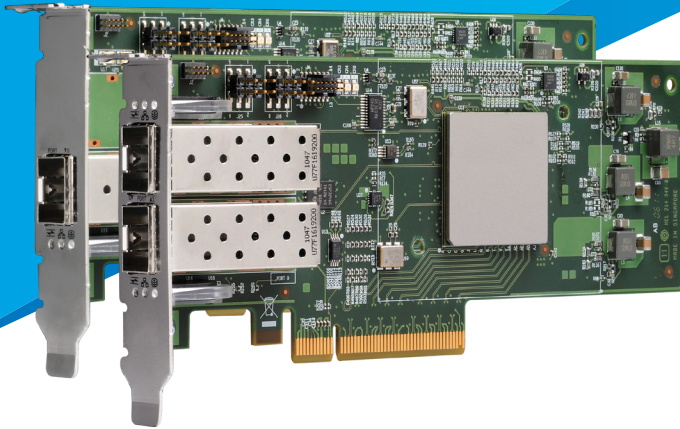


QLogic BR-1860

Fabric Adapter



- Provides a class of adapters that meets all Fibre Channel and Ethernet connectivity needs in cloud-enabled data centers
- Supports Gen 5 Fibre Channel and 10GbE DCB connectivity for TCP/IP, iSCSI, and FCoE with QLogic AnyIO® technology
- Consolidates I/O devices and optimizes QoS with QLogic vFLink technology
- Enhanced virtualization support, including Windows Server® 2012 Virtual Fibre Channel and network QoS (bandwidth management) functionality
- Centralized management through single pane-of-glass by integration with Brocade® Network Advisor

OVERVIEW

To keep pace with dynamic and growing business demands, many organizations are transitioning their data centers to private cloud architectures to leverage the many benefits of virtualization. This approach enables them to consolidate, scale, simplify, and automate their IT resources to increase business agility while reducing capital and operational expenditures. The QLogic BR-1860, designed for today's data centers, simplifies the journey to the private cloud.

Server virtualization continues to be a key technology for enabling private cloud architectures. Organizations worldwide are taking virtualization to the next level, increasing virtual machine (VM) densities and virtualizing mission-critical workloads. This trend is increasing demand for shared storage and flatter, more scalable networks—as well as higher bandwidth and I/O capacity for client/server and storage networks.

To help address that demand, the BR-1860 Fabric Adapter meets all the connectivity needs of cloud-enabled data centers while providing unmatched performance, application-aware services, unified management, and reduced cost and complexity. It is the simplest, most flexible, and most powerful server connectivity adapter designed to extend fabric services to VMs and applications in highly demanding virtualized environments (Figure 1).

A SINGLE ADAPTER FOR ALL CONNECTIVITY NEEDS

Available in single-port and dual-port models, the BR-1860 features QLogic AnyIO technology, making it the industry's first multiprotocol server connectivity product designed for highly virtualized, cloud-enabled data centers. The BR-1860 is a new class of adapters that combines a Gen 5 Fibre Channel Host Bus Adapter with a 10-gigabit Ethernet (GbE) Converged Network Adapter and a NIC to support native Fibre Channel, TCP/IP, data center bridging (DCB) Ethernet, Fibre Channel over Ethernet (FCoE), and iSCSI running simultaneously in a single product.

Gen 5 Fibre Channel is the purpose-built, data center-proven network infrastructure for storage, delivering unmatched reliability, simplicity, and 16Gbps performance. The BR-1860 Fabric Adapter with Gen 5 Fibre Channel unleashes the full potential of high-density server virtualization, cloud architectures, and next-generation storage.

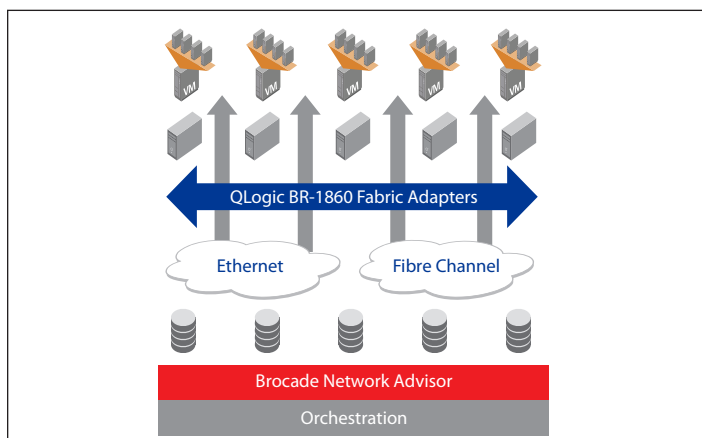


Figure 1. BR-1860 Fabric Adapter technology extends Fibre Channel and Ethernet fabric services to the VMs and applications

Organizations have the flexibility to choose, on a port-by-port basis, the adapter type and connectivity protocol that are most appropriate for their applications and their business requirements. This unmatched flexibility allows organizations to standardize on a single adapter for all of their connectivity needs. IT departments can realize capital and operational savings by consolidating multiple lower-speed Fibre Channel Host Bus Adapters and 1GbE NICs into a single adapter, acquiring space-efficient 1U rack-mount servers, connecting to existing Fibre Channel and Ethernet networks without requiring additional switch ports, and future-proofing their data centers for a seamless transition to multiprotocol networks.

Delivering full-duplex, line-rate 16Gbps Fibre Channel and 10GbE speeds, and over one million IOPS per dual-port adapter for storage applications—including Fibre Channel, FCoE, and iSCSI—the QLogic BR-1860 is the ideal platform to support the most demanding mission-critical workloads in the largest data centers. The BR-1860 supports full FCoE protocol offload as well as stateless networking offloads for 10GbE, including TCP checksum and segmentation offloads for improved performance and more efficient CPU utilization.

DESIGNED FOR THE PRIVATE CLOUD

Virtualization is transforming the data center, essentially moving the access layer of the network into the server. In addition to virtualizing I/O devices to allow them to be shared by the VMs, hypervisors have become, by necessity, software-based Ethernet switches that provide networking services for VMs—using CPU cycles and hindering virtualization scalability and performance. Even with the most powerful processors, at 16Gbps Fibre Channel and 10GbE speeds, hypervisors simply cannot keep up with I/O, and line-rate performance becomes impossible to achieve.

By implementing virtual machine optimized ports (VMOPs), the BR-1860 leverages hypervisor multiqueue technologies such as VMware® NetQueue and Microsoft® VMQ to offload the incoming network packet classification and sorting tasks from the hypervisor onto the adapter, freeing the CPU and enabling line-rate performance.

I/O Virtualization (IOV) and Virtual Switching

The BR-1860 supports QLogic virtual Fabric Link (vFLink) technology, which partitions a single adapter into as many as eight virtual adapters called vNICs. This is done in hardware by using multiple physical functions (PFs) at the PCIe® bus level, appearing as separate physical devices at the OS level. These virtual links can be assigned minimum and/or maximum bandwidth levels allocated in 100Mbps increments, with a maximum of 10Gbps for Ethernet. This helps organizations overcome the proliferation of adapters in virtual environments while maintaining management isolation and quality of service (QoS) for different types of networks, including production, backup, management, or live migration (Figure 2).

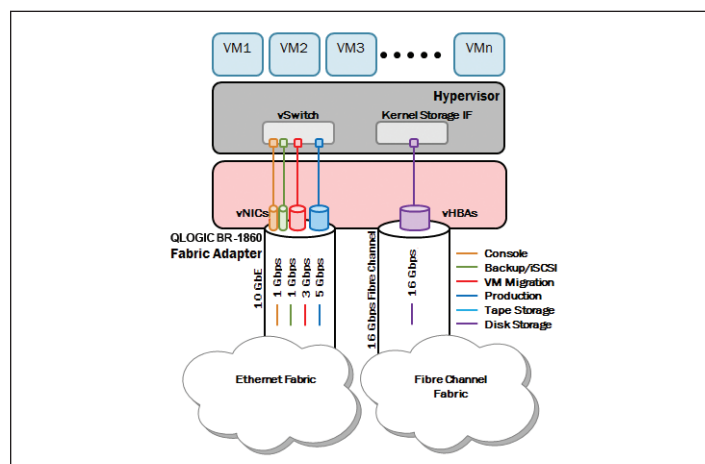


Figure 2. QLogic vFLink I/O virtualization technology enables I/O consolidation

To further improve performance in virtual environments, VMs can bypass the hypervisor and access I/O devices directly, leveraging server chipset technologies such as Intel® virtualization technology for directed I/O (VT-d) or AMD® I/O virtualization (AMD-Vi).

The BR-1860 will help organizations overcome this limitation through its ability to support the PCI-SIG® single root input/output virtualization (SR-IOV) specification¹, which extends QLogic vFLink technology to support up to 255 virtual fabric links. SR-IOV utilizes PCIe virtual functions (VFs), which are lightweight PCI functions that are assigned to the VMs while the hypervisor retains control of the underlying PF. SR-IOV enables an efficient sharing of I/O devices for VMs as well as direct I/O for increased performance (Figure 3).

¹ SR-IOV is hardware capable.

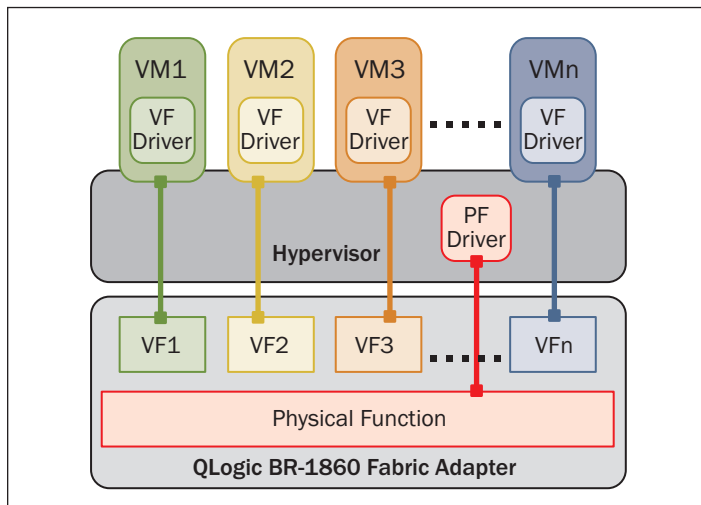


Figure 3. SR-IOV enables efficient sharing of I/O resources with direct I/O for enhanced performance

The BR-1860 also incorporates a built-in virtual Layer 2 Ethernet switch, or virtual Ethernet bridge (VEB), to offload the hypervisor from all of the inter-VM traffic switching tasks, delivering better network performance for VMs while freeing the CPU for additional application processing.

Extend Fabric Services to the Server and Applications

The BR-1860 supports Brocade's Server Application Optimization (SAO) technology to extend the intelligence and fabric services of industry-leading Brocade Fibre Channel fabrics into servers. N_Port trunking extends the ISL trunking capability from the Brocade switches into the server, combining two 16Gbps links in a dual-port adapter into a single logical 32Gbps connection with frame-level load balancing for unmatched levels of performance and fault tolerance.

Brocade SAO also extends QoS from the fabric to the VM and application level, enabling organizations to virtualize mission-critical applications and scale virtualization environments with confidence. Leveraging virtual channel technology in the Brocade switch and QLogic adapter ASICs, QoS ensures that mission-critical workloads will not be impacted by congestion or misbehaving devices, helping organizations more efficiently meet application service level agreements (SLAs).

Unprecedented Visibility and Insight Across the Storage Network with Advanced Monitoring and Diagnostics

Offering innovative diagnostic, monitoring, and management capabilities, the BR-1860 helps administrators avoid problems, maximize application performance, and reduce operational costs with the following technologies:

- **Diagnostic port (D_Port) support:** Ensures optical and signal integrity for Gen 5 Fibre Channel optics and cables, simplifying deployment and support of high-performance fabrics. It leverages the ClearLink diagnostic port (D_Port) capabilities of Brocade's Gen 5 Fibre Channel switch platforms.

- **Integration into Brocade's Brocade Network Advisor (BNA):** Provides customizable health and performance dashboard views to pinpoint problems faster, simplify SAN configuration and management, and reduce operational costs.
- **Critical diagnostic and monitoring capabilities:** Helps ensure early problem detection and recovery.
- **Forward error correction (FEC):** Enables recovery from bit errors in ISLs, enhancing transmission reliability and performance.
- **Credit loss recovery:** Helps overcome performance degradation and congestion due to buffer credit loss.

Diagnostic ports (D_Ports) are a port type that enables administrators to quickly identify and isolate optics and cable problems, reducing fabric deployment and diagnostic times. Organizations can also use Brocade's ClearLink diagnostics to run a variety of tests through QLogic Host Connectivity Manager (HCM), QLogic BCU CLI, or Brocade's BNA to test ports, SFPs, and cables for faults, latency, and distance.

D_Port enabled diagnostic ports can be configured either explicitly by the user in static mode or forced by the switch port in dynamic mode. Dynamic mode automatically configures D_Ports on the adapter from the switch, streamlining deployment and reducing operational overhead. To take advantage of Brocade's ClearLink diagnostics functionality, the BR-1860 needs to be in Host Bus Adapter mode and requires 16Gbps optics.

In addition, the BR-1860 extends credit recovery and FEC from the SAN fabric to the server level. Extending these fabric services to the server improves link resiliency and enhances overall application performance and availability.

The BR-1860 is hardware-capable to support the upcoming virtual Ethernet port aggregator (VEPA) standard as defined by the IEEE 802.1Qbg *Edge Virtual Bridging (EVB)* specification. VEPA allows inter-VM traffic to be switched by the access layer switch in the network. Combined with QLogic vFLink technology, VEPA logically extends the physical Ethernet switch all the way to the VMs. This allows networking policies to be defined with VM granularity and enables the delivery of VM-aware services and VM-level traffic monitoring.

Optimal Support for Windows Server 2012 and 2012 R2

By supporting Windows Server® 2012, the BR-1860 enhances its ability to support Windows-based virtual workloads and provides network administrators with policy-based tools to manage traffic on the virtual and physical networks. Furthermore, its support of the Hyper-V® virtual Fibre Channel feature enables direct connectivity to Fibre Channel SANs from within a Hyper-V VM, allowing Fibre Channel SANs to seamlessly support Windows-based virtualized workloads. Support for Fibre Channel in Hyper-V guests also includes support for many high-availability features, such as virtual SANs, clustered VMs, live migration, and multipath I/O (MPIO).

Through its support of Windows Server 2012 policy-based QoS, the BR-1860 enables administrators to specify network bandwidth controls based on application type, users, and servers for the physical network. In addition, support of Hyper-V QoS enables cloud hosting providers and enterprises to deliver predictable network performance for multiple types of traffic for VMs using BR-1860 adapters running in DCB mode.

SIMPLIFYING SERVER DEPLOYMENT WITH DYNAMIC FABRIC PROVISIONING

Dynamic fabric provisioning (DFP) allows organizations to eliminate fabric reconfiguration when adding or replacing servers through the virtualization of host world wide names (WWNs). It combines Brocade switch and QLogic adapter technology to reduce or eliminate the need to modify zoning or LUN masking. In addition, DFP enables pre-provisioning of virtual WWNs, helping organizations eliminate time-consuming steps when deploying new equipment or moving devices within a switch.

CENTRALIZED ADAPTER MANAGEMENT

QLogic's Host Connectivity Manager (HCM) is an easy-to-use adapter management tool for configuring, monitoring, and troubleshooting the QLogic BR-series adapters. HCM enables server administrators to quickly configure BR-series adapters locally or remotely.

HCM scans the SAN environment to discover visible storage resources and display target LUNs. A simple to use graphical tree view provides fast access to the managed Host Bus Adapters, Converged Network Adapters, ports, and target storage resources. HCM also provides notifications of various conditions and problems through a user-defined event filter.

In addition to providing a graphical interface, QLogic also provides a powerful command line interface, BCU CLI, for scripting and task automation.

For holistic data center-wide management, QLogic HCM is tightly integrated with Brocade Network Advisor (BNA) to provide end-to-end configuration and management of the entire SAN infrastructure. Administrators can launch QLogic HCM from within BNA to provide single-pane-of-glass management of QLogic BR-series adapters and Brocade switches.

QLogic also provides open APIs and standards-based interfaces for integration with popular third-party applications.

MAXIMIZING INVESTMENTS

To help optimize technology investments, QLogic and its partners offer complete solutions that include professional services, technical support, and education. For more information, contact a QLogic sales partner or visit www.qlogic.com.

Fibre Channel Specifications

Data Rate

- 14.025Gbps (1600MBps); 8.5Gbps (800MBps); 4.25Gbps (400MBps); 2.125Gbps (200MBps) auto-sensing (per port); full duplex

Performance

- Over 500,000 IOPS per port (1,000,000 IOPS per dual-port adapter)

Topology

- Point-to-point (N_Port), switched fabric (N_Port), FC-AL, FC-AL2

Key Features

- Dynamic fabric provisioning (DFP). Fibre Channel fabric assigned worldwide name (FA-PWWN)
- D_Port. Port type enabling rapid isolation of optics or cable problems
- Credit recovery. Buffer credit loss detection and automatic recovery at 16GFC
- Forward error correction (FEC): error recovery mechanism when operating at 16Gbps link speed
- N_Port trunking. Aggregation of 2×16Gbps links into a single logical 32Gbps link

Distance Support

- 15m at 16Gbps on 62.5/125µm (OM1) multimode fiber (MMF)
- 35m at 16Gbps on 50/125µm OM2 MMF
- 100m at 16Gbps on 50/125µm OM3 MMF
- 125m at 16Gbps on 50/125µm OM4 MMF
- 10km at 16Gbps on 9/125µm single-mode fiber (SMF)

Ethernet Specifications

Data Rate

- 10.3125Gbps

Distance Support

- 33m at 10Gbps on 62.5/125µm OM1 MMF
- 82m at 10Gbps on 50/125µm OM2 MMF
- 300m at 10Gbps on 50/125µm OM3 MMF
- 10km at 10Gbps on 9/125µm SMF

Frame Sizes

- All standard Ethernet frame sizes supported, including 9,600 byte jumbo frames and mini-jumbo frames

Boot Options

- Pre-boot execution environment (PXE and gPXE), BIOS, UEFI

FCoE Specifications

Performance

- Over 500,000 IOPS per port (1,000,000 IOPS per dual-port adapter)

Host Specifications

Server Platform

- Intel (IA32, IEM64T), AMD (x86, 64), and Sun® (x86, SPARC®)

Bus Interface

- PCI Express Gen 2.0 compatible (x8), with MSI-X and INTx

Software

Management

- QLogic Host Connectivity Manager (HCM)
- QLogic BCU CLI

Operating Systems

- For the latest applicable operating system information, see <http://driverdownloads.qlogic.com>.

Physical Specifications

Form Factor

- PCI Express low-profile form factor; 16.77cm×6.89cm (6.60in.×2.71in.)

Environmental and Power Requirements

Airflow

- 45 linear feet per minute (LFM)

Operating Temperature

- 0°C to 55°C /32°F to 131°F (dry bulb)

Non-Operating Temperature

- -43°C to 73°C/-40°F to 163°F (dry bulb)

Operating Humidity

- 5% to 93% (relative, non-condensing)

Non-Operating Humidity

- 5% to 95% (relative, non-condensing)

Operating Voltage

- 12V

Agency Approvals

United States

- Bi-Nat UL/CSA 60950-1 2nd Ed; ANSI C63.4; cCSAus; FCC Class B

Canada

- Bi-Nat UL/CSA 60950-1 2nd Ed; ICES-003 Class B; cCSAus

Japan

- CISPR22 Class B and JEIDA (Harmonics); VCCI-B

European Union

- EN60950-1; EN55022 Class B and EN55024; TÜV Bauart, CE Mark

Australia, New Zealand

- EN55022 and CISPR22 Class B or AS/NZS CISPR22; C-Tick

Russia

- IEC60950-1; 51318.22-99 and .24-99; GOST Mark

Korea

- KN22 and KN24; KC Mark Class B

Taiwan

- CNS 13438(95) Class A; BSMI Mark

Ordering Information

BR-1860-1xxx (single port)

- Ships in a single pack with low-profile and standard brackets

BR-1860-2xxx (dual port)

- Ships in a single pack with low-profile and standard brackets

NOTICES

Brocade Network Advisor (BNA) is a management solution from Brocade that enables unified management across SAN and IP networks. Brocade Server Application Optimization (SAO) is an optional feature available on Brocade switches. SAO works with QLogic BR series adapters to enhance application performance and VM scalability. Licenses for Brocade's BNA and SAO products can be purchased separately through Brocade Corporation.

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