

Overview

Brocade 16Gb Fibre Channel SAN Switch Module for HPE Synergy

The Brocade 16Gb Fibre Channel SAN Switch Module for HPE Synergy Frame 12000 represents an easy to manage high performance and scalable 24-port capable embedded traditional Fibre Channel switch module with 16 Gb FC technology for HPE's Composable Infrastructure. It hot-plugs into the back of the HPE Synergy Frame 12000 and its integrated design frees up rack space, enables shared power and cooling, and reduces cabling resulting in significant infrastructure savings. Enhanced trunking support with external switches provides higher bandwidth up to 128Gb/s FC per trunk group to enable demanding applications and high density server virtualization. The Power Pack+ SAN management software option enables you to manage data flow to maintain optimized application performance. In addition, external facing ports (uplinks) auto-sense lower bandwidth components for flexibility and investment protection (4, 8 or 16 Gb/s for external SFP+ ports) and future investment protection with interoperability to 32Gb and 64Gb SANs when they become available. Furthermore the ports on demand (POD) upgrade license enables you to scale as you grow. The Brocade 16Gb Fibre Channel SAN Switch Module for HPE Synergy saves space and cost, significantly simplifies the SAN environment, enables easier deployment and management, and delivers the performance required for emerging higher throughput applications.

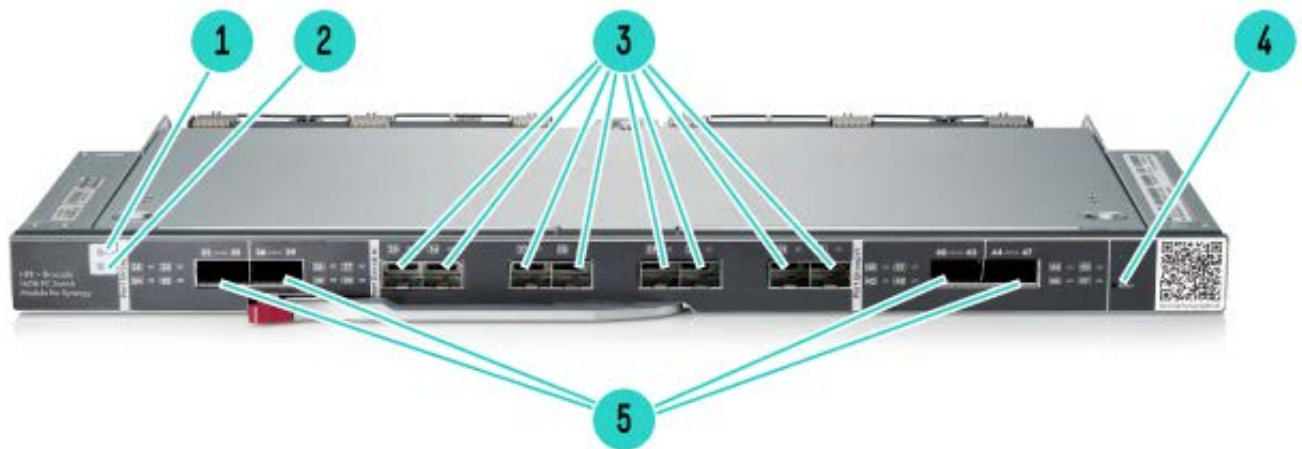


Figure 1 Brocade 16Gb Fibre Channel SAN Switch Module for HPE Synergy

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| 1. UID LED | 4. Reset Button |
| 2. Health LED | 5. Ports 32-47 (4x16Gb FC Optical Transceivers (QSFP)) |
| 3. Port 25-31 & 0 (16Gb/s FC SFP+ Ports) | |

Integrated SAN connectivity

- Enables data center consolidation with HPE Synergy through a state-of-the-art zero-footprint design while lowering cost through shared power and cooling, fewer cables and less space resulting in reduced infrastructure complexity and lower operations costs.

16 Gb FC storage networking

- Enables support of virtualized environments and other emerging technologies through high-speed technology that doubles the performance of the storage network. External facing ports auto-sense lower bandwidth components for flexibility and investment protection with existing FC ports (4, 8, or 16Gb/s FC for external ports) as well as to the future FC products (32Gb and 64Gb).

Quad Small Form-factor Pluggable (QSFP)

- Up to four 4x16Gb/s QSFPs are supported, which can be used as additional 16 Gb/s FC ports, 64 Gb/s high speed FC ISL ports between switch modules, or as part of a 128Gb/s trunk port to a B-series Director.

Non-blocking architecture

- Includes connection speed support for all ports to provide a high-performance system with aggregate bandwidth of 576 Gb/s (36 ports x 16 Gb/s). This capability is supported in Native OS mode, which is the default, and not access gateway mode.

Overview

ISL Trunking performance enhancements

- Support for multiple trunks, with the maximum trunk size of up to eight SAN ports for up to 128 Gb/s balanced throughput per each trunk group. Trunking of the SAN-facing ports with external Brocade or HPE B-series switches provides a high-bandwidth solution while lowering costs through fewer SFPs and cables. You can trunk up to 8 external FC SFP+ ports or up to two QSFP ports. For maximum flexibility any number of consequent ports within adjacent QSFP ports can form a trunk.

Fabric Vision

- Enables powerful built-in monitoring SAN management, and diagnostic tools to simplify administration, increase uptime and reduce costs. This results in significant insight and visibility across SANs with extensive analytics to keep your SAN optimized for best results. Available by default in the Power Pack+ model or as an upgrade option.

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 HPE OneView for monitoring and leverages HPE B-series SAN management and monitoring tools (PowerPack+, Fabric Vision). An SMI-s API enables the use of industry standard interfaces to integrate management with other applications.

Switch Configuration-available in three base models

- Available in 12-port, 24-port and 24-port Power Pack+ Full Fabric models. Choose the features and management options that make sense for your needs.

What's New

- Introducing HPE SANnav Management Software as optional software
- Updated Switch SKUs (Suffix rollover from B to C)
- First traditional 16Gb/s FC modular switch to support HPE's Composable Infrastructure
- New 16 Gb/s Fibre Channel embedded high performance SAN switch module for HPE Synergy 12000 Frame
- 12 downlink internal server ports, up to 8 uplink (SFP+) external ports and 4 uplink (QSFP) external ports; 48-port capable switch is scaleable to 36-FC ports only.
- 4x16 QSFP FC ports can be used as additional 16Gb/s FC ports or 64 Gb/s FC uplinks or ISL trunks up to 128 Gb/s FC ports
- Internal Port Support for HPE Synergy 3830C 16G Fibre Channel Host Bus Adapter
- Support for up to 6 FC switch modules per HPE Synergy Frame 12000
- Updated HPE B-series Network Advisor SKUs to the next suffix (A to B) and added 3 Network Advisor E-LTU SKUs (suffix AE)

Standard Features

Advanced Fabric Services

- Hardware Enforced Zoning*
- Dynamic Path Selection*
- WebTools
- Power Pack+ fabric services software bundle (optional)
 - Fabric Vision
 - ISL Trunking
 - Extended Fabrics*

NOTE: *Not supported in Brocade Access Gateway mode.

Manageability

- HPE Network Advisor
- HPE SANnav Management Software
- WebTools
- HPE Storage Operations Orchestration (optional)
- API
- SNMP
- SMI

Interoperability

Brocade Access Gateway mode enables the Brocade 16Gb Fibre Channel SAN Switch Module for HPE Synergy 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 SAN Design Guide <http://support.hpe.com/hpsc/doc/public/display?docid=c00403562>

Software Components, Standard

Access Gateway*

Brocade Access Gateway Mode enables seamless connectivity for the Brocade 16Gb Fibre Channel SAN Switch Module for HPE Synergy to other supported SAN fabrics, enhances scalability and simplifies manageability. Utilizing N_Port ID Virtualization (NPIV) standards, Brocade Access Gateway eliminates switch/domain considerations.

NOTE:*Brocade Access Gateway mode does not support switch-related features, including some features in the Power Pack+ bundle (e.g. Extended Fabric). Please refer to the 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 Fabric Vision (optional).

Advanced Zoning

Zoning (Port and Worldwide Name), as well as Access Control, are enforced by hardware within the ASIC. 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.

Web Tools

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.

Dynamic Path Selection

Improves performance by dynamically routing data traffic across multiple links and trunk groups.

Standard Features

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 and Traffic Isolation. 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. **NOTE:** Adaptive Networking Services are included by default in the switch firmware and do not require a separate license.

Software Components, Optional

Power Pack+ Software Bundle The Power Pack+ Software Bundle includes:

- Fabric Vision
- ISL Trunking
- Extended Fabrics*

NOTE:* Not supported in Access Gateway mode (see the Access Gateway Administrator's guide for full details).

NOTE: 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 HPE SAN Network Advisor that contains all critical SAN information for convenient review and analysis.

Fabric Vision will be included by default in all HPE 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 HPE 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)

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 HPE B-Series or Brocade switches. Each switch needs its own license. The fabric operating system views the trunk as a single, high bandwidth ISL resource (up to 128 Gb/s when routing connections between 16 Gb/s capable switches). Connections are load-balanced across the individual links, which comprise the logical trunk group.

Extended Fabrics

Extends the native Fibre-Channel traffic up to 3857 km at 4 Gb or up to 964 km at 16Gb. 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.

Standard Features

HPE SANnav Management Software

HPE SANnav Management Software is the next-generation SAN management application suite for HPE B-series SAN environments. It consists of SANnav Management Portal Software and SANnav Global View Software:

- SANnav Management Portal is a next-generation SAN management application with a simple browser-based user interface (UI) streamlining common workflows, such as configuration, zoning, deployment, troubleshooting, and reporting.
- SANnav Global View helps administrators visualize the health, performance and inventory of multiple SANnav Management Portal instances at data centers across the globe or a single multi-tenant data center using a simple, intelligent dashboard.

SANnav Management Portal and SANnav Global View not only transform SAN telemetry data into useful insights, such as health and performance scores, but also enable administrators to quickly associate real-time data with historical metrics and logs for in-depth analysis. This can help with spotting trends, establishing baselines, and identifying any behavioral changes over time.

HPE SANnav Management Software is available as a term-license for 1-year, 3-years and 5-years period as both – physical and electronic License-to-Use (LTU). It supports 8Gb, 16Gb and 32Gb FC Switches and Directors.

SAN Network Advisor Professional

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

- Allows management of two Fabric OS (FOS) fabrics (up to 1,000 devices, 300 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 with up to 2 fabrics.

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 Professional+ or 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 Professional+ or SAN Network Advisor Enterprise.

SAN Network Advisor Enterprise and Professional+

HPE SAN Network Advisor Enterprise and Professional+ are the enterprise-class products that support FOS products. 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 HPE SAN Network Advisor Professional+ provides the same feature set except for support for the SN8000B 8-Slot Director, DC SAN Backbone Director, and FICON.

HPE SAN Network Advisor Enterprise delivers unprecedented scalability, up to 100 fabrics and 15,000 switch ports, while HPE 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.

Standard Features

HPE Synergy Frame 12000 compatibility

Brocade 16 Gb FC SAN Switch Module for HPE Synergy must be deployed within the HPE's Composable Infrastructure solution, and is compatible only with HPE Synergy Frames.

HPE FC HBA Mezzanines

16Gb HPE Fibre Channel Mezzanine cards for HPE Synergy are supported

- Please refer to the HPE FC Mezzanine HBA Product QuickSpecs for Compute Module support details. Support for the 16Gb/s FC HBA Mezzanine with the Brocade 16Gb SAN Switch for HPE Synergy requires HPE FOS v8.0.0_gft or later

NOTE: 8 Gb Fibre Channel Mezzanine HBAs are not supported

HPE Synergy Frame 12000 Frame

Switch interoperability

HPE B-Series Switches, Directors, and Routers

16Gb/s Fibre Channel Switches and Directors

- SN8000B Director Switch (Enterprise)
- SN6500B Fibre Channel SAN Switch
- Brocade 16Gb SAN Switch for HPE BladeSystem c-Class
- SN6000B Fibre Channel Switch (Midmarket)
- SN3000B Fibre Channel Switch (Entry)
- Brocade 16 Gb SAN Switch for HPE c-Class BladeSystem
- Brocade 16Gb Fibre Channel SAN Switch Module for HPE Synergy

8 Gb Switches

- 8/24 SAN Switch
- 8/8 SAN Switch
- Brocade 8 Gb SAN Switch for HPE c-Class BladeSystem

Virtual Connect

- HPE Virtual Connect 8Gb 24-port Fibre Channel Module
- HPE Virtual Connect 8Gb 20-port Fibre Channel Module
- HPE Virtual Connect 16 Gb 24-port Fibre Channel Module
- Virtual Connect FlexFabric 10Gb/24-Port Module for c-Class BladeSystem
- HPE Virtual Connect FlexFabric-20/40 F8 Module for c-class Blade System

Multi-Protocol Routers and Gateways

- Multi-protocol Extension Blade
- SN4000B FC SAN Extension Switch
- 1606 SAN Extension Switch

Features	SN8000B 8-Slot SAN Director Power Pack+	SN8600B 8-Slot SAN Director Power Pack+
Targeted Environment	Cloud Optimized Data Centers	Cloud Optimized Data Centers
Port Bandwidth	Up to 16Gbps	Up to 32 Gbps
Aggregate device bandwidth	10.2Tbps	20.48 Tbps
OS Support	NOTE: Please Refer to SPOCK https://www.hpe.com/storage/spock	
Storage system support	3PAR StoreServ, StoreVirtual 4000, P9000/XP, P6000/EVA, P2000/MSA	
Ports	Up to 512 SFP	512 32 Gbps ports or a 640-port equivalent with 128 Gbps (32 Gbps×4 QSFP ports)
SFP	B-series	B-series
Advanced Trunking	Included with Power Pack	Included with Power Pack
Adaptive Networking	Included	Included
Form factor	14U	14U
Zoning Software	Yes (included)	Yes (included)
Hot plug, redundant power supplies	Yes	Yes
Hot plug fans	Yes	Yes

Standard Features

Features	SN8000B 4-Slot SAN Director and 4-Slot SAN Director Power Pack+	SN8600B 4-slot SAN Director Power Pack+
Targeted Environment	Cloud Optimized Data Centers	Cloud Optimized Data Centers
Port Bandwidth	Up to 16Gbps	Up to 32Gbps
Aggregate device bandwidth	5.1 Tbps	10.24 Tbps
OS Support	NOTE: Please Refer to SPOCK https://www.hpe.com/storage/spock	
Storage system support	3PAR StoreServ, StoreVirtual 4000, P9000/XP, P6000/EVA, P2000/MSA	
Ports	Up to 256 SFP	Up to 256 32 Gbps ports or a 320-port equivalent with 16 ICL ports.
SFP	B-series	B-Series
Advanced Trunking	Included with Power Pack or Optional Upgrade	Included with Power Pack
Adaptive Networking	Included	Included
Form factor	9U	9U
Zoning Software	Yes (included)	Yes (Included)
Hot plug, redundant power supplies	Yes	Yes
Hot plug fans	Yes	Yes

Features	SN6000B 16 Gb FC Switch and SN6000B 16 Gb FC Power Pack+	SN6600B 32 Gb FC Switch and SN6600B 32 Gb FC Power Pack+	SN6600B 32 Gb Bundled (SFP+) FC Switch and SN6600B 32 Gb Power Pack+ Bundled (SFP+) FC Switch
Targeted Environment	Workgroups, Departments	Workgroups, Departments	Workgroups, Departments
Fibre Channel Port Bandwidth	16 Gbps	32 Gbps	32 Gbps
Aggregate device bandwidth	384- 768 Gbps	2 Tbps	2 Tbps
OS Support	NOTE: Please Refer to SPOCK https://www.hpe.com/storage/spock		
Storage system support	3PAR StoreServ, StoreVirtual 4000, P9000/XP, P6000/EVA, P2000/MSA		
FC Ports	24 or 48 Enabled 48 Max	24 or 48 enabled 64 Max	24 or 48 Enabled 64 Max
SFP	B-series	B-series (16 Gb or 32 Gb)	B-series, 24 or 48 32 Gb SFP+ included in the box
Advanced Trunking	Included with Power Pack+ or 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	1U
Zoning Software	Yes (Included)	Yes (Included)	Yes (Included)
Hot plug, redundant power supplies	Yes	Yes	Yes
Hot plug fans	Yes (integrated with power supply)	Yes (integrated with power supply)	Yes (integrated with power supply)

Standard Features

Features	8/8 SAN Switch Base and 8/8 SAN Switch	8/24 SAN Switch Base	SN3000B 16Gb FC Switch	SN3600B 32Gb FC Switch and SN3600B 32Gb FC Power Pack+
Targeted Environment	Workgroups, Departments	Workgroups, Departments	Workgroups, Departments	Workgroups, Departments
Fibre Channel Port Bandwidth	8Gbps	8Gbps	16Gbps	32Gbps
Aggregate device bandwidth	64-192 Gbps	128-192 Gbps	192-384 Gbps	768 Gbps
OS Support	NOTE: Please Refer to SPOCK https://www.hpe.com/storage/spock			
Storage system support	3PAR StoreServ, StoreVirtual 4000, P9000/XP, P6000/EVA, P2000/MSA			
FC Ports	8 Enabled 24 Max	16 Enabled 24 Max	12 or 24 Enabled 24 Max	8 or 24 Enabled 24 Max
SFP	B-series	B-series	B-series	B-series
Advanced Trunking	Optional Upgrade	Included with Power Pack+ or Optional Upgrade	Included with Power Pack+ Upgrade	Included with Power Pack+ or Optional Upgrade
Adaptive Networking	Included	Included	Included	Included
Form factor	1U	1U	1U	1U
Zoning Software	Yes (Included)	Yes (Included)	Yes (Included)	Yes (Included)
Hot plug, redundant power supplies	No	No	Optional	No
Hot plug fans	No	No	Yes (integrated with power supply)	Yes (integrated with power supply)

Standard Features

Features	SN6500B 16Gb FC Switch and SN6500B 16Gb FC Power Pack+	SN4000B Power Pack+ SAN Extension Switch	1606 Extension SAN Switch
Targeted Environment	Workgroups, Departments	Data Centers; long distance replication, multiprotocol SAN Fabrics	Data Centers
Fibre Channel Port Bandwidth	16Gbps	16Gbps	8Gbps
Ethernet	N/A	1/10/40 Gbps Ethernet	1Gbps Ethernet
Aggregate device bandwidth	768-1536-Gbps		
OS Support	NOTE: Please Refer to SPOCK https://www.hpe.com/storage/spock		
Storage system support	3PAR StoreServ, StoreVirtual 4000, P9000/XP, P6000/EVA, P2000/MSA		
FC Ports	48 or 96 Enabled 96 Max	24 FC Ports Enabled 24 Max	4 or 16 Enabled 16 Max
Ethernet Ports	N/A	16 Enabled	2 or 6 Enabled 6 Max
SFP	B-series	B-series	B-series
Advanced Trunking	Included with Power Pack+ or Optional Upgrade	Included	Included with Power Pack+ or Optional Upgrade
Adaptive Networking	Included	Included	Included
Form factor	2U	2U	1U
Zoning Software	Yes (Included)	Yes (Included)	Yes (Included)
Hot plug, redundant power supplies	Yes	Yes	Yes
Hot plug fans	Yes	Yes	Yes

Standard Features

Features	Brocade 16Gb SAN Switch for HPE c-Class BladeSystem	Brocade 8Gb SAN Switch for HPE c-Class BladeSystem	Brocade 16Gb Fibre Channel SAN Switch Module for HPE Synergy
Targeted Environment	Enterprise, Datacenters, Workgroups, Departments	Workgroups, Departments	Enterprise, Datacenters, Workgroups, Departments
Port Bandwidth	16Gbps	8Gbps	16Gbps
Aggregate device bandwidth	448 Gbps	192 Gbps	576 Gb/s (36 ports x 16 Gb/s)
OS Support	NOTE: Please Refer to SPOCK https://www.hpe.com/storage/spock		
Storage system Support	3PAR StoreServ, StoreVirtual 4000, P9000/XP, P6000/EVA, P2000/MSA		
Ports	12 external /16 internal	4 or 8 external / 8 or 16 internal	8 SFP+ external, 4 QSFP external /12 internal
SFP	B-series	B-series	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
Adaptive Networking	Included	Included	Included
Form factor	Embedded	Embedded	Embedded
Zoning Software	Yes (Included)	Yes (Included)	Yes (Included)
Hot plug, redundant power supplies	Yes, in BladeSystem Enclosure	Yes, in BladeSystem Enclosure	Yes, in Synergy Frame
Hot plug fans	Yes, in BladeSystem Enclosure	Yes, in BladeSystem Enclosure	Yes, in Synergy Frame

Service and Support

Warranty	<p>(3-3-3) Hardware Warranty - Three-year on-site warranty, normal business hours, next business day response, and installation not included.</p> <p>NOTE: The hardware warranty covers firmware and embedded non-saleable software. Saleable software carries its own warranty, please see below.</p> <p>Software Warranty: Hewlett Packard Enterprise warrants only that the software media will be free of physical defects for a period of ninety (90) days from delivery.</p> <p>EXCLUSIVE REMEDY: The entire liability of Hewlett Packard Enterprise 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 Hewlett Packard Enterprise in the country in which you obtained the software.</p>
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Services Included with Product Purchase	The Power Pack+ Software Bundle includes three years of Hewlett Packard Enterprise standard business hours, standard business days Software Support (includes software technical support and software product and documentation updates).
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Service and Support	<p>Achieve maximum return from your IT investment</p> <p>Get the expertise you need at every step of your IT journey with HPE Pointnext services and support. We help you lower your risks and costs using proven best practices, automation and methodologies that have been tested and refined by HPE experts through thousands of deployments globally. With Advisory Services, we focus on your business outcomes and goals, partnering with you to design your transformation and build a roadmap tuned to your unique challenges. Our Professional and Operational Services can be leveraged to speed up time-to-production, boost performance and accelerate your business. HPE Pointnext specializes in flawless and on-time implementation, on-budget execution, and creative configurations that get the most out of software and hardware alike.</p>
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Consume IT on your terms	<p>HPE GreenLake Flex Capacity combines the simplicity, agility, and economics of public cloud with the security and performance benefits of on-premises IT. You determine your own "Right Mix" of Hybrid IT and workload placement without having to use.</p>
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With its agile pay-per-use service, HPE GreenLake Flex Capacity can help your IT organization:

- Avoid IT expenses stemming from overprovisioning
- Improve time to market by maintaining a safe buffer of capacity, ready for use when you need it
- Keep capacity ahead of demand with regular monitoring-and a simple change order to replenish
- Pay for only the capacity used, not the capacity deployed
- Reduce IT risk with tailored support

Connect your devices	<p>Unlock all of the benefits of your technology investment by connecting your products to Hewlett Packard Enterprise. Reduce down time, increase diagnostic accuracy and have a single consolidated view of your environment. By connecting, you will receive 24x7 monitoring, pre-failure alerts, automatic call logging, and automatic parts dispatch. HPE Proactive Care Service and HPE Datacenter Care Service customers will also benefit from proactive activities to help prevent issues and increase optimization. All of these benefits are already available to you with your server storage and networking products, securely connected to HPE support.</p>
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Learn more about getting connected at
<http://www.hpe.com/services/getconnected>

Service and Support

Recommended Support Services

Optimized Care

Free up resources with Operational Services from HPE Pointnext

Choose from the recommended services for customers purchasing from Hewlett Packard Enterprise or an authorized reseller are quoted using Hewlett Packard Enterprise order configuration tools.

HPE Datacenter Care helps customers to address the pressing needs of IT today and smoothly transform to a more agile cloud-like IT operations model. We help run and monitor your IT by offloading the day to day routine tasks, helping customers be more predictive and proactive, and saving time with one place to call with for all of their IT. Datacenter Care is available as both tailored statement of work and as a packaged service for 3, 4, and 5 year terms.

Partner with an assigned account team backed by local and global experts, access HPE enhanced call experience with priority access, use specialized support for complex, technologies, choose hardware and software support for your devices, implement proactive monitoring to stay ahead of issues, and access HPE IT best practices and IP. HPE Datacenter Care advantage options are available to add to your agreement to give you specialized expertise for performance, security, back up analysis, and much more.

HPE Proactive Care Advanced* - 24x7 coverage, three year Support Service

This service helps achieve a higher return on your product investment with personalized support from a local assigned Account Support Manager who will share best practice advice and personalized recommendations designed to help improve availability and performance to increase stability and reduce unplanned downtime. Leverage your system's ability to connect to HPE for pre-failure alerts, automatic call logging and parts dispatch. For business critical incidents, this service offers critical event management to reduce mean time to resolution. This recommendation provides 24x7 coverage with four-hour response for hardware and software support that offers two-hour callback for supported software issues.

<http://www.hpe.com/h20195/V2/GetDocument.aspx?docname=4AA5-3259ENW&cc=us&lc=en>

Standard Care

HPE Proactive Care* with 24x7 coverage, three year Support Service

HPE Proactive Care gives customers an enhanced call experience plus helps preventing problems and maintains IT stability by utilizing personalized proactive reports with recommendations and advice when your products are connected to Hewlett Packard Enterprise. This Service combines three years' proactive reporting and advice with our 24x7 coverage, four hour hardware response time when there is a problem.

<https://www.hpe.com/h20195/v2/GetPDF.aspx/4AA3-8855ENW.pdf>

Basic Care

HPE Foundation Care 24x7, three-year Support Service

HPE Foundation Care 24x7 gives you access to Hewlett Packard Enterprise 24 hours a day, seven days a week for assistance on resolving issues. This service includes need based Hardware onsite response within four hours. Simplify your support experience and make Hewlett Packard Enterprise your first call to help resolve hardware or software problems.

<https://www.hpe.com/h20195/v2/GetPDF.aspx/4AA4-8876ENW>

NOTE:*HPE Proactive Care and HPE Proactive Care Advanced require that the customer connect their devices to make the most of these services and receive all the deliverables.

Related Services

HPE SAN Deployment Service

Hewlett Packard Enterprise delivers complete design and implementation services for Fibre Channel, FCoE, FCIP, SAS, and iSCSI SAN connectivity components.

<http://h20195.www2.hpe.com/V2/GetPDF.aspx/5981-8527ENW.pdf>

HPE Service Credits offers flexible services and technical skills to meet your IT demands as your business evolves. With a menu of services, you can access additional resources and specialist skills to help you maintain peak performance of your IT. HPE Service Credits help you proactively respond to your dynamic IT and business needs.

Service and Support

HPE Education Services provides comprehensive training designed to expand the skills of your IT staff and keep them up to speed with the latest technologies.

Consult your Hewlett Packard Enterprise Sales Representative or Authorized Channel Partner of choice for any additional questions and support options.

HPE Installation and startup services for HPE Synergy

HPE Installation and Startup Services for HPE Synergy provides for the hardware installation and startup of the first Synergy 12000 Frame in a OneView management domain, along with HPE Synergy Compute Modules, HPE Interconnect Modules for HPE Synergy, HPE Synergy Interconnect Link Modules, Fibre Channel Switch Modules for HPE Synergy, HPE Synergy SAS Connection Modules, and HPE Synergy Storage Modules.

<https://www.hpe.com/h20195/v2/GetPDF.aspx/4AA6-5014ENW.pdf>

Parts and Materials

Hewlett Packard Enterprise will provide HPE-supported replacement parts and materials necessary to maintain the covered hardware product in operating condition, including parts and materials for available and recommended engineering improvements.

Parts and components that have reached their maximum supported lifetime and/or the maximum usage limitations as set forth in the manufacturer's operating manual, product quick-specs, or the technical product data sheet will not be provided, repaired, or replaced as part of these services.

The defective media retention service feature option applies only to Disk or eligible SSD/Flash Drives replaced by Hewlett Packard Enterprise due to malfunction.

More Information

HPE Support Center

The HPE Support Center is a personalized online support portal with access to information, tools and experts to support HPE business products. Submit support cases online, chat with H Hewlett Packard Enterprise experts, access support resources or collaborate with peers. Learn more

www.hpe.com/support/hpesc

The HPE Support Center Mobile App* allows you to resolve issues yourself or quickly connect to an agent for live support. Now, you can get access to personalized IT support anywhere, anytime.

HPE Insight Remote Support and HPE Support Center are available at no additional cost with a HPE warranty, HPE Support Service or HPE contractual support agreement.

Learn More:

<http://www.hpe.com/services>

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- Services for customers purchasing from Hewlett Packard Enterprise or an enterprise reseller are quoted using HPE order configuration tools.
- Customers purchasing from a commercial reseller can find HPE Support Services at <https://ssc.hpe.com/portal/site/ssc/>

Configuration Information

Step 1 – Base Configurations

Select one:

	Part Number
Brocade 16Gb/12 Fibre Channel SAN Switch Module for HPE Synergy	K2Q83B
<ul style="list-style-type: none"> • (1) 16Gb/s SAN Switch • 12 ports enabled for any combination (12 internal and 24 external) • Dual function mode - Native OS (default) or Access Gateway Mode • Documentation 	
Brocade 16Gb/24 Fibre Channel SAN Switch Module for HPE Synergy	K2Q84B
<ul style="list-style-type: none"> • 16Gb/s SAN Switch • 24 ports enabled for any combination (12 internal and 24 external) • Dual function mode - Native OS (default) or Access Gateway Mode • Documentation 	
Brocade 16Gb/24 PowerPack+ Fibre Channel SAN Switch Module for HPE Synergy	K2Q86B
<ul style="list-style-type: none"> • (1) 16Gb/s SAN Switch • 24 ports enabled for any combination (12 internal and 24 external) • Dual function mode - Native OS (default) or Access Gateway Mode • 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
16Gb/s QSFP	HPE B-series 4x16 Short Wave QSFP Transceiver	K2Q87A
16Gb/s Optical Transceivers (SFP+)	HPE B-series 16Gb SFP+ Short Wave Transceiver	QK724A
	HPE B-series 16Gb SFP+ Long Wave 10km Transceiver	QK725A
	HPE B-series 16Gb LW 25km FC SFP 1-pack Transceiver	H6Z29A
8 Gb Optical Transceivers (SFP+)	HPE 8Gb Shortwave B-series Fibre Channel 1 Pack SFP+ Transceiver	AJ716B
	HPE 8Gb Long Wave B-series 10km Fibre Channel 1 Pack SFP+ Transceiver	AJ717A

Optical cables

PremierFlex OM4 LC/LC Multi-mode Cables

HPE Premier Flex LC/LC Multi-mode OM4 2 fiber 1m Cable	QK732A
HPE Premier Flex LC/LC Multi-mode OM4 2 fiber 2m Cable	QK733A
HPE Premier Flex LC/LC Multi-mode OM4 2 fiber 5m Cable	QK734A
HPE Premier Flex LC/LC Multi-mode OM4 2 fiber 15m Cable	QK735A
HPE Premier Flex LC/LC Multi-mode OM4 2 fiber 30m Cable	QK736A
HPE Premier Flex LC/LC Multi-mode OM4 2 fiber 50m Cable	QK737A

OM3 LC/LC Multi-mode Cables

HPE LC to LC Multi-mode OM3 2-Fiber 0.5m 1-Pack Fiber Optic Cable	AJ833A
HPE LC to LC Multi-mode OM3 2-Fiber 1.0m 1-Pack Fiber Optic Cable	AJ834A
HPE LC to LC Multi-mode OM3 2-Fiber 2.0m 1-Pack Fiber Optic Cable	AJ835A
HPE LC to LC Multi-mode OM3 2-Fiber 5.0m 1-Pack Fiber Optic Cable	AJ836A
HPE LC to LC Multi-mode OM3 2-Fiber 15.0m 1-Pack Fiber Optic Cable	AJ837A
HPE LC to LC Multi-mode OM3 2-Fiber 30.0m 1-Pack Fiber Optic Cable	AJ838A
HPE LC to LC Multi-mode OM3 2-Fiber 50.0m 1-Pack Fiber Optic Cable	AJ839A

Configuration Information

QSFP to 4xLC Breakout Cables	HPE Multi Fiber Push On to 4 x Lucent Connector 5m Cable	K2Q46A
	HPE Multi Fiber Push On to 4 x Lucent Connector 15m Cable	K2Q47A
OM4 MPO/MPO Multi-mode Cables	HPE Premier Flex MPO/MPO Multi-mode OM4 12 fiber 10m Cable	QK729A
	HPE Premier Flex MPO/MPO Multi-mode OM4 8 fiber 50m Cable	QK731A
	HPE Premier Flex MPO/MPO OM4 100m (12ft) Cable	H6Z30A
Software:		
Power Pack+ Software Bundle	Brocade 16Gb Embedded Switch Power Pack+ E-LTU (For upgrading Brocade 16Gb Fibre Channel SAN Switch Module for HPE Synergy to Power Pack+). Includes bundled license for Fabric Vision, ISL Trunking, Extended Fabrics	TC464BAE
Optional Software	HPE 8/16Gb Embedded Switch Fabric Vision E-LTU NOTE: Physical License - TC514A	TC514AAE
	HPE B-series Entry Switch ISL Trunking E-LTU NOTE: Physical License - T5527A	T5527AAE
	Extended Fabrics*	
	Brocade 16Gb Fibre Channel SAN Switch Module 12-port Upgrade E-LTU for HPE Synergy NOTE: Physical License -D4U69A	D4U69AAE
<p>NOTE: the Brocade 16Gb FC Switch Module for HPE Synergy is capable of supporting 48 FC ports, up to 24 uplink FC ports and up to 24 downlink FC ports. However with Dual Port 16Gb FC Mezzanine cards, only a maximum of 12 downlinks are supported. This allows each Brocade 16Gb Fibre Channel SAN Switch Module for HPE Synergy to support a maximum of 36 FC ports. The Brocade 16Gb Fibre Channel SAN Switch Module 12-port Upgrade LTU provides up to 12 additional usable ports. This LTU adds ports in increments of 12 up to a current total of 36 usable ports. For example, for the 16Gb/12 port base model you can add up to (QTY) 2 12 port upgrade LTUs or for the 16Gb/24-port models you can add (QTY) 1 12-port upgrade LTU totaling 36 ports.</p>		
	HPE SANnav Management Portal Base 1yr E-LTU NOTE: Physical License - R3P45A	R3P45AAE
	HPE SANnav Management Portal Enterprise 1yr E-LTU NOTE: Physical License - R3P46A	R3P46AAE
	HPE SANnav Global View 1yr E-LTU NOTE: Physical License - R3P47A	R3P47AAE
	HPE SANnav Management Portal Base 3yr E-LTU NOTE: Physical License - R3P48A	R3P48AAE
	HPE SANnav Management Portal Enterprise 3yr E-LTU NOTE: Physical License - R3P49A	R3P49AAE
	HPE SANnav Global View 3yr E-LTU (Physical License - R3P50A)	R3P50AAE
	HPE SANnav Management Portal Base 5yr E-LTU NOTE: Physical License - R4P29A	R4P29AAE
	HPE SANnav Management Portal Enterprise 5yr E-LTU NOTE: Physical License - R4P30A	R4P30AAE
	HPE SANnav Global View 5yr E-LTU NOTE: Physical License - R4P31A	R4P31AAE
	NOTE: The Base edition of HPE SANnav Management Portal does not support management of director class switches.	

Configuration Information

NOTE: While installing HPE SANnav Management software, there is an option to install a 90-day full-featured free trial version of the SANnav Management Portal and SANnav Global View version. The trial version includes full functionality but expires after the trial period.

NOTE: HPE SANnav Management Software License-to-Use (LTU/E-LTU) includes maintenance and support for the duration of the license. At the end of the license period, customer needs to purchase a new license to continue using the software. Software renewal via HPE PointNext is not allowed/supported.

NOTE: *In order to obtain Extended Fabrics Software, a purchase of the TC464AAE Power Pack+ Software Bundle is required.

NOTE: Most HPE B-series software licenses are available through the Electronic Delivery (E-Delivery) mechanism. The E-Delivery software licenses with part numbers listed in this document are functionally equivalent to the corresponding physical licenses with different part numbers. Some software licenses in this document are represented by two part numbers, the first of which is the E-Delivery version (ending with AAE) and the second is the physical version.

NOTE: HPE SAN Network Advisor software will no longer be shipped as a DVD to customers. Instead, customers will be able to access and download the software from The HPE Product Download web site.

NOTE: Universal Temporary Licenses (UTLs) are available for trial usage or to test select features before purchasing permanent licenses. These UTLs enable optional features on B-series Directors and Switches on a temporary basis for one-time usage. Additional information can be found at the following URL using your HPE Passport credentials:

<https://h20392.www2.hpe.com/portal/swdepot/displayProductInfo.do?productNumber=BROCADETRIAL>

Technical Specifications

Fibre Channel ports	12 Internal 16Gb/s (downlink) ports; up to 24 External 4/8/16 Gb/s auto-sensing (8x SFP+ and 4x16 QSFP+) (uplink) – universal (E, F, N, D) ports. For the 16Gb/24 Port SAN Switch model: up to 24 ports in any internal/external port combination enabled. Depending on SAN switch model selected, order the total number of Brocade 16Gb Fibre Channel SAN Switch Module 12-port Upgrade E-LTU or LTU for HPE Synergy to increase active FC port counts.	
Device support and Scalability guidelines	https://support.hpe.com/hpsc/doc/public/display?docId=emr_na-c04787660	
Performance	16Gb/s line speed, full duplex	
Certified maximum	Certified maximum information available at: https://support.hpe.com/hpsc/doc/public/display?docId=emr_na-c04787660	
Switch core	Non-blocking	
Fabric latency	700 nanoseconds through the use of cut-through frame routing at 16Gb/s	
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 4x16 QSFP+ (16/8/4 Gbit/sec) and/or SFP+ (16/8/4 Gbit/sec) optical transceivers.	
Advanced	Short-wave, long-wave, and extended long wave laser transceivers are supported	
Fabric services	Simple Name Server, Registered State Change Notification (RSCN). Includes Advanced WebTools and Advanced Zoning. Optional advanced fabric services include: Fabric Vision, ISL Trunking, and Extended Fabrics.	
Options	SFP media, port upgradeable licensing, advanced management software licensing	
Supported software	Telnet, SSH, SNMP (FE MIB, FC Management MIB), HPE Storage Operations Manager, Advanced WebTools, Advanced Zoning, SAN Network Advisor, HPE SANnav Management Software	
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	1.08 in. (2.75 cm.)
	Height	11.05 in. (28.07 cm.)
	Width	16.92 in. (42.97 cm.)
	Weight	Approx. 7.0 lb. (3.18 kg.) - without media

Technical Specifications

Environment	System Inlet Temperature	Operating	Inlet air temperature up to 43°C (109.4°F) at sea level with an altitude derating of 1.0°C per every 1000 feet of elevation above sea level to a maximum operating altitude. For example, the maximum inlet air temperature requirement at 5000 ft. above Sea level is 38°C.
		Non-operating	-40°C to 70°C (-40° to 158°F). Maximum rate of change is 20°C/Hr (36°F/Hr).
	Relative Humidity	Operating	5 to 95% relative humidity, 38.7°C maximum wet bulb temperature, and 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.	

Summary of Changes

Date	Version History	Action	Description of Change
03-Feb-2020	Version 8	Changed	Standard Features, Service and Support, and Configuration Information sections were updated.
07-Oct-2019	Version 7	Changed	Overview, Product Highlights, Service and Support, Configuration Information and Technical Specifications sections were updated.
		Removed	Obsolete SKU was deleted: AW538A
01-Oct-2018	Version 6	Changed	Overview, Service and Support, Configuration Information, and Family Comparison sections were updated. (Updated SKUs (suffix rollover from B to C)
		Added	SKUs added in Configuration Information: K2Q83B, K2Q84B, K2Q86B, QK724A, TC464BAE, TC352CAE, TC353CAE, TC354CAE.
		Removed	SKUs deleted in Configuration Information: K2Q83A, K2Q84A, K2Q86A, TC464AAE, TC352BAE, TC353BAE, TC354BAE.
13-Feb-2017	Version 5	Changed	Changed initial description from 48-port capable to 24, per Nolo Moreno comment.
07-Jun-2016	Version 4	Changed	Updated Sn Network Advisor SKU/E-LTU and Added SMART SAN details
15-Apr-2016	Version 3	Changed	Changes made to the Technical Specifications section
31-Mar-2016	Version 2	Changed	Content Updated
01-Dec-2015	Version 1	Created	Document Created



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