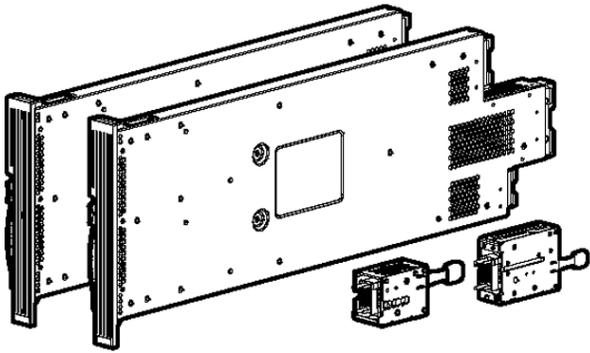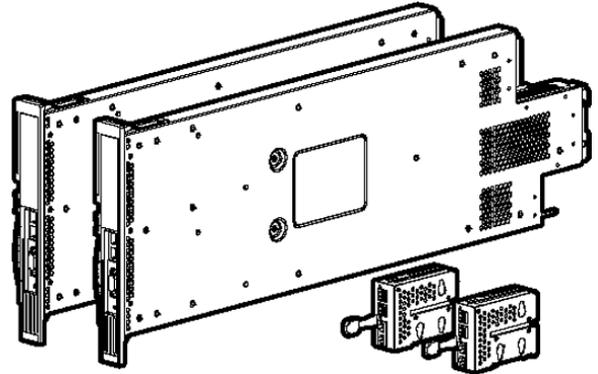# QuickSpecs

Overview

OR
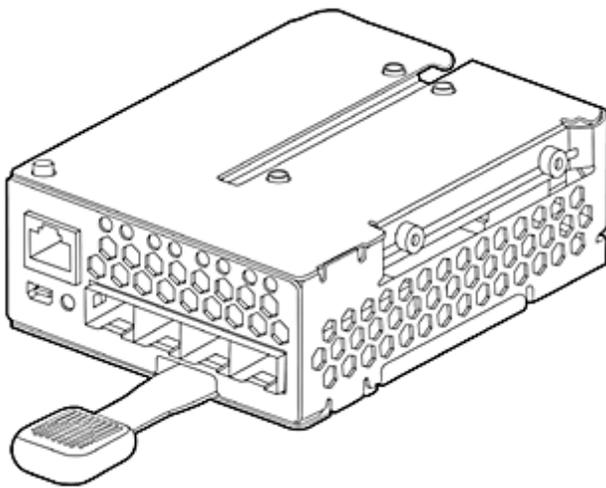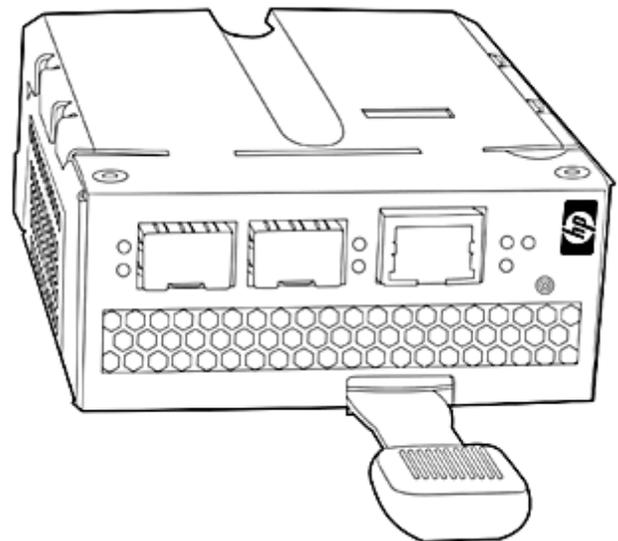
Patch Panel (shown) or Patch Panel 2

GbE Interconnect Switch (shown) or GbE2 Interconnect Switch or CGESM Interconnect Switch (fiber or copper-based)

OR

Brocade 4Gb SAN Switch for HP p-Class BladeSystem

McDATA 4Gb SAN Switch for HP p-Class BladeSystem

At A Glance

This document covers the HP BladeSystem p-Class Interconnects Components only. For more information on HP ProLiant Server Blades and HP BladeSystem p-Class Infrastructure please see the following QuickSpecs:

HP ProLiant Server Blade QuickSpecs: http://h18000.www1.hp.com/products/quickspecs/Division/11070.html
HP BladeSystem p-Class Infrastructure QuickSpecs:
http://h18000.www1.hp.com/products/quickspecs/12330_div/12330_div.HTML

HP BladeSystem solutions starts with a Server Blade Enclosure, HP ProLiant Server Blades, networking interconnects, SAN switches, management tools and a centralized power sub-system.

- Cisco Gigabit Ethernet Switch Module (CGESM) option for Gigabit Ethernet network adapter consolidation.
- Types of interconnects available: GbE Interconnect Switches, GbE2 and CGESM Interconnect Switches with optional Fibre Channel pass through, Patch Panels or Patch Panel 2 with Fibre Channel pass through. Please see the following URL for additional information:
  http://h18000.www1.hp.com/products/quickspecs/12164_div/12164_div.HTML

NOTE: For additional information on HP BladeSystem SAN switches, please see the following URL:
http://h18004.www1.hp.com/products/blades/components/san-switches.html
NOTE: HP ProLiant server blades, p-Class server blade enclosures, interconnects and power enclosures protected by a limited three

Overview

year warranty with optional service uplifts available. The warranty for p-Class SAN switches is unique to the SAN switch which is a one year warranty that is upgradeable to three years via CarePack.
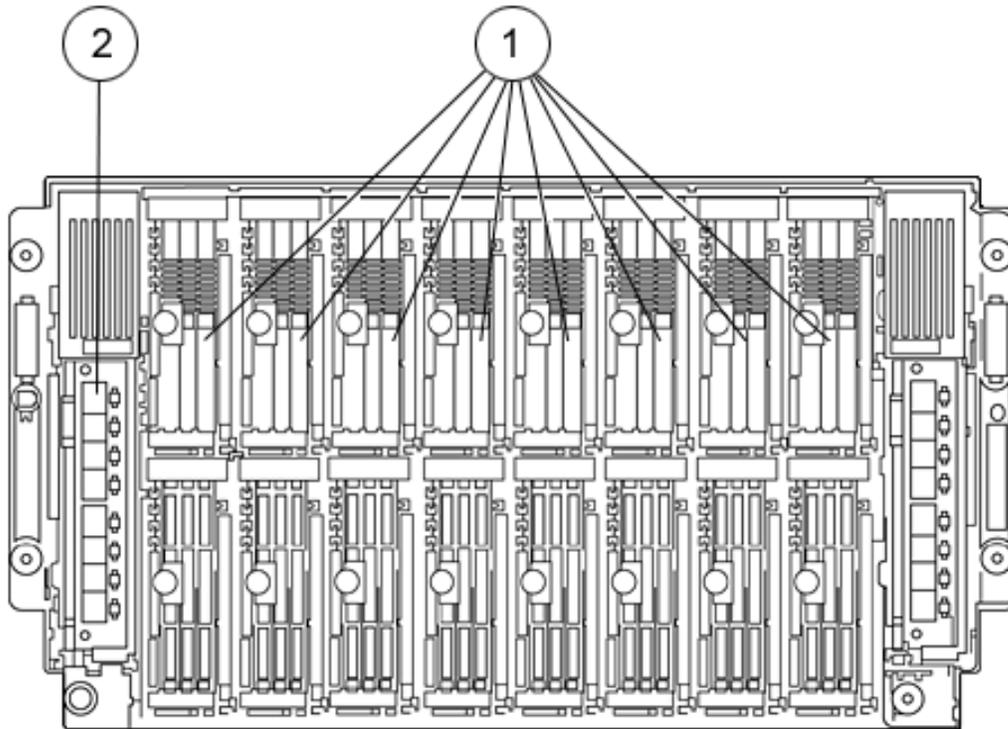
HP ProLiant Server Blades in HP BladeSystem p-Class Server Blade Enclosure

QuickSpecs

Standard Features (HP BladeSystem p-Class Interconnect Components)

HP ProLiant BL p-Class Interconnect Components

ProLiant BL p-Class Interconnect Switch Option

(Every HP BladeSystem p-Class server blade enclosure requires two interconnect switches OR two RJ-45 patch panels)

Provides up to a 32 to 1 server networking cable reduction per server enclosure depending on the mix of HP ProLiant BL20p, HP ProLiant BL25p, HP ProLiant BL30p, HP ProLiant BL35p, HP ProLiant BL40p and HP ProLiant BL45p server blades. Each interconnect switch (two per enclosure) reduces up to sixteen internal server network (NIC) ports to six external ports (four on a modular rear mounting interconnect module and two on the switch front panel). This provides a total of twelve external ports per server blade enclosure. Only one to all twelve external ports may be used per server blade enclosure.

The Cisco Gigabit Ethernet Switch Module (CGESM) Interconnect Kits are for applications that require network adapter consolidation to 1000 Mbps (Gigabit Ethernet) in a Cisco infrastructure. The CGESM supports the same Fibre Channel pass-through as the GbE2.

- The Cisco Gigabit Ethernet Switch Module Interconnect kit includes one CGESM Interconnect Switch or one CGESM with four (4) RJ-45 10/100/1000 T/TX/T Small Form Factor Pluggable (SFP) Modules
- Quantity 2 Cisco Gigabit Ethernet Switch Module Interconnect kits provide two CGESM Interconnect Switches providing any combination of up to twelve (12) RJ-45 10/100/1000 T/TX/T or Fiber SX external ports per server blade enclosure.
- The optional ProLiant BL p-Class Storage Connectivity Kit (321745 -B21) is required for Fibre Channel pass-through when using either the GbE2 or CGESM Interconnect Kit.

The GbE2 Interconnect Kits (C-GbE2 and F-GbE2) are for applications that require network adapter consolidation to 1000 Mbps (Gigabit Ethernet) and HP ProLiant Server Blade Fibre Channel pass-through.

- The ProLiant BL p-Class F-GbE2 Interconnect Kit includes two GbE2 Interconnect Switches and two QuadSX Interconnect Modules that provide eight (8) LC 1000 SX and four (4) RJ-45 10/100/1000 T/TX/T external ports per server blade enclosure.
- The ProLiant BL p-Class C-GbE2 Interconnect Kit includes two GbE2 Interconnect Switches and two QuadT2 Interconnect Modules that provide twelve (12) RJ-45 10/100/1000 T/TX/T external ports per server blade enclosure.

The optional ProLiant BL p-Class Storage Connectivity Kit (321745 -B21) is required for Fibre Channel pass-through when using either the C-GbE2 or F-GbE2 Interconnect Kit.

The GbE Interconnect Kits (C-GbE and F-GbE) are for applications that require network adapter consolidation to 100 Mbps (Fast Ethernet).

- The ProLiant BL p-Class F-GbE Interconnect Kit includes two GbE Interconnect Switches and two DualTSX Interconnect Modules that provide four (4) LC 1000 SX and eight (8) RJ-45 10/100 T/TX external ports per server blade enclosure.
- The ProLiant BL p-Class C-GbE Interconnect Kit includes two GbE Interconnect Switches and two QuadT Interconnect Modules that provide four (4) RJ-45 10/100/1000 T/TX/T and eight (8) RJ-45 10/100 T/TX external ports per server blade enclosure.

Also included (per Interconnect Switch):
- One (1) RS-232 DB-9 front panel out-of-band management port
- Redundant crosslink ports connecting the two interconnect switches
- Redundant power inputs and on-board redundant fans
- Hot-plug and hot- remove with configuration retention and no need to cable/re-cable
- Power ON, management, and per port status and speed LED indicators
- Reset/power momentary push-button switch
- HP ProLiant BL Interconnect Switch Management Utilities and User Documentation CD
- Fully pre-configured for rapid deployment and immediate operation

Standard Features (HP BladeSystem p-Class Interconnect Components)

The GbE Interconnect Kits (C-GbE and F-GbE) are for applications that require network adapter consolidation to 100 Mbps (Fast Ethernet).

- The ProLiant BL p-Class F-GbE Interconnect Kit includes two GbE Interconnect Switches and two DualTSX Interconnect Modules that provide four (4) LC 1000 SX and eight (8) RJ-45 10/100 T/TX external ports per server blade enclosure.
- The ProLiant BL p-Class C-GbE Interconnect Kit includes two GbE Interconnect Switches and two QuadT Interconnect Modules that provide four (4) RJ-45 10/100/1000 T/TX/T and eight (8) RJ-45 10/100 T/TX external ports per server blade enclosure.

ProLiant BL Interconnect Switch Management System and Utilities:

Full featured web-based and scriptable command line (CLI) interfaces, password protected multi-level user accounts, Telnet, SNMP, BootP client, port mirroring, port-based VLANs and VLAN tagging, EtherChannel compatible multi-port trunking, network time protocol, spanning tree protocol, broadcast/multicast storm control, flow control, human readable/writeable configuration file, TFTP client, IP address security restrictions, auto-MDI/MDIX, auto-negotiation and auto-sensing of speed and duplex mode, and more.

ProLiant BL p-Class Storage Connectivity Kit Option
(Supports two CGESM or GbE2 switches per kit)

The Storage Connectivity Kit is used if Fibre Channel signal pass-through is desired when using the CGESM or GbE2 Interconnect Switch. Therefore, both LAN cable consolidation and SAN connectivity is possible using a single interconnect option. Order one Storage Connectivity Kit per server blade enclosure for Fibre Channel pass through.
The Storage Connectivity Kit includes two OctalFC Interconnect Modules that provide sixteen open transceiver slots for the pluggable small form factor transceivers that come with each Dual port Fibre Channel Adapter. The Storage Connectivity Kit supports up to sixteen Fibre Channel signals).

HP ProLiant BL p-Class SAN Switches

Embedded Fibre Channel SAN switching within the p-Class Server Enclosure. Brocade and McDATA based SAN switches featuring 4Gb ASIC technology providing fabric connectivity for all HP ProLiant BL p-Class Server blades.

The Brocade 4Gb SAN Switch for HP p-Class BladeSystem is a 4Gb 12 port Fibre Channel SAN switch. Three factory configurations:

- Base unit - Includes Advanced Web Tools and Zoning. Limited to 2 switches (domains) in a single fabric. (P/N A7533A)
- Full Fabric - Includes Advanced Web Tools and Zoning. Full Fabric support to current scalability limit of 2560 ports and 50 domains per single SAN fabric. (P/N A7534A)
- Power Pack - Includes all features and functionality of Full Fabric, as well as, Enterprise license features: Trunking, Advanced Performance Monitoring, Fabric Watch and Extended Fabrics (P/N A7535A)

For additional information on the Brocade 4Gb SAN Switch for HP p-Class BladeSystem please see the following URL: http://h18006.www1.hp.com/products/storageworks/b4gbsanswitchblade/index.html

The McDATA 4Gb SAN Switch for HP p-Class BladeSystem is a 4Gb 10 port Fibre Channel SAN Switch. This product comes in one factory configuration.

- Full Fabric Switch - Includes and switch hardware and firmware. (P/N A8001A)

There is an enhanced software license available for the McDATA SAN switch.

- McDATA Enhanced Software License (P/N T4263A)
  License includes:
    ○ McDATA SANtegrity Binding
    ○ McDATA SANtegrity Authentication

Standard Features (HP BladeSystem p-Class Interconnect Components)

For additional information on the McDATA 4Gb SAN Switch for HP p-Class BladeSystem please see the following URL: http://h18006.www1.hp.com/products/storageworks/mcd4gbsanswitch/index.html

NOTE: Both Brocade and McDATA SAN switches are shipped in singles (one switch per kit), for redundant configurations please order two switch kits.

HP ProLiant BL p-Class RJ-45 Patch Panel (Two patch panels per kit) (Every BL p-Class server blade enclosure requires two Interconnect switches OR two RJ-45 patch panels)	6U (10.5-inch), Plugs into HP BladeSystem p-Class 6U server blade enclosures Used to pass NIC signals from all server blades in server blade enclosure out as RJ-45 connections Supports Gigabit Ethernet network adapters 16 RJ-45 connectors on the back of each BL p-Class 6U RJ-45 Patch Panel (32 RJ-45 connections per server blade enclosure)

HP ProLiant BL p-Class RJ-45 Patch Panel 2 (with Fibre Channel pass through)
(Two patch panels per kit)
(Every BL p-Class server blade enclosure requires two Interconnect switches OR two RJ-45 patch panels)
NOTE: The Patch Panel 2 or a Switch Interconnect Kit is required for SAN connectivity on HP

6U (10.5-inch), Plugs into HP BladeSystem p-Class 6U server blade enclosures

Used to pass NIC signals from all server blades in server blade enclosure out as RJ-45 connections also used to pass Fibre Channel signals for SAN connectivity

Supports Gigabit Ethernet network adapters

16 RJ-45 connectors on the back of each RJ-45 patch panel 2 (32 RJ-45 connections per server blade enclosure)

Fibre Channel, pass through	Fibre Channel signals travel from a HP ProLiant BL25p server blade with a Dual-Port Fibre Channel Adapter through p-Class server blade enclosure backplane. The Fibre Channel signals are terminated through the RJ-45 Patch Panel 2 in the interconnect bays. To provide redundancy each server blade has two Fibre Channel signals and one Fibre Channel signal terminates through the right RJ-45 Patch Panel 2, one Fibre Channel signal travels terminates through the left RJ-45 Patch Panel 2. 8 Fibre Channel small form factor pluggable (SPF) transceiver slots on the front of each RJ-45 patch panel 2 (16 Fibre Channel connections per server blade enclosure); for insertion of SPF transceivers included with the BL20p G3 Dual-port Fibre Channel Adapter.

Required Network Cabling	10Base-T	Categories 3, 4 or 5 UTP (100 meters) EIA/TIA-568 100-ohm STP (100 meters)
	100Base-TX	Category 5 UTP (100 meters) EIA/TIA-568 100-ohm STP (100 meters)
	1000Base-T	Category 5 UTP (100 meters) EIA/TIA-568 100-ohm STP (100 meters)
	1000Base-SX	50/125 μm Multimode Fiber, 400 MHz/Km (500 meters) 50/125 μm Multimode Fiber, 500 MHz/Km (550 meters) 62.5/125 μm Multimode Fiber, 160 MHz/Km (220 meters) 62.5/125 μm Multimode Fiber, 200 MHz/Km (275 meters)

NOTE: For cabling information, refer to the Web site at:
http://www.compaq.com/products/servers.

Standard Features

Intelligent Manageability Interconnect Switch Management System and Utilities (Interconnect Switch option)

Availability   Interconnect Switch Availability

- Hot-plug and hot- remove with configuration retention and no need to cable/re-cable
- Two network connections per server blade bay (four NICs total) routed to two redundant interconnect switches
- Redundant Ethernet inter-switch communication with two sets of redundant Ethernet uplink ports per each interconnect switch
- Redundant front panel ports per each interconnect switch for diagnostics, management, and additional uplinks
- Redundant serial ports
- Compatibility with PVST+ (CGESM or GbE2 switch) and 802.1D Spanning tree protocol support for loop-free path redundancy
- Static IEEE 802.3ad (EtherChannel compatible) trunking with automatic port load balancing and failover
- Redundant configuration files and operating system firmware images in memory (GbE2 switch)
- Redundant fans per each interconnect switch
- Redundant 1+1 power to each interconnect switch
- Support for ProLiant network adapter teaming
- Redundant configurable community strings and SNMP trap manager hosts
- Redundant configurable syslog server, DNS server, and default gateways (GbE2 switch)

Security   Interconnect switch multilevel user names and passwords, management interface time out period setting, SSH*, SCP secure copy protocol, port-based IEEE 802.1Q tagged VLANs, RADIUS user authentication and authorization*, and IP address restriction
                           *NOTE: CGESM and GbE2 Interconnect Switch only

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Factory Express Portfolio HP Factory Express offers configuration, customization, integration and deployment services for HP
for Servers and Storage servers and storage products. Customers can choose how their factory solutions are built, tested, integrated, shipped and deployed.

Factory Express offers service packages for simple configuration, racking, installation, complex configuration and design services as well as individual factory services, such as image loading, asset tagging and custom packaging. HP products supported through Factory Express include: a wide array of servers and storage: HP Integrity, HP ProLiant & HP ProLiant Server Blades, HP BladeSystem, HP 9000 servers as well as the MSA1000, VA7xxx, EVA3000 & EVA5000, XP, rackable tape libraries and configurable network switches.

For more information on Factory Express services for your specific server model please contact your sales representative or go to http://www.hp.com/go/factory-express.

Standard Features

Service and Support

This product is covered by a global limited warranty and supported by HP Services and a worldwide network of HP Authorized Channel Partners. Hardware diagnostic support and repair is available for three years from date of purchase. Support for software and initial setup is available for 90 days from date of purchase. Additional support may be covered under the warranty or available for an additional fee. Enhancements to warranty services are available through HP Care Pack services or customized service agreements.

NOTE: Server Blade Limited Warranty includes 3 year Parts, 3 year Labor, 3-year on-site support. This warranty supports the HP ProLiant BL20p, HP ProLiant 25p, HP ProLiant 40 and HP ProLiant 45p Server Blades.
NOTE: Server Blade Limited Warranty includes 3 year Parts, 1 year Labor, 1-year on-site support. This warranty supports the HP ProLiant BL30p and HP ProLiant 35p Server Blades.
NOTE: Server Blade Enclosure Limited Warranty includes 3 year Parts, 3 year Labor, 3-year on-site support. Additional information regarding worldwide limited warranty and technical support is available at: http://h18004.www1.hp.com/products/servers/platforms/warranty/index.html

HP Care Pack services provide total care and support expertise with committed response designed to meet your IT and business needs.

HP Care Pack services for HP BladeSystem p-Class server blade enclosure covers the enclosure including patch panels, HP supported Ethernet interconnects, power enclosure with power supplies and power distribution.

To fully capitalize on your HP BladeSystem servers' capabilities requires a service partner who thoroughly understands your server technology and systems environment. HP Services, an industry leader in provision of multi vender support solutions provides a range of support services designed to meet the varying needs of business. Whether an SMB or large global corporation HP has a HP BladeSystem server support offer to help you speedily deploy and maximize system uptime.

Recommended Service - Simplify ProLiant solution implementation, maintenance and management.

- **Support Service** - 4-Hour Response Coverage, 3-Year, 24 x 7, Same Business Day
- **Deployment Service** - Installation and Start Up for HP BladeSystem Infrastructure

Enhanced Service - Optimize service level to increase IT performance and availability

- **Support Service** - HP Proactive BladeSystem Service, 1-Year
- **Deployment Service** - Enhanced Network Installation and Start-up for HP BladeSystem Switches

Installation & Start-Up service for HP BladeSystem Infrastructure plus HP BladeSystem Enhanced Network Installation and Start-UP as per the Customer Description and/or Data Sheet. To be delivered on a scheduled basis 8am-5pm, M-F, excluding HP holidays.

For a complete listing of service offerings and information visit:
http://www.hp.com/services/bladesystemservices
http://www.hp.com/go/proliant/carepack

Options

Configuration Steps

For a complete configuration on the HP ProLiant Server Blades, please do the following:

Step 1: Select desired model, configuration and quantity of HP ProLiant server blades
NOTE: For server blade information, please visit: http://h18000.www1.hp.com/products/quickspecs/Division/11070.html

Step 2: Determine quantity of HP BladeSystem p-Class Server Blade Enclosures to purchase
NOTE: Each HP BladeSystem p-Class Server Blade Enclosure holds 2,4,8 or 16 HP ProLiant server blades plus two Interconnects depending on server blade selection.
NOTE: For additional information on HP BladeSystem p-Class Infrastructure please visit:
http://h18000.www1.hp.com/products/quickspecs/12330_div/12330_div.HTML

Step 3: Select an interconnect kit. Each interconnect kit contains a pair of interconnects except the Cisco GESM which contains a single switch per kit. One pair of interconnects is required with each blade enclosure.
NOTE: For additional information on Interconnect Options, please visit:
http://h18000.www1.hp.com/products/quickspecs/12164_div/12164_div.HTML

HP BladeSystem p-Class Interconnects	RJ-45 Patch Panel 2 with Fibre Channel pass through NOTE: Required for Fibre Channel connectivity on HP ProLiant BLXXp when using the patch panel interconnect	306465-B21
	Brocade 4Gb SAN Switch for HP p-Class BladeSystem	A7533A
	Brocade 4Gb SAN Switch Full Fabric Switch	A7534A
	Brocade 4Gb SAN Switch w/Power Pack NOTE: Two SAN switch kits required per server blade enclosure	A7535A
	McDATA 4Gb SAN Switch for HP p-Class BladeSystem NOTE: Two SAN switch kits required per server blade enclosure.	A8001A
	Cisco Gigabit Ethernet Switch Module for HP BladeSystem p-Class Interconnect Kit Base Unit only NOTE: Two CGESM interconnect kits required per server blade enclosure.	378926-B21
	Cisco Gigabit Ethernet Switch Module for HP BladeSystem p-Class Interconnect Kit Base Unit (populated with two RJ-45 10/100/1000 T/TX/T Small Form Factor Pluggable (SFP) Modules) NOTE: Two CGESM interconnect kits required per server blade enclosure.	378927-B21
	Cisco RJ-45 10/100/1000 T/TX/T SFP Module	378928-B21
	1000BASE SX Fiber SFP Module	378929-B21
	ProLiant BL p-Class C-GbE2 Interconnect Kit (with pair of GbE2 Interconnect Switches and two QuadT2 Interconnect Modules) NOTE: Only one interconnect kit required per server blade enclosure.	283192-B22
	HP ProLiant BL p-Class Storage Connectivity Kit NOTE: Required for BLXXp Fibre Channel signal pass through when using the CGESM or GbE2 Interconnect Switch. NOTE: Only one Storage Connectivity Kit required per each GbE2 Interconnect Kit. NOTE: Only one Storage Connectivity Kit required for (2) CGESM Interconnect Kit.	321745-B21

QuickSpecs

Options

Step 4: Select a HP BladeSystem p-Class power enclosure and power supplies based on configuration
NOTE: For additional information on HP BladeSystem p-Class Infrastructure please visit:
http://h18000.www1.hp.com/products/quickspecs/12330_div/12330_div.HTML

Use p-Class sizing tool to help determine power configuration:
http://h30099.www3.hp.com/configurator/calc/Power%20Calculator%20Catalog.xls
NOTE: Power enclosures and supplies are not needed if using facility DC (-48V ± 10%).

Step 5: Select power distribution (only required with 3U power enclosures)
NOTE: For additional information on HP BladeSystem p-Class Infrastructure please visit:
http://h18000.www1.hp.com/products/quickspecs/12330_div/12330_div.HTML

Service and Support Offerings (HP Care Pack Services)

NOTE: The HP Care Pack service part numbers below for ProLiant BL p-Class server blades, cover the server blade and all HP branded hardware options qualified for the server, purchased at the same time or afterwards, internal to the server.

Hardware Services On-site Service

4-Hour On-site Service, 7-Day x 24-Hour Coverage, 3 Years, Electronic	UD188E

NOTE: The HP Care Pack service part numbers below for HP BladeSystem p-Class server blade enclosure covers the enclosure including patch panels, HP supported Ethernet interconnects, power enclosure with power supplies and power distribution.

Hardware Services On-site Service

4-Hour On-site Service, 5-Day x 13-Hour Coverage, 3 Years, Electronic	HC031E

NOTE: The HP Care Pack service part numbers below covers the HP BladeSystem Brocade and McData SAN Switches.

Hardware Services On-site Service

4-Hour On-site Service, 7-Day x 24-Hour Coverage, 3 Years, Electronic	UC009E
4-Hour On-site Service, 7-Day x 24-Hour Coverage, 3 Years, (24 port) Electronic	UE438E

Installation & Start-up Services

HP Installation & Startup Service for HP BladeSystem Infrastructure	UC905E

NOTE: Provides for an integrated hardware and software implementation that includes remote service planning, onsite deployment of hardware and software, installation verification testing and customer orientation. Hardware deployment covers the installation of a single BladeSystem enclosure that include server blades (up to 16), Ethernet network interconnect, and power options. Software deployment covers the installation and configuration of HP Systems Insight Manager (SIM), HP Rapid Deployment Pack (RDP), and deploy up to two operating system editions of either Windows or Linux, using scripted operating system installation software.

HP BladeSystem Enhanced Network Installation and Startup Service, Electronic	UE603E

HP Proactive BladeSystem Service Care Pack

1 Year, HP Proactive BladeSystem Service	UG858E

NOTE: For more information, customer/resellers can contact
http://www.hp.com/hps/carepack/services/

Technical Specifications

Operating and Performance Specifications for RJ-45 Patch Panel 2 with Fiber Channel pass through	Dimensions	Height	10.405 in (26.43 cm)
		Width	1.535 in (3.899 cm)
		Depth	27.697 in (70.35 cm)
	Capability	IEEE 802.2, 802.3, 802.3u	
	Network Transfer Rate	10 Base-T (half-duplex)	10 Mbps
		10 Base-T (full-duplex)	20 Mbps
		100 Base-TX (half-duplex)	100 Mbps
		100 Base-TX (full-duplex)	200 Mbps
		1000 Base-TX (full-duplex)	1000 Mbps
	Fiber Channel SAN	Velio VC1070 re-timer	Auto-rate negotiate between 2G and 1G
	Connector	Network	RJ-45 in the back.
		Fiber Channel SAN	Pluggable SFP optical slot in the front.
	Cable Support	10 Base-TX	Categories 3, 4, or 5 UTP (2 or 4 pair); up to 328 ft (100 m)
		100 Base-TX	Category 5 UTP (2 pair); up to 328 ft/100 m
		1000 Base-TX	Category 5E (4 pair); up to 328 ft (100 m)
		Fiber Channel	SFP optical cable
	EMI	FCC Class A	
		ICES-003 Class A	
		AS/NZS 3548 Class A	
		VCCI Class A	

NOTE: Operating temperature has an altitude derating of 34° F (1° C) per 1,000 ft (304.8 m). No direct sunlight. Upper operating limit is 10,000 ft (3,048 m) or 70Kpa/10.1 psia. Upper non-operating limit is 30,000 ft (9,144 m) or 30.3 KPa/4.4 psia. Storage maximum humidity of 95% is based on a maximum temperature of 113° F (45° C). Altitude maximum for storage is 70 KPa.

Operating and Performance Specifications for RJ-45 Patch Panel	Dimensions	Height	10.405 in (26.43 cm)
		Width	1.535 in (3.899 cm)
		Depth	27.697 in (70.35 cm)
	Capability	IEEE 802.2, 802.3, 802.3u	
	Network Transfer Rate	10 Base-T (half-duplex)	10 Mbps
		10 Base-T (full-duplex)	20 Mbps
		100 Base-TX (half-duplex)	100 Mbps
		100 Base-TX (full-duplex)	200 Mbps
		1000 Base-TX (full-duplex)	1000 Mbps
	Connector	Network	RJ-45 in the back
	Cable Support	10 Base-TX	Categories 3, 4, or 5 UTP (2 or 4 pair); up to 328 ft (100 m)
		100 Base-TX	Category 5 UTP (2 pair); up to 328 ft (100 m)
		1000 Base-TX	Category 5E (4 pair); up to 328 ft (100 m)
	Power Requirements	200 mA at + 5V DC; 500 mA at -48V	
	Temperature Range	Operating	50° to 95° F (10° to 35° C)
		Non-operating	-22° to 140° F (-30° to 60° C)
	Relative Humidity (non-condensing)	Operating	20% to 80%
		Non-operating	5% to 95%

QuickSpecs

HP BladeSystem p-Class Interconnect Components

Technical Specifications

Wet Bulb Temperature	Operating	82.4° F (28° C)
	Non-operating	101.7° F (38.7° C)

NOTE: Operating temperature has an altitude derating of 34° F (1° C) per 1,000 ft (304.8 m). No direct sunlight. Upper operating limit is 10,000 ft (3,048 m) or 70Kpa/10.1 psia. Upper non-operating limit is 30,000 ft (9,144 m) or 30.3 KPa/4.4 psia. Storage maximum humidity of 95% is based on a maximum temperature of 113° F (45° C). Altitude maximum for storage is 70 KPa.

Operating and Performance Specifications for ProLiant BL p-Class GbE Interconnect Switch

Dimensions	Height	10.405 in (26.43 cm)
	Width	1.535 in (3.899 cm)
	Depth	27.697 in (70.35 cm)

Weight   11.5 lb/5.2 kg per interconnect switch

Performance

9.6 Gbps external port bandwidth per server blade enclosure (full duplex)

Forwarding rate 0.15 million pps per 10/100 port, 1.5 million pps per gigabit port, (64-byte packets)

Non-blocking, full-wire speed for all connections

Auto-MDI/MDIX, auto-negotiation and auto-sensing with full-duplex support

Forwarding Mode   Store and forward

MAC Addresses   8,191 per interconnect switch; MAC address based filtering and MAC address packet priority configuring

Forwarding Table Age Time   Maximum age: 1 to 1,000,000 seconds; default: 300 seconds

Memory   32MB Main, 6MB flash and 16MB packet buffer per interconnect switch

Compliance

IEEE 802.3, 802.3u, 802.3ab, 802.3x, 802.3z (F-GbE only), 802.1D, 802.1p, 802.3ac, 802.3ad (Static), and 802.1Q

SNMP v1 (RFC 1157) and RMON v1 (RFC 1757) groups 1, 2, 3, and 9

MIB-II (RFC 1213), Bridge MIB (RFC 1493), Interface Group MIB (RFC 2863), Ethernet MIB (RFC 1643), 802.1Q Extended Bridge MIB (RFC 2674), Entity MIB (RFC 2037), SNMP Trap Convention (RFC 1215), Bridge Trap (RFC 1493), Remote Monitoring Traps (RFC 1757), and HP Enterprise Switch MIBs and Environmental Traps

IGMP v1 (RFC 1112), IGMP v2 (RFC 2236), SNTP (RFC 1361), Telnet (RFC 854), TFTP client (RFC 783), BootP client, (RFC 2132), DHCP client, (RFC 2131) and ZModem,

Network Transfer Rate	10 Base-T (half-duplex)	10 Mbps
	10 Base-T (full-duplex)	20 Mbps
	100 Base-TX (half-duplex)	100 Mbps
	100 Base-TX (full-duplex)	200 Mbps
	1000 Base-TX (half and full-duplex)	2000 Mbps
	1000 Base-SX (full-duplex)	2000 Mbps

Connector

12 RJ-45, 2 DB-9 (C-GbE Interconnect Kit)
4 LC fiber, 8 RJ-45, 2 DB-9 (F-GbE Interconnect Kit)

Cable Support

FCC Class A

ICES-003 Class A

AS/NZS 3548 Class A

VCCI Class A

Technical Specifications

Safety	UL/CUL Listed Accessory	
	CE	
Power Requirements	-48VDC: 1050 mA, 50 W maximum (per interconnect switch)	
Temperature Range	Operating	50° to 95° F (10° to 35° C)
	Non-operating	-22° to 140° F (-30° to 60° C)
Relative Humidity (non-condensing)	Operating	20% to 80%
	Non-operating	5% to 95%
Wet Bulb Temperature	Operating	82.4° F (28° C)
	Non-operating	101.7° F (38.7° C)

NOTE: Operating temperature has an altitude derating of 34° F (1° C) per 1,000 ft (304.8 m). No direct sunlight. Upper operating limit is 10,000 ft (3,048 m) or 70Kpa/10.1 psia. Upper non-operating limit is 30,000 ft (9,144 m) or 30.3 KPa/4.4 psia. Storage maximum humidity of 95% is based on a maximum temperature of 113° F (45° C). Altitude maximum for storage is 70 KPa.

Operating specifications for McDATA 4Gb SAN Switch		
Fibre Channel ports	2 external ports (ships with two 4Gb SFPs)	
Performance	4 GB/sec line speed, full duplex	
Certified maximum	24 switches, 7 hops; larger fabrics certified as required	
Switch core	Non-blocking	
Fabric latency	$<2\,\mu$ sec. with no contention, cut-through routing	
Maximum frame size	2112-byte payload	
Classes of service	Class 2, Class 3, Class F (inter-switch frames)	
Port types	FL_Port, F_Port, and E_Port; self-discovery based on G_Port or GL_Port	
Data traffic types	Fabric switches support unicast, multicast (256 groups), and broadcast	
Media types	Small Form-Factor Pluggable (SFP)	
Laser	Short-wave up to 500 m (1,640 ft); long-wave up to 10 km (6.2 mi) when available	
Options	SFP media-take out	
Supported software	SANtegrity Enhanced Software	
Management access	10/100 Ethernet (RJ-45)	
Diagnostics	POST and embedded online/offline diagnostics	
Dimensions	**Height**	3.4 in (8.6 cm)
	Width	1.5 in (3.8 cm)
	Depth	4.75 in (12.1 cm) 7 in (17.9 cm) with handle
	Weight	1.94 lbs (.88 kg)
Temperature	**Operating**	32° to 104° F (0° to 40° C)

QuickSpecs

HP BladeSystem p-Class Interconnect Components

Technical Specifications

Operating and Performance Specifications for GbE2 Interconnect Switch	Dimensions	Height	10.405 in (26.43 cm)
		Width	1.535 in (3.899 cm)
		Depth	27.697 in (70.35 cm)
	Weight	12.0 lb/5.4 kg per interconnect switch	
	Performance	24 Gbps External port bandwidth per server blade enclosure (full duplex)	
		Forwarding rate 1.5 million pps per gigabit port (64-byte packets)	
		Auto-MDI/MDIX, auto-negotiation and auto-sensing with full-duplex support	
	Forwarding Mode	Store and forward	
	MAC Addresses	2,048 per interconnect switch	
	Forwarding Table Age Time	Maximum age: 1 to 65535 seconds; default: 300 seconds	
	Memory	128MB Main, 32MB flash and 2MB packet buffer per interconnect switch	
	Compliance	IEEE 802.3, 802.3u, 802.3ab, 802.3x, 802.3z (F-GbE2 only), 802.1D, 802.3ac, 802.3ad (Static), and 802.1Q	
		SNMP v1 (RFC 1157), MIB-II (RFC 1213), Bridge MIB (RFC 1493), Interface Group MIB (RFC 2863), Ethernet MIB (RFC 1643), 802.1Q Extended Bridge MIB , Entity MIB (RFC 2037), RADIUS Authentication MIB, 802.3-2002 MIB, SNMP Trap Convention (RFC 1215), Bridge Trap (RFC 1493), Remote Monitoring Traps (RFC 1757) and HP Enterprise Switch MIBs and Environmental Traps	
		RADIUS (RFC 2138), Telnet (RFC 854), TFTP client (RFC 783), SSH v1.5, SCP v1.5, NTP v2 (RFC 1119), BootP client (RFC 2132), and XModem	
	Network Transfer Rate	10 Base-T (half-duplex)	10 Mbps
		10 Base-T (full-duplex)	20 Mbps
		100 Base-TX (half-duplex)	100 Mbps
		100 Base-TX (full-duplex)	200 Mbps
		1000 Base-TX (half and full-duplex)	2000 Mbps
		1000 Base-SX (full-duplex)	2000 Mbps
	Connector	12 RJ-45, 2 DB-9 (C-GbE2 Interconnect Kit) 8 LC fiber, 4 RJ-45, 2 DB-9 (F-GbE2 Interconnect Kit)	
	EMI	FCC Class A	
		ICES-003 Class A	
		AS/NZS 3548 Class A	
		VCCI Class A	
	Safety	UL/CUL Listed Accessory	
		CE	
	Power Requirements	48VDC: 2040 mA, 98 W maximum (per interconnect switch without Storage Connectivity Kit) 48VDC: 2355 mA, 113 W maximum (per interconnect switch with Storage Connectivity Kit)	
	Temperature Range	Operating	50° to 95° F (10° to 35° C)
		Non-operating	-22° to 140° F (-30° to 60° C)
	Relative Humidity (non-condensing)	Operating	20% to 80%
		Non-operating	5% to 95%
	Wet Bulb Temperature	Operating	82.4° F (28° C)
		Non-operating	101.7° F (38.7° C)

Technical Specifications

NOTE: Operating temperature has an altitude derating of 34° F/1° C per 1,000 ft/304.8 m. No direct sunlight. Upper operating limit is 10,000 ft/3,048 m or 70Kpa/10.1 psia. Upper non-operating limit is 30,000 ft/9,144 m or 30.3 KPa/4.4 psia. Storage maximum humidity of 95% is based on a maximum temperature of 113° F/45° C. Altitude maximum for storage is 70 KPa.

Operating and Performance Specifications for CGESM Interconnect Switch			
	Dimensions	Height	10.405 in (26.43 cm)
		Width	1.6 in (4.06 cm)
		Depth	28 in (71.12 cm)
	Weight	11.5 lb/5.2 kg per interconnect switch	
	Performance	28 Gbps Maximum Forwarding Bandwidth. 38.7mpps Maximum Forwarding Rate (64 Byte Packets)	
		9018Bytes Jumbo Frames MTU	
		Non-blocking architecture. Wire Speed Performance on all ports	
		Auto-MDI/MDIX, auto-negotiation and auto-sensing with full-duplex support	
	Forwarding Mode	Store and forward	
	MAC Addresses	8000 MAC/physical address Table Size	
	Memory	128MB DRAM Memory. 16MB Flash Memory	
	Compliance	IEEE 802.1s, IEEE 802.1w, IEEE 802.1x, IEEE 802.3ad, IEEE 802.3x full duplex on 10BASE-T, 100BASE-TX, and, IEEE 802.1D Spanning-Tree Protocol, IEEE 802.1p CoS Prioritization, IEEE 802.1Q VLAN, IEEE 802.3 10BASE-T specification, IEEE 802.3u 100BASE-TX specification, IEEE 802.3ab 1000BASE-T specification, IEEE 802.3z 1000BASE-X specification	
		RMON I and II standards, SNMPv1, SNMPv2c, and SNMPv3	
		(RFC1493) , CISCO-CDP-MIB, CISCO-CLUSTER-MIB, CISCO-CONFIG-MAN-MIB, CISCO-ENTITY-FRU-CONTROL-MIB, CISCO-ENVMON-MIB, CISCO-FLASH-MIB, CISCO-FTP-CLIENT-MIB, CISCO-IGMP-FILTER-MIB, CISCO-IMAGE-MIB, CISCO IP-STAT-MIB, CISCO-MAC-NOTIFICATION-MIB, CISCO-MEMORY-POOL-MIB, CISCO-PAGP-MIB, CISCO-PING-MIB, CISCO-PROCESS-MIB, CISCO-RTTMON-MIB, CISCO-STP-EXTENSIONS-MIB, CISCO-SYSLOG-MIB, CISCO-TCP-MIB, CISCO-VLAN-IFTABLE-RELATIONSHIP-MIB, CISCO-VLAN-MEMBERSHIP-MIB, CISCO-VTP-MIB, ENTITY-MIB, ETHERLIKE-MIB, IF-MIB (in and out counters for VLANs are not supported), IGMP-MIB, OLD-CISCO-CHASSIS-MIB, OLD-CISCO-FLASH-MIB, OLD-CISCO-INTERFACES-MIB, OLD-CISCO-IP-MIB, OLD-CISCO-SYS-MIB, OLD-CISCO-TCP-MIB, OLD-CISCO-TS-MIB, RFC1213-MIB (per the agent capabilities specified in the, CISCO-RFC1213-CAPABILITY.my), RFC1253-MIB, RMON-MIB, RMON2-MIB, SNMP-FRAMEWORK-MIB, SNMP-MPD-MIB, SNMP-NOTIFICATION-MIB, SNMP-TARGET-MIB, SNMPv2-MIB, TCP-MIB, UDP-MIB	
		1000BASE-T ports, 1000BASE-X (SFP), 1000BASE-SX	
	Network Transfer Rate	10 Base-T (half-duplex)	10 Mbps
		10 Base-T (full-duplex)	20 Mbps
		100 Base-TX (half-duplex)	100 Mbps
		100 Base-TX (full-duplex)	200 Mbps
		1000 Base-TX (half and full-duplex)	2000 Mbps
		1000 Base-SX (full-duplex)	2000 Mbps
	Connector	4 SFP, 2 RJ-45 10/100/1000 T/TX/T, 1 DB-9	

Technical Specifications

EMI	FCC Part 15 Class A	
	EN 55022: 1998 (CISPR22)	
	EN 55024: 1998 (CISPR24)	
	CNS 13438 Class A MIC	
	CD	
	MIC	
	AS/NZS 3548 Class A CE	
	VCCI Class A	
Safety	UL to UL 60950, Third Edition	
	C-UL to CAN/CSA C22.2 No. 60950-00, Third Edition	
	TUV/GS to EN 60950:2000	
	CB to IEC 60950 with all country deviations	
	NOM to NOM-019-SCFI	
	CE Marking	
Power Requirements	-48VDC: 1050 mA, 125 W maximum (per interconnect switch)	
Temperature Range	Operating	50° to 95° F (10° to 35° C)
	Non-operating	-22° to 140° F (-30° to 60° C)
Relative Humidity (non-condensing)	Operating	20% to 80%
	Non-operating	5% to 95%
Wet Bulb Temperature	Operating	82.4° F (28° C)
	Non-operating	101.7° F (38.7° C)

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Environment-friendly Products and Approach

End-of-life Management and Recycling

Hewlett-Packard offers end-of-life HP product return, trade-in, and recycling programs in many geographic areas. For trade-in information, please go to http://www.hp.com/go/green. To recycle your product, please go to: http://www.hp.com/go/green or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: http://www.hp.com/go/green. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.