

HP BladeSystem c-Class Fibre Channel networking solutions

Family data sheet

Overcome your connectivity challenges Get more of what you need

To get more value from your servers and storage systems, and the critical information in them, you need a flexible, standards-based connectivity solution. This is true whether you need to set up a new IT infrastructure, add components to your existing data center, or redesign and consolidate an existing installation.

Each of these initiatives bring with them unique challenges of connecting server resources to storage area networks (SANs). These include a proliferation of cables, the need to connect growing numbers of servers per rack, and ever-increasing cooling and power requirements.

And then, there are other major issues to consider: To keep pace with data growth, you need flexible connectivity solutions that allow your IT systems to change quickly to meet shifts in demand. To keep your business moving, you need to work to achieve higher levels of availability for mission-critical data. And to protect your current investments, you need to be confident that your connectivity choices will not create interoperability issues with your legacy systems and networking gear.

Ultimately, today's data centers need innovative, standards-based connectivity solutions that deliver the performance required by a dynamic business—and do so in a cost-effective manner. You will find all of this in the growing family of HP BladeSystem c-Class Fibre Channel (FC) networking solutions.

The HP BladeSystem c-Class architecture gives you a broad range of choices for connecting your servers to your Fibre Channel networks. These include new groundbreaking HP Virtual Connect FlexFabric modules and FlexFabric adapters, embedded switches with all the features and power of their stand-alone counterparts, pass-thru modules, and host bus adapter (HBA) mezzanine cards.

With these solutions, you gain the confidence that comes with industry-standard products. Support for common standards helps protect your existing investments while reducing complexity of your IT environment.

Here are some of the ways in which the BladeSystem c-Class architecture helps you gain more value from your Fibre Channel networking solutions—and get more of what you need:

- **Flexibility:** This flexible interconnect architecture supports a variety of the latest fabrics using familiar standards, including Fibre Channel, Ethernet, InfiniBand, iSCSI, and Serial Attached SCSI (SAS).
- **Choice:** The BladeSystem architecture supports a broad portfolio of Fibre Channel interconnect options to meet your specific requirements and preferences. These options include new HP Virtual Connect (VC) modules along with interconnects from leading providers, such as Brocade, Cisco, Emulex, and QLogic.
- **Standards:** The BladeSystem supports industry standards from internationally recognized organizations, including the ANSI T11 standards body and the Storage Networking Industry Association (SNIA).



- **Innovation:** The BladeSystem c-Class architecture supports the unique HP connectivity technology available today in HP Virtual Connect modules and the new Virtual Connect FlexFabric. This technology enables the most flexible interconnect architecture in the industry. It can help you reduce sprawl at the server edge by up to 95 percent¹, substantially lower your SAN connectivity costs, and simplify server and SAN administration.
- **Bandwidth:** Up to 5 TB of aggregate bandwidth and eight interconnect bays support up to three fully redundant Fibre Channel fabrics at once.
- **Reliability:** The BladeSystem helps you increase availability with built-in redundancy, no single point of failure, and hot-plug capabilities.
- **Density:** With the BladeSystem's zero footprint design, all modules fit into the HP BladeSystem c-Class enclosure and FlexFabric adapters, which are built into most HP ProLiant server blades.
- **Management:** You gain great management control through integration with HP Onboard Administrator, HP Insight Control, HP Systems Insight Manager, and HP Storage Essentials software. Virtual Connect Manager and Virtual Connect Enterprise Manager provide role-based management for all Fibre Channel modules for single domains and multiple domains, respectively. Both well understand the different roles of storage, server, and network teams and thereby allow them to work productively together.

Choose from a broad range of connectivity options

HP Virtual Connect 4 Gb Fibre Channel Module for BladeSystem c-Class

The HP Virtual Connect 4 Gb Fibre Channel Module provides a simple, flexible way to connect your BladeSystem c-Class servers to your SAN. It lets you add, move, and replace servers in just minutes, without affecting your SAN.

Virtual Connect simplifies server connections by separating the server enclosure from your SAN and it also simplifies network connections by reducing your need for cables, without leaving you with more switches to manage.

The standards-based HP Virtual Connect Fibre Channel Module is like a pass-thru device to your SAN, yet provides the key benefits of integrated switching. These include high-performance 4 Gb auto-negotiating ports and compatibility with other SAN switches.

Virtual Connect extends the advantages of virtualization beyond the server boundary to the connections to external networks and storage. This innovative HP technology, now available in Ethernet as well as Fibre Channel modules, lets your server administrators change server blades without having to call in SAN or LAN specialists.

HP Virtual Connect 8 Gb 20-Port Fibre Channel Module for BladeSystem c-Class

HP brings to you the HP Virtual Connect 8 Gb 20-Port Fibre Channel Module, which has been designed keeping the server administrators in mind to quickly bring up servers on the LAN and SAN.

With Virtual Connect, you can reduce costs and simplify connections to the LANs and SANs. You can consolidate your network connections and enable your administrators to add, replace, and recover server resources on the fly.

Manage your virtual servers independently with the HP Virtual Connect 20-Port Fibre Channel Module. It offers next-generation 8 Gb technology that includes backward compatibility with 2 Gb and 4 Gb networks. The HP Virtual Connect 8 Gb 20-Port FC Module is also compatible with other NPIV switch products, providing high-performance, and end-to-end connections with your brands of core switches.

HP Virtual Connect 8 Gb 24-Port Fibre Channel Module for BladeSystem c-Class

The HP Virtual Connect 8 Gb 24-Port FC Module reduces cabling and simplifies SAN management for c-Class server blades. It has the ability to add and replace servers or move workloads (in minutes) without impacting SAN connections. Next-generation 8 Gbps technology includes backward compatibility with 2 Gb and 4 Gb networks and a 4x overall increase in aggregate I/O bandwidth.

The standards-based Virtual Connect 8 Gb 24-Port FC Module looks like a pass-thru device to the network, yet provides all the key benefits of integrated switching including high performance 8 Gb uplinks to the SAN. The integrated design frees up rack space, decreases power and cooling requirements, and reduces cables and small form-factor pluggables.

HP Virtual Connect FlexFabric 10 Gb/24-Port Module

HP Virtual Connect FlexFabric 10 Gb/24-port Modules are the simplest, most flexible way to connect virtualized server blades to data and storage networks. VC FlexFabric modules eliminate up to 95 percent² of network sprawl at the server edge with only one device that converges traffic inside

^{1, 2} Based on HP analysis of networking equipment (adapters and enclosure interconnects)

A traditional server blade configuration would typically require a dual port LOM, an extra quad port NIC mezzanine, and a dual port HBA along with switch modules (6 Ethernet and 2 Fibre Channel). The total traditional configuration components come up to 40 versus the VC FlexFabric solution. The VC FlexFabric solution requires only embedded dual port FlexFabric CNAs on servers (no mezzanine cards) and two VC FlexFabric modules. This simple calculation will help you understand it better, $(40-2)/40 = 95\%$.

enclosures and directly connects to external LANs and SANs. Using Flex-10 technology with industry-standard Fibre Channel over Ethernet (FCoE) and accelerated iSCSI, these modules converge traffic over high speed 10 Gb connections to servers with HP FlexFabric adapters. Each module provides four adjustable connections (three data and one storage or all data) to each 10 Gb server port.

VC FlexFabric modules help avoid network complexity by reducing the need for multiple Ethernet and Fibre Channel switches, extension modules, cables, and software licenses. They allow you to converge data and storage traffic onto a single fabric without a fork-lift upgrade to your data center networks.

Also, like Virtual Connect Ethernet Modules, Virtual Connect wire-once connection management is built-in, enabling easy server additions, moves, and replacement in minutes versus days or weeks.

Embedded Fibre Channel switches

With the BladeSystem c-Class, you have a choice of embedded Fibre Channel switches from leading providers, including Brocade and Cisco, for seamless integration to your existing fabrics.

The embedded Fibre Channel switches available from HP provide:

- **Connectivity:** The switches support connectivity to HP StorageWorks and third-party storage systems and SAN devices. This helps you protect your current investments and increase flexibility.
- **Bandwidth:** You can move data faster with the highest available aggregate bandwidth—up to 384 Gbps per switch (24 ports x 8 Gbps x 2 for full duplex) with the new Brocade 8 Gb SAN Switch models. The BladeSystem c-Class supports up to six Fibre Channel Switches per enclosure. It all adds up to high performance, high availability, and increased flexibility that are great for virtual server environments.
- **Scalability:** A scalable design, including 12-port and 24-port models with license key port activation, provides deployment flexibility and helps lower your acquisition costs.
- **Efficiency:** Internal server and switch interconnect to the BladeSystem reduces your need for cabling and small form-factor pluggables (SFPs). This approach also helps you reduce costs and improve reliability and availability.
- **Management:** Integration with the HP Onboard Administrator for BladeSystem, HP Systems Insight Manager, and HP Storage Essentials software helps you simplify management, increase efficiency, and reduce costs.

Fibre Channel pass-thru modules

The 4 Gb Fibre Channel pass-thru module for HP BladeSystem c-Class enables a direct connection between each server blade within the enclosure and your external Fibre Channel SAN switches or directors. These modules provide 16 server and 16 uplink ports and full interoperability with third-party fabrics.

The HP Fibre Channel pass-thru module delivers up to 164 Gbps Fiber Optic I/O connections, providing 1:1 non-switched, non-blocking paths between the server blade and the SAN. The modular design is hot pluggable and easily installs into the I/O bays of the c-Class enclosure. Installing a pair of Fibre Channel pass-thru modules provides redundant paths for connection to your SAN.

FlexFabric Adapters

NC551m: The NC551m FlexFabric 10 Gb mezzanine adapter delivers the performance benefits and cost savings of converged network connectivity for HP BladeSystem servers. The dual-port NC551m helps optimize network and storage traffic with hardware acceleration and offloads for stateless TCP/IP, TCP Offload Engine (TOE), Fibre Channel over Ethernet (FCoE), and iSCSI. When connected to a Convergence Enhanced Ethernet (CEE) capable switch, FC, and Ethernet, I/O are separated and routed to the corresponding network. For iSCSI storage, the NC551m supports full protocol offload providing better CPU efficiency when compared to software initiators enabling the server to handle increased virtualization workloads and compute-intensive applications. The NC551m also supports Virtual Connect Flex-10 that allows each 10 Gb port to be divided into four physical NICs to help optimize bandwidth management for virtualized servers. This combination of high-performance network and storage connectivity reduces cost and complexity and provides the flexibility and scalability for BladeSystem servers.

Integrated FlexFabric

NC551i: The NC551i is a 10 Gb Integrated FlexFabric Adapter for HP BladeSystem G7 servers with AMD processors. It delivers the performance benefits and cost savings of converged network connectivity. The NC551i includes a BladeEngine 2 (BE2) controller. For the first time, BladeSystem servers can support converged networking without requiring an add-on mezzanine card. Integrated into AMD G7 Blade servers, the dual-port NC551i Integrated FlexFabric Adapter optimizes network and storage traffic with hardware acceleration and offloads for stateless TCP/IP, TCP Offload Engine (TOE), Fibre Channel over Ethernet (FCoE), and iSCSI.

When connected to a Convergence Enhanced Ethernet (CEE) capable switch, FC, and Ethernet, I/O are separated and routed to the corresponding network. For iSCSI storage, the NC551i Integrated FlexFabric Adapter supports full protocol offload that provides better CPU efficiency when compared to software initiators enabling the server to handle increased virtualization workloads and compute-intensive applications. The NC551i also supports Virtual Connect Flex-10 that allows each 10 Gb port to be divided into four physical NICs to optimize bandwidth management for virtualized servers. This combination of high-performance network and storage connectivity reduces cost and complexity and provides the flexibility and scalability for BladeSystem servers.

NC553i: The NC553i is a 10 Gb Integrated FlexFabric Adapter for HP BladeSystem G7 servers with Intel processors. The NC553i delivers the performance benefits and cost savings of converged network connectivity. In addition to the features offered by the NC551i, the NC553i includes a BladeEngines 3 (BE3) controller. The BE3 controller via SR-IOV provides platforms to facilitate virtual server network connectivity. The NC553i provides multiple storage protocols for customer environments (FCoE and iSCSI).

There are also 8 Gb Fibre Channel solutions from Brocade, Emulex, and QLogic

Emulex LPe1205-HP dual-channel PCI Express 8 Gb/s FC HBA for HP BladeSystem c-Class

The Emulex LPe1205-HP dual-port PCI Express Fibre Channel mezzanine card HBA provides high-performance SAN connectivity for the HP BladeSystem c-Class to meet the needs of the most demanding applications. Leveraging eight generations of design, the Emulex LPe1205-HP seamlessly attaches to 2/4/8 Gb/s SAN devices. It provides superior reliability, enhanced security, and scalable management capabilities—making it well-suited for virtual server and enterprise-class applications.

Brocade 804 8 Gb FC HBA for HP BladeSystem c-Class

The Brocade 8 Gb FC HBA offers high performance connectivity, extend fabric features to the server and applications, and integrate seamlessly with management software such as Data Center Fabric Manager (DCFM) to provide a complete end-to-end data center solution.

Brocade FC HBAs support the Server Application Optimization (SAO) license to extend Brocade data center fabric technologies to the server infrastructure, thereby improving overall application performance

and virtual machine scalability. SAO enables individual traffic flows to be specifically configured, prioritized, and optimized from end-to-end throughout the data center. SAO is enabled via software licensing on Brocade switches and directors, and is deployed along with Brocade FC HBAs to help IT organizations more easily manage true end-to-end SAN services across next-generation data centers.

Combining high transfer rates, enhanced I/O processing, and extended interrupt management with Emulex Virtual HBA Technology, LPe1205-HP provides a rich set of features making it ideal for high-transaction database environments. It delivers broad interoperability, enabling easy deployment, and nearly continuous availability in a complex, heterogeneous SAN environment. The dual-channel design makes it ideal for mission-critical applications that rely on high-availability connectivity.

In addition, the unique Emulex firmware and driver architecture provide full driver compatibility with all Emulex HBAs. This means that firmware can be upgraded without taking the server offline or requiring system re-boots—giving you outstanding investment protection of end-user hardware and reduced downtime.

QLogic QMH2562 8 Gb FC HBA for HP BladeSystem c-Class

Designed for the HP BladeSystem c-Class, the QLogic QMH2562 8 Gb FC HBA provides reliable SAN connectivity and is ideal for virtualized environments. It delivers twice the data throughput of the previous generation 4 Gb mezzanine card. With 200,000 IOPS per port and leading-edge FC connectivity, you can enjoy the benefits of increased storage networking bandwidth and I/O performance to meet the requirements of demanding applications.

The PCI Express-based 8 Gb FC mezzanine card is optimized for virtualization, low power usage, management, security as well as reliability, availability, and serviceability (RAS). You now have a powerful SAN solution that can increase transfer rates for mission-critical data center applications and reduce the backup windows. In addition, the fault-tolerant 8 Gb HBA architecture and the extended virtualization capabilities can help you scale your storage infrastructure—even while keeping costs low.

4 Gb Fibre Channel HBA mezzanine cards

With the BladeSystem, you have a choice of Fibre Channel HBA mezzanine cards from leading providers, including QLogic and Emulex.

These HBAs offer dual-port 8 Gbps/port performance per mezzanine. The BladeSystem c-Class design provides two mezzanine slots per half-height server blade and three mezzanine slots per full-height server blade.

	HP Virtual Connect FlexFabric 10 Gb/24-port Module for BladeSystem c-Class	HP Virtual Connect 4 Gb Fibre Channel Module for BladeSystem c-Class	HP 4 Gb Fibre Channel Pass-Thru Module for BladeSystem c-Class	HP Virtual Connect 8 Gb 20-Port Fibre Channel Module for BladeSystem c-Class	HP Virtual Connect 8 Gb 24-Port Fibre Channel Module for BladeSystem c-Class
Performance and form factor					
Blade type	Single bay	Single-wide, Fibre Channel Virtual Connect	Single-wide, Fibre Channel Pass-Thru	Single bay	Single bay
Performance	Line Rate, full-duplex 240 Gbps bridging fabric 1.2 μ s on Ethernet only ports 1.7 μ s Ethernet/FC ports Maximum Ethernet frame size 9216 (Jumbo Frame) Maximum FC frame size 2148 bytes (2112 byte payload) Buffer-to-buffer flow control management Packet prioritization	4 Gbps line speed, full duplex 1.2 μ sec latency Maximum frame size 2112 byte payload Buffer-to-buffer flow control management Packet prioritization	4 Gbps per port, non-blocking	8 Gbps line speed, full duplex 1.2 μ sec latency Maximum frame size 2112-byte payload Buffer-to-buffer flow control management Packet prioritization	8 Gbps line speed, full duplex 700 μ sec latency Maximum frame size 2112 byte payload Aggregate bandwidth up to 384 Gbps Buffer-to-buffer flow control management Packet prioritization
Port configuration	16 x 10 Gb downlinks to servers 2 x 10 Gb cross connects 4 x 10 Gb external SR, LR fiber and copper uplinks SFP+ (Enet/FC) 4 x 10 Gb external SR, LRM and LR fiber and copper uplinks SFP+ (Enet) 1 internal interface to c-Class Onboard Administrator Module	16 Internal 4 Gb downlinks presented as F-Ports 4 External 4 Gb uplinks presented as N-Ports	(16) 4 Gbps internal downlinks (16) 1/2/4 Gbps auto-negotiating external uplinks	16 internal 8 Gb downlinks presented as F-Ports 4 external 8 Gb uplinks presented as N-Ports	(16) Internal 8 Gb, 2/4/8 Gb Auto-negotiating Server ports (8) External 8 Gb, 2/4/8 Gb Auto-negotiating SFP + SAN ports
Media types	Fibre Channel SFP/SFP+ 2/4/8 Gb short wave up to 500 m 1/2/4 Gb long wave up to 10 km Ethernet SFP/SFP+ 10 GbE SR, LR, and LRM 10 GbE copper direct attached cable 1 GbE SX 1 GbE 1000Base-T copper	Small form-factor pluggable (SFP) laser, 1/2/4 Gb short wave up to 500 m, and 1/2/4 Gb long wave up to 10 km	50/125 micron multimode fiber optic	Small form-factor pluggable (SFP) laser, 2/4/8 Gb short wave up to 500 m, and 1/2/4 Gb long wave up to 10 km	1/2/4 Gb short wave and long wave B-series SFP transceivers 2/4/8 Gb short wave and long wave B-series SFP + transceivers
Management and protocols					
Management features	Simple and intuitive Graphical User Interface and Setup Wizards Embedded SNMP v1, v2; SMI-S Command Line Interface Port Mirroring—Any uplink port can be used as a dedicated mirrored port from the server port(s) Extended management features Virtual Connect Enterprise Manager (VCEM) supports PXE, WOL, port VLAN, VLAN Tagging, VLAN pass through, IGMP Snooping, NIC Teaming Integrated with Onboard Administrator, HP Systems Insight Manager, HP Storage Essentials (FC Management MIB), Telnet, SNMP	Management through Onboard Administrator Telnet, SNMP (FC Management MIB), HP Systems Insight Manager, HP Storage Essentials, HTTP, HTTPS, SSL	Link Status indicators Power and Cooling monitored by the BladeSystem Onboard Administrator	Simple and intuitive Graphical User Interface and Setup Wizards accessible through VC Ethernet module Command Line Interface accessible through VC Ethernet module Embedded SNMP v1 and v2 SMI-S	Management through Onboard Administrator SNMP SMI-S Management through Virtual Connect Manager HP Systems Insight Manager (through SNMP and SMI-S) HP Storage Essentials (through SNMP and SMI-S)
High availability features	Link Aggregation Protocol Automatic loop protection Mirrored profile database Multi-path heartbeat between redundant modules	Mirrored profile database Multi-path heartbeat between redundant modules	Supports redundant FC connection using a second FC Pass-Thru	Mirrored profile database Multi-path heartbeat between redundant modules	Mirrored profile database Multi-path heartbeat between redundant modules
Protocols supported	IEEE 802.1Qbb (preliminary), 802.1Qaz (preliminary), 802.1AB, 802.1D, 802.1Q, IEEE 802.2, 802.3ad INCITS FC-BB-5 Rev 2.00 INCITS T11 N_Port ID Virtualization (NPIV)	NCITS T11 N_Port ID Virtualization (NPIV)	Transparent protocol support	NCITS T11 N_Port ID Virtualization (NPIV)	NCITS T11 N_Port ID Virtualization (NPIV)
Deployment					
Maximum per enclosure	8	Up to 6	Up to 6	Up to 6	Up to 6
Options available	SFP+ not included and must be ordered separately	SFP modules	SFPs included	SFPs not included and must be ordered separately	Two 8 Gb SFPs included
Warranty (parts/labor/onsite)	1-year/1-year/1-year	1-year/1-year/1-year	1-year/1-year/1-year	1-year/1-year/1-year	1-year/1-year/1-year

Embedded Fibre Channel switches

	Brocade 8 Gb SAN Switch for HP BladeSystem c-Class	Cisco MDS 9124e Fabric Switch for HP BladeSystem c-Class
Performance	8 Gbps, non-blocking and auto-sensing 2/4/8 Gbps	4 Gbps, non-blocking and auto-sensing 1/2/4 Gbps
Maximum ports	24	24
Minimum ports	12	12
Aggregate switch bandwidth	384 Gbps (end-to-end)	192 Gbps (end-to-end)
Protocol support	Fibre Channel	Fibre Channel
High availability features	Redundant switches, hot-pluggable, non-disruptive software upgrades	Redundant switches, hot-pluggable, non-disruptive software upgrades
Management	Brocade CLI and WebTools, Power Pack+ (bundled or optional): Adaptive Networking, ISL Trunking, Advanced Performance Monitoring, Fabric Watch, Extended Fabrics, Fabric Manager (optional)	Cisco MDS 9000 Family Command Line Interface (CLI), Cisco Fabric Manager, Cisco Fabric Manager Server (optional), Cisco Enterprise Package (optional)
Form factor	Embedded	Embedded
Media types	Small form factor pluggable (SFP) transceivers	Small form factor pluggable (SFP) transceivers
Upgradeability	Standard 12-port model is upgradeable (maximum 24-ports), Power Pack+ upgrade for advanced management software features	Standard 12-port model is upgradeable (maximum 24-ports)
What's in the box?	<ul style="list-style-type: none"> 12-port model includes 12-port licensed Fibre Channel switch, two 8 Gbps short wave SFP+, 8-port dust covers, full fabric connectivity, documentation 24-port model includes 24-port licensed Fibre Channel switch, four 8 Gbps short wave SFP+, 8-port dust covers, full fabric connectivity, documentation 24-port Power Pack+ model includes 24-port licensed Fibre Channel switch, four 8 Gbps short wave SFP+, 8-port dust covers, Power Pack+ Bundle licensed software, full fabric connectivity, documentation 	<ul style="list-style-type: none"> 12-port model includes 12-port licensed Fibre Channel switch, two 4 Gbps short wave SFPs, 8-port dust covers, SAN-OS, documentation 24-port model includes 24-port licensed Fibre Channel switch, four 4 Gbps short wave SFPs, 8-port dust covers, SAN-OS, documentation
Models available	Factory-configured 12-port Full Fabric, 24-port Full Fabric, and 24-port Full Fabric Power Pack+ models	Factory-configured 12-port and 24-port models
Optional software	Adaptive Networking, ISL Trunking, Advanced Performance Monitoring, Extended Fabrics, Fabric Watch, Fabric Manager Enterprise Edition, Fabric Manager Base (10 Domains)	Cisco Fabric Manager Server Package, Cisco Enterprise Package
Required software	None	None
Included software	WebTools, Power Pack+ model includes licensed Power Pack+ software	Cisco Fabric Manager, SAN-OS
Deployment		
Maximum per enclosure	Up to 6	Up to 6
Options available	SFPs (short wave, long wave)	SFPs (short range, medium range, long range) MDS 9000 Port Analyzer Adapter
Warranty (parts/labor/onsite)	1-year/1-year/1-year	1-year/1-year/1-year

Technical specifications

Fibre Channel HBA mezzanine cards

	Emulex LPe1105-HP 4 Gb FC HBA for HP BladeSystem c-Class	HP QLogic QMH2462 4 Gb FC HBA for HP BladeSystem c-Class	Emulex LPe1205-HP 4 Gb FC HBA for HP BladeSystem c-Class	HP QLogic QMH2562 8 Gb FC HBA for HP BladeSystem c-Class	Brocade 804 8 Gb FC HBA for HP BladeSystem c-Class
Performance and form factor					
Blade type	PCI Express Type 1 Mezzanine Card	PCI Express Type 1 Mezzanine Card	PCI Express Type 1 Mezzanine Card	PCI Express Type 1 Mezzanine Card	PCI Express Type 1 Mezzanine Card
Performance	115,000 IOPS per channel	150,000 IOPS per channel	200,000 IOPS per channel	200,000 IOPS per channel	500,000 IOPS per port
Port configuration	Dual 4 Gb Fibre Channel Ports	Dual 4 Gb Fibre Channel Ports	Dual 8 Gb Fibre Channel Ports	Dual 8 Gb Fibre Channel Ports	Dual 8 Gb Fibre Channel ports
Media types	62.5/125 multimode fiber optic cable with LC type connector	62.5/125 multimode fiber optic cable with LC type connector	62.5/125 multimode fiber optic cable with LC type connector	62.5/125 multimode fiber optic cable with LC type connector	Internally hard-wired through the backplane
Management and protocols					
Management features	Emulex installation and management tools automate installation and provide local and remote HBA configuration and management	QLogic SANsurfer FC HBA Manager for centralized management and remote control of distributed HBAs	Emulex installation and management tools automate installation and provide local and remote HBA configuration and management	QLogic SANsurfer FC HBA Manager for centralized management and remote control of distributed HBAs	Integrates into HP's StorageWorks DCFM
High availability features	Multi-path support for redundant HBAs and paths	Multi-path support for redundant HBAs and paths	Multi-path support for redundant HBAs and paths	Multi-path support for redundant HBAs and paths	Multi-path support for redundant HBAs and paths
Protocols supported	Full support for both FC service Class 2 and 3	Full support for both FC service Class 2 and 3	Full support for both FC service Class 2 and 3	Full support for both FC service Class 2 and 3	Full support for both FC service Class 2 and 3
Deployment					
Maximum per enclosure	Server dependent	Server dependent	Server dependent	Server dependent	Server dependent
Options available	Emulex driver support for x86 and x64 Linux and Microsoft® Windows® Server 2000, 2003, 2003 x64	QLogic driver support for x86 and x64 Linux and Microsoft Windows Server 2000, 2003, 2003 x64	Emulex driver support for Windows Server 2003, Windows Server 2008, Linux, VMware ESX 3.5	QLogic driver support for Windows, Linux, HP-UX, and VMware Server 2000, 2003, 2003 x64	Brocade driver support for Windows Server 2003, 2008, 2008 R2, Hyper-V, Red Hat Enterprise Linux 5, SUSE Linux 10, 11, VMware ESX 3.5/4.0, VMware ESXi 4.0
Warranty (parts/labor/onsite)	1-year/1-year/1-year	1-year/1-year/1-year	1-year/1-year/1-year	1-year/1-year/1-year	1-year/1-year/1-year

Technical specifications (Add-on mezzanine adapters)

HP NC551m Dual Port FlexFabric 10 Gb Converged Network Adapter

Performance and form factor	
Blade type	Type I card, x8 PCIe 2.0
Performance	20,000 Mbps full duplex
Port configuration	Two ports, 40 Gbps aggregate full duplex theoretical bandwidth
Network Controller	BladeEngines (BE2)
Management and protocols	
Management features	Management through Onboard Administrator
High availability features	Dual-port support for redundant
Protocols supported	Full support for both FC service Class 2 and 3
Deployment	
Maximum per enclosure	Server dependent
Options available	TCP Offload Engine (TOE), Fibre Channel over Ethernet (FCoE), and iSCSI
Warranty (parts/labor/onsite)	1-year/0/0

Emulex LPe1105-HP 4 Gb FC HBA for

HP BladeSystem c-Class

The Emulex LPe1105-HP dual-port Fibre Channel HBA provides reliable, high-performance 4 Gb connectivity, enabling high availability to scalable storage that meets the needs of the most demanding applications and environments. Based on the same field-proven ASIC, firmware, and driver technology as Emulex's renowned LPe1150 HBA, the Emulex LPe1105-HP is fully driver compatible with all Emulex HBAs.

Emulex HBAs provide powerful installation software such as Enterprise AutoPilot Installer to streamline the installation of HBA driver and management applications. As a centralized management suite, HBAnyware incorporates agent technology that provides discovery, reporting, and management of local and remote HBAs. Emulex HBAs feature an exclusive firmware-based architecture, which allows firmware and features to be upgraded without taking the server blade offline or re-booting, and without the need to upgrade the driver. This provides investment protection for end-user hardware and helps reduce downtime.

QLogic QMH2462 4 Gb FC HBA for

HP BladeSystem c-Class

The QLogic QMH2462 4 Gb FC HBA Adapter provides the BladeSystem c-Class with two 4 Gb Fibre Channel ports for fast and reliable SAN connectivity. Through the implementation of a SAN with the HP BladeSystem, you can achieve improved data availability, easy scalability, and realize management cost savings from consolidating disk resources.

Fibre Channel SAN connectivity is achieved using a QLogic QMH2462 specifically designed for HP BladeSystem c-Class. This new adapter is RoHS compliant, has low power requirements, 150,000 IOPS per port, 4 Gb performance and driver support for Windows and Linux. The Linux driver includes a new and improved failover feature that now includes dynamic load balancing for a multi-path solution.

HP Services

When technology works, business works

The challenge of virtually every IT organization is similar: to develop and maintain an agile, virtualized, and efficient server and network infrastructure that delivers the service levels your business needs.

HP Technology Services offers a comprehensive portfolio of HP Care Pack Services to help design, deploy, manage, and support your blades-based virtualized environment.

Minimum Recommended HP Care Pack offerings

- Three-year, four-hour response, onsite 24x7 hardware support
- Blades Infrastructure plus Enhanced Network Installation and Startup services

Enhanced service level Care Pack offerings

- Three-year Support Plus 24—integrated 24x7 hardware and software support
- Proactive Select—access to HP best-in-class technical consultants. Purchase service credits and obtain expertise when needed

HP Care Pack service benefits

- Speedy deployment delivering faster return on investment
- Increase uptime and performance of servers availability to your business
- Detect and diagnose problems automatically, resulting in quick repairs—saving time, money, and resources

For more information, visit: www.hp.com/services/bladesystem

QLogic embraces the use of common drivers, which means that you can standardize on one QLogic Windows or Linux driver whether you are using the QMH2462 or other 4 Gb and 2 Gb HP HBAs powered by QLogic.

HP Financial Services

HP Financial Services provides financing and financial asset management programs to help you cost-effectively acquire, manage, and ultimately retire your HP solutions. For more information on these services, contact your local HP representative, or visit:

www.hp.com/go/hpfinancialservices

Visit www.hp.com/go/virtualconnect and www.hp.com/go/bladesystem/interconnects to learn how the HP BladeSystem c-Class architecture helps you gain more value from your Fibre Channel networking solutions.

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