



Hewlett Packard
Enterprise

HPE Lightning Protection Guide

CLICK ANYWHERE on THIS PAGE to RETURN to LIGHTNING
PROTECTION SYSTEMS at InspectApedia.com

© Copyright 2015, 2016 Hewlett Packard Enterprise Development LP

The information contained herein is subject to change without notice. The only warranties for Hewlett Packard Enterprise products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. Hewlett Packard Enterprise shall not be liable for technical or editorial errors or omissions contained herein.

Confidential computer software. Valid license from Hewlett Packard Enterprise required for possession, use, or copying. Consistent with FAR 12.211 and 12.212, Commercial Computer Software, Computer Software Documentation, and Technical Data for Commercial Items are licensed to the U.S. Government under vendor's standard commercial license.

Links to third-party websites take you outside the Hewlett Packard Enterprise website. Hewlett Packard Enterprise has no control over and is not responsible for information outside the Hewlett Packard Enterprise website.

Acknowledgments

Intel®, Itanium®, Pentium®, Intel Inside®, and the Intel Inside logo are trademarks of Intel Corporation in the United States and other countries.

Microsoft® and Windows® are trademarks of the Microsoft group of companies.

Adobe® and Acrobat® are trademarks of Adobe Systems Incorporated.

Java and Oracle are registered trademarks of Oracle and/or its affiliates.

UNIX® is a registered trademark of The Open Group.

Contents

Overview	1
Basic concepts	1
Lightning strike	1
Lightning overvoltage	1
Grounding	1
Lightning arrester	1
Lightning down conductor	1
Earth electrode	1
Earthing network	1
Earthing down conductor	1
Grounding terminal	2
Equipotential bonding	2
PE	2
PGND	2
GND	2
Common grounding system	2
Lightning strikes on network devices	2
Lightning protection	3
References	3
Lightning protection installation	4
Grounding	4
General requirements	4
Grounding methods	4
Cable routing	7
General requirements	7
Routing power cords	7
Routing signal cables	7
Routing fibers	7
Routing grounding cables	8
Equipotential bonding	8
General requirements	8
Equipotential bonding connection	8
(Optional) Installing lightning protectors	9
Installing a power lightning protector	9
Installing a signal lightning protector	10
Lightning protector installation example	12
Installing lightning protection in a wiring closet	13
Document conventions and icons	16
Conventions	16
Network topology icons	17
Support and other resources	18
Accessing Hewlett Packard Enterprise Support	18
Accessing updates	18
Websites	19
Customer self repair	19
Remote support	19
Documentation feedback	19
Index	21

Overview

Lightning strikes might cause extensive damage to devices and interrupt the operation of the entire device system. It is crucial to protect devices from lightning strikes.

Basic concepts

Lightning strike

A lightning strike is an electric discharge between clouds, or between a cloud and the ground and the objects on the ground.

Lightning overvoltage

Lightning overvoltage is transient overvoltage on a point caused by a lightning strike.

Grounding

Connect a conductive object to the earth so that the object has the potential equal to or approximately the same as the potential of the earth.

Lightning arrestor

A lightning arrestor is a lightning rod, lightning strip (thread), lightning grid, and metal roof surface or metal structure used for lightning protection.

Lightning down conductor

Lightning down conductor is a metal conductor that connects a lightning arrestor to a grounding facility.

Earth electrode

Earth electrode is a conductive part or a group of conductive parts that are in intimate contact with the earth and provide an electrical connection.

Earthing network

Earthing network is part of an earthing installation that is restricted to the earth electrodes and their interconnections.

Earthing down conductor

Earthing down conductor is a metal conductor that connects the earthing network and the main earthing bar.

Grounding terminal

Grounding terminal is a protective earth (PE) terminal of the device.

Equipotential bonding

Equipotential bonding is an electrical connection that connects grounding terminals of connected devices to reach the same or similar potential.

PE

PE is the protective earth for the chassis and metal cover of the devices in the chassis.

PGND

PGND is the DC power grounding for the chassis. Typically ground the –48 VDC positive electrode at the power distribution cabinet.

GND

GND is the digital and analog grounding for circuits on cards and motherboards.

Common grounding system

Common grounding system is the grounding system that connects the following:

- Lightning protection facilities of all parts.
- Metal structures of the building.
- Low voltage electrical distribution PE wire.
- Equipotential bonding strip.
- Equipment protection earthing.
- Shielding body earthing.
- ESD grounding.
- Earthing facilities.

Lightning strikes on network devices

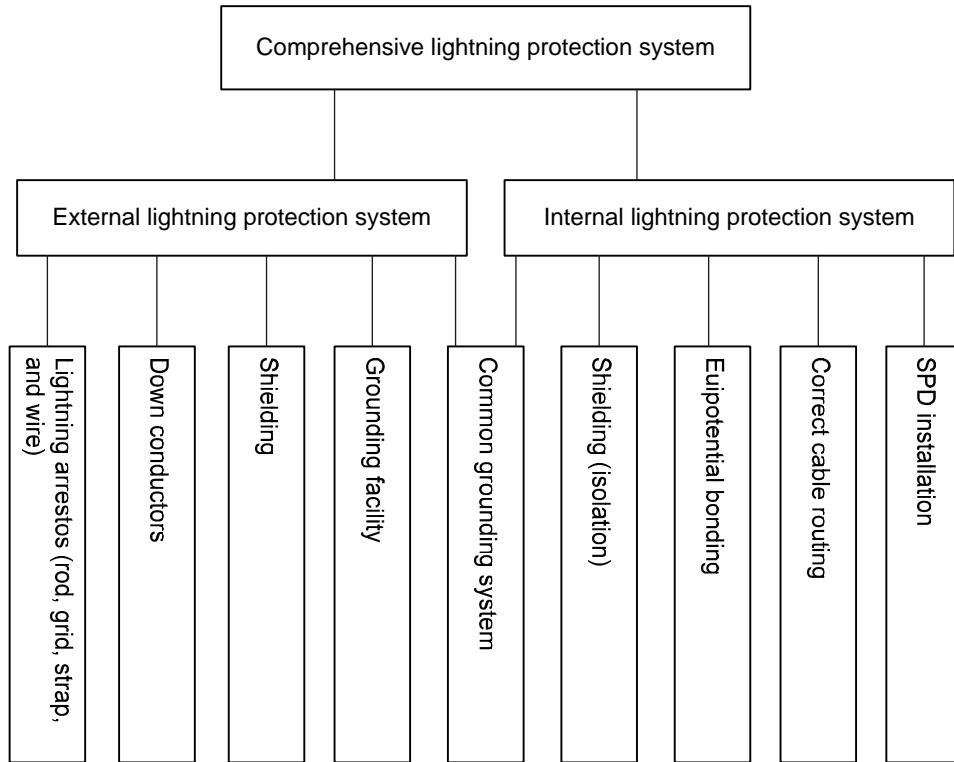
Lightning strikes might damage network devices through the following ways:

- A direct lightning strike is diverted to the earth directly through a lightning arrester, which leads to the earth potential around the earthing network rising. Over-voltage is drawn to the devices along the grounding cables, damaging the devices.
- When the lightning current is led into the ground through the lightning down conductor, high current rate change causes a strong magnetic field in the vicinity of the down conductor. Overvoltage is induced on the surrounding devices.
- The power lines or communication lines in and out of a building or an equipment room is hit by a lightning strike. Over-voltage and over-current run into the devices along the lines and damage the devices.

Lightning protection

Typically a building uses a lightning rod against direct lightning strikes. However, the power cords and signal cables of electronic devices might easily carry induced currents caused by lightning strikes to the devices. Therefore, you must build a comprehensive lightning protection system for a building, including an external and internal lightning protection system.

Figure 1 Comprehensive lightning protection system



The external lightning protection system includes lightning arrestors, down conductors, and grounding facilities. The system mainly protects the building from direct lightning strikes.

The internal lightning protection system includes equipotential bonding system, common grounding system, shielding system, correct cable routing, and SPD installation. The system reduces and prevents the EM effects of overcurrents caused by lightning strikes.

References

- IEC61024, *Protection of Structures Against Lightning*
- ITU K.27, *Bonding Configurations and Earthing Inside a Telecommunication Building*

Lightning protection installation

This section describes the following lightning protection methods for device installation. These methods protect devices from induced lightning strikes.

- **Grounding**—Reliable grounding is crucial for lightning protection and anti-interference. To ground the devices correctly and reliably, follow all the guidelines in this section.
- **Cable routing**—To minimize the impact of induced lightning strikes on devices and enhances resistance against interferences, follow these guidelines to route power cords and signal cables:
 - Avoid routing cables overhead and along roofs.
 - Route different types of cables separately.
- **Equipotential bonding**—Equipotential bonding is designed to reduce the potential difference between metal components and the system. It can effectively reduce overvoltage occurrences caused by lightning strikes.

Grounding

General requirements

To quickly discharge overvoltage and overcurrent caused by lightning strikes or other reasons, ground all the uncharged metal components of the device. Uncharged metal components include grounding terminals on the chassis, metal sheaths or shields on outdoor cables, and signal lightning arrestors on cables. When AC power is used, you can use the PE wire to ground the device. When DC power is used, ground the positive electrode of the 48V DC power source (or the negative electrode of the 24V DC power module) at the DC power outlet on the power distribution cabinet.

Design the lightning protection grounding system based on the principles of voltage balance and equal potential. All the grounding facilities share a group of grounding conductors.

Follow these guidelines to select and lay a grounding cable:

- Select a short and thick yellow and green plastic insulated copper wire (not aluminum) as the grounding cable. Do not use other equipment as the electrical connection part of a grounding cable.
- Verify that the cross-sectional area of the grounding cable is greater than or equal to 6 mm² (0.0093 sq in). The length of the grounding cable does not exceed 30 m (98.43 ft). If the connection distance is greater than 30 m (98.43 ft), add a new grounding strip or rearrange the grounding strips to reduce the length of the grounding cable.
- Do not lay a grounding cable and a signal cable in parallel or entangle them.
- Do not add a connector, switch, or fuse to a grounding cable.
- Ensure good electrical contact at the connection points of both ends of a grounding cable. To protect the connection points from corrosion, perform either of the following tasks:
 - Coat them with silicone, and wrap the insulation tape and then the UV protection tape.
 - Weld the connection points, and first coat the connection points with silver paint powders and then apply the antirust paint.

Grounding methods

This example uses an HPE Ian access switch as example to describe the following grounding methods for lightning protection:

- Connect the grounding cable to the grounding strip.
- Bury a grounding conductor in the earth.
- Ground the device by using the PE wire of the AC power cord.

⚠ IMPORTANT:

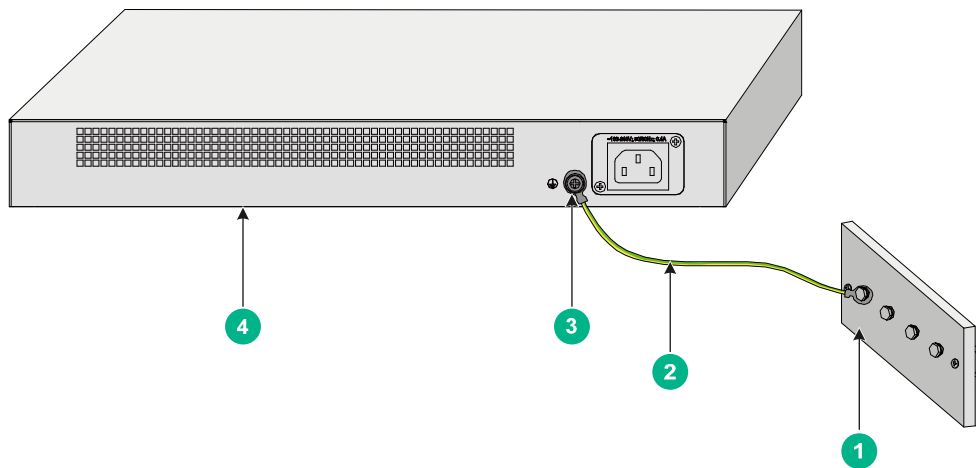
- If part of a cable is laid outdoors, ground the metal sheath or shield of the outdoor part reliably.
- If you install a signal lightning arrester for a cable, ground the signal lightning arrester reliably.

Connecting the grounding cable to a grounding strip

If a grounding strip is available at the installation site, perform the following steps:

1. Connect the grounding cable to the grounding terminal on the rear panel of the chassis.
2. Attach one end of the grounding cable to the grounding terminal on the rear panel of the chassis.
3. Attach the other end to a grounding post on the grounding strip and fasten it with the nut.

Figure 2 Connecting the grounding cable to a grounding strip



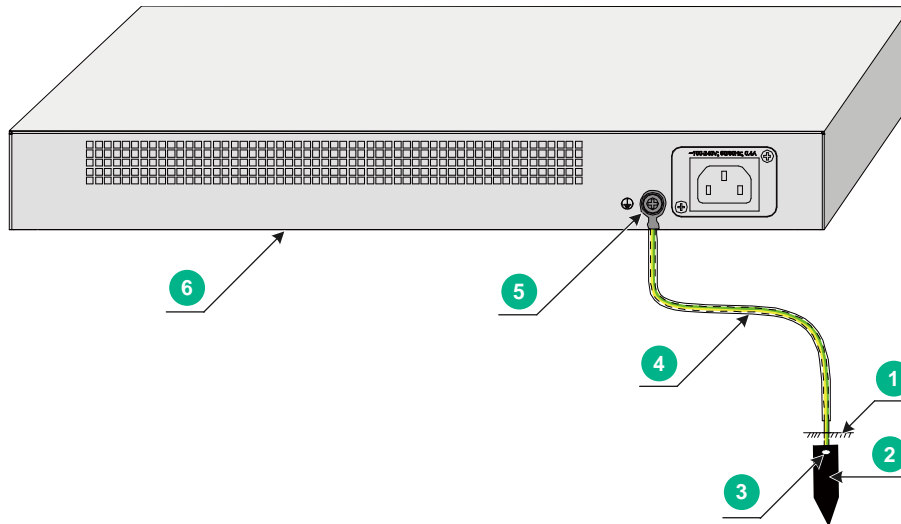
(1) Grounding strip	(2) Grounding cable
(3) Grounding terminal	(4) Chassis rear panel

Burying a grounding conductor in the earth

If the installation site does not have any grounding strips, but earth ground is available, perform the following steps:

1. Hammer a 0.5 m (1.64 ft) or longer angle iron or steel tube into the earth ground to act as a grounding conductor.
The dimensions of the angle iron must be a minimum of 50 × 50 × 5 mm (1.97 × 1.97 × 0.20 in). The steel tube must be zinc-coated and its wall thickness must be a minimum of 3.5 mm (0.14 in).
2. Weld the yellow-green grounding cable to the angel iron or steel tube and treat the joint for corrosion protection.

Figure 3 Burying a grounding conductor in the earth



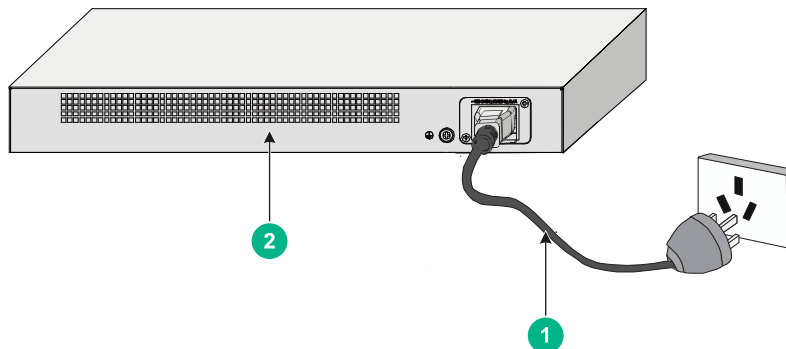
(1) Earth	(2) Grounding conductor	(3) Joint
(4) Grounding cable	(5) Grounding terminal	(6) Chassis rear panel

Grounding the device by using the PE wire of the AC power cord

If the installation site does not have a grounding strip and you cannot bury a grounding conductor at the site, ground the device by using the PE wire of the AC power cord. Make sure the following requirements are met:

- The AC power cord has a PE wire.
- The PE wire is reliably grounded.
- The PE terminal of the device is securely connected to the PE wire of the AC power cord.

Figure 4 Grounding the device by using the PE wire of the AC power cord



(1) Three-wire AC power cord	(2) Chassis rear panel
------------------------------	------------------------

Grounding resistance

Make sure the grounding resistance of the grounding strip is less than 5Ω. For the angle iron in the ground, the grounding resistance should be less than 10Ω. For locations with high soil resistivity, sprinkle some resistance reducer to reduce soil resistivity.

Cable routing

To minimize damage caused by induced lightning strikes, route signal cables and Ethernet network cables indoors whenever possible. If you have to lay these cables overhead or along roofs, see "[Outdoor cable routing](#)."

General requirements

Indoor cable routing

- Route different types of cables separately.
- Bind the cables with cable ties every 100 mm (3.94 in).
- Make sure the grounding cable is as short and thick as possible. When you connect a grounding cable to a grounding strip, use the nut to fasten the joint tightly or weld the joint and treat it with anti-corrosion measures.

Outdoor cable routing

- If the cables cannot be routed completely indoors, lay the outdoor cables underground (from the ground into the room). If the cables cannot be laid underground, lay the cable overhead and feed the cables through a metal pipe 15 m (49.21 ft) near the room. Ground the two ends of the metal pipe reliably and install a signal lightning arrestor for each interface on the device.
- If you use a shielded cable, make sure the shielding layer makes good contact with the device metal cover at the interface and install a signal lightning arrestor for the interface.
- If you connect outdoor cables without any protection to the device, install a signal lightning arrestor for each interface.
- Lay the fibers neatly. Do not stretch the fibers or bundle the fibers too tightly.

Routing power cords

Connect one end of the power cord to the device and the other end to the power strip or the lightning protection strip. Fold the excess part of the cord into an S-shape and attach it to the inside panel of the chassis. Keep the power cords a minimum of 20 cm (7.87 in) away from other cables.

Routing signal cables

Install and bundle outdoor and indoor signal cables separately and route them from different outlets on the chassis.

Routing fibers

CAUTION:

A fiber is not conductive and does not transmit overvoltage. However, a buffered optical fiber (for example, a metallic armored fiber) transmits over-voltage. Therefore, ground the device reliably if you use fibers to connect the device.

To connect fiber-copper converters, hang the fibers on the inside panel of the chassis. To connect other devices, feed the fibers through PVC pipes. Do not pull and stretch the fibers.

Routing grounding cables

Before you connect a grounding cable, determine the connection distance in case the cable is too long or too short.

After you complete connecting cables, you can use firestop sealant to fill up the extra space in the outlets.

Connect one end of a grounding cable to the grounding terminal on the device and the other end to the grounding strip. Keep the grounding cable 20 cm (7.87 in) away from other cables (for example, signal cable).

Equipotential bonding

General requirements

Equipotential bonding is required for devices interconnected for the same purpose, including interconnected devices, metal sheaths of cables, PE wires of power cords, and metal structures.

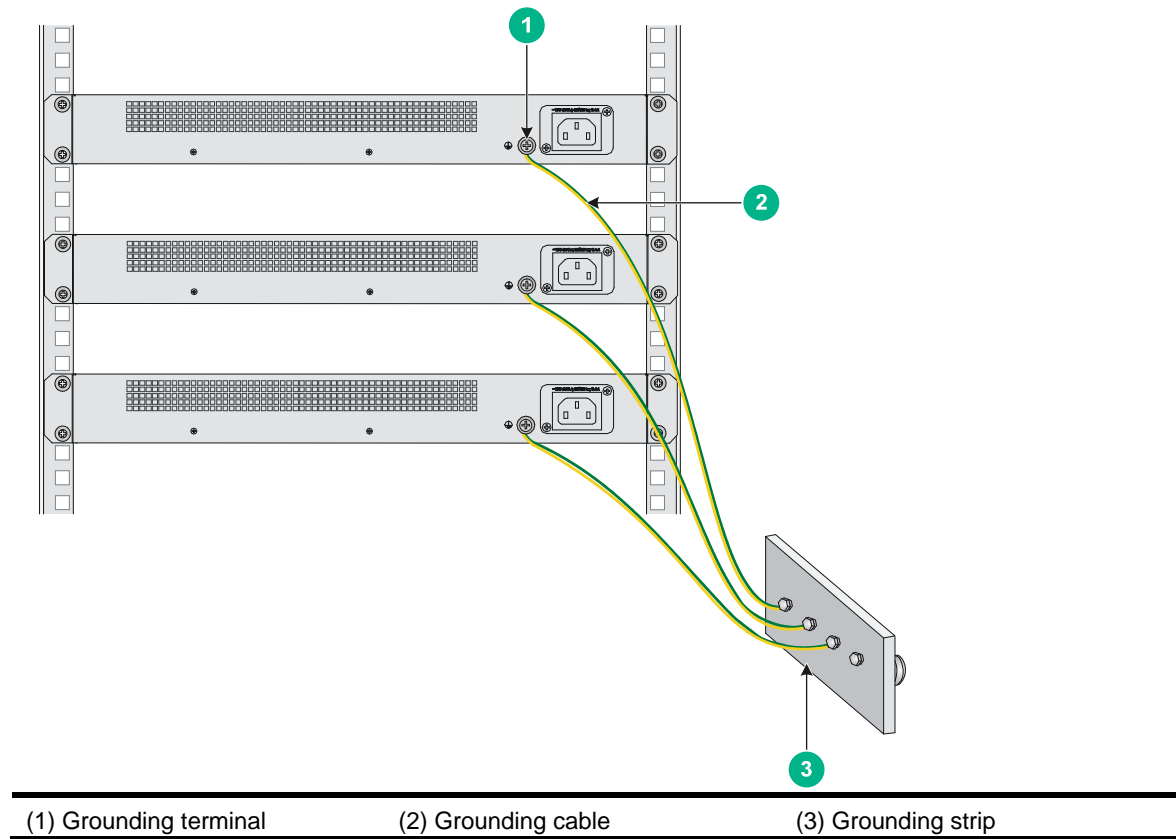
Follow these guidelines for equipotential bonding:

- Use yellow and green cables with a diameter greater than or equal to 6 mm² (0.0093 sq in).
- Use cables as short as possible.
- Prepare a grounding strip (ring) to act as the equipotential bonding point.

Equipotential bonding connection

Connect the interconnected devices as shown in [Figure 5](#) for equipotential bonding. After you finish the connection, use a multimeter to test each connection point to ensure good contact and ensure that the resistance is not less than 0.1 ohm.

Figure 5 Equipotential bonding connection



(Optional) Installing lightning protectors

Installing a power lightning protector

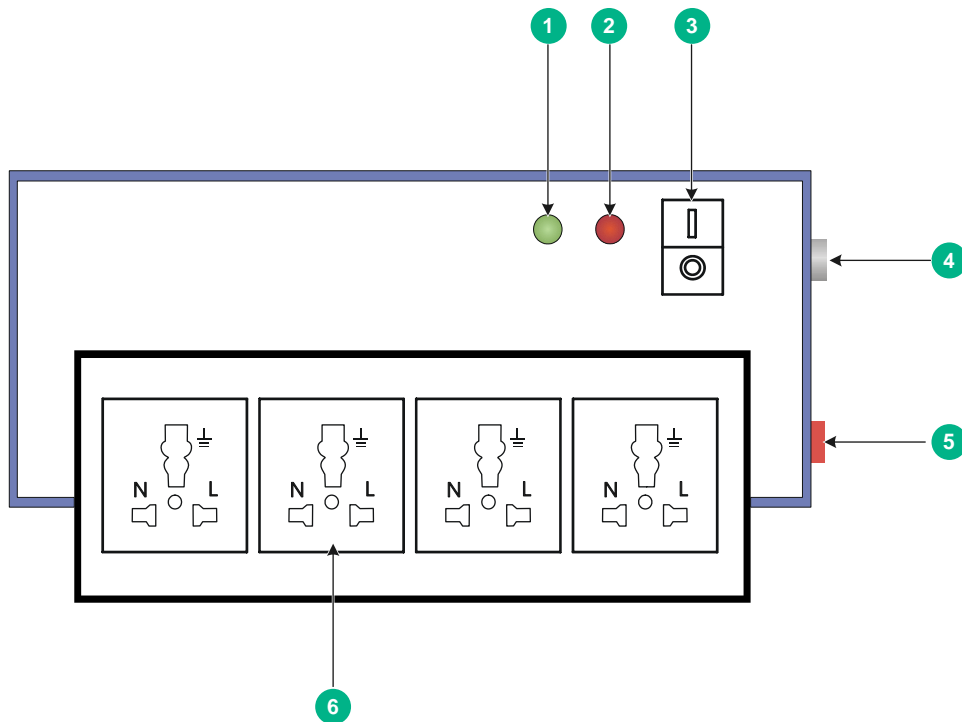
⚠ CAUTION:

To avoid damage to the device, make sure the PE terminal of the power socket on the power strip is reliably grounded.

To install a power lightning protector:

1. Prepare a power lightning protector (it is not included with the device).
2. If part of the AC power line is routed outdoors, use a lightning protection power strip to connect the AC power cord of the switch to the AC power line to protect the switch from being damaged by lightning strikes.
3. Attach the lightning protection power strip to the rack, workbench, or wall of the equipment room.
4. After you connect the AC power cord from the switch to a socket on the power strip, verify that the green RUN LED on the strip is on and the red LED is off.
5. If the red LED is on, use a multimeter to verify the polarity of the wires in the power socket for incorrect connections. If the zero wire (left) and the live wire (right) are correctly connected, check for missing grounding connections.

Figure 6 Lightning protection power strip



(1) LED	<ul style="list-style-type: none"> • Steady green—The circuit is operating correctly. • Off—The circuit is damaged.
(2) Grounding/pole detection LED	Steady red indicates a wrong wire connection (the wire is not grounded or the live line and null line are reversely connected), and you need to examine the power supply line.
(3) Power switch	
(4) IEC standard socket	It is used to connect to the power source in the equipment room through a power cord.
(5) Overload automatic protector	The protector automatically opens the electric circuit when the current exceeds the threshold and closes the electric circuit when the current drops below the threshold.
(6) Multifunctional socket	It is used to connect the power module of the device.

Installing a signal lightning protector

⚠ IMPORTANT:

Before you install a signal lightning protector, read the instructions carefully.

Required tools

- Phillips or flat-blade screwdriver
- Multimeter
- Diagonal pliers

Installation procedure

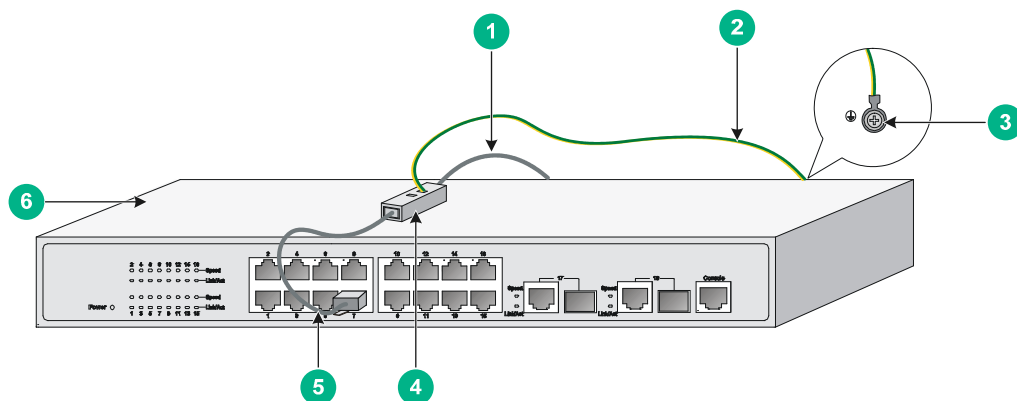
To install a lightning protector:

1. Prepare a signal lightning protector (it is not included with the device).
2. Place the signal lightning protector as close to the grounding terminal of the device as possible.
3. If the device has more than one network port connected with other devices through outdoor cables, install a signal lightning protector for each network port.
4. Measure the distance between the protector and the grounding screw of the device, cut the ground wire of the protector to a length as required, and securely tighten the ground wire to the grounding terminal of the device.
5. Use the multimeter to verify that the ground wire of the protector makes good contact with the grounding terminal of the device.
6. Insert the outdoor network cable into the protector's IN end, and the cable connected to the switch into the OUT end, and observe the LEDs on the lightning protector to verify that the connection is correct.
7. Use nylon ties to bundle the cables neatly.
8. After the connection is complete, use the multimeter to verify that the ground wire for the protector is as short as possible to ensure its good contact with the grounding terminal of the device.

NOTE:

- If part of the network cable of a 10/100/1000 Mbps RJ-45 copper Ethernet port must be routed outdoors, connect the cable first to a signal lightning protector and then to the port.
 - Hewlett Packard Enterprise recommends that you install a signal lightning protector for each 10/100/1000 Mbps RJ-45 copper Ethernet port. Before you install a signal lightning protector, read the instructions carefully.
-

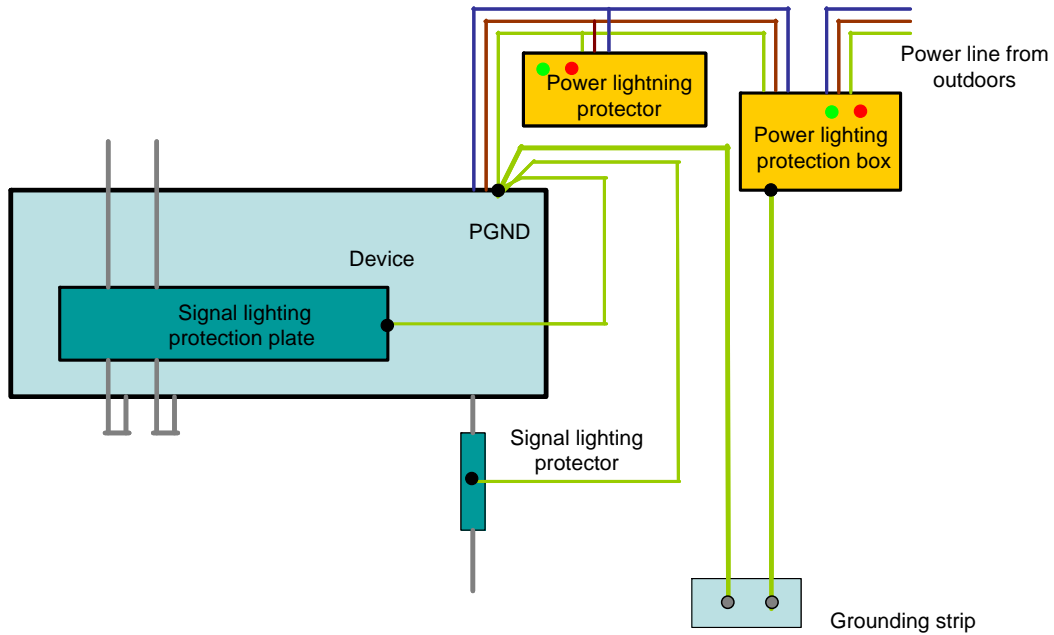
Figure 7 Installing a signal lightning protector



-
- | | | |
|--------------------------------|--------------------------------|------------------------------|
| (1) Cable routed from outdoors | (2) Equipotential bonding line | (3) Grounding terminal |
| (4) Lightning protector | (5) Ethernet network cable | (6) Device (Ethernet switch) |
-

Lightning protector installation example

Figure 8 Lightning protector installation example



As shown in [Figure 8](#):

- The power lightning protector is connected in parallel to the power grounding terminal on the device with a cable 20 cm (7.87 in) to 30 cm (11.81 in).
- The signal lightning protector is placed near the device grounding terminal.
- A signal lightning protection plate is installed above the device and is connected to the PGND of the device with a grounding cable of 20 cm (7.87 in).
- All the devices are connected in equipotential bonding and then connected to the main earthing bar.

Installing lightning protection in a wiring closet

You can place a switch, fiber splice enclosure, and fiber-copper converter in a wiring closet. Place the devices in the wiring closet in this order: uplink fibers, fiber splice enclosure, fiber-copper converter, switch, and user. Avoid intertwining the cables.

The following devices and equipment are involved in this installation example:

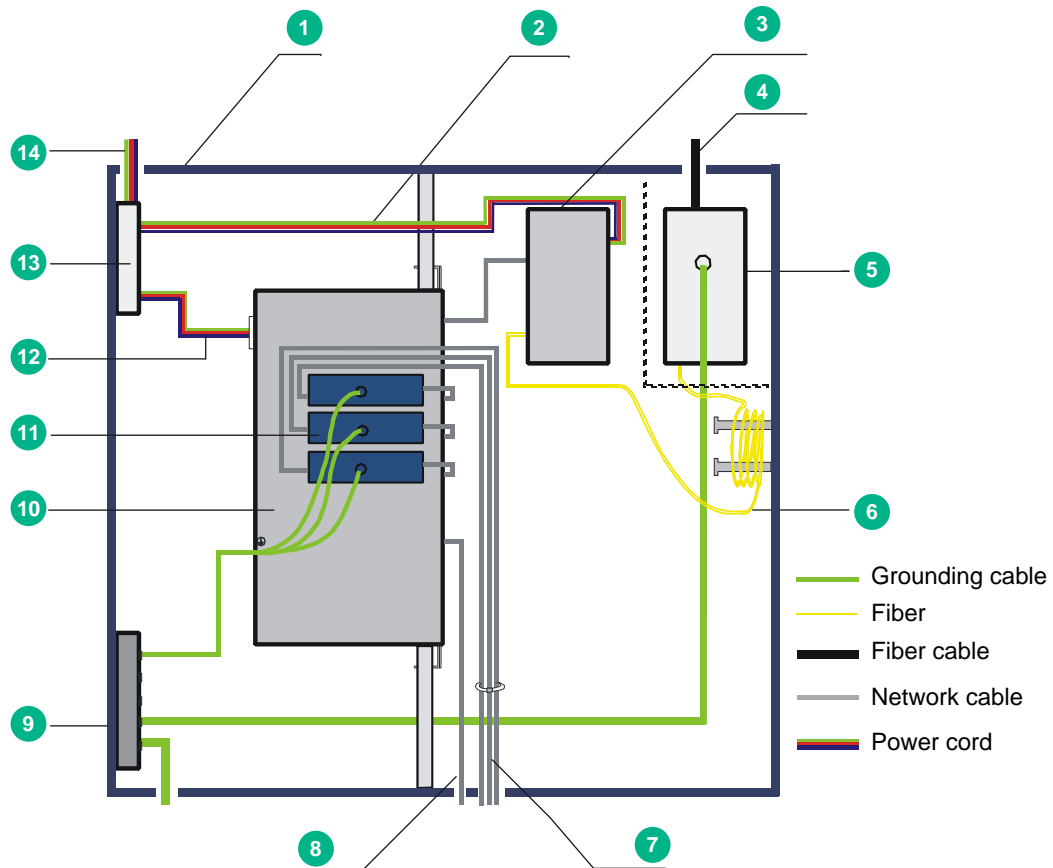
- **Wiring closet**—Metal closet that contains the devices to be protected.
- **Power cord for the fiber-copper converter**—Connects the fiber-copper converter and the lightning protection power strip.
- **Fiber-copper converter**—Optional. If the device supports SFP transceiver modules, you do not need to order the fiber-copper converter separately.
- **Fiber cable with metal-shielded fiber core**—Routes a fiber cable outdoors from the fiber cable outlet and connects it to an uplink device. To protect fiber cables from environmental affects, use fiber cables with metal-shielded fiber core.
- **Fiber splice enclosure**—Optional. Fuses fibers and fiber patch cords.
- **Fiber**—If the fiber in the wiring closet is too long, wrap and fix the fiber. Wrap the fiber with a large radius.
- **Cables to route outdoors**—Bundle the cables neatly and rout them through the outlet to the outdoors.
- **Cables to route indoors**—Bundle and outlet the indoor cables separately from the outdoor cables.
- **Grounding strip for the wiring closet**—Used to ground the devices and protect the devices from lightning strikes.
- **Protected device**—Ethernet switch.
- **Signal lightning protector**—Install a signal lightning protector for cables laid from outdoors.
- **Power cord of the device**—Connects the device and the lightning protection power strip.
- **Lightning protection strip**—Use a lightning protection strip for power input at a site where lightning strikes frequently occur or a site with special needs.
- **Power cord routing from outdoors**—Connects the power source and the lightning protection power strip.

Follow these restrictions and guidelines when you perform lightning protection installation:

- **Wiring closet**
 - Install the wiring closet at the first floor to reduce the grounding resistance.
 - Install the wiring closet at a dry and ventilated site where there is no sun exposure.
 - Do not mount the wiring closet on a pole or on an outdoor wall.
- **Protected device**
 - Connect the grounding terminal on the rear panel of the device to the grounding strip of the wiring closet.
 - The power of the device is led in through the lightning protection strip or common strip in the wiring closet. Make sure the strip is reliably grounded.
- **Fiber-copper converter**
 - Secure the fiber-copper converter in the wiring closet. Do not intertwine the network cables and the power cords.

- Lead the power of the fiber-copper converter in through the lightning protection strip or common strip in the wiring closet. Make sure the strip is reliably grounded.
- Fiber cable and fiber splice enclosure
 - Lay the uplink fiber underground before you lead it into the wiring closet, and connect it to the fiber splice enclosure.
 - If you have to lay the fiber cable overhead, isolate the fiber splice enclosure from the wiring closet. You can use a PVC gasket or dielectric frame to isolate the fiber splice enclosure from the wiring closet and make sure the fiber splice enclosure is a minimum 10 cm (3.94 in) away from the wiring closet and other devices. If you cannot totally separate them, use a buffered optical fiber, for example, a metallic armored fiber. Feed the buffered optical fiber through a multi-strand copper wire with a minimum cross-section area of 16 mm² (0.0248 sq in), and connect it to the grounding strip.
- Signal lightning protector
 - Add a signal lightning protector for an outdoor wiring cable and a cable connected to the outdoor devices.
 - Connect the grounding cable of the signal lightning protector directly to the grounding terminal of the device. If a number of single-port signal lightning protectors are used, and the grounding terminals of the device is not sufficient for single-port signal lightning protectors, connect the grounding cables of the protectors directly to the grounding strip of the wiring closet. Make sure the grounding cables are as short and thick as possible.
- Power supply
 - Do not connect the power cord from the power grid directly to the device. Use the power from the distribution boxes in the corridor.
 - For the site where lightning strikes frequently occur or the site with special needs, lead in power through the lightning protection strip.
 - Ensure reliable PE connection at the power inlets.
- Grounding strip of the wiring closet
 - Add a grounding strip for the wiring closet. Most wiring closets do not have a grounding strip.
 - If you cannot add a grounding strip for the wiring closet, make sure all devices in the wiring closet are equipotentially bonded and are connected finally to the outdoor earth.

Figure 9 Wiring closet lightning protection installation



(1) Wiring closet	(2) Power cord for the fiber-copper converter
(3) Fiber-copper converter	(4) Fiber cable with metal-shielded fiber core
(5) Fiber splice enclosure	(6) Fiber
(7) Cables to route outdoors	(8) Cables to route indoors
(9) Grounding strip for the wiring closet	(10) Protected device
(11) Signal lightning protector	(12) Power cord of the device
(13) Lightning protection strip	(14) Power cord routing from outdoors

Document conventions and icons

Conventions

This section describes the conventions used in the documentation.

Port numbering in examples

The port numbers in this document are for illustration only and might be unavailable on your device.





Command conventions

Convention	Description
Boldface	Bold text represents commands and keywords that you enter literally as shown.
<i>Italic</i>	<i>Italic</i> 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 appears; 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 card, such as a firewall, load balancing, NetStream, SSL VPN, IPS, or ACG card.

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.

Index

B C E G I L P R

B

Basic concepts,1

C

Cable routing,7

Common grounding system,2

E

Earth electrode,1

Earthing down conductor,1

Earthing network,1

Equipotential bonding,2

Equipotential bonding,8

Equipotential bonding connection,8

G

General requirements,4

General requirements,7

General requirements,8

GND,2

Grounding,1

Grounding,4

Grounding methods,4

Grounding terminal,2

I

Installing a power lightning protector,9

Installing a signal lightning protector,10

L

Lightning arrester,1

Lightning down conductor,1

Lightning overvoltage,1

Lightning protection,3

Lightning protector installation example,12

Lightning strike,1

Lightning strikes on network devices,2

P

PE,2

PGND,2

R

References,3

Routing fibers,7

Routing grounding cables,8

Routing power cords,7

Routing signal cables,7