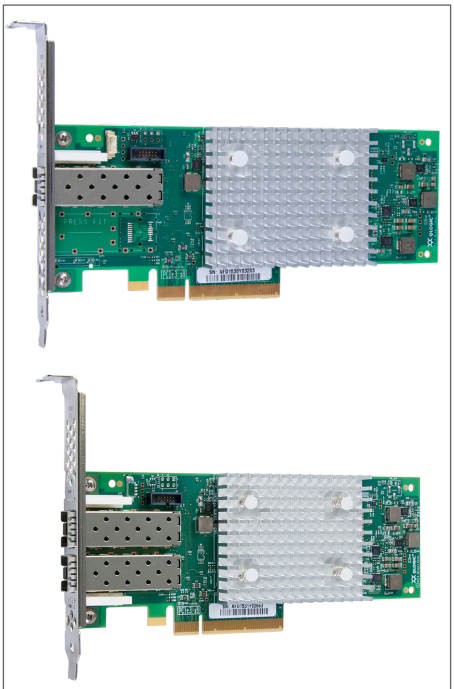
Marvell® HPE® SN1100Q

Single and Dual Port Enhanced 16GFC Adapters



- The latest and most advanced 16GFC HBA from Marvell, available in single- and dual-port versions
- Up to 1.3 million IOPS fuel high performance in AFAs and high-density virtualized environments
- Universal SAN Congestion Mitigation (USCM) helps pinpoint and prevent SAN Congestion utilizing Fabric Performance Indication Notification (FPIN) technology
- NVMe over Fibre Channel capability allows simultaneous access to NVMe and SCSI based Storage on the same port

The HPE SN1100Q Single and Dual Port Host Bus Adapters (HBAs) are based on Marvell QLogic® 16GFC technology with exceptional native Fibre Channel (FC) performance, including extremely low CPU usage with full hardware offloads.

Enhanced 16GFC

The HPE SN1100Q 16-Gigabit Fibre Channel (GFC) HBAs offer high per-port performance (up to 650K IOPS) with low power consumption. In addition, Smart SAN-optimized technology delivers streamlined provisioning, guaranteed QoS, and improved resiliency while addressing the needs of IT organizations that require reliability, integrated management, and guaranteed network performance.

Marvell QLogic Enhanced FC technology resolves data center complexities by enabling a storage network infrastructure that supports powerful virtualization features, application-aware services, and simplified management. The HPE SN1100Q HBAs provide advanced storage networking features capable of supporting the most demanding virtualized and private cloud environments while fully leveraging the capabilities of high-performance 16GFC and all-flash arrays (AFAs). Powerful management tools and integration with HPE Smart SAN and HPE Network Orchestrator software automate and simplify SAN provisioning to help reduce cost and complexity, while the 16GFC performance eliminates potential I/O bottlenecks in today's powerful multiprocessor, multicore servers.

Superior Performance

The HPE SN1100Q HBAs can accelerate mission-critical enterprise applications by delivering up to 1.3 million IOPS for physical, virtual, and private cloud environments. These Marvell QLogic adapters for HPE deliver the best storage application performance in virtualized and non-virtualized environments with support for up to 6,400MBps of aggregate throughput.

NVMe® Over Fibre Channel (FC-NVME)

The HPE SN1100Q also supports Fibre Channel over Non-Volatile Memory Express (FC-NVMe™) for connectivity to next-generation storage systems. The adapter provides the ability to deliver concurrent FC-NVMe and FCP-SCSI communications, enabling these adapters to support both legacy storage and new storage in the same environment. NVMe storage offers exceptionally high performance at very low latencies. NVMe works best with a network that can provide lossless, low-latency, and high-performing

- Enhanced reliability, diagnostics, and accelerated deployment powered by Marvell StorFusion™ technology
- Port isolation design offers deterministic and scalable performance on each port
- Fully integrated with HPE Smart SAN and HPE Network Orchestrator management software

transport. The HPE SN1100Q Enhanced 16GFC Adapters bring the best of both worlds by offering the highest performance and lowest latency access to NVMe and SCSI storage over an FC network

Virtualization Optimized

The HPE SN1100Q HBAs support standards-based virtualization features. Under VMware® ESXi 6.*x* and later, I/O requests and responses can be tagged with the virtual machine-ID (VM-ID) of the appropriate virtual machine, providing end-to-end visibility at the VM level. Support for N_Port ID virtualization (NPIV) enables a single FC adapter port to provide multiple virtual ports for increased network scalability. In addition, the 16GFC line rate per physical port delivers unmatched storage performance to maximize the number of VMs per physical server.

Smart SAN-Optimized Technology

HPE SN1100Q HBAs, with StorFusion technology, have been designed to work with HPE Smart SAN and HPE Network Orchestrator management software. Enhanced features integrate with HPE's software to enable storage administrators to zone the fabric, map and mask servers to LUNs, and run diagnostics, all from either the HPE 3PAR management console or a virtual machine running HPE Network Orchestrator, saving IT administrators time and resources.

In addition, the HPE SN1100Q HBAs include advanced capabilities that are enabled when deployed with supported Brocade® or Cisco® FC switches. By combining these industry-leading solutions, SAN administrators can take advantage of enhanced features that improve availability, accelerate deployment, and increase network performance.

Marvell Universal SAN Congestion Mitigation Technology (USCM)

SAN congestion, although rare, has the potential to quickly spread and significantly disrupt application performance leading to lost business. Modern SANs, specifically those with flash storage and mix of Fibre Channel endpoint speeds can be prone to congestion. SAN Congestion typically occurs when slower FC endpoints cannot accept responses generated by flash/NVMe storage, a condition referred to as oversubscription/over-utilization. Rarely, a misbehaving FC device can also lead to SAN congestion when it is unable to replenish credits which are key to reliable Fibre Channel transmissions, a condition referred to as slow-drain. 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 FC endpoints.

Utilizing FPINs, Marvell's QLogic HPE SN1100Q Adapters implement Universal SAN Congestion Mitigation Technology (USCM). USCM uniquely works both 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. HPE SN1100Q HBAs 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. HPE SN1100Q HBAs 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.

Improved Total Cost of Ownership and Reliability

StorFusion technology delivers advanced link diagnostics, which improve availability and support for high performance fabrics. Using the diagnostic port (D_Port) feature, administrators can quickly run a battery of automated diagnostic tests to assess the health of links and fabric components.

The HPE SN1100Q HBAs support link cable beacon (LCB), which enables administrators to visually identify both ends of a physical link. In a large data center with hundreds of ports and cables to manage, a simple command turns on port LED beacons on both ends of a link cable connection. Administrators can use LCB to quickly identify connection peer ports without tracing the cable.

Marvell QLogic technology in these adapters includes the read diagnostic parameters (RDP) feature, which provides detailed port, media, and optics diagnostics. From any point in the fabric, an administrator can use RDP to easily discover and diagnose link-related errors and degrading conditions on any N_Port-to-F_Port link.

The extensive suite of diagnostic tools maximize uptime and performance, allowing organizations to address problems before they impact operations.

Rapid Server Deployment and Orchestration

StorFusion technology includes fabric pre-provisioning services that enable servers to be quickly deployed, replaced, and moved across the SAN. By leveraging the fabric-assigned port world wide name (FA-WWN) and fabric-based boot LUN discovery (F-BLD) capabilities, the creation of zones, LUNs, SAN-based boot images, and other services can be completed before the servers arrive on site—eliminating time consuming, manual tasks that typically delay server deployment.

Performance SLA Enforcement with VM-level QoS

Network performance can be dramatically improved by implementing the industry-standard class-specific control (CS_CTL)-based frame prioritization QoS and VM-ID tagging, which helps alleviate network congestion. When adapters with Marvell StorFusion technology are connected to supported SAN fabrics, traffic is classified as it arrives at the switch, and is then processed on the basis of configured priorities. Traffic can be identified and prioritized for delivery, or subjected to limited delivery options. As a result, mission-critical and virtual workloads can be assigned a higher priority than less time-sensitive network traffic for optimized performance.

Higher Resiliency and Performance with Automatic Error Recovery

Forward error correction (FEC) improves performance and link integrity to support higher end-to-end data rates by automatically recovering from many transmission

errors without re-sending the frames. FEC automatically detects and recovers from bit errors, which results in higher availability and performance.

Automatic buffer-to-buffer credit recovery (BB-CR) helps overcome performance degradation, congestion, and link resets caused by buffer credit loss, especially on longer distance and high-loss fiber connections.

Simplified Management

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

High Availability and Reliability

HPE SN1100Q HBAs continue the Marvell design tradition of providing complete port-level isolation across the FC controller architecture. This architecture, unlike other vendor solutions, provides independent function, transmit and receive buffers, an on-chip CPU, DMA channels, and a firmware image for each port. These features enable complete port-level isolation, prevent errors and firmware crashes from propagating across all ports, and provide predictable and scalable performance across all ports. The Marvell QLogic architecture delivers ultimate reliability to meet the needs of mission-critical enterprise applications with lower power and fewer CPU cycles, all while maintaining peak performance. See Figure 1.

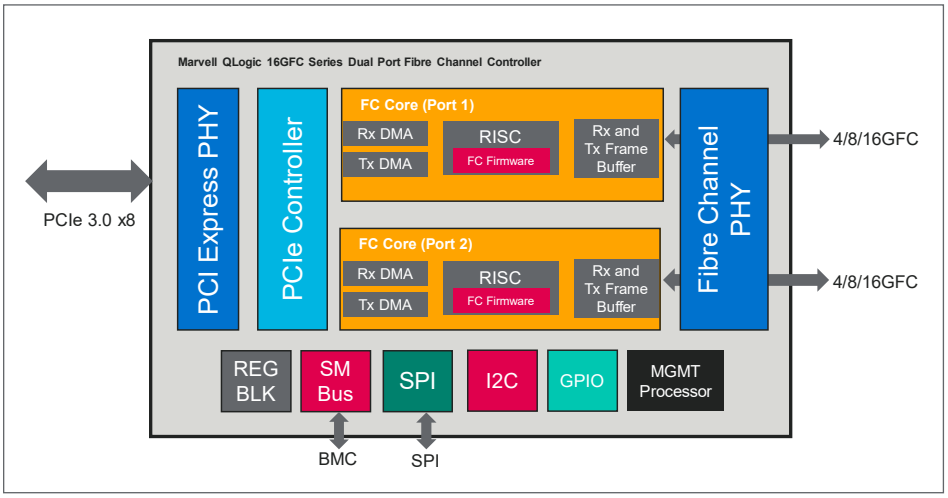


Figure 1. HPE SN1100Q Block Diagram

In addition, overlapping protection domains (OPDs) ensure the highest level of reliability as data moves to and from the PCI® bus and FC network.

The HPE SN1100Q HBAs also provide end-to-end data integrity with support for T10 Performance Information (T10 PI), which prevents the risk of silent data corruption in environments running HPE 3PAR StoreServ arrays and Oracle® Linux® with the Unbreakable Enterprise Kernel.

Leadership, Confidence, and Trust

The HPE SN1100Q HBAs are compatible with the same FC software driver stack that has been tested and validated across all major hardware platforms and all major hypervisors and OSes. The HBAs are backward compatible with existing 4GFC and 8GFC infrastructure, leveraging existing SAN investments.

Like all Marvell QLogic Fibre Channel HBAs from HPE, the HPE SN1100Q adapters are compatible with all HPE Storage Arrays like HPE Primera, HPE 3PAR, and MSA, as well as with third-party Fibre Channel storage arrays.

Marvell technology leads the market in FC adapters, with over 20 years of experience, 20+ million ports shipped, and multiple generations of FC products that have been qualified by all major server 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

- PCI Express® (PCIe®) 3.0 x8.

Host Interrupts

- INTx and MSI-X

Compliance

- *PCI Express Base Specification*, Rev. 3.1
- *PCI Express Card Electromechanical Specification*, Rev. 3.0
- *PCI Bus Power Management Interface Specification*, Rev. 1.2
- *PCIe Hot Plug Specification,* Rev. 1.1

Fibre Channel Specifications

Throughput

- 3,200MBps full duplex line rate per port

Logins

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

Port Virtualization

- NPIV

Compliance

- *Fibre Channel Physical Interface 5 (FC-PI5)*
- *Fibre Channel Tape (FC-TAPE) Profile*
- *SCSI Fibre Channel Protocol-4 (FCP-4)*
- *SCSI-3 Fibre Channel Protocol (SCSI-FCP)*
- *Second Generation Fibre Channel Generic Services (FC-GS-2)*
- *Third Generation Fibre Channel Generic Services (FC-GS-3)*
- *Fibre Channel - Non-volatile Memory Express - 2 (FC-NVMe-2)*

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

- BIOS, Unified Extensible Firmware Interface (UEFI), Forth code (FCode)

Tools and Utilities (continued)

APIs

- SNIA HBA API V2
- SMI-S

Operating Systems

- For the latest applicable operating system information, see the HPE SPOCK portal at https://h20272.www2.hpe.com/SPOCK/

End-to-End Provisioning and Management Features

The following features require a supported Brocade or Cisco switch.

Performance

- QoS CS_CTL
- FEC
- FPIN for Congestion Mitigation
- BB-CR: automatic buffer credit loss detection and recovery

Diagnostics

- Diagnostics Port
- LCB
- RDP

Deployment and Management

- FA-WWN
- F-BLD
- VM-ID: frame tagging of virtual machine ID information
- Fabric device management interface (FDMI) enhancements

Physical Specifications

Ports

- HPE SN1100Q: 16GFC Single Port FC HBA (P9D93A)
- HPE SN1100Q: 16GFC Dual Port FC HBA (P9D94A)

Form Factor

- Low profile PCIe card (6.6 inches × 2.731 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

- Operating: 10% to 90%
- Storage: 5% to 95%

Environment and Equipment Specifications (continued)

Maximum Cable Distances

Rate	Multi-Mode Optic Cable and Distance (m)			
	OM1	OM2	OM3	OM4
4GFC	70	150	380	400
8GFC	21	50	150	190
16GFC	Note 1	35	100	125

1. Not supported

Agency Approvals—Safety

US/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/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
- CISPR 32 Class A

Japan

- VCCI: Class A

New Zealand/Australia

- AS/NZS: Class A

Korea

- KC-RRA Class A

Taiwan

- BSMI CNS 13438

UK

- UKCA

Ordering Information

HPE SN1100Q 16GFC Single Port FC HBA (part number P9D93A)

- Ships in an individually packed box with a standard-height bracket installed
- Ships with SR optical transceiver installed

HPE SN1100Q 16GFC Dual Port FC HBA (part number P9D94A)

- Ships in an individually packed box with a standard-height bracket installed
- Ships with SR optical transceivers installed

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 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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