



**Hewlett Packard
Enterprise**

HPE B-series 16Gb SAN Switches Hardware Reference Guide

Abstract

This document provides information on installing, configuring, and maintaining the HPE StoreFabric SN6500B 16Gb Fibre Channel Switch, the HPE SN6000B 16Gb Fibre Channel Switch, the HPE SN3000B 16Gb Fibre Channel Switch, and the StoreFabric SN4000B SAN Extension Switch. It is intended for system administrators and technicians with knowledge of SANs and HPE FC switches.

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HPE 16Gb FC switches

This chapter provides general information about the HPE StoreFabric SN6500B 16Gb FC Switch, HPE SN6000B 16Gb FC Switch, HPE SN3000B 16Gb FC Switch, and HPE StoreFabric SN4000B SAN Extension Switch.

NOTE:

For descriptions of acronyms and abbreviations used in this Guide, see the **Glossary** on page 93.

HPE StoreFabric SN6500B 16Gb FC Switch

This section provides an overview of the StoreFabric SN6500B 16Gb FC Switch. It describes platform capabilities and components, the physical layout of the switch, and hardware and software options.

Overview

The StoreFabric SN6500B 16Gb FC Switch is a 96-port autosensing 4, 8, 10, or 16 Gb/s FC switch that delivers the latest Hewlett Packard Enterprise multi-chip architecture for FC SANs. It is an enterprise-class switch designed to handle the large-scale SAN requirements of an enterprise environment, and can also be used to address the SAN requirements of a small-sized to medium-sized workgroup. It provides excellent value as the foundation of a SAN, and is able to grow to meet an organization's SAN needs.

The StoreFabric SN6500B 16Gb FC Switch meets the RAS, performance, and scalability requirements of an enterprise switch, while delivering interoperability and ease-of-use advantages. This switch is the latest offering from the Hewlett Packard Enterprise family of entry-to-enterprise products.

The StoreFabric SN6500B 16Gb FC Switch provides up to 96 ports in a double (2U) height switch only 24 inches deep. This small size enables the creation of very dense fabrics in a relatively small space.

The StoreFabric SN6500B 16Gb FC Switch offers POD licensing. Base models of the switch contain 48 ports, and up to two additional 24-port POD licenses can be purchased. With the appropriate licensing, ports can be configured to run at 4, 8, or 16 Gb/s, and optionally 10 Gb/s for the first eight ports. Port activation works through DPOD, where ports are licensed only as they come online. For example, a base model with 48-port licenses registers the first 48 ports to come online, regardless of their numbering. After all 48 licenses have been assigned, you can manually move the licenses between those ports.

Platform capabilities

The StoreFabric SN6500B 16Gb FC Switch offers the following features and capabilities:

- Up to 96 autosensing ports in a single domain, with high-performance 16 Gb/s technology.
- POD scaling from 48 to 72 or 96 ports.
- Port licensing through DPOD.
- 4, 8, and 16 Gb/s autosensing FC switch and router ports.
 - 4 and 8 Gb/s performance is enabled by 8 Gb/s SFP+ transceivers.
 - 4, 8, and 16 Gb/s performance is enabled by 16 Gb/s SFP+ transceivers.
- 10 Gb/s manual set capability on FC ports (requires the optional 10 Gb FCIP/FC license), on the first eight ports only.
 - 10 Gb/s performance is enabled by 10 Gb/s SFP+ transceivers.
 - The first eight ports can be configured for 10 Gb/s for metro connectivity.
- FC ports self-configure as E_Ports and F_Ports. EX_Ports can be activated on a per-port basis with the optional Integrated Routing license.

- M_Ports and D_Ports must be configured manually.
- The D_Port feature provides physical media diagnostic, troubleshooting, and verification services.
- In-flight data compression and encryption on up to four ports provide efficient link utilization and security.
- VF support improves isolation between VFs.
- FCR service, available with the optional Integrated Routing license, provides improved scalability and fault isolation.
- ISL Trunking (licensable), which allows up to eight ports (at 4, 8, or 16 Gb/s) between a pair of switches combined to form a single, logical ISL with a speed of up to 128 Gb/s (256 Gb/s full duplex) for optimal bandwidth utilization and load balancing. There is no limit to how many trunk groups can be configured.
- DPS (Dynamic Path Selection), which optimizes fabric-wide performance and load balancing by automatically routing data to the most efficient available path in the fabric.
- Hewlett Packard Enterprise-branded SFP+ optical transceivers that support any combination of SWL, LWL, and ELWL optical media among the switch ports.
- Support for unicast data traffic types.
- Fabric OS delivers distributed intelligence throughout the network, and enables a wide range of value-added applications such as Advanced Web Tools and Zoning. Optional fabric services include Adaptive Networking with QoS, Extended Fabrics, Enhanced Group Management, Fabric Watch, ISL Trunking, and End-to-End APM.
- The StoreFabric SN6500B 16Gb FC Switch includes the capabilities associated with the Adaptive Networking and Server Application Optimization (SAO) features by default; the licenses to enable these features are not required on this switch.
- Hardware zoning is accomplished at the port level of the switch and by WWN. Hardware zoning permits or denies delivery of frames to any destination port address.
- Extensive diagnostic and system-monitoring capabilities for enhanced RAS.
- The EZSwitchSetup wizard makes SAN configuration a three-step point-and-click task.
- Real-time power monitoring enables monitoring the real-time power usage of the fabric, at a switch level.
- Local port latency minimized to 700 ns using cut-through frame routing at 16 Gb/s.
- Allows for switch latency of 2,100 ns (L2 latency without forward error correction).

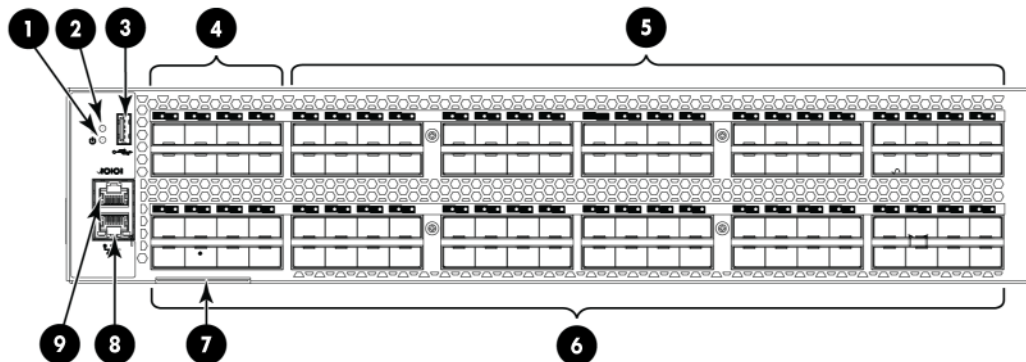
Platform components

- A system motherboard that features a primary CPU running at 1.20 GHz, with integrated peripherals
- An RJ45 10/100/1000 BaseT Ethernet system management port (RJ45 connector), in conjunction with EZSwitchSetup, that supports switch IP address discovery and configuration, eliminating the need to attach a serial cable to configure the switch IP address
- One RS-232 console serial port with an RJ45 connector for initial switch setup, if not using EZSwitchSetup, and factory default restoration
- One 2 GB DDR2 running at 400 MHz
- Boot memory of 8 MB
- One 2 GB compact flash card
- Up to 96 16 Gb/s FC ports
- One USB 2.0 port that provides storage for firmware updates, output of the `supportSave` command, and storage for configuration uploads and downloads
- Two hot-swappable, 80+ Platinum-certified, redundant power supplies
- Three hot-swappable fan FRUs
- One LED (green/amber) per FC port to indicate status
- One LED (green) for system power
- One LED (green/amber) for system status
- Two LEDs per power supply: one green LED for AC line-in status, and one green/amber LED for DC power-out

- One LED (green/amber) per fan
- Two Ethernet LEDs (integrated with RJ45) for speed and activity status
- EEPROM for switch identification
- Voltage and temperature monitoring
- RTC with battery
- Fan monitoring, including flow direction

Port side of the switch

Figure 1: Port side of the HPE StoreFabric SN6500B 16Gb FC Switch on page 8 shows the port side of the SN6500B StoreFabric 16Gb FC Switch.

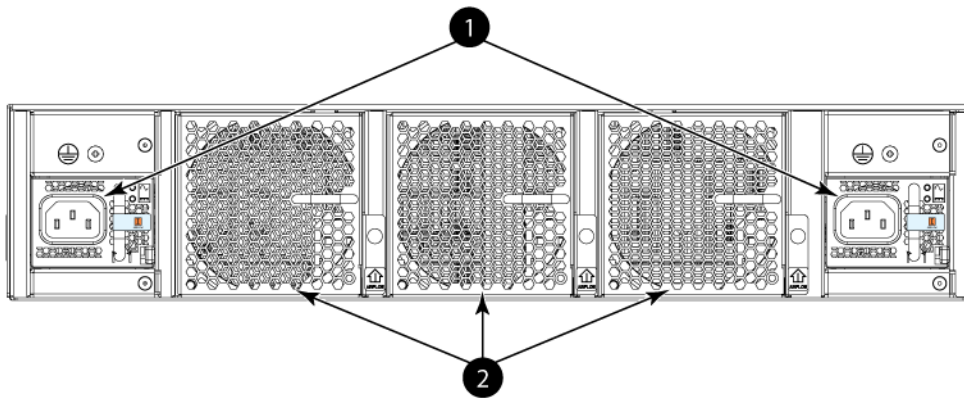


- | | |
|---------------------------|--------------------------------------|
| 1. System power LED | 2. System status LED |
| 3. USB port | 4. FC ports 0–7 |
| 5. FC ports 8–47 | 6. FC ports 48–95 |
| 7. Switch ID pull-out tab | 8. Management Ethernet port with LED |
| 9. Serial console port | |

Figure 1: Port side of the HPE StoreFabric SN6500B 16Gb FC Switch

Nonport side of the switch

Figure 2: Nonport side of HPE SN6500B StoreFabric 16Gb FC Switch on page 9 shows the nonport side of the StoreFabric SN6500B 16Gb FC Switch, which contains the power supplies (including the AC power receptacle) and fans.



1. Power supplies with integral fans

2. Fans

Figure 2: Nonport side of HPE SN6500B StoreFabric 16Gb FC Switch

Software options

The following optional software kits and licenses are available:

- The Power Pack Software Bundle kit includes:
 - Fabric Watch
 - ISL Trunking
 - Extended Fabric
 - Advanced Performance Monitor
 - Fabric Vision Software
- Extended Fabric
- Fabric Watch
- Advanced Performance Monitor
- ISL Trunking
- Integrated Routing
- StoreFabric SN6500B 16Gb 24-port FC Upgrade LTU

NOTE:

- Adaptive Networking and Server Application Optimization features are included by default in the switch firmware FOS 7.2.x or later, and do not require a separate license. For more information about supported FOS versions, see the HPE SPOCK website at <http://www.hpe.com/storage/spock>.
 - For the latest information on supported software components, see the product QuickSpecs available from the Hewlett Packard Enterprise website: <http://www.hpe.com/support/sn6500b/quickspecs>
-

ISL Trunking

HPE ISL Trunking is optional software, requiring a license, that allows you to create trunking groups of ISLs between adjacent switches. Up to eight FC ports on the StoreFabric SN6500B 16Gb FC Switch can be used as a trunking group to achieve speeds of up to 128 Gb/s (256 Gb/s full duplex) for optimal bandwidth utilization and load balancing. For more information about ISL Trunking, see the Fabric OS Administrator Guide.

Hardware options

Table 1: Optional hardware kits

Hardware kit	Part number
HPE PremierFlex OM4+ Fiber Optic Cables	1m PremierFlex OM4 LC/LC Multi-mode Optical Cable
	2m PremierFlex OM4 LC/LC Multi-mode Optical Cable
	5m PremierFlex OM4 LC/LC Multi-mode Optical Cable
	15m PremierFlex OM4 LC/LC Multi-mode Optical Cable
	30m PremierFlex OM4 LC/LC Multi-mode Optical Cable
	50m PremierFlex OM4 LC/LC Multi-mode Optical Cable
HPE PremierFlex OM4+ QSFP Fiber Optic Cables	1m (12f) PremierFlex OM4 MPO/MPO Optical Cable
	2m (12f) PremierFlex OM4 MPO/MPO Optical Cable
	5m (12f) PremierFlex OM4 MPO/MPO Optical Cable
	10m (12f) PremierFlex OM4 MPO/MPO Optical Cable
	15m (12f) PremierFlex OM4 MPO/MPO Optical Cable
	30m (12f) PremierFlex OM4 MPO/MPO Optical Cable
	50m (12f) PremierFlex OM4 MPO/MPO Optical Cable
	100m (12f) PremierFlex OM4 MPO/MPO Optical Cable
HPE PremierFlex MPO to 4xLC OM4 Splitter Cables	5m PremierFlex MPO to 4xLC Optical Cable
	15m PremierFlex MPO to 4xLC Optical Cable
	30m PremierFlex MPO to 4xLC Optical Cable
	50m PremierFlex MPO to 4xLC Optical Cable
OM3 LC-LC Optical Cables	0.5m OM3 LC-LC Multi-mode Optical Cable
	1m OM3 LC-LC Multi-mode Optical Cable
	2m OM3 LC-LC Multi-mode Optical Cable

Table Continued

Hardware kit	Part number
	5m OM3 LC-LC Multi-mode Optical Cable
	15m OM3 LC-LC Multi-mode Optical Cable
	30m OM3 LC-LC Multi-mode Optical Cable
	50m OM3 LC-LC Multi-mode Optical Cable

NOTE:

For the latest information on supported hardware components, see the product QuickSpecs available on the [Hewlett Packard Enterprise website](#).

SFP transceivers

Table 2: SFP transceiver options

Option	Part number
8Gb Transceivers	HPE 8Gb Shortwave B-series FC SFP+
	HPE 8Gb LW B-series 10km FC SFP+
	HPE B-series 8Gb LW 25km FC SFP
10Gb Transceivers	HPE B-series 10Gb SFP+ Short Range Transceiver
	HPE B-series 10Gb SFP+ Long Range Transceiver
16Gb Transceivers	HPE B-series 16Gb SFP+ Short Wave Transceiver
16Gb Long Wave Transceivers	HPE 16Gb Long Wave B-series 10km FC SFP+ 1 Pack

HPE SN6000B 16Gb FC Switch

This section provides an overview of the SN6000B 16Gb FC Switch. It describes platform capabilities and components, the physical layout of the switch, and hardware and software options.

Overview

The SN6000B 16Gb FC Switch is a 48-port autosensing 4, 8, 10, or 16 Gb/s FC switch that delivers the latest Hewlett Packard Enterprise single-chip architecture for FC SANs. The SN6000B 16Gb FC Switch is an enterprise-class switch designed to handle the large-scale SAN requirements of an enterprise environment, and can also be used to address the SAN requirements of a small-sized or medium-sized workgroup.

The SN6000B 16Gb FC Switch meets RAS, performance, and scalability requirements of an enterprise switch, while delivering interoperability and ease-of-use advantages. This switch is the latest offering from the Hewlett Packard Enterprise family of entry-to-enterprise products.

The SN6000B 16Gb FC Switch provides 48 ports in a single (1U) height switch that enables the creation of very dense fabrics in a relatively small space.

The SN6000B 16Gb FC Switch also offers POD licensing. Base models of the switch contain 24 ports, and up to two additional 12-port POD licenses can be purchased. The switch provides excellent value as the foundation of a SAN, and can grow to meet an organization's SAN needs.

The SN6000B 16Gb FC Switch can be configured in AG mode, which enables configuring the enterprise fabric to handle additional N_Ports instead of domains. Reducing the number of domain IDs and ports simplifies configuration and management in a large fabric. Switches in AG mode are logically transparent to the host and fabric. You can increase the number of hosts that have access to the fabric without increasing the number of switches.

Platform capabilities

The SN6000B 16Gb FC Switch offers the following features and capabilities:

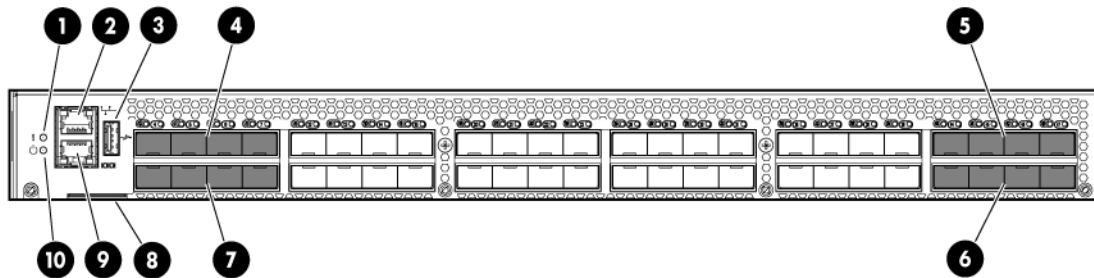
- Up to 48 autosensing ports of high-performance 16 Gb/s technology in a single domain.
- POD scaling from 24 to 36 or 48 ports.
- 4, 8, and 16 Gb/s autosensing FC switch and router ports.
 - 4 and 8 Gb/s performance is enabled by 8 Gb/s SFP+ transceivers.
 - 4, 8, and 16 Gb/s performance is enabled by 16 Gb/s SFP+ transceivers.
- 10 Gb/s manual set capability on FC ports (requires the optional 10 Gb FC-IP/FC license).
 - 10 Gb/s performance is enabled by 10 Gb/s SFP+ transceivers.
 - The first eight ports can be configured for 10 Gb/s for metro connectivity.
- Universal ports self-configure as E, F, M, or D ports. EX_Ports can be activated on a per port basis with the optional Integrated Routing license. The D_Port feature provides physical media diagnostic, troubleshooting, and verification services.
- In-flight data compression and encryption on up to two ports provides efficient link utilization and security.
- VF support improves isolation between VFs.
- FCR service, available with the optional Integrated Routing license, provides improved scalability and fault isolation.
- FICON, FICON Cascading, and FICON CUP ready.
- ISL Trunking (licensable), which allows up to eight ports (at 4, 8, or 16 Gb/s) between a pair of switches combined to form a single, logical ISL with a speed of up to 128 Gb/s (256 Gb/s full duplex) for optimal bandwidth utilization and load balancing.
- DPS, which optimizes fabric-wide performance and load balancing by automatically routing data to the most efficient available path in the fabric.
- Hewlett Packard Enterprise-branded SFP+ optical transceivers that support any combination of SWL, LWL and ELWL optical media among the switch ports.
- Support for unicast, multicast (255 groups), and broadcast data traffic types.
- Fabric OS delivers distributed intelligence throughout the network, and enables a wide range of value-added applications such as Advanced Web Tools and Zoning. Optional Fabric Services include Adaptive Networking with QoS, Extended Fabrics, Enhanced Group Management, Fabric Watch, ISL Trunking, and APM.
- Support for AG configuration where server ports connected to the fabric core are virtualized.
- Hardware zoning is accomplished at the port level of the switch and by WWN. Hardware zoning permits or denies delivery of frames to any destination port address.
- Extensive diagnostics and system-monitoring capabilities for enhanced RAS.
- 10 Gb/s FC integration on the same port provides DWDM metro connectivity on the same switch (can be done on the first eight ports only).
- Real-time power monitoring enables monitoring the fabric power usage at a switch level.
- Port-to-port latency minimized to 800 nanoseconds through cut-through frame routing at 16 Gb/s.

Platform components

- A system motherboard that features a PowerPC 440EPx RISC CPU running at 667 MHz, with integrated peripherals, and provides high performance with low power consumption
- An RJ-45 10/100 Base-T Ethernet system management port that supports switch IP address discovery and configuration
- One RS-232 serial port with an RJ-45 connector for initial switch setup and factory default restoration, (the integral LEDs remain unlit at all times)
- A USB port that provides storage for firmware updates, `supportsave` command output, and storage for configuration uploads and downloads
- Two hot-swappable, redundant power supply and fan assemblies. There are two fans per power supply
- Designed for rack mounting in a 19-inch EIA rack (1U high)
- One LED (green/amber) per FC port to indicate status
- One LED (green) for system power
- One LED (green/amber) for system status
- Two Ethernet LEDs (integrated with RJ-45) for speed and activity status
- EEPROM for switch identification
- Voltage and temperature monitoring
- RTC with battery

Port side of the switch

Figure 3: Port side of the HPE SN6000B 16Gb FC Switch on page 13 shows the port side of the SN6000B 16Gb FC Switch.



- | | |
|------------------------|---------------------------------------|
| 1. System status LED | 2. Management Ethernet port with LEDs |
| 3. USB port | 4. FC ports (0-3) |
| 5. FC ports (40-43) | 6. FC ports (44-47) |
| 7. FC ports (4-7) | 8. Switch ID pull-out tab |
| 9. Serial console port | 10. System power LED |

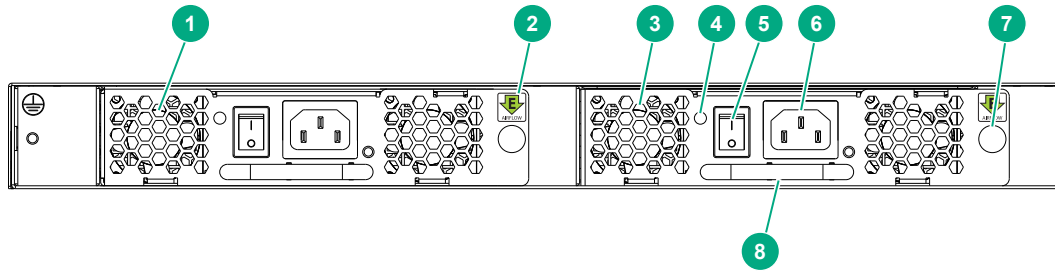
Figure 3: Port side of the HPE SN6000B 16Gb FC Switch

NOTE:

The two LEDs on the serial console port are nonfunctional.

Nonport side of the switch

Figure 4: Nonport side of the HPE SN6000B 16Gb FC Switch on page 14 shows the nonport side of the SN6000B 16Gb FC Switch, which contains two power supply and fan assemblies (each including an AC power receptacle and AC power switch).



- | | |
|-------------------------------------|--------------------------------------|
| 1. Power supply and fan assembly #2 | 2. Airflow label |
| 3. Power supply and fan assembly #1 | 4. Power supply and fan assembly LED |
| 5. On/off switch | 6. Power plug receptacle |
| 7. Thumbscrew | 8. Handle |

Figure 4: Nonport side of the HPE SN6000B 16Gb FC Switch

Software options

The following optional software kits and licenses are available:

- The Power Pack Software Bundle kit includes:
 - Adaptive Networking
 - Fabric Watch
 - ISL Trunking
 - Extended Fabric
 - Server Application Optimization
 - Advanced Performance Monitor
 - Fabric Vision Software¹
- Extended Fabric
- Fabric Watch
- Advanced Performance Monitor
- ISL Trunking
- Integrated Routing
- HPE SN6000B 10Gb Integrated FC Extension (enables 10Gb FC for first eight ports)
- SN6000B 16Gb 24-48 12-port FC Upgrade LTU

¹ Fabric OS 7.2.0a or later

NOTE:

- Adaptive Networking and Server Application Optimization features are included by default in the switch firmware FOS 7.2.x or later, and do not require a separate license. For more information about supported FOS versions, see the HPE SPOCK website at <http://www.hpe.com/storage/spock>.
 - For the latest information on supported software components, see the product QuickSpecs available from the Hewlett Packard Enterprise website: <http://www.hpe.com/info/sn6000b/quickspecs>.
-

ISL Trunking

ISL Trunking is optional software that enables creating trunking groups of ISLs between adjacent switches. Up to eight FC ports on the SN6000B 16Gb FC Switch can be used as a trunking group to achieve speeds of up to 128 Gb/s (256 Gb/s full duplex) for optimal bandwidth utilization and load balancing.

For example, the FC ports on the SAN Switch are numbered from left to right and color-coded in groups of eight to indicate which ports you can combine into trunking groups. **Figure 5: Trunking groups example** on page 15 shows the switch with three trunking groups of eight ports.

NOTE:

If your switch is licensed for ISL Trunking, use the trunking groups available on the switch.

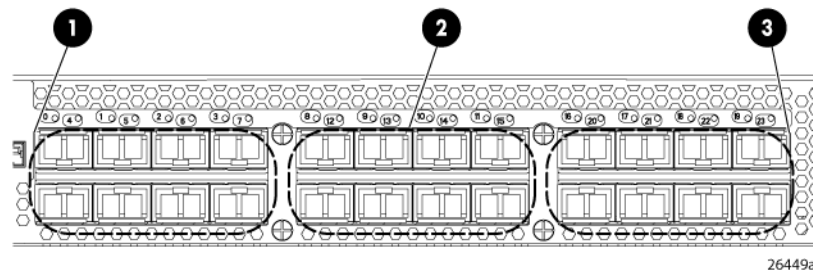


Figure 5: Trunking groups example

- | | |
|----------------------------------|---------------------------------|
| 1. Trunking group 1: Ports 0–7 | 2. Trunking group 2: Ports 8–15 |
| 3. Trunking group 3: Ports 16–23 | |

For more information about ISL Trunking, see the Fabric OS 7.0.x Administrator's Guide for the firmware version you are running.

Hardware options

For more information on optional hardware kits, see [Optional hardware kits](#).

NOTE:

For the latest information on supported hardware components, see the product QuickSpecs available on the [Hewlett Packard Enterprise website](#).

SFP transceivers

Table 3: SFP transceiver options

Option	Part number
8Gb Transceivers	8Gb Shortwave B-series FC SFP+
	8Gb LW B-series 10km FC SFP+
	B-series 8Gb LW 25km FC SFP
10Gb Transceivers	B-series 10Gb SFP+ Short Range Transceiver
	B-series 10Gb SFP+ Long Range Transceiver
16Gb Transceivers	B-series 16Gb SFP+ Short Wave Transceiver
16Gb Long Wave Transceivers	16Gb Long Wave B-series 10km FC SFP+ 1 Pack

HPE SN3000B 16Gb FC Switch

This section provides an overview of the SN3000B 16Gb FC Switch. It describes platform capabilities and components, the physical layout of the switch, and hardware and software options.

Overview

The SN3000B 16Gb FC Switch is a 24-port autosensing 4, 8, or 16 Gb/s FC switch that delivers the latest Hewlett Packard Enterprise single-chip architecture for FC SANs. The SN3000B 16Gb FC Switch is a small-sized to mid-sized business-class switch that is designed to handle smaller-scale SAN requirements.

The SN3000B 16Gb FC Switch provides up to 24 ports in a single height (1U) switch, which enables the creation of very dense fabrics in a relatively small space. This switch also offers POD licensing. Base models of the switch contain 12 ports, and an additional 12-port POD license can be purchased.

NOTE:

The base model of the SN3000B 16Gb FC Switch includes a single power supply and fan module assembly. An optional second power supply and fan module assembly can be added to the switch as an upgrade, for redundancy and hot-swap capability.

The SN3000B 16Gb FC Switch supplies RAS performance and the scalability requirements of an enterprise switch along with interoperability and ease-of-use advantages.

The SN3000B 16Gb FC Switch can be configured in AG mode, which enables configuring the enterprise fabric to handle additional N_Ports instead of domains. Reducing the number of domain IDs and ports simplifies configuration and management in a large fabric. Switches in AG mode are logically transparent to the host and the fabric. You can increase the number of hosts that have access to the fabric without increasing the number of switches.

Platform capabilities

The SN3000B 16Gb FC Switch offers the following features and capabilities:

- Up to 24 autosensing ports of high-performance 16-Gb/s technology in a single domain.
- POD scaling from 12 to 24 ports.
- 4, 8, and 16 Gb/s autosensing FC switch and router ports
 - 4 and 8 Gb/s performance is enabled by 8 Gb/s SFP+ transceivers
 - 4, 8, and 16 Gb/s performance is enabled by 16 Gb/s SFP+ transceivers
- Universal ports self-configure as E, F, or M ports. EX_Ports can be activated on a per-port basis with the optional Integrated Routing license. D-port functionality is also available for diagnostics.
- Airflow is set for port-side exhaust.
- ISL Trunking (licensable), which allows up to eight ports (at 4, 8, or 16 Gb/s speeds) between a pair of switches combined to form a single, logical ISL with a speed of up to 128 Gb/s (256 Gb/s full duplex) for optimal bandwidth utilization and load balancing. The base model permits one eight-port trunk plus one four-port trunk.
- DPS, which optimizes fabric-wide performance and load balancing by automatically routing data to the most efficient available path in the fabric.
- Hewlett Packard Enterprise-branded SFP+ optical transceivers that support any combination of SWL, LWL, and ELWL optical media among the switch ports.
- Support for unicast traffic type.
- Fabric OS delivers distributed intelligence throughout the network, and enables a wide range of value-added applications such as Advanced Web Tools and Zoning. Optional Fabric Services include Adaptive Networking with QoS, Extended Fabrics, Enhanced Group Management, Fabric Watch, ISL Trunking, and APM.
- Support for AG configuration where server ports connected to the fabric core will be virtualized.
- Hardware zoning is accomplished at the port level of the switch and by WWN. Hardware zoning permits or denies delivery of frames to any destination port address.
- Extensive diagnostics and system-monitoring capabilities for enhanced RAS.
- Real-time power monitoring enables users to monitor real-time power usage of the fabric at a switch level.
- Port-to-port latency minimized to 800 ns using cut-through frame routing at 16 Gb/s.

Platform components

- A system motherboard that features a PowerPC 440EPx RISC CPU running at 667 MHz, with integrated peripherals
- An RJ-45 10/100 Base-T Ethernet system management port that supports switch IP address discovery and configuration
- One RS-232 serial port with an RJ-45 connector for initial switch setup and factory default restoration (the integral LEDs remain unlit at all times)
- A USB port that provides storage for firmware updates, `supportsave` command output, and storage for configuration uploads and downloads
- One power supply and fan assembly in the base model. There are two fans per assembly. An optional second power supply and fan assembly is available for redundancy and hot-swap capability
- One LED (green/amber) per FC port to indicate status
- One LED (green) for system power
- One LED (green/amber) for system status
- Two Ethernet port LEDs (integrated with RJ45) for speed and port activity. (A green LED for port speed and an amber LED for port activity)
- EEPROM for switch identification
- Voltage, fan, and temperature monitors
- RTC with battery

Port side of the switch

Figure 6: Port side of the HPE SN3000B 16Gb FC Switch on page 18 shows the port side of the SN3000B 16Gb FC Switch.

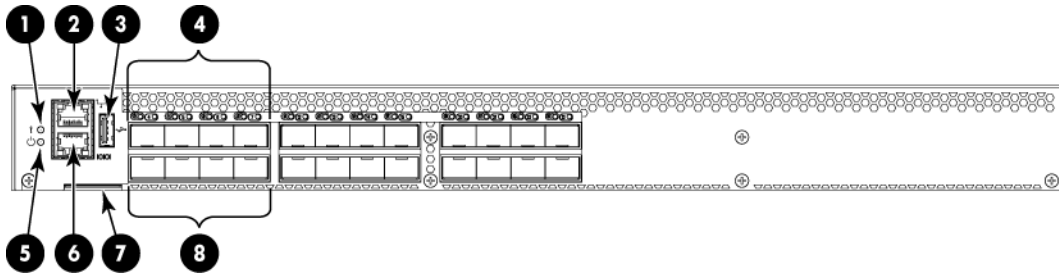


Figure 6: Port side of the HPE SN3000B 16Gb FC Switch

- | | |
|---------------------------|---------------------------------------|
| 1. System status LED | 2. Management Ethernet port with LEDs |
| 3. USB port | 4. FC ports (0-3) |
| 5. System power LED | 6. Serial console port |
| 7. Switch ID pull-out tab | 8. FC ports (4-7) |

NOTE:

The two LEDs on the serial console port are nonfunctional.

Nonport side of the switch

Figure 7: Nonport side of the HPE SN3000B 16Gb FC Switch on page 18 shows the nonport side of the SN3000B 16Gb Switch.

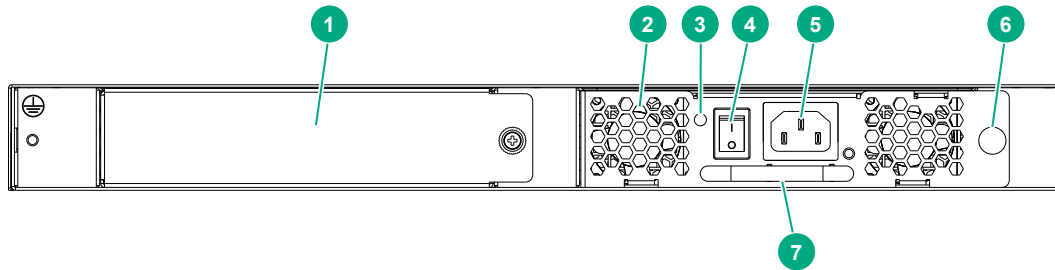


Figure 7: Nonport side of the HPE SN3000B 16Gb FC Switch

- | | |
|--|-------------------------------------|
| 1. Filler panel (Optional Power supply and fan assembly can be added in this slot) | 2. Power supply and fan assembly #1 |
| 3. Power supply and fan assembly LED | 4. On/off switch |
| 5. Power plug receptacle | 6. Thumbscrew |
| 7. Handle | |

Software options

The following optional software kits and licenses are available.

- The Power Pack+ Software Bundle kit includes:
 - Adaptive Networking
 - Fabric Watch
 - ISL Trunking
 - Extended Fabric
 - Server Application Optimization
 - Advanced Performance Monitor
 - Fabric Vision Software
- HPE B-series 8-24 Port SAN Switch Adaptive Networking LTU
- HPE B-series 8-24 Port SAN Switch ISL Trunking LTU
- HPE SN3000B 16Gb 24/12 FC Switch 12-port Upgrade LTU

NOTE:

- Adaptive Networking and Server Application Optimization features are included by default in the switch firmware FOS 7.2.x or later, and do not require a separate license. For more information about supported FOS versions, see the SPOCK website at <http://www.hpe.com/storage/spock>.
 - For the latest information on supported software components, see the product QuickSpecs available from the Hewlett Packard Enterprise website: <http://www.hpe.com/info/sn3000b/quickspecs>
-

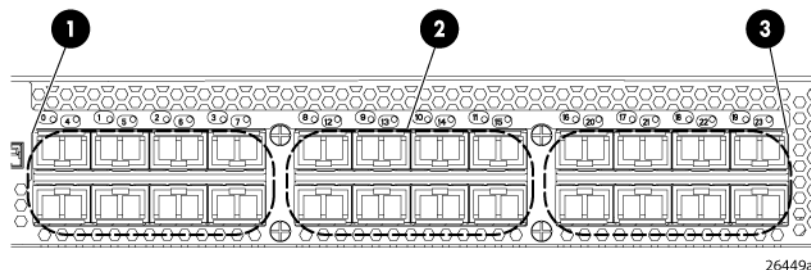
ISL Trunking

ISL Trunking is optional software that enables creating trunking groups of ISLs between adjacent switches. Up to eight FC ports on the SN3000B 16Gb FC Switch can be used as a trunking group to achieve speeds of up to 128 Gb/s (256 Gb/s full duplex) for optimal bandwidth utilization and load balancing.

For example, the FC ports on the SAN Switch are numbered from left to right and color-coded in groups of eight to indicate which ports you can combine into trunking groups. **Figure 8: HPE SN3000B 16Gb FC Switch trunking groups example** on page 20 shows the switch with three trunking groups of eight ports.

NOTE:

If your switch is licensed for ISL Trunking, use the trunking groups available on the switch.



1. Trunking group 1: Ports 0–7
2. Trunking group 2: Ports 8–15
3. Trunking group 3: Ports 16–23

Figure 8: HPE SN3000B 16Gb FC Switch trunking groups example

For more information about ISL Trunking, see the Fabric OS 7.0.x Administrator's Guide for the firmware version you are running.

Hardware options

For more information on optional hardware kits, see [Optional hardware kits](#).

NOTE:

For the latest information on supported hardware components, see the product QuickSpecs available on the [Hewlett Packard Enterprise website](#).

SFP transceivers

Table 4: SFP transceiver options

Option	Part number
8 Gb Transceivers	8Gb Shortwave B-series FC SFP+
	8Gb LW B-series 10km FC SFP+
	B-series 8Gb LW 25km FC SFP
16 Gb Transceivers	B-series 16Gb SFP+ Short Wave Transceiver
16 Gb Long Wave Transceivers	16Gb Long Wave B-series 10km FC SFP+ 1 Pack

HPE StoreFabric SN4000B SAN Extension Switch

This section provides an overview of the StoreFabric SN4000B SAN Extension Switch. It describes platform capabilities and components, and the physical layout of the switch.

Overview

The StoreFabric SN4000B SAN Extension Switch is a platform for FCIP that enables transmission of Fiber Channel data over long distances through IP networks by wrapping Fiber Channel frames in IP

packets. Each end of the FCIP communication path is a compatible FCIP device. The switch operates independently or in a fabric containing multiple extension switches.

Platform capabilities

The SN4000B SAN Extension Switch offers the following features and capabilities:

- Multiple logical FCIP tunnels with a maximum tunnel bandwidth up to 20 Gb/s allows for scalable connectivity between sites.
- The FCIP trunking feature allows multiple IP source and destination address pairs (defined as FCIP circuits) providing high bandwidth FCIP tunnel and lossless failover resiliency using multiple 1/10GbE or 40GbE interfaces. Additionally, each FCIP circuit supports four QoS classes (Class F, High, Medium, and Low Priority), each as a TCP connection.
- The ARL feature meets minimum bandwidth guarantee for each tunnel while fully utilizing the available network bandwidth, without any adverse throughput performance during high traffic load.
- Hardware-based compression maximizes throughput over lower bandwidth links in a WAN, thereby optimizing the cost efficiencies of FCIP. The switch compresses the FC frames before they are encapsulated into FCIP packets.
- Key protocol features are enabled in the FCIP implementation to optimize performance of extension over IP networks.
- The hardware-based IPsec supports a mix of secure and nonsecure tunnels on the same Ethernet port, jumbo frames, and VLAN-tagged connections. The IPsec function of the switch supports both IPv4 and IPv6.
- FastWrite, Open Systems Tape Pipelining, and Advanced Accelerator for FICON mitigate the latency effect of a long distance FCIP connection over IP WAN.
- FCIP HCL provides in-service firmware upgrade for supporting business operations 24/7.
- Built-in WAN link tester generates traffic over an IP connection to test for maximum throughput, congestion, loss percentage, out-of-order delivery, latency, and other network conditions. It helps determine the health of a WAN link before deploying it for use.
- Fabric Vision advanced monitoring provides the following functions:
 - Policy-based monitoring monitors FCIP connectivity and WAN anomalies using multilayer metrics.
 - Flow monitoring reports IOPS and data rate of individual I/O flows of inter-DC replication and tape backup operations.
 - Flow generator generates FC frames for a defined flow with default or custom size and pattern and sends them across FCIP tunnel to help validate end-to-end network setup and configuration.
- Fabric OS delivers distributed intelligence throughout the network, and enables a wide range of value-added applications.

Platform components

- A total of 24 Fibre Channel ports with link speeds of 2, 4, 8, and 16 Gb/s, compatible with SWL, LWL, and ELWL SFP+ transceivers
- Rack-mountable 2U chassis
- A total of 16 1GbE/10GbE ports, compatible with copper, ultra short reach, short reach, and long reach SFP/SFP+ transceivers
- Two 40 GbE ports compatible with short reach and long reach QSFP transceivers
- An RJ-45 Ethernet management port with 10/100/1000 Mb/s autonegotiating capability
- A USB port that provides storage for firmware updates, `supportSave` command output, and storage for configuration uploads and downloads
- Two redundant, hot-swappable 1100 W AC/DC power supply units with integral fans
- Three port-side exhaust DC fan FRUs

Port side of the switch

Figure 9: Port side of the HPE StoreFabric SN4000B SAN Extension Switch on page 22 shows the port side of the StoreFabric SN4000B SAN Extension Switch.

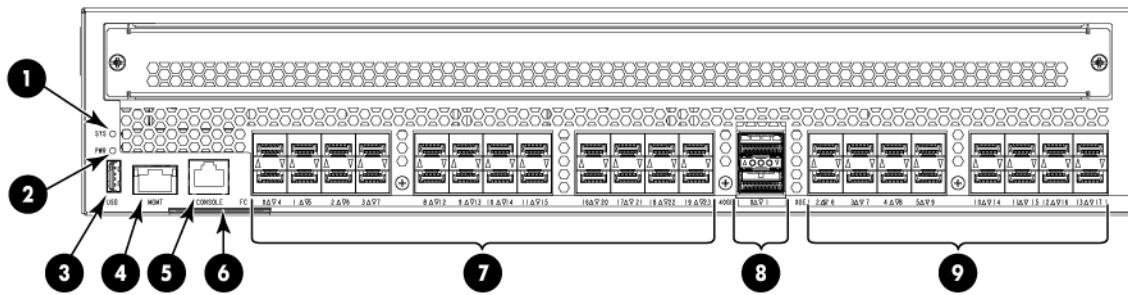


Figure 9: Port side of the HPE StoreFabric SN4000B SAN Extension Switch

- | | |
|-----------------------------|---------------------------------|
| 1. System status LED | 2. Power Status LED |
| 3. USB port | 4. Ethernet management Port |
| 5. Console port (RJ-45) | 6. Switch ID pull-out tab |
| 7. 16 GbE FC ports (24) | 8. 40 GbE FCIP ports (QSFP) (2) |
| 9. 1/10 GbE FCIP ports (16) | |

Nonport side of the switch

Figure 10: Nonport side of the StoreFabric SN4000B SAN Extension Switch on page 22 shows the nonport side of the StoreFabric SN4000B SAN Extension Switch.

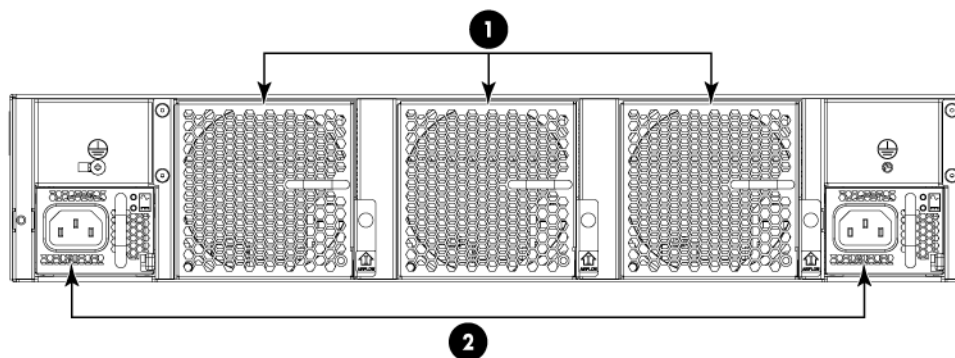


Figure 10: Nonport side of the StoreFabric SN4000B SAN Extension Switch

- | | |
|-------------|---|
| 1. Fan FRUs | 2. Power supply FRUs with integral fans |
|-------------|---|

Software options

The following optional software kits and licenses are available:

- HPE StoreFabric SN4000B 10Gb WAN Rate Upgrade LTU
- HPE StoreFabric SN4000B 40Gb WAN Rate Upgrade LTU
- HPE StoreFabric SN4000B FICON Accelerator LTU

NOTE:

For the latest information on supported software components, see the product QuickSpecs available from the Hewlett Packard Enterprise website: <http://www.hpe.com/info/sn4000b/quickspecs>.

Hardware options

For more information on optional hardware kits, see [Optional hardware kits](#).

NOTE:

For the latest information on supported hardware components, see the product QuickSpecs available on the [Hewlett Packard Enterprise website](#).

Transceivers

Table 5: Transceiver options

Option	Part number
8 Gb Transceivers	8Gb Shortwave B-series FC SFP+ 1 Pack
	8Gb LW B-series 10km FC SFP+ 1 Pack
	B-series 8Gb LW 25km FC SFP 1 Pack
16 Gb Transceivers	B-series 16Gb SFP+ Short Wave Transceiver
16 Gb Long Wave Transceivers	B-series 16Gb SFP+ LW 10km XCVR
	B-series 16Gb LW 25km FC SFP 1Pk XCVR
1 GbE Transceivers	B-series 1GbE LX SFP Transceiver
	B-series 1Gb Ethernet Copper SFP Transceiver
10 GbE Transceivers	10GbE SW B-series SFP+ Transceiver
	10GbE LW B-series SFP+ Transceiver
40 GbE Transceivers	B-series 40GbE LR QSFP+ Transceiver
	B-series 40GbE SR QSFP+ Transceiver

Installing and configuring HPE 16Gb FC switches

This chapter provides installation and configuration information for the HPE 16Gb FC switches.

Accessories

The following items are included with the standard shipment of a fully-configured 16Gb FC Switch. When opening the packages, verify that the following items are included and that no damage has occurred during shipping:

- One StoreFabric SN6500B 16Gb FC Switch with two hot-swappable power supplies and three hot-swappable fans, or one SN6000B 16Gb FC Switch with two integrated power supply and fan assemblies, or one SN3000B 16Gb FC Switch with one integrated Power supply and fan assembly, or one StoreFabric SN4000B SAN Extension Switch with two integrated power supplies and integral fans.

NOTE:

The SN3000B 16Gb FC Switch can, as an option, be configured with a second Power supply and fan assembly, which must be ordered separately.

-
- Serial cable with an RJ-45 connector plus an adaptor for RJ-45 to DB9.
 - Power cords: two included with the StoreFabric SN4000B, SN6500B, and SN6000B switches, one included with the SN3000B.
 - Rubber feet, required to set up the switch as a standalone unit.
 - One accessory kit with the following items:
 - Rack Mount Kit, including rails, rail mounting hardware, and plenum.
 - Hewlett Packard Enterprise product documentation, including Read Me First, Safety Guides, User License, and Warranty.
 - HPE EZ Switch and China ROHS documentation.
 - HP SAN Network Advisor DVD.

Installation and safety considerations

You can install the switch in a rack or as a standalone device on a flat surface. Hewlett Packard Enterprise recommends mounting the SN6000B 16Gb FC Switch, the SN3000B 16Gb FC Switch, and the StoreFabric SN4000B SAN Extension Switch in any of the supported HPE racks.

The supported HPE racks include the HPE 10000 G2 Series, the Intelligent Series racks, and the HPE 11000 G2 Series racks.

Electrical considerations

For successful installation and operation of the switch, ensure that the following electrical requirements are met:

- The primary outlet is wired correctly, protected by a circuit breaker, and grounded in accordance with local electrical codes.
- The supply circuit, line fusing, and wire size are adequate, as specified by the electrical rating on the switch nameplate.
- A maximum of 71.36 cubic meters/hour (42 cubic feet/minute). Nominal airflow is 59.47 cubic meters/hour (35 cubic feet/minute).
- The primary AC input follows:

- **SN6000B 16Gb FC Switch and SN3000B 16Gb FC Switch**

85–264 VAC Nominal: 100–240 VAC, 2.0 A; 47–63 Hz. The switch autosenses input voltage.

- **StoreFabric SN6500B 16Gb FC Switch**

90–264 VAC, Nominal: 100–240 VAC, 12.0 A–5.0 A; 47–63 Hz. The switch autosenses input voltage.

- **StoreFabric SN4000B SAN Extension Switch**

100–240 VAC, 50–60 Hz. The switch autosenses input voltage.

Environmental considerations

For successful installation and operation of the switch, ensure that the following environmental requirements are met:

 IMPORTANT:

Always use the plenum when installing the switch in a rack.

- At a minimum, adequate cooling requires installing the switch with the intake side, the nonport side of the switch, facing the cool-air aisle.

NOTE:

For switches with Port Side Air Intake, install the switch with the port side facing the cool-air aisle.

-
- All equipment in the rack should force air in the same direction to avoid intake of exhaust air.
 - A maximum of 102 cubic meters/hour (60 cubic feet/minute) and a minimum of 74.8 cubic meters/hour (44 cubic feet/minute) of airflow must be available for air intake.
 - The ambient air temperature must not exceed 40°C (104°F) while the switch is operating.

Cabling considerations

You can organize and manage cables in a number of ways, such as using cable channels on the sides of the cabinet or patch panels.

Before installing the switch, consider the following Hewlett Packard Enterprise cabling recommendations:

- Hewlett Packard Enterprise recommends using Hewlett Packard Enterprise PremierFlex cables because they have a minimum bend radius of 2 mm (0.08 inch) compared to previous cables, which required a minimum 5 cm (2 inches) bend radius for a 50-micron cable under full tensile load and 3 cm (1.2 inches) with no tensile load.
- Leave at least 1 m (3.28 ft) of slack for each port cable. This provides room to remove and replace the switch, allows for inadvertent movement of the rack, and helps prevent the cables from being bent to less than the minimum bend radius.
- If you are using ISL Trunking, consider grouping cables by trunking groups. The cables used in trunking groups must meet specific requirements, as described in the Fabric OS Administrator's Guide.
- For easier maintenance, label the fiber optic cables and record the devices to which they are connected.
- Keep LEDs visible by routing port cables and other cables away from the LEDs.
- Use Velcro straps to secure and organize fiber optic cables.

 CAUTION:

Do not use tie wraps on fiber optic cables. The wraps are easily overtightened and can damage the optical fibers.

Installing the switch

This section provides instructions for installing the StoreFabric SN6500B 16Gb FC Switch, SN6000B 16Gb FC Switch, SN3000B 16Gb FC Switch, and the StoreFabric SN4000B SAN Extension Switch.

Items required for installation

To set up the switch for the first time, you will need the following:

- Workstation with an installed terminal emulator (such as HyperTerminal)
- Unused IP address and corresponding subnet mask and gateway address
- Serial cable (supplied with the switch)
- Ethernet cable
- Access to an FTP server, SCP server, or USB device for backing up the switch configuration (optional)
- HPE B-series SFP+ transceivers and compatible cables, as required (B-series 16 Gb/s SFP+ transceivers are required for 16 Gb/s performance)

❗ IMPORTANT:

Order transceivers and cables separately. The StoreFabric SN6500B, SN6000B, SN3000B 16Gb FC switches, and the StoreFabric SN4000B SAN Extension switches support only transceivers and cables labeled B-series SFP+ or B-series cable. For more information on supported transceivers, see **SFP transceiver options** and the HPE SAN Compatibility Tool at <http://www.hpe.com/support/SANcompatibility>.

Installing the HPE StoreFabric SN6500B 16Gb FC Switch in a rack using the Rack Mount Kit

Use the SAN Switch Rack Mount Kit to install your Hewlett Packard Enterprise device in the Hewlett Packard Enterprise custom racks:

- 10000 Series Rack

For optimal cable management, Hewlett Packard Enterprise recommends that you install the SAN Switch Rack Mount Kit to allow the nonport side of the switch to slide out of the cool-air side of the rack. In this installation, the port-side of the switch is set back from the edge of the rack, allowing a more gradual bend in the fiber optic cables.

NOTE:

For the switches with Port Side Air Intake, install the Rack Mount Kit so that when the switch is installed, the port side faces the front of the rack.

The following items are required to install the switch in a rack:

- Power cables
- #2 Phillips screwdriver
- 7/16-inch wrench or socket
- SAN Switch Rack Mount Kit hardware

SAN Switch Rack Mount Kit hardware identifies the rails and rail-mounting hardware.

Table 6: SAN Switch Rack Mount Kit hardware

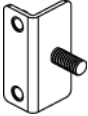
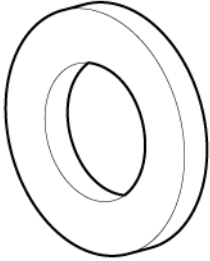
Item	Description
	Two rear mounting brackets
	A right inner rail and a right outer rail
	A left inner rail and a left outer rail
	Fourteen #8-32 x 5/16-inch Phillips panhead SEMS screws for use with the StoreFabric SN6500B 16Gb FC Switch. This switch requires 10 screws. Fourteen #8-32 x 3/16-inch Phillips panhead screws with thread lock (do not use)
	Ten #10-32 x 1/2-inch Phillips panhead screws with captive star lock washers
	Eight #10 alignment washers
	Eight #10 adapter washers

Table Continued

Item	Description
	Two 1/4-20 hex nuts with captive star lock washers
	Two 1/4-inch flat washers

⚠ CAUTION:

For proper airflow, the SFP+ media side of the switch port-side must face the rear of the rack. This allows cool air to enter the front of the rack and exit from the rear.

For switches with Port Side Air Intake, the SFP+ media side of the switch port side must face the front of the rack.

To install the switch in a rack:

Procedure

1. Verify that the required parts and hardware are available. See **SAN Switch Rack Mount Kit hardware**.
2. Choose a mounting location for the switch in the rack.
3. Attach the rear mounting brackets to the rear rack uprights.

For a 10000 Series Rack, assemble each of the brackets using two #10-32 x 1/2-inch Phillips panhead screws with captive star lock washers and two #10 adapter washers, as shown in **Figure 11: Installing the rear mounting brackets (HPE 10000 Series Rack)** on page 29.

NOTE:

For switches with Port Side Air Intake, attach the rear mounting brackets to the front rack uprights.

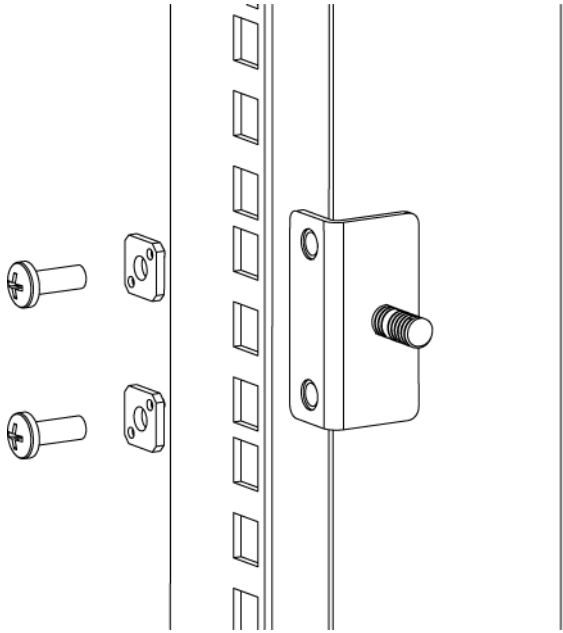


Figure 11: Installing the rear mounting brackets (HPE 10000 Series Rack)

NOTE:

The SAN Switch Rack Mount Kit contains rails labeled **Left** and **Right** to designate the left side and right side of the switch or cabinet, as viewed from the front of the cabinet.

4. Assemble the outer rails as follows:
-

NOTE:

For switches with Port Side Air Intake, attach Left outer rail to the right side of the rack and Right outer rail to the left side of the rack.

- a. For switches with Port Side Air Intake, attach the left outer rail and right outer rail to the rear mounting brackets using two 1/4-20 hex with captive star lock washers attached loosely, as shown in **Figure 12: Installing the outer rails (HPE 10000 Series Rack)** on page 30. Do not tighten the nuts.

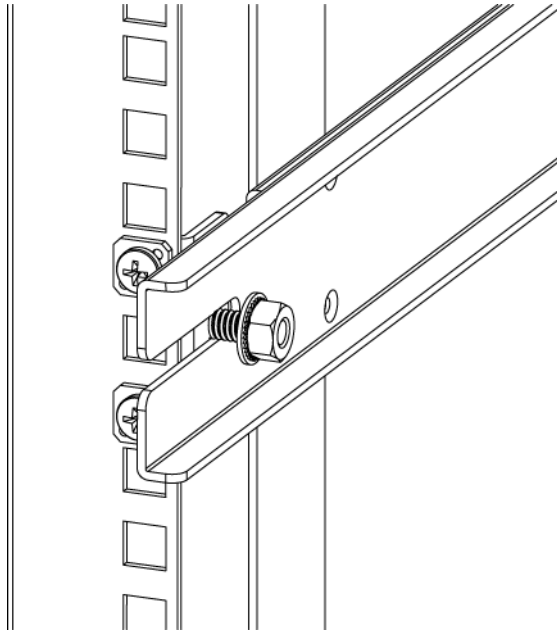


Figure 12: Installing the outer rails (HPE 10000 Series Rack)

- b. For an 10000 Series Rack, install two #10-32 x 1/2-inch Phillips panhead screws with captive star lock washers and two #10 adapter washers in the upper and lower holes on the right rail. Then, install two #10-32 x 1/2-inch Phillips panhead screws with captive star lock washers and two #10 adapter washers in the upper and lower holes on the left rail. See **Figure 13: Assembling the outer rails (HPE 10000 Series Rack)** on page 30.

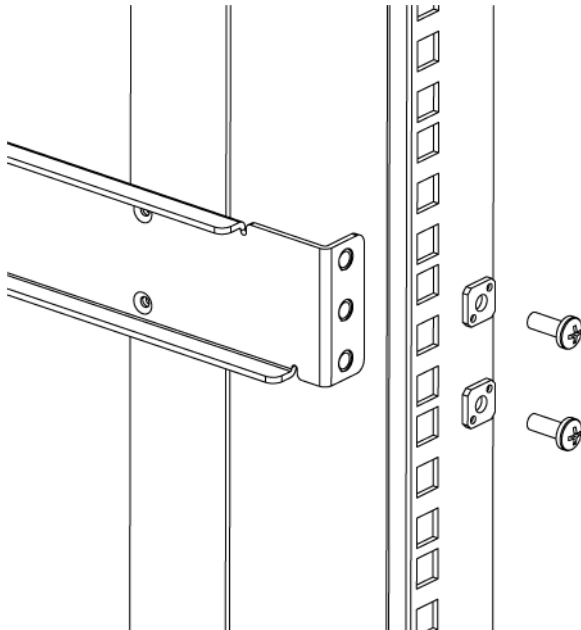


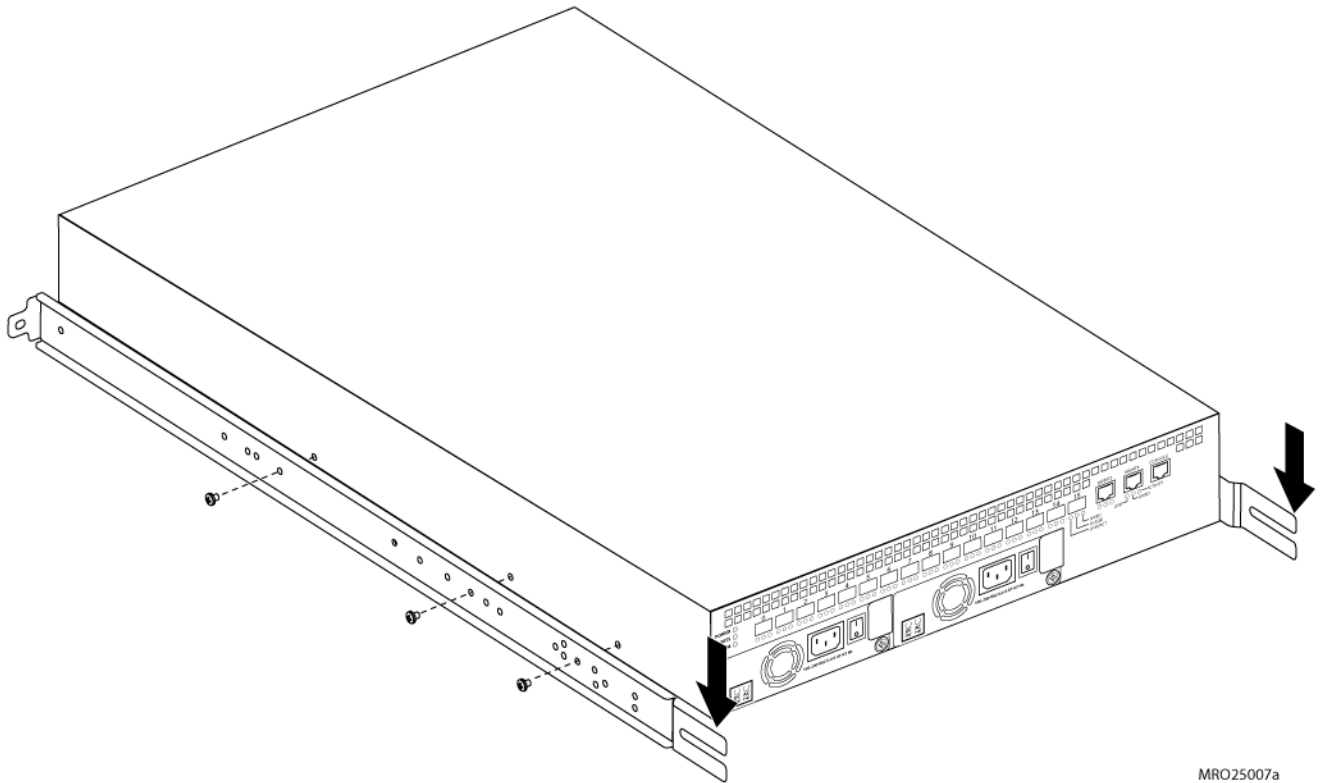
Figure 13: Assembling the outer rails (HPE 10000 Series Rack)

5. Use the #8-32 x 5/16-inch Phillips panhead SEMS screws (in the screw holes marked 16) to attach the two inner rails to the switch. For switches with Port Side Air Intake, five screws are required for each rail.

Figure 14: Attaching the inner rails to the switch on page 31 shows how the inner rails are attached to the switch with the open ends (highlighted in yellow) on the port-side.

NOTE:

The switch in the figure is not an StoreFabric SN6500B, but it shows the direction of the open ends of the rails when they are attached to the switch.



MRO25007a

Figure 14: Attaching the inner rails to the switch

Securing the switch to the outer rails

Procedure

1. Insert the switch with the attached inner rails into the outer rails.
2. Insert the switch into the rack and install one #10-32 x 1/2-inch Phillips panhead screw with captive star lock washer. Repeat for the other side. See **Figure 15: Securing the switch (HPE 10000 Series Rack)** on page 32.

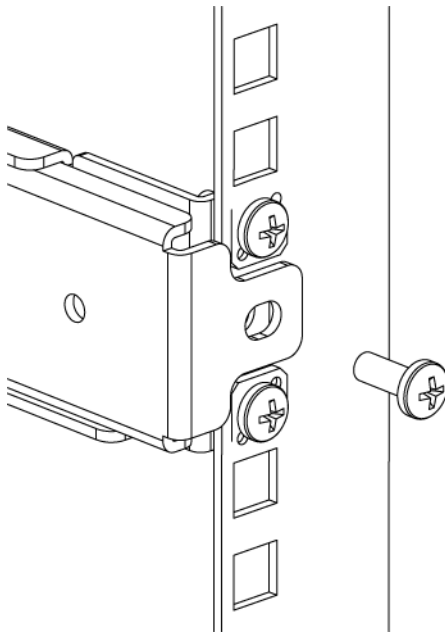
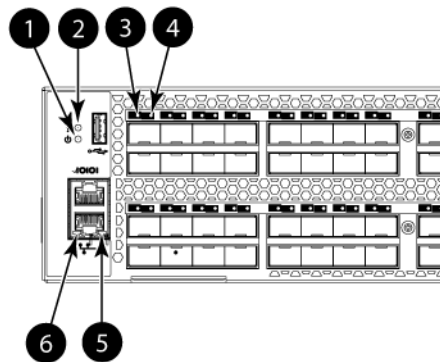


Figure 15: Securing the switch (HPE 10000 Series Rack)

3. Tighten the hex nuts installed in step 4 on page 29.
4. Verify that the switch power and status LEDs on the port side of the switch are green. See **Figure 16: LEDs on port side** on page 32.



- | | |
|--------------------------------|--------------------------------|
| 1. System power LED | 2. System status LED |
| 3. FC port status LED (port 0) | 4. FC port status LED (port 4) |
| 5. Ethernet port activity LED | 6. Ethernet port speed LED |

Figure 16: LEDs on port side

5. For switches with Port Side Air Intake, proceed to **Setting up the switch** on page 43.

This completes the rack mount procedure.

Installing the HPE SN6000B 16Gb FC and HPE SN3000B 16Gb FC switches in a rack using the Rack Mount Kit

Use the SN6000B and the SN3000B Switch Rack Mount Kits to install the switch in an 10000 Series Rack.

⚠ CAUTION:

Install the Rack Mount Kits as described in this section so that when the switch is installed, the port side faces the rear of the rack. This configuration optimizes performance in the following ways:

- Provides better airflow by using a plenum. A plenum is an air duct that attaches to the switch rails, enabling the switch to draw cooler air from outside the rack rather than drawing in heated air from within the rack.
- Provides room for a gradual bend in the fiber optic cables because the port side of the switch is set back from the edge of the rack.

Use only the screws provided in the Rack Mount Kit. Using other screws can cause damage to internal components.

NOTE:

For switches with Port Side Air Intake, install the Rack Mount Kit so that when the switch is installed the port side faces the front of the rack.

Installation safety guidelines

Verify that the rack and the area around the rack meet the following requirements:

- Plan a rack space that is a 1U high and provides clearance for the switch power cords to run between the rack sides and the rails at the front of the 19-inch EIA rack.
- Ground all equipment in the rack through a reliable branch circuit connection and maintain ground at all times. Do not rely on a secondary connection to a branch circuit, such as a power strip.
- Ensure that airflow and temperature requirements are met on an ongoing basis.
- Secure the rack to ensure stability in case of unexpected movement.

Rack mount installation

To install the switch in a rack using the Rack Mount Kit:

Procedure

1. Place the switch on a flat surface and attach each inner rail to the switch using three flat-head screws. See **Figure 17: Attaching the inner rails to the switch** on page 33.

The rails are labeled Left and Right to designate the left side and right side of the switch as viewed from its nonport side.

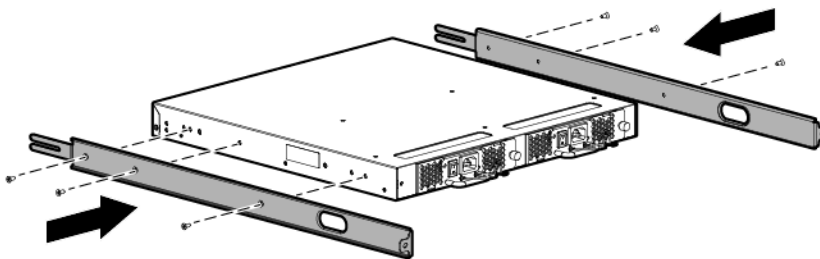


Figure 17: Attaching the inner rails to the switch

2. Take care to select a mounting location in the rack such that the cutouts in the sides of each rail are not obstructed. You will route the switch power cords through these holes later in this procedure.

3. Attach each rear mounting bracket to a rear rack upright column using two Phillips screws and adapter washers. See **Figure 18: Installing the rear mounting brackets** on page 34.

NOTE:

For switches with Port Side Air Intake, attach the rear mounting brackets to the front rack upright column.

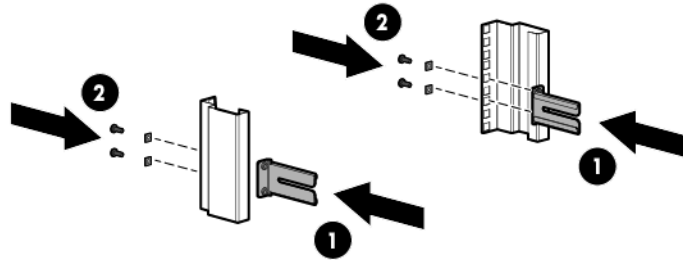


Figure 18: Installing the rear mounting brackets

4. Attach each outer rail as shown in **Figure 19: Attaching the outer rails** on page 34. The rails are labeled Left and Right to designate the left side and right side of the rack as viewed from the front of the cabinet.

NOTE:

For switches with Port Side Air Intake, attach Left outer rail to the right side of the rack and Right outer rail to the left side of the rack.

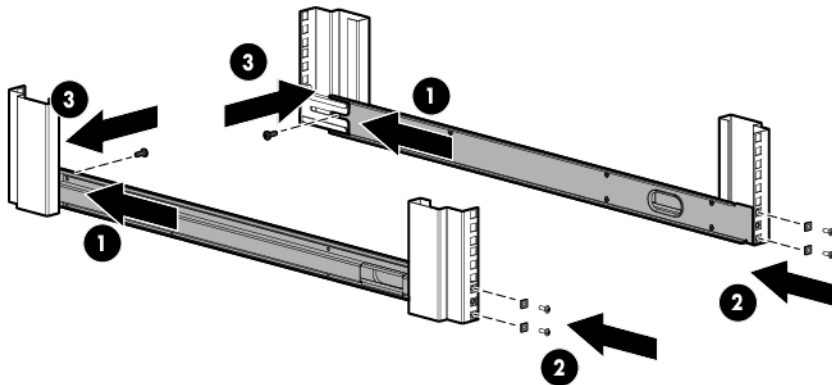


Figure 19: Attaching the outer rails

- a. Slide each rail over the rear mounting brackets.
- b. Attach the front of the rail to a front rack upright column using two Phillips screws and adapter washers.
- c. Attach the outer rail to the rear mounting bracket using a Phillips screw.

**TIP:**

Tighten the rear screws just enough for the end of the screw to go through the rear brackets. Later in the procedure, you will need room to slide the inner rail between the screw head and the outer bracket.

5. Install the switch. See **Figure 20: Installing the switch in the rack** on page 35.
 - a. From the front of the rack, slide the switch (with inner rails attached) onto the outer rails, taking care to align the inner rails with the attachment screws on the outer rails at the rear of the rack.
 - b. When the switch is in place, secure the inner rails to the outer rails by tightening the screws at the rear of the rack.

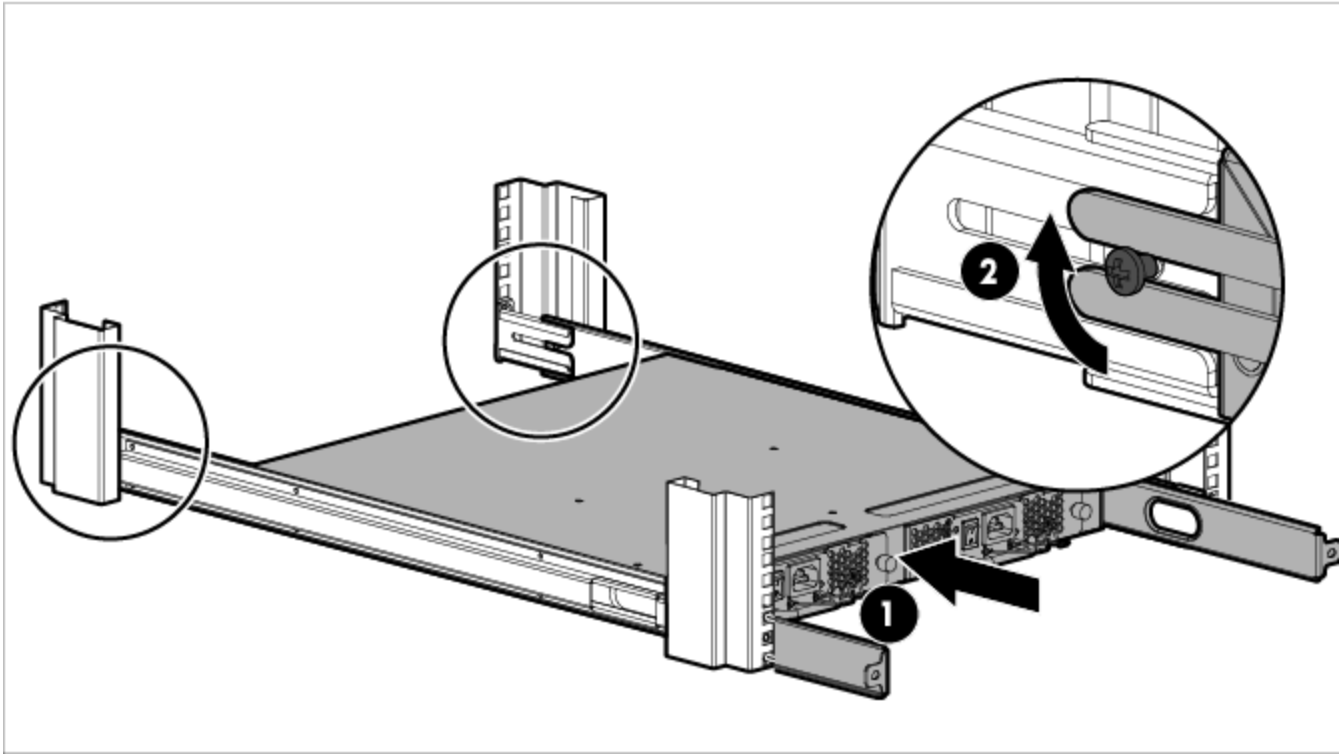


Figure 20: Installing the switch in the rack

6. At the front of the rack, run the switch power cords from the sides of the rack through the cutouts in the rail, and then connect them to the switch power supplies. Connect two power cords to the SN6000B 48-port switch. Connect one power cord to the SN3000B 24-port switch. See **Figure 21: Connecting power and installing the plenum** on page 36.

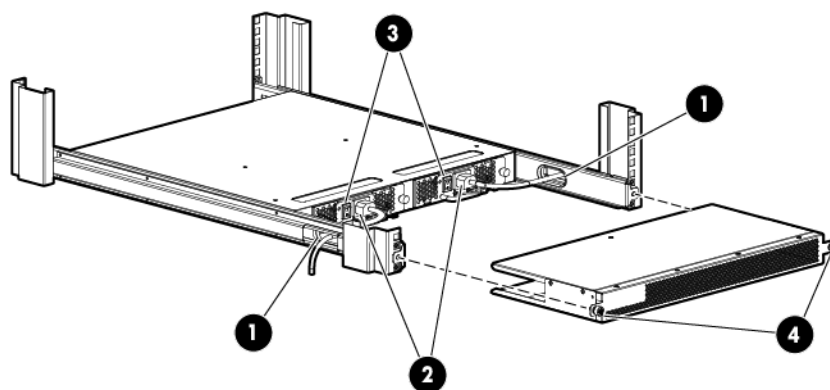
**IMPORTANT:**

Make sure that the power cords do not come in contact with any sharp edges.

NOTE:

For switches with Port Side Air Intake, the power connections are at the rear of the rack.

If you are configuring the second (optional) power supply, the SN3000B 24-port switch will also have two power cords.



- | | |
|----------------------------|------------------------|
| 1. Cutouts for power cords | 3. Power switches |
| 2. Power cable plugs | 4. Plenum thumb screws |

Figure 21: Connecting power and installing the plenum

7. Connect the other end of the power cords to power sources on separate circuits to protect against AC failure. (Make sure that two power cords are connected to the SN6000B 48-port switch and one power cord is connected to the SN3000B 24-port switch.)

NOTE:

If you are configuring the second (optional) power supply, the SN3000B switch will also have two power cords.

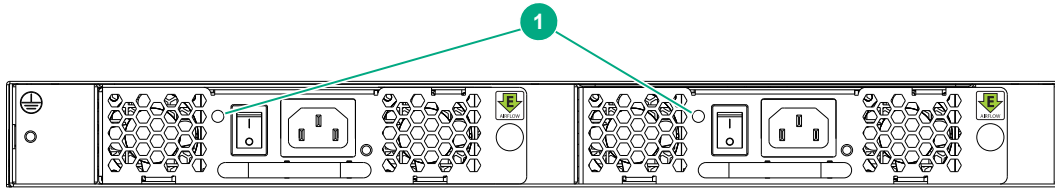
8. Power on the power supplies by setting both power switches to the ON (I) position.

The power supply LEDs are amber until the POST is complete, and then change to green. See **Power supply and fan assembly LEDs**. The switch takes several minutes to boot and complete POST.

NOTE:

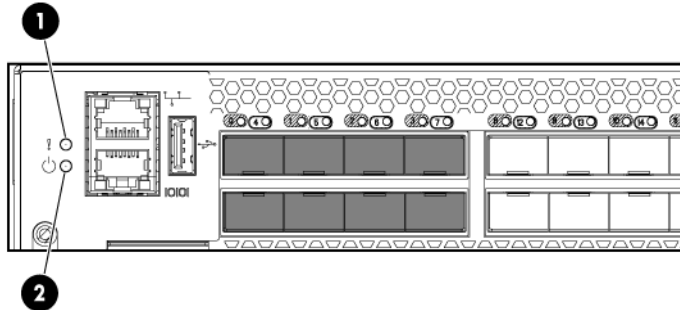
When installed, the plenum covers the power supply switches and LEDs. However, the LEDs are visible through the air holes in the front of the plenum.

9. Slide the plenum over the nonport side of the inner rails, taking care to bypass the power cables. See **Figure 21: Connecting power and installing the plenum** on page 36.
10. Tighten the thumbscrews to secure the plenum to the front of the rack.
11. Verify that the switch power and status LEDs on the port side of the switch are green. See **Figure 23: Port side status LEDs** on page 37.
12. Proceed to **Setting up the switch** on page 43.



1. Power supply and fan assembly status LEDs

Figure 22: Power supply and fan assembly LEDs



1. System power LED
2. System status LED

Figure 23: Port side status LEDs

Installing the HPE StoreFabric SN4000B SAN Extension Switch

Use the SAN Switch Rack Mount Kit to install your Hewlett Packard Enterprise device in the 10000 Series Rack custom rack.

For optimal cable management, Hewlett Packard Enterprise recommends that you install the SAN Switch Rack Mount Kit to allow the nonport side of the switch to slide out of the cool-air side of the rack. In this installation, the port-side of the switch is set back from the edge of the rack, allowing a more gradual bend in the fiber optic cables.

The following items are required to install the switch in a rack:

- Power cables
- #2 Phillips screwdriver
- SAN Switch Rack Mount Kit hardware

SAN Switch Rack Mount Kit hardware identifies the rails and rail-mounting hardware.

Table 7: SAN Switch Rack Mount Kit hardware

Item	Description
	Two rear mounting brackets
	A right inner rail and a right outer rail
	A left inner rail and a left outer rail
	Sixteen #8-32 x 5/16-inch Phillips flathead SEMS screws
	Twelve #10-32 x 1/2-inch Phillips panhead screws with captive star lock washers
	Eight #10 alignment washers
	Eight #10 adapter washers

⚠ CAUTION:

For proper airflow, the SFP+ media side of the switch port-side must face the rear of the rack. This allows cool air to enter the front of the rack and exit from the rear.

To install the switch in a rack:

Procedure

1. Verify that the required parts and hardware are available. See **SAN Switch Rack Mount Kit hardware**.
2. Choose a mounting location for the switch in the rack.

3. Attach the rear mounting brackets to the rear rack uprights.
 - Assemble each of the brackets using two #10-32 x 1/2-inch Phillips panhead screws with captive star lock washers and two #10 adapter washers, as shown in **Installing the rear mounting brackets**.

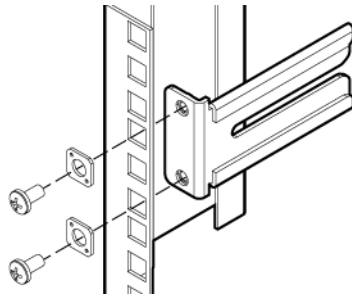


Figure 24: Installing the rear mounting brackets

NOTE:

The SAN Switch Rack Mount Kit contains outer rails labeled Left and Right to designate the left side and right side of the device or cabinet as viewed from the front of the cabinet. The inner rails are interchangeable and can be used on either side of the switch.

4. Assemble the outer rails as follows:
 - a. Attach the left outer rail and right outer rail to the rear mounting brackets using the #10-32 x 1/2-inch Phillips panhead screws with captive star lock washers, as shown in **Installing the outer rails**. Four screws are required for attaching the outer rails.

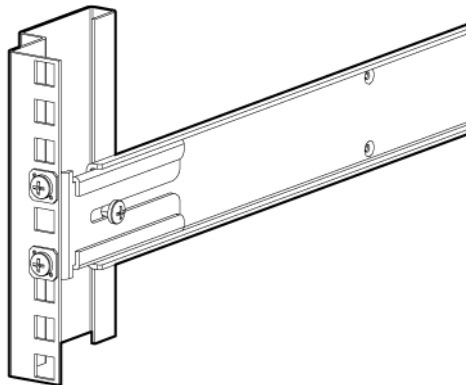


Figure 25: Installing the outer rails

- b. Install two #10-32 x 1/2-inch Phillips panhead screws with captive star lock washers and two #10 adapter washers in the upper and lower holes on the right rail. Then, install two #10-32 x 1/2-inch Phillips panhead screws with captive star lock washers and two #10 adapter washers in the upper and lower holes on the left rail. See **Assembling the outer rails**.

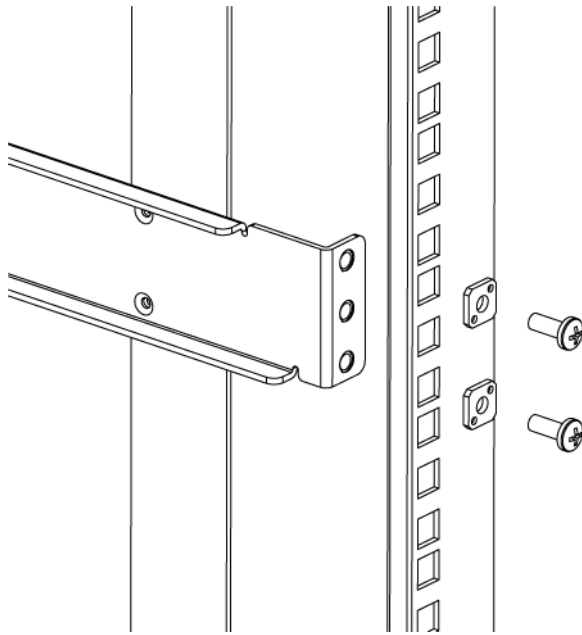


Figure 26: Assembling the outer rails

5. Use the screw type #8-32 x 5/16-inch (in the screw holes marked 16) to attach the two inner rails to the switch. Eight screws are required for each rail.

Inner rails attachment shows how the inner rails are attached to the switch.

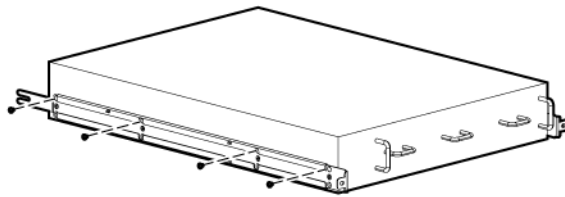


Figure 27: Inner rails attachment

Securing the switch to the outer rails

Procedure

1. Insert the switch with the attached inner rails to the outer rails.
2. Insert the switch into the rack and install one #10-32 x 1/2-inch Phillips panhead screw with captive star lock washer. Repeat for the other side. See **Figure 28: Securing the switch** on page 41.

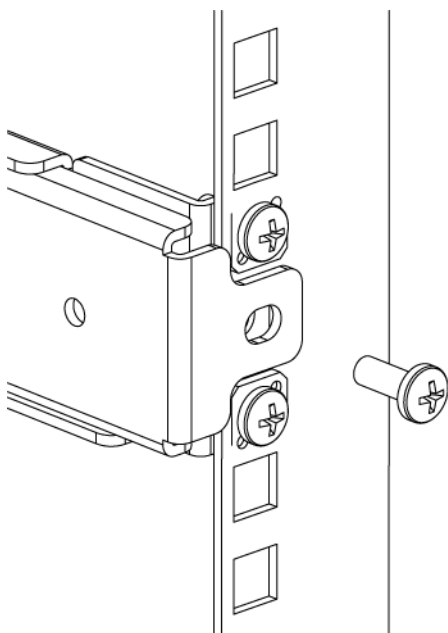


Figure 28: Securing the switch

3. Install one #10-32 x 1/2-inch Phillips panhead screw with captive star washer through the front of the inner rail, through the rear bracket, and secure to the outer rail. Repeat for the other side. See **Figure 29: Securing the front of the switch to outer rails** on page 41.

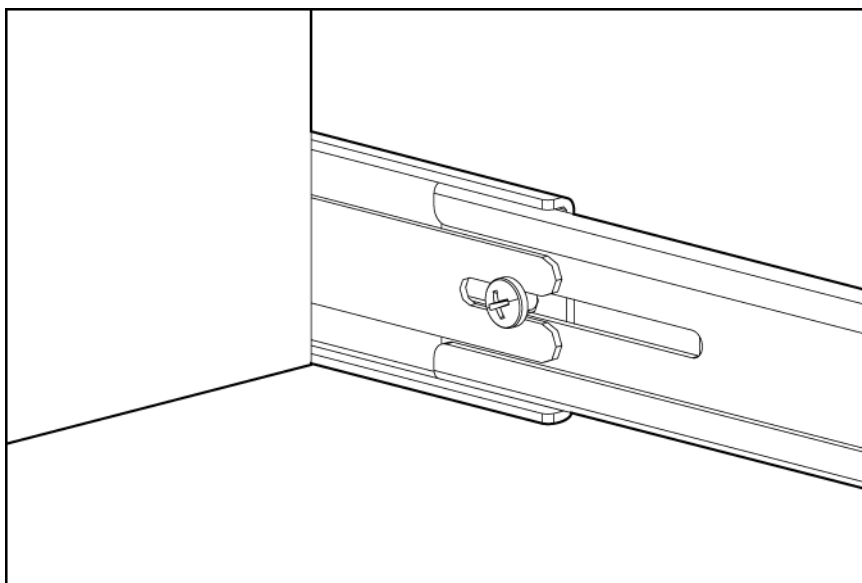
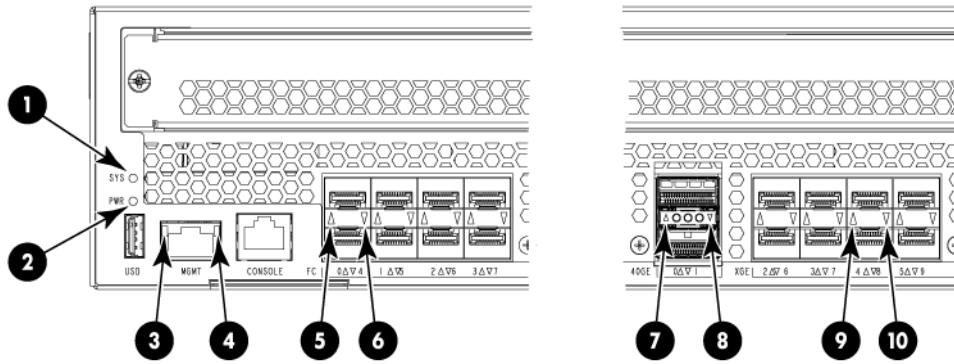


Figure 29: Securing the front of the switch to outer rails

4. Tighten the screws as mentioned in **Installing the outer rails**.
5. Verify that the switch power and status LEDs on the port side of the switch are green. See **Figure 30: LEDs on the port side** on page 42.



- | | |
|---|--|
| 1. System status LED | 2. System power LED |
| 3. Ethernet link LED | 4. Ethernet status LED |
| 5. FC port status LED (port 0) | 6. FC port status LED (port 4) |
| 7. 40 GbE FCIP port status LED (port 0) | 8. 40 GbE FCIP port status LED (port 1) |
| 9. 1/10 GbE FCIP port status LED (port 4) | 10. 1/10 GbE FCIP port status LED (port 8) |

Figure 30: LEDs on the port side

6. Proceed to **Setting up the switch** on page 43.

This completes the rack mount procedure.

Installing a standalone switch

Procedure

1. Unpack the switch and verify the contents, as described in **Accessories** on page 24.
2. Apply the adhesive rubber feet to prevent the switch from sliding off the supporting surface.
 - a. Clean the indentations at each corner on the bottom of the switch to ensure that they are free of dust or other debris.
 - b. With the adhesive side against the chassis, place one rubber foot in each indentation and press into place.
3. Place the switch on a flat, sturdy surface.
4. Connect the power cords to each power supply present.
 - For the SN6500B, SN6000B, and SN4000B switches, connect the power cords to both power supplies and then to power sources on separate circuits to protect against AC failure.
 - For the SN3000B switch, connect a power cord to either the single power supply present or to both power supplies, if an optional second power supply is present. Then connect the power cords to power sources on separate circuits to protect against AC failure.

NOTE:

If you are configuring the second (optional) power supply on the SN3000B switch, it will also have two power cords.

Ensure that the cords have a minimum service loop of 6 inches available and are routed to avoid stress.

5. Power on the power supplies by setting both AC switches to the on (I) position.

The power supply LEDs are amber until POST is complete, and then change to green. See **Power supply and fan assembly LEDs**. The switch takes several minutes to boot and complete POST.

NOTE:

Power is supplied to the switch as soon as the first power supply is connected and turned on.

6. After POST is complete, verify that the switch power and status LEDs on the port side of the switch are green. See **Figure 23: Port side status LEDs** on page 37.

Setting up the switch

To set up the switch, you will need the following:

- Standard screwdriver
- WWN, located on the switch ID pull-out tab
- Ethernet connection (hub or switch)
- Ethernet and FC cables
- Disk array with FC ports
- Browser that allows pop-up windows
- If you are using static IP addressing, you will need the following items (not required if using DHCP):
 - Fixed IP address (IPv4 or IPv6) for the switch
 - Subnet mask value
 - Default gateway value

Connecting the serial cable

Procedure

1. Connect the serial cable to the serial port on the switch and to an RS-232 serial port on the workstation.

If the serial port is RJ-45 instead of RS-232, remove the adapter on the end of the serial cable and insert the exposed RJ-45 connector into the RJ-45 serial port on the workstation.
2. Disable any serial communication programs running on the workstation.
3. Open a terminal emulator (such as HyperTerminal on a PC, or TERM, TIP, or Kermit in a UNIX environment) and configure as follows:

For most Windows systems:

Bits per second: 9,600

Data bits: 8

Parity: None

Stop bits: 1

Flow control: None

For most UNIX systems:

Enter `tip /dev/ttyb -9600`

If `ttyb` is already in use, enter `tip /dev/ttya -9600`

Logging in to the serial console port

Procedure

1. Verify that the switch has completed POST.

When POST is complete, the switch status and switch power LEDs return to a normal state.

2. When the terminal emulator stops reporting information, press **Enter** to display the login prompt.
3. Log in to the switch as `admin`, using the default password, `password`.

You are prompted to change the default password at initial login.

NOTE:

You can configure the switch using a static IP address or DHCP. With DHCP (enabled by default), the switch obtains its IP address, subnet mask, and default gateway address from the DHCP server. The DHCP client can connect only to a DHCP server that is on the same subnet as the switch. The Ethernet cable must be connected to the management Ethernet port on the switch if you are using DHCP. If you are using a static IP address, see [Setting a static IP address](#).

Setting the IP address

You can configure the switch with a static IP address or you can use a DHCP server to set the IP address. (DHCP is enabled by default.) The switch supports both IPv4 and IPv6.

Using DHCP to set the IP address

When using DHCP, the switch obtains its IP address, subnet mask, and default gateway address from the DHCP server. The DHCP client can connect only to a DHCP server that is on the same subnet as the switch. If your DHCP server is not on the same subnet as the switch, use a static IP address.

Setting a static IP address

Procedure

1. Use the `ipaddrset` command to set the Ethernet IP address.
 - For an IPv4 address, use dotted-decimal notation: `switch :admin> ipaddrset`
 - For an IPv6 address, use colon-separated notation: `switch:admin> ipaddrset -ipv6 --add 1080::8:800:200C:417A/64`
2. Provide the following network information for an IPv4 address:
 - a. Ethernet IP address: 192.168.74.102
 - b. Ethernet subnet mask: 255.255.255.0
 - c. Gateway IP address: 192.168.74.1
3. When prompted, enter `off` to disable DHCP:

```
DHCP [OFF]: off
```
4. Verify the IP address by entering the `ipaddrshow` command at the prompt.
5. Record the IP address on the pull-out tab on the port side of the switch.
6. If the serial port is no longer required, use the `logout` command to log out of the serial console. Remove the serial cable and replace the plug in the serial port.
7. Connect the Ethernet port on the switch to the Ethernet network where the IP address was assigned.

Setting the date and time

The date and time are maintained by the switch's battery-backed RTC circuit. Incorrect date and time will not affect switch operation. However, setting the date and time accurately is important because these values are used for logging, error detection, and troubleshooting.

Setting the date

Procedure

1. Log in to the switch using the admin account. The default password is `password`.
2. Enter the `date` command:

```
date "mmddHHMMyy"
```

The values are as follows:

`mm` is the month; valid values are 01 through 12.

`dd` is the date; valid values are 01 through 31.

`HH` is the hour; valid values are 00 through 23.

`MM` is minutes; valid values are 00 through 59.

`yy` is the year; valid values are 00 through 99. (Values greater than 69 are interpreted as 1970 through 1999; values less than 70 are interpreted as 2000-2069.)

```
switch:admin> date
```

```
Fri Dec 30 17:01:48 UTC 2016
```

```
switch:admin> date "0109142417"
```

```
Mon Jan 9 14:24:00 UTC 2017
```

Setting the time zone

Users with administrative permissions can set the time zone for the switch by the zone name (such as PST), by the country and city, or by time zone location (such as US/Central).

If you do not set the time zone, the switch retains the previous zone settings. The `tstimezone` command includes an `--old` option, which reverts to the prior time zone format. For more information, see the Fabric OS Command Reference.

The `tstimezone` command has three options:

Procedure

1. The `tstimezone` command with no parameters displays the current time zone setting.
2. The `tstimezone --interactive` command displays all time zones supported in the firmware.
3. The `timeZone_fmt` command sets the time zone based on the country and city, or a time zone ID, such as PST, that you enter.

This command requires administrator privileges.

The time zone setting has the following characteristics:

- Automatically adjusts for Daylight Savings Time.
- Changing the time zone updates the local time zone setup and is reflected in local time calculations.
- By default, switches are in the GMT time zone (0,0). If all switches in a fabric are in one time zone, you can keep the time zone setup at the default setting.

- System services that have already started reflect the time zone changes only after the next reboot.
- In the event of failover, time zone settings are retained to ensure high availability.

You need only set the time zone once on each switch because the value is written to nonvolatile memory. The following examples show how to set the time zone. The first example uses the time zone selection; the second uses the country location selection.

The following procedure sets the current time zone to Central Standard Time using the `timezone_fmt` command:

- Log in to the switch using the default password `password`.
- Use `timezone_fmt` to set the time zone by Country/City or by time zone ID, such as PST. The following example shows how to change the time zone to US/Central:

```
switch:admin> tsttimezone
Time Zone : US/Pacific
switch:admin> tsttimezone US/Central
switch:admin> tsttimezone
Time Zone : US/Central
```

The following procedure sets the time zone to Pacific Standard Time using interactive mode:

- Enter the `tsttimezone` command:
- `switch:admin> tsttimezone --interactive`
- A list of timezones appears followed by a prompt for you to select a general location:
- Please identify a location so that time zone rules can be set correctly.
- Enter the appropriate number (an offset of GMT) or press **Ctrl+D** to quit.
- At the prompt, select a country location.
- At the prompt, enter the appropriate number to specify the time zone region, or press **Ctrl+D** to quit.

Synchronizing local time

You can synchronize the local time of the principal or primary FCS switch to a maximum of eight external NTP servers. To keep the time current in your SAN, Hewlett Packard Enterprise recommends that the principal or primary FCS switch time is synchronized with at least one external NTP server. The other switches in the fabric automatically take their time from the principal or primary FCS switch.

All switches in the fabric maintain the current clock server value in nonvolatile memory. By default, this value is the local clock server `LOCL` of the principal or primary FCS switch. Changes to the clock server value on the principal or primary FCS switch are propagated to all switches in the fabric.

When a switch has been added to the fabric, the time server daemon of the principal or primary FCS switch sends the addresses of all existing clock servers and the time to that switch. If a switch running Fabric OS 5.3.0 or later has been added to the fabric, it can store the list and the active servers. Switches running Fabric OS 5.3.0 or earlier ignore the new list parameter in the payload and update only the active server address.

If the active NTP server configured is IPv6, distributing the same information in the fabric is not possible to switches running Fabric OS versions earlier than 5.3.0, because IPv6 is supported only for Fabric OS version 5.3.0 and later. The default value `LOCL` is distributed to switches running Fabric OS 5.3.0 or earlier.

The `tsclockserver` command accepts multiple server addresses in IPv4, IPv6, or DNS name format. When multiple NTP server addresses are passed, `tsclockserver` sets the first obtainable address as the active NTP server. The remaining addresses are stored as backup servers that can take over if the active NTP server fails. The principal or primary FCS switch synchronizes its time with the NTP server every 64 seconds.

Synchronizing local time using NTP

To synchronize the local time using NTP:

Procedure

1. Log in to the switch using the admin account. The default password is `password`.
2. Enter the `tsclockserver` command:

```
switch:admin> tsclockserver "<ntp1;ntp2>"
```

The value `ntp1` is the IP address or DNS name of the first NTP server, which the switch must be able to access. The value `ntp2` is the name of the second NTP server and is optional. The entire operand "`<ntp1;ntp2>`" is optional; by default, this value is `LOCL`, which uses the local clock of the principal or primary switch as the clock server.

```
switch:admin> tsclockserver
```

```
LOCLx
```

```
switch:admin> tsclockserver "132.163.135.131"
```

```
switch:admin> tsclockserver
```

```
132.163.135.131
```

The following example shows how to set up more than one NTP server using a DNS name:

```
switch:admin> tsclockserver "10.32.170.1;10.32.170.2;ntp.localdomain.net"
```

Changes to the clock server value on the principal or primary FCS switch are propagated to all switches in the fabric.

For more information on using an NTP server, and IPv6 considerations, see the *Fabric OS Administrator's Guide*.

Configuring the zones and selecting devices

See the Fabric OS Administrator's Guide, Web Tools Administrator Guide, or Network Advisor user manual, available from the **Storage** section of the Hewlett Packard Enterprise website:

<http://www.hpe.com/support/manuals>

Connecting devices

The **Connect Devices** window shows a graphical representation of the switch with the device connections, based on the information that you entered in **Configuring the zones and selecting devices**.

NOTE:

Only B-series optical transceivers are supported. For more information, see the Hewlett Packard Enterprise website at <http://www.hpe.com/support/SANcompatibility>.

Consider the following when connecting devices:

- Transceivers and cables are keyed so that they can be inserted only one way. If a transceiver or cable does not slide in easily, make sure it is oriented correctly.
- Do not insert a cable intended for an mSFP transceiver into a regular SFP+ transceiver; you may damage the cable. The mSFP transceivers and cables are supported only with the 64-port 8 Gb/s

blade for the SN8000B SAN directors. Do not attempt to insert a standard SFP cable into an mSFP transceiver; you can damage the transceiver.

Procedure

1. Install the SFP+ transceivers in the FC ports on the switch to match the ports displayed in the **Device Connection** window.

If you are using an SFP+ transceiver that does not have a pull tab, ensure that the wire bail is in the unlocked position. See **Figure 31: Inserting an SFP+ transceiver with no pull tab in an FC port** on page 48.

NOTE: Each SFP+ transceiver has a 10-pad gold-plated PCB-edge connector on the bottom. Insert an SFP+ transceiver into the upper row of ports with the gold edge down. Insert an SFP+ transceiver into the lower row of ports with the gold edge up.

- a. Remove any protector plugs from the SFP+ transceiver. Insert each SFP+ transceiver (right side up in the top row of ports, and upside down in the bottom row of ports) until it is firmly seated and the latching mechanism clicks.

The 16 Gb/s SFP+ transceiver does not have a bail. Use the pull tab to push the transceiver into the port.

- b. Close the latching bail if there is one.

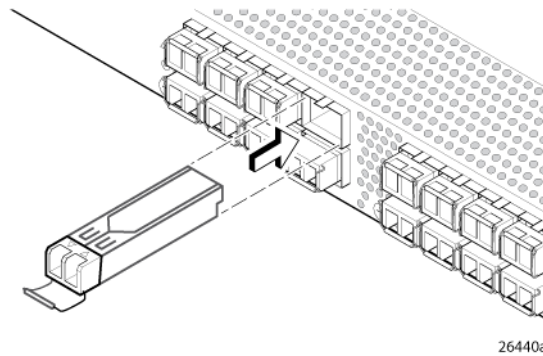


Figure 31: Inserting an SFP+ transceiver with no pull tab in an FC port

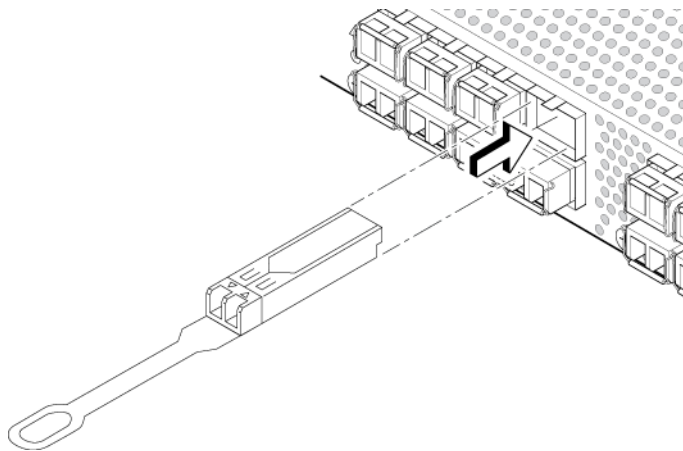


Figure 32: Inserting a 16 Gb/s SFP+ transceiver in an FC port

2. Connect the FC cables from the switch to your host and storage devices. Ensure that the physical connections match the connections displayed in the **Device Connection** window.

- a. Remove the plastic protector caps from the FC cable ends (if there are any) and position the cable connector so that it is oriented correctly.
- b. Position a cable so that the key (the ridge on one side of the cable connector) is aligned with the slot in the transceiver (see **Figure 32: Inserting a 16 Gb/s SFP+ transceiver in an FC port** on page 48) .
- c. Insert the cable into the transceiver until the latching mechanism clicks.

The **Device Connection** window shows missing, valid, and invalid connections as you cable the switch. It can take up to 15 seconds for the screen to display the connection as valid.

- d. Verify that the connections display green, and then click **Next**.

Setting switch features

See the Fabric OS 7.0.x Administrator's Guide and the Fabric OS 7.0.x Command Reference Manual for detailed instructions on setting all supported switch features.

Switch status policy

Switch status policy is a feature that monitors different switch parameters such as power supplies and fan units, and provides switch status based on their health.

The switch status policy configuration can be updated using the `switchstatuspolicyset` command. The following example shows the default settings of 2 and 0 for DOWN and MARGINAL units for both Bad Power Supplies and Bad Fans.

```
switch:admin>switchstatuspolicyset
```

```
some output skipped
```

```
The minimum number of
```

```
Bad PowerSupplies contributing to DOWN status: (0..2) [2]
```

```
Bad PowerSupplies contributing to MARGINAL status: (0..2) [0]
```

```
some output skipped
```

```
Bad Fans contributing to DOWN status: (0..2) [2]
```

```
Bad Fans contributing to MARGINAL status: (0..2) [0]
```

```
output truncated
```

If two power supply and fan assemblies are installed in the switch, Hewlett Packard Enterprise recommends changing the configuration to 2 and 1 for DOWN and MARGINAL for both the Bad Power Supplies and Bad Fans. Use the `switchStatusPolicyShow` command to see the results of your changes.

Changing the switch name and chassis name

Changing the switch and chassis names is important for accurate tracking of errors in the RASlog. The messages in the log are labeled with the switch or chassis name, so choose a meaningful name for the switch and chassis.

Procedure

1. Using Telnet, log in to the switch as `admin`.
2. Use the `chassisname` command to change the chassis name.

The following example shows how to change the chassis name to `myhpcassis`.

```
switch:admin> chassisname myhpcassis
```

```
switch:admin> chassisname  
myhpcchassis
```

3. Use the `switchname` command to change the switch name. The following example shows how to change the switch name to myhpswitch.

```
switch:admin> switchname myhpswitch  
switch:admin> switchname  
myhpswitch
```

Verifying the configuration

To confirm that the switch is configured and ready for use:

Procedure

1. Observe the LEDs to verify that all components are functional.
2. Issue the `switchshow` command from the workstation.

This command provides information about the switch and port status.

3. Issue the `fabricshow` command from the workstation.

This command provides general information about the fabric.

Backing up the configuration

Hewlett Packard Enterprise recommends regular backups to ensure that a recent configuration is available.

Procedure

1. Enter the `configupload` command.

This command uploads the switch configuration to the server, making it available for downloading to a replacement switch, if necessary. For instructions on backing up the configuration, see the *Fabric OS Administrator's Guide*.

2. Follow the on-screen prompts.

Installing and activating Port Upgrade licenses

Procedure

1. Use the `portshow` command to verify the number of ports licensed on your switch.

The command output displays `Started` and `Licensed` for enabled ports. For more information on this command, see the *Fabric OS Command Reference Manual*.

2. Obtain the WWN from the Switch ID pull-out tab located on the port side of your switch.

You can also use the `switchshow` command to display the WWN.

3. Contact your Hewlett Packard Enterprise representative to purchase the appropriate Port Upgrade license. Hewlett Packard Enterprise requires the switch WWN obtained in **2** on page 50 to assign a license key.
4. Install the license.
 - a. Log in to the switch as `admin`.
 - b. Enter the `licenseadd` command, followed by the license key enclosed in quotation marks.

The license key consists of approximately 16 uppercase and lowercase letters and numerals.

! IMPORTANT:

Enter the license key exactly as issued. If you enter the key incorrectly, the license will not function properly.

-
- c. Enter the `licenseshow` command to verify that the license is valid.

If a licensed product is not displayed, the license is not valid.

NOTE:

You do not need to reboot the system.

-
5. Configure the inactive ports.

- a. Enter the `portstart` command to start the ports. For example:

```
portstart 16-31
```

This command loads the port code, unlike the `portenable` command, which enables the port laser.

- b. Enter the `portenable` command to enable the ports. For example:

```
portenable 16-31
```

6. Optional: Enter the `portshow` command to verify that the newly activated ports have started.

Fabric OS Native and AG modes

The switch can function in either Fabric OS Native mode or AG mode. The switch is shipped in Native mode by default.

- You can enable AG mode using Fabric OS commands or Web Tools.
- All POD licenses must be installed before you enable AG mode.
- When enabling AG mode, use the default F_Port-to-N_Port mappings or change this mapping using the CLI or Web Tools, after configuring an IP address as described in **Setting the IP address**.
- AG simplifies SAN deployment by using NPIV. NPIV provides FC switch functions that improve switch scalability, manageability, and interoperability.
 - For a list of F_Ports mapped to N_Ports by default, see **AG default port mapping** on page 88.
 - For general information and details on using AG, see the AG Administrator's Guide.

NOTE:

AG cannot be connected directly to an array; it requires a fabric to support NPIV.

-
- The Fabric OS features available to the switch depend on whether the switch is configured in AG or Native mode. For a list of available features for each mode, see the Access Gateway Administrator's Guide.
 - In AG mode, cascading is not available for the switch. See the Access Gateway Administrator's Guide for details on any restrictions.
 - In Native mode, the SN6000B switch provides up to 48 external FC ports and the SN3000B switch provides up to 24 external FC ports. These universal self-configuring ports are capable of becoming one of the following port types:
 - F_Port (fabric enabled)
 - FL_Port (fabric loop enabled)

- E_Port (expansion port)
- M_Port (mirror port)
- In AG mode, the SN6000B switch provides up to 48 external FC ports and the SN3000B switch provides up to 24 external FC ports. However, these ports are configured as N_Ports; you cannot reconfigure them as any other port type.

Disabling and enabling AG mode

This section explains how to disable and enable AG mode using Fabric OS commands. For more information on using these commands, see the Access Gateway Administrator's Guide or see the Fabric OS Administrator's Guide.

NOTE:

You can disable and enable AG mode using Web Tools. For more information, see the Web Tools Administrator's Guide.

Enabling AG mode

Note the following when enabling AG mode:

- After you enable AG mode, some fabric information is erased, such as the zone and security databases.
- Enabling AG mode is disruptive because the switch is disabled and rebooted.
- Ensure that no zoning or AD transaction buffers are active. If a transaction buffer is active, enabling AG mode fails with the error `Failed to clear Zoning/Admin Domain configuration`.

To enable AG mode using Fabric OS commands:

Procedure

1. Before enabling AG mode, save the current configuration file using the `configupload` command.
2. Enter the `switchshow` command to verify the switch mode.

AG Mode is displayed for `switchMode` if the switch is in AG mode. `Native` is displayed for `switchMode` if the switch is in Native mode.

3. Enter the `switchdisable` command to disable the switch.

The switch must be disabled in order to enable or disable AG mode.

4. Enter the `ag --modeenable` command to enable AG mode.
5. Enter the `ag --modeshow` command to verify that AG mode is enabled.

```
switch:admin> ag --modeshow Access Gateway mode is enabled.
```

Disabling AG mode

When you disable AG mode, the switch reboots automatically and comes back online using the fabric switch configuration. The AG parameters, such as F_Port-to-N_Port mapping, Failover, and Failback are removed automatically. When the switch reboots, it starts in Native mode. For instructions on adding the switch back to the core fabric, see the Access Gateway Administrator's Guide.

To disable AG mode using Fabric OS commands:

Procedure

1. Enter the `switchshow` command to verify the switch mode.

AG Mode is displayed if the switch is in AG mode. `Interopmode 0` or `Native` is displayed if the switch is in Native mode.

2. Enter the `switchdisable` command to disable the switch.

The switch must be disabled in order to enable or disable AG mode.

3. Enter the `ag --modeDisable` command to disable AG mode.
4. Enter the `ag --modeshow` command to verify that AG mode is disabled.

```
switch:admin> ag --modeshow
```

```
Access Gateway mode is NOT enabled
```

Operating HPE 16Gb FC switches

This chapter discusses switch power, LEDs, maintenance, and management.

Powering the switch on and off

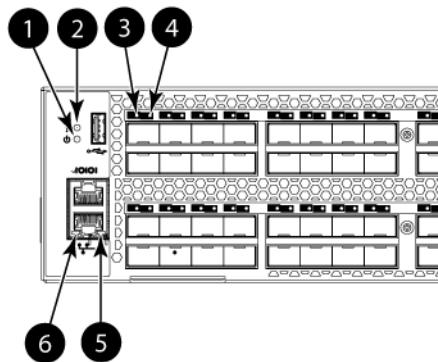
- Power switches are located on the nonport side of the switch.
- If either the SN3000B or SN6000B 16Gb FC switch is mounted in a rack, you must remove the plenum to access the power switches.
- Power is supplied to the switch as soon as the first power supply is connected and powered on.
- To power the switch off, power off the power supplies present by setting the AC power switch to **O**. All devices are returned to their initial state the next time the switch is powered on.

LEDs

The switch LEDs indicate system activity and status. There are three LED states: no light, a steady light, and a flashing light. Flashing lights can be slow, fast, or flickering. The lights are green or amber.

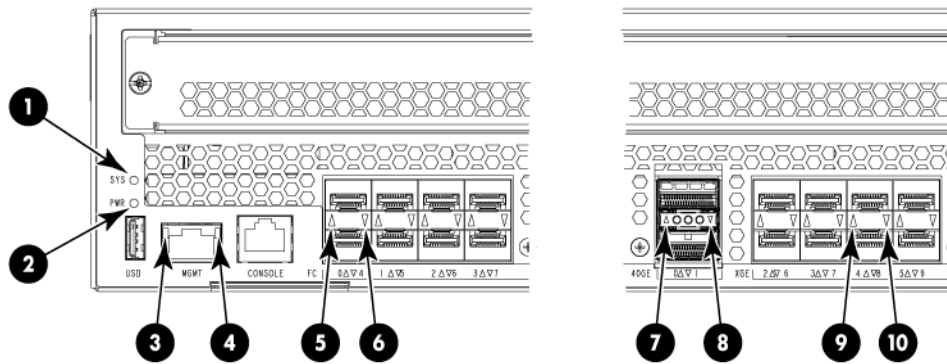
The LEDs can flash green or amber during boot, POST, or other diagnostic tests. This is normal; it does not indicate a problem unless the LEDs do not indicate a healthy state after all boot processes and diagnostic tests are complete.

Figure 33: LEDs on the port side of the HPE StoreFabric SN6500B 16Gb FC Switch on page 54, **Figure 34: LEDs on the port side of the HPE StoreFabric SN4000B SAN Extension Switch** on page 55 , and **Figure 37: Port side of the HPE SN6000B and SN3000B 16Gb FC switches** on page 59 show the LEDs on the port side of the switches. The port status LEDs for the FC ports are arranged left to right, and correspond to the upper and lower ports in each pair. The LEDs on the nonport side of the switches are shown in **Figure 35: LEDs on nonport side of the HPE StoreFabric SN6500B 16Gb FC Switch** on page 55, **Figure 36: LEDs on nonport side of the HPE StoreFabric SN4000B SAN Extension Switch** on page 56 , and **Power supply/fan assembly status LEDs on the nonport side of the HPE SN6000B and SN3000B 16Gb FC switches** .



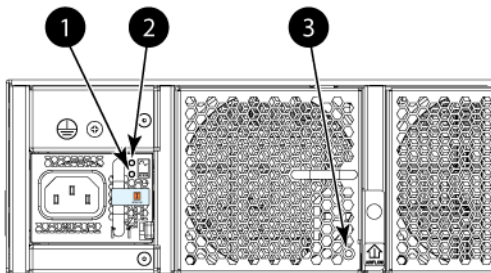
- | | |
|--------------------------------|--------------------------------|
| 1. System power LED | 2. System status LED |
| 3. FC port status LED (port 0) | 4. FC port status LED (port 4) |
| 5. Ethernet port activity LED | 6. Ethernet port speed LED |

Figure 33: LEDs on the port side of the HPE StoreFabric SN6500B 16Gb FC Switch



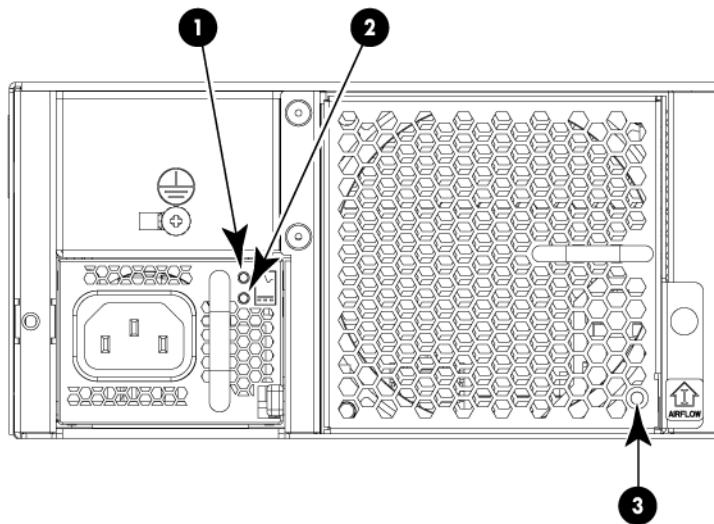
- | | |
|---|--|
| 1. System status LED | 2. System power LED |
| 3. Ethernet link LED | 4. Ethernet status LED |
| 5. FC port status LED (port 0) | 6. FC port status LED (port 4) |
| 7. 40 GbE FCIP port status LED (port 0) | 8. 40 GbE FCIP port status LED (port 1) |
| 9. 1/10 GbE FCIP port status LED (port 4) | 10. 1/10 GbE FCIP port status LED (port 8) |

Figure 34: LEDs on the port side of the HPE StoreFabric SN4000B SAN Extension Switch



- | | |
|-------------------------------|-------------------------------|
| 1. Power supply DC status LED | 2. Power supply AC status LED |
| 3. Fan status LED | |

Figure 35: LEDs on nonport side of the HPE StoreFabric SN6500B 16Gb FC Switch



1. Power supply DC status LED

2. Power supply AC status LED

3. Fan status LED

Figure 36: LEDs on nonport side of the HPE StoreFabric SN4000B SAN Extension Switch

Table 8: LED patterns on the nonport side of the HPE StoreFabric SN6500B 16Gb FC Switch and the HPE StoreFabric SN4000B SAN Extension Switch

LED name	LED color	Status of hardware	Recommended action
Power supply/AC input status (one green LED)	No light	Power supply is not receiving AC input voltage or AC input voltage is below the operational limit.	Verify that the power supply is seated correctly, and the power cord is connected to a functioning AC power source.
	Steady green	AC input voltage is within the operational range.	No action is required.
Power supply/DC output status (one bicolor LED)	Flashing amber (1:1)	Output voltage is not enabled.	Verify that the power supply is seated correctly and the captive screw is secured.
	Flashing amber/green (2:1)	The temperature has exceeded the threshold.	Verify that the ambient temperature is less than 40°C. Check for airflow-intake blockage.
	Flashing amber/green (1:1)	Internal fan is faulty.	Replace the power supply.
	Steady amber	Power supply is faulty or is not plugged in completely.	Check the power cord, current, voltage, and temperature to determine the problem.

Table Continued

LED name	LED color	Status of hardware	Recommended action
	Steady green	DC output is within the expected range.	No action is required.
Fan assembly status (one bicolor LED)	No light	Fan assembly is not receiving power.	Verify that the fan FRU is seated correctly.
	Steady green	Fan assembly is operating normally.	No action is required.
	Steady amber (for more than 5 seconds)	Fan fault for one of the following reasons: - A fan assembly with mismatched airflow is present. - One or more of the fans in the fan assembly has failed.	Try one of the following: - Replace the mismatched fan assembly with one that has the correct airflow direction. - Replace the faulty fan assembly.

Table 9: LED patterns on the port side of the HPE StoreFabric SN6500B, SN6000B, SN3000B, and SN4000B 16Gb FC switches

LED name	LED color	Status of hardware	Recommended action
System power (green)	No light	System is off or there is an internal power supply failure.	Verify that the system is powered on (power supply switches set to I), the power cables are attached, and the power source is live. The unit may be faulty. Contact your switch service provider.
	Steady green	System is on and power supplies are functioning properly.	No action is required.
System status (bicolor)	No light	System is off or there is no power.	Verify that the system is on and has completed booting.
	Steady green	System is on and is functioning properly.	No action is required.
	Steady amber (for more than 5 seconds)	A system fault has occurred. This LED is steady amber during POST, which is normal and does not indicate a fault.	Check the failure indicated on the system console. Contact your switch service provider.

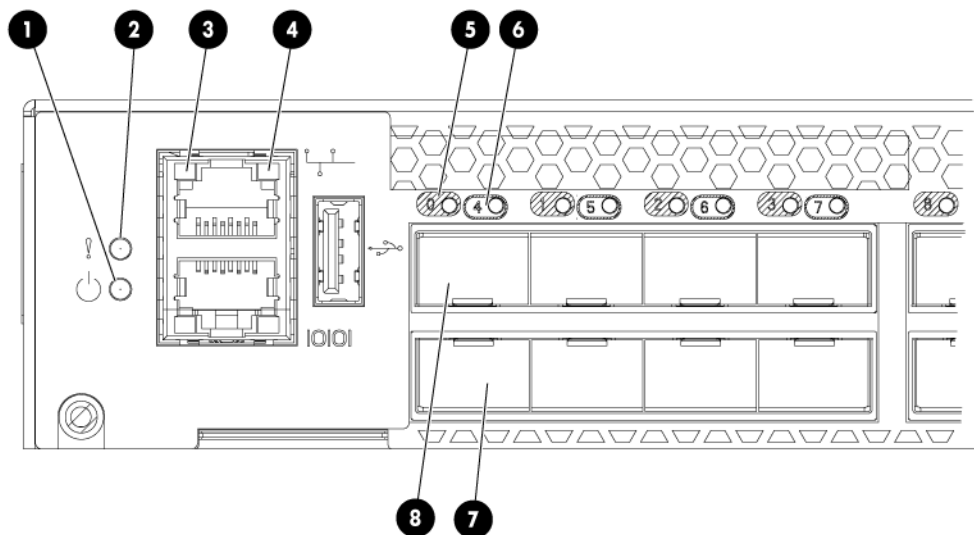
Table Continued

LED name	LED color	Status of hardware	Recommended action
	Steady amber (for more than a few minutes)	Unknown state, boot has failed, or the system is faulty. This may also be a result of switch failure after completion of POST.	Perform the following steps: 1. Connect a serial cable to the system. 2. Reboot the system. 3. Check the failure indicated on the system console. 4. Contact your switch service provider.
	Blinking amber	Attention is required. There can be a number of reasons for this status, including a single power supply failure, a fan failure, or one or more environmental ranges exceeded.	Check the management interface and the error log for details on the cause of this status. Contact your switch service provider.
Ethernet port activity/link	No light	There is no link.	Verify that the Ethernet cable is connected correctly.
	Steady green	There is a link.	No action is required.
	Blinking green	There is link activity (traffic).	No action is required.
Ethernet port speed	No light	Port speed is 10 Mb/s.	No action is required.
	Steady green	Port speed is 100 Mb/s. For the StoreFabric SN6500B 16Gb FC Switch only, this indicates a 100 or 1000 Mb/s link.	No action is required.
FC optical media port status (one bicolor LED for each FC port)	Off	There is no light or no signal carrier on the media interface.	Verify that the transceiver is installed correctly and the cable is connected correctly.
	Steady amber	Receiving light or carrier, but not online.	No action is required
	Slow blinking amber (2 seconds)	Either the port has been disabled by diagnostic tests running or was disabled from executing the <code>portdisable</code> CLI command.	Verify that the diagnostic tests are not being run. Re-enable the port using the <code>portenable</code> command.
	Fast blinking amber (1/2 second)	There is a port failure.	Check the management interface and the error log for details on the cause of the failure. Contact technical support if necessary.

Table Continued

LED name	LED color	Status of hardware	Recommended action
	Steady green	The port is online.	No action is required.
	Slow blinking green (2 seconds)	The port is online, but is segmented due to a loopback cable or incompatible switch.	No action is required.
	Fast blinking green (1/2 second)	Internal loopback (diagnostic).	No action is required.
	Flickering green	The port is online, with frames flowing through the port.	No action is required.
10 GE/40 GE Ethernet port status ¹	No light	The port is offline. There is no activity.	Verify that the power LED is on. Check the transceiver and the cable.
	Steady green	The port is online and active.	No action is required.

¹ This is applicable to the SN4000B SAN Extension Switch only.



- | | |
|--------------------------------|--------------------------------|
| 1. System power LED | 2. System status LED |
| 3. Ethernet port activity LED | 4. Ethernet port speed LED |
| 5. FC port status LED (port 0) | 6. FC port status LED (port 4) |
| 7. FC port 4 | 8. FC port 0 |

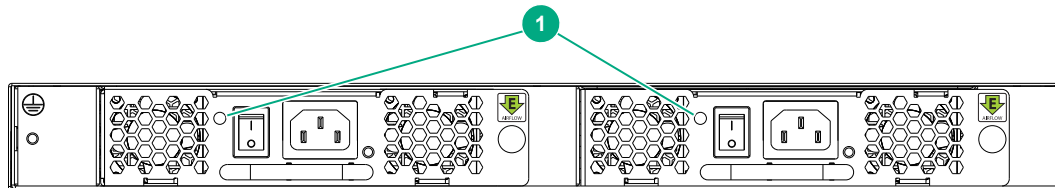
Figure 37: Port side of the HPE SN6000B and SN3000B 16Gb FC switches

NOTE:

The two LEDs on the serial console port are not functional.

LED patterns on the port side of the HPE StoreFabric SN6500B, SN6000B, SN3000B, and SN4000B 16Gb FC switches describes the LED patterns on the port side of the switches.

The nonport side of the switches has one LED per Power supply and fan assembly. See **Power supply/fan assembly status LEDs on the nonport side of the HPE SN6000B and SN3000B 16Gb FC switches**. The standard configuration of the SN3000B 16Gb FC Switch includes a single Power supply and fan assembly. **LED patterns on the nonport side of the HPE SN6000B, SN3000B, and SN4000B 16Gb FC switches** describes the LED patterns on the nonport side of the SN6000B and SN3000B 16Gb FC switches.



1. Power supply and fan assembly status LEDs

Figure 38: Power supply/fan assembly status LEDs on the nonport side of the HPE SN6000B and SN3000B 16Gb FC switches

Table 10: LED patterns on the nonport side of the HPE SN6000B, SN3000B, and SN4000B 16Gb FC switches

LED name	LED color	Status of hardware	Recommended action
Power supply and fan assembly status	No light	Power supply/fan assembly is not receiving power or is off.	Verify that the power supply/fan assembly is on and seated and the power cord is connected to a functioning power source.
	Steady green	Power supply/fan assembly is operating normally.	No action is required.
	Flashing green	Power supply/fan assembly is faulty. When the switch is first powered on, the power supply/fan assembly status LED is flashing green until POST is complete.	Check the power cable connection. Verify that the power supply/fan assembly is powered on. Replace the power supply/fan assembly FRU.
	Steady amber (for more than 5 seconds)	Fan fault for one of the following reasons: - A fan assembly with mismatched airflow is present. - One or more of the fans in the fan assembly has failed.	Try one of the following: - Replace the mismatched fan assembly with one that has the correct airflow direction. - Replace the faulty fan assembly.
Power supply/DC	Flashing amber (1:1)	Output voltage is not enabled.	Verify that the power supply is seated correctly and the captive screw is secured.

Table Continued

LED name	LED color	Status of hardware	Recommended action
output status (one bicolor LED)	Flashing amber/green (2:1)	The temperature has exceeded the threshold.	Verify that the ambient temperature is less than 40°C. Check for airflow-intake blockage.
	Flashing amber/green (1:1)	Internal fan is faulty.	Replace the power supply.
	Steady amber	Power supply is faulty or is not plugged in completely.	Check the power cord, current, voltage, and temperature to determine the problem.
	Steady green	DC output is within the expected range.	No action is required.

POST and boot specifications

When the switch is powered on or rebooted, it performs POST. Total boot time with POST can be several minutes. POST can be omitted after subsequent reboots by using the `fastboot` command or entering the `diagDisablePost` command to persistently disable POST. For more information about these commands, see the Fabric OS 7.0.x Command Reference Manual.

POST

You can monitor the results of the diagnostic tests that run during POST through LED activity, the error log, or the CLI. POST includes the following tasks:

- Conducting preliminary POST diagnostics
- Initializing the operating system
- Initializing hardware
- Running diagnostic tests on several functions, including circuitry, port functionality, memory, statistics counters, and serialization

To determine whether POST completed successfully:

Procedure

1. Inspect the switch LEDs to determine whether components are operating properly.
See **LED patterns on the port side of the HPE StoreFabric SN6500B, SN6000B, SN3000B, and SN4000B 16Gb FC switches** and **LED patterns on the nonport side of the HPE SN6000B, SN3000B, and SN4000B 16Gb FC switches** for descriptions of LED patterns. If one or more LEDs do not display a healthy state, verify that the LEDs are not set to beacon by entering the `switchshow` command to detect if beaconing is active.
2. Verify that the switch prompt is displayed on a workstation connected to the switch.
If there is no switch prompt when POST is complete, press **Enter**. If the switch prompt still does not appear, open a Telnet session or access the switch through another management tool. If this does not solve the problem, the switch did not complete POST successfully. Contact your switch supplier for repair.
3. Review the switch system log for errors.
Any errors detected during POST are written to the system log, accessible through the `errShow` command.

For information about error messages, see the Fabric OS Message Reference Manual.

Boot

Boot occurs after POST is complete and includes the following tasks:

- Performing universal port configuration.
- Initializing links.
- Analyzing the fabric.

If any ports are connected to other switches, the switch participates in a fabric configuration.

- Obtaining a domain ID and assigning port addresses.
- Constructing unicast routing tables.
- Enabling normal port operation.

Switch maintenance

The switch supports only Hewlett Packard Enterprise-branded 8 Gb/s and 16 Gb/s SFP+ optical transceivers. For the FC connections, the switch uses SFP+ transceivers that support any combination of SWL, LWL, and ELWL optical media.

If you use an unqualified transceiver, the `switchshow` command output shows the port in a `Mod_Inv` state. Fabric OS also logs the issue in the system error log.

For information about installing transceivers, see [Connecting devices](#).

Diagnostic tests

In addition to POST, Fabric OS includes diagnostic tests to help you troubleshoot the hardware and firmware. This includes tests of internal connections and circuitry, fixed media, and transceivers and cables.

The tests are implemented by command through a Telnet session or a console set up to the serial connection to the switch. Some tests require that ports be connected by external cables in order to verify the serializer/deserializer interface, transceiver, and cable. Some tests require loopback plugs.

Diagnostic tests run at a link speed of 2, 4, 8, 10, or 16 Gb/s (FC), depending on the speed of the link being tested and the type of port.

NOTE:

- Diagnostic tests can temporarily lock the transmit and receive speed of the links.
 - Hewlett Packard Enterprise does not support 2 Gb/s connectivity to the StoreFabric SN4000B, SN6500B, SN6000B, and SN3000B 16Gb FC switches.
-

For information about specific diagnostic tests, see the Fabric OS Troubleshooting and Diagnostics Guide.

Switch management

You can use the management functions built into the switch to monitor the fabric topology, port status, physical status, and other information to help you analyze switch performance and to accelerate system debugging.

For information about upgrading the Fabric OS version installed on your switch, see the Fabric OS Administrator's Guide.

You can manage the switch using any of the management tools listed in [Switch management tools](#). For more information on the CLI commands, see the Fabric OS 7.3.x Command Reference Manual.

Table 11: Switch management tools

Management tool	Out-of-band support	In-band support
CLI Up to two admin sessions and four user sessions simultaneously. See the Fabric OS Administrator's Guide and the Fabric OS 7.3.x Command Reference Manual.	Ethernet or serial connection	IP over FC
Web Tools See the Web Tools Administrator's Guide.	Ethernet or serial connection	IP over FC
Standard SNMP applications See the MIB Reference Manual.	Ethernet or serial connection	IP over FC
Management Server See the Fabric OS Administrator's Guide and the Fabric OS 7.3.x Command Reference Manual.	Ethernet or serial connection	Native in-band interface (over HBA only)
Network Advisor (option to purchase) See the Network Advisor documentation set.	Ethernet or serial connection	IP over FC

FRU removal and replacement

No special tools are required to remove and replace the power supply and fan assembly FRU for the following switches:

- SN6000B 16Gb FC Switch
- SN3000B 16Gb FC Switch
- StoreFabric SN6500B 16Gb FC Switch
- StoreFabric SN4000B SAN Extension Switch

The switches will continue to operate during the FRU replacement if you follow the procedures in this chapter. However, the SN3000B 16Gb FC Switch will continue to operate normally only if it has two power supplies installed. The SN3000B 16Gb FC switch comes with only one power supply by default and if removed will have no power. Replacing a power supply and fan assembly takes less than two minutes.

CAUTION:

Disassembling any part of the power supply voids the part warranty and regulatory certifications. There are no user-serviceable parts inside the power supply and fan assembly. The cooling system relies on pressurized air, so do not leave either of the power supply and fan assembly slots empty longer than two minutes when the switch is operating. If a power supply and fan assembly fails, leave the power supply and fan assembly in the switch until it can be replaced. The power supply and fan assembly must be operational to ensure redundancy.

Replacing the HPE StoreFabric SN6500B 16Gb FC Switch or the HPE StoreFabric SN4000B SAN Extension Switch power supply

The StoreFabric SN6500B 16Gb FC and the StoreFabric SN4000B SAN Extension switches have two power supplies (see **Figure 39: HPE StoreFabric SN6500B 16Gb FC Switch power supply** on page

66 and **Figure 40: HPE StoreFabric SN4000B SAN Extension Switch power supply** on page 66). The Fabric OS identifies power supplies from left to right on the nonport side as power supply #2 and power supply #1.

See this cautionary note before beginning replacement **"CAUTION"**.

See **LED patterns on the nonport side of the HPE StoreFabric SN6500B 16Gb FC Switch and the HPE StoreFabric SN4000B SAN Extension Switch** for the power supply status LED colors, patterns, and recommended actions, if any.

Determining the need to replace a power supply

Use one of the following methods to determine the status of the power supplies:

- Check the power supply AC status and DC status LEDs; both should be green. See **LEDs** on page 54 for more information. If the DC status LED is amber, there is no power running through the cord.
- In Web Tools, click the **Power Status** icon.
- At the command prompt, enter the `psShow` command to display the power supply status:

Example of the `psShow` command for the StoreFabric SN6500B 16Gb FC Switch:

```
Switch:admin> psshow
Power Supply #1 is OK
Airflow Direction : Portside Intake (Forward)
Power Supply #2 is OK
Airflow Direction : Portside Intake (Forward) Switch:admin>
```



WARNING:

You must disconnect the power cords from all power sources to completely remove power from the chassis.

Before beginning the power supply replacement



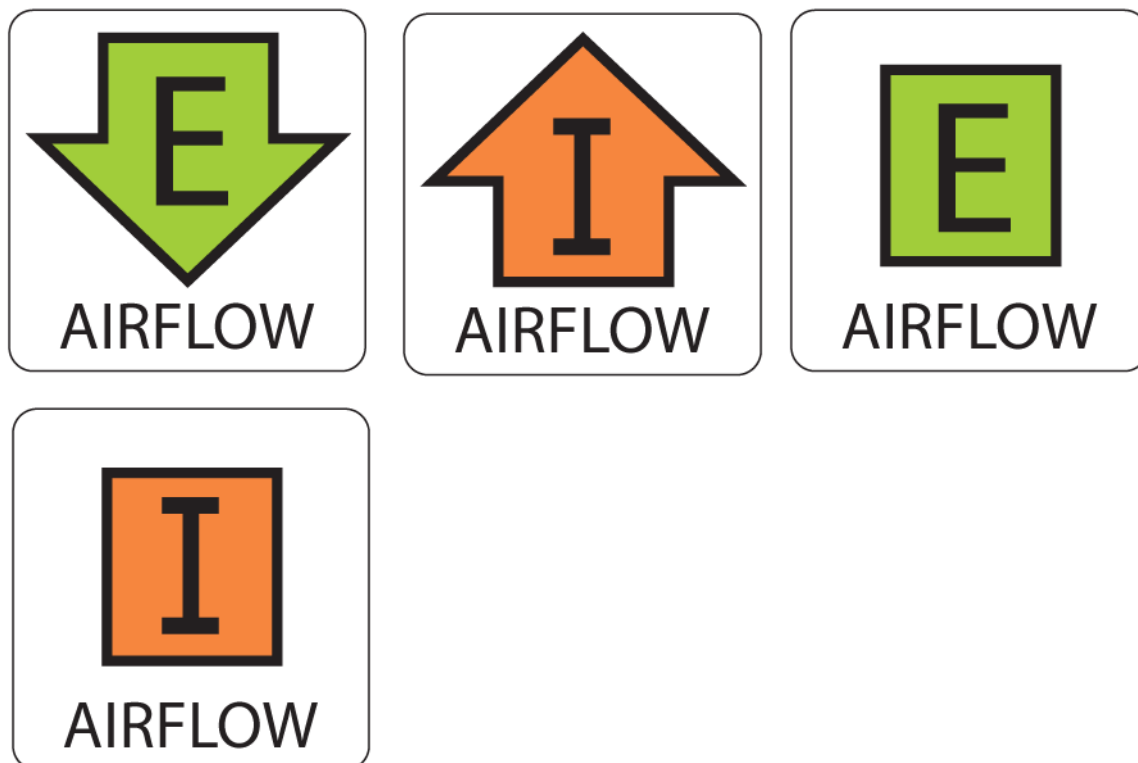
CAUTION:

Hewlett Packard Enterprise only supports the port-side exhaust configuration, and only offers the port side exhaust fan FRU. The following information is provided only for reference.

When replacing a failed power supply or fan, the new FRU must have the same part number as the FRU it is replacing. The manufacturing part number is located on the top of the FRU.

Both the power supply and fan FRUs are labeled with an airflow symbol on the faceplate to indicate whether the fan assembly pulls in or exhausts air. These labels also appears on the top of the fan assembly. All fan assemblies and power supplies must have the same airflow symbol (E or I) to be compatible with each other.

Examples of airflow symbols



Some information to note:

- The green E symbol indicates an exhaust unit. This unit pulls air in from the port-side of the switch and exhausts it out the nonport side. This is also called front-to-back airflow or forward airflow. This symbol should appear on FRUs with part numbers ending with -F.
- The orange I symbol indicates an intake unit. This unit pulls air in from the nonport side of the switch and exhausts it out the port-side. This is also called back-to-front airflow or reverse airflow. This symbol should appear on FRUs with part numbers ending with -R.
- The `chassisShow` command will indicate either forward or reverse airflow.
- If one fan fails, the remaining fans go to high speed to maintain proper cooling until the failed fan is replaced.
- If a mismatched power supply or fan assembly is installed by mistake, a critical error message is sent to the console. The message will be similar to the following:

```
CRITICAL HIL-1611 MISMATCH in PSU/FAN Air Flow direction. Replace PSU with
fan air flows in same direction. System will be shut down in 2 minutes.
```

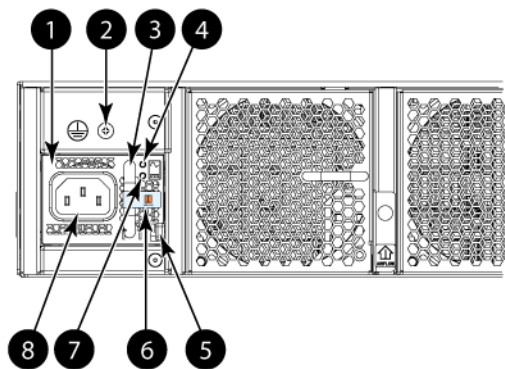
Replacing a power supply

Replacing a power supply in the StoreFabric SN6500B 16Gb FC Switch or the StoreFabric SN4000B SAN Extension Switch should require less than two minutes to complete.

The new power supply must have the same part number and airflow indicator as the power supply you are replacing. See **Figure 39: HPE StoreFabric SN6500B 16Gb FC Switch power supply** on page 66, **Figure 40: HPE StoreFabric SN4000B SAN Extension Switch power supply** on page 66, and **Figure 41: HPE StoreFabric SN4000B SAN Extension Switch airflow labels** on page 67 for the power supply details and the location of the airflow labels.

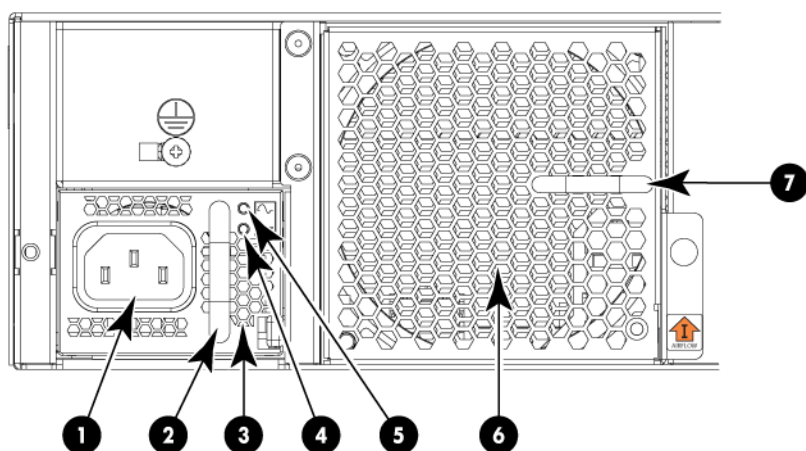
NOTE:

Hewlett Packard Enterprise only supports the port side exhaust power supply.



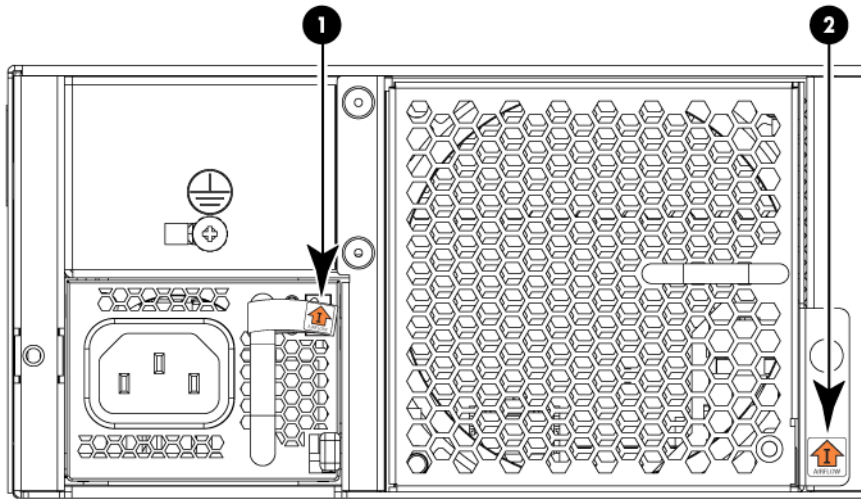
- | | |
|-------------------------|--------------------------|
| 1. Power supply #2 | 2. Grounding screw |
| 3. Handle | 4. AC input status LED |
| 5. Locking tab | 6. Airflow label |
| 7. DC output status LED | 8. Power cord receptacle |

Figure 39: HPE StoreFabric SN6500B 16Gb FC Switch power supply



- | | |
|---------------------------|------------------|
| 1. AC power socket | 2. Handle |
| 3. Integral fan air inlet | 4. DC status LED |
| 5. AC status LED | 6. Fan air inlet |
| 7. Handle | |

Figure 40: HPE StoreFabric SN4000B SAN Extension Switch power supply



1. Airflow label for PSU integral fan

2. Airflow label for fan FRU

Figure 41: HPE StoreFabric SN4000B SAN Extension Switch airflow labels

To replace a power supply in the StoreFabric SN6500B 16Gb FC Switch or the StoreFabric SN4000B SAN Extension Switch (**Figure 42: Inserting the power supply in the HPE StoreFabric SN6500B 16Gb FC Switch or the HPE StoreFabric SN4000B SAN Extension Switch** on page 68):

1. Verify that the second power supply has been powered on for at least four seconds, and that the LED is steady green. This ensures the switch remains in service while replacing a power supply.
2. Unplug the power cord from the power supply that is being replaced.
3. Push the locking tab to the left and hold it there, and use the handle on the power supply to pull it straight out and away from the chassis. Pull the power supply out slowly to avoid catching a finger on the locking tab.
4. Slide the new power supply into the chassis until the locking tab engages.

⚠ CAUTION:

- Do not force the power supply into the chassis. If the power supply does not slide in easily, ensure that it is oriented correctly before continuing.
- After replacing the power supply, if the switch powers down after two minutes, it is probably because the new power supply has a mismatched airflow.

5. Plug the power cord into the power supply to power on the unit.

If the power was on before the replacement, the power supply will attempt to power up immediately.

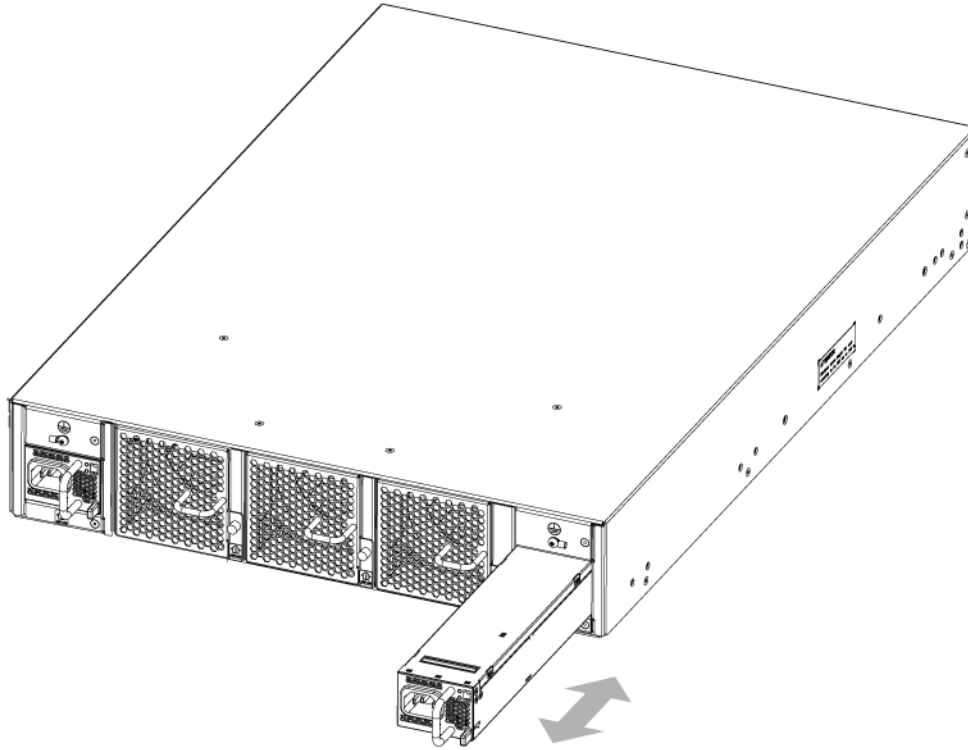


Figure 42: Inserting the power supply in the HPE StoreFabric SN6500B 16Gb FC Switch or the HPE StoreFabric SN4000B SAN Extension Switch

6. Verify that the LEDs on the new power supply are steady green when the switch is operating. See **LED patterns on the nonport side of the HPE StoreFabric SN6500B 16Gb FC Switch and the HPE StoreFabric SN4000B SAN Extension Switch** for more information. If the LEDs are not steady green, ensure that the power supply is installed securely.

Optionally, using the CLI, enter the `psShow` command or `chassisShow` command to display the power supply status.

You can also use Web Tools to view the power supply status.

Replacing an HPE StoreFabric SN6500B 16Gb FC Switch or an HPE StoreFabric SN4000B SAN Extension Switch fan

The StoreFabric SN6500B 16Gb FC and the StoreFabric SN4000B San Extension switches have three fans, as shown in **Figure 2: Nonport side of HPE SN6500B StoreFabric 16Gb FC Switch** on page 9 and **Figure 10: Nonport side of the StoreFabric SN4000B SAN Extension Switch** on page 22. The Fabric OS identifies the fan locations from left to right as fan #3, fan #2, and fan #1.

⚠ CAUTION:

Disassembling any part of the fan assembly voids the part warranty and regulatory certifications. There are no user-serviceable parts inside the fan. Because the cooling system relies on pressurized air, do not leave any of the fan slots empty for longer than two minutes while the switch is operating. If a fan fails, leave it in the switch until it can be replaced.

Maintain all three fans in operational condition to ensure redundancy.

See **LED patterns on the nonport side of the HPE StoreFabric SN6500B 16Gb FC Switch and the HPE StoreFabric SN4000B SAN Extension Switch** for the power supply status LED colors, patterns, and recommended actions, if any.

Determining the need to replace a fan

Use one of the following methods to determine the status of the fans:

- Check the fan status LED. See **LEDs** on page 54 for more information.
- In Web Tools, click the **Power Status** icon for the StoreFabric SN6500B 16Gb FC Switch.

For the StoreFabric SN4000B SAN Extension Switch, click the **Fan Status** icon.

- At the command prompt, enter the `fanShow` command to display the fan status.

NOTE:

Fans 4 and 5 are integral to the power supplies. These fans typically operate at approximately 12,000 RPM. The system fans of the StoreFabric SN6500B 16Gb FC switch typically operate at approximately 2,000 RPM, while the system fans of the StoreFabric SN4000B SAN Extension Switch operate at around 4,000 RPM. If there is a problem with fan 4 or 5, see **Replacing the HPE StoreFabric SN6500B 16Gb FC Switch or the HPE StoreFabric SN4000B SAN Extension Switch power supply** on page 63.

Example of the `fanShow` command for the StoreFabric SN6500B 16Gb FC switch:

```
Switch:admin> fanshow Fan 1 is Ok, speed is 1965 RPM Fan 2 is Ok, speed is 2011 RPM Fan 3 is Ok, speed is 2011 RPM Fan 4 is Ok, speed is 12001 RPM Fan 5 is Ok, speed is 11995 RPM Switch:admin>
```

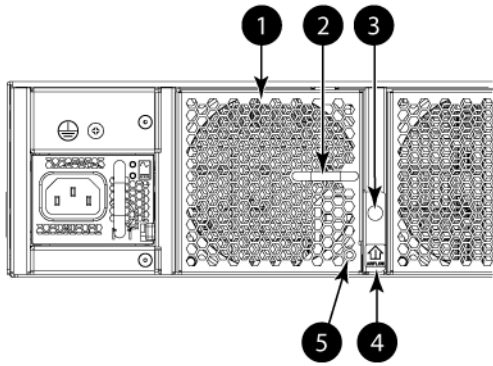
Replacing an HPE StoreFabric SN6500B 16Gb FC Switch or an HPE StoreFabric SN4000B SAN Extension Switch fan

Replacing a fan requires the following:

- A new fan with the same part number and airflow indicator as the fan being replaced. See **Figure 43: HPE StoreFabric SN6500B 16Gb FC Switch fan** on page 70 and **Figure 41: HPE StoreFabric SN4000B SAN Extension Switch airflow labels** on page 67 for the location of the airflow labels.
- A #1 Phillips screwdriver.

NOTE:

Hewlett Packard Enterprise only supports the port-side exhaust fans, and only offers the port-side exhaust fan FRU option. This information is provided for reference only.



- | | |
|------------------|------------------|
| 1. Fan #3 | 2. Handle |
| 3. Captive screw | 4. Airflow label |
| 5. Status LED | |

Figure 43: HPE StoreFabric SN6500B 16Gb FC Switch fan

For the StoreFabric SN4000B SAN Extension Switch fan, see **Figure 40: HPE StoreFabric SN4000B SAN Extension Switch power supply** on page 66.

To replace a fan (**Figure 44: Inserting the fan in the HPE StoreFabric SN6500B 16Gb FC Switch or the HPE StoreFabric SN4000B SAN Extension Switch** on page 71):

1. Using the Phillips screwdriver, unscrew the captive screw on the fan.



WARNING:

Do not insert your fingers in the fan while removing it from the chassis. The fan may still be spinning at a high speed.

2. Remove the fan from the chassis by using the handle on the fan to pull it straight out and away from the chassis.
3. Install the new fan in the chassis:
 - a. Verify that the airflow direction is the same as that of the fan you are replacing.
 - b. Orient the new fan with the captive screw on the right, as shown in **Figure 44: Inserting the fan in the HPE StoreFabric SN6500B 16Gb FC Switch or the HPE StoreFabric SN4000B SAN Extension Switch** on page 71.



CAUTION:

- Do not force the power supply into the chassis. If the fan does not slide in easily, ensure that it is oriented correctly before continuing.
- After replacing a fan, if the switch powers down after 2 minutes, it is probably because the new fan has a mismatched airflow.

- c. Gently push the fan into the chassis until it is firmly seated.
- d. Using the Phillips screwdriver, secure the fan to the chassis by tightening the captive screw.

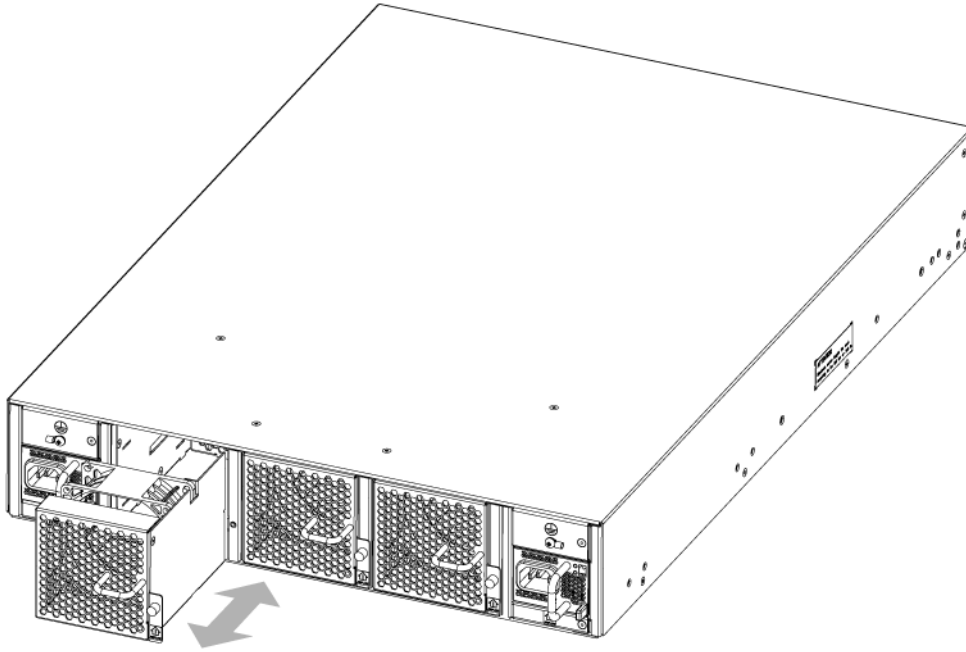


Figure 44: Inserting the fan in the HPE StoreFabric SN6500B 16Gb FC Switch or the HPE StoreFabric SN4000B SAN Extension Switch

4. Verify that the fan status LED is steady green to indicate normal operation. See [LED patterns on the nonport side of the HPE StoreFabric SN6500B 16Gb FC Switch and the HPE StoreFabric SN4000B SAN Extension Switch](#) for more information.

Optionally, using the CLI, enter the `fanShow` command or `chassisShow` command to display the power supply status.

You can also use Web Tools to view the fan status.

Replacing the HPE SN6000B or SN3000B 16Gb FC Switch power supply and fan assembly

The fans are fixed inside the combined power supply and fan FRU to provide the airflow needed to cool the switch. Each FRU contains two fans. The system software measures and sets fan speed through the tachometer interface.

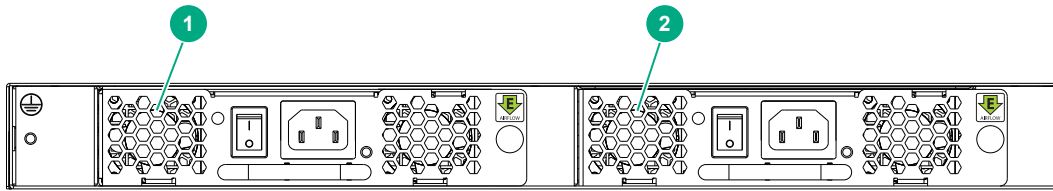
The SN3000B switch comes with one power supply and fan assembly. Fabric OS identifies the assemblies from right to left on the nonport side. Even though they are contained within a single unit, the power supply and fan components are identified separately. In the `chassisShow` command they are identified as Power Supply Unit:1 and Fan Unit:1.

The SN6000B switch has two power supply and fan assemblies. The two power supply and fan assemblies are hot-swappable if replaced one at a time. They are identical and fit into either slot.

NOTE:

When replacing the power supply and fan assembly in an SN3000B 16Gb FC Switch that has only one, the switch must be powered off prior to replacing the assembly.

Power supply and fan assemblies shows the power supply and fan assemblies on the nonport side of a switch with two assemblies. The standard SN3000B 16Gb FC Switch includes a single power supply and fan assembly. Fabric OS identifies the assemblies from right to left as assemblies 1 and 2. (The actual appearance of the switch may differ slightly from this illustration, but the locations are correct.)



1. Power supply and fan assembly #2

2. Power supply and fan assembly #1

Figure 45: Power supply and fan assemblies

Determining the status of a power supply and fan assembly

Use one of the following methods to determine the status of the power supply and fan assembly:

- Check the power supply and fan assembly status LED next to the AC power switch (see **Power supply/fan assembly status LEDs on the nonport side of the HPE SN6000B and SN3000B 16Gb FC switches**).
- In Web Tools, click the **Power Status** icon.
- Enter the `psshow` command at the prompt to display the power supply and fan assembly status:

```
br6510:admin> psshow
Power Supply #1 is OK
Power Supply #2 is OK
br6510:admin>
```

Removing a power supply and fan assembly

The following items are required:

- New power supply and fan assembly
- #1 Phillips screwdriver

To remove a power supply and fan assembly (**Replacing the power supply and fan assembly**):

Procedure

1. If the switch is rack mounted, remove the plenum.
2. If the switch has two power supply and fan assemblies, go to step 3. When replacing the power supply and fan assembly in an SN3000B 16Gb FC Switch that has only one assembly, the switch must be powered off before removing the assembly.

Enter the `sysShutDown` command before powering off the assembly to maintain the reliability of the system.

NOTE:

To keep the switch in service when replacing a power supply and fan in a switch with two assemblies, verify that the other assembly has been powered on for at least four seconds and that its LED is steady green.

3. Power off the power supply to be replaced by setting the AC power switch to the off (O) position.
The fans in the other power supply automatically switch to high speed to maintain adequate cooling.
4. Unplug the power cord from the power supply and fan assembly being replaced.
5. Unscrew the captive screw using a Phillips screwdriver.

6. Remove the power supply and fan assembly by pulling the handle out and away from the chassis.
7. Note the product and airflow labels (or their absence) on the assembly just removed.

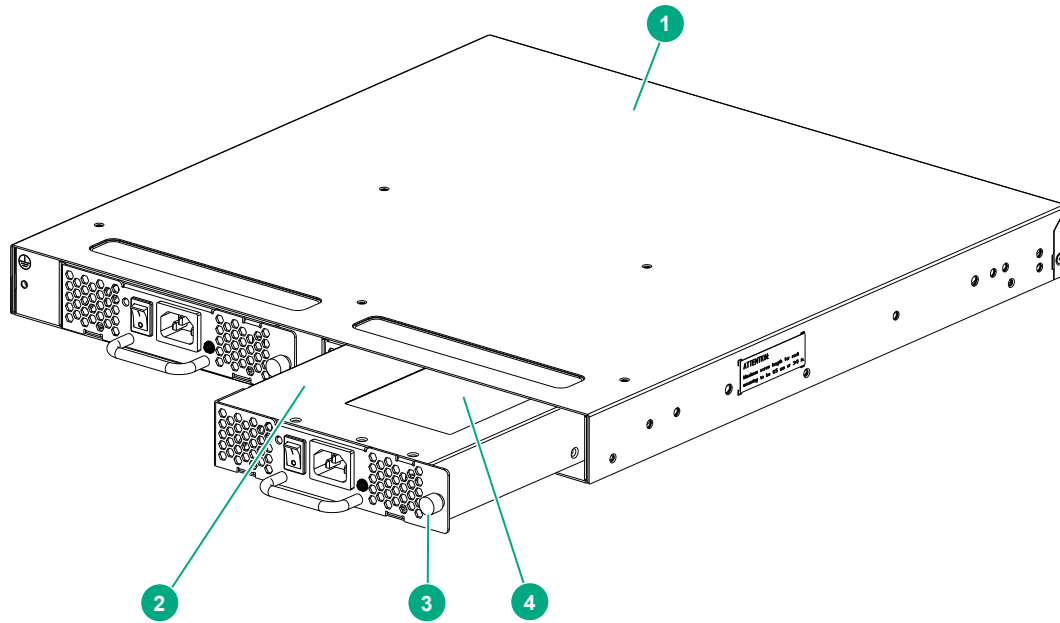


Figure 46: Replacing the power supply and fan assembly

- | | |
|-------------------|----------------------------------|
| 1. Switch chassis | 2. Power supply and fan assembly |
| 3. Captive screw | 4. Product and airflow labels |

Installing a power supply and fan assembly

To install the power supply and fan assembly:

Procedure

1. Ensure that the replacement FRU AC power switch is in the off (O) position.

CAUTION:

Damage to the switch can result if the AC power switch is in the on (I) position when the switch is installed in the chassis.

2. Orient the new power supply and fan assembly with the captive screw on the right, as shown in **Replacing the power supply and fan assembly**.

CAUTION:

Do not force the assembly into the chassis. If it does not slide in easily, ensure that it is oriented correctly before continuing.

3. Gently push the power supply and fan assembly into the chassis until it is firmly seated.
4. Using the Phillips screwdriver, secure the power supply and fan assembly to the chassis by tightening the captive screw.
5. Plug the power cord into the power supply and fan assembly and power on the unit by setting the AC power switch to the on (I) position.

6. Verify that the LED on the new power supply and fan assembly displays a steady green light while the switch is operating. If the LED is not a steady green, ensure that the power supply is installed securely and seated properly.
7. If the switch is installed in a rack, replace the plenum.
8. Optional: If you are using the CLI, enter the `psshow` command at the command-line prompt to display the status. Power supply and fan assembly status can also be viewed using Web Tools.

Support and other resources

Accessing Hewlett Packard Enterprise Support

- For live assistance, go to the Contact Hewlett Packard Enterprise Worldwide website:
www.hpe.com/assistance
- To access documentation and support services, go to the Hewlett Packard Enterprise Support Center website:
www.hpe.com/support/hpesc

Information to collect

- Technical support registration number (if applicable)
- Product name, model or version, and serial number
- Operating system name and version
- Firmware version
- Error messages
- Product-specific reports and logs
- Add-on products or components
- Third-party products or components

Accessing updates

- Some software products provide a mechanism for accessing software updates through the product interface. Review your product documentation to identify the recommended software update method.
- To download product updates, go to either of the following:
 - Hewlett Packard Enterprise Support Center **Get connected with updates** page:
www.hpe.com/support/e-updates
 - Software Depot website:
www.hpe.com/support/softwaredepot
- To view and update your entitlements, and to link your contracts and warranties with your profile, go to the Hewlett Packard Enterprise Support Center **More Information on Access to Support Materials** page:
www.hpe.com/support/AccessToSupportMaterials



IMPORTANT:

Access to some updates might require product entitlement when accessed through the Hewlett Packard Enterprise Support Center. You must have an HP Passport set up with relevant entitlements.

Websites

Website	Link
Hewlett Packard Enterprise Information Library	<u>www.hpe.com/info/enterprise/docs</u>
Hewlett Packard Enterprise Support Center	<u>www.hpe.com/support/hpesc</u>

Table Continued

Website	Link
Contact Hewlett Packard Enterprise Worldwide	www.hpe.com/assistance
Subscription Service/Support Alerts	www.hpe.com/support/e-updates
Software Depot	www.hpe.com/support/softwaredepot
Customer Self Repair	www.hpe.com/support/selfrepair
Insight Remote Support	www.hpe.com/info/insightremotesupport/docs
Serviceguard Solutions for HP-UX	www.hpe.com/info/hpux-serviceguard-docs
Single Point of Connectivity Knowledge (SPOCK) Storage compatibility matrix	www.hpe.com/storage/spock
Storage white papers and analyst reports	www.hpe.com/storage/whitepapers

Customer self repair

Hewlett Packard Enterprise customer self repair (CSR) programs allow you to repair your product. If a CSR part needs to be replaced, it will be shipped directly to you so that you can install it at your convenience. Some parts do not qualify for CSR. Your Hewlett Packard Enterprise authorized service provider will determine whether a repair can be accomplished by CSR.

For more information about CSR, contact your local service provider or go to the CSR website: www.hpe.com/support/selfrepair.

Remote support

Remote support is available with supported devices as part of your warranty or contractual support agreement. It provides intelligent event diagnosis, and automatic, secure submission of hardware event notifications to Hewlett Packard Enterprise, which will initiate a fast and accurate resolution based on your product's service level. Hewlett Packard Enterprise strongly recommends that you register your device for remote support.

For more information and device support details, go to the following website:

www.hpe.com/info/insightremotesupport/docs

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Specifications

This appendix provides switch specifications.

Physical specifications

Table 12: HPE StoreFabric SN6500B 16Gb FC Switch physical specifications

Dimension	Value
Height	86.74 mm (3.415 in)
Depth	609.75 mm (24.006 in)
Width	429.25 mm (16.900 in)
Weight (with two power supplies and three fan assemblies, and no transceivers installed)	16.9 kg (37.3 lb)

Table 13: HPE SN6000B and SN3000B 16Gb FC switches physical specifications

Dimension	Value
Height	1U or 4.3 cm (1.7 in)
Depth (without plenum)	44.3 cm (17.4 in)
Width (The slightly increased width requires a slim rail rack mount kit for mounting.)	43.8 cm (17.2 in)
Weight (with two power supply and fan assemblies, and no SFPs installed)	9.2 kg (20.2 lb)
Weight (with one power supply and fan assembly, and no SFPs installed)	7.82 kg (17.25 lb)

Table 14: StoreFabric SN4000B SAN Extension Switch physical specifications

Dimension	Value
Height	8.6 cm (3.39 in)
Depth	60.9 cm (24.0 in)
Width	44 cm (17.32 in)
Weight (with all the fans and PSU FRUs)	18.23 kg (40.2 lb)

Facility requirements

Table 15: Facility requirements

Dimension	Value
Electrical	- Adequate supply circuit, line fusing, and wire size, as specified by the electrical rating on the switch nameplate - Circuit protected by a circuit breaker and grounded in accordance with local electrical codes See <u>HPE StoreFabric SN6500B 16Gb FC Switch power supply specifications</u> for complete power supply specifications.
Thermal	- Minimum airflow of 79.8 cubic m/hr (47 cubic ft/min) available in the immediate vicinity of the switch - Ambient air temperature not exceeding 40°C (104°F) while the switch is operating
Cabinet (rack mounted) Use rack kits designed for the extra width of the switch to mount in standard cabinets/ racks.	1U in a 48.3 cm (19 in) cabinet - All equipment in cabinet grounded through a reliable branch circuit connection - Plenum installed to prevent overheating - Additional weight of switch not to exceed the cabinet's weight limits - Cabinet secured to ensure stability in case of unexpected movement

Power supply specifications

The power supplies are universal and operate worldwide without voltage jumpers or switches. They meet IEC 61000-4-5 surge voltage requirements and support autoranging to accommodate input voltages and line frequencies. Each power supply has built-in fans for cooling.

Table 16: HPE StoreFabric SN6500B 16Gb FC Switch power supply specifications

Specification	Values
Input voltage	Range: 90–264 VAC Auto-volt, Nominal: 100–240 VAC, 12.0-5.0 A; 47-63 Hz The switch autosenses input voltage Startup: 80–87 VAC; Turn-off: 85–75 VAC
Input frequency	Range: 47–63 Hz; Nominal: 50–60 Hz
Inrush current	Maximum of 40 A peak at 240 VAC during cold startup at 25°C ambient
Input line protection	Both AC lines are fused
Maximum power supply output (each)	1,080 W at 12 VDC

Table 17: SN6000B 16Gb FC Switch power supply specifications

Specification	Values
Input voltage	Range: 85–264 VAC Auto-volt, Nominal: 100–240 VAC, 2.0 A, 47–63 Hz; the switch autosenses input voltage
Input frequency	Range: 47–63 Hz; Nominal: 50–60 Hz
Inrush current	Maximum of 50 A peak at 240 VAC for any initial current surge or spike of 10 ms or less at cold startup. Additional inrush current surges or spikes in the form of AC cycles, or multiple AC cycles greater than 10 ms and less than 150 ms, must not exceed 15 A peak.
Single power supply output	150 W at 12 VDC
Maximum current	12.5 A at 12 VDC
Input line protection	Both AC lines are fused
System power consumption	110 W with all 48 ports populated with 16 Gb/s SWL optical media 72 W with empty chassis and no optical media

Table 18: SN3000B 16Gb FC Switch power supply specifications

Specification	Values
Input voltage	Range: 85–264 VAC, nominal: 100–240 VAC
Input frequency	Range: 47–63 Hz; Nominal: 50–60 Hz
Inrush current	Maximum of 35 A peak at 240 VAC for 10 ms or less
Single power supply output	150 W at 12 VDC
Input line protection	AC lines are fused
System power consumption	80 W with all 24 ports populated with 16 Gb/s SWL optical media 60 W with empty chassis and no optical media

Table 19: StoreFabric SN4000B SAN Extension Switch power supply specifications

Specification	Values
Input voltage	Range: 90–264 VAC, Nominal: 100–240 VAC, 50–60 Hz. 200–240 VAC is recommended. The switch autosenses input voltage.
Input frequency	Nominal: 50–60 Hz
Inrush current	Maximum of 40 A peak at any initial current surge at cold or warm start
Maximum input current	12.5 A
Input line protection	AC lines are fused
Maximum output power rating (DC) ¹	1100 W

¹ The SN4000B SAN Extension Switch does not support DC power supply.

Environmental requirements

HPE SN6000B and SN3000B 16Gb FC switches environmental requirements lists the acceptable environmental ranges for both operating and nonoperating (such as during transportation or storage) conditions.

Table 20: HPE StoreFabric SN6500B 16Gb FC Switch environmental requirements

Condition	Acceptable range during operation	Acceptable range during nonoperation
Ambient temperature	0° to 40°C (32° to 104°F)	-25° to 70°C (-13° to 158°F)
Humidity	10% to 85% RH noncondensing, at 40°C (104°F)	10% to 90% RH noncondensing, at 70°C (158°F)
Altitude	0 to 3 km (9,842 ft) above sea level	0 to 12 km (39,370 ft) above sea level
Shock	20 G, 6 ms, half-sine wave	33 G, 11 ms, half-sine wave, 3/e.g. Axis
Vibration	0.5 G sine, 0.4 gms random, 5–500 Hz	2.0 G sine, 1.1 gms random, 5–500 Hz
Airflow	Maximum: 176.7 cubic m/h (104 cubic ft/m) Nominal: 52.7 cubic m/h (31 cubic ft/m)	N/A
Heat dissipation	1,378.5 BTU/hr (no optics configuration) 1,706.1 BTU/hr (fully populated port configuration)	N/A

Table 21: HPE SN6000B and SN3000B 16Gb FC switches environmental requirements

Condition	Acceptable range during operation	Acceptable range during nonoperation
Ambient temperature	0° to 40°C (32° to 104°F)	-25° to 70°C (-13° to 158°F)
Humidity	10% to 85% RH noncondensing, at 40°C (104°F)	10% to 90% RH noncondensing, at 70°C (158°F)
Altitude	0 to 3 km (9,842 ft) above sea level	0 to 12 km (39,370 ft) above sea level
Shock	20 G, 6 ms, half-sine wave	33 G, 11 ms, half-sine wave, 3/e.g. Axis
Vibration	0.5 G sine, 0.4 gms random, 5–500 Hz	2.0 G sine, 1.1 gms random, 5–500 Hz
Airflow	Maximum: 71.36 cubic m/h (42 cubic ft/m) Nominal: 59.47 cubic m/h (35 cubic f/m)	N/A
Heat dissipation	338 BTU/hr (32-port configuration) 375 BTU/hr (48-port configuration)	N/A

Table 22: StoreFabric SN4000B SAN Extension Switch environmental requirements

Condition	Acceptable range during operation	Acceptable range during nonoperation
Ambient temperature	0° to 40°C (32° to 104°F)	-25° to 70°C (-13° to 158°F)
Humidity	5% to 93% RH noncondensing, at 40°C (104°F)	10% to 95% RH noncondensing, at 70°C (158°F)
Altitude	0 to 3 km (9,842 ft) above sea level	0 to 12 km (39,370 ft) above sea level
Shock	20 G, 11 ms, half-sine wave	20 G, 11 ms, half-sine wave, 3/e.g. Axis
Vibration	1.0 G sine, 0.5 gms random, 5–500 Hz	2.4 G sine, 1.1 gms random, 5–500 Hz
Airflow	Maximum: 347 cubic m/h (204 cubic ft/m)	N/A
Operating noise	48.0 dBA	N/A

General specifications

Table 23: HPE StoreFabric SN6500B 16Gb FC Switch general specifications

Specification	Description
Configurable port types	E_Port, F_Port, M_Port, and D_Port; EX_Port with license
System architecture	Nonblocking shared-memory switch
System processor	PowerPC family CPU at 1.20 GHz
ANSI FC protocol	FC-PH
Modes of operation	FC Class 2 and Class 3
Fabric initialization	Complies with FC-SW-3 Rev. 6.6
FC-IP	Complies with FC-IP 2.3 of FCA profile
Aggregate switch I/O bandwidth	1,536 Gb/s end-to-end full duplex
Local port latency	700 ns
Switch latency	2,100 ns (2.1 microseconds) with no Forward Error Correction

Table 24: SN6000B 16Gb FC Switch general specifications

Specification	Description
Configurable port types	F_Port, E_Port, M_Port, EX_Port, and D_Port
System architecture	Nonblocking shared-memory switch
System processor	PowerPC 440EPx at 667 MHz
ANSI FC protocol	FC-PH
Modes of operation	FC Class 2 and Class 3
Fabric initialization	Complies with FC-SW-3 Rev. 6.6
FC-IP	Complies with FC-IP 2.3 of FCA profile
Aggregate switch I/O bandwidth	768 Gb/s
FC port-to-port latency	Less than 700 ns with no contention (destination port is free)
Aggregate switching capacity	420 million frames per second (for Class 2, Class 3, and Class F frames for the 48 port chassis)

Table 25: SN3000B 16Gb FC Switch general specifications

Specification	Description
Configurable port types	F_Port, E_Port, M_Port, EX_Port, and D_Port
System architecture	Nonblocking shared-memory switch
System processor	PowerPC 440EPx at 667 MHz
ANSI FC protocol	FC-PH
Modes of operation	FC Class 2 and Class 3
Fabric initialization	Complies with FC-SW-3 Rev. 6.6
FC-IP	Complies with FC-IP 2.3 of FCA profile
Aggregate switch I/O bandwidth	384 Gb/s
FC port-to-port latency	800 ns with no contention (destination port is free)
Aggregate switching capacity	An aggregate switching capacity of 210 million frames per second (for Class 2, Class 3, and Class F frames for the 24 port chassis)

Table 26: StoreFabric SN4000B SAN Extension Switch general specifications

Specification	Description
Configurable port types	F_Port, E_Port, M_Port, D_Port and Ex_Port
System architecture	Nonblocking shared-memory extension switch
System processors	Quadcore (P3041) Freescale (PowerPC) processor, 1.5 GHz Cavium 6880 for frame/packet processing Blitzer for Encryption and Compression (Xilinx Kintex-7) Condor-3 for FC Trident+ for 10/40 GE
ANSI FC protocol	FC-PH
Modes of operation	FC Class 2 and Class 3
Fabric initialization	Complies with FC-SW-3 Rev. 6.6
FC-IP	Complies with FC-IP 2.3 of FCA profile
Aggregate switch I/O bandwidth	384 Gb/s
FC port-to-port latency	700 ns with no contention, cut-through routing at 16 Gb/s
Aggregate switching capacity	425 million frames per sec

Data transmission ranges

Table 27: HPE StoreFabric SN6500B 16Gb FC Switch supported optics, speeds, cables, and distances (SFP+)

Transceiver type	Speed	Multimode media (62.5 microns) (OM1)	Multimode media (50 microns) (OM2)	Multimode media (50 microns) (OM3)	Multimode media (50 microns) (OM4)	Single Mode Media (9 microns)
SWL	2 Gb/s ¹	150 m (492 ft)	300 m (984 ft)	500 m (1,640 ft)	N/A	N/A
	4 Gb/s	70 m (229 ft)	150 m (492 ft)	380 m (1,264 ft)	400 m (1,312 ft)	N/A
	8 Gb/s	21 m (68 ft)	50 m (164 ft)	150 m (492 ft)	150 m (492 ft)	N/A
	10 Gb/s	33 m (108 ft)	82 m (269 ft)	300 m (984 ft)	550 m (1,804 ft)	N/A
	16 Gb/s	15 m (49 ft)	35 m (115 ft)	100 m (328 ft)	125 m (410 ft)	N/A
LWL	4 Gb/s	N/A	N/A	N/A	N/A	30 km (18.6 mi)
	8 Gb/s	N/A	N/A	N/A	N/A	10 km (6.2 mi) 40 km (24.8 mi)
	10 Gb/s	N/A	N/A	N/A	N/A	10 km (6.2 mi)
	16 Gb/s	N/A	N/A	N/A	N/A	10 km (6.2 mi)
ELWL	16 Gb/s	N/A	N/A	N/A	N/A	25 km (15.5 mi)

¹ Hewlett Packard Enterprise does not support 2 Gb/s connectivity to the StoreFabric SN6500B 16Gb FC Switch. HP SN6000B 16Gb FC Switch or the HP SN3000B 16Gb FC Switch.

NOTE:

Up to 7,500 km at 2 Gb/s is supported when using a long-distance transport system such as DWDM.

Table 28: HPE SN6000B and SN3000B 16Gb FC switches supported optics, speeds, cables, and distances (SFP+)

Transceiver type	Speed	Multimode media(62.5 microns) (OM1)	Multimode media (50 microns) (OM2)	Multimode media (50 microns) (OM3)	Multimode media (50 microns) (OM4)	Single Mode Media (9 microns)
SWL	4 Gb/s	70 m (229 ft)	150 m (492 ft)	380 m (1,264 ft)	400 m (1,312 ft)	N/A
	8 Gb/s	21 m (68 ft)	50 m (164 ft)	150 m (492 ft)	190 m (623 ft)	N/A
	10 Gb/s	33 m (108 ft)	82 m (269 ft)	300 m (984 ft)	550 m (1,804 ft)	N/A
	16 Gb/s	15 m (49 ft)	35 m (115 ft)	100 m (328 ft)	125 m (410 ft)	N/A
LWL	8 Gb/s	N/A	N/A	N/A	N/A	10 km (6.2 mi)
	10 Gb/s	N/A	N/A	N/A	N/A	10 km (6.2 mi)
	16 Gb/s	N/A	N/A	N/A	N/A	10 km (6.2 mi)
ELWL	4 Gb/s	N/A	N/A	N/A	N/A	30 km (18.6 mi)
	8 Gb/s	N/A	N/A	N/A	N/A	25 km (15.5 mi)

Table 29: StoreFabric SN4000B SAN Extension Switch supported optics, speeds, cables, and distances (SFP+)

Speed	Cable size (microns)	SWL	LWL	ELWL
2 Gb/s ¹	50	300 m (984 ft) (OM2) 500 m (1,640 ft) (OM3)	N/A	N/A
	62.5	150 m (492 ft)	N/A	N/A
	9	N/A	10 km (6.2 mi)	80 km (50 mi)
4 Gb/s	50	150 m (492 ft) (OM2) 380 m (1,246 ft) (OM3)	N/A	N/A
	62.5	70 m (230 ft)	N/A	N/A

Table Continued

Speed	Cable size (microns)	SWL	LWL	ELWL
	9	N/A	10 km (6.2 mi)	N/A
8 Gb/s	50	50 m (164 ft) (OM2) 150 m (492 ft) (OM3)	N/A	N/A
	62.5	21 m (69 ft)	N/A	N/A
	9	N/A	10 km (6.2 mi)	N/A
16 Gb/s	50	N/A	N/A	N/A
	62.5	21 m (69 ft)	N/A	N/A
	9	N/A	10 km (6.2 mi)	N/A

¹ Hewlett Packard Enterprise does not support 2 Gb/s connectivity to the StoreFabric SN4000B SAN Extension Switch.

For Fibre Channel ports, the SN4000B Fibre Channel ports support the following SFP/SFP+ fiber optic transceivers:

- 16G SWL SFP+
- 16G LWL 10km SFP+
- 16G ELWL 25km SFP+
- 10G FC SWL SFP+
- 10G FC LWL 10km SFP+
- 8G SWL SFP+
- 8G LWL 10km SFP+
- 8G ELWL 25km SFP+
- SmartOptics 16G DWDM 40km SFP+ (not in CSD, 3rd party reference sell)
- SmartOptics 8G DWDM 40km SFP+ (not in CSD, 3rd party reference sell)
- SmartOptics 8G CWDM 70km SFP+ (not in CSD, 3rd party reference sell)

For Ethernet user data ports, the following SFP/SFP+ fiber optic and copper transceivers are supported:

1/10GbE ports

- 1GE copper SFP (XBR-000190)
- 1GE SX SFP
- 1GE LX 10km SFP
- 1GE CWDM 80km SFP+
- 10GE USR SFP+ (100m)
- 10GE SR SFP+ (300m)
- 10GE LR SFP+ (10km)
- 10GE Tunable DWDM 80km SFP+

40GbE ports

- 40GE SR4 QSFP+; standard, non-breakout capable
- 40GE LR4 10km QSFP+; standard, non-breakout capable

Memory specifications

Table 30: Memory specifications

Memory type	Size
Boot flash	4 MB (expandable to 8 MB)
Compact flash	1 GB
Main memory (DDR2 SDRAM)	1 GB, 64-bit with 8-bit ECC

Table 31: Memory specifications for the StoreFabric SN4000B SAN Extension Switch

Memory type	Memory type	Size
Boot	Flash	4 MB (expandable to 8 MB)
Compact flash	USB	8 GB
Control plane	DDR3 RDIMM SDRAM	8 GB
Data plane	DDR3 RDIMM SDRAM	128 GB

FC port specifications

The FC ports are compatible with SWL, LWL, and ELWL SFP+ (for 16 Gb/s performance) transceivers. The strength of the signal is determined by the type of transceiver in use.

The FC ports meet all required safety standards. The ports operate at 2, 4, 8, or 16 Gb/s, depending on SFP+ models, and are able to autonegotiate to the maximum link speed.

NOTE:

Hewlett Packard Enterprise does not support 2 Gb/s connectivity to the StoreFabric SN6500B 16Gb FC Switch, SN6000B 16Gb FC Switch, SN3000B 16Gb FC Switch, or StoreFabric SN4000B SAN Extension Switch.

Serial port specifications

The serial port is located on the port-side of the switch and uses an RJ-45 connector for the serial port. An RJ-45 to DB9 adapter cable is supplied with the switch.

NOTE:

To prevent damage, keep the cover on the port when not in use.

Before connecting the switch to a fabric or IP network, you must connect to a workstation through the serial port and configure the switch IP address. The serial port's parameters are fixed at 9600 baud, 8 data bits, and no parity, with flow control set to None. **Serial cable pinouts** lists the serial cable pinouts.

Table 32: Serial cable pinouts

Pin	Signal	Description
1	Not supported	N/A
2	Not supported	N/A
3	UART1_TXD	Transmit data
4	GND	Logic ground
5	GND	Logic ground
6	UART1_RXD	Receive data
7	Not supported	N/A
8	Not supported	N/A

AG default port mapping

SN6000B 16Gb FC Switch AG default port mapping lists the port mappings of F_Ports to N_Ports.

Table 33: SN6000B 16Gb FC Switch AG default port mapping

Total ports	F_Ports	N_Ports	Default port mapping
48	0–39	40–47	0–4 mapped to 40 5–9 mapped to 41 10–14 mapped to 42 15–19 mapped to 43 20–24 mapped to 44 25–29 mapped to 45 30–34 mapped to 46 35–39 mapped to 47

Table 34: SN3000B 16Gb FC Switch AG default port mapping

Total ports	F_Ports	N_Ports	Default port mapping
24	0–15	16–23	0, 1 mapped to 16 2, 3 mapped to 17 4, 5 mapped to 18 6, 7 mapped to 19 8, 9 mapped to 20 10, 11 mapped to 21 12, 13 mapped to 22 14, 15 mapped to 23

Warranty and regulatory information

For important safety, environmental, and regulatory information, see *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at www.hpe.com/support/Safety-Compliance-EnterpriseProducts.

Warranty information

HPE ProLiant and x86 Servers and Options

www.hpe.com/support/ProLiantServers-Warranties

HPE Enterprise Servers

www.hpe.com/support/EnterpriseServers-Warranties

HPE Storage Products

www.hpe.com/support/Storage-Warranties

HPE Networking Products

www.hpe.com/support/Networking-Warranties

Regulatory information

Belarus Kazakhstan Russia marking



Manufacturer and Local Representative Information

Manufacturer information:

- Hewlett Packard Enterprise Company, 3000 Hanover Street, Palo Alto, CA 94304 U.S.

Local representative information Russian:

- **Russia:**

ООО «Хьюлетт Паккард Энтерпрайз», Российская Федерация, 125171, г. Москва, Ленинградское шоссе, 16А, стр.3, Телефон/факс: +7 495 797 35 00

- **Belarus:**

ИООО «Хьюлетт-Паккард Бел», Республика Беларусь, 220030, г. Минск, ул. Интернациональная, 36-1, Телефон/факс: +375 17 392 28 20

- **Kazakhstan:**

ТОО «Хьюлетт-Паккард (К)», Республика Казахстан, 050040, г. Алматы, Бостандыкский район, проспект Аль-Фараби, 77/7, Телефон/факс: + 7 727 355 35 52

Local representative information Kazakh:

- **Russia:**

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- **Kazakhstan:**

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Бостандық ауданы, Әл-Фараби даңғылы, 77/7, Телефон/факс: +7 727 355 35 52

Manufacturing date:

The manufacturing date is defined by the serial number.

CCSYWWZZZZ (serial number format for this product)

Valid date formats include:

- YWW, where Y indicates the year counting from within each new decade, with 2000 as the starting point; for example, 238: 2 for 2002 and 38 for the week of September 9. In addition, 2010 is indicated by 0, 2011 by 1, 2012 by 2, 2013 by 3, and so forth.
- YYWW, where YY indicates the year, using a base year of 2000; for example, 0238: 02 for 2002 and 38 for the week of September 9.

Turkey RoHS material content declaration

Türkiye Cumhuriyeti: EEE Yönetmeliğine Uygundur

Ukraine RoHS material content declaration

Обладнання відповідає вимогам Технічного регламенту щодо
обмеження використання деяких небезпечних речовин в
електричному та електронному обладнанні, затвердженого
постановою Кабінету Міністрів України від 3 грудня 2008 № 1057

Electrostatic discharge and grounding recommendations

Electrostatic discharge recommendations

CAUTION:

To prevent damaging the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage can reduce the life expectancy of the device.

To prevent electrostatic damage, observe the following precautions:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always make sure you are properly grounded when touching a static-sensitive component or assembly.

Grounding methods

There are several methods for grounding. Use one or more of the following methods when handling or installing electrostatic sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm $\pm$ 10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat. If you do not have any of the suggested equipment for proper grounding, have an Hewlett Packard Enterprise authorized reseller install the part.

NOTE:

For more information on static electricity, or for assistance with product installation, contact your Hewlett Packard Enterprise authorized reseller.

Glossary

This glossary defines acronyms and terms used in this Guide or related to this product. It is not a comprehensive glossary of computer terms.

AD

Admin Domain.

AG

Access Gateway.

APM

Advanced Performance Monitoring.

ARL

Adaptive Rate Limiting.

CUP

Control Unit Port.

D_Port

Diagnostic port.

DDR2

Double data rate 2.

DHCP

Dynamic Host Configuration Protocol.

DPOD

Dynamic Ports on Demand.

DPS

Dynamic Path Selection.

DWDM

Dense wavelength-division multiplexing.

ECC

Error-correcting code.

ELWL

Extended Long Wavelength.

FC

Fibre Channel.

FCIP

Fibre Channel over Internet Protocol.

FC-PH

Fibre Channel Physical and Signaling Interface.

FCR

Fibre Channel Routing.

FCS

Fabric Configuration Server.

FICON

Fibre Connection or Fibre Connectivity.

FRU

Field replaceable unit.

FTP

File Transfer Protocol.

GMT

Greenwich Mean Time.

HBA

Host Bus Adapter.

HCL

Hot Code Load.

IOPS

Input and Output Operations Per Second.

ISL

Inter-Switch Link.

LC

Lucent connector.

LTU

License To Use.

LWL

Long Wavelength.

M_Port

Mirror port.

NPIV

N_Port ID Virtualization.

NTP

Network Time Protocol server.

OM3

Optical Multimode 3.

PN

Part Number.

POD

Ports on Demand.

POST

Power-on self-test

QoS

Quality of Service.

RAS

Reliability, Availability, and Serviceability.

RISC

Reduced Instruction Set Computer.

RTC

Real-time Clock.

SAN

Storage Area Network.

SCP

Secure Copy.

SDRAM

Synchronous Dynamic Random-Access Memory.

SEEPROM

Serial Electrically Erasable Programmable Read Only Memory.

SFP

Small Form-Factor Pluggable.

SNMP

Simple Network Management Protocol.

SWL

Short Wavelength.

UTC

Coordinated Universal Time.

VF

Virtual Fabric.

WWN

World Wide Name.