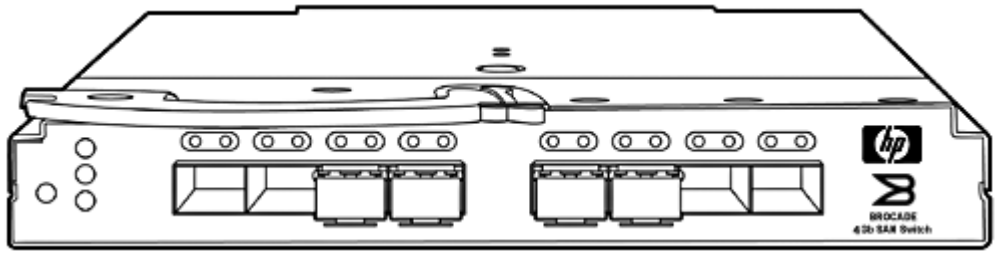
Overview

The Brocade 4Gb SAN Switch for HP c-Class BladeSystem delivers an easy to manage embedded Fibre Channel switch solution with 4 Gbps performance to HP BladeSystem c-Class customers deploying a small SAN or expanding their current SAN. The Brocade 4Gb SAN Switch hot-plugs into the back of the HP BladeSystem c-Class Enclosure, freeing up rack space. Server and switch interconnects internal to the BladeSystem reduce cabling, SFPs and associated costs while increasing reliability. Shared power and cooling resources further reduce costs and additional points of failure. Employing high speed technology for storage networking, trunking between the SAN facing ports and external HP StorageWorks B-series switches provides a higher bandwidth solution. External facing ports auto-sense lower bandwidth components for flexibility and investment protection. Previously, deployments using Fibre Channel-based high speed storage networks connected servers to the network through ports on stand-alone switches external to the BladeSystem. Now IT managers have the ability to consolidate multiple HP servers, Fibre Channel switches, and Ethernet switches into a single platform for connectivity to the networked infrastructure at a lower cost than ever before. Multiple switches coupled with dual-redundant server connections ensure a highly available solution. This integration of technology results in space and cost savings due to a reduction of physical components, significant simplification of the SAN environment, outstanding performance, and easier deployment.

Providing the best value and performance-enhancing features in a 12- or 24-port embedded SAN switch with the option to scale to larger fabrics on a "pay-as-you-grow" basis, the Brocade 4Gb SAN Switch enables increased productivity and substantial cost savings. The new Access Gateway feature enables fabric interoperability, greater scalability and simplified management while the Dynamic Ports on Demand (DPOD) feature enables flexibility in switch port allocation without constraining server slot population.



Brocade 4Gb SAN Switch

Integrated design	• The Brocade 4Gb SAN Switch hot-plugs into the back of the HP BladeSystem enclosure, freeing up rack space. Server and switch interconnects internal to the BladeSystem reduce cabling, SFPs and associated costs while improving reliability. Shared power and cooling resources reduce cost and additional points of failure.
Integrated 4Gb Auto-sensing SAN connectivity	• Employs high speed technology for storage networking. External facing ports auto-sense lower bandwidth components for flexibility and investment protection (4Gb, 2Gb or 1Gb).
Fabric interoperability and scalability	• Employs N_Port ID Virtualization (NPIV), an ANSI T11 standard, to enable interoperability with any supported SAN fabric and eliminate domain considerations for improving SAN scalability.
Redundant switches per enclosure	• The HP BladeSystem c-Class accepts up to six Fibre Channel switches per enclosure. Multiple switches coupled with redundant server connections ensure a highly available solution.
Broad range of management tools	• Integrates with the HP Onboard Administrator for BladeSystem, HP Systems Insight Manager, and HP Storage Essentials and leverages HP B-series SAN Switch management and monitoring tools. It also provides interfaces for other SAN management applications, and is SMI compliant.
Available in three models for greater flexibility	• Available in 12-port Full Fabric, 24-port Full Fabric and 24-port Power Pack models. Choose the features and management options the makes the best sense for your BladeSystem enclosure and SAN needs.

Overview

Dynamic Ports on Demand (DPOD)	• Automatically discovers 'online' ports and assigns an available license. Enables the flexibility to connect server blades to switch ports without regard for the server slot populated - the associated switch ports will be automatically activated as the server ports are deployed. Ports are activated on a first-come, first-served basis for any combination of locations, including external ports. (DPOD is applicable only to the 4/12 switch.)
Scalable licensing	• Supports instant non-disruptive scaling for the 12 port switch by provisioning 12 additional ports via a license key upgrade. Enables 'pay as you grow' scalability for easy, scalable growth in highly dynamic business environments.
Performance: non-blocking architecture	• The non-blocking architecture includes connection speed support for all ports to provide a high-performance system with aggregate bandwidth of 192 Gbps (24 ports x 4 Gbps x 2 for full duplex)
Dynamic Path Selection (DPS)	• Improves performance by dynamically routing data traffic across multiple links and trunk groups.
Support for long distances	• Enables deployment of high-performance distance solutions of up to 166 km for disaster recovery/business continuance or data center consolidation. Improves application uptime, productivity, and investment protection.
SMI-s Conformance	• Provides an SMI-s standards-based API that enables administrators and software developers to use industry standard interfaces to integrate management for the Brocade 4Gb SAN Switch for HP c-Class BladeSystem with other applications in their storage environments.

Product Highlights

Advanced Fabric Services

- Hardware Enforced Zoning (included)*
- Dynamic Path Selection (included)*
- WebTools (included)
- Enhanced Group Management (EGM)
- Data Center Fabric Manager (optional)
- Power Pack fabric services software bundle (optional)
  - ISL Trunking
  - Fabric Watch*
  - Extended Fabrics*
  - Advanced Performance Monitoring*

* Not supported in Brocade Access Gateway mode.

Manageability

- WebTools (included with the switch)
- Enhanced Group Management (EGM)
- Data Center Fabric Manager (optional)
- Advanced Performance Monitoring (optional Power Pack upgrade)
- HP Systems Insight Manager (included with HP BladeSystem)
- HP Storage Essentials (optional)
- API
- SNMP
- SMI

Interoperability

Brocade Access Gateway, a feature enabled in Fabric OS v5.2.1b and later, enables Brocade blade server SAN switches to interoperate with other SAN fabrics running supported firmware. While in Brocade Access Gateway mode, the device must also be connected to an NPIV-enabled edge switch or director. Supported edge environments are listed in the Brocade Fabric OS® release notes.

Software Components, Standard

Access Gateway*

Included with Fabric OS v5.2.1b and later, Brocade Access Gateway Mode enables seamless connectivity for Brocade blade server SAN switches to any SAN fabric, enhances scalability, and simplifies manageability. Utilizing N_Port ID Virtualization (NPIV) standards, Brocade Access Gateway eliminates switch/domain considerations.

* Brocade Access Gateway mode does not support many switch-related features.. Please refer to the latest Fabric OS Release Notes and Access Gateway Administrator's Guide for details.

Frame Filtering

A special B-Series ASIC-based capability that enables new applications and features. The switch has the ability to "view" the first 64-bytes of the Fibre Channel frame. At this time, Frame Filtering enables advanced capabilities such as Advanced Zoning and Advanced Performance Monitoring (optional).

Product Highlights

Advanced Zoning	Zoning (Port and Worldwide Name), as well as Access Control, are enforced by hardware within the ASIC that provides the same simple administration previously enforced only with software. Hardware enforcement enables the highest level of zoning enforcement without any impact to performance. Administrators can organize a physical fabric into logical groups and prevent unauthorized access by devices outside the Zone.
WebTools - included in Brocade Fabric OS	Enables organizations to monitor and manage single Fibre Channel switches and monitor small SAN fabrics. Tasks can be performed through a Java-capable Web browser from a standard laptop, desktop PC or workstation from any location within the enterprise.
EGM	Enhanced Group Management (EGM) is a FOS license that is included with all B-Series switches and enables multi-switch operations. It helps automate operations across multiple switches to save time and streamline repetitive operations, which are typically prone to error. EGM drives consistency across fabrics, while minimizing the risk associated with potential downtime due to configuration mismatches. EGM provides streamlined troubleshooting for more effective fabric monitoring and diagnosis. Both Data Center Fabric Manager Professional and Enterprise enable EGM functionality. Customers have EGM functionality enabled within the hardware product and need only to make the decision around which management application is right for them - Data Center Fabric Manager Professional or Enterprise.
Dynamic Path Selection	Improves performance by dynamically routing data traffic across multiple links and trunk groups.

Software Components, Optional

Power Pack Software Bundle	The Power Pack Software Bundle includes: • ISL Trunking • Advanced Performance Monitoring* • Extended Fabrics* • Fabric Watch* * Not supported in Access Gateway mode
ISL Trunking	For high performance enhanced Trunking, this optional license logically groups up to four E-ports to provide a high bandwidth trunk between two Brocade or HP B-Series switches. Each switch needs its own license. The fabric operating system views the trunk as a single, high bandwidth ISL resource (up to 16 Gb when routing connections between 4Gb capable switches). Each 24-port switch can have a total of two 4-port Trunk groups for a total of up to 32 Gb throughput when routing connections between 4Gb capable switches. Connections are load-balanced across the individual links, which comprise the logical trunk group.
Fabric Watch	Fabric Watch enables each switch to monitor the health of the SAN for potential faults-and automatically alert network managers to problems before they become failures. Fabric Watch tracks a variety of SAN fabric elements, events, and counters. Monitoring fabric-wide events, ports, SFPs, and environmental parameters permits early fault detection and isolation as well as performance measurement. Each switch in the SAN needs its own Fabric Watch license.

Product Highlights

Advanced Performance Monitoring	This enabling technology helps administrators monitor application data traffic from a SID (Source ID) to a DID (Destination ID), so they can fine-tune and scale the fabric more efficiently. Plus, Advanced Performance Monitoring includes the ability for early warning detection of hot spots within the fabric, a powerful tool for maximizing SAN performance.
Extended Fabrics	Extends the native Fibre-Channel traffic up to 166 km. Extended Fabrics increases the scalability all of the scalability, reliability, and performance benefits of Fibre Channel Storage Area Networks (SANs) beyond the native 10 km distance specified by the Fibre Channel standard.
Data Center Fabric Manager Professional	HP StorageWorks Data Center Fabric Manager Professional is a server based management application available at no-charge and comes with B-series SAN Switches and includes the following features: • Allows management of a single Fabric OS (FOS) fabric (up to a 1,000 B-Series switch ports) at a time • Performs group switch management beyond the scope of Web Tools • Does not offer management of the DC SAN Backbone Director It is targeted for SMB customers that use FOS based SAN fabrics and require a management solution for smaller SANs based on a single fabric. SMB customers that initially start off with Data Center Fabric Manager Professional and have a small SAN environment may over time feel the need for an enterprise-class product (Data Center Fabric Manager Enterprise) as their environments start to grow in size and complexity, and as they start to uptake more enterprise-class functionality (such as Fibre Channel Routing, FCIP, etc.). A non-disruptive upgrade path is available from Data Center Fabric Manager Professional to Data Center Fabric Manager Enterprise.
Secure Fabric OS - included in Brocade Fabric OS	Secure Fabric OS features have been fully integrated into the base Fabric OS since v5.3.0. These comprehensive security features for SAN fabrics provide policy-based security protection for more predictable change management, assured configuration integrity and reduced risk of downtime. Security methods supported include digital certificates and digital signatures, multiple levels of password protection, strong password encryption and Public Key Infrastructure (PKI)-based authentication, and 128-bit encryption of the switch's private key used for digital signatures. These features enable organizations to customize SAN security to meet specific policy requirements and work in conjunction with Advanced Zoning to further secure access to the SAN, simplify storage management, and reduce provisioning time.
Data Center Fabric Manager Enterprise	HP StorageWorks Data Center Fabric Manager Enterprise is a server based enterprise-class product that supports FOS products as well as FOS and M-EOS products together. It provides complete DC SAN Backbone Director management including enterprise-class features/environments such as FICON, Fibre Channel Routing, FCIP, Adaptive Networking, etc. It also delivers unprecedented scalability with support for up to 24 SAN fabrics and 9,000 B-series switch ports. HP will provide a free license upgrade to Data Center Fabric Manager Enterprise for existing HAFM/FM customers that have an active maintenance and support contract at the time Data Center Fabric Manager Enterprise is available. Data Center Fabric Manager does require at least one FOS based B-series SAN switch.

Product Highlights

BladeSystem compatibility

The Brocade 4Gb SAN Switch for HP c-Class BladeSystem must be deployed with the c-Class BladeSystem infrastructure and is compatible only with HP BladeSystem c-Class Enclosures.

HP ProLiant Servers	ProLiant BLc server blades
HP Integrity Servers	Integrity BLc server blades
HP BladeSystem c-Class Enclosures	HP BladeSystem c7000 and c3000 Enclosures

Switch interoperability

HP StorageWorks B-Series Switches, Directors, and Routers and HP interconnect modules

8Gb Switches and Directors
8/8 SAN Switch
8/24 SAN Switch
8/40 SAN Switch
8/80 SAN Switch
DC SAN Backbone Director

4Gb Switches and Directors
Brocade 4Gb SAN Switch for HP p-Class BladeSystem
4/8 SAN Switch
4/16 SAN Switch
4/32 SAN Switch
4/64 SAN Switch
4/256 SAN Director

2Gb Switches and Directors
MSA SAN Switch 2/8
SAN Switch 8
SAN Switch 16
SAN Switch 8-EL
SAN Switch 2/8V
SAN Switch 16-EL
SAN Switch 2/16N FF
SAN Switch 2/32
Core Switch 2/64
SAN Director 2/128

Multi-Protocol Routers and Gateways
Multi-Protocol (MP) Router
400 Multi-Protocol Router
Multi-Protocol Router Blade

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

Service and Support, HP Care Pack, and Warranty Information

Warranty

(1-1-1) Hardware Warranty - One-year on-site warranty, normal business hours, next business day response, installation not included.
NOTE: The hardware warranty covers firmware and embedded non-saleable software. Saleable software carries its own warranty, please see below.

Software Warranty: HP warrants only that the software media will be free of physical defects for a period of ninety (90) days from delivery.
EXCLUSIVE REMEDY: The entire liability of HP and its suppliers and your exclusive remedy for software that does not conform to this Limited Warranty shall be the repair or replacement of the defective media. This warranty and remedy are subject to your returning the defective media during the warranty period to HP in the country in which you obtained the software.

HP Service & Warranty Support

HP Service & Warranty Support Additional Warranty protection and/or HP Installation packages can be purchased.
NOTE: Certain restrictions and exclusions apply. Consult the Customer Support Center for details. HP provides a one-year, hardware limited warranty, fully supported by a worldwide network of resellers and service providers.
In addition, available service offerings include a full range of HP Care Pack packaged hardware and software services:

- Installation
- Extended coverage hours and enhanced response times
- System management and performance services

For more information on warranty and support options, please visit our Web site at: http://www.hp.com/hps/tech/storage/supp/.

Software Product Services

- Stand-alone telephone support
- Rights to new license version
- Media and documentation updates

Hardware Product Services

- Installation services
- On-site maintenance (includes warranty support)
- Response time upgrades during the warranty period
- Post-warranty coverage

The embedded SAN switches for HP BladeSystem c-Class are not covered under the BladeSystem c7000 Enclosure Care Packs; the SAN switches carry separate Care Packs. SAN Switch Care Pack service level support should always be uplifted to match existing storage or server service levels.

NOTE: The HP Care Pack service part numbers below covers the Brocade 4/12 SAN Switch & Brocade 4/24 SAN Switch

Hardware Services On-site Service

Next Business Day On-site Service, 5-Day x 9-Hour Coverage, 3 Years, Electronic	UE436E
4-Hour On-site Service, 5-Day x 13-Hour Coverage, 3 Years, Electronic	UE437E
4-Hour On-site Service, 7-Day x 24-Hour Coverage, 3 Years, Electronic	UE438E
6-Hour Call to Repair, On-site Service, 7-Day x 24-Hour Coverage, 3 Years, Electronic	UE439E

Next Business Day On-site Service, 5-Day x 9-Hour Coverage, 4 Years, Electronic	UE440E
4-Hour On-site Service, 5-Day x 13-Hour Coverage, 4 Years, Electronic	UE441E
4-Hour On-site Service, 7-Day x 24-Hour Coverage, 4 Years, Electronic	UE442E
6-Hour Call to Repair, On-site Service, 7-Day x 24-Hour Coverage, 4 Years, Electronic	UE443E
Next Business Day On-site Service, 5-Day x 9-Hour Coverage, 5 Years, Electronic	UE444E
4-Hour On-site Service, 5-Day x 13-Hour Coverage, 5 Years, Electronic	UE445E
4-Hour On-site Service, 7-Day x 24-Hour Coverage, 5 Years, Electronic	UE446E
6-Hour Call to Repair, On-site Service, 7-Day x 24-Hour Coverage, 5 Years, Electronic	UE447E
Hardware Installation, Electronic	U5988E
NOTE: The HP Care Pack service part numbers below covers the Brocade 4/24 SAN Switch Power Pack	
Hardware Services On-site Service	
Support Plus	
Onsite HW support, 8am-9pm, M-F, 4hr response and SW Tech support offsite, onsite at HP's discretion, 8am-9pm, M-F 2hr response time excl. HP holidays, 3 Years, Electronic	UE728E
Onsite HW support, 8am-9pm, M-F, 4hr response and SW Tech support offsite, onsite at HP's discretion, 8am-9pm, M-F 2hr response time excl. HP holidays, 4 Years , Electronic	UF309E
Onsite HW support, 8am-9pm, M-F, 4hr response and SW Tech support offsite, onsite at HP's discretion, 8am-9pm, M-F 2hr response time excl. HP holidays, 5 Years , Electronic	UF311E
Support Plus 24	
Onsite HW support 24x7, 4hr response and SW Tech support offsite, onsite at HP's discretion, 24x7 2hr response time incl. HP holidays, 3 Years, Electronic	UE729E
Onsite HW support 24x7, 4hr response and SW Tech support offsite, onsite at HP's discretion, 24x7 2hr response time incl. HP holidays, 4 Years, Electronic	UF310E
Onsite HW support 24x7, 4hr response and SW Tech support offsite, onsite at HP's discretion, 24x7 2hr response time incl. HP holidays, 5 Years, Electronic	UF312E

HP Care Pack Services Warranty Upgrade Options

Service offerings include a full range of Customer HP Care Pack services for both hardware and software services:

- Response – Upgrade on-site response from next business day to same day 4-hours
- Coverage – Extend hours of coverage from 5 days x 9 hours to 7 days x 24 hours
- Duration – Select duration of coverage for a period of 1, 3, or 5 years

Additional Warranty protection and/or HP Installation packages can be purchased.

NOTE: Certain restrictions and exclusions apply. Consult the HP Customer Support Center for details

Service and Support, HP Care Pack, and Warranty Information

HP Care Pack Information

HP Care Pack is defined as an upgrade to the product warranty attribute, available for a specific duration and hours of coverage.

- HP Care Pack is not available for less than the product's warranty duration.
- HP Care Pack is available for sale anytime during the warranty period for most products, but the commencement date will be the same as the Warranty Start Date (delivery date to end user customer). Proof of purchase may be required.
- HP Care Pack services are prepaid.

For additional HP Care Pack (hardware & software) information, as well as orderable part numbers, please refer to the URL listed below:
http://h18005.www1.hp.com/services/carepaq/index.html

Additional Services

Implementation service, SAN Architecture service. For more information on service options, please visit our Web site at: http://www.hp.com/go/san.

Step 1 – Base Configurations

Select one:

Model Name	Model Description	Part Number
HP Brocade 4/12 SAN Switch	(1) 4Gb SAN Switch; 12 ports enabled for any combination (internal and external); two (2) short wave 4Gb SFPs; WebTools license; Zoning license; full fabric connectivity; documentation	AE370A*
HP Brocade 4/24 SAN Switch	(1) 4Gb SAN Switch; 24 ports enabled (16 internal, 8 external); four (4) short wave 4Gb SFPs; WebTools license; Zoning license; full fabric connectivity; documentation	AE372A*
HP Brocade 4/24 SAN Switch Power Pack	(1) 4Gb SAN Switch; 24 ports enabled (16 internal, 8 external); four (4) short wave 4Gb SFPs; WebTools license; Zoning license; full fabric connectivity; documentation and includes Power Pack Bundle and management tools (see software components, optional) *NOTE: #0D1 may appear after this part number on your sales order when factory integration is indicated.	AE371A*

Step 2 – Additional Options

Select each type of required options with quantities specified:

Hardware:

Model Name	Model Description	Part Number
4Gb Optical Transceivers (SFPs)	Short Wave:	A7446B
	Long Wave - 10 km	AE493A
Optical cables	OM3 LC-LC type cables	
	.5 m LC-LC Multi-Mode OM3 Fibre Channel Cable	AJ833A
	1 m LC-LC Multi-Mode OM3 Fibre Channel Cable	AJ834A
	2 m LC-LC Multi-Mode OM3 Fibre Channel Cable	AJ835A
	5 m LC-LC Multi-Mode OM3 Fibre Channel Cable	AJ836A
	15 m LC-LC Multi-Mode OM3 Fibre Channel Cable	AJ837A
	30 m LC-LC Multi-Mode OM3 Fibre Channel Cable	AJ838A
	50 m LC-LC Multi-Mode OM3 Fibre Channel Cable	AJ839A
	OM2 LC-LC type cables	
	2 m LC-LC Multi-Mode Fibre Channel Cable	221692-B21
	5 m LC-LC Multi-Mode Fibre Channel Cable	221692-B22
	15 m LC-LC Multi-Mode Fibre Channel Cable	221692-B23
	30 m LC-LC Multi-Mode Fibre Channel Cable	221692-B26
	50 m LC-LC Multi-Mode Fibre Channel Cable	221692-B27
	OM2 LC-SC type cables	
	2 m LC-SC Multi-Mode Fibre Channel Cable	221691-B21
	5 m LC-SC Multi-Mode Fibre Channel Cable	221691-B22
	15 m LC-SC Multi-Mode Fibre Channel Cable	221691-B23
	30 m LC-SC Multi-Mode Fibre Channel Cable	221691-B26
	50 m LC-SC Multi-Mode Fibre Channel Cable	221691-B27

Configuration Information

Software:

Power Pack Software Bundle	For upgrading Full Fabric switches to Power Pack Includes bundled license for: • ISL Trunking • Advanced Performance Monitoring • Fabric Watch • Extended Fabrics	T3573A
Optional Software	HP Brocade 4/12 SAN Switch 12-port Upgrade LTU	AE373A
	Fabric Watch	324504-B21
	ISL Trunking	324506-B21
	Advanced Performance Monitoring	324507-B21
	Extended Fabrics	324505-B21
	Secure Fabric OS	332924-B21
	Data Center Fabric Manager Enterprise	T5542A

Family Comparison

Features	4/8 SAN Switch Base and 4/8 SAN Switch	4/16 SAN Switch and 4/16 SAN Switch Power Pack	4/32 SAN Switch and 4/32 SAN Switch Power Pack	4/64 SAN Switch and 4/64 SAN Switch Power Pack	4/256 SAN Director and 4/256 SAN Director Power Pack
Targeted Environment	Workgroups, Departments	Workgroups, Departments	Workgroups, Departments	Workgroups, Departments	Data Centers
Port Bandwidth	4Gbit/sec	4Gbit/sec	4Gbit/sec	4Gbit/sec	4Gbit/sec
Aggregate device bandwidth	64 Gbit/sec end-to-end	128 Gbit/sec end-to-end	128-256 Gbit/sec end-to-end	512 Gbit/sec end-to-end	3.264Tbit/sec end-to-end
OS Support	NOTE: Please Refer to SAN Design Guide pointer http://www.hp.com/go/SANdesign or http://www.hp.com/go/SANdesignguide				
Storage system support	MA8000, EMA12000/ EMA16000, EVA,XP, VA, MSA	MA8000 EMA12000/ EMA16000 EVA, XP, VA, MSA	MA8000 EMA12000/ EMA16000 EVA, XP, VA, MSA	MA8000 EMA12000/ EMA16000 EVA, XP, VA, MSA	MA8000 EMA12000/ EMA16000, EVA,XP,VA, MSA
Ports	16 SFP	16 SFP	32 SFP	32 SFP Base 64 64 SFP PP	Up to 384 SFP
Cascading support	Yes	Yes	Yes	Yes	Yes
Advanced Trunking	Optional Upgrade	Included with Power Pack or Optional Upgrade	Included with Power Pack or Optional Upgrade	Included with Power Pack or Optional Upgrade	Included with Power Pack or Optional Upgrade
Form factor	1U	1U	1U	2U	14U
Zoning Software	Yes (Included)	Yes (Included)	Yes (Included)	Yes (Included)	Yes (Included)
Hot plug, redundant power supplies	No	No	Yes	Yes	Yes
Hot plug fans	No	No	Yes	Yes	Yes
Enterprise Backup Solution (EBS) support	Yes	Yes	Yes	Yes	Yes

Features	Brocade 4Gb SAN Switch for HP c-Class BladeSystem	MSA SAN Switch 2/8 (embedded switch)	HP 400 Multi-protocol Router	B-Series Multi-protocol Router Blade
Targeted Environment	Workgroups, Departments	Workgroups, Departments	Workgroups, Departments	Data Centers
Port Bandwidth	4 Gbit/sec	2 Gbit/sec	4 Gbit/sec Ethernet: 1 Gbit/sec	4 Gbit/sec Ethernet: 1 Gbit/sec
Aggregate device bandwidth	192 Gbit/sec end-to-end	32 Gb/sec end-to-end	128 Gbit/sec end to end	N/A
OS Support	NOTE: Please Refer to SAN Design Guide pointer: http://www.hp.com/go/SANdesign or http://www.hp.com/go/SANdesignguide			
Storage system support	MSA, EVA, XP	MSA 1000	MSA, EVA, XP	MSA, EVA, XP
Ports	4 or 8 external / 8 or 16 internal	7 external / 1 internal	18 ports: 16 FC and 2 Gigabit Ethernet	18 ports: 16 FC and 2 Gigabit Ethernet
Cascading support	Yes	Yes	Yes	Yes

Family Comparison

Advanced Trunking	Optional Upgrade	Optional Upgrade	Optional Upgrade	Optional Upgrade to chassis
Form factor	Embedded	Embedded	1U	Blade in Director
Zoning Software	Yes (Included)	Yes (Included)	Yes (Included)	Yes (Included)
Hot plug, redundant power supplies	Yes, in BladeSystem Enclosure	No	Yes	Yes, in director chassis
Hot plug fans	Yes, in BladeSystem Enclosure	No	Yes	Yes, in director chassis
Enterprise Backup Solution (EBS) support	Yes	Yes	Yes	Yes

Technical Specifications

Fibre Channel ports	Brocade 4/12 SAN Switch model: 12 4Gb ports in any internal/external port combination (ships with two 4Gb short wave SFPs) Brocade 4/24 SAN Switch models: 16 internal 4Gb ports and 8 external 4Gb auto-sensing ports (ships with four 4Gb short wave SFPs)		
Device support and Scalability guidelines	http://h18006.www1.hp.com/products/storageworks/san/documentation.html		
Performance	4 Gb/sec line speed, full duplex		
Certified maximum	Certified maximum information available at: http://h18006.www1.hp.com/products/storageworks/san/documentation.html		
Switch core	Non-blocking		
Fabric latency	1.2 μ sec. with no contention, cut-through routing at 4Gb. Latency increases as input port speed increases and becomes disparate from output port speed.		
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; N_Port, self-discovery based on switch type (U_Port)		
Data traffic types	Fabric switches supporting unicast and broadcast		
Media types	Small Form-Factor Pluggable (SFP) Transceiver. 1/2/4Gb short wave up to 500 m (1,640 ft.) and 1/2/4Gb long wave* up to 10 km		
Laser	Short-wave and long-wave laser transceivers (SFP's) are supported		
	Distance using short-wave 4Gb optical transceivers at 2Gb and 4Gb connection speed:		
	4 Gb:	OM3 fiber: 270 m	
		OM2 fiber: 150 m	
	2 Gb:	OM3 fiber: 500 m	
		OM2 fiber: 300 m	
Fabric services	Simple Name Server, Registered State Change Notification (RSCN). Includes Advanced WebTools, Enhanced group Management, and Advanced Zoning. Optional fabric services include: Fabric Watch, ISL Trunking, Advanced Performance Monitoring, and Extended Fabrics.		
Options	SFP media, port upgradeable licensing, advanced management software licensing		
Supported software	Telnet, SNMP (FE MIB, FC Management MIB), HP Systems Insight Manager, HP Storage Essentials, HP Onboard Administrator for BladeSystem, Advanced WebTools, Enhanced group Management, Advanced Zoning, Data Center Fabric Manager, Fabric Watch, and Advanced Performance Monitoring		
Management access	WebTools, SMI-s provider, SNMP, Telnet, and Secure Telnet		
Diagnostics	POST and embedded online/offline diagnostics		
Dimensions	Depth	11.00 in. (with handle protrusion)	
	Height	1.13 in.	
	Width	7.63 in.	
	Weight	Approx. 2.85 lb - without media	
Environment	**System Inlet Temperature**	Operating	10° to 35°C (50° to 95°F) at sea level with an altitude derating of 1.0°C per every 305m (1.8°F per every 1000ft) above sea level to a maximum of 3050m (10,000ft), no direct sustained sunlight. Maximum rate of change is 10°C/Hr (18°F/Hr). The upper limit may be limited by the type and number of options installed. System performance may be reduced if operating with a fan fault or above 30°C (86°F).
		Non-operating	-30° to 60°C (-22° to 140°F). Maximum rate of change is 20°C/Hr (36°F/Hr).

	Relative Humidity	Operating	10 to 90% relative humidity (Rh), 28°C (82.4°F) maximum wet bulb temperature, non-condensing.
		Non-operating	5 to 95% relative humidity (Rh), 38.7°C (101.7°F) maximum wet bulb temperature, non-condensing.
	Altitude	Operating	3050 m (10,000 ft). This value may be limited by the type and number of options installed. Maximum allowable altitude change rate is 457 m/min (1500 ft/min).
		Non-operating	9144 m (30,000 ft). Maximum allowable altitude change rate is 457 m/min (1500 ft/min).
Vibration	Operating	1 G, 10-500 Hz, 60 minutes per axis	
	Non-operating	2 G, 10-500 Hz, 30 minutes	
Shock	Operating	Half-sine-wave shock, 40 G, 2 ms duration, in each direction of three mutually perpendicular axes.	
	Non-operating	Half-sine-wave shock, 140 G, 2 ms duration, in each direction of three mutually perpendicular axes; and square-wave shock up to 80 G, 180 inches/s velocity change, in each direction of three mutually perpendicular axes.	

EMI

CFR 47 Subpart B of Part 15 of the FCC Rules, Class A level
CISPR22 Class A
EN55022 Class A
VCCI Class A ITE
AS/NZS 3548 Class A
CNS 13438 Class A
EMC Directive (89/336/EEC) for CE Marking in European Union

Safety

Underwriters Laboratories, UL60950
Canadian Standards Association, CSA60950
TUV Rheinland of North America, EN60950
Nemko, EN60950
Low Voltage Directive (73/23/EEC) for CE Marking in European Union

Fibre Channel Standards And Revisions

FC-AL ANSI X3.272: 1996
FC-AL-2 INCITS 332: 1999
FC-GS-5 Rev 8.2 (under development, includes the following)
FC-GS-4 ANSI INCITS 387: 2004

- FC-GS-3 ANSI INCITS 348: 2001
- FC-GS-2 ANSI INCITS 288: 1999

FC-SW-4 Rev 7.7 (under development, includes the following)

- FC-SW-3 INCITS 384: 2004
- FC-SW-2 INCITS 355: 2001
- FC-SW INCITS 321: 1998

FC-VI INCITS 357: 2002
FC-TAPE INCITS TR-24: 1999
FC-DA INCITS TR-36: 2004 (includes the following)

- FC-FLA INCITS TR-20: 1998

FC-PLDA INCIT S TR-19: 1998

FC-SP Rev 1.73 (under development)
FC-MI-2 ANSI/INCITS TR-39-2005
FC-PI INCITS 352: 2002
FC-PI-2 INCITS 404: 2005
FC-FS-2 Rev 0.9 (under development, includes the following)

FC-FS INCITS 373: 2003

FC-LS Rev 1.2 (under development)
FC-BB-3 Rev 6.9 (under development, includes the following)

FC-BB-2 INCITS 372: 2003

FC-SB-3 INCITS 374: 2003 (replaces FC-SB ANSI X3.271: 1996; FC-SB-2 INCITS 374: 2001)
RFC 2625 IP and ARP Over FC
RFC 2837 Fabric Element MIB
MIB-FA INCITS TR-32: 2003
FCP-2 INCITS 350: 2003 (replaces FCP ANSI X3.269: 1996)
SNIA Storage Management Initiative Specification (SMI-S) Version 1.02 (ANSI INCITS 388: 2004)
SNIA Storage Management Initiative Specification (SMI-S) Version 1.1 (Draft)

© Copyright 2008 Hewlett-Packard Development Company, L.P.

The information contained herein is subject to change without notice.

The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.