Hewlett Packard Enterprise

HPE FlexFabric 5944 Switch Series

Installation Guide

Part number: 5200-7949
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Acknowledgments

Contents

1 Preparing for installation

Table1-1 describes the HPE FlexFabric 5944 switches, power supplies, and fan modules available for the switches.

Table1-1 HPE FlexFabric 5944 switch models and power supplies

Product code	HPE description	Alias
HPE FlexFabric 5944 switch series		
JL836A	HPE FlexFabric 5944 48XGT 6QS28 Switch	HPE 5944 48XGT 6QS28
Power supplies		
JL593A	HPE FlexFabric 5710 450W Back-to-Front AC Power Supply	PSR450-12A
JL592A	HPE FlexFabric 5710 450W Front-to-Back AC Power Supply	PSR450-12A1
JL688A	HPE FlexFabric 5710 450W 48V Front-to-Back DC Power Supply	PSR450-12D
Fan module		
JL838A	HPE FlexFabric 5944 Power to Port Airflow (Back to Front) Fan Module	5944 power-to-port fan module
JL837A	HPE FlexFabric 5944 Port to Power Airflow (Front to Back) Fan Module	5944 port-to-power fan module

For regulatory identification purposes, the HPE 5944 switches are assigned Regulatory Model Number (RMN), which are listed in the following table.

Product code	RMN	Description
JL836A	BJNGA-AD0092	HPE FlexFabric 5944 48XGT 6QS28 Switch

Safety recommendations

To avoid any equipment damage or bodily injury caused by incorrect use, read the following safety recommendations before installation. Note that the recommendations do not cover every possible hazardous condition.

- Before cleaning the switch, remove all power cords from the switch. Do not clean the switch with wet cloth or liquid.
- Do not place the switch near water or in a damp environment. Prevent water or moisture from entering the switch chassis.
- Do not place the switch on an unstable case or desk. The switch might be severely damaged in case of a fall.
- Ensure good ventilation of the equipment room and keep the air inlet and outlet vents of the switch free of obstruction.
- Connect the yellow-green protection grounding cable before power-on.
- Make sure the operating voltage is in the required range.

- To avoid electrical shocks, do not open the chassis while the switch is operating or when the switch is just powered off.
- When replacing FRUs, including power supplies and fan modules, wear an ESD wrist strap to avoid damaging the units.

Examining the installation site

The switch must be used indoors. Mount your switch in a rack and verify the following items:

- Adequate clearance is reserved at the air inlet and outlet vents for ventilation.
- The rack has a good ventilation system.
- Identify the hot aisle and cold aisle at the installation site, and make sure ambient air flows into the switch from the cold aisle and exhausts to the hot aisle.
- Identify the airflow designs of neighboring devices, and prevent hot air flowing out of the bottom device from entering the top device.
- The rack is sturdy enough to support the switch and its accessories.
- The rack is reliably grounded.

To ensure correct operation and long service life of your switch, install it in an environment that meets the requirements described in the following subsections.

Temperature/humidity

Maintain appropriate temperature and humidity in the equipment room.

- Lasting high relative humidity can cause poor insulation, electricity leakage, mechanical property change of materials, and metal corrosion.
- Lasting low relative humidity can cause washer contraction and ESD and cause problems including loose screws and circuit failure.
- High temperature can accelerate the aging of insulation materials and significantly lower the reliability and lifespan of the switch.

For the temperature and humidity requirements of different switch models, see "Appendix A Chassis views and technical specifications."

Cleanliness

Dust buildup on the chassis might cause electrostatic adsorption and dust corrosion, resulting in poor contact of metal connectors and contact points. This might shorten the device's lifetime and even cause device failure in the worst case. Table1-2 describes the dust concentration limits in the equipment room.

Table1-2 Dust concentration limits in the equipment room

Substance	Particle diameter	Concentration limit
Dust particles	≥ 0.5 μm	≤ 3.5×10^6 particles/m^3
Dust particles	≥ 5 μm	≤ 3×10^4 particles/m^3
Dust (suspension)	≤ 75 μm	≤ 0.2 mg/m^3
Dust (sedimentation)	75 μm to 150 μm	≤ 1.5 mg/(m^2h)

To maintain cleanliness in the equipment room, follow these guidelines:

- Keep the equipment room away from pollution sources. Do not smoke, eat, or drink in the equipment room.
- Use double-layer glass in windows and seal doors and windows with dust-proof rubber strips. Use screen doors and window screens for doors and windows open to the outside and make sure the external windows are air tight.
- Use dustproof materials for floors, walls, and ceilings and use wallpaper or matt paint that does not produce powders.
- Clean the equipment room regularly and clean the air filters of the rack each month.
- Wear ESD clothing and shoe covers before entering the equipment room, keep the ESD clothing and shoe covers clean, and change them frequently.

Corrosive gas limit

Corrosive gases can accelerate corrosion and aging of metal components. Make sure the corrosive gases in the equipment room do not exceed the concentration limits as shown in Table1-3.

Table1-3 Corrosive gas concentration limits in the equipment room

Gas	Average concentration (mg/m^3)	Maximum concentration (mg/m^3)
SO_2	0.3	1.0
H_2S	0.1	0.5
Cl_2	0.1	0.3
HCl	0.1	0.5
HF	0.01	0.03
NH_3	1.0	3.0
O_3	0.05	0.1
NO_X	0.5	1.0

△ **CAUTION:**

As a best practice, control the corrosive gas concentrations in the equipment room at their average values. Make sure the corrosive gas concentrations do not exceed 30 minutes per day at their maximum values.

To control corrosive gases, use the following guidelines:

- As a best practice, do not build the equipment room in a place with a high concentration of corrosive gases.
- Make sure the equipment room is not connected to sewer, vertical shaft, or septic tank pipelines and keep it far away from these pipelines. The air inlet of the equipment room must be away from such pollution sources.
- Use environmentally friendly materials to decorate the equipment room. Avoid using organic materials that contains harmful gases, such as sulfur or chlorine-containing insulation cottons, rubber mats, sound-proof cottons, and avoid using plasterboards with high sulfur concentration.
- Place fuel (diesel or gasoline) engines separately. Do not place them in the same equipment room with the device. Make sure the exhausted air of the engines will not flow into the equipment room or towards the air inlet of the air conditioners.
- Place batteries separately. Do not place them in the same room with the device.
- Employ a professional company to monitor and control corrosive gases in the equipment room regularly.

EMI

All electromagnetic interference (EMI) sources, from outside or inside of the switch and application system, adversely affect the switch in the following ways:

- A conduction pattern of capacitance coupling.
- Inductance coupling.
- Electromagnetic wave radiation.
- Common impedance (including the grounding system) coupling.

To prevent EMI, use the following guidelines:

- If AC power is used, use a single-phase three-wire power receptacle with protection earth (PE) to filter interference from the power grid.
- Keep the switch far away from radio transmitting stations, radar stations, and high-frequency devices.
- Use electromagnetic shielding, for example, shielded interface cables, when necessary.
- To prevent signal ports from getting damaged by overvoltage or overcurrent caused by lightning strikes, route interface cables only indoors.

Laser safety

⚠ **WARNING!**

- The switch is a Class 1M laser device.
- Disconnected optical fibers or transceiver modules might emit invisible laser light. Do not stare into beams or view directly with optical instruments when the switch is operating.

Installation tools

No installation tools are provided with the switch. Prepare the following tools yourself:

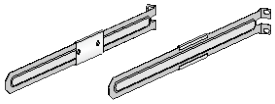
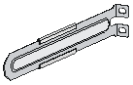
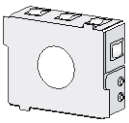
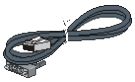
- Phillips screwdriver.
- Flathead screwdriver.
- ESD wrist strap.
- Marker.

Installation accessories

Before installation, make sure you have all the required installation accessories. If any accessory is damaged or missing, use the part No. provided in this table to purchase a new one.

Table1-4 Installation accessories

Part No.	Description	Quantity	Applicable device models
5066-0850	Mounting brackets	1 pair, provided	HPE 5944 48XGT 6QS28

			
5185-8713	1U rack mounting rail kit A (long slide rails) 	1 kit, provided	HPE 5944 48XGT 6QS28
5185-8681	1U rack mounting rail kit B 	Optional	HPE 5944 48XGT 6QS28
N/A	M6 screw and cage nut 	User supplied	HPE 5944 48XGT 6QS28
5080-0012	Grounding cable 	1, provided	HPE 5944 48XGT 6QS28
5185-9579	Grounding screw 	2, provided	HPE 5944 48XGT 6QS28
5190-1773	Power supply filler panel 	1, provided	HPE 5944 48XGT 6QS28
5185-8748	Releasable cable tie 	User supplied	HPE 5944 48XGT 6QS28
5185-8627	Serial console cable 	1, provided	HPE 5944 48XGT 6QS28
5185-8722	SFP port plug 	Same number as the SFP ports	HPE 5944 48XGT 6QS28
5187-9022	QSFP port plug 	Same number as the QSFP28 ports	HPE 5944 48XGT 6QS28

2 Installing the switch

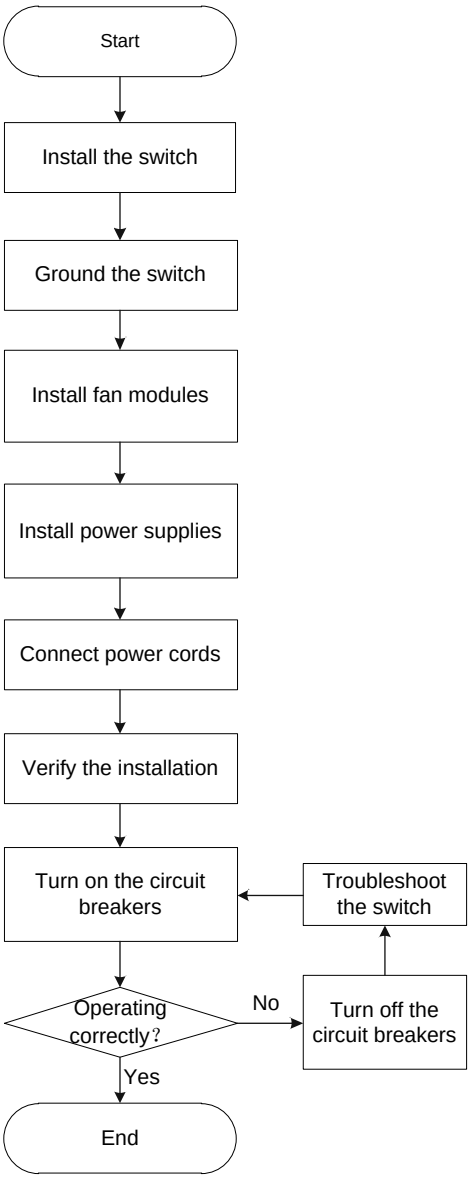
CAUTION:

Keep the tamper-proof seal on a mounting screw on the chassis cover intact, and if you want to open the chassis, contact Hewlett Packard Enterprise for permission. Otherwise, Hewlett Packard Enterprise shall not be liable for any consequence caused thereby.

CAUTION:

Always wear an ESD wrist strap during the installation process. Make sure the wrist strap makes good skin contact and is reliably grounded.

Figure2-1 Hardware installation flow



Installing the switch in a 19-inch rack

Installation accessories

Table2-2 Installation accessories

Switch model	Mounting brackets	Rack mounting rail kit
HPE 5944 48XGT 6QS28	1U high, one pair (provided). See Figure2-2.	• 1U rack mounting rail kit A, including one pair of chassis rails and one pair of long slide rails (provided). See Figure2-3. • 1U rack mounting rail kit B, including one pair of chassis rails and one pair of slide rails (optional). See Figure2-4.

Figure2-2 Mounting brackets

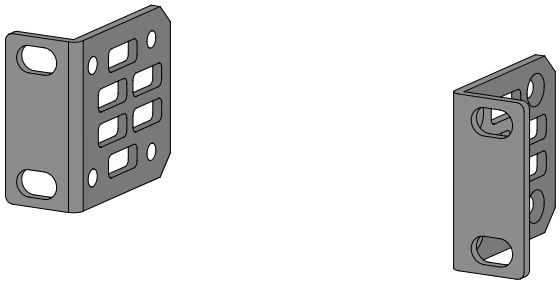
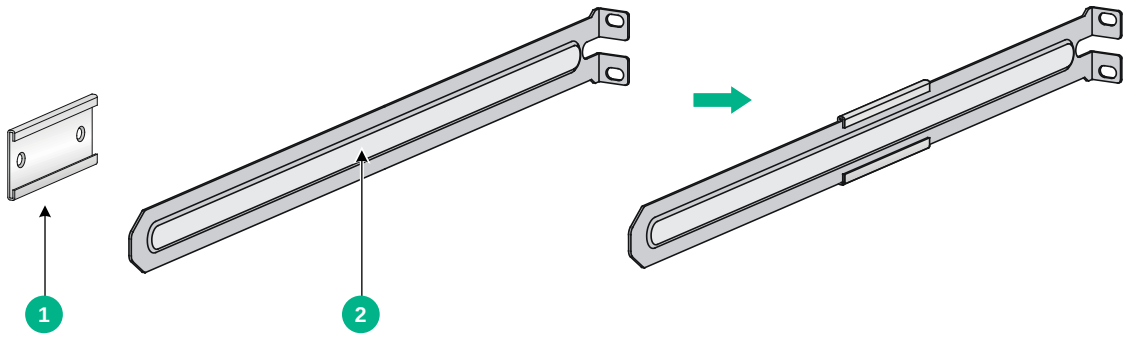
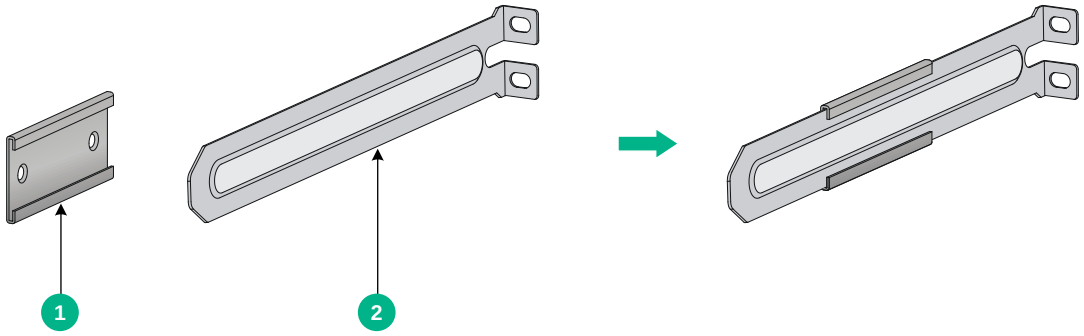


Figure2-3 1U rack mounting rail kit A (long slide rails)



(1) Chassis rail (2) Long slide rail

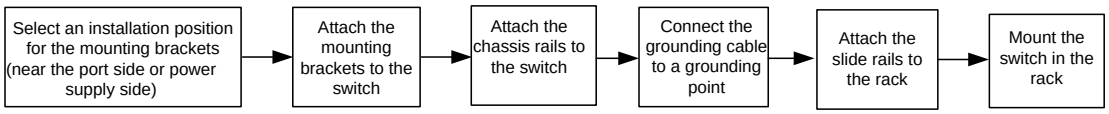
Figure2-4 1U rack mounting rail kit B



(1) Chassis rail	(2) Slide rail

Rack-mounting procedure at a glance

Figure2-5 Rack-mounting procedure

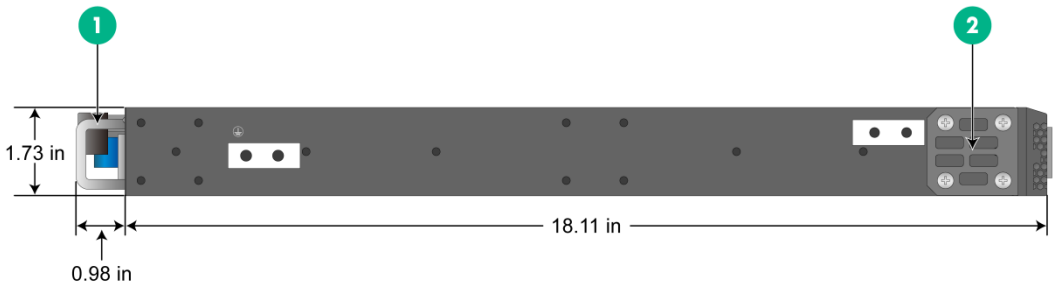


NOTE:

If a rack shelf is available, you can put the switch on the rack shelf, slide the switch to an appropriate location, and attach the switch to the rack with the mounting brackets.

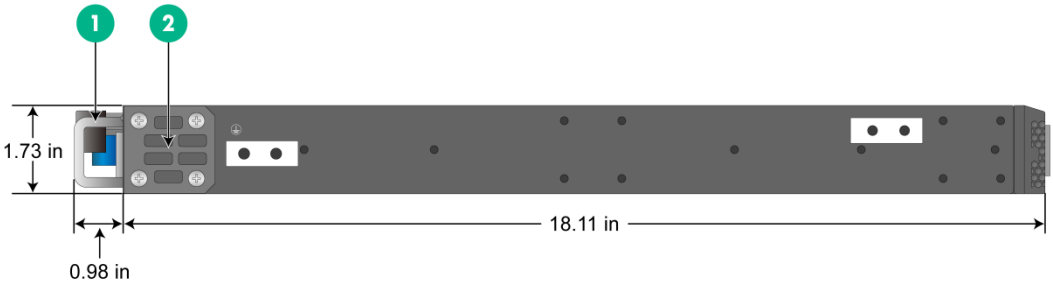
Chassis dimensions and rack requirements

Figure2-6 HPE 5944 48XGT 6QS28 chassis dimensions with the mounting brackets installed at the port side



(1) Power supply handle	(2) Mounting bracket

Figure2-7 HPE 5944 48XGT 6QS28 chassis dimensions with the mounting brackets installed at the power supply side



(1) Power supply handle	(2) Mounting bracket

Follow these guidelines when you install the switch in a 19-inch rack:

- The distance between the front and rear posts of the rack must meet the requirements described in Table2-3.
- To secure the switch to the rack, you must install not only mounting brackets, but also chassis rails and slide rails.

Table2-3 Distance requirements between the front and rear rack posts

Switch model	Installation method	Distance between the front and rear rack posts
HPE 5944 48XGT 6QS28	Using mounting brackets and rack mounting rail kit A (long slide rails)	621 mm to 854 mm (24.45 in to 33.62 in)
	Using mounting brackets and rack mounting rail kit B	401 mm to 634 mm (15.79 in to 24.96 in)

Table2-4 Chassis dimensions and rack depth requirements

Device model	Chassis dimensions	Rack depth requirement

HPE 5944 48XGT 6QS28	• **Height**—44 mm (1.73 in) (1 RU)
	• **Width**—440 mm (17.32 in).
	• **Total depth**—485 mm (19.09 in)
	  ○ 25 mm (0.98 in) for the power supply or fan module handle
	  ○ 460 mm (18.11 in) for the chassis.
		To ensure that the rack door can be closed easily after cables are connected, make sure the rack meets the following requirements:
		• A minimum of 800 mm (31.50 in) in depth (recommended)
		• A minimum of 130 mm (5.12 in) from the front rack post to the front door
		• A minimum of 509 mm (20.04 in) from the front rack post to the rear door

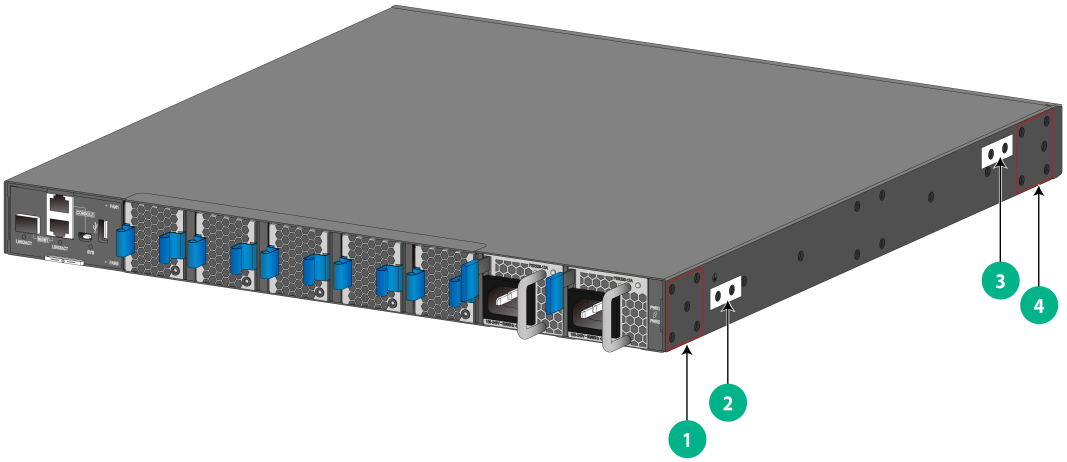
Attaching the mounting brackets, chassis rails, and grounding cable to the chassis

The switch has two mounting bracket installation positions on its two side panels: one near the network port side and one near the power supply side.

The switch provides a primary grounding point (with a grounding sign) and an auxiliary grounding point.

Figure2-8 describes these positions on the HPE 5944 48XGT 6QS28 switch.

Figure2-8 Mounting bracket installation positions and grounding point positions on the HPE 5944 48XGT 6QS28 switch



(1) Mounting bracket installation position near the power supply side	
(2) Primary grounding point	(3) Auxiliary grounding point
(4) Mounting bracket installation position near the port side	

Attaching the mounting brackets and chassis rails to the chassis

IMPORTANT:

M4 screws are used to secure the mounting brackets and chassis rails to the switch. As a best practice, use a torque of 12 kgf-cm (1.18 Nm) to fasten M4 screws.

To attach the mounting brackets and chassis rails to the chassis:

1. Place the wide flange of a mounting bracket against a side panel of the chassis and align the round holes in the wide flange of the front mounting bracket with the screw holes in the side panel. Then use M4 screws (provided) to attach the mounting bracket to the chassis.
   - To install the mounting brackets at the port side, see Figure2-9.
   - To install the mounting brackets at the power supply side, see Figure2-10.
2. Determine the chassis rail installation position based on the mounting bracket installation position.
3. Place the chassis rail against the side panel of the chassis and align the installation holes in the chassis rail with rail mounting holes in the chassis. Then use M4 screws (provided) to attach the chassis rail to the chassis. For installation of chassis rails of rack mounting rail kit A (long slide rails) and rack mounting rail kit B, see Figure2-9 and Figure2-10.
4. Follow the same procedure to attach another mounting bracket and chassis rail to the opposite side.

Figure2-9 Attaching the mounting brackets and chassis rails to an HPE 5944 48XGT 6QS28 (mounting brackets installed near the port side, rack mounting rail kit A or B)

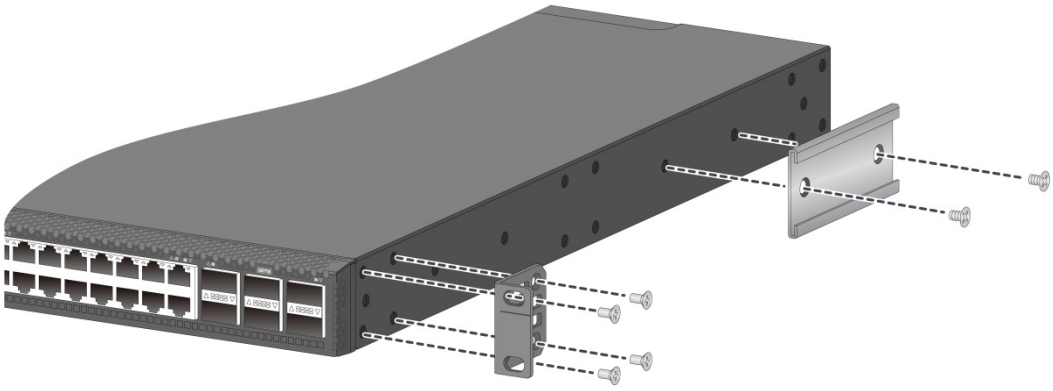
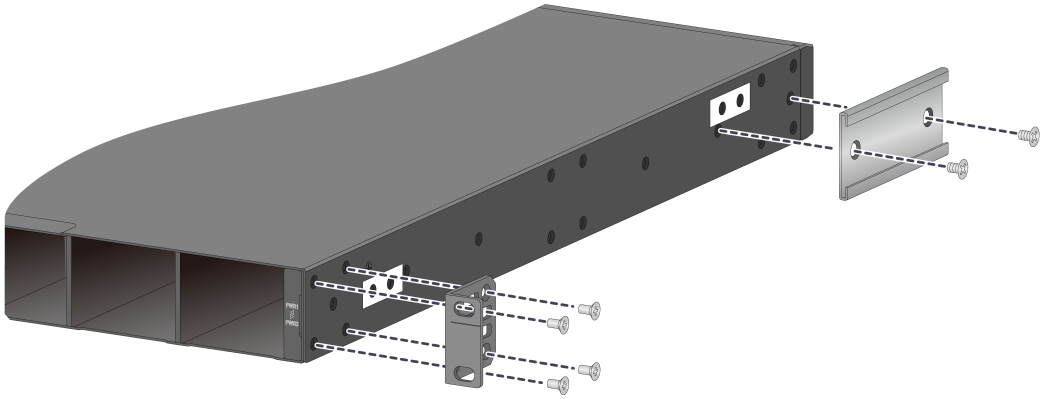


Figure2-10 Attaching the mounting brackets and chassis rails to an HPE 5944 48XGT 6QS28 switch (mounting brackets installed near the power supply side, rack mounting rail kit A or B)



Connecting the grounding cable to the chassis

IMPORTANT:

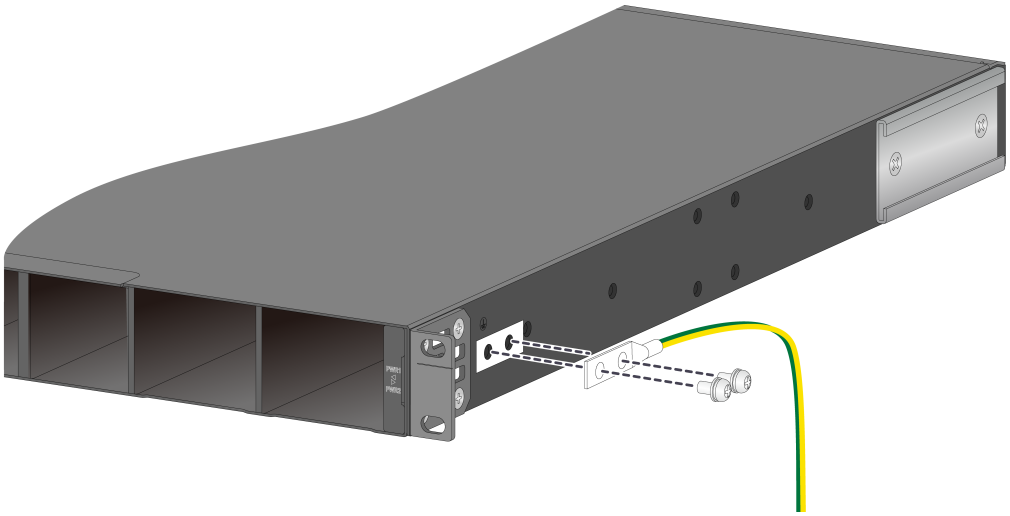
The primary and auxiliary grounding points are located on the left side panel of the chassis. The two grounding points might be not reachable after the switch is mounted in the rack. Connect the grounding cable to a grounding point before you mount the switch in the rack.

To connect the grounding cable to a grounding point:

1. Unpack the grounding cable and grounding screws (applicable to both the primary and auxiliary grounding points).
2. Use the grounding screws to attach the two-hole grounding lug to the grounding point and then fasten the screws, as shown in Figure2-11.

   As a best practice, use a torque of 20 kgf-cm (1.96 Nm) to fasten the grounding screws.

Figure2-11 Attaching the grounding cable to the primary grounding point on an HPE 5944 48XGT 6QS28 switch



Attaching the slide rails to the rack

IMPORTANT:

M6 screws and cage nuts are used to attach the slide rails to the rack. Prepare M6 screws and cage nuts yourself. As a best practice, use a torque of 30 kgf-cm (2.94 Nm) to fasten the M6 screws.

Before mounting the switch in the rack, you must attach slide rails to the rack.

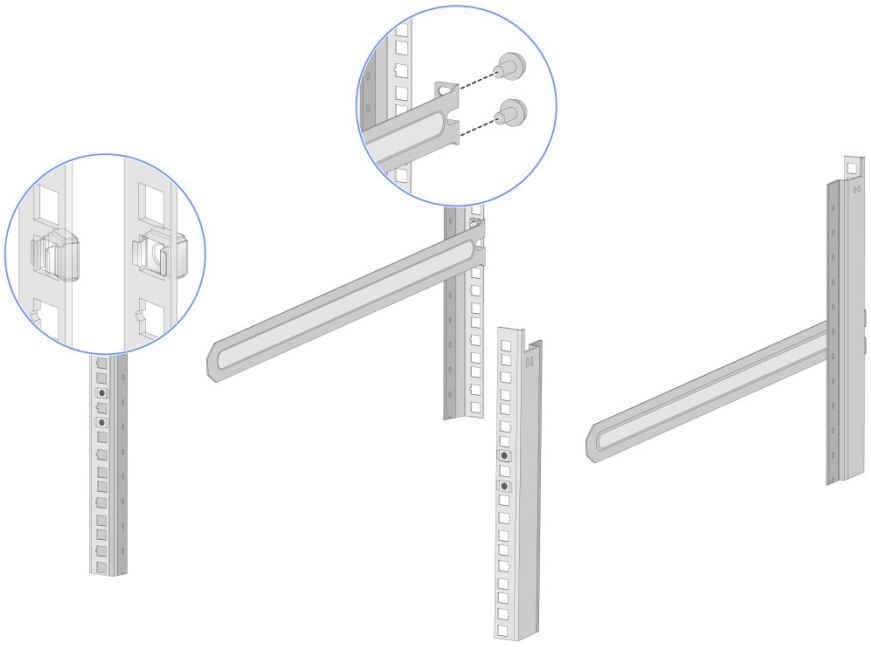
The installation procedure is the same for different types of slide rails. The following procedure attaches 1U long slide rails to the rack.

To attach the slide rails to the rack:

1. Identify the slide rail installation position on the rack based on the switch installation position.
2. Install cage nuts (user-supplied) in the mounting holes in the rack posts.
3. Align the screw holes in one slide rail with the cage nuts in a rear rack post, and then use M6 screws (user-supplied) to attach the slide rail to the rack, as shown in Figure2-12.
4. Attach the other slide rail to the rear rack post on the opposite side.

   Make sure the two slide rails are at the same height and can slide into the chassis rails smoothly.

Figure2-12 Installing the 1U long slide rails



Mounting the switch in the rack

1. Wear an ESD wrist strap and make sure it makes good skin contact and is reliably grounded.
2. Verify that the mounting brackets and chassis rails have been securely attached to the switch chassis.
3. Verify that the slide rails have been correctly attached to the rear rack posts.
4. Attach cage nuts (user-supplied) to the front rack posts and make sure they are at the same level as the slide rails.
5. One person performs the following operations:
   a. Supporting the bottom of the switch, aligns the chassis rails with the slide rails on the rack posts.
   b. Pushes the switch slowly for the slide rails to slide into the chassis rails smoothly until the mounting brackets are flush against the front rack posts. Make sure the front ends of the slide rails reach out of the chassis rails.
6. The other person uses screws (user-supplied, rust-proofed) to attach the mounting brackets to the rack.

Figure2-13 Mounting an HPE 5944 48XGT 6QS28 switch in the rack (mounting brackets installed near the power supply side)

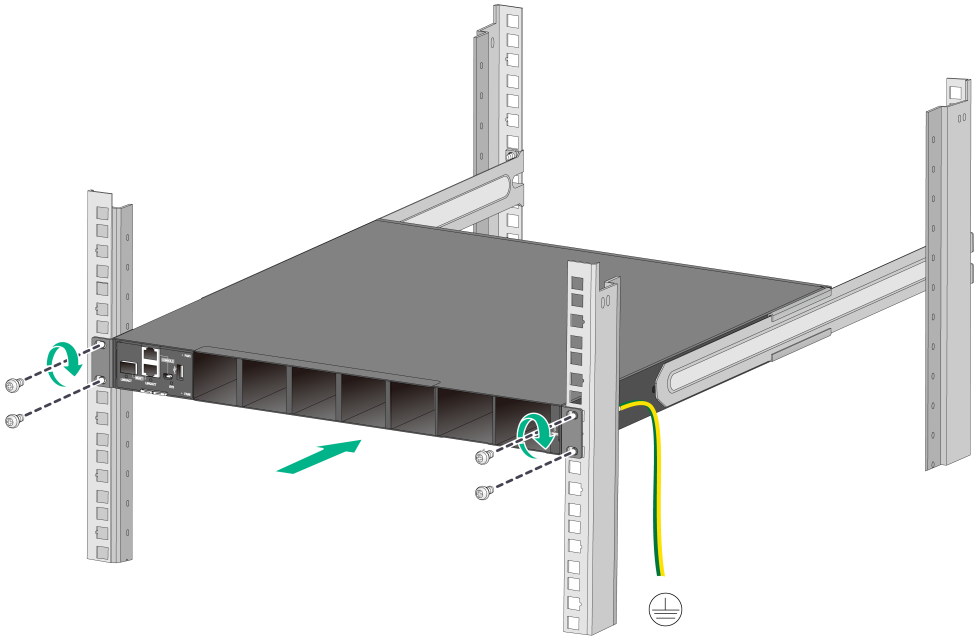
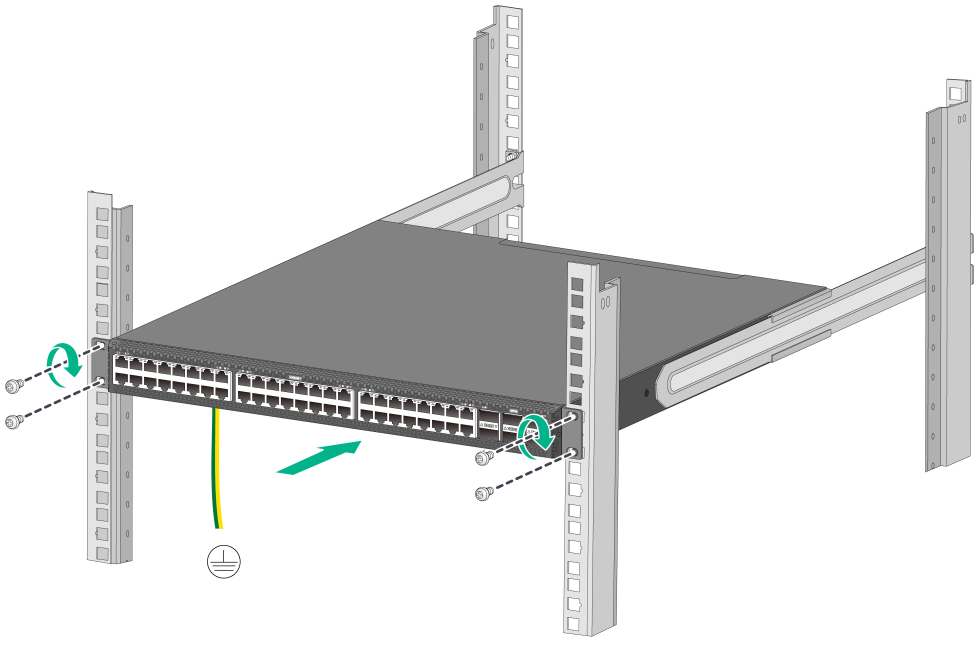


Figure2-14 Mounting an HPE 5944 48XGT 6QS28 switch in the rack (mounting brackets installed near the port side)



Grounding the switch by using a grounding strip

CAUTION:

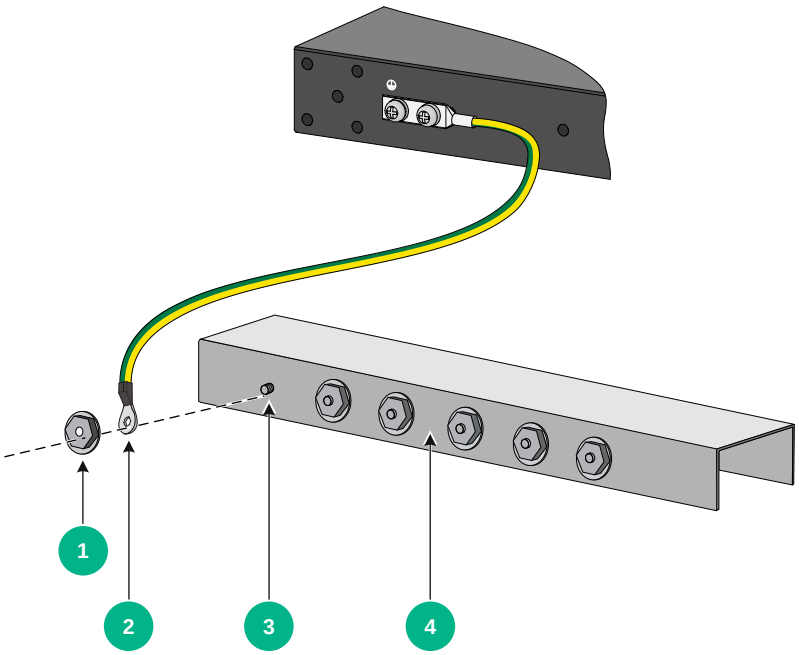
- Correctly connecting the grounding cable is crucial to lightning protection and EMI protection.
- Do not connect the grounding cable to a fire main or lightning rod.
- To guarantee the grounding effect and avoid switch damage, use the grounding cable provided with the switch to connect the switch to a grounding strip in the equipment room.

The power input end of the switch has a noise filter, whose central ground is directly connected to the chassis to form the chassis ground (commonly known as PGND). You must securely connect this chassis ground to the earth so the faradism and leakage electricity can be safely released to the earth to minimize EMI susceptibility of the switch.

To ground the switch by using a grounding strip:

1. Attach the two-hole grounding lug at one end of the grounding cable to a grounding point on the switch chassis. For more information, see "Connecting the grounding cable to the chassis."
2. Remove the hex nut of a grounding post on the grounding strip.
3. Attach the ring terminal at the other end of the grounding cable to the grounding post on the grounding strip, and secure the ring terminal to the grounding post with the hex nut.

Figure2-15 Connecting the grounding cable to a grounding strip



(1) Hex nut	(2) Ring terminal
(3) Grounding post	(4) Grounding strip

Installing and removing a fan module

CAUTION:

- For adequate heat dissipation, you must install five fan modules of the same model for the switch.
- Make sure all slots have a module installed when the switch is operating.
- If more than one fan module fails during switch operation, do not remove the failed fan modules simultaneously. Replace the fan modules one by one and finish replacing each fan module within three minutes.

Installing a fan module

CAUTION:

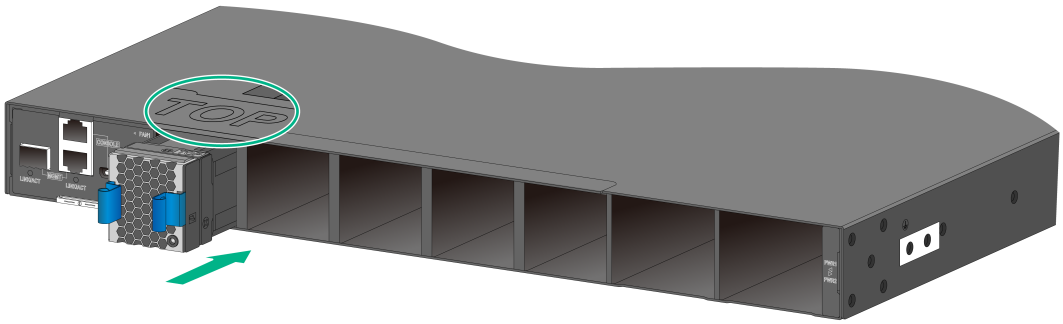
To prevent damage to the fan module or the connectors on the backplane, insert the fan module gently. If you encounter a hard resistance while inserting the fan module, pull out the fan module and insert it again.

Select fan modules for the switch as needed. For the fan modules available for the switch and their specifications, see "Fan modules."

To install a fan module:

1. Wear an ESD wrist strap and make sure it makes good skin contact and is reliably grounded.
2. Unpack the fan module and verify that the fan module model is correct.
3. Orient the fan module with the "TOP" mark facing upward. Grasp the handle of the fan module with one hand and support the fan module bottom with the other, and slide the fan module along the guide rails into the slot until the fan module is fully seated in the slot and has a firm contact with the backplane.

Figure2-16 Installing an HPE 5944 power-to-port fan module



Removing a fan module

WARNING!

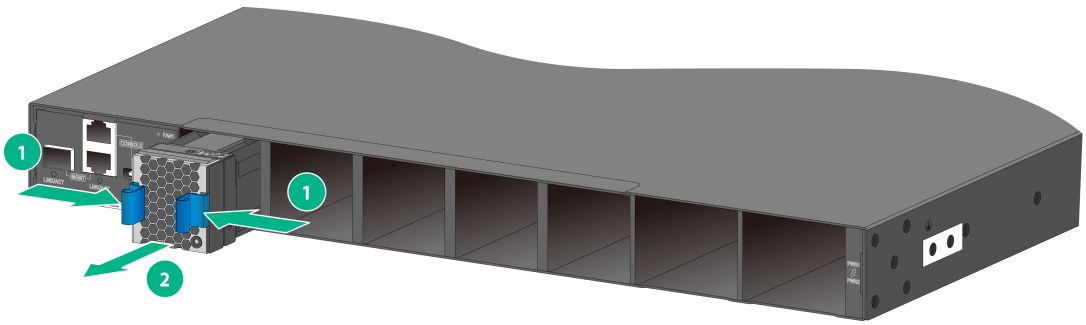
- Ensure electricity safety and never touch the rotating fans when you hot-swap a fan module.
- To prevent an unbalanced fan from causing loud noise, do not touch the fans, even if they are not rotating.
- Do not touch any bare wires and terminals on a fan module.

- Do not place a fan module in a moist location or let liquid flow into it.
- Contact Hewlett Packard Enterprise Support if the circuits or components on a fan module are faulty. Do not remove any fan module components.

To remove a fan module:

1. Wear an ESD wrist strap and make sure it makes good skin contact and is reliably grounded.
2. Grasp the fan module handle and pull out the fan module slowly along the guide rails.
3. Place the removed fan module in an antistatic bag.

Figure2-17 Removing an HPE 5944 power-to-port fan module



Installing and removing a power supply

The switch comes with power supply slot PWR1 empty and power supply slot PWR2 installed with a filler panel. As a best practice, install two power supplies of the same model for the switch.

Select power supplies for the switch as required. For the power supplies available for the switch and their specifications, see "Power supplies."

Precautions

- Provide a separate circuit breaker for each power supply.
- Do not install power supplies of different model on the same switch.
- To avoid device damage and body injury, strictly follow procedures in Figure2-18 and Figure2-19 to install and remove a power supply, respectively.

  Figure2-18 Installation procedure

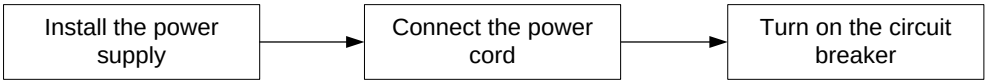
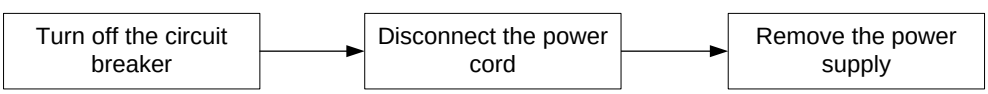
  

  Figure2-19 Removal procedure

- If a power supply slot is empty, install a filler panel in it to ensure adequate heat dissipation.

Installing a power supply

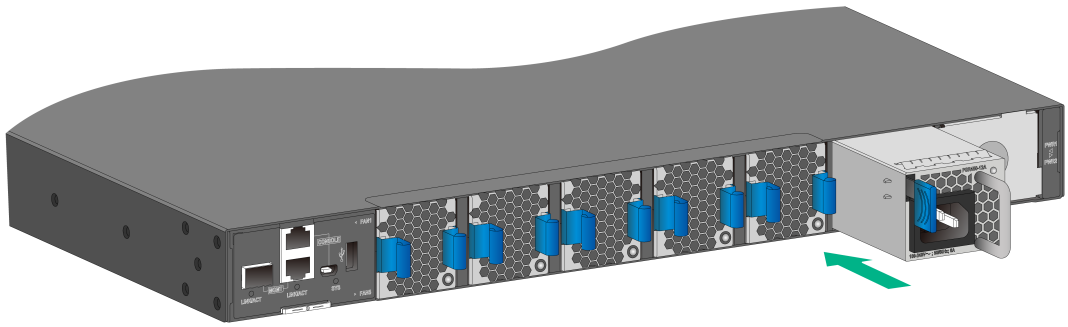
The installation procedure is the same for different models of power supplies. The following procedure installs a PSR450-12A power supply on an HPE 5944 48XGT 6QS28 switch.

To install a power supply:

1. Wear an ESD wrist strap and make sure it makes good skin contact and is reliably grounded.
2. Unpack the power supply and verify that the power supply model is correct.
3. Correctly orient the power supply with the lettering on it upward. Grasp the handle of the power supply with one hand and support its bottom with the other, and slide the power supply slowly along the guide rails into the slot. Make sure the power supply has good contact with the backplane.

   To prevent connector damages, insert the power supply gently. The power supply and power supply slot have disorientation rejection designs. If you encounter a hard resistance while inserting the power supply, pull out the power supply and insert it again.

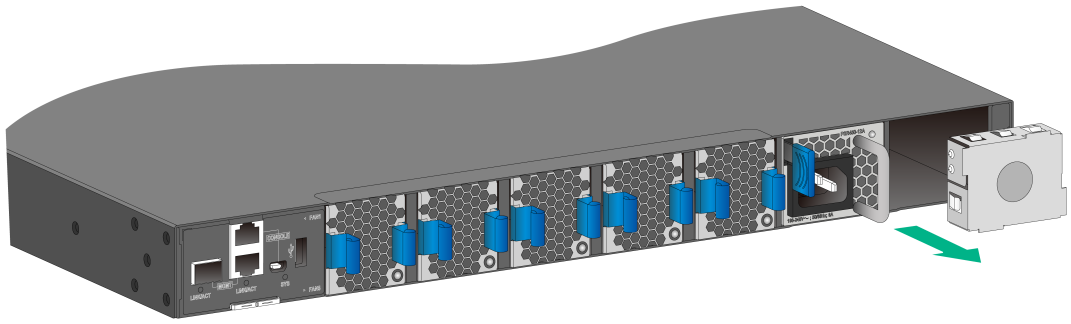
Figure2-20 Installing a power supply



IMPORTANT:

If the target power supply slot has a filler panel installed, first remove the filler panel from the slot (as shown Figure2-21).

Figure2-21 Removing the filler panel from a power supply slot



Removing a power supply

CAUTION:

When the switch has two power supplies in 1+1 redundancy mode, removing one power supply does not affect the operation of the switch. When the switch has only one power supply installed, removing the power supply powers off the switch.

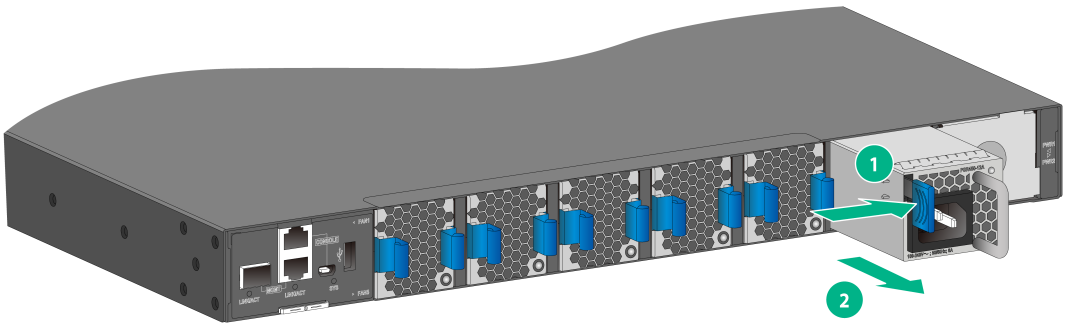
Removing a PSR450-12A/PSR450-12A1 power supply

The removal procedure is the same for the PSR450-12A and PSR450-12A1 power supplies. The following procedure removes a PSR450-12A power supply from an HPE 5944 48XGT 6QS28 switch.

To remove a PSR450-12A power supply:

1. Wear an ESD wrist strap and make sure it makes good skin contact and is reliably grounded.
2. Remove the power cord.
3. Hold the handle on the power supply with one hand, pivot the latch on the power supply to the right with your thumb, and pull the power supply part way out of the slot, as shown in Figure2-22.
4. Supporting the power supply bottom with one hand, slowly pull the power supply out with the other hand.
5. Place the removed power supply in an antistatic bag for future use.

Figure2-22 Removing a PSR450-12A power supply



(1) Pivot the latch to the right with your thumb	(2) Pull the power supply out

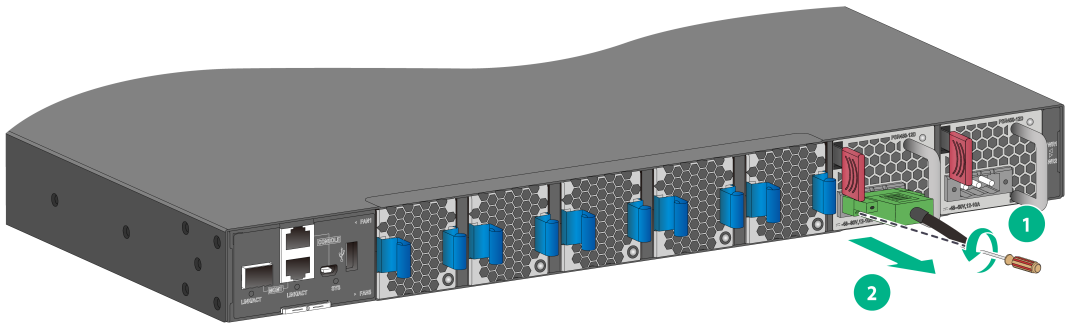
Removing a PSR450-12D DC power supply

The following procedure removes a PSR450-12D power supply from an HPE 5944 48XGT 6QS28 switch.

To remove a PSR450-12D power supply:

1. Wear an ESD wrist strap and make sure it makes good skin contact and is reliably grounded.
2. Use a flat-head screwdriver to loosen the screws on the power cord connector, and then pull the connector out to remove the power cord. See Figure2-23.
3. Hold the handle on the power supply with one hand, pivot the latch on the power supply to the right with your thumb, and simultaneously pull the power supply part way out of the slot. Supporting the power supply bottom with the other, slowly pull the power supply out of the slot. See Figure2-23.
4. Put the removed power supply in an antistatic bag.

Figure2-23 Removing a PSR450-12D power supply



(1) Use a flat-head screwdriver to loosen the screws on the power cord connector
(2) Pull the power cord connector out

Connecting the power cord

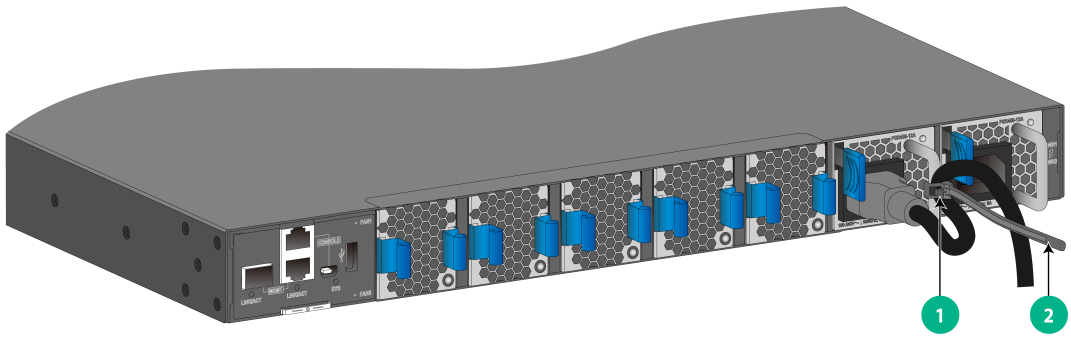
WARNING!

Provide a circuit breaker for each power input. When you connect a power cord, make sure the circuit breaker is switched off.

Connecting the power cord for a PSR450-12A/PSR450-12A1 power supply

1. Insert the female connector of the power cord supplied with the power supply into the power receptacle on the power supply.
2. Use a releasable cable tie to secure the power cord to the handle of the power supply, as shown in Figure2-24.
3. Connect the other end of the power cord to an AC or DC power source.

Figure2-24 Connecting the power cord (PSR450-12A power supply)



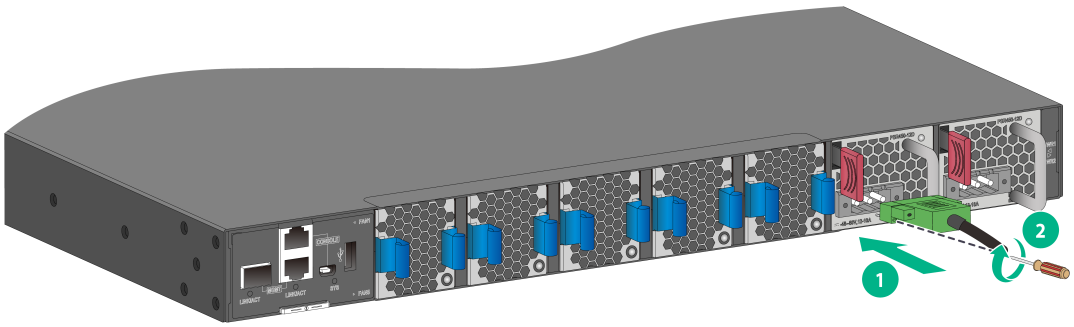
(1) Releasable cable tie
(2) Fasten the cable tie to secure the power cord to the handle of the power supply

Connecting the DC power cord for a PSR450-12D power supply

1. Correctly orient the DC power cord connector and insert the connector into the power receptacle on the power supply.

   If you orient the DC power cord connector upside down, you cannot insert the connector into the power receptacle.
2. Use a flat-head screwdriver to fasten the screws on the power cord connector, as shown in Figure2-25.
3. Connect the other end of the power cord to a DC power source.

Figure2-25 Connecting the DC power cord for a PSR450-12D power supply



Verifying the installation

After you complete the installation, verify the following items:

- There is enough space for heat dissipation around the switch, and the rack is stable.
- The grounding cable is securely connected.
- The power source is as required by the switch.
- The power cords are correctly connected.
- If part of the network cable for a port is routed outdoors, verify that a network port lightning protector is used for the port.
- If a power line is routed from outdoors, verify that a surge protected power strip is used for the switch.

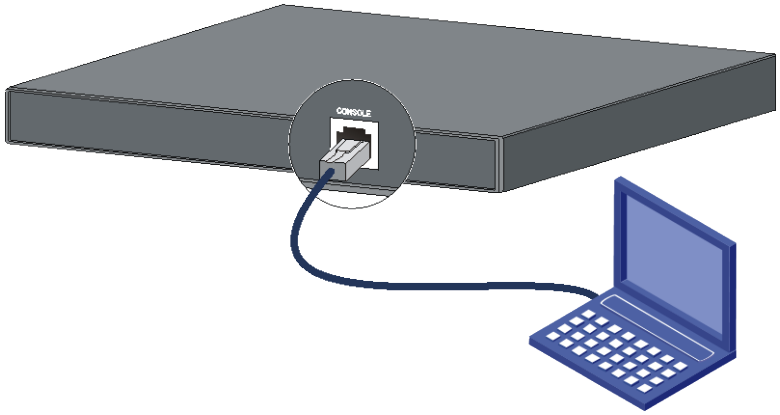
3 Accessing the switch for the first time

Setting up the configuration environment

You can access the switch from the serial console port or the mini USB console port. As a best practice, use the serial console port to access the switch (the switch is provided with a serial console cable). To access the switch from the mini USB console port, prepare a mini USB console cable yourself.

In the following figure, the switch is connected to a PC from the serial console port.

Figure3-1 Connecting the switch to a terminal from the serial console port



Connecting the serial console cable

A serial console cable is an 8-core cable, with a crimped RJ-45 connector at one end for connecting to the serial console port of the switch, and a DB-9 female connector at the other end for connecting to the serial port on the console terminal.

Figure3-2 Serial console cable

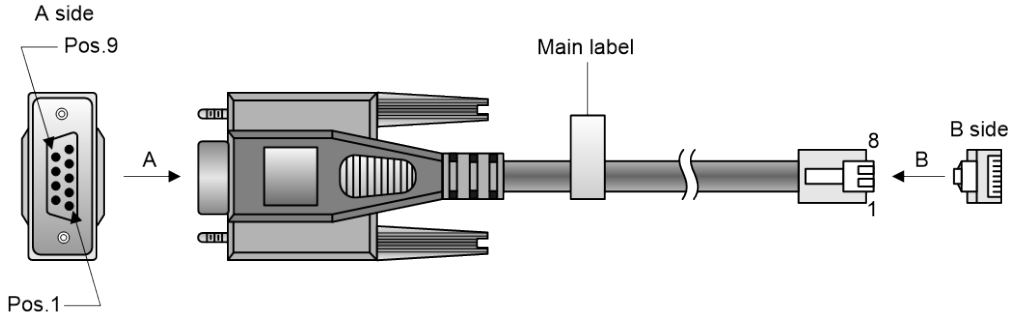


Table3-1 Serial console cable pinout

RJ-45	Signal	DB-9	Signal
1	RTS	8	CTS
2	DTR	6	DSR

RJ-45	Signal	DB-9	Signal
3	TXD	2	RXD
4	SG	5	SG
5	SG	5	SG
6	RXD	3	TXD
7	DSR	4	DTR
8	CTS	7	RTS

To connect the switch to a terminal (for example, a PC) by using the serial console cable:

1. Plug the DB-9 female connector of the serial console cable to the serial port of the PC.
2. Connect the RJ-45 connector to the serial console port of the switch.

NOTE:

- Identify the mark on the console port and make sure you are connecting to the correct port.
- The serial ports on PCs do not support hot swapping. To connect a PC to an operating switch, first connect the PC end. To disconnect a PC from an operating switch, first disconnect the switch end.

Connecting a mini USB console cable

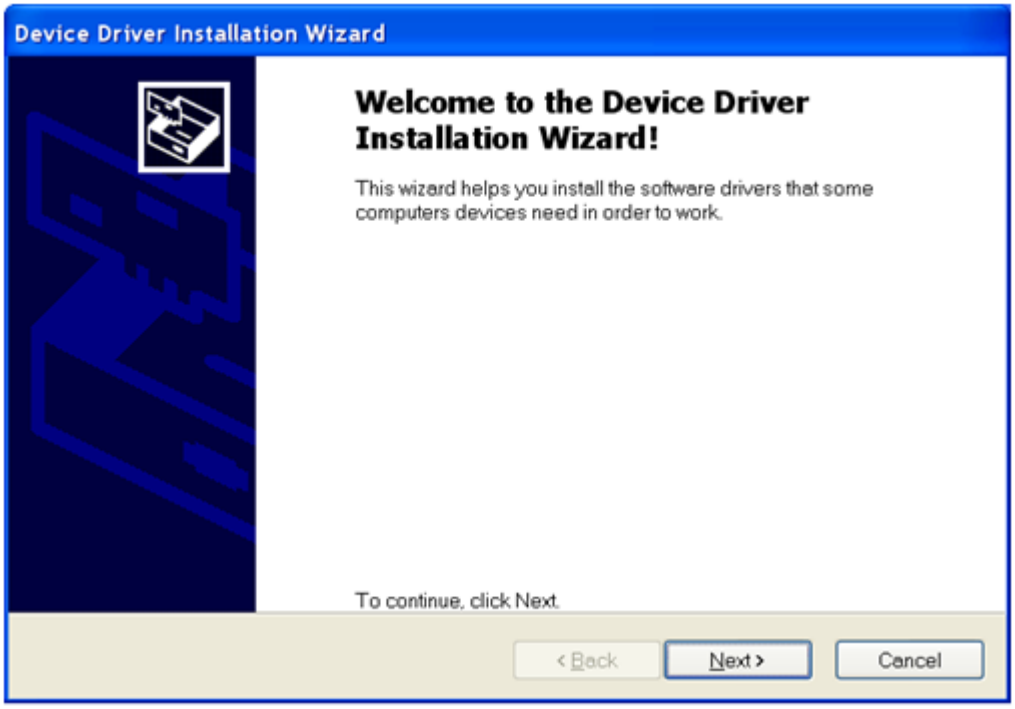
A USB mini console cable has a USB mini-Type B connector at one end to connect to the Mini USB console port of the switch, and a standard USB Type A connector at the other end to connect to the USB port on the configuration terminal.

To connect the switch to a configuration terminal by using a USB mini console cable:

1. Connect the standard USB Type A connector to the USB port on the configuration terminal.
2. Connect the USB mini Type B connector to the Mini USB console port on the switch.
3. Click the following link, or copy it to the address bar on the browser to log in to download page of the USB console driver, and then download the driver.

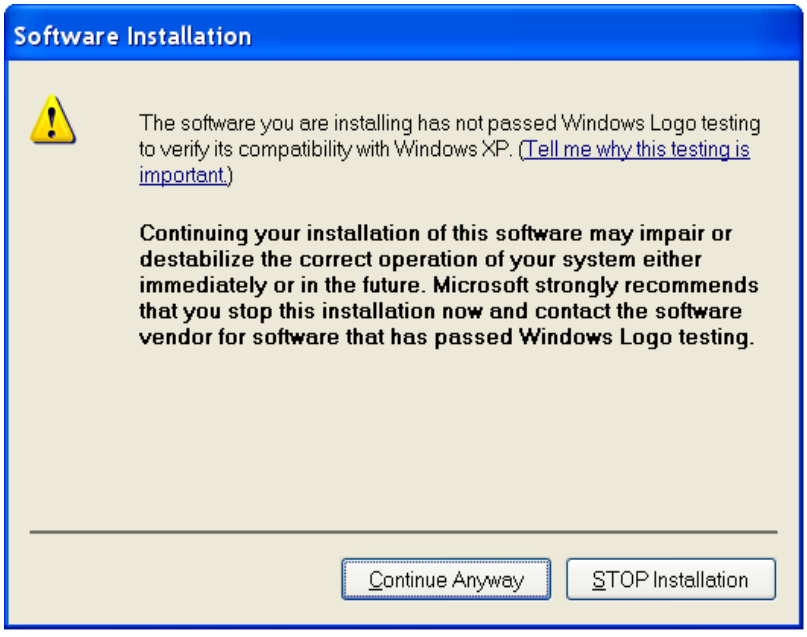
   https://www.exar.com/design-tools/software-drivers
4. Select a driver program in a USB UART product family according to the operating system you use.
5. Click **Next** on the installation wizard.

Figure3-3 Device Driver Installation Wizard



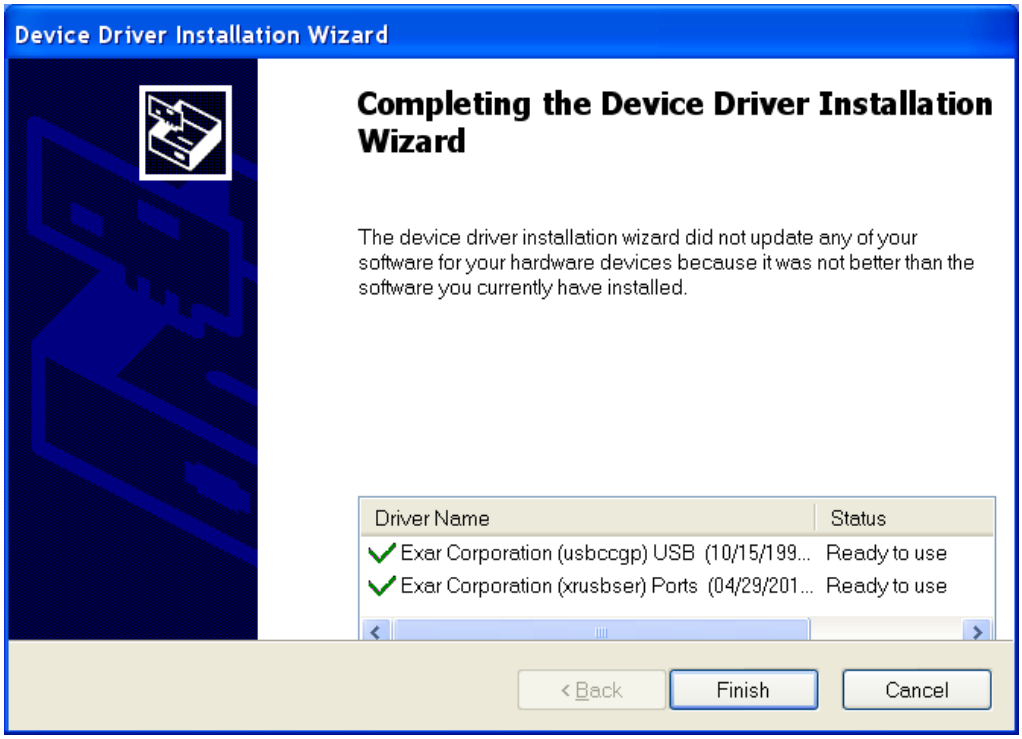
6. Click **Continue Anyway** if the following dialog box appears.

Figure3-4 Software Installation



7. Click **Finish**.

Figure3-5 Completing the device driver installation wizard



Setting terminal parameters

To configure and manage the switch through the serial console port or mini USB console port, you must run a terminal emulator program, TeraTermPro or PuTTY, on your configuration terminal. You can use the emulator program to connect a network device, a Telnet site, or an SSH site. For more information about the terminal emulator programs, see the user guides for these programs

Configure the terminal parameters as follows:

- **Bits per second**—9600.
- **Data bits**—8.
- **Stop bits**—1.
- **Parity**—None.
- **Flow control**—None.

Starting the switch

1. Before powering on the switch, verify that the following requirements are met:
   - The power cords are correctly connected.
   - The input power voltage meets the requirement of the switch.
   - The console cable is correctly connected.
   - The configuration terminal (a PC, for example) has started, and the parameters are set correctly.
2. Power on the switch.

   During the startup process, you can access Boot ROM menus to perform tasks such as software upgrade and file management. The Boot ROM interface and menu options vary by

software versions. For more information about Boot ROM menu options, see the software-matching release notes for the device.

3. After the startup completes, you can access the CLI to configure the switch.

   For more information about the configuration commands and CLI, see *HPE FlexFabric 5944 & 5945 Switch Series Configuration Guides* and *HPE FlexFabric 5944 & 5945 Switch Series Command References*.

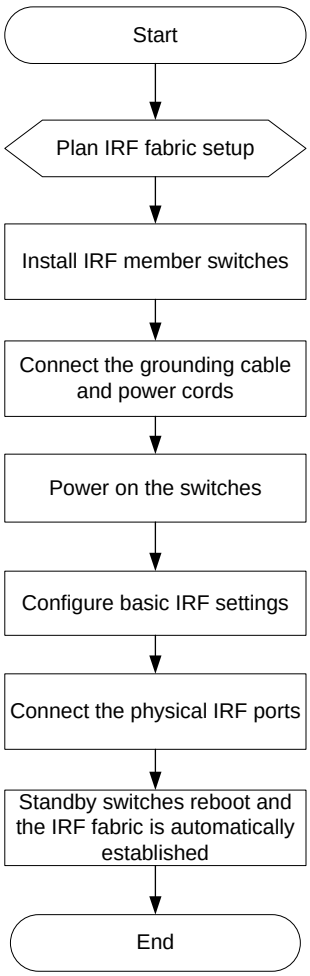
4 Setting up an IRF fabric

You can use HPE IRF technology to connect and virtualize HPE 5944 48XGT 6QS28 switches into a large virtual switch called an "IRF fabric" for flattened network topology, and high availability, scalability, and manageability.

The switch can set up an IRF fabric only with switches from the same switch series.

IRF fabric setup flowchart

Figure4-1 IRF fabric setup flowchart



To set up an IRF fabric:

Step	Description
1. Plan IRF fabric setup.	Plan the installation site and IRF fabric setup parameters: • Planning IRF fabric size and the installation site • Identifying the master switch and planning IRF member IDs • Planning IRF topology and connections • Identifying physical IRF ports on the member switches

Step	Description
	• Planning the cabling scheme
2. Install IRF member switches.	See "Installing the switch in a 19-inch rack."
3. Connect ground wires and power cords.	See "Grounding the switch by using a grounding strip" and "Connecting the power cord."
4. Power on the switches.	N/A
5. Configure basic IRF settings.	See IRF configuration in *HPE FlexFabric 5944 & 5945 Switch Series Virtual Technologies Configuration Guide*.
6. Connect the physical IRF ports.	Connect the physical IRF ports on switches by using QSFP28 transceiver modules and fibers, QSFP28 fiber cables, QSFP28 copper cables, QSFP+ transceiver modules and fibers, QSFP+ fiber cables, or QSFP+ copper cables. All switches except the master switch automatically reboot, and the IRF fabric is established.

Planning IRF fabric setup

This section describes issues that an IRF fabric setup plan must cover.

Planning IRF fabric size and the installation site

Choose switch models and identify the number of required IRF member switches, depending on the user density and upstream bandwidth requirements. The switching capacity of an IRF fabric equals the total switching capacities of all member switches.

Plan the installation site depending on your network solution as follows:

- Place all IRF member switches in one rack for centralized high-density access.
- Distribute the IRF member switches in different racks to implement the top-of-rack (ToR) access solution for a data center.

As your business grows, you can add member switches into the IRF fabric to increase the switching capacity without any topology change or replacement.

Identifying the master switch and planning IRF member IDs

Determine which switch you want to use as the master for managing all member switches in the IRF fabric. An IRF fabric has only one master switch. You configure and manage all member switches in the IRF fabric at the command line interface of the master switch.

NOTE:

IRF member switches will automatically elect a master. You can affect the election result by assigning a high member priority to the intended master switch. For more information about master election, see IRF configuration in *HPE FlexFabric 5944 & 5945 Switch Series Virtual Technologies Configuration Guide*.

Prepare an IRF member ID assignment scheme. An IRF fabric uses member IDs to uniquely identify and manage its members, and you must assign each IRF member switch a unique member ID.

Planning IRF topology and connections

You can create an IRF fabric in daisy chain topology, or more reliably, ring topology. In ring topology, the failure of one IRF link does not cause the IRF fabric to split as in daisy chain topology. Rather, the IRF fabric changes to a daisy chain topology without interrupting network services.

You connect the IRF member switches through IRF ports, the logical interfaces for the connections between IRF member switches. Each IRF member switch has two IRF ports: IRF-port 1 and IRF-port 2. To use an IRF port, you must bind at least one physical port to it.

When connecting two neighboring IRF member switches, you must connect the physical ports of IRF-port 1 on one switch to the physical ports of IRF-port 2 on the other switch.

The IRF port connections in the two figures are for illustration only, and more connection methods are available.

Figure4-2 IRF fabric in daisy chain topology

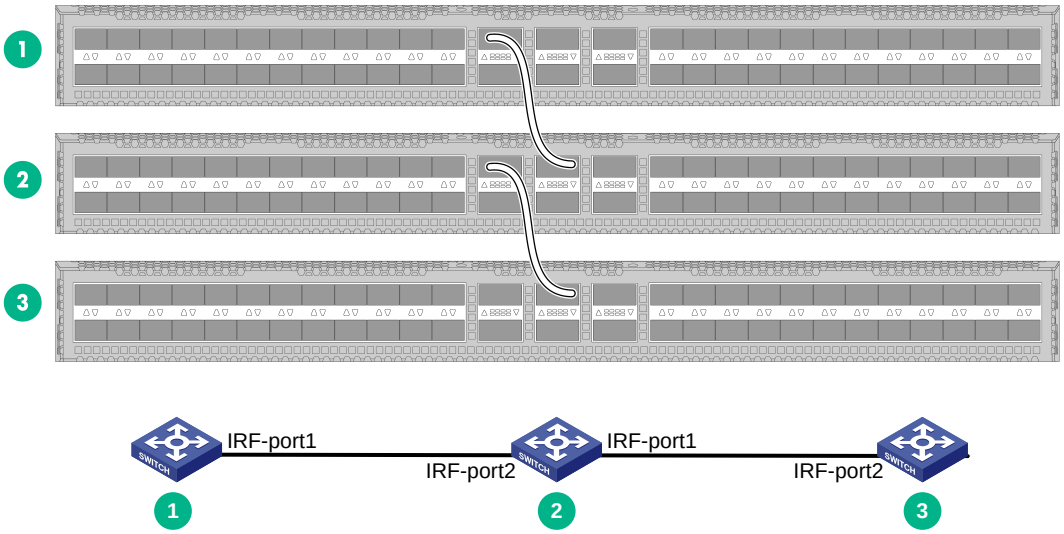
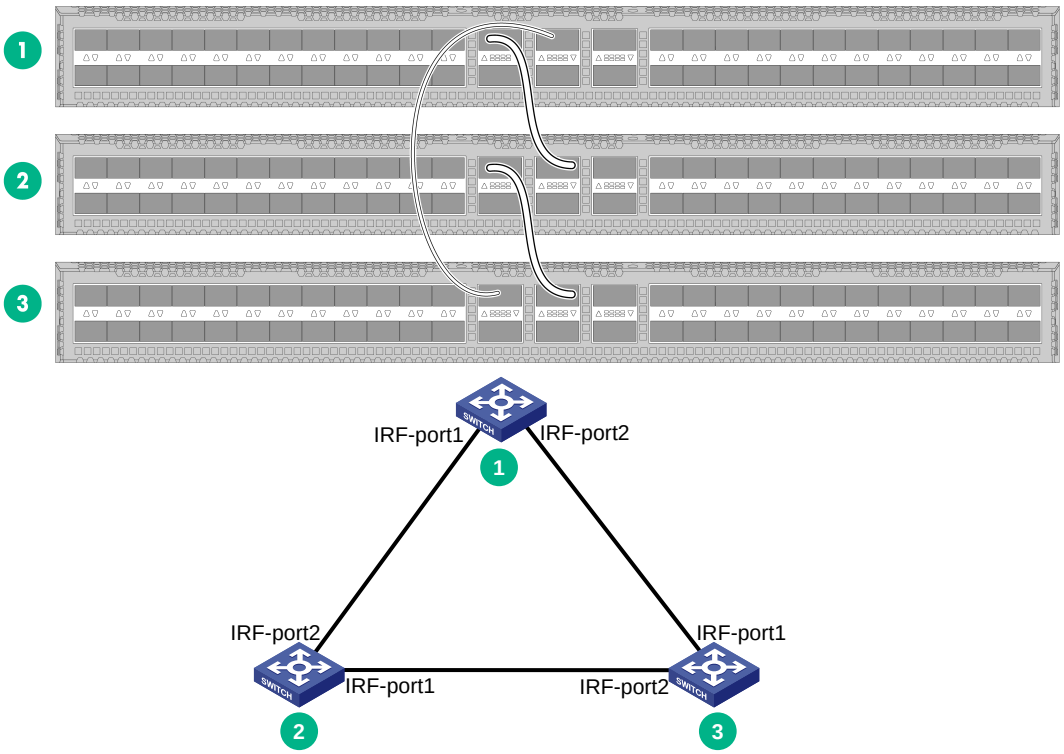


Figure4-3 IRF fabric in ring topology



You can set up 100/40-GE IRF physical connections by connecting only QSFP28 ports between HPE 5944 48XGT 6QS28 switches.

You can bind several ports to an IRF port for increased bandwidth and availability.

Identifying physical IRF ports on the member switches

Identify the QSFP28 ports for IRF connections on the member switches according to your topology and connection scheme.

All the QSFP28 ports on the switch can be used for IRF connections.

Planning the cabling scheme

You can use only QSFP28 transceiver modules and optical fibers, QSFP28 fiber cables, QSFP28 copper cables, QSFP transceiver modules and optical fibers, QSFP fiber cables, or QSFP copper cables to connect the switches for IRF connections.

If the IRF member switches are far away from one another, choose QSFP+/QSFP28 transceiver modules and optical fibers. If the IRF member switches are all in one equipment room, use QSFP/QSFP28 copper or fiber cables. For more information about transceiver modules and cables available for the switch, see "Appendix C Ports and LEDs."

The following subsections describe several IRF connection schemes by using QSFP28 transceiver modules and optical fibers, QSFP28 copper cables, and QSFP28 fiber cables. All these schemes use a ring topology.

Connecting the IRF member switches in one rack

Figure4-4 shows an example for connecting four IRF member switches in a rack. The switches in the ring topology (see Figure4-5) are in the same order as connected in the rack.

Figure4-4 Connecting the switches in one rack

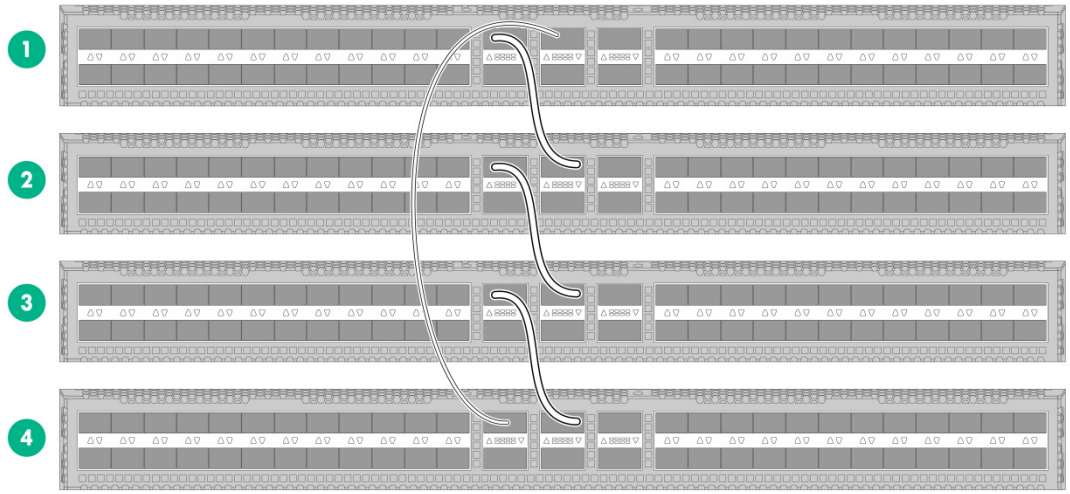
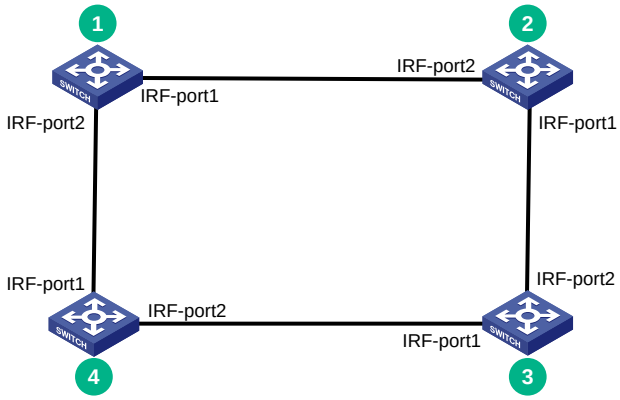


Figure4-5 IRF fabric topology

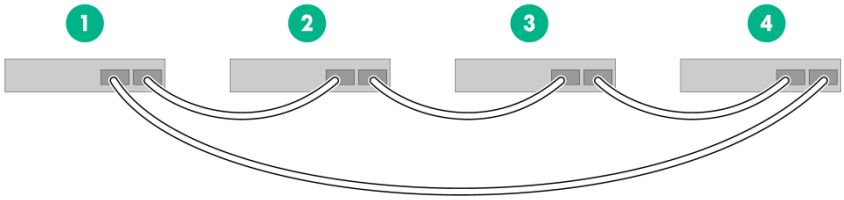


Connecting the IRF member switches in a ToR solution

You can install IRF member switches in different racks side by side to deploy a top of rack (ToR) solution.

Figure4-6 shows an example for connecting four top of rack IRF member switches by using QSFP28 cables and QSFP28 transceiver modules and optical fibers. The topology is the same as Figure4-5.

Figure4-6 ToR cabling



Configuring basic IRF settings

After you install the IRF member switches, power on the switches and then log in to each IRF member switch to configure basic IRF settings, including their member IDs, member priorities, and IRF port bindings.

For the approaches to accessing the switch, see login management in *HPE FlexFabric 5944 & 5945 Switch Series Fundamentals Configuration Guide*.

For information about configuring IRF settings, see IRF configuration in *HPE FlexFabric 5944 & 5945 Switch Series Virtual Technologies Configuration Guide*,.

Connecting the physical IRF ports

CAUTION:

Wear an ESD wrist strap when you connect fiber or copper cables or transceiver modules and optical fibers. For more information, see the installation guide for the transceiver modules and cables.

Use fiber or copper cables or transceiver modules and optical fibers to connect the IRF member switches as planned.

Accessing the IRF fabric to verify the configuration

To verify the basic functionality of the IRF fabric:

1. Log in to the IRF fabric through the console port of any member switch.
2. Create a Layer 3 interface, assign it an IP address, and make sure the IRF fabric and the remote network management station can reach each other.
3. Use Telnet or SNMP to access the IRF fabric from the network management station. For more information about the accessing method, see login management in *HPE FlexFabric 5944 & 5945 Switch Series Fundamentals Configuration Guide*.
4. Display the running status of the IRF fabric by using the commands in Table4-1.

Table4-1 Displaying and maintaining IRF configuration and running status

Task	Command
Display information about the IRF fabric.	**display irf**
Display all members' IRF configurations.	**display irf configuration**
Display IRF fabric topology information.	**display irf topology**

NOTE:

To avoid IP address collision and network issues, configure at least one multi-active detection (MAD) mechanism to detect the presence of multiple identical IRF fabrics and handle collisions. For more information about MAD detection, see *HPE FlexFabric 5944 & 5945 Switch Series Virtual Technologies Configuration Guide*.

5 Maintenance and troubleshooting

Power supply failure

Symptom

The status LED on a power supply is not steady green (active state) or flashing green (standby state).

You can use the status LED on a power supply to identify a power supply failure. For more information about the status LED on a power supply, see *HPE PSR450 Power Supply Series User Guide*.

Solution

To resolve the issue:

1. Verify that the power cord is correctly connected.
2. Verify that the power source is as required by the power supply.
3. Verify that the operating temperature of the switch is in an acceptable range and good ventilation is provided for the power supply.
4. If the issue persists, contact the Hewlett Packard Enterprise Support

To replace a power supply, see "Installing and removing a power supply."

Fan module failure

△ **CAUTION:**

If more than one fan module fails during the switch operation, do not remove the failed fan modules simultaneously. Replace the fan modules one by one and finish replacing each fan module within 3 minutes.

Symptom

The status LED on a fan module is steady on and the system outputs a message that indicates a fan module failure.

Solution

See "Installing and removing a fan module" to replace the failed fan module.

Configuration terminal display issues

No display on the configuration terminal

Symptom

The configuration terminal does not have display when the switch is powered on.

Solution

To resolve the issue:

1. Verify that the power system is operating correctly.
2. Verify that the console cable has been connected correctly and the console cable is in good condition.
3. Verify that terminal parameter settings are correct:
   - **Baud rate**—9600.
   - **Data bits**—8.
   - **Stop bits**—1.
   - **Parity**—None.
   - **Flow control**—None.
4. If the issue persists, contact Hewlett Packard Enterprise Support.

Garbled display on the configuration terminal

Symptom

The configuration terminal displays garbled text when the switch is powered on.

Solution

To resolve the issue:

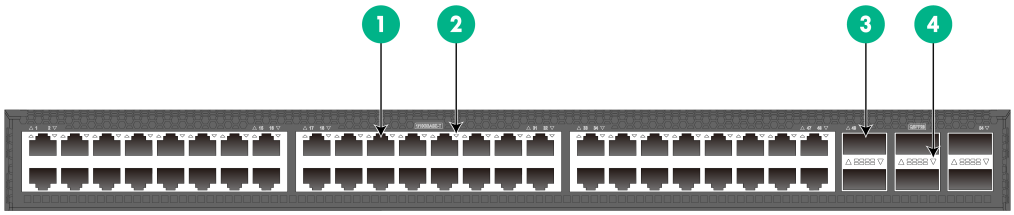
1. Verify that the terminal parameter settings are correct:
   - **Baud rate**—9600.
   - **Data bits**—8.
   - **Stop bits**—1.
   - **Parity**—None.
   - **Flow control**—None.
2. If the issue persists, contact Hewlett Packard Enterprise Support.

6 Appendix A Chassis views and technical specifications

Chassis views

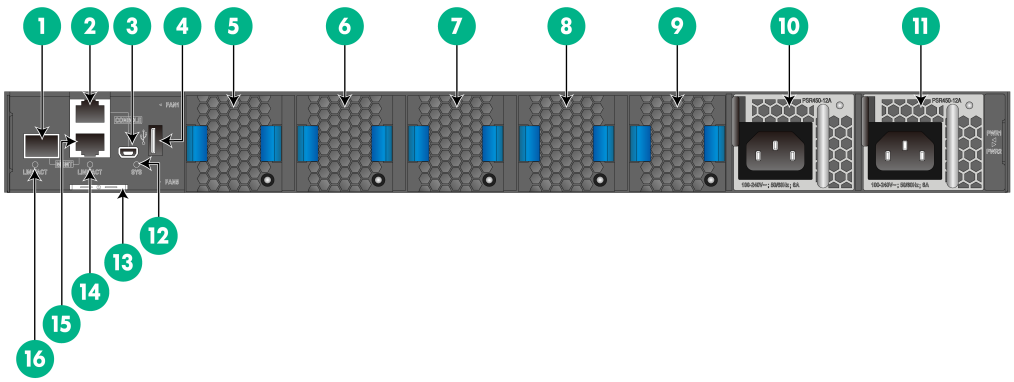
HPE 5944 48XGT 6QS28

Figure6-1 Front panel



(1) 1/10GBASE-T autosensing Ethernet port	(2) 1/10GBASE-T autosensing Ethernet port LED
(3) QSFP28 port	(4) QSFP28 port LED

Figure6-2 Rear panel



(1) Fiber management Ethernet port	(2) Console port
(3) Mini USB console port	(4) USB port
(5) Fan module 1	(6) Fan module 2
(7) Fan module 3	(8) Fan module 4
(9) Fan module 5	(10) Power supply 1
(11) Power supply 2	(12) System status LED (SYS)
(13) Serial label pull tab	(14) Copper management Ethernet port LED (LINK/ACT)
(15) Copper management Ethernet port	(16) Fiber management Ethernet port LED (LINK/ACT)

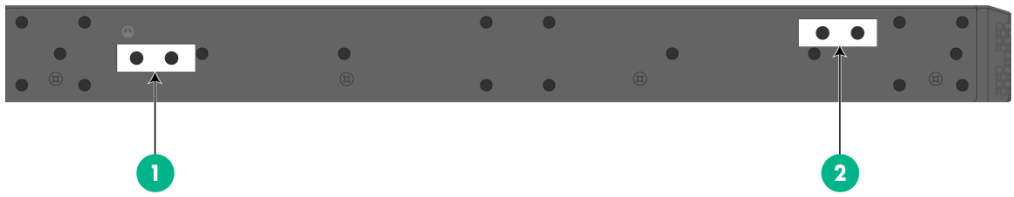
The HPE 5944 48XGT 6QS28 switch has a serial label pull tab on the rear panel. It provides the ESN and MAC address of the switch.

The switch comes with power supply slot PWR1 empty and power supply slot PWR2 installed with a filler panel. In Figure6-2, two PSR450-12A power supplies are installed on the switch. For more

information about installing and removing a power supply, see "Installing and removing a power supply."

The switch comes with the five fan module slots empty. You must install five fan modules of the same model for the switch. In Figure6-2, five HPE 5944 power-to-port fan modules are installed in the fan module slots. For more information about installing and removing a fan module, see "Installing and removing a fan module."

Figure6-3 Left side panel



(1) Primary grounding point	(2) Auxiliary grounding point

Technical specifications

Table6-1 Technical specifications

Item	HPE 5944 48XGT 6QS28
Dimensions (H × W × D)	44 × 440 × 460 mm (1.73 × 17.32 × 18.11 in)
Weight	≤ 10 kg (22.05 lb)
Console port	• 1 × mini USB console port • 1 × serial console port
Management Ethernet port	• 1 × 10M/100M/1000MBASE-T copper port • 1 × SFP port
USB port	1
1/10GBASE-T autosensing Ethernet port	48
QSFP28 port	6
Fan module slot	5
Power supply slot	2

Input voltage	PSR450-12A/PSR450-12A1:
	• AC input
	  ○ Rated voltage range: 100 to 240 VAC @ 50/60 Hz
	  ○ Max voltage range: 90 to 290 VAC @ 47 to 63 Hz
	• High-voltage DC input
	  ○ Rated voltage range: 240 VDC
	  ○ Max voltage range: 180 to 320 VDC
	PSR450-12D:
	• Rated voltage range: –48 to –60 VDC
	• Max voltage range: –36 to –72 VDC

Item	HPE 5944 48XGT 6QS28
Minimum power consumption	PSR450-12A/PSR450-12A1: • Single AC input: 93 W • Dual AC inputs: 100 W PSR450-12D: • Single DC input: 94 W • Dual DC inputs: 101 W
Maximum power consumption	PSR450-12A/PSR450-12A1: • Single AC input: 222 W • Dual AC inputs: 229 W PSR450-12D: • Single DC input: 230 W • Dual DC inputs: 236 W
Chassis leakage current compliance	UL 60950-1/EN 60950-1/IEC 60950-1/GB4943
Melting current of power supply fuse	PSR450-12A/PSR450-12A1: • 10 A @ 250 VAC • 10 A @ 310 VDC PSR450-12D: 20 A @ 125 V
Operating temperature	0°C to 45°C (32°F to 113°F)
Operating humidity	5% RH to 95% RH, noncondensing
Fire resistance compliance	UL 60950-1/EN 60950-1/IEC 60950-1/GB4943

7 Appendix B FRUs and compatibility matrixes

CAUTION:

- Select fan modules and power supplies with airflow directions that meet the ventilation requirements at the installation site. As a best practice, make sure the power supplies and fan modules have the same airflow direction.
- Do not install fan modules of different models on the same switch. To guarantee adequate heat dissipation, install five fan modules of the same model on the switch.
- Do not install power supplies of different models on the same switch. As a best practice, install two power supplies of the same model on the switch for 1+1 power supply redundancy.

Table7-1 Compatibility matrix between the FRUs and HPE 5944 48XGT 6QS28 switch

FRUs	Part No.	HPE 5944 48XGT 6QS28
Power supplies		
PSR450-12A	JL593A	Yes
PSR450-12A1	JL592A	Yes
PSR450-12D	JL688A	Yes
Fan modules		
HPE 5944 power-to-port fan module	JL838A	Yes
HPE 5944 port-to-power fan module	JL837A	Yes

Power supplies

CAUTION:

When the switch has two power supplies in 1+1 redundancy, you can replace one of them without powering off the switch. To avoid device damage and body injury, make sure the power supply to be replaced is powered off before you replace it.

Table7-2 Power supply specifications

Power supply	Specifications	Remarks

PSR450-12A (with an airflow direction from the power supply side to the port side)
PSR450-12A1 (with an airflow direction from the port side to the power supply side)
	• AC input:
	  ○ Rated input voltage range: 100 to 240 VAC @ 50/60 Hz
	  ○ Max input voltage range: 90 to 290 VAC @ 47 to 63 Hz
	  ○ Max output power: 450 W
	• DC input:
	  ○ Rated input voltage range: 240 VDC
	  ○ Max input voltage range: 180 to 320 VDC
	  ○ Max output power: 450 W
		For more information about the power supplies, see *HPE PSR450 Power Supply Series User Guide.*

Power supply	Specifications	Remarks
PSR450-12D (with an airflow direction from the port side to the power supply side)	• Rated input voltage range: –48 to –60 VDC • Max input voltage range: –36 to –72 VDC • Max output power: 450 W	

Fan modules

Table7-3 Fan module specifications

Item	Specifications
HPE 5944 power-to-port fan module	
Dimensions	41 × 40 × 105 mm (1.61 × 1.57 × 4.13 in), including the handle
Fan number	1
Fan speed	20000 R.P.M
Max airflow	20 CFM
Airflow direction	From the power supply side to the port side
Input voltage	12 V
Maximum power consumption	9.8 W
Documentation reference	HPE 5944 Fan Modules (JL837A & JL838A) User Guide
HPE 5944 port-to-power fan module	
Dimensions	41 × 40 × 105 mm (1.61 × 1.57 × 4.13 in), including the handle
Fan number	1
Fan speed	20000 R.P.M
Max airflow	20 CFM
Airflow direction	From the port side to the power supply side
Input voltage	12 V
Maximum power consumption	9.8 W
Documentation reference	HPE 5944 Fan Modules (JL837A & JL838A) User Guide

8 Appendix C Ports and LEDs

Ports

IMPORTANT:

- As a best practice, use HPE transceiver modules and cables for the switch.
- The HPE transceiver modules and cables are subject to change over time. For the most up-to-date list of HPE transceiver modules and cables, contact Hewlett Packard Enterprise Support or marketing staff.
- For more information about HPE transceiver modules and cables, see *HPE Comware-Based Devices Transceiver Modules User Guide*.

Console port

The switch has two console ports: serial console port and Mini USB console port.

Table8-1 Console port specifications

Item	Console port	Mini USB console port
Connector type	RJ-45	USB mini-Type B
Compliant standard	EIA/TIA-232	USB 2.0
Transmission baud rate	9600 bps (default) to 115200 bps	
Services	• Provides connection to an ASCII terminal. • Provides connection to the serial port of a local or remote (through a pair of modems) PC running terminal emulation program.	• Provides connection to an ASCII terminal. • Provides connection to the USB port of a local PC running terminal emulation program.

Management Ethernet port

The switch provides a copper and a fiber management Ethernet port.

You can connect this port to a PC or management station for loading and debugging software or remote management.

Table8-2 Copper management Ethernet port specifications

Item	Specification
Connector type	RJ-45
Connector quantity	1
Port transmission rate and duplex mode	10/100/1000 Mbps, half/full duplex
Transmission medium and max	100 m (328.08 ft) over category-5 twisted pair cable

transmission distance	
Functions and services	Software and Boot ROM upgrade and network management

Table8-3 Fiber management Ethernet port specifications

Item	Specification
Connector type	LC
Connector quantity	1
Port transmission rate	100/1000 Mbps, full duplex
Transmission medium and max transmission distance	See Table8-4 and Table8-5.
Functions and services	Software upgrade and network management

Table8-4 FE SFP transceiver modules

Product code	Description	Central wavelength (nm)	Fiber diameter (μm)	Maximum transmission distance
JD102B	HPE X115 100M SFP LC FX Transceiver	1310	50/125	2 km (1.24 miles)
			62.5/125	
JD120B	HPE X110 100M SFP LC LX Transceiver	1310	9/125	15 km (9.32 miles)

Table8-5 GE SFP transceiver modules

Product code	Description	Central wavelength(nm)	Fiber diameter (μm)	Multimode fiber modal bandwidth (MHz*km)	Maximum transmission distance
JD089B	HPE X120 1G SFP RJ45 T Transceiver	N/A	Category-5 twisted pair	N/A	100 m (328.08 ft)
JD118B	HPE X120 1G SFP LC SX Transceiver	850	50/125	500	550 m (1804.46 ft)
				400	500 m (1640.42 ft)
			62.5/125	200	275 m (902.23 ft)
				160	220 m (721.78 ft)
JD119B	HPE X120 1G SFP LC LX Transceiver	1310	9/125	N/A	10 km (6.21 miles)
			50/125	500 or 400	550 m (1804.46 ft)
			62.5/125	500	550 m (1804.46 ft)
JD061A	HPE X125 1G SFP LC LH40 1310nm Transceiver	1310	9/125	N/A	40 km (24.86 miles)
JD062A	HPE X120 1G SFP LC LH40 1550nm Transceiver	1550	9/125	N/A	40 km (24.86 miles)
JD063B	HPE X125 1G SFP LC LH80 Transceiver	1550	9/125	N/A	80 km (49.71 miles)

USB port

The switch has one OHC-compliant USB2.0 port that can upload and download data at a rate up to 480 Mbps. You can use this USB port to access the file system on the flash file system of the switch, for example, to upload or download application and configuration files.

IMPORTANT:

- USB devices from different vendors vary in compatibility and driver. Hewlett Packard Enterprise does not guarantee correct operation of all USB devices on the switch. If a USB device fails to operate on the switch, replace it with one from another vendor.
- The USB port on the switch is designed to output current in strict accordance with the USB 2.0 standard. For a USB storage device to be identified by the USB port, make sure the USB device fully complies with USB 2.0.

QSFP28 port

The QSFP28 ports on the switch do not support breakout. They support the following transceiver modules and cables:

- QSFP28 transceiver modules in Table8-6.
- QSFP28 copper cables in Table8-7.
- QSFP28 fiber cables in Table8-8.
- QSFP+ transceiver modules in Table8-9.
- QSFP+ copper cables in Table8-10.
- QSFP+ fiber cables in Table8-11

Table8-6 QSFP28 transceiver modules available for the QSFP28 ports

Product code	Module description	Central wavelength (nm)	Cable specifications (μm)	Modal bandwidth (MHz*km)	Maximum transmission distance
JL274A	HPE X150 100G QSFP28 MPO SR4 100m MM Transceiver	850	50/125	2000	70 m (229.66 ft)
				4700	100 m (328.08 ft)
JL275A	HPE X150 100G QSFP28 LC LR4 10km SM Transceiver	Four lanes: • 1295 • 1300 • 1304 • 1309	9/125	N/A	10 km (6.21 miles)

Table8-7 QSFP28 copper cables available for the QSFP28 ports

Product code	Cable description	Cable length
JL271A	HPE X240 100G QSFP28 to QSFP28 1m Direct Attach Copper Cable	1 m (3.28 ft)
JL272A	HPE X240 100G QSFP28 to QSFP28 3m Direct Attach Copper Cable	3 m (9.84 ft)
JL273A	HPE X240 100G QSFP28 to QSFP28 5m Direct Attach Copper Cable	5 m (16.40 ft)

Table8-8 QSFP28 fiber cables available for the QSFP28 ports

Product code	Cable description	Cable length
JL276A	HPE X2A0 100G QSFP28 to QSFP28 7m Active Optical Cable	7 m (22.97 ft)
JL277A	HPE X2A0 100G QSFP28 to QSFP28 10m Active Optical Cable	10 m (32.81 ft)
JL278A	HPE X2A0 100G QSFP28 to QSFP28 20m Active Optical Cable	20 m (65.62 ft)

Table8-9 40GE QSFP+ transceiver modules available for the QSFP28 ports

Product code	Description	Central wavelength (nm)	Fiber diameter (μm)	Multimode fiber modal bandwidth (MHz*km)	Maximum transmission distance
JG325B	HPE X140 40G QSFP+ MPO SR4 Transceiver	850	50/125	2000	100 m (328.08 ft)
				4700	150 m (492.12 ft)
JG709A	HPE X140 40G QSFP+ MPO MM 850nm CSR4 300m Transceiver	850	50/125	2000	300 m (984.25 ft)
				4700	400 m (1312.33 ft)
JL251A	HPE X140 40G QSFP+ LC BiDi 100m MM Transceiver	850	50/125	2000	100 m (328.08 ft)
				4700	150 m (492.12 ft)
JG661A	HPE X140 40G QSFP+ LC LR4 SM 10km 1310nm Transceiver	Four lanes: • 1271 • 1291 • 1311 • 1331	9/125	N/A	10 km (6.21 miles)
JL286A	HPE X140 40G QSFP+ LC LR4L 2km SM Transceiver	Four lanes: • 1271 • 1291 • 1311 • 1331	9/125	N/A	2 km (1.24 miles)

Table8-10 QSFP+ copper cables available for the QSFP28 ports

Product code	Description	Cable length
JG326A	HPE X240 40G QSFP+ QSFP+ 1m Direct Attach Copper Cable	1 m (3.28 ft)
JG327A	HPE X240 40G QSFP+ QSFP+ 3m Direct Attach Copper Cable	3 m (9.84 ft)
JG328A	HPE X240 40G QSFP+ QSFP+ 5m Direct Attach Copper Cable	5 m (16.40 ft)

Table8-11 QSFP+ fiber cables available for the QSFP28 ports

Product code	Description	Cable length
JL287A	HPE X2A0 40G QSFP+ to QSFP+ 7m Active Optical Cable	7 m (22.97 ft)
JL288A	HPE X2A0 40G QSFP+ to QSFP+ 10m Active Optical Cable	10 m (32.81 ft)
JL289A	HPE X2A0 40G QSFP+ to QSFP+ 20m Active Optical Cable	20 m (65.62 ft)

1/10GBASE-T autosensing Ethernet port

An HPE 5944 48XGT 6QS28 switch provides forty-eight 1/10GBASE-T autosensing Ethernet ports.

Table8-12 1/10GBASE-T autosensing Ethernet port specifications

Item	Specification
Connector type	RJ-45
Port transmission rate, duplex mode, and auto-MDIX	1/10 Gbps, full duplex, MDI/MDIX autosensing
Transmission medium and max transmission distance	• 55 m (180.45 ft) over category-6 unshielded twisted pair cable • 100 m (328.08 ft) over category-6 shielded twisted pair cable • 100 m (328.08 ft) over category-6A or above twisted pair cable
Compatible standards	• IEEE 802.3ab • IEEE 802.3an

To avoid interference between cables, layer cables as follows:

- Use category-6A or above cables and connectors.
- Do not bundle cables in their first 20 m (65.62 ft).
- Separate power cords and twisted pair cables at and around the distribution frame.
- For ports adjacent to one another on the device, the peer ports on the distribution frame are preferably not adjacent, for example:
  - If the device connects to one distribution frame, connect port 1 on the device to port 1 on the distribution frame, port 2 on the device to port 3 on the distribution frame, and port 3 on the device to port 5 on the distribution frame.
  - If the device connects to two distribution frames, connect port 1 on the device to port 1 on distribution frame 1, port 2 on the device to port 1 on distribution frame 2, and port 3 on the device to port 2 on distribution frame 1.

LEDs

System status LED

The system status LED shows the operating status of the switch.

Table8-13 System status LED description

LED mark	Status	Description
SYS	Steady green	The switch is operating correctly.
	Flashing green	The switch is performing power-on self test (POST).
	Steady red	The system has failed POST, or a fault has occurred.
	Flashing red	Some ports have failed POST.
	Flashing blue (3 Hz)	Helps you to locate the device. To locate the device, execute the **`locator blink`** command on the device. Then the SYS LED will be in this state.
	Off	The switch is powered off or has failed to start up.

QSFP28 port LED

Each QSFP28 port has a status LED to show its operating status and activities.

Table8-14 QSFP28 port LED description

LED status	Description
Steady green	A transceiver module or cable has been correctly installed. The port has a link and is operating at 100 Gbps.
Flashing green	The port is sending or receiving data at 100 Gbps.
Steady yellow	A transceiver module or cable has been correctly installed. The port has a link and is operating at 40 Gbps.
Flashing yellow (3 Hz)	The port is sending or receiving data at 40 Gbps.
Off	No transceiver module or cable has been installed or no link is present on the port.

1/10GBASE-T autosensing Ethernet port LEDs

Table8-15 1/10GBASE-T autosensing Ethernet port LED description

Status	Description
Steady green	The port has a link and is operating at 10 Gbps.
Flashing green	The port is sending or receiving data at 10 Gbps.
Steady yellow	The port has a link and is operating at 1 Gbps.
Flashing yellow	The port is sending or receiving data at 1 Gbps.
Off	No link is present on the port.

Management Ethernet port LEDs

The switch provides a LINK/ACT LED for each management Ethernet port. To view the description for the copper management Ethernet port LED, see Table8-16. To view the description for the fiber management Ethernet port LED, see Table8-17.

Table8-16 Copper management Ethernet port LED description

LED mark	Status	Description
LINK/ACT	Steady green	The port is operating at 10/100/1000 Mbps and a link is present.
	Flashing green	The port is receiving or sending data.
	Off	No link is present.

Table8-17 Fiber management Ethernet port LED description

LED mark	Status	Description
LINK/ACT	Off	No link is present.
	Steady green	The port is operating at 1000 Mbps and a link is present.

	Flashing green	The port is receiving or sending data at 1000 Mbps.
	Steady yellow	The port is operating at 100 Mbps and a link is present.
	Flashing yellow	The port is receiving or sending data at 100 Mbps.

Fan module alarm LEDs

The HPE 5944 power-to-port fan module and HPE 5944 port-to-power fan module each provide an alarm LED.

Table8-18 Fan module alarm LED description

Status	Description
On	The fan module is faulty.
Off	The fan module is operating correctly.

9 Appendix D Cooling system

CAUTION:

To guarantee heat dissipation, you must install fan modules of the same model for the switch.

To dissipate heat timely and ensure system stability, the switch uses the front-rear air aisle cooling system. Consider the site ventilation design when you plan the installation site for the switch.

Table9-1 Cooling system for the switch

Available fan modules	Airflow direction
HPE 5944 power-to-port fan module	From the power supply side to the port side
HPE 5944 port-to-power fan module	From the port side to the power supply side

Figure9-1 Airflow from the power supply side to the port side through the HPE 5944 48XGT 6QS28 chassis (with HPE 5944 power-to-port fan module)

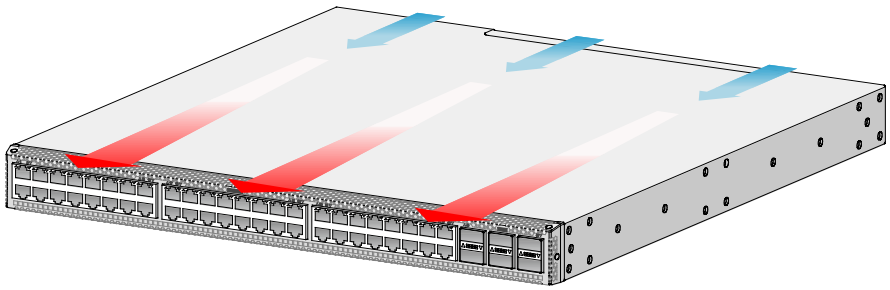
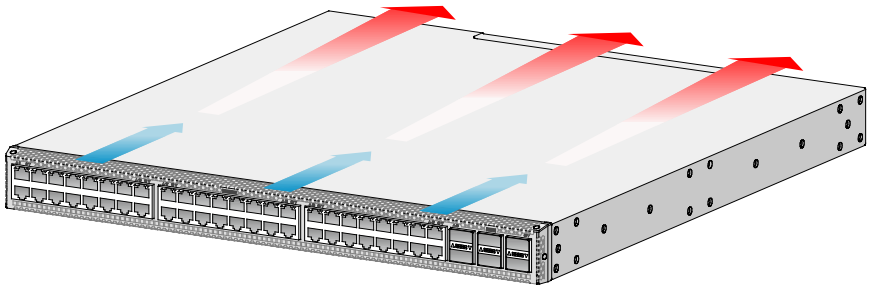


Figure9-2 Airflow from the port side to the power supply side through the HPE 5944 48XGT 6QS28 chassis (with HPE 5944 port-to-power fan module)



10 Document conventions and icons

Conventions

This section describes the conventions used in the documentation.

Command conventions

Convention	Description
Boldface	**Bold** text represents commands and keywords that you enter literally as shown.
Italic	*Italic* text represents arguments that you replace with actual values.
[ ]	Square brackets enclose syntax choices (keywords or arguments) that are optional.
{ x | y | ... }	Braces enclose a set of required syntax choices separated by vertical bars, from which you select one.
[x | y | ...]	Square brackets enclose a set of optional syntax choices separated by vertical bars, from which you select one or none.
{ x | y | ... } *	Asterisk marked braces enclose a set of required syntax choices separated by vertical bars, from which you select at least one.
[x | y | ...] *	Asterisk marked square brackets enclose optional syntax choices separated by vertical bars, from which you select one choice, multiple choices, or none.
&<1-n>	The argument or keyword and argument combination before the ampersand (&) sign can be entered 1 to n times.
#	A line that starts with a pound (#) sign is comments.

GUI conventions

Convention	Description
Boldface	Window names, button names, field names, and menu items are in Boldface. For example, the **New User** window opens; click **OK**.
>	Multi-level menus are separated by angle brackets. For example, **File** > **Create** > **Folder**.

Symbols

Convention	Description
⚠ **WARNING!**	An alert that calls attention to important information that if not understood or followed can result in personal injury.
△ **CAUTION:**	An alert that calls attention to important information that if not understood or followed can result in data loss, data corruption, or damage to hardware or software.
ⓘ **IMPORTANT:**	An alert that calls attention to essential information.
NOTE:	An alert that contains additional or supplementary information.
TIP:	An alert that provides helpful information.

Network topology icons

Convention	Description
	Represents a generic network device, such as a router, switch, or firewall.
	Represents a routing-capable device, such as a router or Layer 3 switch.
	Represents a generic switch, such as a Layer 2 or Layer 3 switch, or a router that supports Layer 2 forwarding and other Layer 2 features.
	Represents an access controller, a unified wired-WLAN module, or the access controller engine on a unified wired-WLAN switch.
	Represents an access point.
	Represents a wireless terminator unit.
	Represents a wireless terminator.
	Represents a mesh access point.
	Represents omnidirectional signals.
	Represents directional signals.
	Represents a security product, such as a firewall, UTM, multiservice security gateway, or load balancing device.
	Represents a security module, such as a firewall, load balancing, NetStream, SSL VPN, IPS, or ACG module.

Examples provided in this document

Examples in this document might use devices that differ from your device in hardware model, configuration, or software version. It is normal that the port numbers, sample output, screenshots, and other information in the examples differ from what you have on your device.

11 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, Care Packs, 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
Networking websites	
Hewlett Packard Enterprise Information Library for Networking	www.hpe.com/networking/resourcefinder
Hewlett Packard Enterprise Networking website	www.hpe.com/info/networking
Hewlett Packard Enterprise My Networking website	www.hpe.com/networking/support
Hewlett Packard Enterprise My Networking Portal	www.hpe.com/networking/mynetworking
Hewlett Packard Enterprise Networking Warranty	www.hpe.com/networking/warranty
General websites	
Hewlett Packard Enterprise Information Library	www.hpe.com/info/enterprise/docs
Hewlett Packard Enterprise Support Center	www.hpe.com/support/hpesc
Hewlett Packard Enterprise Support Services Central	ssc.hpe.com/portal/site/ssc/
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 (not applicable to all devices)	www.hpe.com/support/selfrepair
Insight Remote Support (not applicable to all devices)	www.hpe.com/info/insightremotesupport/docs

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, Care Pack Service, 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

Documentation feedback

Hewlett Packard Enterprise is committed to providing documentation that meets your needs. To help us improve the documentation, send any errors, suggestions, or comments to Documentation Feedback (docsfeedback@hpe.com). When submitting your feedback, include the document title,

part number, edition, and publication date located on the front cover of the document. For online help content, include the product name, product version, help edition, and publication date located on the legal notices page.

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