Overview

IT organizations continue to face unprecedented data growth as more platforms, applications, and users connect to the data center network. In turn, the storage network infrastructure must continue evolving to enable fast, continuous, and most cost-effective access to mission-critical data from anywhere in the world.

To address this challenge, the HP StorageWorks 1606 Extension SAN Switch helps provide fast, reliable, and cost-effective network infrastructure for remote data replication, backup, and migration. Leveraging next-generation Fibre Channel and advanced Fibre Channel over IP (FCIP) technology, the 1606 Extension SAN Switch provides a flexible and extensible platform to move more data faster and further than ever before.

Whether configured for simple point-to-point or comprehensive multisite SAN extension, the 1606 Extension SAN Switch addresses the most demanding business continuity, compliance, and global data access requirements. Up to sixteen 8 Gbps Fibre Channel ports and six 1 Gigabit Ethernet (GbE) ports provide unmatched Fibre Channel and FCIP bandwidth, port density, and throughput for maximum application performance over WAN links.

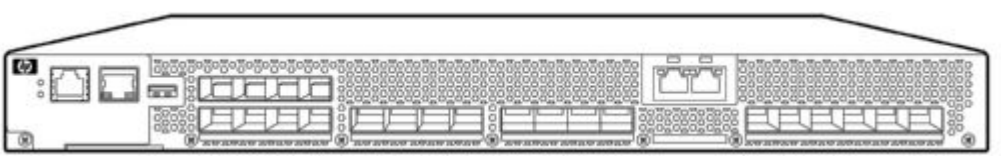
The 1606 Extension SAN Switch is available in three models:

- Power Pack+: 22 Total Ports (sixteen 8Gb FC and six 1GbE) and value add software
- Full: 22 Total Ports (sixteen 8Gb FC and six 1GbE)
- Base: 6 Total Ports (four 8Gb FC and two 1GbE)

The Base model is targeted for smaller environments such as the Small to Medium Enterprise (SME) and Enterprise Remote Office/Branch Office (ROBO), yet provides the ability to grow as the business demands equating to investment protection while also affording no disruption in service. Through an Upgrade Bundle all FC and GE ports on the system may be activated along with several complementary features that meet the needs of larger environments. Embracing a building block methodology for add-on features, the 1606 Extension SAN Switch provides the flexibility to custom tailor a solution to best meet the needs of customer's unique environment.

The 1606 Extension SAN Switch integrates a variety of best-in-class capabilities, such as Fibre Channel routing, Storage-Optimized TCP ("SO-TCP"), hardware-based compression, write and read acceleration for disk and tape, in-tunnel Quality of Service (QoS), IP Security ("IPsec") encryption, FCIP trunking and Adaptive Rate Limiting to deliver a high-performance, highly reliable, and secure distance-connectivity solution. This makes the HP 1606 Extension SAN Switch strategic for a variety of IT initiatives; including business continuance, site mirroring, replication, and data migration across virtually unlimited distances.

The 1606 Extension San Switch is fully compatible with the entire B-Series family of FC switching platforms, delivering advanced 8 Gbit/sec fabric services end-to-end over distance and providing investment protection for hardware as well as the ability to leverage expertise and training across the data center staff.



Overview

Key Features

Maximize the Value of SANs

- FCIP Extension of Fibre Channel SANs provides connectivity over longer distances that would otherwise be technologically not possible, impractical, too expensive with native Fibre Channel or when dark fiber resources are unavailable.
- Achieve bandwidth savings and higher bandwidth utilization via data compression by compressing FC frames before they are encapsulated into FCIP packets.
- Extensive diagnostics, system-monitoring capabilities, and performance monitoring (including extensive and granular TCP statistics graphing in Webtools).

Superior Performance

- TCP acceleration helps to overcome latency between source and target locations by adjusting the TCP window size and performing selective acknowledgements.
- Advanced Quality of Service (QoS) techniques can be used to prioritize traffic and guarantee that necessary bandwidth requirements are met.
- Key protocol features are enabled in the FCIP implementation to optimize performance of SAN extension over IP networks, including Storage-Optimized TCP.

Outstanding Scalability and operational flexibility

- FCIP Trunking feature allows multiple IP source and destination address pairs (defined as FCIP circuits) to provide high bandwidth FCIP tunnel and failover resiliency.
- Optional Adaptive Rate Limiting feature meets minimum bandwidth guarantee for each tunnel while allowing full utilization of the available network bandwidth without adverse impact to throughput performance during high traffic loads.
- Optional FC Routing delivers fabric isolation in conjunction with FCIP, enabling separate fabrics to share devices without merging across the IP network.

Product Highlights

1606 Extension SAN Switch

- Up to 16 ports of auto-sensing 1GB, 2Gb, 4Gb, and 8Gb Fibre Channel interfaces in a single 1U enclosure for seamless integration with existing B-series fabrics
- Up to 6 ports of 1 GBE to instantly extend connectivity between multiple SAN fabrics over distance. Two of the 6 GE ports can be configured for copper or optical cable connectivity. The other 4 GE ports offer cable connectivity via SFP module only

Configuration Support

The HP 1606 Extension Switch is fully compatible with the B-series of FC switches and directors. For complete interoperability information please check:

- http://www.hp.com/go/SANdesign
- http://www.hp.com/go/SANdesignguide

FCIP Tunnels

The FCIP Tunneling Service enables organizations to extend their Fibre Channel SANs over distances that would be impractical or expensive with native Fibre Channel links, or in situations where dark fiber links would be impractical but in which IP WAN connectivity already exists. As a result, organizations have a more manageable way to share resources across geographical boundaries and implement reliable business continuance solutions. The tight integration also enables a unified architecture for connectivity across the MetaSAN, paving the way for future value-added SAN applications that extend their reach across the whole storage infrastructure.

This service also provides superior performance and scalability through hardware-based compression, combined with up to an industry leading eight virtual FCIP tunnels per 1606 Extension SAN Switch.

Multiple logical FCIP tunnels allow for scalable connectivity between sites. Note that FCIP tunnels between two 1606 Extension SAN Switches or a 1606 Extension Switch and an Multi Protocol Extension Blade for the DC SAN Directors (1GE) is supported. The 1606 Extension SAN Switch does not support FCIP connectivity with any other products including the B-series 400 MP Router and MP Router Blade.

Hardware Based Compression

Hardware-based compression delivers the ability to maximize throughput over lower bandwidth links in the wide area network, optimizing the cost efficiencies of FCIP. The 1606 Extension SAN Switch compresses FC frames before they are encapsulated into FCIP packets. When compressed FC frames are encapsulated, multiple frames can be batched together to form a bigger FCIP packet up to the MTU.

IPSec

Improved over the B-series 400 MP Router and MP Router Blade, the 1606 Extension SAN Switch IPSec function is capable of supporting both Ipv4 and Ipv6, mix of secure and non-secure tunnels on the same GE port, jumbo frames, and VLAN tagged connections.

Manageability

- B-Series Web Tools
- Enhanced Group Management (EGM)
- B-series Data Center Fabric Manger (DCFM sold separately)
- CLI
- Support for SMI-S based applications

Product Highlights

Scalability

Refer to the guidelines described in the Heterogeneous Open SAN Design Reference Guide available at: http://www.hp.com/go/SANdesignguide

Cabinet Support

HP StorageWorks (22U, 36U and 42U)9000 and 10000 G1 Series, (25U, 33U and 41U) HP System/e, and the new 42U HP 10000 G2 Series
NOTE: To order factory integration, add 0D1 after the part number on your sales order.

Software Components, Standard

WebTools

Enables organizations to monitor and manage single Fibre Channel switches or router in 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.

Data Center Fabric Manager Professional, Data Center Fabric Manager 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 management application is right for them - Data Center Fabric Manager Professional, Professional Plus, or Enterprise.

FastWrite over FCIP

FastWrite over FCIP reduces the number of round-trip "waits" for Write I/O to one to mitigate the latency effect of a long distance FCIP link.

Software Components, Optional

1606 Base to Full Upgrade

This license enables full hardware capabilities on the 1606 Base Extension SAN Switch, increasing the number of Fibre Channel ports from four to sixteen and the number of Gigabit Ethernet ports from two to six. A 1606 Base Extension SAN Switch with the Upgrade License also supports up to eight FCIP tunnels instead of two and supports advanced capabilities such as tape read/write pipelining.

Tape pipelining is similar to FastWrite in that it reduces the number of round-triptime delays that the server must wait while writing to tape. In the case of Tape Pipelining, the FCIP ports act as a tape device (on the server side) and as a server (on the tape device side). I/O requests are initiated and acknowledged locally at both end of the link. The final Write Tape Mark command from the
server is acknowledged only after all data has been written to the tape device.

Advanced Extension

Optional software license for the 1606 Extension SAN Switch which enables two advanced extension features: FCIP Trunking and Adaptive Rate Limiting.

FCIP Trunking:

FCIP Trunking feature allows multiple IP source and destination address pairs (defined as FCIP circuits) via multiple of the 1 GE and 10 GE interfaces to provide high bandwidth FCIP tunnel and failover resiliency. In addition, each FCIP circuit supports four QoS classes (Class-F, Hi, Medium

and Low Priority), each as a TCP connection.

Adaptive Rate Limiting:

An FCIP tunnel can be configured a minimum (guaranteed) committed rate as well as a maximum committed rate. FCIP tunnel will run at least the minimum rate. If additional bandwidth is needed, the committed rate will grow until the channel traffic demand is satisfied, maximum committed rate is reached, or the throughput capabilities of the network are reached.

Adaptive Rate Limiting:

Adaptive Rate Limiting dynamically adjusts shared bandwidth between guaranteed minimum rates and uncongested maximum rates for each FCIP circuit within a tunnel or trunk. This overcomes the problem of fixed provisioning of bandwidth that leads to over-provisioning and underutilization of bandwidth. Adaptive Rate Limiting enables applications to exceed guaranteed minimum rates when competing bandwidth is idle.

Integrated Routing

Integrated Routing is an optional license which provides native Fibre Channel Routing (FRC) on a per-port basis, rather than limiting routing ports to those on a dedicated routing blade or switch. Just like traditional FCR, Integrated Routing uses EX_Ports to import/export devices between fabrics, enabling selective device sharing while maintaining remote fabric isolation. Integrated Routing provides architecture flexibility to route on a port-by-port basis, enabling increased scalability and fault isolation.

FICON CUP

Optional software allows FICON Switching to provide Fibre Channel and FICON intermix, FICON Control Unit Port (CUP), and FICON cascading for more than one B-Series SAN Director in XP Storage Array environments. The license feature provides Control Unit Port (CUP) in-band management function designed to allow mainframe applications to perform configuration, monitoring, management and statistics collection. These applications include System Automation for OS/390 (SA/390), Dynamic Channel Management Facility (DCM) and Resource Management Facility (RMF). Hardware- enforced FICON and FCP port zoning enhances separation with intermix operation.

Power Pack + Software Bundle

The Power Pack+ Software Bundle comes with the 1606 Extension SAN Switch Power Pack+ or as an optional software bundle for the 1606 Extension SAN Switch base and full models. It includes the following:

- Adaptive Networking
- Fabric Watch
- Performance Monitor
- Extended Fabric
- ISL Trunking
- Server Application Optimization (SAO)

Adaptive Networking

Adaptive Networking (AN) is an optional family of technologies which allow flexible control of traffic movement within the fabric which deliver application aware management of fabric resources. Applications may be used with multiple protocols and multiple classes of service. It includes the following features:

Ingress Rate Limiting:

Allows the ingress bandwidth of a port to be throttled to a rate lower than negotiated with the SAN

node. This could be very useful for enterprises offering stepped levels of service and enforcing SLAs.

Quality of Service (QoS):

Enables zones with high, medium, and low priorities within a fabric on a zone by zone basis. This can be very useful for prioritizing array replication over MANs and WANs over less critical traffic.

Traffic Isolation Zones:

Defines paths through a fabric for some or all nodes. Failover allows a non-preferred path to be used if the preferred fails. TIZs use failover by default but it can be disabled if traffic should stop if a preferred path fails. TIZ can be used to manually map out traffic flows within a fabric based on application, priority, and topology.

Fabric Watch

Fabric Watch is an optional license which enables each switch to monitor 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 optional enabling technology helps administrators monitor and watch specific fabric metrics -- 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 maintaining overall balanced performance.

Top Talkers is a component of Advanced Performance Monitoring and tracks the top traffic flows for hosts and targets for a switch port or a switch. Top Talkers can help identify the ports that need certain Quality of Service (QoS) attributes or it can help determine portions of the physical topology that need reconfiguration.

Extended Fabric

Optional license which extends 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.

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 switches. Each 8Gb switch needs its own license. The switch operating system views the trunk as a single, high bandwidth resource (up to 64Gb) when routing connections between 8G switches. Connections are load-balanced across the individual links, which comprise the logical trunk group.

Server Application Optimization (SAO)

Server Application Optimization (SAO) license improves overall application performance for physical servers and virtual machines. SAO, when deployed with B-Series Fibre Channel HBAs, extends B-Series Adaptive Networking from the B-series SAN fabric to the server infrastructure. This delivers application-level, fine-grain Quality of Service (QoS) management to the HBAs and related server applications.

Solution Requirements:

- SAO license must be installed on the edge (server connected) switch
- Adaptive networking (AN) license must be installed on the edge (server connected) switch

- SAO requires B-series HBA installed in the server

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 ToolsDoes not offer management of the DC SAN Backbone Director or FICON

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

Data Center Fabric Manager Enterprise and Professional Plus

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

HP DCFM Enterprise delivers unprecedented scalability, up to 24 fabrics and 9,000 switch ports, while HP DCFM Professional+ scales to 4 SAN Fabrics and 2560 switch ports. There is an upgrade available from DCFM Professional Plus to DCFM Enterprise.

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

While DCFM provides increased functionality, not all features available in FM or HAFM are available in DCFM Enterprise and Professional Plus, and some functions may operate differently. Please refer to the Migration and Transition guide for additional information.

Service and Support, HP Care Pack, and Warranty Information

Warranty

(1-1-1) Hardware Warranty - One-year on-site warranty, 8x5, next business day response, installation not included.
NOTE: The hardware warranty covers firmware and embedded non-saleable software. Saleable software carries its own warranty, 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.

For bundled Software Support

Your HP storage product includes comprehensive support and software updates to enhance the performance and availability of your software. Experienced Response Center engineers provide trustworthy advice on issues such as software features and use, problem diagnosis and resolution, and software defect identification.
Software support benefits include:

- Improved productivity of system managers and operators
- Improved system performance and reduced downtime due to software defects
- Expedited problem resolution through expert-level technical resources
- Software and documentation updates
- Electronic access to essential product and support information

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For increased uptime, productivity and ROI -HP Care Pack packaged services for Storage

These days, you need to get the most out of your storage investment-you can't afford not to. When you buy HP storage products and solutions, it's also a good time to think about what levels of service and support you may need. To help take the worry out of deploying, designing, maintaining, and managing your environment, we've designed a portfolio of service options that are as: flexible, reliable and scalable as your storage. Unlike storage-only vendors, we take a holistic approach to your entire environment, bridging storage, servers, blades, software and network infrastructures with our HP Care Pack packaged services for Storage.

Protect your business beyond the warranty

When it comes to robustness and reliability, standard warranties on today's computing equipment have matured just as the technologies have matured. Good news on some fronts-but also a source of potential problems and subsequent consequences that come from depending on standard warranties alone. Standard warranty protects against product defects and some causes of downtime- but not the business. By using a standard approach to warranty uplifts, such as HP Care Pack Services, you can reduce downtime risks and be more certain of operational consistency for both mission-critical and standard business computing. Simply put, HP Care Pack Services normalize the warranty of combined products - helping you proactively guard against unplanned downtime.

Service and Support, HP Care Pack, and Warranty Information

Extending warranties with HP Care Pack Services

For cost-effective upgrading or extending your standard warranty, HP Care Pack Services offer a suite of standard reactive hardware and software support services that are sold separately, or combined as with our Support Plus and Support Plus 24 services. The portfolio also provides a combination of proactive and reactive services, such as Proactive 24 Service and Critical Service. In addition, with HP Proactive Select we offer an innovative approach to service delivery that gives you the flexibility to acquire the specific proactive services you need today, then add services as your needs evolve. HP Proactive Select offers a broad set of technical or per-event type service options - including server, storage, and network, SAN device, and software, environment, installation and education services. Services that you can mix and match depending on your specific requirements, from preliminary planning and equipment delivery to installation, configuration, integration, and testing, through every level of ongoing support. Our HP Care Pack packaged services for Storage assures help when you need it most. And for many products, post-warranty HP Care Pack Services are available when your original warranty has expired.

HP Storage Services: Offering reliability, flexibility and value-just like your storage

HP Storage Services offers a full spectrum of customer care, from technology support to complex migrations to complete completely managed services. HP Factory Express provides customization, integration and deployment services for turnkey solutions. HP Education offers flexible, comprehensive training on storage networking, disk storage systems, and storage software to help your IT staff get the most out of your investments. And HP Financial solutions extend innovative financing and asset management programs to cost-effective buy, manage and eventually retire your older equipment.

HP Storage Services, the trusted business technology experts who manage your technology in action, because when technology works, business works. http://www.hp.com/hps/storage

NOTE: Care Pack Services availability may vary by product and country.

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 http://h30125.www3.hp.com/csn/salesmktg/elfpack/elf_nonlkup_ctrylang.asp?code=ELNL

Recommended HP Care Pack Services for optimal satisfaction with your HP product.

Recommended Support 3-Year HP Support Plus 24

For a higher return on your storage investment, HP Support Plus 24 provides integrated hardware and software support services designed specifically for your technology. Available 24x7, this 3-year combined reactive support option delivers onsite hardware support and over-the-phone software support around-the-clock. Leverage the full strength of HP Technology Services - customers can trust the services professionals at HP to work collaboratively with them, putting our strategic and technical know-how to work across their entire infrastructure.

- Improve uptime with responsive hardware and software services
- Cost-effectively obtain expert multivendor support
- Enjoy consistent service coverage across geographically dispersed sites
- Update HP and selected third-party software at a predictable cost
- Take advantage of subscription savings on software updates
- Increase revenue-with access to world-class expertise without headcount implications
- Increase customer satisfaction-with no interoperability gaps

http://h20195.www2.hp.com/V2/GetPDF.aspx/5981-6638EN.pdf

Service and Support, HP Care Pack, and Warranty Information

eSupport

HP eSupport is a portfolio of technology-based services that assist you with managing your business environment - from the desktop to the data center.

Support Portal

The HP support portal provides one-stop access to the information, tools and services you need to manage the daily operations of your IT environment.

Features include:

- Access to self-solve tools (including search technical knowledge base)
- Efficient logging and tracking of support cases
- Collaboration with other business and IT professionals
- Download of patches and drivers
- Access to diagnostic tools
- Proactive notification of relevant information

Access to certain features of the support portal requires an HP service agreement. To access the support portal, visit http://www.hp.com/support

Remote Support Technology (RST)-HP Remote Support Pack

Taking a more proactive approach to IT support, the HP Remote Support pack plug-in module easily integrates with HP Systems Insight Manager to provide a powerful, unified "single pane of glass" solution for onsite and remote management.

HP Remote Support Pack enhances HP Systems Insight Manager with intelligent event diagnosis plus the automatic submission of hardware event notifications securely to HP support, including acknowledgment and status returns. It adds remote configuration collections to allow the delivery of assessment and proactive services for your SAN storage and HP-UX environments.

Customer Technical Training

Consider education as an integral part of your strategy to get the best return on investment for your HP storage solution. HP offers a variety of training courses on storage software, networking, archiving and disk storage systems. Our classes are available in many delivery modalities from traditional instructor-led courses at one of our 80 training centers worldwide to on-site training customized to your needs or online. www.hp.com/learn/storage

HP Services Awards

HP Services continues to be recognized for service and support excellence by customers, partners, industry organizations and publications around the world. Recent honors and award reflect our services team's dedications, technical expertise, professionalism and uncompromising commitment to customer satisfaction. For a list of all our awards, please visit http://h20219.www2.hp.com/services/cache/433028-0-0-225-121.html

Additional Services Information

For more information about HP Care Pack Services for Storage, please visit: http://www.hp.com/hps/storage

If you have specific questions, contact your local HP representative. Contact information for a representative in your area can be found at "Contact HP" http://www.hp.com

Family Information

Features	8/8 SAN Switch Base and 8/8 SAN Switch	8/24 SAN Switch Base	8/40 SAN Switch and 8/40 SAN Switch Power Pack+	8/80 SAN Switch and 8/80 SAN Switch Power Pack+	2408 FCoE CN Switch and 2408 FCoE CN Switch Power Pack+	1606 Extension SAN Switch	Encryption SAN Switch
Targeted Environment	Workgroups, Departments	Workgroups, Departments	Workgroups, Departments	Workgroups, Departments	Workgroups, Departments	Data Centers	Data Centers
Fibre Channel Port Bandwidth	8Gbit/sec	8Gbit/sec	8Gbit/sec	8Gbit/sec	8Gbit/sec	8Gbit/sec	8Gbit/sec
Ethernet	N/A	N/A	N/A	N/A	10Gbit/sec Converged Enhanced Ethernet	1Gbit/sec Ethernet	N/A
Aggregate device bandwidth	128 - 384 Gbit/sec end-to-end	256 - 384 Gbit/sec end-to-end	384 - 640 Gbit/sec end-to-end	768 - 1280 Gbit/sec end-to-end			512 Gbit/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	XP, EVA, MSA						
FC Ports	8 Enabled 24 Max	16 Enabled 24 Max	24 Enabled 40 Max	48 Enabled 80 Max	8 Enabled 8 Max	4 or 16 Enabled	32 Enabled 32 Max
Ethernet Ports	N/A	N/A	N/A	N/A	24 Enabled 24 Max	2 or 6 Enabled 6 Max	N/A
SFP	B-series	B-series	B-series	B-series	B-Series	B-series	B-series
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	Included with Power Pack+ or Optional Upgrade	Optional Upgrade
Adaptive Networking	Optional Upgrade	Included with Power Pack+ or Optional Upgrade	Included with Power Pack+ or Optional Upgrade	Included with Power Pack+ or Optional Upgrade	No	Included with Power Pack+ or Optional Upgrade	Optional Upgrade
Form factor	1U	1U	1U	2U	1U	1U	2U
Zoning Software	Yes (Included)	Yes (Included)	Yes (Included)	Yes (Included)	Yes (Included)	Yes (Included)	Yes (Included)
Hot plug, redundant power supplies	No	No	Yes	Yes	Yes	Yes	Yes
Hot plug fans	No	No	Yes	Yes	Yes	Yes	Yes

Family Information

Features	4/256 SAN Director and 4/256 SAN Director Power Pack	DC04 SAN Director and DC04 SAN Director Power Pack+	DC SAN Backbone Director
Targeted Environment	Data Centers	Data Centers	Data Centers
Port Bandwidth	4Gbit/sec	8Gbit/sec	8Gbit/sec
Aggregate device bandwidth	3.264Tbit/sec end-to-end	3 Tbit/sec end-to-end	6.5 Tbit/sec end-to-end
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	XP, EVA, MSA		
Ports	Up to 384 SFP	Up to 192	Up to 384
SFP	HP	B-series	B-series
Advanced Trunking	Included with Power Pack or Optional Upgrade	Included with Power Pack+ or Optional Upgrade	Included with Power Pack+
Adaptive Networking	Included with Power Pack or Optional Upgrade	Included with Power Pack+ or Optional Upgrade	Included with Power Pack+
Form factor	14U	7U	14U
Zoning Software	Yes (Included)	Yes (Included)	Yes (Included)
Hot plug, redundant power supplies	Yes	Yes	Yes
Hot plug fans	Yes	Yes	Yes

Features	Embedded SAN Switch for EVA4400	Brocade 8Gb SAN Switch for HP c-Class BladeSystem	Brocade 4Gb SAN Switch for HP c-Class BladeSystem	B-Series Multi-protocol Router Blade	B-Series Multi-protocol Extension Blade
Targeted Environment	Workgroups, Departments	Workgroups, Departments	Workgroups, Departments	Data Centers	Data Centers
Port Bandwidth	8Gbit/sec	8Gbit/sec	4Gbit/sec	4 Gbit/sec FC Ethernet: 1 Gbit/sec	8 Gbit/sec FC Ethernet: 1 or 10 Gbit/sec
Aggregate device bandwidth	320 Gbit/sec end-to-end	384 Gbit/sec end-to-end	192 Gbit/sec end-to-end	N/A	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	XP, EVA, MSA				
Ports	20 external per EVA Controller Pair	4 or 8 external / 8 or 16 internal	4 or 8 external / 8 or 16 internal	18 ports: 16 FC and 2 Gigabit Ethernet	12 8Gb FC and 10 1GbE or 2 10GbE
SFP	B-series	B-Series	HP	HP	B-Series
Advanced Trunking	Included with Power Pack+ or Optional Upgrade	Included with Power Pack+ or Optional Upgrade	Included with Power Pack+ or Optional Upgrade	Optional Upgrade to chassis	Optional Upgrade to chassis
Adaptive Networking	Included with Power Pack+ or Optional Upgrade	Included with Power Pack+ or Optional Upgrade	Included with Power Pack+ or Optional Upgrade	Optional Upgrade to chassis	Optional Upgrade to chassis
Form factor	Embedded	Embedded	Embedded	Blade in 4/256, DC SAN Back, or DC04 SAN Dir	Blade in DC SAN Back or DC04 SAN Dir
Zoning Software	Embedded	Yes (Included)	Yes (Included)	Yes (Included)	Yes (Included)

Family Information

Hot plug, redundant power supplies	Yes (Included)	Yes, in BladeSystem Enclosure	Yes, in BladeSystem Enclosure	Yes, in director chassis	Yes, in director chassis
Hot plug fans	Yes, in EVA 4400 Enclosure	Yes, in BladeSystem Enclosure	Yes, in BladeSystem Enclosure	Yes, in director chassis	Yes, in director chassis

Step 1 – Base Configuration and Power Pack

Select one:

Model	Model Description	Part Number
HP StorageWorks 1606 Power Pack+ Extension SAN Switch	22 ports (16 8Gb Fibre Channel and 6 1Gigabit Ethernet) Extension switch for Fibre Channel over Internet Protocol (FCIP) traffic forwarding over IP wide area networks (WAN). Includes rack mount kit, advanced zoning, web tools, Adaptive Networking, Advanced Performance Monitor, Fabric Watch, ISL Trunking, Extended Fabrics, and Server Application Optimization. **NOTE:** Fibre Channel ports require optical transceivers listed below. Ethernet ports require optical or copper transceivers listed below.	AP864A
HP StorageWorks 1606 Full Extension SAN Switch	22 ports (16 8Gb Fibre Channel and 6 1Gigabit Ethernet) Extension switch for Fibre Channel over Internet Protocol (FCIP) traffic forwarding over IP wide area networks (WAN). Includes rack mount kit, advanced zoning, and web tools. **NOTE:** Fibre Channel ports require optical transceivers listed below. Ethernet ports require optical or copper transceivers listed below.	AP863A
HP StorageWorks 1606 Base Extension SAN Switch	6 ports (4 8Gb Fibre Channel and 2 1Gigabit Ethernet) Extension switch for Fibre Channel over Internet Protocol (FCIP) traffic forwarding over IP wide area networks (WAN). Includes rack mount kit, advanced zoning, and web tools. Separate upgrade license available to add additional 16 ports (12 8Gb Fibre Channel and 4 1Gigabit Ethernet). **NOTE:** Fibre Channel ports require optical transceivers listed below. Ethernet ports require optical or copper transceivers listed below.	AP862A
HP StorageWorks 1606 Base to Full Upgrade	Optional software license for 1606 Base Extension SAN Switch to activate additional 16 ports (12 8Gb Fibre Channel and 4 1Gigabit Ethernet)	TA746A

Step 2 – Options

Select each type of required options with quantities specified:

	Model Description	Quantity	Part Number
8 Gb Transceivers	HP 8Gb Short Wave B-Series FC SFP+ 1 Pack	1	AJ716A
	HP 8Gb Long Wave B-series 10km FC SFP+ 1 Pack	1	AJ717A
	HP 8Gb Long Wave B-Series 25km FC SFP+ 1 Pack	1	AW538A
4 Gb Transceivers	HP 4Gb Short Wave B-Series FC SFP 1 Pack **NOTE:** Compatible with the 1606 Extension SAN Switch 1Gb Ethernet ports.	1	AJ715A

Distance-Maximum	OM2 Cable	OM3 Cable	PremierFlex Cable
8Gb performance:	50 meters	150 meters	150 meters
4Gb performance:	150 meters	380 meters	380 meters
2Gb performance:	300 meters	500 meters	500 meters

Configuration Information

Distance-Maximum	OM2 Cable	OM3 Cable	PremierFlex Cable
4Gb performance:	150 meters	380 meters	380 meters
2Gb performance:	300 meters	500 meters	500 meters
1Gb performance:	500 meters	860 meters	860 meters

	HP 4Gb Long Wave B-Series FC SFP 1 Pack - 10km	1	AK870A
	HP 4Gb Long Wave B-Series FC SFP 1 Pack - 30km	1	AN211A
Copper Transceivers	HP 1GbE B-Series Copper SFP 1 Pack	1	AW537A
Optical Cables	**PremierFlex OM3+ type cables**		
	0.5m PremierFlex LC/LC Multi-Mode Optical Cable	1	BK837A
	1m PremierFlex LC/LC Multi-Mode Optical Cable	1	BK838A
	2m PremierFlex LC/LC Multi-Mode Optical Cable	1	BK839A
	5m PremierFlex LC/LC Multi-Mode Optical Cable	1	BK840A
	15m PremierFlex LC/LC Multi-Mode Optical Cable	1	BK841A
	30m PremierFlex LC/LC Multi-Mode Optical Cable	1	BK842A
	50m PremierFlex LC/LC Multi-Mode Optical Cable	1	BK843A
	OM3 LC-LC type cables		
	.5 m LC-LC Multi-Mode OM3 Fibre Channel Cable	1	AJ833A
	1 m LC-LC Multi-Mode OM3 Fibre Channel Cable	1	AJ834A
	2 m LC-LC Multi-Mode OM3 Fibre Channel Cable	1	AJ835A
	5 m LC-LC Multi-Mode OM3 Fibre Channel Cable	1	AJ836A
	15 m LC-LC Multi-Mode OM3 Fibre Channel Cable	1	AJ837A
	30 m LC-LC Multi-Mode OM3 Fibre Channel Cable	1	AJ838A
	50 m LC-LC Multi-Mode OM3 Fibre Channel Cable	1	AJ839A
	OM2 LC-LC type cables		
	2 m LC-LC Multi-Mode Fibre Channel Cable	1	221692-B21
	5 m LC-LC Multi-Mode Fibre Channel Cable	1	221692-B22
	15 m LC-LC Multi-Mode Fibre Channel Cable	1	221692-B23
	30 m LC-LC Multi-Mode Fibre Channel Cable	1	221692-B26
	50 m LC-LC Multi-Mode Fibre Channel Cable	1	221692-B27
	LC-SC for between a 1 Gb and a 2 Gb device		
	2 m LC-SC Multi-Mode Fibre Channel Cable	1	221691-B21
	5 m LC-SC Multi-Mode Fibre Channel Cable	1	221691-B22
	15 m LC-SC Multi-Mode Fibre Channel Cable	1	221691-B23
	30 m LC-SC Multi-Mode Fibre Channel Cable	1	221691-B26
	50 m LC-SC Multi-Mode Fibre Channel Cable	1	221691-B27

Configuration Information

Step 3 - Optional Software*

* For Fabric OS (FOS) minimum requirements, please refer to:
http://spock.corp.hp.com/

Optional Software	HP B-series 24-40 Port SAN Switch Power Pack+ Upgrade	T5522A
	NOTE: The Power Pack+ Software Bundle kit includes Adaptive Networking, Fabric Watch, ISL Trunking, Extended Fabric, Advanced Performance Monitor, and Server Application Optimization	
	Data Center Fabric Manager Enterprise	T5542A
	Data Center Fabric Manager Professional Plus	TA754A
	HP StorageWorks B-series DCFM Professional Plus Upgrade LTU	TA755A
	Integrated Routing	TA750A
	Advanced Extension	TA747A
	HP 40 SAN Switch FICON CUP LTU	TA748A
	HP 1606 Switch FICON CUP Accelerator LTU	TA749A
	NOTE: The FICON CUP accelerator support is contingent upon IBM certification. Please refer to HP's B-Series FICON connectivity stream at HP "Single Point of Connectivity Knowledge" (SPOCK) for the latest information.	
	Adaptive Networking	T5525A
	Extended Fabric	313458-B21
	Fabric Watch	313454-B21
	Advanced Performance Monitor	313450-B21
	ISL Trunking	313452-B21
	Server Application Optimization	TA757A

Fibre Channel Standards And Revisions	FC-FG Rev 3.5	FC-AL Rev. 4.5	FC-FLA Rev 2.7	FC-PLDA Rev 2.1	FC-VI Rev 1.5
	FC-PH-2 Rev 7.4	FC-GS-2 Rev 5.3	FC-PH-3 Rev 9.4	FC-SW Rev 3.3	IPFC RFC 2625
	FC-AL-2 Rev. 7.0	FC-PH Rev 4.3			

Technical Specifications

System Architecture	**Ports**	22 ports: 16 Fibre Channel (E, F, M, FL, EX) and 6 Gigabit Ethernet (VE,)
	B-series switch interoperability	• SAN Switch 8 • SAN Switch 16 • SAN Switch 8-EL • SAN Switch 2/8V • 4/8 SAN Switch • SAN Switch 16-EL • SAN Switch 2/16V • SAN Switch 2/16N FF • 4/16 SAN Switch • Integrated /32 • SAN Switch 2/32 • 4/32 SAN Switch • 4/32B SAN Switch • 4/64 SAN Switch • Core Switch 4/64 • SAN Director 2/128 • SAN Director 4/256 • DC SAN Director • DC04 SAN Director • SAN Switch 2/16 • SAN Switch 1/16-EL • MSA SAN Switch 2/8 • 8/8 SAN Switch • 8/24 SAN Switch • 8/40 SAN Switch • 8/80 SAN Switch • Encryption SAN Switch • 1606 Extension SAN Switch • 2408 FCoE Converged Network Switch • Brocade 4Gb SAN Switch for p-class HP BladeSystem • Brocade 4Gb SAN Switch for c-class HP BladeSystem • 400 MP Router • B-Series MP Router Blade
	Performance	Fibre Channel: 1.063 Gbps line speed, full duplex; 2.125 Gbps line speed, full duplex; 4.25 Gbps line speed, full duplex; 8.5 Gbps line speed, full duplex. Auto-sensing of 1 Gbps, 2 Gbps, 4 Gbps, and 8 Gbps port speeds; optionally programmable to fixed port speed. Speed matching between 1 Gbps, 2 Gbps, 4 Gbps, and 8 Gbps ports. FCIP Performance: 1Gbps line speed
	ISL Trunking	Up to eight 8 Gbps ports per ISL trunk; up to 64 Gbps per ISL trunk. There is no limit to how many trunk groups can be configured in the switch.
	Fibre Channel aggregate bandwidth	128 Gbps: 16 ports at 8 Gbps (half duplex)
	FCIP aggregate bandwidth	6 Gbps: 6 ports at 1 Gbps (data rate)
	Fabric latency	700 ns with no contention, cut-through routing at 8 Gbps
	Maximum frame size	2112-byte payload
	Maximum MTU size	1500-byte Ethernet packets with FCIP

Classes of service		Class 2, Class 3, Class F (inter-switch frames)
Port types		FL_Port, F_Port, E_Port, Ex_Port, M_Port (Mirror Port), and self-discovery based on switch type (U_Port). For FCIP, VE_Port (Virtual E_Port).
Data traffic types		Fabric switches supporting unicast, multicast (255 groups), and broadcast
USB		One USB port for system log file downloads or firmware upgrades
Media types		Fibre Channel: B-Series hot-pluggable Small Form Factor Pluggable (SFP) and SFP+, LC connector; Short-Wave Laser (SWL) and Long-Wave Laser (LWL); distance depends on fiber-optic cable and port speed; supports SFP+ (2, 4, and 8 Gbps) and SFP (1, 2, and 4 Gbps) optical and copper transceivers
Fabric services		B-Series Advanced Zoning, Dynamic Path Selection (DPS), FDMI, Enhanced Group Management (EGM), Frame Redirection, Registered State Change Notification (RSCN), Reliable Commit Service (RCS), and Simple Name Server (SNS). Optional fabric services include Advanced Performance Monitoring, Adaptive Networking, Fabric Watch, Integrated Routing, and ISL Trunking.
Licensing options		The following optional extension features can be enabled via license keys: ● Advanced Extension: Enables FCIP Trunking and Adaptive Rate Limiting ● 1606 Base to Full Upgrade License: Enables all ports, additional FCIP tunnels, and tape read/write pipelining The following options are available for the 1606 Extension SAN Switch Full and Power Pack+ or 1606 Base Extension SAN Switch with the Upgrade License: ● FICON Management Server: Control Unit Port (CUP) enables host control of switches in mainframe environments
Management	**Supported management software**	SSH v2, HTTP/HTTPS, SNMP v1/v3, Telnet; SNMP (FE MIB, FC Management MIB); Web Tools; DCFM Professional, Professional Plus, and Enterprise (optional); SMI-S, RADIUS, LDAP
	Security	DH-CHAP (between switches and end devices), HTTPS, IPsec, IP Filtering, LDAP, Port Binding, RADIUS, Role-Based Access Control (RBAC), Secure Copy (SCP), Secure RPC, SSH v2, SSL, Switch Binding, Trusted Switch
	Management access	10/100/1000 Ethernet (RJ-45), in-band over Fibre Channel ports; serial port (RJ-45) and one USB port
	Diagnostics	POST and embedded online/offline diagnostics, including FCping, Pathinfo (FCtraceroute), etc.
Mechanical	**Enclosure**	Back-to-front airflow; 1U, 19-inch EIA-compliant, power from back

Technical Specifications

	Size	Width: 43.2 cm (17.0 in) Height: 4.5 cm (1.8 in) Depth: 64.1 cm (25.2 in)
	System weight	10.9 kg (24.0 lbs) with two power supplies, without SFP/SFP+
Environmental	**Temperature**	Operating: 0°C to 40°C (32°F to 104°F) Non-operating: -25°C to 70°C (-13°F to 158°F)
	Humidity	Operating: 10% to 85% (non-condensing) Non-operating: 10% to 90% (non-condensing)
	Altitude	Operating: Up to 3000 m (9842 ft) Storage: Up to 12 km (39,370 ft)
	Shock	Operating: 20 g, 6 ms, half-sine Non-operating: 33 g, 11 ms, half-sine, 3/eg Axis
	Vibration	Operating: 0.5 g sine, 0.4 grms random, 5 to 500 Hz Non-operating: 2.0 g sine, 1.1 grms random 5 to 500 Hz
	Heat dissipation	Maximum 22 ports: 590 BTU/hr
	Airflow	Maximum 60 CFM; nominal 44 CFM
Power	**Power supply**	Dual hot-swappable redundant power supplies
	Power inlet	C13
	Input voltage	85 to 264 VAC nominal
	Input line frequency	47 to 63 Hz
	Inrush current	Maximum of 60 amps for period of 10 to 150 ms
	Power	Nominal 145 watts; maximum 173 watts