

Family data sheet

# HP Virtual Connect and Networking for BladeSystem



September 2013

## Wire-once simplicity

HP Virtual Connect simplifies and converges your server edge connections, making server changes transparent to storage and networks, and delivering four times the number of connections per physical network link. Virtual connect enables you to dynamically optimize and control bandwidth using fewer physical ports for the same performance, while reducing server edge infrastructure (switches, host bus adapters (HBAs), network interface cards (NICs), and cables) up to 95 percent and hardware costs up to 65 percent, in turn saving power up to 40 percent. HP Virtual Connect FlexFabric connects servers and virtual machines to data and storage networks over Ethernet, Fibre Channel, and iSCSI protocols. With more than 8.5 million ports shipped, Virtual Connect continues to deliver proven simplified operations.

## Virtual Connect

### HP Virtual Connect FlexFabric

#### 10 Gb/24-port Module

As the simplest, most flexible way to connect virtualized server blades to data or storage networks, HP Virtual Connect FlexFabric 10 Gb/24-port Modules eliminate up to 95 percent<sup>1,2</sup> of network sprawl at the server edge—using one device that converges traffic inside enclosures and directly connects to external LANs and SANs. Utilizing Flex-10 technology with Fibre Channel over Ethernet and accelerated iSCSI, these modules converge traffic over high-speed 10 Gb connections to servers with HP FlexFabric Adapters (HP NC551i or HP NC551m Dual Port FlexFabric 10 Gb Converged Network Adapter or HP NC553i 10 Gb 2-port FlexFabric Converged Network Adapter). Each redundant pair of VC FlexFabric modules provides eight adjustable downlink connections (six Ethernet and two Fibre Channel, or six Ethernet and two iSCSI, or eight Ethernet) to dual port 10 Gb FlexFabric Adapters on servers. Up to eight uplinks are available for connection to upstream Ethernet and Fibre Channel switches. Virtual Connect FlexFabric modules avoid the confusion of traditional and other converged network solutions by eliminating the need for multiple Ethernet and Fibre Channel switches, extension modules, cables, and software licenses. Also, Virtual Connect wire-once connection management is built-in, enabling server adds, moves, and replacements in minutes instead of days or weeks.

FlexFabric bridges the convergence gap between server and network with single-hop and dual-hop to provide maximum flexibility. The single-hop brings convergence to servers without changing existing LAN and SAN. Dual-hop brings convergence from server to aggregation layer.

<sup>1,2</sup> HP internal calculations comparing the number of hardware components of traditional infrastructure vs. HP BladeSystem with two Virtual Connect FlexFabric modules; June 2013.

### Easy operations and deployment

- Server blades are change-ready—you can add, move, replace, or upgrade server blades, as well as move workloads without affecting your LAN and SAN.
- You can wire once, and then add, move, and change network connections in minutes instead of days. You can also manage connections to thousands of servers from a single pane-of-glass.
- HP Virtual Connect modules simplify your network by providing one module for all your data and storage connection needs with both single-hop and dual-hop. Single-hop enables converged fabric at server end without impacting traditional LAN and SAN. Dual-hop bridges gap between converged fabric at server end and aggregation layer.
- HP Virtual Connect modules are compatible with existing data and storage networks, protocols, and procedures, as well as with all other standards-based switch products. VC modules provide high-performance and end-to-end optical or copper connections with HP Networking or other brands of aggregation or core switches.
- HP Virtual Connect modules are edge-safe. Any changes to the server are transparent to its associated network. This clearly separates the server blades from your LAN/SAN and relieves LAN/SAN administrators from server maintenance.
- FlexFabric adapters support hypervisor best practice configurations, with six HP FlexNIC and two HP FlexHBA standard connections on each adapter.
- HP VC FlexFabric 10 Gb/24-port Module supports FlatSAN solution with direct attach to Fibre Channel (FC) storage with HP 3PAR StoreServ Storage Systems, which removes the need for SAN fabric between servers and HP 3PAR Storage Arrays—resulting in operational simplicity and reduced total cost of ownership (TCO) in connecting to FC storage in a virtualized environment.
- HP VC FlexFabric 10 Gb/24-port Module supports both single-hop and dual-hop.
- HP VC Flex-10/10D Module supports dual-hop only.

### Enterprise-class performance and availability

- Requires up to 95 percent<sup>1</sup> fewer network cards, switches, and cables to buy, install, qualify, and maintain; helps significantly reduce power, cooling, and equipment costs with HP Virtual Connect Converged Networking
- Most efficient use of your network by using only the capacity you need
- Increases uptime with high-availability features such as NIC teaming, trunk failover, and dual redundant Virtual Connect FlexFabric modules
- Provides direct uplink connections to LAN and SAN, unlike other solutions that reroute SAN traffic to the LAN
- Builds in standards-based data center connectivity through port-based VLANs, VLAN tagging, Internet Group Management Protocol (IGMP) Snooping, N\_Port ID Virtualization (NPIV), and uplink port aggregation with up to 1,000 VLANs per shared uplink set
- Fine-tunes the performance of each data and storage connection to meet the needs of each virtual machine and workload

### HP Virtual Connect Flex 10/10D Module

An innovative, new class of integrated interconnects, the HP Virtual Connect Flex-10/10D Module for c-Class BladeSystem simplifies your data center and makes it change-ready. The simplest, most flexible connection to your networks, the Virtual Connect Flex-10/10D Modules:

- Simplifies server connections by cleanly separating the server enclosure from the LAN
- Simplifies networks by reducing cables without adding switches to manage
- Allows you to change servers in just minutes, not days
- Tailors network connections and speeds based on application needs
- Bridges convergence fabric gap between server and network with dual-hop feature

HP Flex-10 technology significantly reduces infrastructure costs by increasing the number of NICs per connection without adding extra blade I/O modules, and reducing cabling uplinks to the data center network.

### Security and management

- Virtual Connect Manager (VCM) Web-based console is embedded in each VC FlexFabric and Converged Networking/Ethernet module. You can define available LANs, SANs, and server connections, as well as manage server connection profiles for individual BladeSystem enclosures.
- The latest VC firmware now supports both SNMP v1 and SNMP v2 traps; traps for key predefined threshold conditions; and per-destination configuration of traps.
- Additional role-based privileges for user accounts can be created by domain, server, networking, and storage administrators.
- Multi-enclosure stacking enables all of the VC modules (up to four connected enclosures) to function as a single VC domain.

## HP Virtual Connect Ethernet

### Ease of operations and deployment

- You can preconfigure the enclosures for easy, drop-in server installations, either locally or remotely.
- Server blades are change-ready—you can add, move, replace, or upgrade server blades, as well as move workloads, without affecting your LAN.
- The standards-based HP VC Ethernet modules are compatible with all other standards-based Ethernet switch products. These modules provide high-performance, end-to-end optical, or copper connections with HP Networking or other brands of core switches.
- HP VC Ethernet modules appear as pass-thru devices to the network. Any changes to the server are transparent to its associated network. This clearly separates the server blades from your LAN and relieves LAN administrators from server maintenance.

### Enterprise-class performance and availability

- Choices of 1 Gb to 10 Gb downlink connections to server-embedded and mezzanine NICs and CNAs; up to 200 Gb full-duplex uplink bandwidth through 1/10 Gb and 2/4/8 Gb Fibre Channel uplinks for providing non-blocking bandwidth to data center networks.
- Standards-based data center connectivity is built in, using features such as port-based virtual LANs (VLANs), VLAN tagging, IGMP Snooping, NPIV, and uplink port aggregation with up to 1,000 VLANs per shared uplink set.
- VC server profiles are shared and continually updated between high-availability pairs.

### Security and management

- Embedded VCM Web-based console runs on either VC Ethernet or FlexFabric modules. You can define available LANs and server connections, as well as manage server connection profiles for individual BladeSystem enclosures.
- The latest VC firmware now supports both SNMP v1 and SNMP v2 traps; traps for key predefined threshold conditions; and per-destination configuration of traps.
- Role-based privileges for the administrator account are defined by default; they can be modified by the server administrator and integrated with Lightweight Directory Access Protocol (LDAP) servers.
- For networking environments that have implemented TACACS+ and RADIUS protocols for security, VC supports these protocols in addition to LDAP.
- Additional role-based privileges for user accounts can be created by domain, server blade, networking, and storage.
- Multi-enclosure stacking enables all of the VC modules (up to four connected enclosures) to function as a single VC domain.

## Virtual Connect Interconnect Modules for HP BladeSystem c-Class Servers



**HP Virtual Connect FlexFabric  
10 Gb/24-port Module**



**HP Virtual Connect Flex 10/10D Module**

<b>Blade type</b>	Single bay	Single bay
<b>Network connections</b>	<p>16 x 10 Gb downlinks to servers</p> <p>2 x 10 Gb cross connects</p> <p>4 x 10 Gb external SR, LR fiber, and copper uplinks SFP+ (Ethernet/FC)</p> <p>4 x 10 Gb external SR, LRM, and LR fiber and copper uplinks SFP+ (Ethernet)</p> <p>One internal interface to c-Class Onboard Administrator Module</p>	<p>16 x 10 Gb downlinks midplane</p> <p>4 x 10 Gb cross connect</p> <p>10 x 10 Gb SR, LR, or LRM fiber uplinks SFP+</p> <p>One internal interface to c-Class Onboard Administrator Module</p>
<b>Media types</b>	<p>FC 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+, 10GbE SR, LR, and LRM, 10GbE copper direct-attached cable, 1GbE SX, 1GbE 1000BASE-T copper HP 7 m C-series Active Copper SFP+ Cable, HP 10 m C-series Active Copper SFP+ Cable, HP X242 SFP+ 15 m DAC Cable, HP X242 SFP+ 7 m DAC Cable</p>	<p>SFP+ SR, LR, LRM SFP SX, R J-45, SFP+ Copper, HP 7 m C-series Active Copper SFP+ Cable, HP 10 m C-series Active Copper SFP+ Cable, HP X242 SFP+ 15 m DAC Cable, HP X242 SFP+ 7 m DAC Cable</p>
<b>Performance</b>	<p>Line rate, full-duplex 480 Gb/s bridging fabric</p> <p>1.2 <math>\mu</math>s on Ethernet-only ports</p> <p>1.7 <math>\mu</math>s Ethernet/FC ports</p> <p>Maximum Ethernet frame size 9216 (jumbo frame)</p> <p>Maximum FC frame size 2148 bytes (2,112 byte payload)</p> <p>Buffer-to-buffer flow control management</p> <p>Packet prioritization</p>	<p>Line rate, full-duplex 600 Gb/s bridging fabric</p> <p>Less than 0.9 <math>\mu</math>s with Ethernet-only ports</p> <p>Maximum Ethernet frame size 9,216 (jumbo frame)</p>
<b>Protocol support</b>	<p>IEEE 802.1Qbb (preliminary), 802.1Qaz (preliminary), 802.1AB, 802.1D, 802.1Q, IEEE, 802.2, 802.3ad</p> <p>INCITS FC-BB5 Rev 2.00 INCITS T11 NPIV, and FC-BB5</p>	<p>IEEE 802.1Qbb (preliminary), 802.1Qaz (preliminary), 802.1AB, 802.1D, 802.1Q, IEEE 802.2, 802.3ad, and FC-BB5</p>
<b>Management</b>	<p>Simple and intuitive GUI and setup wizards, embedded SNMP v1, v2; SMI-S port, mirroring—any uplink port can be used as a dedicated mirrored port from the server port(s)</p>	<p>Simple and GUI and setup wizards embedded SNMP, v1, v2; SMI-S CLI port mirroring—any uplink port can be used as a dedicated mirrored port from the server port(s)</p>

## Virtual Connect Interconnect Modules for HP BladeSystem c-Class Servers (continued)

	<b>HP Virtual Connect FlexFabric 10 Gb/24-port Module</b>	<b>HP Virtual Connect Flex 10/10D Module</b>
<b>Extend management features</b>	Virtual Connect Manager supports PXE, WOL, port VLAN, VLAN Tagging, VLAN pass-thru, IGMP Snooping, NIC Teaming Integrated with Onboard Administrator, HP Systems Insight Manager, HP Storage Essentials (FC Management MIB), Telnet, SNMP, FC port telemetry via GUI, Telemetry support for port utilization including Memory, and CPU performance measurement including FlexNICs telemetry	Virtual Connect Manager supports PXE, WOL, port VLAN, VLAN Tagging, VLAN pass-thru, IGMP Snooping, NIC Teaming Integrated with Onboard Administrator, HP Systems Insight Manager Telnet, SNMP. Telemetry support for port utilization including memory, and CPU performance measurement including FlexNICs telemetry
<b>High availability features</b>	Link Aggregation protocol automatic, loop protection, Mirrored profile database, and multipath heartbeat between redundant modules	Link Aggregation protocol automatic, loop protection, Mirrored profile database, and multipath heartbeat between redundant modules
<b>Security</b>	LDAP, SSL, TACACS+ and Radius, role-based management, and GUI and CLI session timeout	LDAP, SSL, TACACS+ and Radius, role-based management, and GUI and CLI session timeout
<b>Diagnostics</b>	Troubleshoot network performance and monitor health in terms of CPU and memory, FlexNIC and LAG stats	Troubleshoot network performance and monitor health in terms of CPU and memory, FlexNIC and LAG stats
<b>Maximum per enclosure</b>	Eight	Eight
<b>Direct attach with FC storage</b>	With HP 3PAR T, V, and F series	N/A
<b>Part number</b>	571956-B21	638526-B21 662048-B21 (dual module with VCEM)
<b>Warranty in year(s) (parts/labor/onsite)</b>	1/1/1	1/1/1

## HP Virtual Connect Fibre Channel

### HP Virtual Connect 8 Gb/24-port Fibre Channel Module

Look to the Virtual Connect 8 Gb/24-port Fibre Channel for the highest port density in the Virtual Connect Fibre Channel line-up. This standards-based module is compatible with all other NPIV standards-based switch products—enabling high-performance and end-to-end connections with your available options of core switches.

The 8 Gb Fibre Channel interconnect enables greater performance and server consolidation. Eight SAN-facing ports and 16 server ports help reduce oversubscription for high-throughput applications. In addition, separate storage resources are available for each virtual machine—up to 255 per server blade.

### HP Virtual Connect 8 Gb/20-port Fibre Channel Module

Simplify and make your data center change-ready with the HP Virtual Connect 8 Gb/20-port Fibre Channel Module for BladeSystem c-Class. As the next-generation successor to the current HP 4 Gb Virtual Connect Fibre Channel Module, the HP Virtual Connect 8 Gb/20-port FC module offers enhanced support for server-side NPIV and Virtual Connect capabilities—allowing up to 128 virtual machines to run on the same physical server to access separate storage resources.

Provisioned storage resources are associated directly to a specific virtual machine—even if the virtual server is re-allocated within the BladeSystem. Storage management of virtual machines is no longer limited by the single physical HBA on a server blade. SAN administrators can now manage virtual HBAs with the same methods and viewpoint of physical HBAs.

The HP Virtual Connect 8 Gb/20-port Fibre Channel Module for the BladeSystem c-Class is the simplest, most flexible connection to your SAN fabrics. The module simplifies server connections by cleanly separating the server enclosure from SAN, simplifies SAN fabrics by reducing cables without adding switches to the domain, and allows you to change servers in just minutes, not days.

### Ease of operations and deployment

- With NPIV and HP Virtual Connect Fibre Channel technology, storage management is no longer limited to a single HBA World Wide Name (WWN) on the physical server. NPIV provides the ability to share a single physical Fibre Channel HBA port among multiple virtual ports, each with its own unique identifiers—allowing control of virtual machine access to LUNs on per virtual machine basis.
- The standards-based HP Virtual Connect Fibre Channel Module interoperates with other SAN switch products. NPIV allows you to scale, gaining immediate benefits without having to add domain IDs. Consider a blade server environment, such as an HP BladeSystem c7000 chassis that has Fibre Channel switches in the back of the chassis. By using NPIV, you can add these switches to your fabric without assigning a domain ID to each one—resulting in high-performance end-to-end connections with your available options of core switches.

### Enterprise-class performance and availability

- Storage resources can be provisioned and associated directly to a specific virtual machine in a virtualized server environment.
- High-availability features such as dual modules and automatic fail over provide increased uptime.
- VC server blade profiles are shared and continually updated between high availability pairs.
- Enhanced NPIV capability supports multiple virtual machines per server blade and provides a separate storage resource to each virtual machine—up to 128 per server blade.

## Virtual Connect Fibre Channel Modules for HP BladeSystem c-Class Servers



**HP Virtual Connect 8 Gb/20-port  
Fibre Channel Module**



**HP Virtual Connect 8 Gb/24-port  
Fibre Channel Module**

<b>Blade type</b>	Single bay	Single bay
<b>Network connections</b>	16 internal 8 Gb downlinks presented as F-Ports Four external 8 Gb uplinks presented as N-Ports	16 internal 8 Gb downlinks presented as F-Ports Eight external 8 Gb uplinks presented as N-Ports
<b>Media types</b>	Small form-factor pluggable (SFP) laser 2/4/8 Gb short wave up to 500 m (1,640 ft) 1/2/4 Gb long wave up to 10 km	Small form-factor pluggable (SFP) laser 1/2/4 Gb short wave, long wave SFP+ 2/4/8 Gb short wave, long wave
<b>Performance</b>	8 Gb/s line speed, full duplex 1.2 $\mu$ s latency Maximum frame size 2,112-byte payload Buffer-to-buffer flow control management packet prioritization	Line rate, full-duplex 600 Gb/s bridging fabric Less than 0.9 $\mu$ s with Ethernet-only ports Maximum Ethernet frame size 9,216 (jumbo frame)
<b>Protocol support</b>	NCITS T11 NPIV	NCITS T11 NPIV
<b>Management</b>	Simple and intuitive GUI and setup wizards accessible through VC Ethernet module CLI accessible through VC Ethernet module Embedded SNMP v1 and v2 SMI-S	Simple and intuitive GUI and setup wizards accessible through VC Ethernet module CLI accessible through VC Ethernet module Embedded SNMP v1 and v2 SMI-S
<b>Extend management features</b>	Virtual Connect Manager supports HP Storage Essentials (FC Management MIB)	Virtual Connect Manager supports HP Storage Essentials (FC Management MIB)
<b>High availability features</b>	Link Aggregation Protocol Automatic loop protection Mirrored profile database Multipath heartbeat between redundant modules	Link Aggregation Protocol Automatic loop protection Mirrored profile database Multipath heartbeat between redundant modules
<b>Security</b>	LDAP, SSL, role-based management	LDAP, SSL, role-based management
<b>Maximum per enclosure</b>	Six	Six
<b>Part number</b>	572018-B21	466482-B21
<b>Warranty in year(s) (parts/labor/onsite)</b>	1/1/1	1/1/1

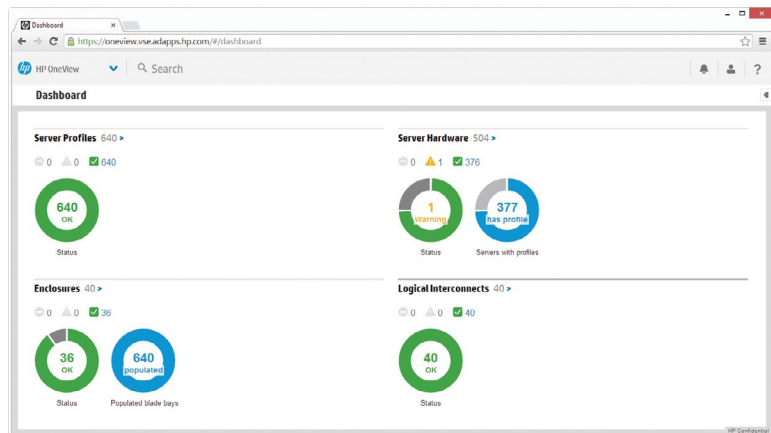
## Introducing HP OneView

### Next-generation infrastructure management designed for the way you work and think

HP OneView is a fresh approach to converged infrastructure management, inspired by the way you expect to work, with a single integrated view of your IT infrastructure. By shifting the focus from “how devices run” to “how people work,” HP OneView architecture delivers unprecedented ease of use that lets you deploy and manage your infrastructure faster, at a lower cost, and at virtually any scale.

HP OneView provides:

- A single, collaborative management platform built for speed. It allows IT teams to work and collaborate in a more natural and automated way.
- Software-based approach to lifecycle management, which automates operations to reduce the cost and time to deliver IT services.
- An open development platform designed to rapidly adapt to your business needs. This programmable platform, built on the REST API, allows you to scale beyond your data center walls to the cloud



### Transform the way you manage your IT infrastructure—today

*Consumer-inspired management experience*

- Reduce risk—and deployment and management time—with a modern architecture-based, single management platform for HP BladeSystem environments
- Simplify everyday management tasks—no matter how large or complex the environment—with an intuitive user interface
- Get a comprehensive view of all infrastructure resources with the intuitive dashboard
- Quickly find what you’re looking for in your environment and act on it with Smart Search
- See the relationships between every device—for fast troubleshooting and resolution—using Map View

### Software-defined lifecycle management

- Instantly deliver resources without mistakes or variation with configuration profiles for push-button builds
- Boost productivity and consistency—workflow templates capture best-practices and policies
- Automate common BladeSystem management tasks thanks to built-in intelligence

### Open, extensible platform

- Easily customize workflows and scripts with fully programmable interface
- Architecture builds on the open REST API, the way modern web-based architectures and applications are designed today
- Work faster—integration with other applications, processes, and devices is done in minutes versus hours

To learn more visit: [hp.com/go/oneview](http://hp.com/go/oneview)



## Ethernet blade switches

### **Simplify your network with our complete portfolio of Ethernet blade switches**

HP is redefining the data center. We started with the BladeSystem c-Class—a simple, modular infrastructure designed to save your time, energy, and money, regardless of what you put inside. To be efficient, a data center must be able to access and disseminate data instantaneously, securely, and reliably. This is where the HP portfolio of Ethernet switching products can make a difference.

HP BladeSystem c-Class switches provide a rich set of networking features and can lower the cost of maintenance and operation, as well as increase network reliability by sharing the same redundant power and cooling resources with the server blades, while also aggregating cables and reducing wiring clutter.

### **An Ethernet switch for every application**

Whether you need basic network connectivity for a remote office or a high-bandwidth, low-latency link for a high-performance computing cluster, HP Ethernet switches provide the solution. You can choose from simple-to-configure 1 Gb switches, 1 Gb/10 Gb hybrid switches designed especially for data centers in transition, or a powerful 10/40 Gb switch designed for handling data from today's multiprocessor virtualized servers.

If your data center has an ever-increasing appetite for bandwidth, look to HP for help. When coupled with our high-performance server blades and mezzanine cards, HP Ethernet switches can also support iSCSI and converged fabric standards—all from a single network connection. These protocols are designed to move data more efficiently and with less overhead than standard methods. Redefining the data center and simplifying your job—as well as offering greater value, reliability, connectivity, and scalability—is what the HP Ethernet blade switch portfolio is all about.

### **HP 6125 Blade Switch series**

Introducing the next-generation Ethernet blade switches from HP Networking. Designed from the ground up with the latest switching technology, and configured with processing power and memory usually reserved for higher-density rack switches, the HP 6125 Switch series brings a new level of network access to the c-Class enclosure.

HP 6125 Switch series run on Comware, a common operating system for blade, top-of-rack aggregation, and core Ethernet switches from HP Networking. The use of a common OS means that today's demanding data centers can be managed and configured from edge-to-edge under a single stream of firmware using common configuration scripts, troubleshooting procedures, and upgrade policies. HP 6125 Switches can be combined into a single virtual switch with the HP Intelligent Resilient Framework (IRF).

All HP 6125 Switch series provide Layer 3 routing and are IPv6 compatible. And similar to all other HP Networking switches, the HP 6125 Switch series can be managed through the HP Intelligent Management Center (IMC). HP IMC is next-generation management software that provides the data center operations team with a comprehensive single pane-of-glass management platform that integrates network technologies and provides full fault tolerance, configuration, accounting, performance, and security management functionality.

### **The new HP 6125XLG Blade Switch**

As the next generation blade switching technology for data center environments, the HP 6125XLG Ethernet Blade Switch delivers a feature-rich, high-performance, and low-latency 10/40GbE switch. HP 6125XLG provides a converged fabric solution that supports Ethernet, Fibre Channel over Ethernet (FCoE), and iSCSI protocols that enables connectivity for FCoE or iSCSI storage solutions. In addition, HP 6125XLG supports advanced features such as DCB, VEPA, TRILL, and full Layer 3 routing.

HP 6125XLG is ideal for blade customers requiring 10/40GbE connectivity to top-of-rack or aggregation switches for data center environment.

## Ethernet Interconnect Modules for HP BladeSystem c-Class Servers



**HP 6125XLG Ethernet Blade Switch**



**HP 6125G/XG Ethernet Blade Switch**



**HP 6125G Ethernet Blade Switch**

<b>Blade type</b>	Single bay	Single bay	Single bay
<b>Network connections</b>	16 internal 1/10 Gb downlinks Four external 40 Gb Eight external 10 Gb Four internal 10 Gb cross-link Four IRF at 10 Gb (IRF up to 4 devices) One management console port	16 internal 1 Gb downlinks Four external RJ45 (1 Gb) Four external SFP/SFP+ (1 Gb) Four IRF at 10 Gb (IRF up to 10 devices) One internal 10 Gb cross-link One management console port	16 internal 1 Gb downlinks Four external RJ45 (1 Gb) Four external SFP (1 Gb) Two IRF at 10 Gb (IRF up to 10 devices) One internal 10 Gb cross-link One management console port
<b>Media types</b>	SFP+ SR/LR/LRM optical QSFP+ SR4	Copper RJ45 SFP SX optical SFP+ SR/LR/LRM optical	Copper RJ45 SFP SX optical
<b>Performance</b>	240 Gb/s uplink port bandwidth; 160 Gb/s downlink, (server) port bandwidth; 10 Gb/s cross-link bandwidth, Forwarding rate 1.5 million pps per Gigabit port, (64-byte packets), 14.8 million pps per 10 Gb port, and 59.3 million pps per 40 Gb port	44 Gb/s uplink port bandwidth; 16 Gb/s downlink (server) port bandwidth; 10 Gb/s cross-link bandwidth. Forwarding rate 1.5 million pps per Gigabit port, (64-byte packets), and 14.8 million pps per 10 Gb port	26 Gb/s uplink port bandwidth; 16 Gb/s downlink (server) port bandwidth; 10 Gb/s cross-link port bandwidth. Forwarding rate 1.5 million pps per Gigabit port, (64-byte packets), and 14.8 million pps per 10 Gb port
<b>Protocol support</b>	SSHv2, TACACS, TACACS+, RADIUS; IEEE 802.3, 802.3ab, 802.1ad, 802.1s, 802.1w, 802.1p, 802.1x, 802.1Qbg (VEPA) 802.3ad (static), and 802.1Q, IGMP snooping, and BOOTP, FCoE (FCF), TRILL	SSHv2, TACACS, TACACS+, RADIUS; IEEE 802.3, 802.3ab, 802.1d, 802.1s, 802.1w, 802.1p, 802.1x, 802.3ad (static), and 802.1Q, IGMP snooping, and BOOTP	SSHv2, TACACS, TACACS+, RADIUS; IEEE 802.3, 802.3ab, 802.1d, 802.1s, 802.1w, 802.1p, 802.1x, 802.3ad (static), and 802.1Q, IGMP snooping, and BOOTP
<b>Management</b>	Web browser or CLI, HTTPS SNMPv1, v2c, and v3 OOBM via OA GUI management via IMC RJ45 console port sFlow and RMON network monitoring NTP OAM (802.3ah) CFD (802.1ag) Virtual Application Network (VAN)	Web browser or CLI, HTTPS SNMPv1, v2c, and v3 OOBM via OA GUI Management via IMC RJ45 console port sFlow and RMON network monitoring NTP OAM (802.3ah) CFD (802.1ag)	Web browser or CLI, HTTPS SNMPv1, v2c, and v3 OOBM via OA GUI Management via IMC RJ45 console port sFlow and RMON network monitoring NTP OAM (802.3ah) CFD (802.1ag)
<b>High availability features</b>	IRF, LACP, Spanning Tree, ECMP DLDP, RRRPP, Smart Link, VRRP	IRF, LACP, Spanning Tree, ECMP DLDP, RRRPP, Smart Link, VRRP	IRF, LACP, Spanning Tree, ECMP DLDP, RRPP, Smart Link, VRRP
<b>Maximum per c7000 enclosure</b>	Eight	Eight	Eight
<b>Part number</b>	711307-B21	658250-B21	658247-B21
<b>Warranty in year(s) (parts/labor/onsite)</b>	1/1/1	1/1/1	1/1/1

### **Mellanox SX1018HP Ethernet Switch**

This extensive portfolio now includes the world's fastest Ethernet Blade Switch from HP. Another industry first, the Mellanox SX1018HP Ethernet Switch provides the lowest port-to-port latency of any blade switch—more than four times faster than previous switches. HP is the first to provide 40 Gb downlinks to each blade server, enabling InfiniBand-like performance in an Ethernet Blade switch. When combined with the space, power, and cooling benefits of blade servers, the Mellanox SX1018HP Ethernet Switch provides the perfect network interface for financial applications and high-performance clusters.

The Mellanox SX1018HP Ethernet Switch is the highest-performing Ethernet fabric solution in a blade switch form factor. The switch delivers up to 1.36 Tb/s of non-blocking throughput to support high-performance computing, high-frequency trading, and enterprise data center applications.

Utilizing the latest Mellanox SwitchX ASIC technology, the SX1018HP is an ultra-low latency switch suited as an access switch with 16 10 Gb/40 Gb server side downlinks and 18 40 Gb QSFP+ uplinks to the core, with port-to-port latency as low as 220 ns.

The Mellanox SX1018HP Ethernet Switch offers a rich set of Layer 2 networking and security features; it also supports faster application performance and enhanced server CPU utilization with RDMA over Converged Ethernet (RoCE)—making this switch an excellent choice for any high-performance Ethernet network.

### **Cisco Catalyst 3120 Blade Switch series**

Designed to meet the rigorous requirements of blade server environments, the Cisco Catalyst 3120 Blade Switch series is built on Cisco's hardware and IOS software.

The Catalyst 3120 Blade Switch uses a stacking technology that allows multiple switches to act as a single entity. This switch-stacking technology treats the individual physical switches within a rack as a single logical switch. This built-in ability enables the Catalyst 3120 Blade Switch to simplify operations and management. Functionality such as Layer 3 routing is available through the IP Services upgrade option.

### **Cisco Fabric Extender for HP BladeSystem**

Providing an extension of the Cisco Nexus switch fabric to the HP server edge, the Cisco Fabric Extender for HP BladeSystem behaves like a remote line card to a parent Cisco Nexus 5000/6000 Series switch. The Cisco Fabric Extender and the parent Nexus switch form a distributed modular system. The Fabric Extender for HP BladeSystem forwards traffic to the Cisco Nexus 5000/6000 Series Switches over eight 10GbE uplinks.

Serving as an extension of a Nexus 5000/6000, the Cisco Fabric Extender can switch Ethernet, FCoE, or iSCSI traffic according to policies established by the Nexus 5000/6000 Series Switch—all from a single point of management.

## Ethernet Interconnect Modules for HP BladeSystem c-Class Servers



**Mellanox SX1018HP**



**Cisco Catalyst 3120G/3120X**



**Cisco Fabric Extender for HP**

<b>Blade type</b>	Double bay	Single bay	Single bay
<b>Network connections</b>	16 internal 10 Gb/40 Gb downlinks 18 40 Gb QSFP+ uplinks One management console port (double bay width interconnect)	16 internal 1 Gb downlinks Four external 1 Gb Base-T uplinks Two internal cross connects Four optional external 1 Gb SFP uplinks Two external 10 Gb X2 uplinks (3120X only)	16 internal 1/10 Gb downlinks Eight external SFP+ 10 Gb uplinks
<b>Media types</b>	QSFP+	Copper RJ-45 Fiber SFP—SR/LR X2—SR, LRM, LX4, CX4 (3120X only)	SFP+ SR/LR/optical DAC copper cables Cisco Fabric Extender Transceivers
<b>Performance</b>	1,440 Gb/s uplink port bandwidth; 640 Gb/s downlink (server) port bandwidth; 220 ns latency at 40 Gb; 270 ns latency at 10 Gb; 2 Gb main, 2 MB flash memory	256 MB SDRAM 64 MB flash memory	48 Gb switching fabric 128 MB DDR SDRAM 16 MB flash memory
<b>Protocol support</b>	SSHv2, TACACS, TACACS+, RADIUS, IEEE 802.3, 802.3u, 802.3ab, 802.1d, 802.1s, 802.1w, 802.1p, 802.3ac, and 802.1x	SSHv2, 802.1s, 802.1w, 802.1x, 802.3ad, 802.3x, 802.1d, 802.1p, 802.1q, 802.3, 802.3u, 802.3ab, and 802.3z	IEEE 802.1p: CoS prioritization; 802.1Q; 802.3; 802.3ae; 802.3ap; SFF 8431 SFP+ support; RMON; SFF 8461
<b>Management</b>	Web browser or CLI, HTTPS GUI management via UFM SNMP v1, v2c, and v3 OOBM via OA IGMPv1 and IGMPv2 NTP RADIUS/TACACS+ LLDP Discovery protocol	CLI CiscoWorks SNMP v1, v2c, and v3 Telnet	Fabric extender management using in-band management; Cisco DCNM and standard SNMP, XML interfaces, and CLI
<b>High availability features</b>	Rapid spanning tree protocol (RSTP); Link aggregation control protocol	Per VLAN spanning tree plus Uplink fast, port fast Bridge protocol data unit	Uplink traffic management through Cisco Ether Channel hashing or static port pinning
<b>Maximum per c7000 enclosure</b>	Two	Eight	Eight
<b>Part number</b>	689638-B21	(3120G) 451438-B21 (3120X) 451439-B21	641146-B21 657787-B21
<b>Warranty in year(s) (parts/labor/onsite)</b>	1/1/1	1/1/1	1/1/1

## Adapters for HP BladeSystem c-Class Gen8 servers



**HP Ethernet 10 Gb  
2-port 560 FLB adapter**



**HP Ethernet 10 Gb  
2-port 560 M adapter**



**HP FlexFabric 10 Gb  
2-port 554 M adapter**



**HP FlexFabric 10 Gb  
2-port 554 FLB adapter**



**HP Flex-10 10 Gb 2-port  
552 M adapter**

### Hardware features

<b>Server type</b>	Blade (Gen8)	Blade (Gen8)	Blade (Gen8)	Blade (Gen8)	Blade (Gen8)
<b>IEEE compliance</b>	802.3, 802.1ab, 802.3x, 802.3ad, 802.3p, 802.1q, 802.3ae, 802.1au, 802.3ap, 802.1as, 802.1qaz, 802.1Qbb, and IEEE 1588	IEEE 802.3, 802.1ab, 802.3x, 802.3ad, 802.3p/802.1q, 802.3ae, 802.1qau, 802.3ap, 802.1as, 802.1qaz, and 802.1Qbb	IEEE 802.1p, 802.1q, 802.1qau, 802.3ad, 802.3ae, 802.3ap (10GBASE-KX4), and 802.3x	IEEE 802.1p, 802.1q, 802.1qau, 802.3ad, 802.3ae, 802.3ap (10GBASE-KX4), and 802.3x	IEEE 802.1p, 802.1q, 802.1qau, 802.3ad, 802.3ae, 802.3ap (10GBASE-KX4), and 802.3x
<b>Ports/type</b>	2 x 10 Gb	2 x 10 Gb	2 x 10 Gb	2 x 10 Gb	2 x 10 Gb
<b>Form factor</b>	FlexibleLOM	x8 PCIe 2.0 type A card	x8 PCIe 2.0 type A card	x8 PCIe 2.0 FlexibleLOM	x8 PCIe 2.0 type A card
<b>Network controller</b>	Intel® 82599	Intel 82599	Emulex BE3	Emulex BE3	Emulex BE3

### Software features

<b>Adapter teaming</b>	Yes	Yes	Yes	Yes	Yes
<b>PXE (pre-boot execution environment)</b>	Yes	Yes	Yes	Yes	Yes
<b>TOE (TCP/IP offload engine)</b>	No	Yes	Yes	Yes	Yes
<b>Accelerated iSCSI</b>	No		Yes	Yes	
<b>iSCSI boot</b>	No		Yes	Yes	
<b>Jumbo frames</b>	Yes	Yes	Yes	Yes	Yes
<b>FlexibleLOM compatible</b>	Yes			Yes	
<b>Part number</b>	655639-B21	665246-B21	647590-B21	647586-B21	674764-B21
<b>Warranty in year(s) (parts/labor/onsite)</b>	1/0/0	1/0/0	1/0/0	1/0/0	1/0/0

## Adapters for HP BladeSystem c-Class Gen8 servers (continued)



**HP FlexFabric 10 Gb 2-port 534 M adapter**



**HP FlexFabric 10 Gb 2-port 534 FLB adapter**



**HP Flex-10 10 Gb 2-port 530 M adapter**



**HP Flex-10 10 Gb 2-port 530 FLB adapter**



**HP Ethernet 1 Gb 4-port 366 M adapter**



**HP Ethernet 1 Gb 2-port 361 FLB adapter**

### Hardware features

<b>Server type</b>	Blade (Gen8)	Blade (Gen8)	Blade (Gen8)	Blade (Gen8)	Blade (Gen8)	Blade (Gen8)
<b>IEEE compliance</b>	802.3, 802.1ab, 802.3x, 802.3ad, 802.3p, 802.1q, 802.3ae, 802.1au, 802.3ap, 802.1as, 802.1qaz, 802.1Qbb, and IEEE 1588	802.1p, 802.1Q, 802.3, 802.3ad, and 802.3x, IEEE 1588, and 802.1AS	IEEE 802.3, 802.3ab, 802.3u, 802.3x, 802.3ad, 802.3p, 802.1q, 802.3ae, and 802.3ap	IEEE 802.3, 802.1ab, 802.3x, 802.3ad, 802.3p, 802.1q, 802.3ae, 802.1au, and 802.3ap	802.1p, 802.1Q, 802.3, 802.3ad, and 802.3x, IEEE 1588, and 802.1AS	802.1p, 802.1Q, 802.3, 802.3ad, and 802.3x, IEEE 1588, and 802.1AS
<b>Ports/type</b>	2 x 10 Gb	2 x 10 Gb	2 x 10 Gb	2 x 10 Gb	4 x 1 Gb	2 x 1 Gb
<b>Form factor</b>	x8 PCIe, type I card	FlexibleLOM	x8 PCIe 2.0, type A card	x8 PCIe 2.0 FlexibleLOM	x4 PCIe, type I card	FlexibleLOM
<b>Network controller</b>	Broadcom 578105	Broadcom 578105	Broadcom 578105	Broadcom 578105	Intel i350	Intel i350

### Software features

<b>Adapter teaming</b>	Yes	Yes	Yes	Yes	Yes	Yes
<b>PXE (pre-boot execution environment)</b>	Yes	Yes	Yes	Yes	Yes	Yes
<b>TOE (TCP/IP offload engine)</b>	No	No	Yes	Yes	No	No
<b>Accelerated iSCSI</b>	No	No			No	No
<b>iSCSI boot</b>	No	No			No	No
<b>Jumbo frames</b>	Yes	Yes	Yes	Yes	Yes	Yes
<b>FlexibleLOM compatible</b>	Yes	Yes		Yes	No	Yes
<b>Part number</b>	700748-B21	700741-B21	631884-B21	656590-B21	615729-B21	652500-B21
<b>Warranty in year(s) (parts/labor/onsite)</b>			1/0/0	1/0/0	1/0/0	1/0/0

## Adapters for HP BladeSystem c-Class servers



**HP NC553m 10 Gb 2-port FlexFabric adapter**



**HP NC552m 10 Gb 2-port Flex-10 Ethernet adapter**



**HP NC551m dual-port FlexFabric 10 Gb converged network adapter**



**HP NC550m 10 Gb 2-port PCIe x8 Flex-10 adapter**



**HP NC542m dual-port Flex-10 10GbE multifunction adapter**

### Hardware features

<b>Server type</b>	Blade	Blade	Blade	Blade	Blade
<b>IEEE compliance</b>	IEEE 802.1p, 802.1q, 802.1qau, 802.3u, 802.3ad, 802.3ae, 802.3ap (10GBASE-KX4), 802.3x, and 802.3z	IEEE 802.3ae, 802.3ap (10GBASE-KX4), 802.1q, 802.1qau, 802.3x, 802.1p, 802.3ad, 802.3u, and 802.3z	IEEE 802.1p, 802.3ad, 802.3x, 802.1q, 802.1qau, 802.3u, 802.3ae, 802.3ap (10GBASE-KX4), and 802.3z	IEEE 802.3ae, 802.3ap (10GBASE-KX4), 802.1q, 802.1qau, 802.3x, 802.1p, 802.3ad, 802.3u, and 802.3z	IEEE 802.1p, 802.1q, 802.3u, 802.3ad, 802.3ae, 802.3x, 802.3z, and 802.3ap (10GBASE-KX4)
<b>Ports/type</b>	2 x 10 Gb	2 x 10 Gb	2 x 10 Gb	2 x 10 Gb	2 x 10 Gb
<b>Form factor</b>	x8 PCIe 2.0, type I card	x8 PCIe 2.0, type I card	x8 PCIe 2.0, type I card	x8 PCIe 2.0, type I card	x8 PCIe 2.0, type I card
<b>Network controller</b>	Emulex BE3	Emulex BE3	Emulex BE3	Emulex BE2	Mellanox ConnectX-2 EN

### Software features

<b>Adapter teaming</b>	N/A	N/A	N/A	N/A	N/A
<b>PXE (pre-boot execution environment)</b>	N/A	N/A	Yes	Yes	N/A
<b>TOE (TCP/IP offload engine)</b>	Yes	Yes	Yes (Microsoft® Windows®)	Yes (Windows)	N/A
<b>Accelerated iSCSI</b>	Yes	Yes	Yes (Windows and Linux)		N/A
<b>iSCSI boot</b>	Yes	Yes	Yes (Windows and Linux)		N/A
<b>Jumbo frames</b>	Yes	Yes	Yes	Yes	Yes

### FlexibleLOM compatible

<b>Part number</b>	613431-B21	610609-B21	580151-B21	581204-B21	539857-B21
<b>Warranty in year(s) (parts/labor/onsite)</b>	1/0/0	1/0/0	1/0/0	1/0/0	1/0/0

## Adapters for HP BladeSystem c-Class servers (continued)



**HP NC532m dual-port Flex-10 10GbE multifunction adapter**



**HP NC382m PCI express dual-port multifunction adapter**



**HP NC364m quad-port 1GbE adapter**



**HP NC360m quad-port 1GbE adapter**



**HP NC325m PCI Express quad-port adapter**

### Hardware features

<b>Server type</b>	Blade	Blade	Blade	Blade	Blade
<b>IEEE compliance</b>	IEEE 802.3u, 802.3x, 802.3ad, 802.1p, 802.1q, 802.3z, 802.3ae, and 802.3ap (10GBASE-KX4)	IEEE 802.1p, 802.1Q, 802.3, 802.3ad, and 802.3x	IEEE 802.1p, 802.1Q, 802.3, 802.3ad, and 802.3x	IEEE 802.1p, 802.1Q, 802.3, 802.3ad, and 802.3x	IEEE 802.1p, 802.1Q, 802.3, 802.3ad, and 802.3x
<b>Ports/type</b>	2 x 10 Gb	2 x 1 Gb	4 x 1 Gb	4 x 1 Gb	4 x 1 Gb
<b>Form factor</b>	x8 PCIe 2.0, type I card	x4 PCIe, type I card	x4 PCIe, type I card	x4 PCIe, type I card	x4 PCIe, type I card
<b>Network controller</b>	Broadcom 57711	Broadcom 5709S	Dual Intel 82571EB	Intel 82571EB	Dual Broadcom 5715S

### Software features

<b>Adapter teaming</b>		Yes	N/A	N/A	Yes
<b>PXE (pre-boot execution environment)</b>	Yes	Yes	PXE boot with VC modules only	PXE boot with VC modules only	Yes
<b>TOE (TCP/IP offload engine)</b>	Yes	Yes (Windows)	Yes (Windows)	Yes (Windows)	
<b>Accelerated iSCSI</b>	Yes (Windows)	Yes	Yes (Windows and Linux)		N/A
<b>iSCSI boot</b>	Yes (Windows and Linux)	Yes (Windows and Linux)			
<b>Jumbo frames</b>	Yes	Yes	Yes	Yes	Yes
<b>FlexibleLOM compatible</b>					
<b>Part number</b>	467799-B21	453246-B21	447883-B21	445978-B21	416585-B21
<b>Warranty in year(s) (parts/labor/onsite)</b>	1/0/0	1/0/0	1/0/0	1/0/0	1/0/0



## Fibre Channel switches for HP BladeSystem c-Class servers



**Brocade 16 Gb SAN Switch**



**Brocade 8 Gb SAN Switch**



**Cisco MDS 8 Gb Fabric Switch**

<b>Performance</b>	896 Gb/s (full duplex)	384 Gb/s (end-to-end)	384 Gb/s (end-to-end)
<b>Port configuration</b>	16 Gb/s, non-blocking, and auto-sensing 8/16 Gb for internal ports and 4/8/16 Gb for external ports	8 Gb/s, non-blocking, and auto-sensing 2/4/8 Gb	8 Gb/s, non-blocking, and auto-sensing 2/4/8 Gb
<b>Management features</b>	SAN Network Advisor (optional); Web tools; advanced zoning; Power Pack+ (bundled or optional); ISL Trunking, Advanced Performance Monitoring, Fabric Watch, Extended Fabrics (Adaptive Networking and Server Application Optimization included in Firmware)	Web tools; advanced zoning; Power Pack+ (bundled or optional); Adaptive Networking, Server Application Optimization, ISL Trunking, Advanced Performance Monitoring, Fabric Watch, Extended Fabrics; SAN Network Advisor (optional)	Cisco MDS 9000 Family Command Line Interface (CLI), Cisco Fabric Manager, Cisco Fabric Manager Server for HP BladeSystem c-Class (optional), Cisco Enterprise Package for HP BladeSystem c-Class (optional), Cisco Fabric Manager Server Enterprise Package Bundle for HP BladeSystem c-Class (optional)
<b>High availability features</b>	Hot pluggable; non-disruptive software upgrades; diagnostic ports	Redundant switches; hot pluggable; non-disruptive software upgrades	Redundant switches; hot pluggable; non-disruptive software upgrades
<b>Protocols supported</b>	Fibre Channel	Fibre Channel	Fibre Channel
<b>Part number</b>	C8545A, C8546A, and C8547A	AJ820B, AJ821B, and AJ822B	AW563A and AW564A
<b>Warranty in year(s) (parts/labor/onsite)</b>	1/1/1	1/1/1	1/1/1

### New Brocade 16 Gb SAN Switch

The Brocade 16 Gb SAN Switch for HP BladeSystem c-Class is a next-generation embedded switch designed for midsize and enterprise-class customers.

High-density blade server virtualization, faster multi-core server processors, and the adoption of solid-state drives (SSDs) are driving higher bandwidth requirements in data centers. The Brocade 16 Gb SAN Switch for BladeSystem c-Class enables customers to deploy enterprise-class applications on blade servers, while providing industry-leading data center performance.

## Fibre Channel mezzanine adapters for HP BladeSystem c-Class servers



**HP QMH2672**  
**16 Gb FC HBA**



**HP BLc Emulex**  
**LPe1205-HP**  
**8 Gb/s FC HBA**



**HP LPe1205A**  
**8 Gb FC HBA**



**QLogic QMH2562**  
**8 Gb FC HBA**



**HP QMH2572**  
**8 Gb FC HBA7**

### Hardware features

HP ProLiant BL	Gen8	Gen6/Gen7	Gen8	Gen6/Gen7	Gen8
<b>Performance</b>	Up to 500,000 IOPS per channel	Up to 200,000 IOPS per channel	Up to 200,000 IOPS per channel	Up to 200,000 IOPS per channel	Up to 115,000 IOPS per channel
<b>Port configuration</b>	Dual 16 Gb Fibre Channel Ports	Dual 8 Gb Fibre Channel ports	Dual 8 Gb Fibre Channel ports	Dual 8 Gb Fibre Channel ports	Dual 8 Gb Fibre Channel ports
<b>Protocols supported</b>	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
<b>Chipset</b>	QLogic	Emulex	Emulex	QLogic	QLogic
<b>Form factor</b>	Mezzanine Type A	Mezzanine Type 1	Mezzanine Type A	Mezzanine Type 1	Mezzanine Type A
<b>Media types</b>	62.5/125 multi-mode fiber optic cable with LC type connector	62.5/125 multi-mode fiber optic cable with LC type connector	62.5/125 multi-mode fiber optic cable with LC type connector	62.5/125 multi-mode fiber optic cable with LC type connector	62.5/125 multi-mode fiber optic cable with LC type connector

### Other features

<b>Management features</b>	QLogic Converge Console management utility 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	Emulex installation and management tools automate installation and provide local and remote HBA configuration and management	QLogic Converge Console management utility for centralized management and remote control of distributed HBAs	QLogic Converge Console management utility for centralized management and remote control of distributed HBAs
<b>High availability features</b>	Multipath support for redundant HBAs and paths	Multipath support for redundant HBAs and paths	Multipath support for redundant HBAs and paths	Multipath support for redundant HBAs and paths	Multipath support for redundant HBAs and paths
<b>NPIV</b>	Yes	Yes	Yes	Yes	Yes
<b>VPorts</b>	256	255	255	256	256
<b>Part number</b>	710608-B21	456972-B21	659818-B21	451871-B21	651281-B21
<b>Warranty in year(s) (parts/labor/onsite)</b>	1/1/1	1/1/1	1/1/1	1/1/1	1/1/1

## Fibre Channel mezzanine adapters for HP BladeSystem c-Class servers (continued)



**Brocade 804 8 Gb FC HBA**



**Emulex LPe1105-HP 4 Gb FC HBA**



**HP QLogic QMH2462 4 Gb FC HBA**

### Hardware features

HP ProLiant BL	Gen6/Gen7	Gen6/Gen7	Gen6/Gen7
<b>Performance</b>	Up to 500,000 IOPS per channel	Up to 115,000 IOPS per channel	Up to 150,000 IOPS per channel
<b>Port configuration</b>	Dual 8 Gb Fibre Channel ports	Dual 4 Gb Fibre Channel ports	Dual 4 Gb Fibre Channel ports
<b>Protocols supported</b>	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
<b>Chipset</b>	Brocade	Emulex	QLogic
<b>Form factor</b>	Mezzanine Type 1	Mezzanine Type 1	Mezzanine Type 1
<b>Media types</b>	62.5/125 multi-mode fiber optic cable with LC type connector	62.5/125 multi-mode fiber optic cable with LC type connector	62.5/125 multi-mode fiber optic cable with LC type connector
<b>Other features</b>			
<b>Management features</b>	Integrates into HP Data Center Fabric Manager	Emulex installation and management tools automate installation and provide local and remote HBA configuration and management	QLogic Converge Console management utility for centralized management and remote control of distributed HBAs
<b>High availability features</b>	Multipath support for redundant HBAs and paths	Multipath support for redundant HBAs and paths	Multipath support for redundant HBAs and paths
<b>NPIV</b>	Yes		
<b>VP ports</b>	256		
<b>Part number</b>	590647-B21	403621-B21	403619-B21
<b>Warranty in year(s) (parts/labor/onsite)</b>	1/1/1	1/1/1	1/1/1

## InfiniBand switches for HP BladeSystem c-Class servers



**HP BLc 4X QDR IB Switch**



**HP BLc 4X DDR IB G2 Switch**

<b>Performance</b>	40 Gb/s (QDR) per port, 2.5 Tb/s switching capacity	20 Gb/s (DDR) per port, 1.28 Tb/s switching capacity
<b>Port configuration</b>	16 4X QDR QSFP uplink ports	16 4X DDR QSFP uplink ports
<b>Management features</b>	Externally managed	Externally managed
<b>Protocols supported</b>	IBTA	IBTA
<b>Warranty in year(s) (parts/labor/onsite)</b>	1/0/0	1/0/0

## InfiniBand mezzanine adapters for HP BladeSystem c-Class servers



**HP 4X QDR IB dual-port mezzanine HCA**



**HP IB 4X DDR dual-port mezzanine HCA**

<b>Server type</b>	Blade	Blade
<b>Performance</b>	4X quad data rate (40 Gb/s)	4X double data rate (20 Gb/s)
<b>Port configuration</b>	Dual port	Dual port
<b>Operating support</b>		
<b>Warranty in year(s) (parts/labor/onsite)</b>	1/0/0	1/0/0

## HP services

### **Proactive, personalized, and simplified**

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

- Proactive to help prevent problems before they occur
- Personalized to give you the right balance of coverage and control
- Simplified to keep your team productive

### **Enhanced optimum service-level HP Care Pack offerings**

HP Proactive Care with six-hour call-to-repair hardware onsite support, and three-year coverage. HP Proactive Care Services are geared toward today's IT environments, combining a carefully designed mix of proactive advice, automated alerts, proactive reports, and rapid expert support.

Offered as HP Care Pack Services or as a support contract, HP Proactive Care provides:

- Proactive advice and reporting, which includes platform reviews, analyses, and scans
- A superior call experience with rapid connection to advanced technical expertise and end-to-end call ownership
- A choice of reactive hardware support levels
- HP Proactive Care Personalized Support option, assigned you a local account support manager

For more on HP Proactive Care, visit: [hp.com/services/ProactiveCare](http://hp.com/services/ProactiveCare)

To round out your HP support experience, you can choose:

- Blade Infrastructure plus Enhanced Network Installation and Startup services to ensure your BladeSystem environment is configured and ready when you are
- HP Software Support for industry-leading software such as Microsoft, Red Hat, SUSE Linux, or VMware. Buy your subscriptions and support from HP for the life of your BladeSystem to further simplify your operations. Make the first call to HP.

### **Minimum recommended HP Care Pack offerings**

HP Proactive Care with 24x7 hardware support, four-hour response, three-year coverage.

### **Important note about support on options in this data sheet**

To receive support services (beyond warranty) for certain hardware server options, you must purchase a support service for each individual option. These support services are available for purchase with the primary product. For a list of components that require separate support, please visit: [hp.com/services/excludedoptions](http://hp.com/services/excludedoptions).

### **HP Care Pack Services benefits**

- Deploy your infrastructure quickly, delivering faster return on investment
- Increase server uptime, performance, and availability to your business
- Detect and diagnose problems automatically, resulting in quick repairs—saving time, money, and resources

For more information visit: [hp.com/services/bladesystem](http://hp.com/services/bladesystem)

Customize your IT lifecycle management, from acquisition of new IT, management of existing assets, and removal of unneeded equipment. [hp.com/go/hpfinancialservices](http://hp.com/go/hpfinancialservices)

Transform your data center and make it future ready. To understand how HP Virtual Connect solutions can help visit: [hp.com/go/virtualconnect](http://hp.com/go/virtualconnect)

## HP Factory Express

HP Factory Express provides customization and deployment services along with your storage and server purchases. You can customize hardware to your exact specifications in the factory—helping speed deployment. [hp.com/go/factoryexpress](http://hp.com/go/factoryexpress)

## Customer Technical Training

Gain the skills you need with ExpertOne training and certification from HP. With HP ProLiant, training, you will accelerate your technology transition, improve operational performance, and get the best return on your HP investment. Our training is available when and where you need it, through flexible delivery options and a global training capability. [hp.com/learn/proliant](http://hp.com/learn/proliant)

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