

### Overview

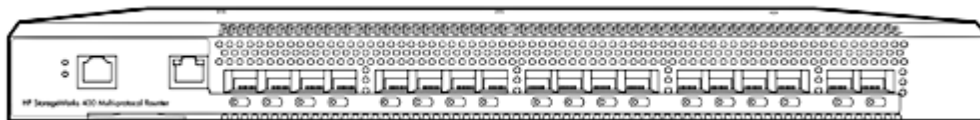
For many organizations, the storage infrastructure has evolved into a set of multiple disconnected SAN islands increasing complexity and costs. The HP StorageWorks 400 Multi-protocol Router enables organizations to derive more value from the SAN infrastructure by providing the ability to connect SAN islands and share resources, without the risk and complexity of merging them into a single large fabric, both for FCIP and native Fibre Channel connectivity. The resulting modular SAN design provides a more scalable, flexible and stable infrastructure that is not limited by distance, maximizing the business value of the SAN infrastructure

The HP 400 MP-Router provides two types of SAN Services:

- **FC-FC Subnet Routing Service for SAN island consolidation:** Logically connect devices in multiple SAN fabrics to share storage resources-from any fabric regardless of distance-with the administration and fault isolation benefits of separately managed fabrics
- **FCIP Tunneling Service for SAN extension over distance:** Seamlessly and reliably extend HP B-Series SANs across MAN and WAN IP networks with FCIP, and it is fully integrated with HP CA solutions for EVA and XP

These services provide new options for connecting SAN islands and extending SAN benefits over multiple networks, to larger SAN sizes, across longer distances, and offer key advantages such as:

- Simplifying SAN design, implementation, and management through centralization
- Providing a seamless and secure way to share resources across multiple SANs without the complexity of physically merging those SANs
- Creating a more unified SAN environment with easier interconnection and support for SANs and SAN resources purchased from different storage vendors
- Reducing disruptions created by events such as data migration, storage or server consolidation, migration to production environments, and application rebalancing between fabrics
- Extending those benefits over long distances with high performance FCIP services



### Key Features

- **Maximize the value of SANs**
  - A. Reduces the cost and effort of SAN design, implementation and management
  - B. Ensures greater utilization of data networks
  - C. Integrated with HP B-Series products and management tools for investment protection
- **Outstanding scalability and operational flexibility**
  - A. Hierarchical routing architectures for increased SAN scalability (supports 1000's of ports and 1000's of shared devices)
  - B. Maintains fabric isolation for improved operational stability
  - C. Non-disruptive integration to the SAN environment
- **Superior performance**
  - A. Industry's leading 4 Gbit/sec FC Routing services
  - B. Performance optimized FCIP services with compression, and up to 8 FCIP tunnels per Gbit Ethernet port
  - C. Ability to run applications at line-rate speeds

### Product Highlights

**Configuration Support** The HP 400 MP router is fully compatible with the B-series of FC switches and the HP B-Series MP Router Blade. For complete interoperability information please check:

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

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### FC-FC Subnet Routing Service

One of the services on the HP 400 Multi-protocol Router, the FC-FC Subnet Routing Service enables devices located in separate SAN fabrics to establish communication without requiring the fabrics to merge into a single large SAN. By using this service, organizations can interconnect devices without having to redesign or reconfigure their entire environment. FC-to-FC routing capabilities provide key strategic advantages, such as:

- Simplifying SAN design, implementation, and management by introducing modular architectures
- Providing a seamless way to share resources across multiple SANs without the complexity of physically merging those SANs
- Creating a more unified SAN environment with easier interconnection and support for SANs and SAN resources deployed for different purposes

When devices on different SAN fabrics are allowed to communicate through the HP 400 MPR, the resulting connectivity group is known as a Logical SAN (LSAN). LSANs enable selective, secure resource sharing across multiple SAN fabrics and facilitate scalability by:

- Minimizing the risk and complexity of large SAN fabrics
- Right-sizing SANs based on application and business requirements rather than over-building just to avoid possible availability risk
- Simplifying management and fault isolation while protecting existing technology investments

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### FCIP Tunneling Service

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. Deploying FCIP on the HP 400 MP-Router is more flexible and cost-effective than an external gateway. 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 an industry leading eight virtual FCIP tunnels per Gigabit Ethernet port. This enables more data throughput over expensive WAN bandwidth, and conserves Ethernet ports at the central data center when fanning in multiple remote sites.

FC routing and FCIP work together to form a powerful combination. The FC routing function enables two fabrics connected to an FCIP link to remain separate rather than merging them into a single fabric across the IP WAN. The solution provides flexible device connectivity to enable a variety of uses combined with fault isolation. As a result, this combined FC routing and FCIP approach enables a more secure and reliable distance-connectivity solution for disaster recovery, site mirroring; and data migration over distance; and it is fully integrated with HP CA solutions for XP and EVA.

### Product Highlights

#### Manageability

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

#### 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.

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.

### Software Components, Optional

#### 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

### *Product Highlights*

#### **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.

### 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.

#### 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. The first year of Rights to New License Version and standard business day, standard business hours telephone support is included with the purchase of an HP Power Pack. In order to continue to receive telephone support and Rights to New License Version after the first year, the purchase of a software support contract or Care Pack is required.

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

#### 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>

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#### **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>.

# QuickSpecs

## HP StorageWorks 400 Multi-protocol Router (base and power pack models)

### Family Information

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	<b>NOTE: Please Refer to SAN Design Guide pointer</b> <a href="http://www.hp.com/go/SANdesign">http://www.hp.com/go/SANdesign</a> or <a href="http://www.hp.com/go/SANdesignguide">http://www.hp.com/go/SANdesignguide</a>				
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 p-Class BladeSystem	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	Workgroups, Departments	Data Centers
Port Bandwidth	4Gbit/sec	4Gbit/sec	2 Gbit/sec	4 Gbit/sec Ethernet: 1 Gbit/sec	4 Gbit/sec Ethernet: 1 Gbit/sec
Aggregate device bandwidth	48 Gbit/sec end-to-end	192 Gbit/sec end-to-end	32 Gbit/sec end-to-end	128 Gbit/sec end to end	N/A
OS Support	<b>NOTE: Please Refer to SAN Design Guide pointer</b> <a href="http://www.hp.com/go/SANdesign">http://www.hp.com/go/SANdesign</a> or <a href="http://www.hp.com/go/SANdesignguide">http://www.hp.com/go/SANdesignguide</a>				
Storage system Support	MSA, EVA, XP	MSA, EVA, XP	MSA 1000	MSA, EVA, XP	MSA, EVA, XP
Ports	4 external / 8 internal	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	Yes
Advanced Trunking	Optional Upgrade	Optional Upgrade	Optional Upgrade	Optional Upgrade	Optional Upgrade to chassis
Form factor	Embedded	Embedded	Embedded	1U	Blade in Director
Zoning Software	Yes (Included)	Yes (Included)	Yes (Included)	Yes (Included)	Yes (Included)



### Family Information

Hot plug, redundant power supplies	Yes, in BladeSystem Enclosure	Yes, in BladeSystem Enclosure	No	Yes	Yes, in director chassis
Hot plug fans	Yes, in BladeSystem Enclosure	Yes, in BladeSystem Enclosure	No	Yes	Yes, in director chassis
Enterprise Backup Solution (EBS) support	Yes	Yes	Yes	Yes	Yes



## Configuration Information

### Step 1 – Base Configuration and Power Pack

Select one:

Model	Model Description	Part Number
HP StorageWorks 400 Multi-protocol Router base	18 ports (16 Fibre Channel and 2 Gigabit Ethernet) multi-protocol router providing 2 types of SAN services: FC subnet routing, and FCIP tunneling (optional). Includes rack mount kit, advanced zoning and web tools. <b>NOTE:</b> Requires optical transceivers listed below.	AG458A
HP StorageWorks 400 Multi-protocol Router power pack	18 ports (16 Fibre Channel and 2 Gigabit Ethernet) multi-protocol router providing 2 types of SAN services: FC subnet routing, and FCIP tunneling (Optional). Includes rack mount kit, advanced zoning, web tools, Advanced Performance Monitor, Fabric Watch, ISL Trunking, and Extended Fabrics. <b>NOTE:</b> Requires optical transceivers listed below.	AG459A
HP StorageWorks B-series FCIP MPR LTU	Optional software license to activate the FCIP SAN services	T4425A

### Step 2 – Additional Options

Select each type of required options with quantities specified:

#### Optical Transceivers

4 Gb Transceivers	4Gb shortwave transceiver- Single Distance	A7446B
	<ul style="list-style-type: none"> <li>4Gb performance: 150 meters between devices</li> <li>2Gb performance: 300 meters between devices</li> <li>1Gb performance: 500 meters between devices</li> </ul>	
2 Gb Transceivers	4 Gb 10km Long Wave Transceiver	AE493A
	Short Wave, 300 m, 2X, FC	A6515A
	Long Wave - 10 km	A6516A
	Long Wave - 35 km	300836-B21
optical cables	<b>LC-LC for between two 2 Gb or 4Gb devices</b>	
	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
	<b>LC-SC for between a 1 Gb and a 2 Gb device</b>	
	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

#### Step 3 – Optional Software

Optical Software	HP StorageWorks MPR Power Pack LTU	T4426A
	<b>NOTE:</b> The Power Pack Software Bundle kit includes Fabric Watch, ISL Trunking, Extended Fabric, and Advanced Performance Monitor	
	Data Center Fabric Manager Enterprise	T5542A
	Extended Fabric	313458-B21
	Fabric Watch	313454-B21
	Advanced Performance Monitor	313450-B21
	ISL Trunking	313452-B21
	Secure Fabric OS	332925-B21

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<b>Fibre Channel Standards</b>	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
<b>And Revisions</b>	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

<b>System Architecture</b>	<b>Ports</b>	18 ports: 16 Fibre Channel (E, F, FL,EX) and 2 Gigabit Ethernet (VE, Vex)	
	<b>B-series switch interoperability</b>	SAN Switch 8, SAN Switch 16, SAN Switch 8-EL, SAN Switch 16-EL, SAN Switch 2/8v, SAN Switch 2/16v, SAN Switch 2/16N, SAN Switch 2/16, SAN Switch 2/1-EL, Core Switch 2/64, SAN Switch 2/32, SAN Director 2/128; 4/256 SAN Director; 4/64 SAN Switch ;SAN Switch 4/32; 4/8 SAN Switch; 4/16 SAN Switch; Brocade 4Gb SAN Switch for HP p-Class BladeSystem; Brocade 4Gb SAN Switch for HP c-class BladeSystem; MSA SAN Switch 2/8; B-Series MP-Router Blade; HP MP Router	
	<b>Performance</b>	Fibre Channel: 1.063/2.125/4.250 Gbit/sec line speed, full duplex; auto-sensing of 1, 2, and 4 Gbit/sec port speeds; optionally programmable to fixed port speed; speed matching between 1, 2, and 4 Gbit/sec ports Ethernet: 1.25 Gbit/sec. Performance information is based on measured and projected performance limits and may not refelect what may be attained in all applications. FCIP performance is dependent on link distance, latency, link quality and total available bandwidth	
	<b>Aggregate bandwidth</b>	128 Gbit/sec full duplex end-to-end Fibre Channel	
	<b>Fabric latency</b>	< 8 microseconds (FC-to-FC routed traffic) 30 microseconds (FCIP)	
	<b>Maximum frame size</b>	2112-byte payload for Fibre Channel, 2250-byte payload for Gigabit Ethernet, 2048-byte payload for Fibre Channel routed networks	
	<b>Classes of service</b>	Class 2 and 3	
	<b>Port types</b>	FL_Port, F_Port, EX_Port, and E_Port; self-discovery based on switch type (U_Port); Gigabit Ethernet for VE and VEx	
	<b>Media types</b>	Hot-pluggable, industry-standard Small Form-factor Pluggable (SFP), LC connector; Short-Wavelength Laser (SWL) up to 500 meters (1640 feet); Long-Wavelength Laser (LWL) up to 10 km (6.2 mi); Extended Long-Wavelength Laser (ELWL) up to 80 km (49.6 mi); distance depends on fiber-optic cable and port speed, CWDM SFPs (8 lambdas); RJ45 Copper SFP for Gigabit Ethernet ports	
	<b>Fabric services</b>	Simple Name Server, Registered State Change Notification (RSCN); B-Series FC-FC Routing Service, B-Series Advanced Zoning, and B-Series Web Tools; Enhanced group Management, optional fabric services include the B-Series FCIP Tunneling Service and B-Series Advanced ISL Trunking	
<b>Management</b>	<b>Supported management software</b>	Telnet, B-Series Advanced Web Tools, Enhanced group Management B-Series Data Center Fabric Manager SMI-S based applications	
	<b>Management access</b>	10/100 Mbps Ethernet (RJ-45), serial port	
<b>Mechanicals</b>	<b>Diagnostics</b>	POST and embedded online/offline diagnostics	
	<b>Enclosure</b>	Non-cable-side to cable-side airflow; power from cable-side; 1U, 19-in. EIA rack-compliant	
	<b>Size</b>	Width: 16.88 in (42.87 cm) Height: 1.69 in (4.30 cm) Depth: 25.40 in (64.56 cm)	
<b>Environment</b>	<b>System Weight</b>	30.2 lb (13.7 kg) with two power supplies, no SFPs	
	<b>Operating Temperature</b>	50° to 104° F (10° to 40° C)	<b>Non-Operating</b> -13° to 158° F (-25°C to 70° C)
	<b>Humidity</b>	20 to 85%, non-condensing	20 to 85%, non-condensing
	<b>Altitude</b>	3 km	3 km
	<b>Shock</b>	105 G, 2.5 ms, half-sine	40 G, 13 ms, trapezoidal
	<b>Vibration</b>	0.5 G (5-500-5Hz)	2.0 G (5-500-5Hz)

### Technical Specifications

<b>Power</b>	<b>AC input</b>	Nominal: 6.0A@100-120 VAC; 3.0A@200-240 VAC
	<b>Frequency</b>	47 to 63 Hz

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