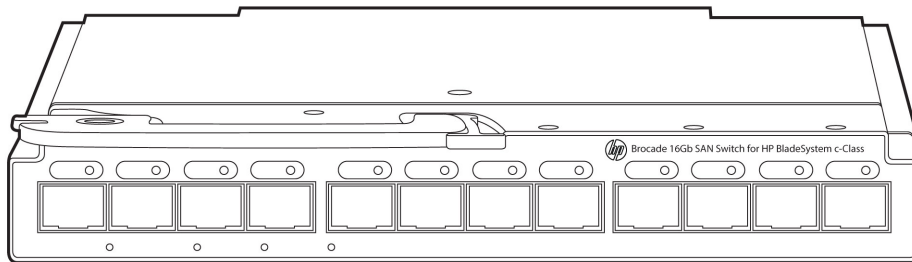# QuickSpecs

Overview

The Brocade 16Gb SAN Switch for HP BladeSystem c-Class represents an easy to manage next generation embedded Fibre Channel switch with 16 Gbps Fibre Channel performance. It hot-plugs into the back of the HP BladeSystem c-Class Enclosure and its integrated design frees up rack space, enables shared power and cooling, and reduces cabling and small form-factor pluggables. Enhanced trunking support with external switches provides higher bandwidth to enable demanding applications and high density server virtualization. The Power Pack+ software option enables you to manage data flow to maintain optimized application performance. In addition, both internal and external facing ports auto-sense lower bandwidth components for flexibility and investment protection (4, 8 or 16 Gbps for external ports and 8 or16 Gbps for internal ports) and an upgrade license enables you to 'pay as you grow'. The Brocade 16Gb SAN Switch for HP BladeSystem c-Class saves space and cost, significantly simplifies the SAN environment, enables easier deployment and management, and delivers the performance required for emerging higher throughput applications.

The HP BladeSystem c7000 Platinum Enclosure is required to permit 16 Gbps speed on internal ports. Other HP BladeSystem c7000 Enclosures will have a maximum speed of 8 Gbps.

Brocade 16Gb SAN Switch for HP BladeSystem c-Class

Integrated SAN connectivity	● Enables data center consolidation with HP BladeSystem c-Class through a state-of-the-art zero-footprint design while lowering cost through shared power and cooling, fewer cables and SFPs and a reduction in space.
16 Gbps storage networking	● Enables support of virtualized environments and other emerging technologies through high-speed technology that doubles the performance of the storage network. Both internal and external facing ports auto-sense lower bandwidth components for flexibility and investment protection (4, 8 or 16 Gbps for external ports and 8 or16 Gbps for internal ports).
Non-blocking architecture	● Includes connection speed support for all ports to provide a high-performance system with aggregate bandwidth of 896 Gbps (28 ports x 16 Gbps x 2 for full duplex).
ISL Trunking performance enhancements	● Support for a single trunk made up of up to eight SAN ports for a total of up to 128 Gbps balanced throughput. Trunking of the SAN-facing ports with external Brocade or HP B-series switches provides a high-bandwidth solution while lowering costs through fewer SFPs and cables. F-Port Trunking supported in Access Gateway mode.
Adaptive Networking Services	● Enables organizations to better manage data flows and meet service level agreements while maintaining optimized application performance in virtual environments with Adaptive Networking services, including Adaptive Fabric Quality of Service, Traffic Isolation, and Ingress Rate Limiting.

Overview

Access Gateway mode	● Employs N_Port ID Virtualization (NPIV), an ANSI T11 standard, to enable interoperability with other SAN fabrics and eliminate domain considerations while improving SAN scalability.
Broad range of management tools and SMI-s conformance	● Integrates with HP Onboard Administrator for BladeSystem, HP Systems Insight Manager, and HP Storage Essentials and leverages HP B-series management and monitoring tools. An SMI-s API enables the use of industry standard interfaces to integrate management with other applications.
Available in three models with a scalable licensing option	● Available in 16-port, 28-port and 28-port Power Pack+ Full Fabric models. Choose the features and management options that make sense for your needs. In addition, enables 'pay as you grow' scalability for easy, scalable growth in dynamic business environments with a non-disruptive 12-port upgrade for the 16-port model.

What's New

- New 16 Gbps Fibre Channel embedded switch for HP BladeSystem c-Class
- 16 downlink Internal ports and 12 uplink (SFP+) external ports
- Internal Port Support for 8 and 16 Gb BladeSystem Mezzanine cards (See BladeSystem Compatibility for details)
- Support for up to 6 switches per c7000 chassis

Product Highlights

Advanced Fabric Services
- Hardware Enforced Zoning*
- Dynamic Path Selection*
- WebTools
- Enhanced Group Management (EGM)
- Power Pack+ fabric services software bundle (optional)
  - Fabric Vision
  - ISL Trunking
  - Fabric Watch**
  - Extended Fabrics*
  - Advanced Performance Monitoring**
- Secure Fabric OS (included in base FOS)*
- SAN Network Advisor (optional)

**Partial support in Access Gateway mode (see the Access Gateway Administrator´s guide for full details)
* Not supported in Brocade Access Gateway mode.

Manageability
- WebTools
- Enhanced Group Management (EGM)
- Advanced Performance Monitoring (optional Power Pack+ upgrade)
- HP OnBoard Administrator (included with HP BladeSystem)
- HP Systems Insight Manager (included with HP BladeSystem)
- HP Storage Essentials (optional)
- API
- SNMP
- SMI

Interoperability   Brocade Access Gateway mode enables the Brocade 16Gb SAN Switch for HP BladeSystem c-Class switch to interoperate with other SAN fabrics running supported firmware. While in Access Gateway mode, the device must 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*   Brocade Access Gateway Mode enables seamless connectivity for the Brocade 16Gb SAN Switch for HP BladeSystem c-Class to other supported SAN fabrics, 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, including most features in the Power Pack+ bundle. Please refer to the 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	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.
	SAN Network Advisor Professional, Professional Plus and Enterprise enable EGM functionality. Customers have EGM functionality enabled within the hardware product and need only to make the decision around which SAN Network Advisor application is right for them.
Dynamic Path Selection	Improves performance by dynamically routing data traffic across multiple links and trunk groups.
Secure 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.
Adaptive Networking Services	Adaptive Networking services optimize fabric behavior and ensure ample bandwidth for mission-critical applications. The tools currently include Quality of Service (QoS), Ingress Rate Limiting, Traffic Isolation, and Top Talkers. By assigning zones a high, medium, or low priority, QoS allocates bandwidth in the event of congestion to expedite high-priority traffic and keep all traffic flowing. Ingress Rate Limiting restricts data flow from less-critical hosts at preset bandwidths. Traffic Isolation assigns high-bandwidth data flows to specific ISLs. And Top Talkers measures the top bandwidth-consuming traffic in real time for a specific physical or virtual device, or end to end across the fabric.
	NOTE: Adaptive Networking Services are included by default in the switch firmware and do not require a separate license

Product Highlights

Server Application Optimization	Server Application Optimization (SAO) improves overall application performance for physical servers and virtual machines. SAO, when deployed with Brocade Fibre Channel HBAs, extends Brocade Adaptive Networking from the Brocade SAN fabric to the server infrastructure. This delivers application-level, fine-grain Quality of Service (QoS) management to the HBAs and related server applications. NOTE: Server Application Optimization (SAO) is included by default in the switch firmware and does not require a separate license **NOTE:** SAO requires Brocade HBA installed in the server

Software Components, Optional

Power Pack+ Software Bundle	The Power Pack+ Software Bundle includes: ● Fabric Vision ● ISL Trunking ● Advanced Performance Monitoring** ● Extended Fabrics* ● Fabric Watch** * Not supported in Access Gateway mode **Partial support in Access Gateway mode (see the Access Gateway Administrator´s guide for full details) **NOTE:** The Power Pack+ Software Bundle includes Fabric Vision, Fabric Watch, ISL Trunking, Extended Fabric and Advanced Performance Monitor. Adaptive Networking and Server Application Optimization features are included by default in the switch firmware and do not require a separate license
Fabric Vision	Fabric Vision offers innovative diagnostic, monitoring and management capabilities to help accelerate new application deployments, address SAN problems before they impact operations and reduce operational costs. It Includes ● Monitoring and Alerting Policy Suite: A policy-based monitoring tool with pre-built rules and automation that simplifies fabric-wide threshold configuration and monitoring. ● Flow Vision: A comprehensive tool that enables administrators to identify, monitor, and analyze specific application data flows without using taps to ensure optimized performance ● Health and performance dashboard: A single customizable screen displayed in HP SAN Network Advisor that contains all critical SAN information for convenient review and analysis Fabric Vision will be included by default in all HP StoreFabric B-series Fibre Channel switches and Directors bundled with Power Pack+ (with FOS 7.2.0a and later). In all other cases, Fabric Vision can be enabled on HP StoreFabric B-series Fibre Channel switches and Directors in any one of the following ways ● Application of the Fabric Vision LTU (FOS 7.2.0a and later) ● Application of the Power Pack+ LTU (FOS 7.2.0a and later) ● Upgrading existing Switch/Director loaded with Power Pack+ to FOS 7.2.0a or later ● Upgrading existing Switch/Director loaded with both Advanced Performance Monitor (APM) and Fabric Watch (FW) licenses to FOS 7.2.0a or later

Product Highlights

ISL Trunking
For high performance and seamless failover, this optional license logically groups up to eight E-ports (switch mode) or F-ports (Access Gateway mode) 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 128 Gbps when routing connections between 16 Gbps 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.

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 590 km. Extended Fabrics increases 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.

SAN Network Advisor Professional
HP SAN Network Advisor Professional is a management application available at no-charge and comes with B-series SAN Switches and:

- Allows management of a single Fabric OS (FOS) fabric (up to 1,000 switch ports) at a time
- Performs group switch management beyond the scope of Web Tools
- Does not offer management of the SN8000B 8-Slot or DC SAN Backbone Directors

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 SAN Network Advisor Professional and have a small SAN environment may over time feel the need for an enterprise-class product (SAN Network Advisor 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 SAN Network Advisor Professional to SAN Network Advisor Enterprise.

Product Highlights

SAN Network Advisor Enterprise and Professional+	HP SAN Network Advisor Enterprise and Professional+ are the enterprise-class products that support FOS products as well as FOS and M-EOS products together. SAN Network Advisor Enterprise provides complete SN8000B 8-Slot Director and DC SAN Backbone Director management including enterprise-class features/environments such as FICON, Fibre Channel Routing, FCIP, adaptive networking, etc while HP SAN Network Advisor Professional+ provides the same feature set except for support for the SN8000B 8-Slot Director, DC SAN Backbone Director, and FICON.

HP SAN Network Advisor Enterprise delivers unprecedented scalability, up to 36 fabrics and 9,000 switch ports, while HP SAN Network Advisor Professional+ scales to 36 SAN Fabrics and 2560 switch ports. To accommodate growth, there is an upgrade available to SAN Network Advisor Enterprise from SAN Network Advisor Professional Plus.

Both offerings provide brand-new features including Adaptive Networking features for quality of service, ingress rate limiting and traffic isolation zones. |

BladeSystem compatibility

The Brocade 16 Gb SAN Switch for HP BladeSystem c-Class must be deployed within the HP BladeSystem c-Class infrastructure and is compatible only with HP BladeSystem c-Class Enclosures.
NOTE: The HP BladeSystem c7000 Platinum Enclosure is required to permit 16 Gbps speed on the internal ports. Other HP BladeSystem c7000 Enclosures will have a maximum speed of 8 Gbps.

NOTE: The HP BladeSystem Onboard Administrator (OA) 4.0 is required when configuring the Brocade 16Gb SAN Switch for HP BladeSystem c-Class in a C7000 enclosure.

HP ProLiant Servers	ProLiant BLc server blades (ProLiant BLc server blades with support for 8Gb and 16Gb Fibre Channel Mezzanine cards - Please refer to the server and mezzanine card Quickspecs for details)
HP Integrity Servers	Integrity BLc server blades (Integrity BLc server blades with support for 8Gb Fibre Channel Mezzanine cards - Please refer to the server and mezzanine card Quickspecs for details)
HP FC HBA Mezzanines	8Gb and 16Gb HP Fibre Channel Mezzanine cards for Bladesystem c-Class are supported

- Please refer to the HP FC Mezzanine HBA Product QuickSpecs for server support details. 16Gb FC HBA Mezzanine support with the Brocade 16Gb SAN Switch for HP BladeSystem c-Class requires HP FOS 7.1.0_blv or later
- For more information on HP FC Mezzanine Host Bus Adapters, please refer to http://h18000.www1.hp.com/products/blades/components/c-class-adapters.html

NOTE: 4 Gb Fibre Channel Mezzanine adapters are not supported |
| **HP BladeSystem c-Class Enclosures** | HP BladeSystem c7000 Enclosure
NOTE: The HP BladeSystem c7000 Platinum Enclosure is required to permit 16 Gbps speed on the internal ports. Other HP BladeSystem c7000 Enclosures will have a maximum speed of 8 Gbps. |

Product Highlights

Switch interoperability

HP B-Series Switches, Directors, and Routers	**16 Gb Fibre Channel Switches and Directors**	● SN8000B Director Switch (Enterprise) ● SN6500B Fibre Channel Switch (High-end) ● SN6000B Fibre Channel Switch (Midmarket) ● SN3000B Fibre Channel Switch (Entry)
	8 Gb Switches and Directors	● DC SAN Backbone Director ● DC04 SAN Director ● 8/80 SAN Switch ● 8/40 SAN Switch ● 8/24 SAN Switch ● 8/8 SAN Switch ● Embedded switch for HP 4400 Enterprise Virtual Array ● Encryption SAN Switch ● Brocade 8Gb SAN Switch for HP c-Class BladeSystem
	4 Gb Switches and Directors	● Brocade 4Gb SAN Switch for HP c-Class BladeSystem ● 4/8 SAN Switch ● 4/16 SAN Switch ● x`4/32B SAN Switch ● 4/64 SAN Switch ● 4/256 SAN Director
	Virtual Connect	● HP Virtual Connect 4Gb Fibre Channel Module for HP c-Class BladeSystem ● HP Virtual Connect 8Gb 24-port Fibre Channel Module ● HP Virtual Connect 8Gb 20-port Fibre Channel Module ● Virtual Connect FlexFabric 24-Port Module for c-Class BladeSystem
	Multi-Protocol Routers and Gateways	● MPX200 Multiprotocol Router (iSCSI, FCIP, FC, FCoE) and Data Migration* ● Multi-protocol Extension Blade ● 10/24 Blade for DC SAN Directors ● 1606 Extension SAN Switch ● Multi-Protocol Router Blade

* Supported in the same fabric with Brocade 16Gb SAN Switch for HP BladeSystem c-Class, but not directly connected.

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.
Services Included with Product Purchase	The Power Pack+ Software Bundle includes one year of HP standard business hours, standard business days Software Support (includes software technical support and software product and documentation updates).
HP Service and Support	**Services to accelerate time to results** HP Storage Services bring you a rich portfolio of consulting and support services designed to add value to our core storage products and solutions. We have the know-how and experience to put storage technology to work for you. We work closely with you as your strategic partner, leveraging our full services portfolio to make sure that everything works to optimize your enterprise. Choose from services aligned to our storage product offerings and lifecycle. From mission-critical onsite services to innovative web-based remote support, you choose the precise level of attention and support your business demands. **HP Technology Services for BladeSystem** Capitalizing on HP BladeSystem capabilities requires a service partner who understands your increasingly complex business technology environment. That's why it makes sense to team up with the people who know HP infrastructure hardware and software best - the experienced professionals at HP Services. **Protect your business beyond warranty with HP Care Pack Services** HP Care Pack services offer complete care and support expertise with committed response choices designed to meet your IT and business needs. HP Foundation Care services offer scalable reactive support-packages for HP BladeSystem and software. You can choose the type and level of service that is most suitable for your IT and business needs. HP Proactive Care delivers high levels of system availability through proactive service management and advanced technical response.

Service and Support, HP Care Pack, and Warranty Information

Discover, plan, and design Choose from a rich portfolio of services to make the most of Brocade 16Gb SAN Switch for HP Blade System c-Class, so you can efficiently and affordably consolidate, manage, and extract value from unstructured data.

Start here to understand your HP HP 16Gb SAN Switch for HP Blade System c-Class options. Plan with confidence with services designed to help you detail the complete solution and specify the right storage area network (SAN) solutions technology.

HP Backup Recovery Efficiency Analysis - Assessment of how efficiently backup components are being used as the amount of data to be backed up continues to grow exponentially via analysis intelligence and a snapshot of your current backup environment. http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA3-8490ENW.pdf

HP Backup Recovery Impact Analysis - Focus placed on service requirements and design as the key to success for gaining a clear understanding of the role of increasingly diverse data protection strategies. http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA4-1175ENW.pdf

HP Backup Recovery Modernization - Initial discovery, interviews, reference architecture design, proposal content development, vendor grading, and final recommendations carried out so as to require minimal resources and locations on your part.
http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA4-1199ENW.pdf

Deploy and integrate Mitigate risk and accelerate storage implementation with services to improve capacity utilization to reduce costs as you establish information management standards applicable to backup, replication, and archiving needs.

HP Install Storage Blade Service - This easy-to-buy, easy-to-use HP Care Pack service helps ensure that your new HP hardware is installed smoothly, efficiently, and with minimal disruption of your IT and business operations.
http://h71028.www7.hp.com/ERC/downloads/5981-9356EN.pdf

HP Proactive Select - A flexible way to purchase services to fit your environment with an extensive menu of HP Proactive Select event and technical services, such as onsite firmware upgrades, health checks, assessments, and education
http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA2-3842ENW.pdf

HP Installation and Startup Services for HP BladeSystem c-Class Infrastructure c3000 or C7000 enclosures - Provides for hardware installation (c-Class ProLiant and Integrity server blades, storage blades, Ethernet Interconnects and Virtual Connect) and software installation and startup of a BladeSystem c7000 or c3000 Infrastructure in a single enclosure including deployment of OS (two servers), HP Insight Control and Server Deployment (RDP).
http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA0-5964ENW.pdf

Service and Support, HP Care Pack, and Warranty Information

Operate and support	Choose the right support to maximize uptime, free up your resources, and achieve improved value-as you get the most out of the existing IT assets while accelerating time-to-revenue. **HP Proactive Care 24x7 -** Hardware and software support services designed specifically for your technology with rapid access to Advanced Solution Center Specialists plus firmware and software management and best practice advice http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA3-8855ENW.pdf **HP Proactive Care Personalized Support -** An option-if you have HP Proactive Care- to bring increased personalization of the Proactive Care support experience through the assignment of an Account Service Manager (ASM) who provides IT best practice advice to help address IT issues and projects. http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA4-3446ENW.pdf **HP Education Services -** Comprehensive training for new, as well as experienced, storage administrators designed to expand your skills and keep you up to speed with the latest storage and virtualization technology from HP Storage. http://education.hp.com/curr-storsan.htm
Optimized Care - Delivers the highest levels of performance and stability through deployment and proactive management practices	Choose from levels of operate and support care **3-Year HP 6 hour Call to Repair Response, Proactive Care** Combined reactive and proactive support for hardware and software helping optimize your systems and delivering high levels of availability through proactive service management and advanced technical response. Hardware problem resolution to return the hardware in operating condition within 6 hours of the initial service request. A Technical Account Manager, as your single point of contact, will own your call or issue end to end until resolved. http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA3-8855EEE.pdf Additional options **HP Proactive Care Personalized Support (once per Proactive Care support new environment) and 10 HP Proactive Select credits per year**
Standard Care - maintains high level of uptime, along with expert help to cut the cost and complexity of implementation and support	**3-Year HP 24x7 4 hour response, Proactive Care Service** This service gives you combined reactive and proactive support including rapid access to our Advanced Solution Center to manage and prevent problems and a Technical Support Specialist with a broad level of technical knowledge that will engage with additional technical expertise as needed from HP's vast global resources. http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA3-8855EEE.pdf Additional options **HP Proactive Care Personalized Support (once per Proactive Care support new environment) and 10 HP Proactive Select credits per year**

Service and Support, HP Care Pack, and Warranty Information

Remote Support Automation	HP Insight Remote Support-Available at no additional cost to all warranty, HP Care Pack Service and service agreement customers, uses proven technology to deliver secure, reliable 24x7 remote monitoring, diagnosis and problem resolution. http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA2-4676ENW.pdf http://h18004.www1.hp.com/products/servers/management/insight-remote-support/overview.html

For more information	www.hp.com/services/storage To learn more on HP Storage Services, please contact your HP sales representative or HP Authorized Channel Partner HP Care Pack Services are sold by HP and HP Authorized Service Partners: ● Services for customers purchasing from HP or an enterprise reseller are quoted using HP order configuration tools. ● Customers purchasing from a commercial reseller can find HP Care Pack Services at www.hp.com/go/lookuptool

Configuration Information

Step 1 – Base Configurations

Select one:

	Part Number
Brocade 16Gb/16 SAN Switch for HP BladeSystem c-Class	C8S45A

- (1) 16 Gb SAN Switch
- 16 ports enabled for any combination (internal and external)
- full fabric connectivity
- documentation

Brocade 16Gb/28 SAN Switch for HP BladeSystem c-Class	C8S46A

- (1) 16 Gb SAN Switch
- 28 ports enabled (16 internal, 12 external)
- full fabric connectivity
- documentation

Brocade 16Gb/28 SAN Switch Pwr Pk+ for HP BladeSystem c-Class	C8S47A

- (1) 16 Gb SAN Switch
- 28 ports enabled (16 internal, 12 external)
- full fabric connectivity
- documentation and includes Power Pack+ Bundle and management tools (see software components, optional)

Step 2 – Additional Options

Select each type of required options with quantities specified:

Hardware:

Model Name	Model Description	Part Number
16 Gb Optical Transceivers (SFP+)	HP B-series 16Gb SFP+ Short Wave Transceiver	QK724A
	HP B-series 16Gb SFP+ Long Wave 10Km Transceiver	QK725A
	HP B-series 16Gb Long Wave 25km Fibre Channel SFP+ 1 Pack	H6Z29A
8 Gb Optical Transceivers (SFP+)	HP 8Gb Shortwave B-series Fibre Channel 1 Pack SFP+ Transceiver	AJ716B
	HP 8Gb Long Wave B-series 10km Fibre Channel 1 Pack SFP+ Transceiver	AJ717A
	HP B-series 8Gb Extended Long Wave 25km Fibre Channel SFP+ Transceiver 1 Pack	AW538A
Optical cables	**PremierFlex OM4 type cables**	
	HP Premier Flex LC/LC Multi-mode OM4 2 fiber 1m Cable	QK732A
	HP Premier Flex LC/LC Multi-mode OM4 2 fiber 2m Cable	QK733A
	HP Premier Flex LC/LC Multi-mode OM4 2 fiber 5m Cable	QK734A
	HP Premier Flex LC/LC Multi-mode OM4 2 fiber 15m Cable	QK735A
	HP Premier Flex LC/LC Multi-mode OM4 2 fiber 30m Cable	QK736A
	HP Premier Flex LC/LC Multi-mode OM4 2 fiber 50m Cable	QK737A
	LC-LC for between 4/8 Gb and 4/8 Gb Fibre Channel devices	
	HP LC to LC Multi-mode OM3 2-Fiber 0.5m 1-Pack Fiber Optic Cable	AJ833A
	HP LC to LC Multi-mode OM3 2-Fiber 1.0m 1-Pack Fiber Optic Cable	AJ834A
	HP LC to LC Multi-mode OM3 2-Fiber 2.0m 1-Pack Fiber Optic Cable	AJ835A
	HP LC to LC Multi-mode OM3 2-Fiber 5.0m 1-Pack Fiber Optic Cable	AJ836A
	HP LC to LC Multi-mode OM3 2-Fiber 15.0m 1-Pack Fiber Optic Cable	AJ837A
	HP LC to LC Multi-mode OM3 2-Fiber 30.0m 1-Pack Fiber Optic Cable	AJ838A

Configuration Information

	HP LC to LC Multi-mode OM3 2-Fiber 50.0m 1-Pack Fiber Optic Cable	AJ839A

Software:

Power Pack+ Software Bundle	Brocade 16Gb SAN Switch for HP BladeSystem c-Class Power Pack+ Upgrade LTU	TC464A
	(For upgrading Full Fabric 16 Gb SAN Switch for HP BladeSystem c-Class to Power Pack+). Includes bundled license for	TC464A

- Fabric Vision
- ISL Trunking
- Advanced Performance Monitoring
- Fabric Watch
- Extended Fabrics

NOTE: Adaptive Networking and Server Application Optimization features will be included by default in all Fabric OS releases for this switch and do not require a separate license

Optional Software	Brocade 8 and 16 Gb SAN Switch for HP BladeSystem c-Class 12-port Upgrade LTU	T5517A
	Brocade 8Gb and 16Gb SAN Switch for HP BladeSystem c-Class Fabric Vision LTU	TC514A
	Fabric Watch*	TC464A*
	HP B-series 8-24 Port SAN Switch ISL Trunking LTU	T5527A
	Advanced Performance Monitoring*	TC464A*
	Extended Fabrics*	TC464A*
	HP B-series SAN Network Advisor Enterprise LTU	TC352A
	HP B-series SAN Network Advisor Professional Plus LTU	TC353A
	HP B-series SAN Network Advisor Professional Plus Upgrade LTU	TC354A

* In order to obtain Fabric Watch, Advanced Performance Monitoring or Extended Fabrics Software, a purchase of the TC464A Power Pack+ Software Bundle is required.

Family Comparison

Features	8/8 SAN Switch Base and 8/8 SAN Switch	8/24 SAN Switch Base	8/80 SAN Switch and 8/80 SAN Switch Power Pack+
Targeted Environment	Workgroups, Departments	Workgroups, Departments	Workgroups, Departments
Fibre Channel Port Bandwidth	8Gbit/sec	8Gbit/sec	8Gbit/sec
Aggregate device bandwidth	128 - 384 Gbit/sec full duplex	256 - 384 Gbit/sec full duplex	768 - 1280 Gbit/sec full duplex
OS Support	**NOTE:** Please Refer to SAN Design Guide http://www.hp.com/go/sandesign or http://www.hp.com/go/sandesignguide		
Storage system support	**3PAR StoreServ, StoreVirtual 4000, P9000/XP, P6000/EVA, P2000/MSA**		
FC Ports	8 Enabled 24 Max	16 Enabled 24 Max	48 Enabled 80 Max
SFP	B-series	B-series	B-series
Advanced Trunking	Optional Upgrade	Included with Power Pack+ or Optional Upgrade	Included with Power Pack+ or Optional Upgrade
Adaptive Networking	Included	Included	Included
Form factor	1U	1U	2U
Zoning Software	Yes (Included)	Yes (Included)	Yes (Included)
Hot plug, redundant power supplies	No	No	Yes
Hot plug fans	No	No	Yes

Features	SN3000B 16Gb FC Switch and SN3000B 16Gb FC Power Pack+	SN6000B 16Gb FC Switch and SN6000B 16Gb FC Power Pack+	SN6500B 16Gb FC Switch and SN6500B 16Gb FC Power Pack+
Targeted Environment	Workgroups, Departments	Workgroups, Departments	Workgroups, Departments
Fibre Channel Port Bandwidth	16Gbit/sec	16Gbit/sec	16Gbit/sec
Aggregate device bandwidth	384 - 768 Gbit/sec full duplex	768 - 1536 Gbit/sec full duplex	1536-3072 Gbit/sec full duplex
OS Support	**NOTE:** Please Refer to SAN Design Guide http://www.hp.com/go/sandesign or http://www.hp.com/go/sandesignguide		
Storage system support	**3PAR StoreServ, StoreVirtual 4000, P9000/XP, P6000/EVA, P2000/MSA**		
FC Ports	12-24 Enabled 24 Max	24 or 48 Enabled 48 Max	48 or 96 Enabled 96 Max
SFP	B-series	B-series	B-series
Advanced Trunking	Included with Power Pack+	Included with Power Pack+ or Optional Upgrade	Included with Power Pack+ or Optional Upgrade
Adaptive Networking	Included	Included	Included
Form factor	1U	1U	2U
Zoning Software	Yes (Included)	Yes (Included)	Yes
Hot plug, redundant power supplies	Optional	Yes	Yes
Hot plug fans	Yes	Yes (integrated with power supply)	Yes

Family Comparison

Features	8/24 Bundled FC Switch	SN6000B 16Gb Bundled FC Switch
Targeted Environment	Workgroups, Departments	Workgroups, Departments
Fibre Channel Port Bandwidth	8Gbit/sec	16Gbit/sec
Aggregate device bandwidth	256 - 384 Gbit/sec full duplex	768 - 1536 Gbit/sec full duplex
OS Support	**NOTE:** Please Refer to SAN Design Guide http://www.hp.com/go/sandesign or http://www.hp.com/go/sandesignguide	
Storage system support	**3PAR StoreServ, StoreVirtual 4000, P9000/XP, P6000/EVA, P2000/MSA**	
FC Ports	16 Enabled 24 Max	24 or 48 Enabled 48 Max
SFP	B-series, 16 units included in the box	B-series, 24 units included in the box
Advanced Trunking	Included with Power Pack+ or Optional Upgrade	Included with Power Pack+ or Optional Upgrade
Adaptive Networking	Included	Included
Form factor	1U	1U
Zoning Software	Yes (Included)	Yes (Included)
Hot plug, redundant power supplies	No	Yes
Hot plug fans	No	Yes (integrated with power supply)

Features	SN8000B 8-Slot SAN Director Power Pack+	SN8000B 4-Slot SAN Director and 4-Slot SAN Director Power Pack+	DC SAN Backbone Director Power Pack+	DC04 SAN Director and DC04 SAN Director Power Pack+
Targeted Environment	Cloud Optimized Data Centers	Cloud Optimized Data Centers	Traditional Data Centers	Traditional Data Centers
Port Bandwidth	Up to 16Gbit/sec	Up to 16Gbit/sec	8Gbit/sec	8Gbit/sec
Aggregate device bandwidth	16.4 Tbit/sec full duplex	8.2 Tbit/sec full duplex	4.1 Tbit/sec full duplex	2 Tbit/sec full duplex
OS Support	**NOTE:** Please Refer to SAN Design Guide http://www.hp.com/go/sandesign or http://www.hp.com/go/sandesignguide			
Storage system Support	**3PAR StoreServ, StoreVirtual 4000, P9000/XP, P6000/EVA, P2000/MSA**			
Ports	Up to 512	Up to 256	Up to 512	Up to 256
SFP	B-series	B-series	HP	B-series
Advanced Trunking	Included with Power Pack	Included with Power Pack or Optional Upgrade	Included with Power Pack+	Included with Power Pack+ or Optional
Adaptive Networking	Included	Included	Included	Included
Form factor	14U	9U	14U	9U
Zoning Software	Yes (included)	Yes (included)	Yes (Included)	Yes (Included)
Hot plug, redundant power supplies	Yes	Yes	Yes	Yes
Hot plug fans	Yes	Yes	Yes	Yes

Family Comparison

Features	Brocade 16Gb SAN Switch for HP c-Class BladeSystem	Brocade 8Gb SAN Switch for HP c-Class BladeSystem	B-Series Enhanced Multi-protocol Extension Blade
Targeted Environment	Datacenters, Workgroups, Departments	Workgroups, Departments	Data Centers
Port Bandwidth	16Gbit/sec	8Gbit/sec	8 Gbit/sec FC Ethernet: 1 or 10 Gbit/sec
Aggregate device bandwidth	896 Gbit/sec full duplex	384 Gbit/sec full duplex	N/A
OS Support	NOTE: Please Refer to SAN Design Guide http://www.hp.com/go/sandesign or http://www.hp.com/go/sandesignguide		
Storage system support	3PAR StoreServ, StoreVirtual 4000, P9000/XP, P6000/EVA, P2000/MSA		
Ports	12 external /16 internal	8 external /16 internal	16 8Gb FC and 10 1GbE or 2 10GbE
SFP	B-series	B-series	B-series
Advanced Trunking	Included with Power Pack+ or Optional Upgrade	Included with Power Pack+ or Optional Upgrade	Optional Upgrade to chassis
Adaptive Networking	Included	Included	Included
Form factor	Embedded	Embedded	Blade in SN8000B and DC SAN Directors
Zoning Software	Yes (Included)	Yes (Included)	Yes (Included)
Hot plug, redundant power supplies	Yes, in BladeSystem Enclosure	Yes, in BladeSystem Enclosure	Yes, in director chassis
Hot plug fans	Yes, in BladeSystem Enclosure	Yes, in BladeSystem Enclosure	Yes, in director chassis

Features	1606 Extension SAN Switch	Encryption SAN Switch
Targeted Environment	Data Centers	Data Centers
Fibre Channel Port Bandwidth	8Gbit/sec	8Gbit/sec
Ethernet	1Gbit/sec Ethernet	N/A
Aggregate device bandwidth		512 Gbit/sec full duplex
OS Support	NOTE: Please Refer to SAN Design Guide http://www.hp.com/go/sandesign or http://www.hp.com/go/sandesignguide	
Storage system support	3PAR StoreServ, StoreVirtual 4000, P9000/XP, P6000/EVA, P2000/MSA	
FC Ports	4 or 16 Enabled 16 Max	32 Enabled 32 Max
Ethernet Ports	2 or 6 Enabled 6 Max	N/A
SFP	B-series	B-series
Advanced Trunking	Included with Power Pack+ or Optional Upgrade	Optional Upgrade
Adaptive Networking	Included	Included
Form factor	1U	2U
Zoning Software	Yes (Included)	Yes (Included)
Hot plug, redundant power supplies	Yes	Yes
Hot plug fans	Yes	Yes

Family Comparison

Technical Specifications

Fibre Channel ports	16 Internal (downlink) ports; 12 External (uplink) ports - universal (E, F, N, D) ports 16/16c SAN Switch model: (16) 16 Gb ports in any internal/external port combination enabled 16/28c SAN Switch models: 16 internal 16Gb ports and 12 external 16 Gb auto-sensing ports enabled
Device support and Scalability guidelines	http://h18006.www1.hp.com/products/storageworks/san/documentation.html
Performance	16 Gbps 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	700 nSec. Latency increases as input port speed is lower than the output port speed.
Maximum frame size	2112-byte payload
Classes of service	Class 2, Class 3, Class F (inter-switch frames)
Port types	D_Port (Diagnostic port), E_Port, F_Port; optional port type control Brocade Access Gateway mode: F_Port and NPIV-enabled N_Port
Data traffic types	Fabric switches supporting unicast
Media types	Hot-pluggable, B-Series Branded Small Form Factor Pluggable (SFP), LC connector; Short-Wave Laser (SWL), Long-Wave Laser (LWL); Extended Long-Wave Laser (ELWL); distance depends on fiber-optic cable and port speed. Supports SFP (4/2/1 Gbit/sec) and/or SFP+ (8/4/2 Gbit/sec) optical transceivers.
Laser	Short-wave, long-wave, and extended long wave laser transceivers (SFP's) are supported
Fabric services	Simple Name Server, Registered State Change Notification (RSCN). Includes Advanced WebTools Enhanced group Management and Advanced Zoning. Optional fabric services include: Adaptive Networking, 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, SAN Network Advisor, Fabric Watch, and Advanced Performance Monitoring
Management access	WebTools, SMI-s provider, SNMP, Telnet, and Secure Telnet
Diagnostics	Cable diagnostic (D_Port), including electrical/optical loopback, link traffic/latency/distance
Dimensions	Depth 10.57 in. Height 1.1 in. Width 7.59 in. Weight Approx. 3.3 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).

Technical Specifications

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-2 INCITS 332: 1999
- FC-GS-5 ANSI INCITS 427: (includes the following.)
    - FC-GS-4 ANSI INCITS 387: 2004
- FC-IFR INCITS 1745-D, revision 1.03 (under development)
- FC-SW-4 INCITS 418:2006 (includes the following)
    - FC-SW-3 INCITS 384: 2004
- 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-MI-2 ANSI/INCITS TR-39-2005
- FC-PI INCITS 352: 2002
- FC-PI-2 INCITS 404: 2005
- FC-PI-4 INCITS 1647-D, revision 7.1 (under development)
- FC-FS-2 ANSI/INCITS 424:2006 (includes the following)
    - FC-FS INCITS 373: 2003
- FC-LS INCITS 433: 2007
- FC-BB-3 INCITS 414: 2006 (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)

Technical Specifications

- 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 1.2 (includes the following)
  - SNIA Storage Management Initiative Specification (SMI-S) Version 1.03 ISO standard IS24775-2006. Replaces (ANSI INCITS 388: 2004)
  - SNIA Storage Management Initiative Specification (SMI-S) Version 1.1.0
  - SNIA Storage Management Initiative Specification (SMI-S) Version 1.2.0