ExtremeSwitching Hardware Installation Guide

for Switches Using ExtremeXOS Version 30

121248-05 Rev. AN
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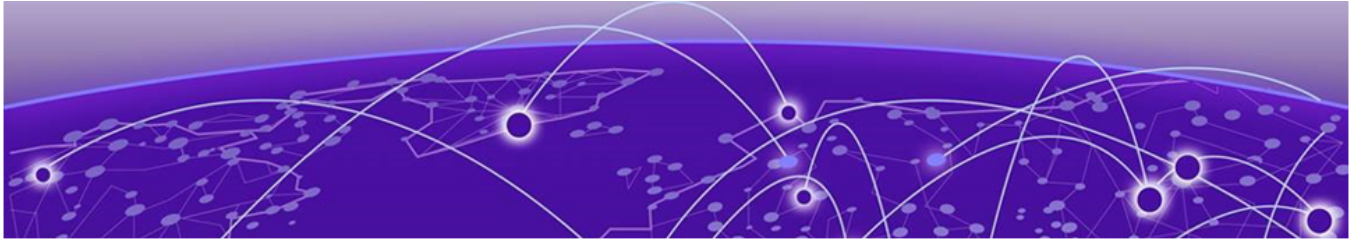

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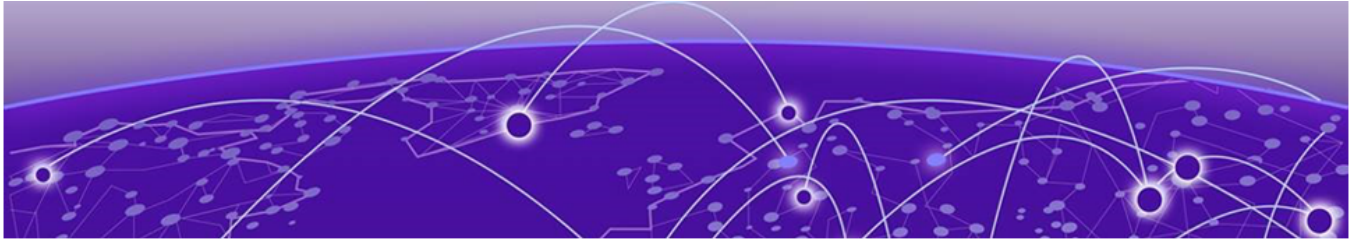


Preface

This guide provides the instructions and supporting information needed to install the following Extreme Networks® ExtremeSwitching® and Summit® family switches:

The guide includes information about site preparation, switch functionality, and switch operation.

Audience

This guide is intended for use by network administrators responsible for installing and setting up network equipment. It assumes a basic working knowledge of:

- Local area networks (LANs)
- Ethernet concepts
- Ethernet switching and bridging concepts
- Routing concepts
- Simple Network Management Protocol (SNMP)
- Basic equipment installation procedures

See the *ExtremeXOS 30.7 User Guide* and the *ExtremeXOS 30.7 Command Reference Guide* for information about configuring ExtremeSwitching switches.

Note
If the information in an installation note or release note shipped with your Extreme Networks equipment differs from the information in this guide, follow the installation or release note.

Conventions

This section discusses the conventions used in this guide.

Text Conventions

Unless otherwise noted, information in this document applies to all supported environments for the products in question. Exceptions, like command keywords associated with a specific software version, are identified in the text.

When a feature, function, or operation pertains to a specific hardware product, the product name is used. When features, functions, and operations are the same across an entire product family, such as ExtremeSwitching switches or SLX routers, the product is referred to as *the switch* or *the router*.

Table 1: Notes and warnings

Icon	Notice type	Alerts you to...
	Tip	Helpful tips and notices for using the product
	Note	Useful information or instructions
	Important	Important features or instructions
	Caution	Risk of personal injury, system damage, or loss of data
	Warning	Risk of severe personal injury

Table 2: Text

Convention	Description
`screen displays`	This typeface indicates command syntax, or represents information as it is displayed on the screen.
The words *enter* and *type*	When you see the word *enter* in this guide, you must type something, and then press the Return or Enter key. Do not press the Return or Enter key when an instruction simply says *type*.
Key names	Key names are written in boldface, for example **Ctrl** or **Esc**. If you must press two or more keys simultaneously, the key names are linked with a plus sign (+). Example: Press **Ctrl**+**Alt**+**Del**

Table 2: Text (continued)

Convention	Description
Words in italicized type	Italics emphasize a point or denote new terms at the place where they are defined in the text. Italics are also used when referring to publication titles.
NEW!	New information. In a PDF, this is searchable text.

Table 3: Command syntax

Convention	Description
bold text	Bold text indicates command names, keywords, and command options.
italic text	Italic text indicates variable content.
`[ ]`	Syntax components displayed within square brackets are optional. Default responses to system prompts are enclosed in square brackets.
`{ x | y | z }`	A choice of required parameters is enclosed in curly brackets separated by vertical bars. You must select one of the options.
`x | y`	A vertical bar separates mutually exclusive elements.
`< >`	Nonprinting characters, such as passwords, are enclosed in angle brackets.
...	Repeat the previous element, for example, *member*`[`*member*`...]`.
\	In command examples, the backslash indicates a “soft” line break. When a backslash separates two lines of a command input, enter the entire command at the prompt without the backslash.

Terminology

When features, functionality, or operation is specific to a switch family, such as ExtremeSwitching, the family name is used. Explanations about features and operations that are the same across all product families simply refer to the product as the *switch*.

Providing Feedback

The Information Development team at Extreme Networks has made every effort to ensure the accuracy and completeness of this document. We are always striving to improve our documentation and help you work better, so we want to hear from you. We welcome all feedback, but we especially want to know about:

- Content errors, or confusing or conflicting information.

- Improvements that would help you find relevant information in the document.
- Broken links or usability issues.

If you would like to provide feedback, you can do so in three ways:

- In a web browser, select the feedback icon and complete the online feedback form.
- Access the feedback form at https://www.extremenetworks.com/documentation-feedback/.
- Email us at documentation@extremenetworks.com.

Provide the publication title, part number, and as much detail as possible, including the topic heading and page number if applicable, as well as your suggestions for improvement.

Getting Help

If you require assistance, contact Extreme Networks using one of the following methods:

Extreme Portal

Search the GTAC (Global Technical Assistance Center) knowledge base; manage support cases and service contracts; download software; and obtain product licensing, training, and certifications.

The Hub

A forum for Extreme Networks customers to connect with one another, answer questions, and share ideas and feedback. This community is monitored by Extreme Networks employees, but is not intended to replace specific guidance from GTAC.

Call GTAC

For immediate support: (800) 998 2408 (toll-free in U.S. and Canada) or 1 (408) 579 2826. For the support phone number in your country, visit: www.extremenetworks.com/support/contact

Before contacting Extreme Networks for technical support, have the following information ready:

- Your Extreme Networks service contract number, or serial numbers for all involved Extreme Networks products
- A description of the failure
- A description of any actions already taken to resolve the problem
- A description of your network environment (such as layout, cable type, other relevant environmental information)
- Network load at the time of trouble (if known)
- The device history (for example, if you have returned the device before, or if this is a recurring problem)
- Any related RMA (Return Material Authorization) numbers

Subscribe to Service Notifications

You can subscribe to email notifications for product and software release announcements, Vulnerability Notices, and Service Notifications.

1. Go to www.extremenetworks.com/support/service-notification-form.
2. Complete the form (all fields are required).
3. Select the products for which you would like to receive notifications.

Note
You can modify your product selections or unsubscribe at any time.

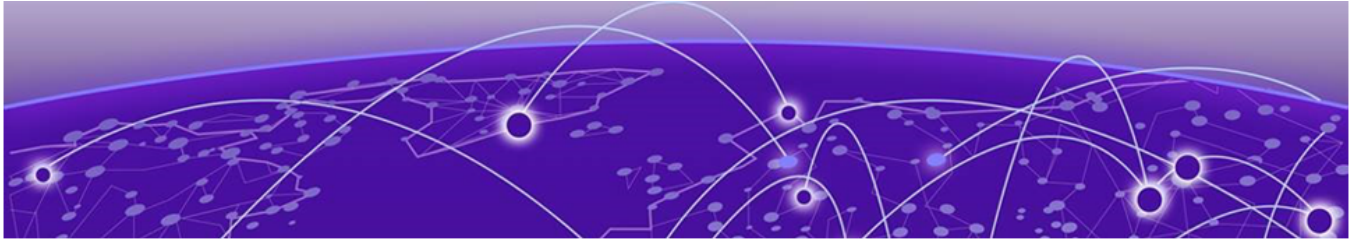
4. Select **Submit**.

Documentation and Training

Find Extreme Networks product information at the following locations:

Current Product Documentation
Release Notes
Hardware and software compatibility for Extreme Networks products
Extreme Optics Compatibility
Other resources such as white papers, data sheets, and case studies

Extreme Networks offers product training courses, both online and in person, as well as specialized certifications. For details, visit www.extremenetworks.com/education/.



ExtremeSwitching Switches

The ExtremeSwitching switches are compact enclosures 1.75 inches high (1 U). Each switch model provides high-density copper or fiber optic ports operating at speeds up to 100 Gbps. On some models, these ports can be partitioned into data lanes through the use of split cables, effectively increasing the port count. Many models also provide combination copper/fiber uplink ports. PoE connections and options for adding faster uplink connections are available on some models.

Models are available for AC or DC power connection, and many models provide bays for pluggable power supplies. All switches make provision for redundant power supplies.

Many ExtremeSwitching switches include high-speed stacking interfaces that allow you to connect up to eight switches into a stack, which can be managed as a single entity.

For information about earlier Summit-branded switches, refer to *ExtremeSwitching and Summit Switches: Hardware Installation Guide for Switches Using ExtremeXOS 16 or Earlier*.

The following sections contain general information about the switches:

- ExtremeSwitching X435 Series Switches on page 22
- ExtremeSwitching X440-G2 Series Switches on page 30
- ExtremeSwitching X450-G2 Series Switches on page 49
- ExtremeSwitching X460-G2 Series Switches on page 60

Overview of the Switches

The following sections describe the ExtremeSwitching switches and summarize the features available in each series.

Model numbers for the switches are in the following format:

<Series>-<number of front-panel I/O ports><port type><internal power supply type>

- The number of ports ranges from 8 to 72.
- The port type can be t (copper), p (copper providing PoE), q (QSFP+), or x (fiber).
- For models with integral power supplies, the power supply type can be AC (no designation) or DC.

  Models with pluggable power supplies can accommodate either AC or DC supplies and have no power designation in their model numbers.

Note
See the *ExtremeXOS 30.7 User Guide* and the *ExtremeXOS 30.7 Command Reference Guide* for feature-specific information about the Summit switches and for information regarding switch configuration.

Combination Ports and Failover

ExtremeSwitching switches provide 2, 4, or 12 uplink ports implemented as combination ports that pair a copper port using RJ45 connectors with an optical port using LC connectors.

The copper port operates as an autonegotiating 10/100/1000BASE-T port. The optical port allows Gigabit Ethernet uplink connections through Extreme Networks small form factor pluggable (SFP) interface modules. See the individual switch descriptions for the port numbers of the combination ports on each switch model.

ExtremeSwitching switches support automatic failover from an active fiber port to a copper backup or from an active copper port to a fiber port. If one of the uplink connections fails, the Summit uplink connection automatically fails over to the second connection. To set up a redundant link on a combination port, connect the active 1000BASE-T and fiber links to both the RJ45 and SFP interfaces of that port.

Gigabit Ethernet uplink redundancy on the ExtremeSwitching switches follows these rules:

- With both the SFP and 1000BASE-T interfaces connected on a combination port, only one interface can be activated. The other is inactive.
- If only one interface is connected, the switch activates the connected interface.
- The switch determines whether the port uses the fiber or copper connection based on the order in which the connectors are inserted into the switch. When the switch senses that an SFP and a copper connector are inserted, the switch enables the uplink redundancy feature. For example, if you first connect copper ports x and y on a switch, and then insert SFPs into ports x and y, the switch assigns the copper ports as active ports and the fiber ports as redundant ports.

Hardware identifies when a link is lost and responds by swapping the primary and redundant ports to maintain stability. After a failover occurs, the switch keeps the current port assignment until another failure occurs or a user changes the assignment using the CLI. For more information about configuring automatic failover on combination ports, see the *ExtremeXOS 30.7 User Guide*.

Port Partitioning

On some ExtremeSwitching switch models, you can configure QSFP28 and QSFP+ ports either as single ports or as multiple, partitioned ports. In a partitioned port, with appropriate cabling, the original physical port can accommodate multiple data lanes at lower bandwidths.

The following partitioning options are available:

Table 4: QSFP28 and QSFP+ Port Partitioning

Switch model	Port bandwidth	Port partitions
X465 (all models) SFP28	25 Gb	One 10 Gb port
X465 (all models) QSFP+	40 Gb	One 40 Gb port or Four 10 Gb ports
X670-G2-48x-4q QSFP+	40 Gb	One 40 Gb port or Four 10 Gb ports
X590 (all models) QSFP28 and QSFP+	100 Gb	One 100 Gb port with one of the following: • Two 50 Gb ports • Four 25 Gb ports
	40 Gb	One 40 Gb port or Four 10 Gb ports
X690 (all models) QSFP28 and QSFP+	100 Gb	One 100 Gb port with one of the following: • Two 50 Gb ports • Four 25 Gb ports
	40 Gb	One 40 Gb port or Four 10 Gb ports

Table 4: QSFP28 and QSFP+ Port Partitioning (continued)

Switch model	Port bandwidth	Port partitions
X695 (all models) QSFP	100 Gb	One 100 Gb port (default) with one of the following: • Two 50 Gb ports • One 40 Gb port • Four 25 Gb ports • Four 10 Gb ports
X870 (all models) QSFP28 and QSFP+	100 Gb	One 100 Gb port with one of the following: • Two 50 Gb ports • Four 25 Gb ports **Note:** On X870-96x-8c series switches, an optional Switch Port Speed License is required to increase the data rate to 100 Gb on physical ports 1 through 24. No license is required for 100 Gb capability on physical ports 25 through 32.
	40 Gb	One 40 Gb port or Four 10 Gb ports

For information about configuring partitioned ports, see the *ExtremeXOS 30.7 Command Reference Guide*.

ExtremeSwitching X435 Series Switches

The X435 Series switches provide 8 or 24 Ethernet ports that deliver high-density fast Ethernet or Gigabit Ethernet connectivity using fixed 10/100/1000BASE-T half/full duplex or PoE+ ports, plus four 1 or 2.5G SFP ports (2.5Gb uplink support is a future capability) or two 10/100/1000BASE-T 802.3bt ports, depending on the model.

X435 Series switches include the following models:

- ExtremeSwitching X435-8T-4S Switch Features on page 23
- ExtremeSwitching X435-8P-4S Switch Features on page 24
- ExtremeSwitching X435-8P-2T-W Switch Features on page 25
- ExtremeSwitching X435-24T-4S Switch Features on page 27
- ExtremeSwitching X435-24P-4S Switch Features on page 28

Management

For X435-24T-4S and X435-24P-4S models, a serial console port on the rear panel of the switch enables you to connect a terminal and perform local management. An Ethernet management port can be used to connect the system to a parallel management network for administration. Alternatively, you can use an Ethernet cable to connect

this port directly to a laptop to view and locally manage the switch configuration. The Ethernet management port supports 10/100/1000 Mbps speeds.

Cooling

The X435-24P-2S model contains an internal, non-FRU fan with side-to-side airflow. All other models are fanless.

Power Supplies

The non-PoE X435 Series switches contain internal, non-FRU power supplies. X435-8P-2T-W is powered via the front PoE/PD ports.

Operating Temperatures

The 8-port X435 switch models support an operating range from 0°C to 40°C. The 24-port models support an operating range from 0°C to 45°C. Temperature restrictions apply for some models at high altitudes. See each individual model's description for more detail.

ExtremeSwitching X435-8T-4S Switch Features

The front panel of the X435-8T-4S switch includes:

- Eight 10/100/1000BASE-T ports that provide 8Gbps of high-density copper connectivity.
- Four unpopulated 1/2.5G SFP ports that support fiber connectivity

  Note
  2.5Gb uplink support is a future capability

- One RJ-45 console port
- One USB A port
- LEDs to indicate port status and switch operating conditions

Note
The mode button has no function associated with it and is not expected to have any function associated with it in the future.

For a description of the LEDs and their operation, see ExtremeSwitching X435 Series Switch LEDs on page 29

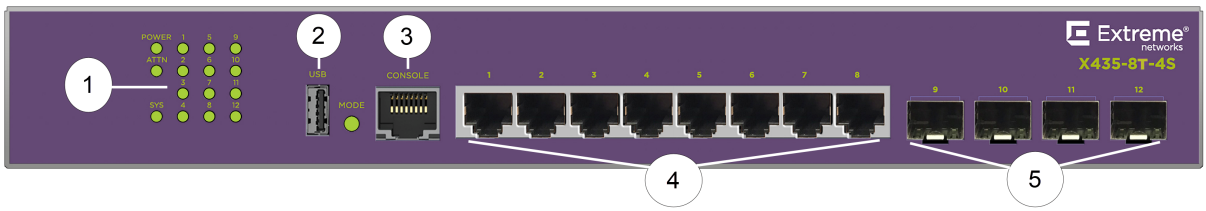


Figure 1: X435-8T-4S Switch Front Panel

1 = System LEDs	3 = RJ-45 console port	5 = 1/2.5G SFP ports*
2 = USB A port	4 = 10/100/1000BASE-T ports	

Note
*2.5Gb uplink support is a future capability

The rear panel of the X435-8T-4S switch includes:

- AC power input socket

The internal AC power supply operates from 100VAC to 240VAC.

Figure 2: X435-8T-4S Switch Rear Panel

ExtremeSwitching X435-8P-4S Switch Features

The front panel of the X435-8P-4S switch includes:

- Eight 10/100/1000BASE-T PoE+ ports that provide 8Gbps of high-density copper connectivity. In addition, all of these ports (ports 1-8) support the POE protocol IEEE802.3af and PoE+ protocol IEEE802.3at standard.

  All X435 PoE models can provide up to 15.4W by using PoE protocol, and provide up to 30W by using PoE+ protocol on a single port.
- Four unpopulated 1/2.5G SFP ports that support fiber connectivity

  Note
  2.5Gb uplink support is a future capability
- One RJ-45 console port

- One USB A port
- LEDs to indicate port status and switch operating conditions

Note
The mode button has no function associated with it and is not expected to have any function associated with it in the future.

For a description of the LEDs and their operation, see ExtremeSwitching X435 Series Switch LEDs on page 29

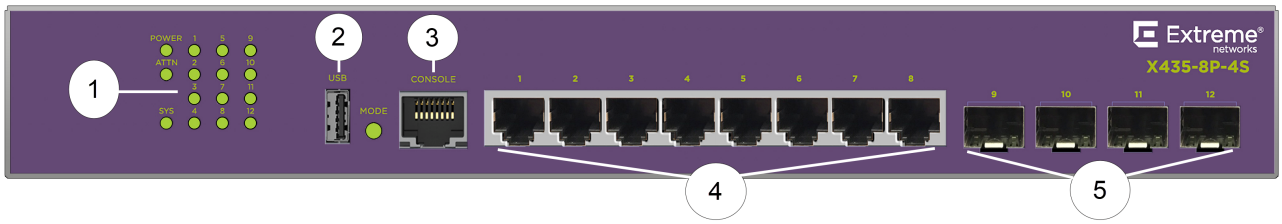


Figure 3: X435-8P-4S Front Panel

1 = System LEDs	3 = RJ-45 console port	5 = 1/2.5G SFP ports*
2 = USB A port	4 = 10/100/1000BASE-T PoE+ ports	

Note
*2.5Gb uplink support is a future capability

The rear panel of the X435-8P-4S switch includes:

- AC power input socket

The internal AC power supply operates from 100VAC to 240VAC.

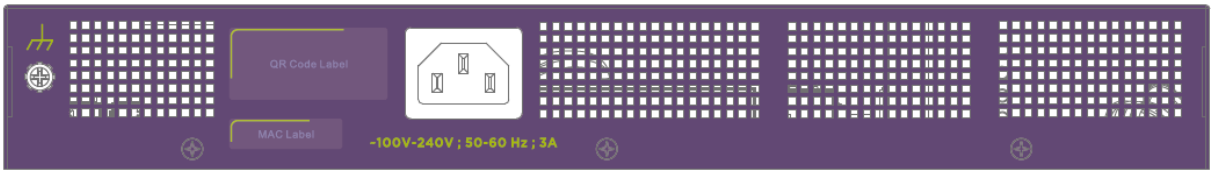


Figure 4: X435-8P-4S Rear Panel

ExtremeSwitching X435-8P-2T-W Switch Features

The front panel of the X435-8P-2T-W switch includes:

- Eight 10/100/1000BASE-T PoE+ ports that provide 8 Gbps of high-density copper connectivity. In addition, all of these ports (ports 1-8) support the POE protocol IEEE802.3af and PoE+ protocol IEEE802.3at standard.

All X435 PoE models can provide up to 15.4W by using PoE protocol, and provide up to 30W by using PoE+ protocol on a single port.

- Two unpopulated 10/100/1000BASE-T 802.3bt ports that support copper connectivity
- One RJ-45 console port
- One USB A port
- LEDs to indicate port status and switch operating conditions

Note
The mode button has no function associated with it and is not expected to have any function associated with it in the future.

For a description of the LEDs and their operation, see ExtremeSwitching X435 Series Switch LEDs on page 29

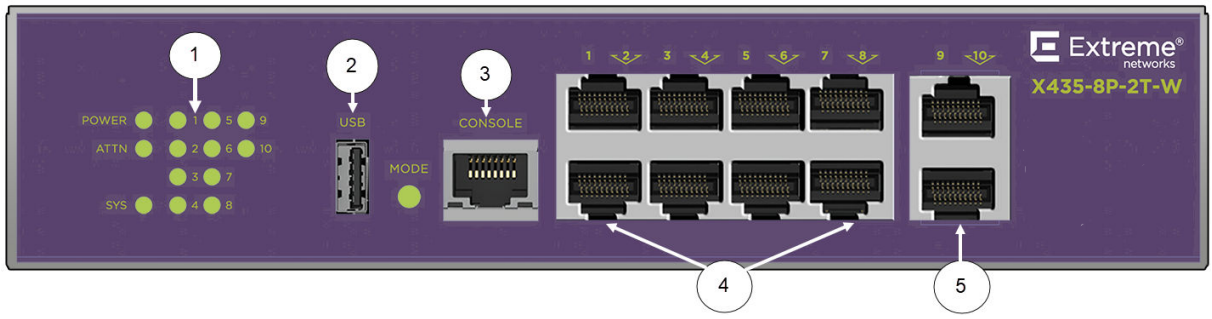


Figure 5: X435-8P-2T-W Front Panel

1 = System LEDs	3 = RJ-45 console port	5 = 10/100/1000BASE-T 802.3bt ports
2 = USB A port	4 = 10/100/1000BASE-T PoE+ ports	

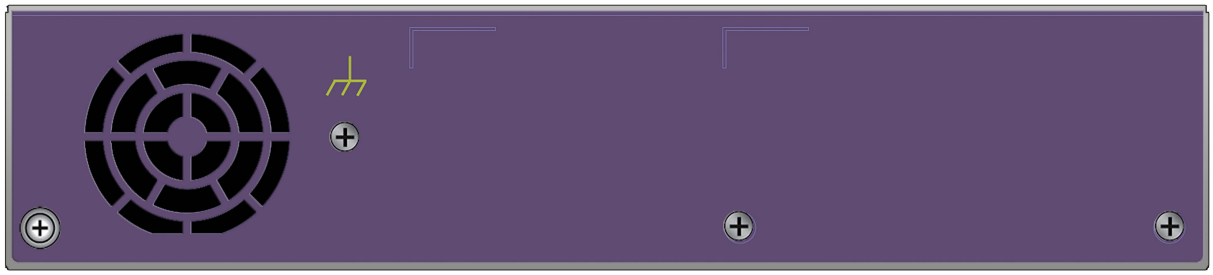


Figure 6: X435-8P-2T-W Rear Panel

ExtremeSwitching X435-24T-4S Switch Features

The front panel of the X435-24T-4S switch includes:

- Twenty-four 10/100/1000BASE-T ports that provide 24Gbps of high-density copper connectivity.
- Four unpopulated 1/2.5G SFP ports that support fiber connectivity

Note
2.5Gb uplink support is a future capability

- One RJ-45 console port
- One RJ-45 management port
- One USB A port
- LEDs to indicate port status and switch operating conditions

Note
The mode button has no function associated with it and is not expected to have any function associated with it in the future.

For a description of the LEDs and their operation, see ExtremeSwitching X435 Series Switch LEDs on page 29

Figure 7: X435-24T-4S Front Panel

1 = System LEDs	3 = RJ-45 console and management ports	5 = 1/2.5G SFP ports*
2 = USB A port	4 = 10/100/1000BASE-T ports	

Note
*2.5Gb uplink support is a future capability

The rear panel of the X435-24T-4S switch includes:

- AC power input socket

The internal AC power supply operates from 100VAC to 240VAC.

Figure 8: X435-24T-4S Rear Panel

ExtremeSwitching X435-24P-4S Switch Features

The front panel of the X435-24P-4S switch includes:

- Twenty-four 10/100/1000BASE-T PoE+ ports that provide 24 Gbps of high-density copper connectivity. In addition, all of these ports (ports 1-24) support the POE protocol IEEE802.3af and PoE+ protocol IEEE802.3at standard.

  All X435 PoE models can provide up to 15.4W by using PoE protocol, and provide up to 30W by using PoE+ protocol on a single port.
- Four unpopulated 1/2.5G SFP ports that support fiber connectivity

Note
2.5Gb uplink support is a future capability

- One RJ-45 console port
- One RJ-45 management port
- One USB A port
- LEDs to indicate port status and switch operating conditions

Note
The mode button has no function associated with it and is not expected to have any function associated with it in the future.

For a description of the LEDs and their operation, see ExtremeSwitching X435 Series Switch LEDs on page 29.

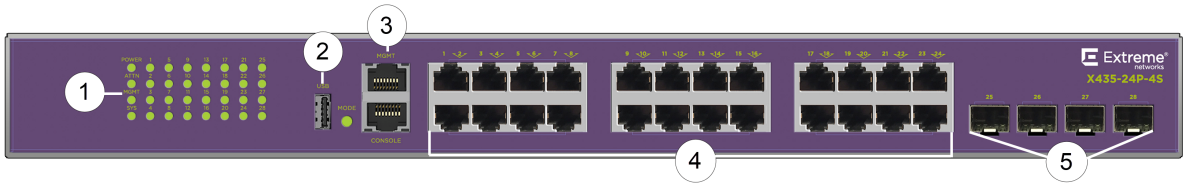


Figure 9: X435-24P-4S Front Panel

1 = System LEDs	3 = RJ-45 console and management ports	5 = 1/2.5G SFP ports*
2 = USB A port	4 = 10/100/1000BASE-T PoE+ ports	

Note
*2.5Gb uplink support is a future capability

The rear panel of the X435-24P-4S switch includes:

- AC power input socket

The internal AC power supply operates from 100VAC to 240VAC.

Figure 10: X435-24P-4S Rear Panel

ExtremeSwitching X435 Series Switch LEDs

The following figures illustrate the X435 front panel LEDs:

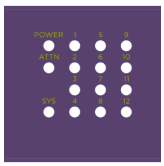


Figure 11: X435-8T/8P LEDs

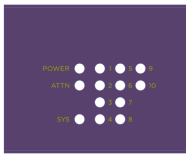


Figure 12: X435-8P-2T-W LEDs

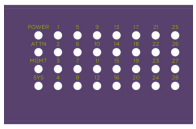


Figure 13: X435-24T/24P LEDs

The X435 front panel LEDs behave as follows:

Table 5: X435 System LEDs

LED	Color/State	Port State
Power	Solid Green	Switch power on
	Off	Switch power off
MGMT (24T/24P only)	Solid Green	OOB Link
	Off	OOB Link down
ATTN	Solid Green	Use not defined in 30.5
	Off	Use not defined in 30.5
	Solid Red	Use not defined in 30.5
	Off	Use not defined in 30.5

Table 5: X435 System LEDs (continued)

LED	Color/State	Port State
System	Blinking Green	System Normal
	Off	System off

Table 6: X435 Port LEDs

Color/State	Port State
Solid green	Link is OK
Blinking Green	Traffic activity
Solid Amber	PoE and link is up
Blinking amber	Link is OK and transmitting packets; port is powered
Off	No link, or disabled port; port is powered

Table 7: X435-8P-2T-W PD Powered Port LEDs (Ports 9 and 10)

Color/State	Port State
Solid green	Link is up, not receiving POE power
Blinking Green	Traffic activity, not receiving POE power
Solid Amber	Link is up, receiving POE power, no traffic
Blinking amber	Link is up, receiving POE power, traffic activity
Off	Link is down and not receiving POE power

Table 8: X435 2.5G Port LEDs (future capability)

Color/State	Port State
Solid green	Link is up
Blinking Green	Traffic activity
Off	Link is down

ExtremeSwitching X440-G2 Series Switches

The ExtremeSwitching X440-G2 switches are cost-effective campus edge switches. They provide 12, 24, or 48 Ethernet ports that deliver high-density fast Ethernet or Gigabit Ethernet connectivity using fixed 10/100/1000BASE-T ports or 100/1000 BASE-X ports. In addition, some models offer IEEE 802.3at PoE+ ports.

Note
An extended-temperature model, 24fx-GE4, provides 24 ports of 100Base-FX. Another extended-temperature model, 12t8fx-GE4, provides 12 ports of 10/100/1000BASE-T and eight ports of 100Base-FX.

The ExtremeSwitching X440-G2 series switches include the following base models:

- ExtremeSwitching X440-G2-12t-10GE4 switch
- ExtremeSwitching X440-G2-12p-10GE4 switch
- ExtremeSwitching X440-G2-24t-10GE4 switch
- ExtremeSwitching X440-G2-24x-10GE4 switch
- ExtremeSwitching X440-G2-24p-10GE4 switch
- ExtremeSwitching X440-G2-48t-10GE4 switch
- ExtremeSwitching X440-G2-48p-10GE4 switch
- ExtremeSwitching X440-G2-24t-10GE4-DC switch
- ExtremeSwitching X440-G2-48t-10GE4-DC switch
- ExtremeSwitching X440-G2-12t8fx-GE4 switch
- ExtremeSwitching X440-G2-24fx-GE4 switch
- ExtremeSwitching X440-G2-24t-GE4 switch

Most X440-G2 switches support both half-duplex and full-duplex communication over 10/100/1000BASE-T ports. For details, see the "Switch Ports and Slots" topics for the individual base models.

All models come equipped with four ports of SFP 1 GbE resident on either the faceplate or rear panel. On the 12-port, 24-port, and 48-port 10/100/1000 models, except for the extended-temperature models, these 1 GbE ports can be upgraded to 10 Gb SFP+ Ethernet through software licensing. The 24- and 48-port 10/100/1000 models (except the X440-G2-24t-GE4) have four 1 GbE SFP combination ports on the front panel.

ExtremeSwitching X440-G2 series switches require ExtremeXOS version 21.1.1 or later.

Security

These switches provide comprehensive security management:

- User policy and host integrity enforcement, and identity management
- Universal Port Dynamic Security Profiles to provide fine granular security policies in the network
- Threat detection and response instrumentation to react to network intrusion with CLEAR-Flow Security Rules Engine
- Denial of Service (DoS) protection and IP security against man-in-the-middle and DoS attacks to harden the network infrastructure

Stacking

Up to eight X440-G2 switches can be stacked using SummitStack-V. Each X440-G2 unit (except the extended temperature range switches) comes equipped with two stacking ports using an SFP+ interface. Standard 10 Gb Ethernet Optics and passive and active cables can be used in the SFP+ ports for stacking X440-G2s together using SummitStack-V.

ExtremeXOS supports the SummitStack-V capability using two SFP+ ports as stacking ports, enabling the use of standard cabling and optics technologies used for 10 GbE SFP+. SummitStack-V provides long-distance stacking connectivity of up to 40 km while reducing the cable complexity of implementing a stacking solution. For a list of X440-G2 ports that can be used with SummitStack-V, see X440-G2 Stacking on page 206.

On X440-G2 switches, SummitStack-V is compatible with X450-G2 and X460-G2 switches with 10 Gb uplinks and with X620, and X670-G2 switches running the same version of ExtremeXOS. SummitStack-V enabled 10 GbE ports must be physically direct-connected.

Note
The SFP+ stacking ports on the base X440-G2 switches are 1 Gb Ethernet ports, not 10 Gb Ethernet ports. The switches run a 10 Gb stacking protocol by default, but they do not run the 10 Gb Ethernet protocol without licensed entitlement. Two- and four-port licenses are available to enable the ports to run the 10 Gb Ethernet protocol.

Note
SummitStack-V is not supported on the following extended temperature range switch models:

- X440-G2-12t8fx-GE4
- X440-G2-24fx-GE4
- X440-G2-24t-GE4

Operating Temperatures

Most X440-G2 switch models support an operating range from 0°C to 50°C. The following models extend the operating range from 0°C to 60°C:

- X440-G2-12t8fx-GE4
- X440-G2-24fx-GE4
- X440-G2-24t-GE4

Additional Features

For all models, a serial console port on the front panel allows you to connect a terminal and perform local management. An Ethernet management port can be used to connect the system to a parallel management network for administration. Alternatively, you can use an Ethernet cable to connect this port directly to a laptop to view and locally manage the switch configurations.

The rear panel provides an AC power input socket or DC input connector, along with a redundant power connector. The switch automatically adjusts to the supply voltage. The redundant power connector allows you to connect the switch to either a standalone external redundant power supply or the EPS-C2 external power system. When a compatible external power supply is used with the ExtremeSwitching X440-G2

switch, the internal and external power supplies are fully fault tolerant. If one power supply fails, the other power supply will provide sufficient power to operate the switch.

All X440-G2 switches support external redundant power options. For details, refer to Table 38 on page 124.

Note
See the *ExtremeXOS 30.7 User Guide* and the *ExtremeXOS 30.7 Command Reference Guide* for feature-specific information about the switches and for information regarding switch configuration.

ExtremeSwitching X440-G2-12t-10GE4 Switch Ports and Slots

The ExtremeSwitching X440-G2-12t-10GE4 switch ports and slots include:

- 12 front panel 10/100/1000BASE-T ports (RJ45), all of which support both half-duplex and full-duplex communication.
- Four unpopulated 1GBASE-X SFP+ ports that can be used as either 1Gb ports or 10Gb ports, where the 10Gb configuration requires an upgrade through additional licensing.

  Alternately, you can convert two of the ports to stacking ports using the `enable stacking-support` command. Doing so would provide you with the option of two 1Gb ports and two stack ports or two 10Gb ports and two stack ports. In the latter configuration, an additional license would be required for the 10Gb non-stacking ports.
- Ethernet management port (10/100/1000BASE-T).
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One front panel USB 2.0 port, operational on switches running ExtremeXOS version 22.2 or later.
- One rear redundant power supply connector (coaxial barrel connector).

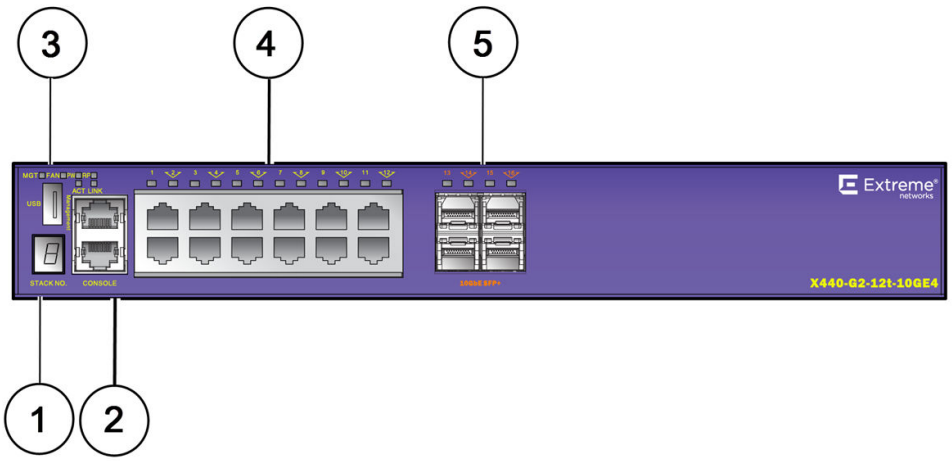


Figure 14: ExtremeSwitching X440-G2-12t-10GE4 Front Panel

1 = Stack number indicator	4 = 10/100/1000BASE-T copper ports
2 = Console port/Ethernet management port	5 = SFP Ports upgradeable to 10GBASE-X
3 = USB port (active with ExtremeXOS version 22.2 or later)	

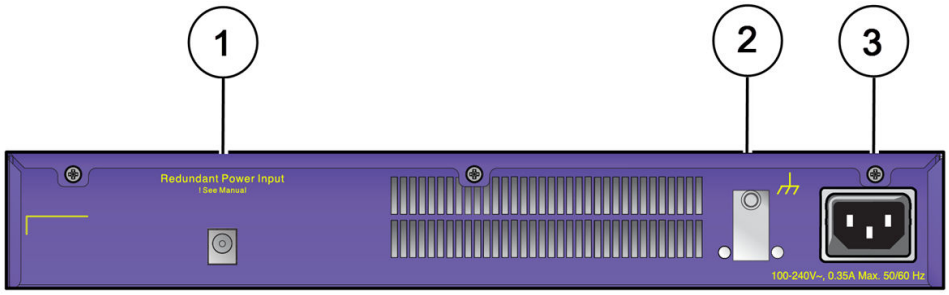


Figure 15: ExtremeSwitching X440-G2-12t-10GE4 Rear Panel

1 = Redundant power input	3 = AC power input socket
2 = Grounding lug	

ExtremeSwitching X440-G2-12p-10GE4 Switch Ports and Slots

The ExtremeSwitching X440-G2-12p-10GE4 switch ports and slots include:

- 12 front panel PoE+ ports of 10/100/1000BASE-T. Both half-duplex and full-duplex communication are supported on all 12 ports.
- Four unpopulated 1GBASE-X SFP+ ports that can be used as either 1Gb ports or 10Gb ports, where the 10Gb configuration requires an upgrade through additional licensing.

  Alternately, you can convert two of the ports to stacking ports using the `enable stacking-support` command. Doing so would provide you with the option of two 1Gb ports and two stack ports or two 10Gb ports and two stack ports. In the latter configuration, an additional license would be required for the 10Gb non-stacking ports.
- Ethernet management port (10/100/1000BASE-T).
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One front panel USB 2.0 port, operational on switches running ExtremeXOS version 22.2 or later.
- One rear redundant power supply connector.

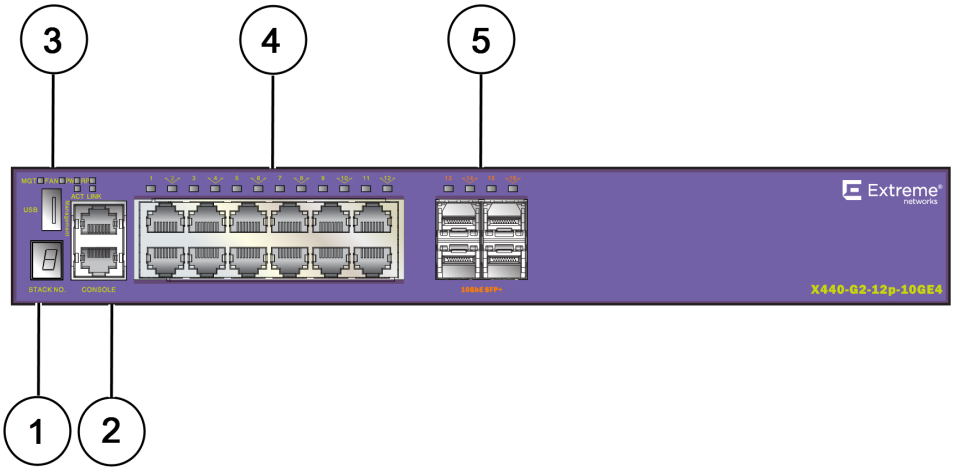


Figure 16: ExtremeSwitching X440-G2-12p-10GE4 Front Panel

1 = Stack number indicator	4 = 10/100/1000BASE-T copper ports
2 = Console port/Ethernet management port	5 = SFP Ports upgradeable to 10GBASE-X
3 = USB port (active with ExtremeXOS version 22.2 or later)	

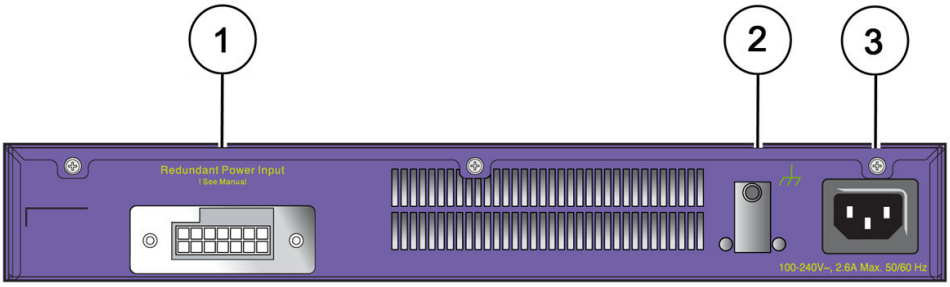


Figure 17: ExtremeSwitching X440-G2-12p-10GE4 Rear Panel

1 = Redundant power input	3 = AC power input socket
2 = Grounding lug	

ExtremeSwitching X440-G2-24t-10GE4 Switch Ports and Slots

The ExtremeSwitching X440-G2-24t-10GE4 switch ports and slots include:

- 24 front panel ports of 10/100/1000BASE-T (RJ45). Both half-duplex and full-duplex communication are supported on ports 1 through 16. Ports 17 through 24 are full-duplex only.
- Four unpopulated front panel 1GBASE-X SFP combination ports.
- Four unpopulated rear panel 1GBASE-X SFP+ ports that can be used as either 1Gb ports or 10Gb ports, where the 10Gb configuration requires an upgrade through additional licensing..

Alternately, you can convert two of the ports to stacking ports using the `enable stacking-support` command. Doing so would provide you with the option of two 1Gb ports and two stack ports or two 10Gb ports and two stack ports. In the latter configuration, an additional license would be required for the 10Gb non-stacking ports.

- Ethernet management port (10/100/1000BASE-T).
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One front panel USB 2.0 port, operational on switches running ExtremeXOS version 22.2 or later.
- One rear redundant power supply connector.

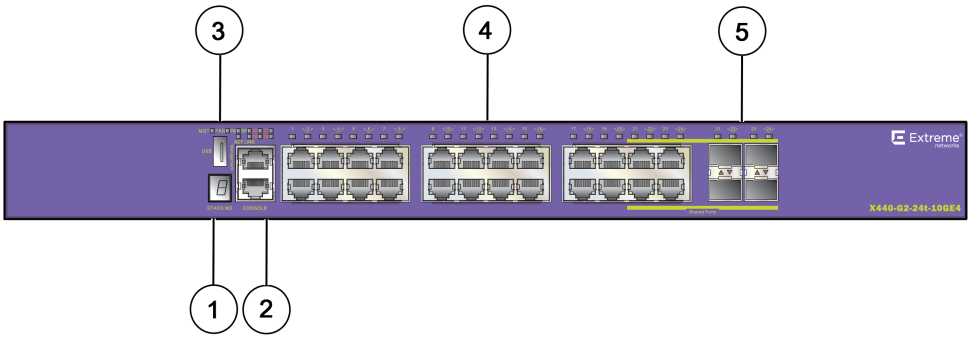


Figure 18: ExtremeSwitching X440-G2-24t-10GE4 Front Panel

1 = Stack number indicator	4 = 10/100/1000BASE-T copper ports
2 = Console port/Ethernet management port	5 = 1000BASE-X SFP combination ports
3 = USB port (active with ExtremeXOS version 22.2 or later)	

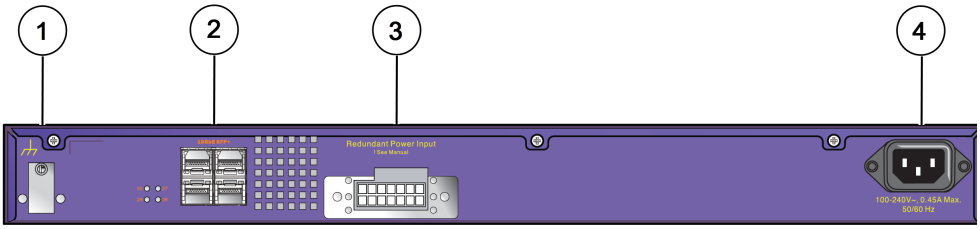


Figure 19: ExtremeSwitching X440-G2-24t-10GE4 Rear Panel

1 = Grounding lug	3 = Redundant power input
2 = SFP Ports upgradeable to 10GBASE-X	4 = AC power input socket

ExtremeSwitching X440-G2-24x-10GE4 Switch Ports and Slots

The ExtremeSwitching X440-G2-24x-10GE4 switch ports and slots include:

- 24 front panel 1GBASE-X SFP ports.
- Four unpopulated front panel 10/100/1000BASE-T (RJ45) ports.
- Four unpopulated rear panel 1GBASE-X SFP+ ports that can be used as either 1Gb ports or 10Gb ports, where the 10Gb configuration requires an upgrade through additional licensing..

  Alternately, you can convert two of the ports to stacking ports using the `enable stacking-support` command. Doing so would provide you with the option of two 1Gb ports and two stack ports or two 10Gb ports and two stack ports. In the latter configuration, an additional license would be required for the 10Gb non-stacking ports.
- Ethernet management port (10/100/1000BASE-T).
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One front panel USB 2.0 port, operational on switches running ExtremeXOS version 22.2 or later.
- One rear redundant power supply connector.

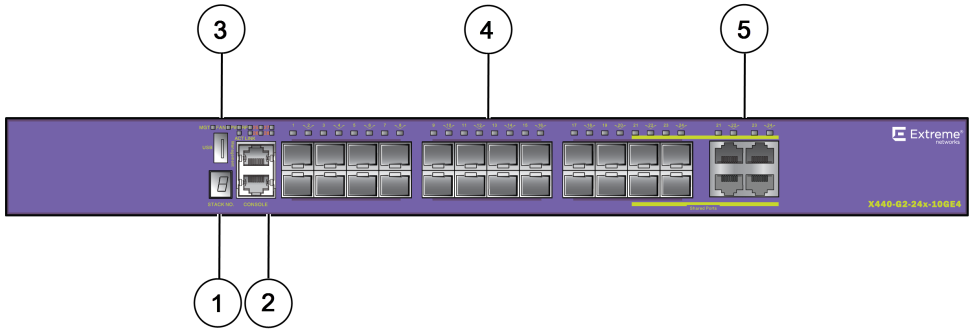


Figure 20: ExtremeSwitching X440-G2-24x-10GE4 Front Panel

1 = Stack number indicator	4 = 1GBASE-X SFP ports
2 = Console port/Ethernet management port	5 = 10/100/1000BASE-T combination ports
3 = USB port (active with ExtremeXOS version 22.2 or later)	

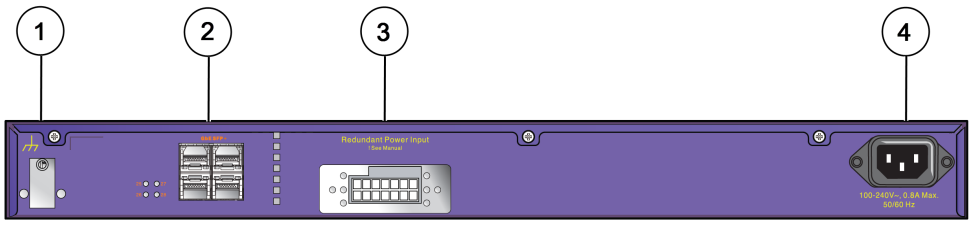


Figure 21: ExtremeSwitching X440-G2-24x-10GE4 Rear Panel

1 = Grounding lug	3 = Redundant power input
2 = SFP Ports upgradeable to 10GBASE-X	4 = AC power input socket

ExtremeSwitching X440-G2-24p-10GE4 Switch Ports and Slots

The ExtremeSwitching X440-G2-24p-10GE4 switch ports and slots include:

- 24 front panel PoE+ ports of 10/100/1000BASE-T. Both half-duplex and full-duplex communication are supported on ports 1 through 16. Ports 17 through 24 are full-duplex only.
- Four unpopulated front panel 1GBASE-X SFP combination ports.
- Four unpopulated rear panel 1GBASE-X SFP+ ports that can be used as either 1Gb ports or 10Gb ports, where the 10Gb configuration requires an upgrade through additional licensing..

  Alternately, you can convert two of the ports to stacking ports using the `enable stacking-support` command. Doing so would provide you with the option of two 1Gb ports and two stack ports or two 10Gb ports and two stack ports. In the latter configuration, an additional license would be required for the 10Gb non-stacking ports.
- Ethernet management port (10/100/1000BASE-T).
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One front panel USB 2.0 port, operational on switches running ExtremeXOS version 22.2 or later.
- One rear redundant power supply connector.

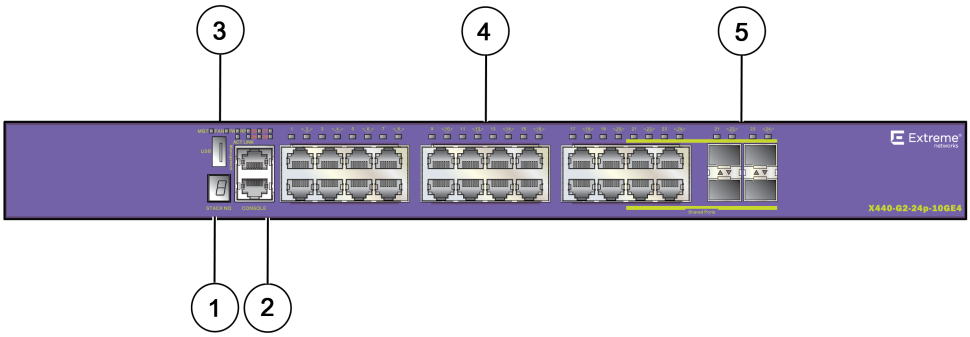


Figure 22: ExtremeSwitching X440-G2-24p-10GE4 Front Panel

1 = Stack number indicator	4 = 10/100/1000BASE-T copper ports
2 = Console port/Ethernet management port	5 = 1GBASE-X SFP combination ports
3 = USB port (active with ExtremeXOS version 22.2 or later)	

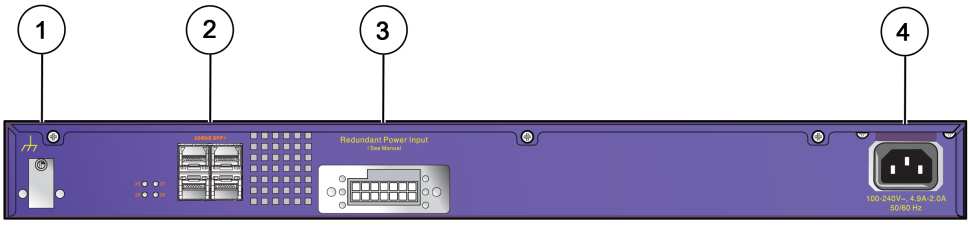


Figure 23: ExtremeSwitching X440-G2-24p-10GE4 Rear Panel

1 = Grounding lug	3 = Redundant power input
2 = SFP Ports upgradeable to 10GBASE-X	4 = AC power input socket

ExtremeSwitching X440-G2-48t-10GE4 Switch Ports and Slots

The ExtremeSwitching X440-G2-48t-10GE4 switch ports and slots include:

- 48 front panel ports of 10/100/1000BASE-T (RJ45). Both half-duplex and full-duplex communication are supported on ports 1 through 16 and 25 through 40. The rest of the ports are full-duplex only.
- Four unpopulated front panel 1GBASE-X SFP combination ports.
- Four unpopulated rear panel 1GBASE-X SFP+ ports that can be used as either 1Gb ports or 10Gb ports, where the 10Gb configuration requires an upgrade through additional licensing..

  Alternately, you can convert two of the ports to stacking ports using the `enable stacking-support` command. Doing so would provide you with the option of two 1Gb ports and two stack ports or two 10Gb ports and two stack ports. In the latter configuration, an additional license would be required for the 10Gb non-stacking ports.
- Two 1GbE copper combination ports that can be upgraded to 10Gb Ethernet.
- Ethernet management port (10/100/1000BASE-T).
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One front panel USB 2.0 port, operational on switches running ExtremeXOS version 22.2 or later.
- One rear redundant power supply connector.

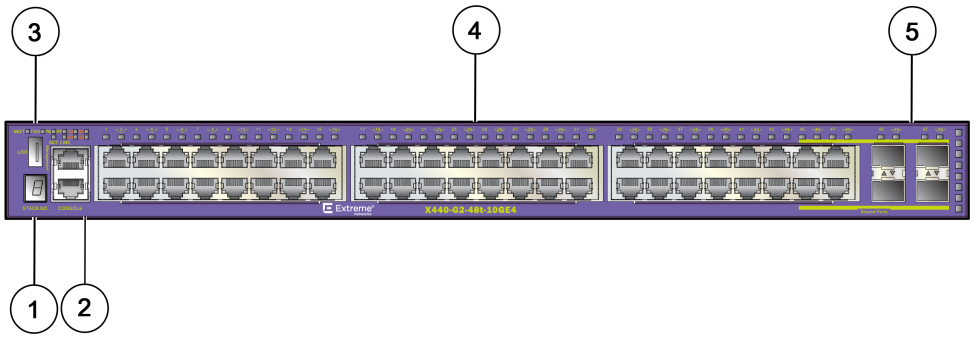


Figure 24: ExtremeSwitching X440-G2-48t-10GE4 Front Panel

1 = Stack number indicator	4 = 10/100/1000BASE-T ports
2 = Console port/Ethernet management port	5 = 1GBASE-X SFP combination ports
3 = USB port (active with ExtremeXOS version 22.2 or later)	

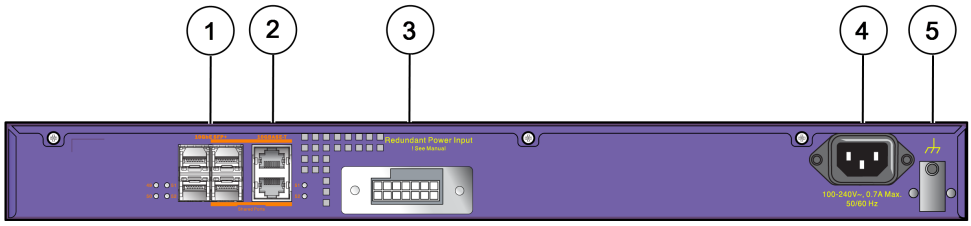


Figure 25: ExtremeSwitching X440-G2-48t-10GE4 Rear Panel

1 = SFP ports upgradeable to 10GBASE-X	4 = AC power input socket
2 = 1GBASE-T combination ports upgradeable to 10GBASE-T	5 = Grounding lug
3 = Redundant power input	

ExtremeSwitching X440-G2-48p-10GE4 Switch Ports and Slots

The ExtremeSwitching X440-G2-48p-10GE4 switch ports and slots include:

- 48 front panel PoE+ ports of 10/100/1000BASE-T. Both half-duplex and full-duplex communication are supported on ports 1 through 16 and 25 through 40. The rest of the ports are full-duplex only.
- Four unpopulated front panel 1GBASE-X SFP combination ports.
- Four unpopulated rear panel 1GBASE-X SFP+ ports that can be used as either 1Gb ports or 10Gb ports, where the 10Gb configuration requires an upgrade through additional licensing..

  Alternately, you can convert two of the ports to stacking ports using the `enable stacking-support` command. Doing so would provide you with the option of two 1Gb ports and two stack ports or two 10Gb ports and two stack ports. In the latter

configuration, an additional license would be required for the 10Gb non-stacking ports.

- Two 1GbE copper combination ports that can be upgraded to 10Gb Ethernet.
- Ethernet management port (10/100/1000BASE-T).
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One front panel USB 2.0 port, operational on switches running ExtremeXOS version 22.2 or later.
- One rear redundant power supply connector.

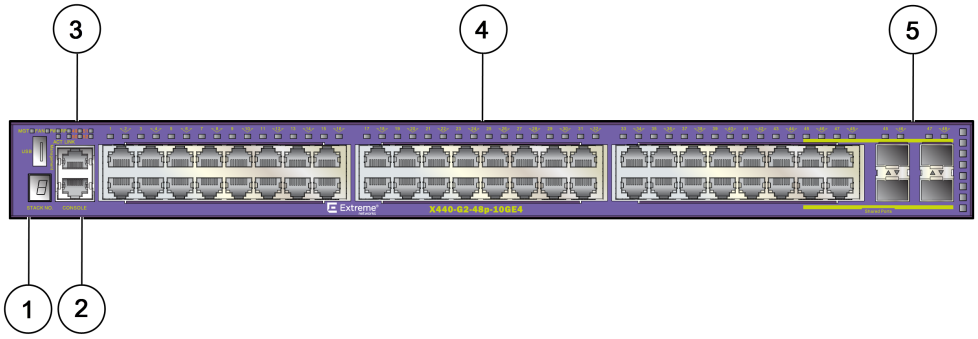


Figure 26: ExtremeSwitching X440-G2-48p-10GE4 Front Panel

1 = Stack number indicator	4 = 10/100/1000BASE-T ports
2 = Console port/Ethernet management port	5 = 1GBASE-X SFP combination ports
3 = USB port (active with ExtremeXOS version 22.2 or later)	

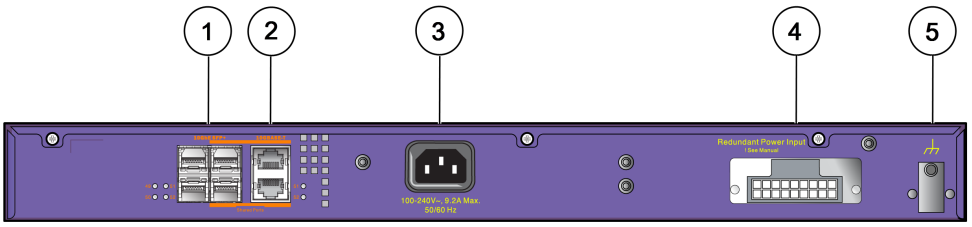


Figure 27: ExtremeSwitching X440-G2-48p-10GE4 Rear Panel

1 = SFP Ports upgradeable to 10GBASE-X	4 = Redundant power input
2 = 1GBASE-T combination ports upgradeable to 10GBASE-T	5 = Grounding lug
3 = AC power input socket	

ExtremeSwitching X440-G2-24t-10GE4-DC Switch Ports and Slots

The ExtremeSwitching X440-G2-24t-10GE4-DC switch ports and slots include:

- 24 front panel ports of 10/100/1000BASE-T (RJ45). Both half-duplex and full-duplex communication are supported on ports 1 through 16. Ports 17 through 24 are full-duplex only.
- Four unpopulated front panel 1GBASE-X SFP combination ports.
- Four unpopulated rear panel 1GBASE-X SFP+ ports that can be used as either 1Gb ports or 10Gb ports, where the 10Gb configuration requires an upgrade through additional licensing..

  Alternately, you can convert two of the ports to stacking ports using the `enable stacking-support` command. Doing so would provide you with the option of two 1Gb ports and two stack ports or two 10Gb ports and two stack ports. In the latter configuration, an additional license would be required for the 10Gb non-stacking ports.
- Ethernet management port (10/100/1000BASE-T).
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One front panel USB 2.0 port, operational on switches running ExtremeXOS version 22.2 or later.
- One rear redundant power supply connector.

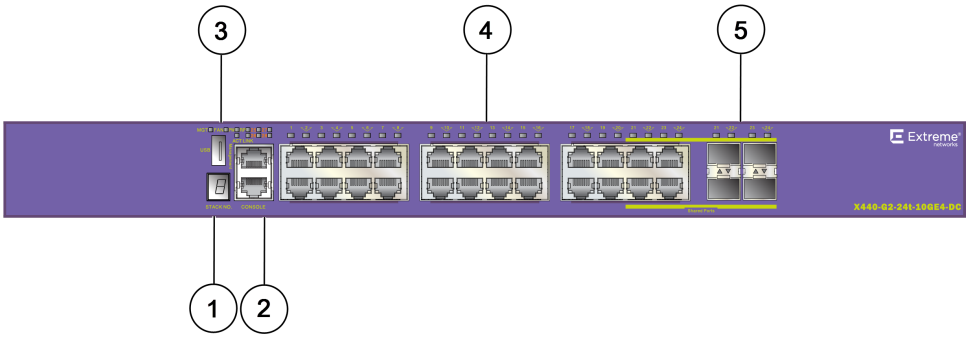


Figure 28: ExtremeSwitching X440-G2-24t-10GE4-DC Front Panel

1 = Stack number indicator	4 = 10/100/1000BASE-T ports
2 = Console port/Ethernet management port	5 = 1GBASE-X SFP combination ports
3 = USB port (active with ExtremeXOS version 22.2 or later)	

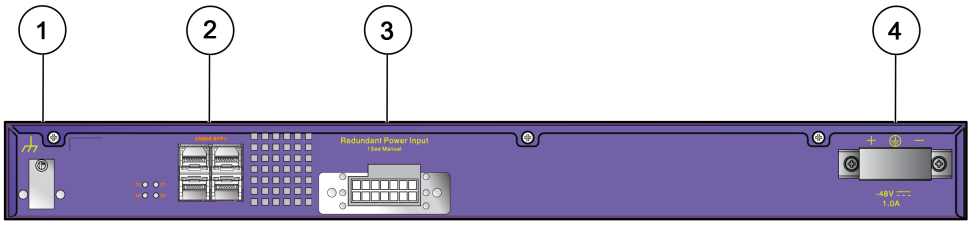


Figure 29: ExtremeSwitching X440-G2-24t-10GE4-DC Rear Panel

1 = Grounding lug	3 = Redundant power input
2 = SFP Ports upgradeable to 10GBASE-X	4 = DC power connector panel

ExtremeSwitching X440-G2-48t-10GE4-DC Switch Ports and Slots

The ExtremeSwitching X440-G2-48t-10GE4-DC switch ports and slots include:

- 48 front panel ports of 10/100/1000BASE-T (RJ45). Both half-duplex and full-duplex communication are supported on ports 1 through 16 and 25 through 40. The rest of the ports are full-duplex only.
- Four unpopulated front panel 1GBASE-X SFP combination ports.
- Four unpopulated rear panel 1GBASE-X SFP+ ports that can be used as either 1Gb ports or 10Gb ports, where the 10Gb configuration requires an upgrade through additional licensing..

  Alternately, you can convert two of the ports to stacking ports using the `enable stacking-support` command. Doing so would provide you with the option of two 1Gb ports and two stack ports or two 10Gb ports and two stack ports. In the latter configuration, an additional license would be required for the 10Gb non-stacking ports.
- Two 1GbE copper combination ports that can be upgraded to 10Gb Ethernet.
- Ethernet management port (10/100/1000BASE-T).
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One front panel USB 2.0 port, operational on switches running ExtremeXOS version 22.2 or later.
- One rear redundant power supply connector.

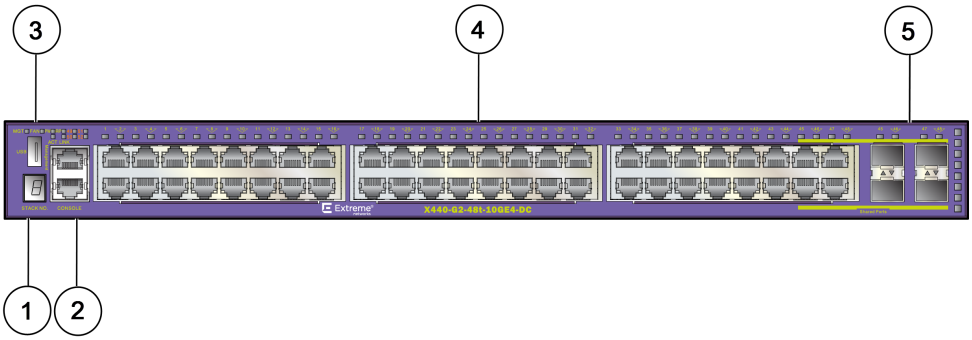


Figure 30: ExtremeSwitching X440-G2-48t-10GE4-DC Front Panel

1 = Stack number indicator	4 = 10/100/1000BASE-T ports
2 = Console port/Ethernet management port	5 = 1GBASE-X SFP combination ports
3 = USB port (active with ExtremeXOS version 22.2 or later)	

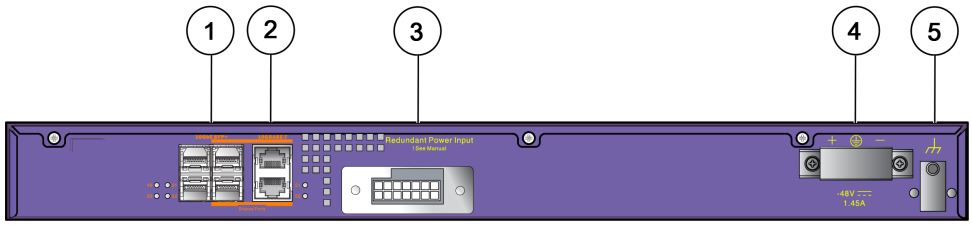


Figure 31: ExtremeSwitching X440-G2-48t-10GE4-DC Rear Panel

1 = SFP Ports upgradeable to 10GBASE-X	4 = DC power connector panel
2 = 1GBASE-T combination ports upgradeable to 10GBASE-T	5 = Grounding lug
3 = Redundant power input	

ExtremeSwitching X440-G2-12t8fx-GE4 Switch Ports and Slots

The ExtremeSwitching X440-G2-12t8fx-GE4 switch ports and slots include:

- 12 front panel 10/100/1000BASE-T ports, all of which support both half-duplex and full-duplex communication.
- Four unpopulated front panel 1GBASE-X SFP ports.
- Eight 100BASE-FX LC connectors.

Note
The LC connectors are transceivers with an LC interface.

- Ethernet management port (10/100/1000BASE-T).
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.

- One front panel USB 2.0 port, operational on switches running ExtremeXOS version 22.2 or later.
- One rear redundant power supply connector.

The X440-G2 12t8fx-GE4 switch supports an operating range from 0°C to 60°C.

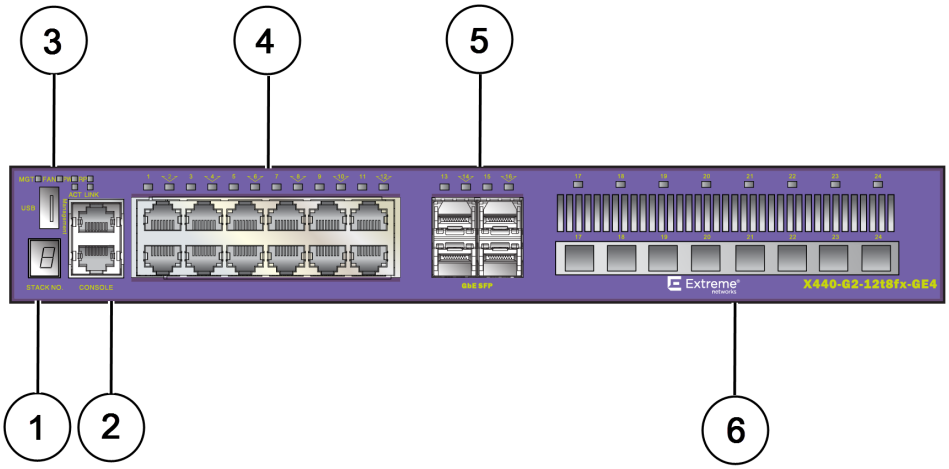


Figure 32: ExtremeSwitching X440-G2-12t8fx-GE4 Front Panel

1 = Stack number indicator	4 = 10/100/1000BASE-T ports
2 = Console port/Ethernet management port	5 = 1GBASE-X SFP ports
3 = USB port (active with ExtremeXOS version 22.2 or later)	6 = 100BASE-FX LC connectors

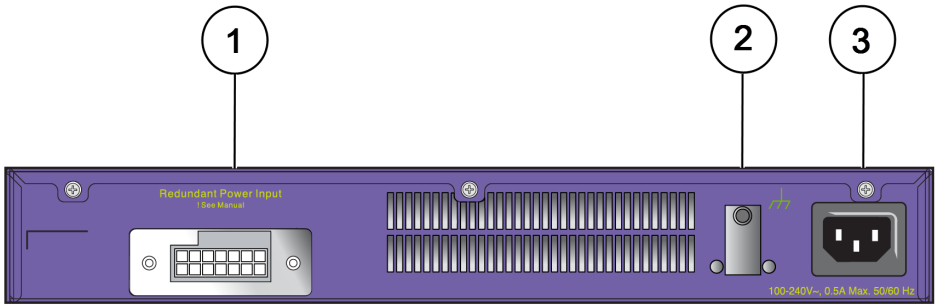


Figure 33: ExtremeSwitching X440-G2-12t8fx-GE4 Rear Panel

1 = Redundant power input	3 = AC power input socket
2 = Grounding lug	

ExtremeSwitching X440-G2-24fx-GE4 Switch Ports and Slots

The ExtremeSwitching X440-G2-24fx-GE4 switch ports and slots include:

- 24 front panel 100BASE-FX LC connectors.

  Note
  The LC connectors are transceivers with an LC interface.

- Four unpopulated front panel 1GBASE-X SFP ports.
- Ethernet management port (10/100/1000BASE-T).
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One front panel USB 2.0 port, operational on switches running ExtremeXOS version 22.2 or later.
- One rear redundant power supply connector.

The X440-G2 24fx-GE4 switch supports an operating range from 0°C to 60°C.

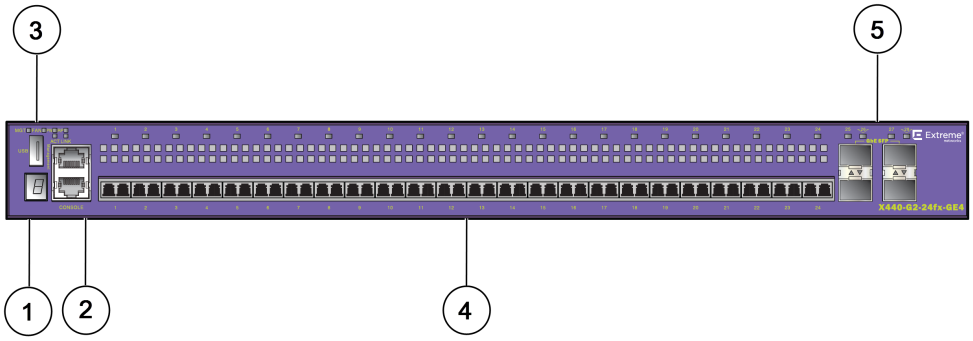


Figure 34: ExtremeSwitching X440-G2-24fx-GE4 Front Panel

1 = Stack number indicator	4 = 100BASE-FX LC connectors
2 = Console port/Ethernet management port	5 = 1GBASE-X SFP ports
3 = USB port (active with ExtremeXOS version 22.2 or later)	

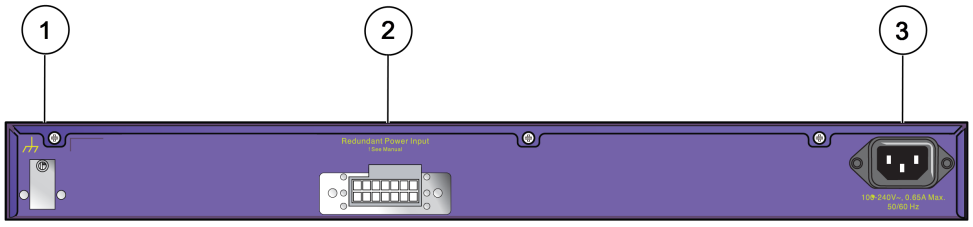


Figure 35: ExtremeSwitching X440-G2-24fx-GE4 Rear Panel

1 = Grounding lug	3 = AC power input socket
2 = Redundant power input	

ExtremeSwitching X440-G2-24t-GE4 Switch Ports and Slots

The ExtremeSwitching X440-G2-24t-GE4 switch ports and slots include:

- 24 front panel 10/100/1000BASE-T ports (RJ45). Both half-duplex and full-duplex communication are supported on ports 1 through 16. Ports 17 through 24 are full-duplex only.
- Four unpopulated front panel 1GBASE-X SFP ports.
- Ethernet management port (10/100/1000BASE-T).
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One front panel USB 2.0 port, operational on switches running ExtremeXOS version 22.2 or later.
- One rear redundant power supply connector.

The X440-G2 24t-GE4 switch supports an operating range from 0°C to 60°C.

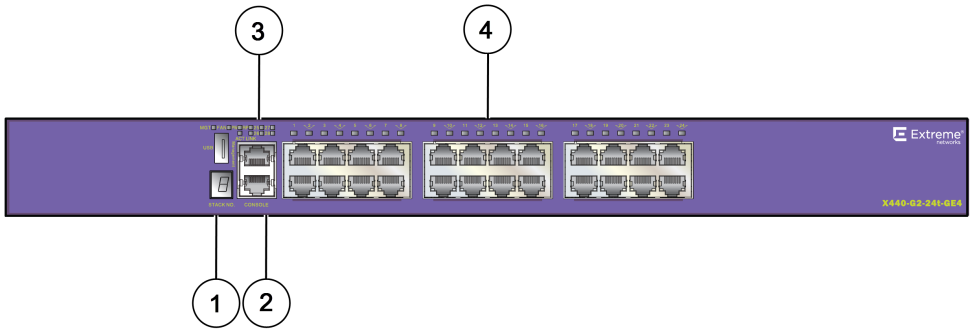


Figure 36: ExtremeSwitching X440-G2-24t-GE4 Front Panel

1 = Stack number indicator	3 = USB port (active with ExtremeXOS version 22.2 or later)
2 = Console port/Ethernet management port	4 = 10/100/1000BASE-T ports

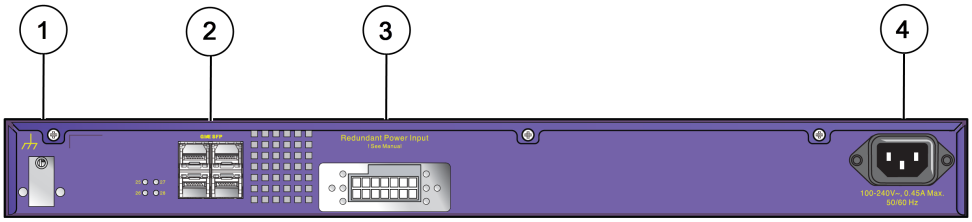


Figure 37: ExtremeSwitching X440-G2-24t-GE4 Rear Panel

1 = Grounding lug	3 = Redundant power input
2 = 1GBASE-X SFP ports	4 = AC power input socket

ExtremeSwitching X440-G2 Series Switch LEDs

The following sections describe the meanings of the LEDs on the ExtremeSwitching X440-G2 series switches.

Table 9: X440-G2 Front Panel LEDs

Label or Type	Color/State	Meaning
M (Management)	Slow blinking green (1 Hz)	Normal operation
	Fast blinking green (2 Hz)	Power-on self test (POST) in progress or Switch diagnostics are running
	Steady green	POST passed: system is booting image
	Blinking amber	System is disabled: POST failed or system overheated
	Off	No external power is attached
S1, S2 (Stack Management)	Steady green	Link OK on the indicated stacking port
	Blinking green	Activity on the indicated stacking port
FAN	Steady green	Normal operation
	Blinking amber	Failure
	Off	No power
Power Supply Unit (PSU)	Steady green	Normal operation
	Blinking amber	Input or output power failure
	Off	No board power
Redundant Power Supply (RPS)	Steady green	Normal operation
	Blinking amber	Power failure When RPS is present, no supply from PSU
	Off	No RPS PSU is attached
Ethernet Management Port	Blinking green (left)	Activity on the indicated port Link OK
	Off (left)	Activity on the indicated port
	Steady green (right)	Link OK
	Off (right)	No link, or port disabled

Table 9: X440-G2 Front Panel LEDs (continued)

Label or Type	Color/State	Meaning
Other ports	Steady green	Link OK
	Blinking green	Activity on the indicated port
	Off	No link, or port disabled

Table 10: Additional Port LED Meanings for PoE Switches: X440-G2-12p-10GE4, X440-G2-24p-10GE4, and X440-G2-48p-10GE4

Label or Type	Color/State	Meaning
All front panel ports	Steady green	Link is OK; port is not powered
	Steady amber	Link is OK; port is powered; no traffic
	Blinking green	Link is OK and transmitting packets; port is not powered
	Blinking amber	Link is OK and transmitting packets; port is powered
	Slow blinking amber	No link, or disabled port; port is powered
	Alternating amber and green	Port has a power fault
	Off	Port is not powered, has no link, or is disabled

Table 11: ExtremeSwitching X440-G2 2-digit Stack Number Indicator

Label or Type	Color/State	Meaning
Left digit (1)	*Reserved for future use*	
Right digit (1 – 8)	Indicates the position of this switch in the ExtremeSwitching stack configuration	
	Upper half blinking	This switch is the stack master node
	Lower half blinking	This switch is the stack backup node
	Lit steadily	This switch is a standby node in the stack

ExtremeSwitching X450-G2 Series Switches

The X450-G2 series switches provide 24 or 48 Ethernet ports that deliver high-density fast Ethernet or Gigabit Ethernet connectivity using fixed 10/100/1000BASE-T ports. In addition, some models offer either 24 or 48 PoE+ ports. The X450-G2 series switches also provide four ports of SFP+ 10 Gb Ethernet or four ports of SFP 1 Gb Ethernet on the front panel. Each model includes two dedicated stacking ports on the rear panel.

All X450-G2 ports are full-duplex. They do not support half-duplex operation.

The X450-G2 series switches include the following base models:

- ExtremeSwitching X450-G2-24t-GE4 Switch Ports and Slots on page 50
- ExtremeSwitching X450-G2-24t-10GE4 Switch Ports and Slots on page 51
- ExtremeSwitching X450-G2-48t-GE4 Switch Ports and Slots on page 52
- ExtremeSwitching X450-G2-48t-10GE4 Switch Ports and Slots on page 53
- ExtremeSwitching X450-G2-24p-GE4 Switch Ports and Slots on page 54
- ExtremeSwitching X450-G2-24p-10GE4 Switch Ports and Slots on page 55
- ExtremeSwitching X450-G2-48p-GE4 Switch Ports and Slots on page 56
- ExtremeSwitching X450-G2-48p-10GE4 Switch Ports and Slots on page 57

Each base model supports front-to-back cooling only. Switch cooling is provided by a replaceable fan module.

Note
The fan module must be ordered separately.

A serial console port on the front panel of the X450-G2 series switch allows you to connect a terminal and perform local management. An Ethernet management port can be used to connect the system to a parallel management network for administration. Alternatively, you can use an Ethernet cable to connect this port directly to a laptop to view and locally manage the switch configuration. The Ethernet management port supports 10/100/1000 Mbps speeds.

The non-PoE+ switches (that is, the 24t and 48t models) have a fixed, internal power supply. The PoE+ switches (that is, the 24p and 48p models) have two power supply bays to accommodate AC power supplies. Power supplies have integrated cooling fans that operate independently of the switch fans.

For more information about the power supplies used in the X450-G2 switches, see Replaceable Internal Power Supplies on page 136.

Note
X450-G2 series switches do not support back-to-front (BF) power supplies, and the switches do not support the back-to-front fan module.

X450-G2 series switches require ExtremeXOS version 16.1.1 or later, or version 21.1.1 or later.

ExtremeSwitching X450-G2-24t-GE4 Switch Ports and Slots

X450-G2-24t-GE4 switch ports and slots include:

- 24 front panel ports of 10/100/1000BASE-T (ports 1–24).
- Four front panel ports of 1GBASE-X SFP (ports 25–28).
- One front panel USB port.
- Ethernet management port 1 x 10/100/1000BASE-T.
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.

- One fixed power supply.
- One rear redundant power supply connector.
- One rear slot for fan module with front-to-back airflow.
- Two dedicated QSFP-form factor 21 Gb stacking ports on the rear panel.

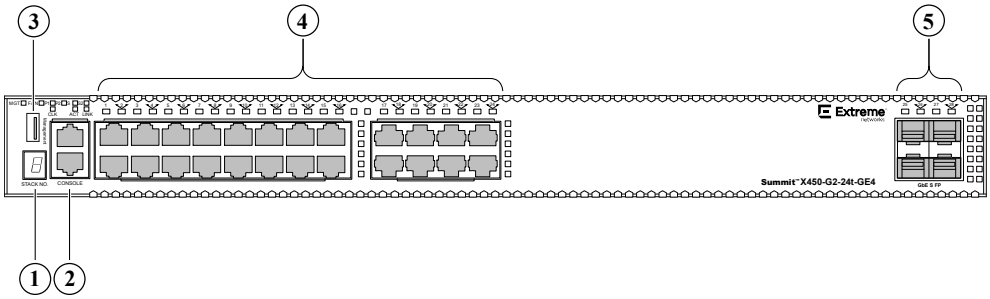


Figure 38: X450-G2-24t-GE4 Front Panel

1 = Stack number indicator	4 = 10/100/1000BASE-T ports
2 = Console port/Ethernet management port	5 = SFP 1GBASE-X ports
3 = USB port	

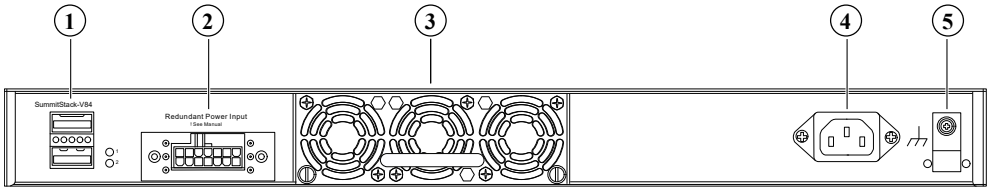


Figure 39: X450-G2-24t-GE4 Rear Panel

1 = 21 Gb stacking ports (QSFP+)	4 = AC power input connector
2 = Redundant power supply (RPS) connector	5 = Grounding screw
3 = Front-to-back fan module slot	

ExtremeSwitching X450-G2-24t-10GE4 Switch Ports and Slots

X450-G2-24t-10GE4 switch ports and slots include:

- 24 front panel ports of 10/100/1000BASE-T (ports 1–24).
- Four front panel ports of 10GBASE-X SFP+ (ports 25–28, with ports 27 and 28 configurable to be stacking ports). The SFP+ ports are dual speed (1 Gb/10 Gb).
- Front panel USB port.
- Ethernet management port 1 x 10/100/1000BASE-T.
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One fixed power supply.
- One rear redundant power supply connector.

- One rear slot for fan module with front-to-back airflow.
- Two dedicated QSFP-form factor 21 Gb stacking ports on the rear panel.

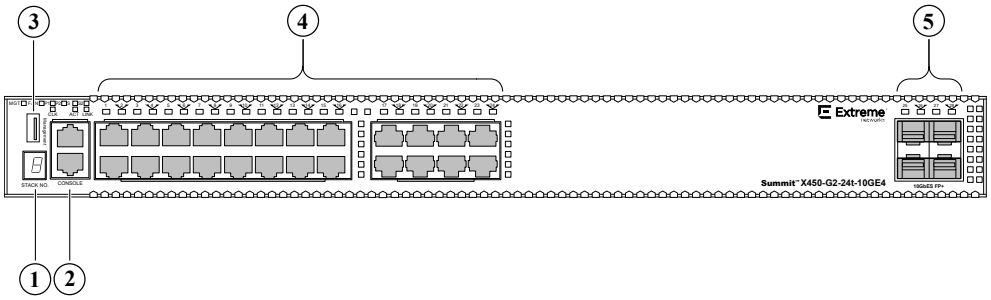


Figure 40: X450-G2-24t-10GE4 Front Panel

1 = Stack number indicator	4 = 10/100/1000BASE-T ports
2 = Console port/Ethernet management port	5 = SFP+ 10GBASE-X ports
3 = USB port	

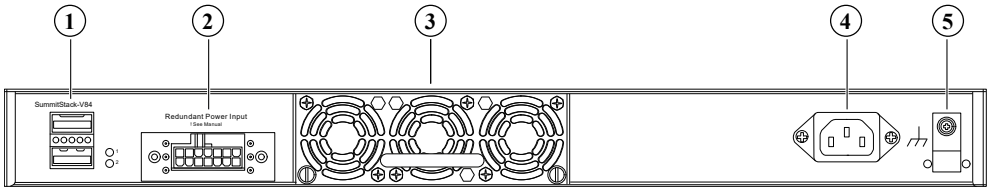


Figure 41: X450-G2-24t-10GE4 Rear Panel

1 = 21 Gb stacking ports (QSFP+)	4 = AC power input connector
2 = Redundant power supply (RPS) connector	5 = Grounding screw
3 = Front-to-back fan module slot	

ExtremeSwitching X450-G2-48t-GE4 Switch Ports and Slots

X450-G2-48t-GE4 switch ports and slots include:

- 48 front panel ports of 10/100/1000BASE-T (ports 1–48).
- Four front panel ports of 1GBASE-X SFP (ports 49–52).
- One front panel USB port.
- Ethernet management port 1 x 10/100/1000BASE-T.
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One fixed power supply.
- One rear redundant power supply connector.
- One rear slot for fan module with front-to-back airflow.
- Two dedicated QSFP-form factor 21 Gb stacking ports on the rear panel.

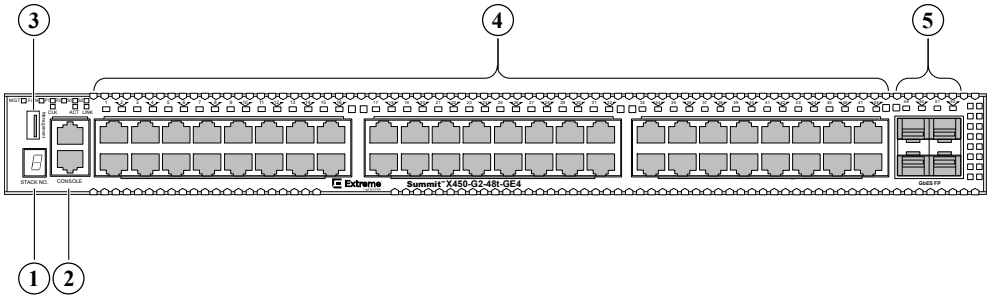


Figure 42: X450-G2-48t-GE4 Front Panel

1 = Stack number indicator	4 = 10/100/1000BASE-T ports
2 = Console port/Ethernet management port	5 = SFP 1GBASE-X ports
3 = USB port	

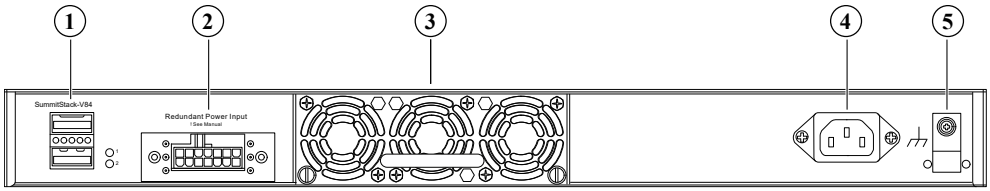


Figure 43: X450-G2-48t-GE4 Rear Panel

1 = 21 Gb stacking ports (QSFP+)	4 = AC power input connector
2 = Redundant power supply (RPS) connector	5 = Grounding screw
3 = Front-to-back fan module slot	

ExtremeSwitching X450-G2-48t-10GE4 Switch Ports and Slots

X450-G2-48t-10GE4 switch ports and slots include:

- 48 front panel ports of 10/100/1000BASE-T (ports 1–48).
- Four front panel ports of 10GBASE-X SFP+ (ports 49–52, with ports 51 and 52 configurable to be stacking ports). The SFP+ ports are dual speed (1 Gb/10 Gb).
- Front panel USB port.
- Ethernet management port 1 x 10/100/1000BASE-T.
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One fixed power supply.
- One rear redundant power supply connector.
- One rear slot for fan module with front-to-back airflow.
- Two dedicated QSFP-form factor 21 Gb stacking ports on the rear panel.

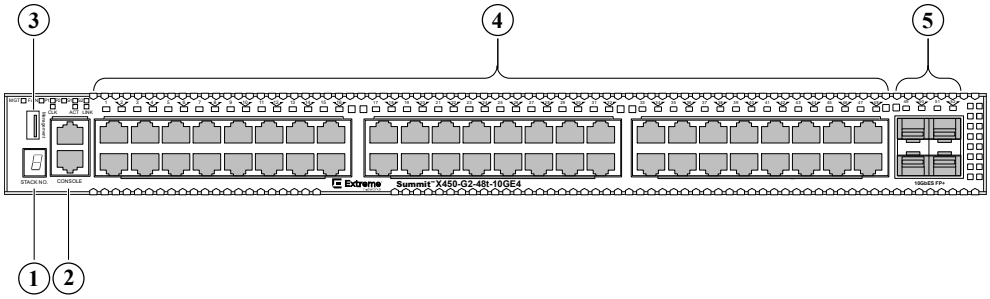


Figure 44: X450-G2-48t-10GE4 Front Panel

1 = Stack number indicator	4 = 10/100/1000BASE-T ports
2 = Console port/Ethernet management port	5 = SFP+ 10GBASE-X ports
3 = USB port	

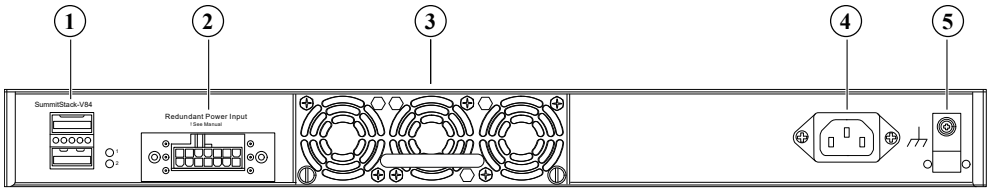


Figure 45: X450-G2-48t-10GE4 Rear Panel

1 = 21 Gb stacking ports (QSFP+)	4 = AC power input connector
2 = Redundant power supply (RPS) connector	5 = Grounding screw
3 = Front-to-back fan module slot	

ExtremeSwitching X450-G2-24p-GE4 Switch Ports and Slots

X450-G2-24p-GE4 switch ports and slots include:

- 24 front panel PoE+ ports of 10/100/1000BASE-T (ports 1–24).
- Four front panel ports of 1GBASE-X SFP (ports 25–28).
- One front panel USB port.
- Ethernet management port 1 x 10/100/1000BASE-T.
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One rear slot for fan module with front-to-back airflow.
- Two dedicated QSFP-form factor 21 Gb stacking ports on the rear panel.
- Rear dual power supply slots with front-to-back airflow.

Note
Unused power supply slots must be covered with blank panels.

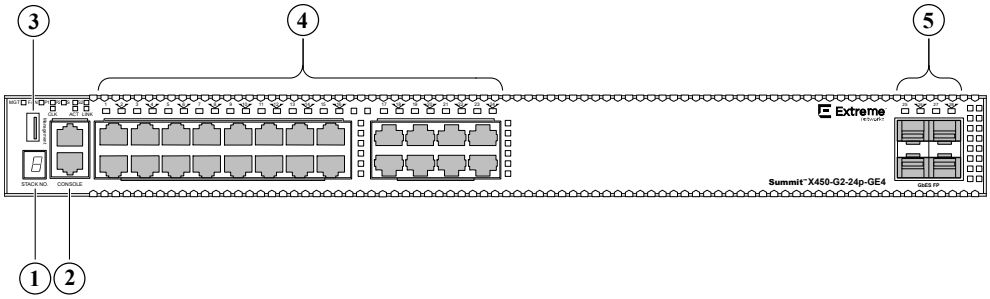


Figure 46: X450-G2-24p-GE4 Front Panel

1 = Stack number indicator	4 = PoE+ 10/100/1000BASE-T ports
2 = Console port/Ethernet management port	5 = SFP 1G ports
3 = USB port	

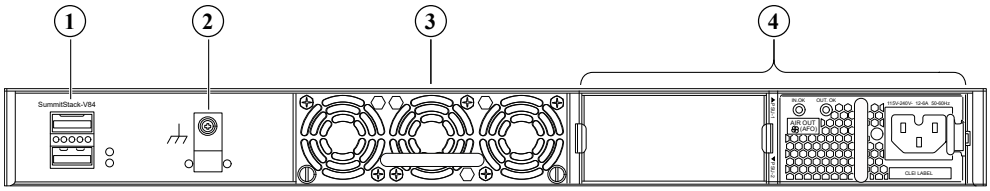


Figure 47: X450-G2-24p-GE4 Rear Panel

1 = 21 Gb stacking ports (QSFP+)	3 = Front-to-back fan module slot
2 = Grounding screw	4 = PoE+ power supply bays

ExtremeSwitching X450-G2-24p-10GE4 Switch Ports and Slots

X450-G2-24p-10GE4 switch ports and slots include:

- 24 front panel PoE+ ports of 10/100/1000BASE-T (ports 1–24).
- Four front panel ports of 10GBASE-X SFP+ (ports 25–28, with ports 27 and 28 configurable to be stacking ports). The SFP+ ports are dual speed (1 Gb/10 Gb).
- Front panel USB port.
- Ethernet management port 1 x 10/100/1000BASE-T.
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One rear slot for fan module with front-to-back airflow.
- Two dedicated QSFP-form factor 21 Gb stacking ports on the rear panel.
- Rear dual power supply slots with front-to-back airflow.

Note
Unused power supply slots must be covered with blank panels.

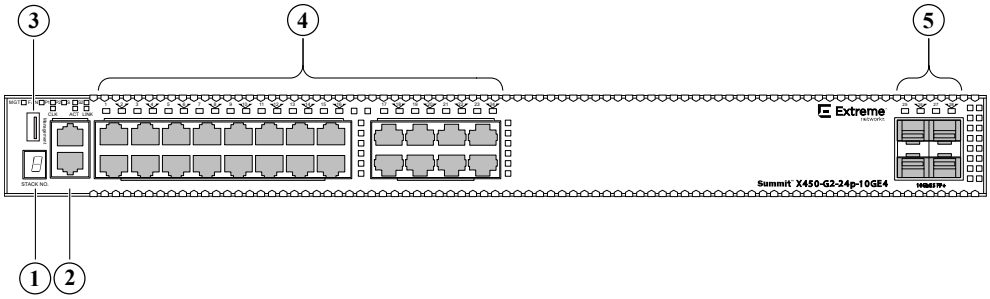


Figure 48: X450-G2-24p-10GE4 Front Panel

1 = Stack number indicator	4 = PoE+ 10/100/1000BASE-T ports
2 = Console port/Ethernet management port	5 = SFP+ 10GBASE-X ports
3 = USB port	

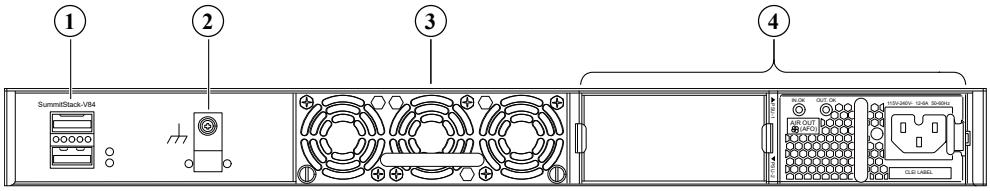


Figure 49: X450-G2-24p-10GE4 Rear Panel

1 = 21 Gb stacking ports (QSFP+)	3 = Front-to-back fan module slot
2 = Grounding screw	4 = PoE+ power supply bays

ExtremeSwitching X450-G2-48p-GE4 Switch Ports and Slots

X450-G2-48p-GE4 switch ports and slots include:

- 48 front panel PoE+ ports of 10/100/1000BASE-T (ports 1–48).
- Four front panel ports of 1GBASE-X SFP (ports 49–52).
- One front panel USB port.
- Ethernet management port 1 x 10/100/1000BASE-T.
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One rear slot for fan module with front-to-back airflow.
- Two dedicated QSFP-form factor 21 Gb stacking ports on the rear panel.
- Rear dual power supply slots with front-to-back airflow.

Note
Unused power supply slots must be covered with blank panels.

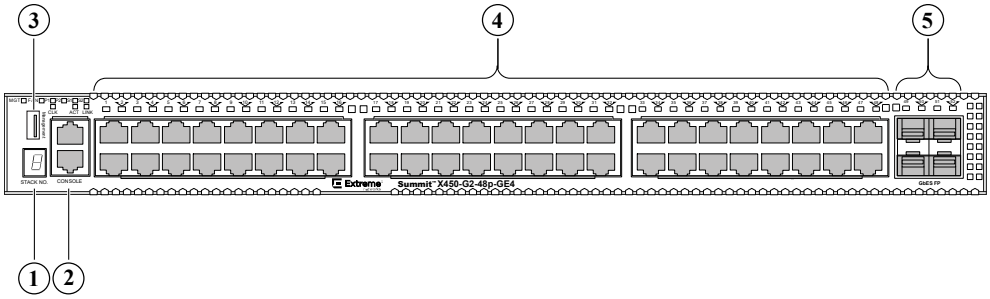


Figure 50: X450-G2-48p-GE4 Front Panel

1 = Stack number indicator	4 = PoE+ 10/100/1000BASE-T ports
2 = Console port/Ethernet management port	5 = SFP 1GBASE-X ports
3 = USB port	

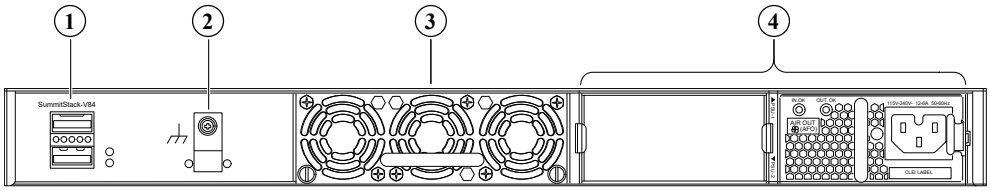


Figure 51: X450-G2-48p-GE4 Rear Panel

1 = 21 Gb stacking ports (QSFP+)	3 = Front-to-back fan module slot
2 = Grounding screw	4 = PoE+ power supply bays

ExtremeSwitching X450-G2-48p-10GE4 Switch Ports and Slots

X450-G2-48p-10GE4 switch ports and slots include:

- 48 front panel PoE+ ports of 10/100/1000BASE-T (ports 1–48).
- Four front panel ports of 10GBASE-X SFP+ (ports 49–52, with ports 51 and 52 configurable to be stacking ports). The SFP+ ports are dual speed (1 Gb/10 Gb).
- Front panel USB port.
- Ethernet management port 1 x 10/100/1000BASE-T.
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One rear slot for fan module with front-to-back airflow.
- Two dedicated QSFP-form factor 21 Gb stacking ports on the rear panel.
- Rear dual power supply slots with front-to-back airflow.

Note
Unused power supply slots must be covered with blank panels.

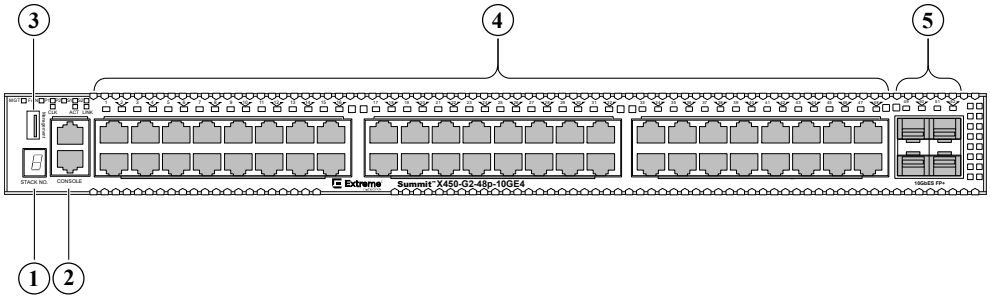


Figure 52: X450-G2-48p-10GE4 Front Panel

1 = Stack number indicator	4 = PoE+ 10/100/1000BASE-T ports
2 = Console port/Ethernet management port	5 = SFP+ 10GBASE-X ports
3 = USB port	

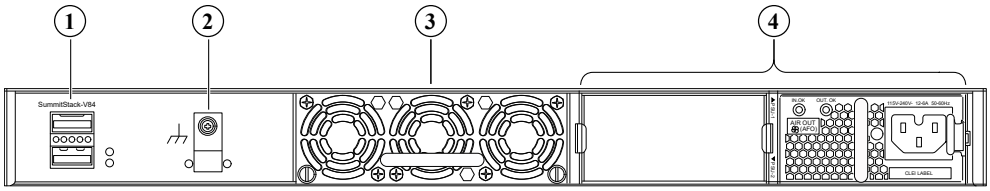


Figure 53: X450-G2-48p-10GE4 Rear Panel

1 = 21 Gb stacking ports (QSFP+)	3 = Front-to-back fan module slot
2 = Grounding screw	4 = PoE+ power supply bays

ExtremeSwitching X450-G2 Series Switch LEDs

The following sections describe the meanings of the LEDs on X450-G2 series switches.

Table 12: X450-G2 Front Panel LEDs

Label or Type	Color/State	Meaning
M (Management)	Slow blinking green (1 Hz)	Normal operation
	Fast blinking green (2 Hz)	Power-on self test (POST) in progress or Switch diagnostics are running
	Steady green	POST passed: system is booting image
	Blinking amber	System is disabled: POST failed or system overheated
	Off	No external power is attached
S1, S2 (Stack Management)	Steady green	Link OK on the indicated stacking port
	Blinking green	Activity on the indicated stacking port

Table 12: X450-G2 Front Panel LEDs (continued)

Label or Type	Color/State	Meaning
FAN	Steady green	Normal operation
	Blinking amber	Failure
	Off	No power
P1, P2 (Power Supply)	Steady green	Normal operation
	Steady amber	Power is attached, but no power is on
	Blinking amber	Power failure
	Off	No power attached
Ethernet Port 1–24 or 1–48	Steady green	Link OK
	Blinking green	Activity on the indicated port
	Off	No link or port disabled
1G SFP ports or 10G SFP+ ports 25, 26, 27, and 28 or 49, 50, 51, and 52	Steady green	Link OK
	Blinking green	Activity on the indicated port
	Off	No 1G or 10G link, or port disabled

Table 13: Additional Port LED Meanings for PoE Switches: X450-G2-24p-GE4, X450-G2-24p-10GE4, X450-G2-48p-GE4, and X450-G2-48p-10GE4

Label or Type	Color/State	Meaning
All front panel ports 1-24 or 1-48	Steady green	Link is OK; port is not powered
	Steady amber	Link is OK; port is powered; no traffic
	Blinking green	Link is OK and transmitting packets; port is not powered
	Blinking amber	Link is OK and transmitting packets; port is powered
	Slow blinking amber	No link, or disabled port; port is powered
	Alternating amber and green	Port has a power fault
	Off	Port is not powered, has no link, or is disabled

Table 14: X450-G2 2-digit Stack Number Indicator

Label or Type	Color/State	Meaning
	Reserved for future use.	

Table 14: X450-G2 2-digit Stack Number Indicator (continued)

Label or Type	Color/State	Meaning
Left digit (1)		
Right digit (1–8)	Indicates the position of this switch in the SummitStack configuration	
	Upper half blinking	This switch is the stack master node
	Lower half blinking	This switch is the stack backup node
	Lit steadily	This switch is a standby node in the stack

ExtremeSwitching X460-G2 Series Switches

The X460-G2 series switches provide 24 or 48 Ethernet ports that deliver high-density fast Ethernet or Gigabit Ethernet connectivity using fixed BASE-T and BASE-X ports. In addition, some models offer either 24 or 48 PoE+ ports.

Ports 25-48 on the X460-G2-24t-24ht-10GE4 and X460-G2-24p-24hp-10GE4 models can operate in half-duplex mode. All other X460-G2 ports are full-duplex.

The X460-G2 series switches include the following base models:

- ExtremeSwitching X460-G2-24t-GE4 Switch Ports and Slots on page 62
- ExtremeSwitching X460-G2-24t-10GE4 Switch Ports and Slots on page 63
- ExtremeSwitching X460-G2-24x-10GE4 Switch Ports and Slots on page 64
- ExtremeSwitching X460-G2-24p-GE4 Switch Ports and Slots on page 65
- ExtremeSwitching X460-G2-24p-10GE4 Switch Ports and Slots on page 66
- ExtremeSwitching X460-G2-48t-GE4 Switch Ports and Slots on page 67
- ExtremeSwitching X460-G2-48t-10GE4 Switch Ports and Slots on page 68
- ExtremeSwitching X460-G2-24t-24ht-10GE4 Switch Ports and Slots on page 69
- ExtremeSwitching X460-G2-48x-10GE4 Switch Ports and Slots on page 70
- ExtremeSwitching X460-G2-48p-10GE4 Switch Ports and Slots on page 72
- ExtremeSwitching X460-G2-24p-24hp-10GE4 Switch Ports and Slots on page 73
- ExtremeSwitching X460-G2-16mp-32p-10GE4 Switch Ports and Slots on page 74

Each base model is available with either front-to-back or back-to-front cooling. There is no operational difference between these switch versions.

A serial console port on the front panel of the X460-G2 series switch allows you to connect a terminal and perform local management. An Ethernet management port can be used to connect the system to a parallel management network for administration. Alternatively, you can use an Ethernet cable to connect this port directly to a laptop to view and locally manage the switch configuration. The Ethernet management port supports 10/100/1000 Mbps speeds.

Switch cooling is provided by a replaceable fan module. Fan modules are available in two different models that direct the airflow either from front to back or from back to

front. Two power supply bays accommodate either AC or DC power supplies. Power supplies have integrated cooling fans that operate independently of the switch fan.

Like the fan module, the power supplies are available in models with either front-to-back or back-to-front cooling airflow. For more information about the power supplies used in the X460-G2 switches, see Replaceable Internal Power Supplies on page 136.

Power supplies and fan trays are ordered separately.

Caution
Air must flow in the same direction for all installed fan modules and power supplies in a switch.

The following X460-G2 switch models require ExtremeXOS version 22.2.1 or later:

- ExtremeSwitching X460-G2-24t-24ht-10GE4
- ExtremeSwitching X460-G2-24p-24hp-10GE4
- ExtremeSwitching X460-G2-16mp-32p-10GE4

All other X460-G2 switch models are compatible with ExtremeXOS version 15.6.1.4 or later, or version 21.1.1 or later.

Versatile Interface Module (VIM) Options for X460-G2 Series Switches

The following VIMs are available for X460-G2 series switches:

- VIM-2q Ethernet Module with 2x40G ports.
- VIM-2ss SummitStack Module
- VIM-2t Ethernet Module with 2x10GBASE-T ports.
- VIM-2x Ethernet Module with 2x10GSFP+ ports.
- TM-CLK Clock Module to support SyncE and 1588

You can form stacks with X460-G2 switches using some or all of these VIMs. However, not all VIMs support stacking on all X460-G2 switch models. For details, see X460-G2 Stacking on page 208.

X460-G2 switches offer Boundary Clock (BC), Transparent Clock (TC), and Ordinary Clock (OC) for synchronizing phase and frequency and allowing the network and the connected devices to be synchronized over Ethernet connections. Precision is +-2 nanoseconds (ns) with time accuracy +50 to -65 ns.

Warning
The switch must be powered off before you install any interface module options (VIMs or Clock Modules). The interface module options are not hot swappable.

Note
If you do not plan to use the TM-CLK Clock Module, a grounding screw (16714) is available that can be inserted into the TM-CLK slot.

For more information on X460-G2 VIM and Clock module options, see Optional Ports for X460-G2 Switches on page 166.

Note
See the *ExtremeXOS 30.7 User Guide* and the *ExtremeXOS 30.7 Command Reference Guide* for feature-specific information about the switches and for information regarding switch configuration.

ExtremeSwitching X460-G2-24t-GE4 Switch Ports and Slots

X460-G2-24t-GE4 switch ports and slots include:

- 24 front panel ports of 10/100/1000BASE-T (ports 1-24, four of which are shared with SFP ports).
- Four front panel combo (shared) SFP ports and four dedicated SFP ports (100/1000BASE-X).
- Four front panel ports of 1GBASE-X SFP (ports 29-32).
- One front panel USB port.
- Ethernet management port 1 x 10/100/1000BASE-T.
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One rear panel VIM slot.
- One rear panel TM-CLK (clock) slot.
- Rear dual PSU power slots with front-to-back or back-to-front airflow.
- One rear slot for fan module with front-to-back or back-to-front airflow.

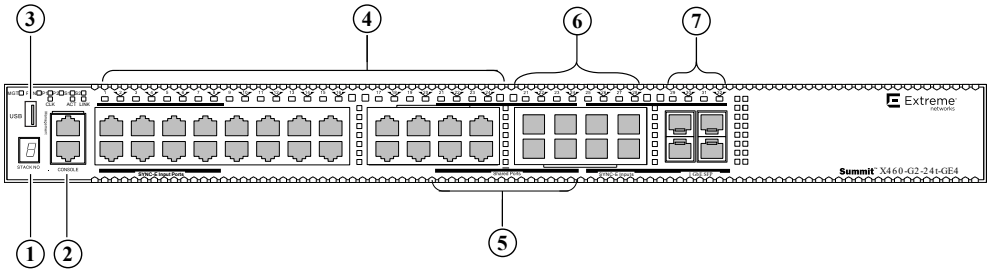


Figure 54: X460-G2-24t-GE4 Front Panel

1 = Stack number indicator	5 = Combo ports
2 = Console port/Ethernet management port	6 = SFP ports
3 = USB port	7 = SFP 1GBASE-X ports
4 = 10/100/1000BASE-T ports	

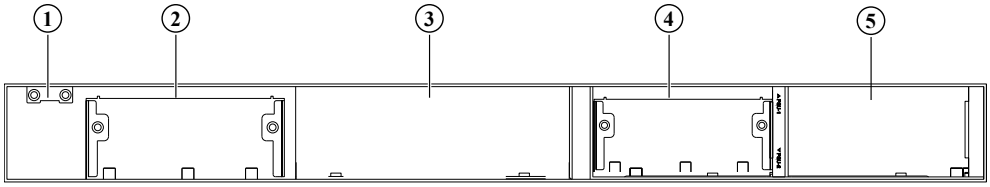


Figure 55: X460-G2-24t-GE4 Rear Panel

1 = TM-CLK (clock) slot cover	4 = Blank power supply cover
2 = VIM slot cover	5 = Power supply slot
3 = Fan module slot	

ExtremeSwitching X460-G2-24t-10GE4 Switch Ports and Slots

X460-G2-24t-10GE4 switch ports and slots include:

- 24 front panel ports of 10/100/1000BASE-T (ports 1-24, four of which are shared with SFP ports).
- Four front panel combo (shared) SFP ports and four dedicated SFP ports (100/1000BASE-X).
- Four front panel ports of 10GBASE-X SFP+ (ports 29-32, with two of these ports configurable to be stacking ports).
- One front panel USB port.
- Ethernet management port 1 x 10/100/1000BASE-T.
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One rear panel VIM slot.
- One rear panel TM-CLK (clock) slot.
- Rear dual PSU power slots with front-to-back or back-to-front airflow.
- One rear slot for fan module with front-to-back or back-to-front airflow.

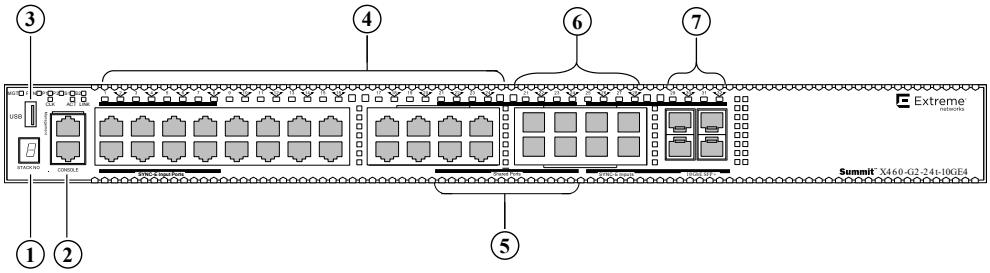


Figure 56: X460-G2-24t-10GE4 Front Panel

1 = Stack number indicator	5 = Combo ports
2 = Console port/Ethernet management port	6 = SFP ports
3 = USB port	7 = SFP+ 10GBASE-X ports
4 = 10/100/1000BASE-T ports	

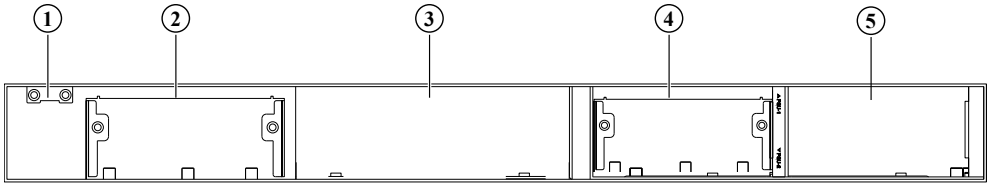


Figure 57: X460-G2-24t-10GE4 Rear Panel

1 = TM-CLK (clock) slot cover	4 = Blank power supply cover
2 = VIM slot cover	5 = Power supply slot
3 = Fan module slot	

ExtremeSwitching X460-G2-24x-10GE4 Switch Ports and Slots

X460-G2-24x-10GE4 switch ports and slots include:

- 24 front panel ports of 100/1000BASE-X (ports 1-24, four of which are shared with 10/100/1000BASE-T ports).
- Four front panel combo (shared) 10/100/1000BASE-T ports and four dedicated 10/100/1000BASE-T ports.
- Four front panel ports of 10GBASE-X SFP+ (ports 29-32, with two of these ports configurable to be stacking ports).
- One front panel USB port.
- Ethernet management port 1 x 10/100/1000BASE-T.
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One rear panel VIM slot.
- One rear panel TM-CLK (clock) slot.
- Rear dual PSU power slots with front-to-back or back-to-front airflow.
- One rear slot for fan module with front-to-back or back-to-front airflow.

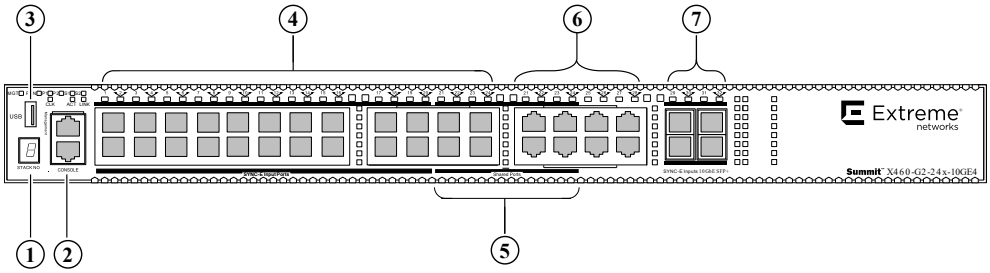


Figure 58: X460-G2-24x-10GE4 Front Panel

1 = Stack number indicator	5 = Combo ports
2 = Console port/Ethernet management port	6 = 10/100/1000BASE-T ports
3 = USB port	7 = SFP+ 10GBASE-X ports
4 = 10/100/1000BASE-X ports	

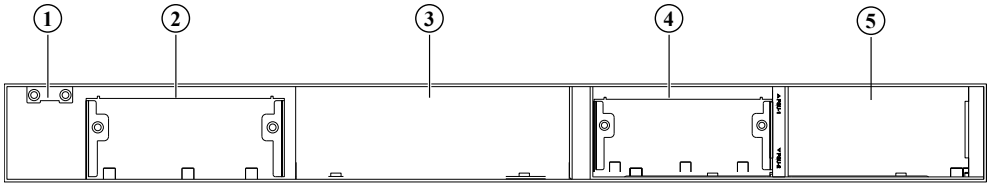


Figure 59: X460-G2-24x-10GE4 Rear Panel

1 = TM-CLK (clock) slot cover	4 = Blank power supply cover
2 = VIM slot cover	5 = Power supply slot
3 = Fan module slot	

ExtremeSwitching X460-G2-24p-GE4 Switch Ports and Slots

X460-G2-24p-GE4 switch ports and slots include:

- 24 front panel PoE+ ports of 10/100/1000BASE-T (ports 1-24, four of which are shared with SFP ports).
- Four front panel combo (shared) SFP ports and four dedicated SFP ports (100/1000BASE-X).
- Four front panel ports of 1GBASE-X SFP (ports 29-32).
- One front panel USB port.
- Ethernet management port 1 x 10/100/1000BASE-T.
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One rear panel VIM slot.
- One rear panel TM-CLK (clock) slot.
- Rear dual PSU power slots with front-to-back or back-to-front airflow.
- One rear slot for fan module with front-to-back or back-to-front airflow.

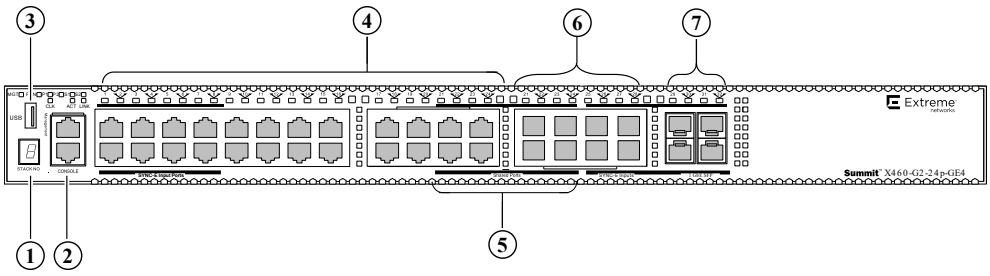


Figure 60: X460-G2-24p-GE4 Front Panel

1 = Stack number indicator	5 = Combo ports
2 = Console port/Ethernet management port	6 = SFP ports
3 = USB port	7 = SFP 1GBASE-X ports
4 = PoE+ 10/100/1000BASE-T ports	

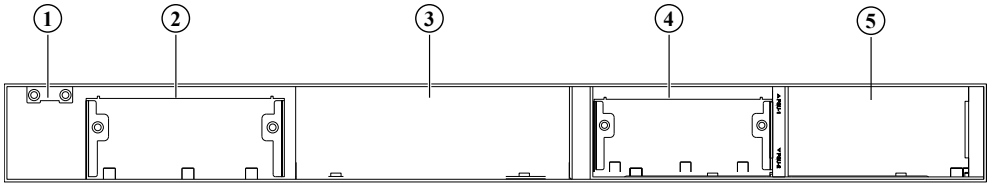


Figure 61: X460-G2-24p-GE4 Rear Panel

1 = TM-CLK (clock) slot cover	4 = Blank power supply cover
2 = VIM slot cover	5 = Power supply slot
3 = Fan module slot	

ExtremeSwitching X460-G2-24p-10GE4 Switch Ports and Slots

X460-G2-24p-10GE4 switch ports and slots include:

- 24 front panel PoE+ ports of 10/100/1000BASE-T (ports 1-24, four of which are shared with SFP ports).
- Four front panel combo SFP ports and four dedicated SFP ports (100/1000BASE-X).
- Four front panel ports of 10GBASE-X SFP+ (ports 29-32, with two of these ports configurable to be stacking ports).
- One front panel USB port.
- Ethernet management port 1 x 10/100/1000BASE-T.
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One rear panel VIM slot.
- One rear panel TM-CLK (clock) slot.
- Rear dual PSU power slots with front-to-back or back-to-front airflow.
- One rear slot for fan module with front-to-back or back-to-front airflow.

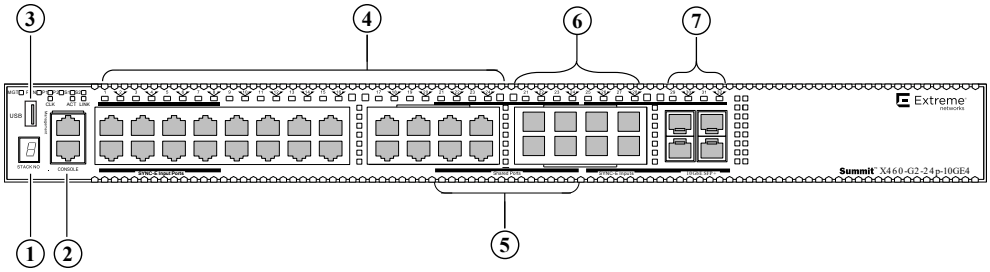


Figure 62: X460-G2-24p-10GE4 Front Panel

1 = Stack number indicator	5 = Combo ports
2 = Console port/Ethernet management port	6 = SFP ports
3 = USB port	7 = SFP+ 10GBASE-X ports
4 = PoE+ 10/100/1000BASE-T ports	

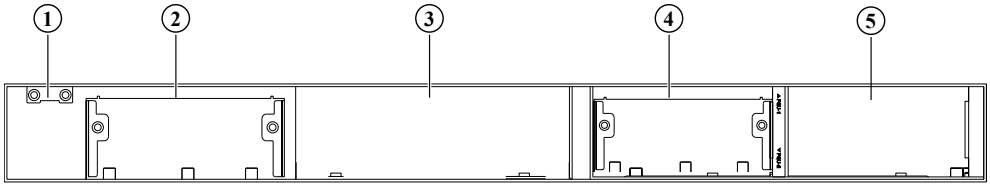


Figure 63: X460-G2-24p-10GE4 Rear Panel

1 = TM-CLK (clock) slot cover	4 = Blank power supply cover
2 = VIM slot cover	5 = Power supply slot
3 = Fan module slot	

ExtremeSwitching X460-G2-48t-GE4 Switch Ports and Slots

X460-G2-48t-GE4 switch ports and slots include:

- 48 front panel ports of 10/100/1000BASE-T (ports 1-48).
- Four front panel ports of 1GBASE-X SFP (ports 49-52).
- One front panel USB port.
- Ethernet management port 1 x 10/100/1000BASE-T.
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One rear panel VIM slot.
- One rear panel TM-CLK (clock) slot.
- Rear dual PSU power slots with front-to-back or back-to-front airflow.
- One rear slot for fan module with front-to-back or back-to-front airflow.

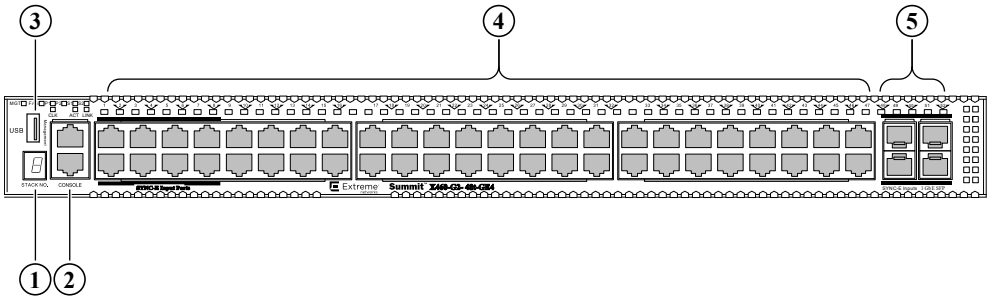


Figure 64: X460-G2-48t-GE4 Front Panel

1 = Stack number indicator	4 = 10/100/1000BASE-T ports
2 = Console port/Ethernet management port	5 = SFP 1GBASE-X ports
3 = USB port	

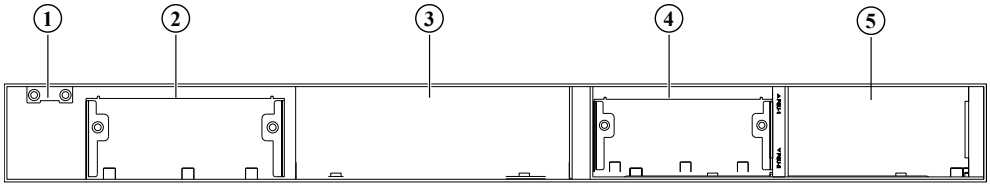


Figure 65: X460-G2-48t-GE4 Rear Panel

1 = TM-CLK (clock) slot cover	4 = Blank power supply cover
2 = VIM slot cover	5 = Power supply slot
3 = Fan module slot	

ExtremeSwitching X460-G2-48t-10GE4 Switch Ports and Slots

X460-G2-48t-10GE4 switch ports and slots include:

- 48 front panel ports of 10/100/1000BASE-T (ports 1-48).
- Four front panel ports of 10GBASE-X SFP+ (ports 49-52, with two of these ports configurable to be stacking ports).
- One front panel USB port.
- Ethernet management port 1 x 10/100/1000BASE-T.
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One rear panel VIM slot.
- One rear panel TM-CLK (clock) slot.
- Rear dual PSU power slots with front-to-back or back-to-front airflow.
- One rear slot for fan module with front-to-back or back-to-front airflow.

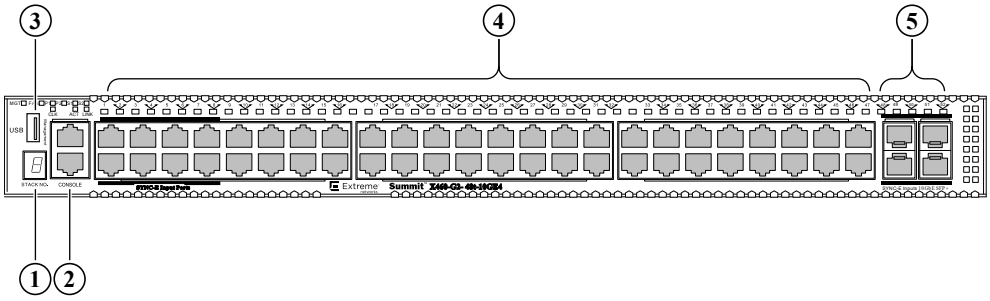


Figure 66: X460-G2-48t-10GE4 Front Panel

1 = Stack number indicator	4 = 10/100/1000BASE-T ports
2 = Console port/Ethernet management port	5 = SFP+ 10GBASE-X ports
3 = USB port	

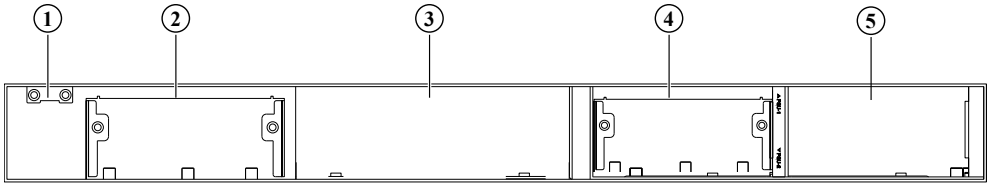


Figure 67: X460-G2-48t-10GE4 Rear Panel

1 = TM-CLK (clock) slot cover	4 = Blank power supply cover
2 = VIM slot cover	5 = Power supply slot
3 = Fan module slot	

ExtremeSwitching X460-G2-24t-24ht-10GE4 Switch Ports and Slots

X460-G2-24t-24ht-10GE4 switch ports and slots include:

- 24 front panel ports of 10/100/1000BASE-T (ports 1-24) that support full-duplex communication only
- 24 front panel ports of 10/100/1000BASE-T (ports 25-48) that support full-duplex communication and support half-duplex communication at speeds less than 1 Gb
- Four ports of 10GBASE-X SFP+ (ports 49-52, with two of these ports configurable to be stacking ports).
- One front panel USB port.
- Ethernet management port 1 x 10/100/1000BASE-T.
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One rear panel VIM slot.
- One rear panel TM-CLK (clock) slot.
- Rear dual PSU power slots with front-to-back or back-to-front airflow.
- One rear slot for fan module with front-to-back or back-to-front airflow.

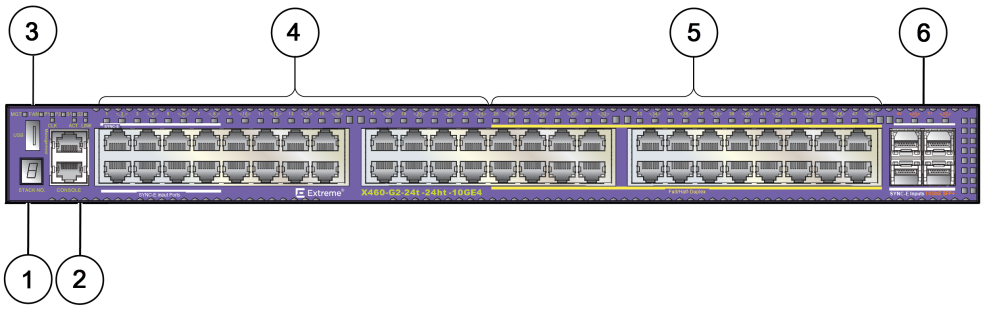


Figure 68: X460-G2-24t-24ht-10GE4 Front Panel

1 = Stack number indicator	4 = 10/100/1000BASE-T ports
2 = Console port/Ethernet management port	5 = 10/100/1000BASE-T ports with half-duplex
3 = USB port	6 = SFP+ 10GBASE-X ports

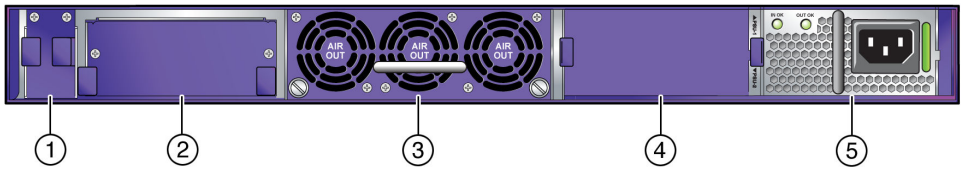


Figure 69: X460-G2-24t-24ht-10GE4 Rear Panel

1 = TM-CLK (clock) slot cover	4 = Blank power supply cover
2 = VIM slot cover	5 = Power supply slot
3 = Fan module slot	

Note
It is not possible to collect statistics on packet collisions for the X460-G2-24t-24ht-10GE4 switch.

ExtremeSwitching X460-G2-48x-10GE4 Switch Ports and Slots

X460-G2-48x-10GE4 switch ports and slots include:

- 48 front panel ports of 100/1000BASE-X (ports 1-48).
- Four front panel ports of 10GBASE-X SFP+ (ports 49-52, with two of these ports configurable to be stacking ports).
- One front panel USB port.
- Ethernet management port 1 x 10/100/1000BASE-T.
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One rear panel VIM slot
- One rear panel TM-CLK (clock) slot.
- Rear dual PSU power slots with front-to-back or back-to-front airflow.
- One rear slot for fan module with front-to-back or back-to-front airflow.

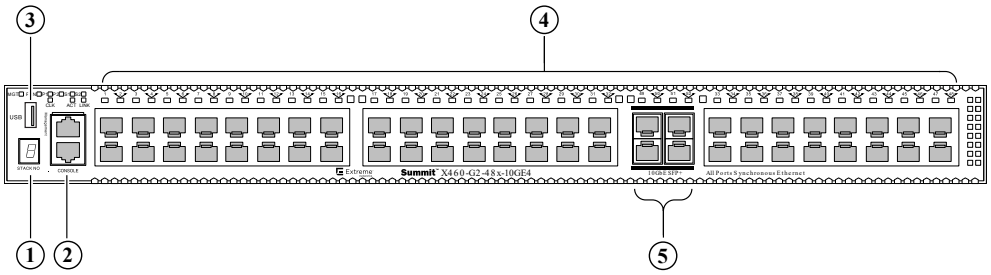


Figure 70: X460-G2-48x-10GE4 Front Panel

1 = Stack number indicator	4 = 100/1000BASE-X ports
2 = Console port/Ethernet management port	5 = SFP+ 10GBASE-X ports
3 = USB port	

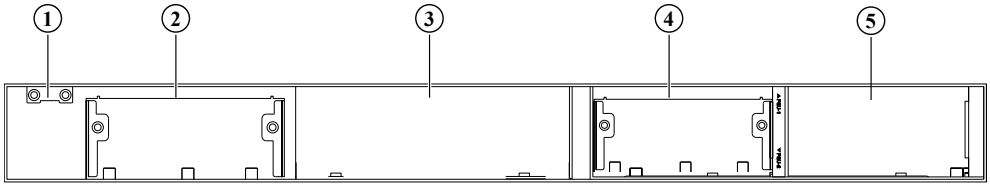


Figure 71: X460-G2-48x-10GE4 Rear Panel

1 = TM-CLK (clock) slot cover	4 = Blank power supply cover
2 = VIM slot cover	5 = Power supply slot
3 = Fan module slot	

Summit X460-G2-48p-GE4 Switch Ports and Slots

The Summit X460-G2-48p-GE4 switch ports and slots include:

- 48 front panel PoE+ ports of 10/100/1000BASE-T (ports 1-48).
- Four front panel ports of 1GBASE-X SFP (ports 49-52).
- One front panel USB port.
- Ethernet management port 1 x 10/100/1000BASE-T.
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One rear panel VIM slot.
- One rear panel TM-CLK (clock) slot.
- Rear dual PSU power slots with front-to-back or back-to-front airflow.
- One rear slot for fan module with front-to-back or back-to-front airflow.

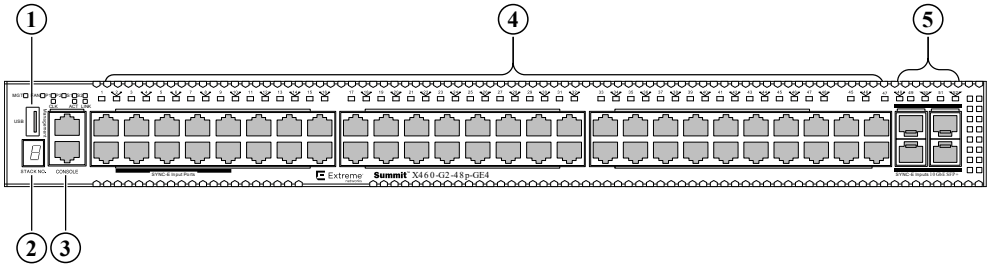


Figure 72: Summit X460-G2-48p-GE4 Front Panel

1 = USB port	4 = PoE+ 10/100/1000BASE-T ports
2 = Stack number indicator	5 = SFP 1GBASE-X ports
3 = Console port/Ethernet management port	

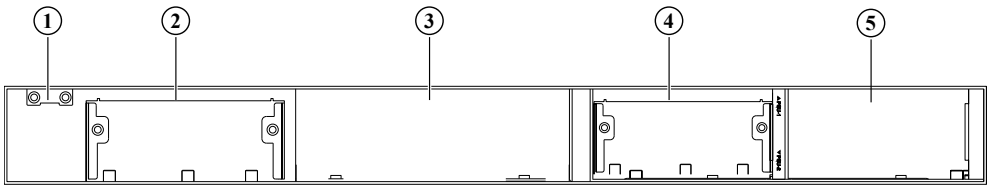


Figure 73: Summit X460-G2-48p-GE4 Rear Panel

1 = TM-CLK (clock) slot cover	4 = Blank power supply cover
2 = VIM slot cover	5 = Power supply slot
3 = Fan module slot	

ExtremeSwitching X460-G2-48p-10GE4 Switch Ports and Slots

X460-G2-48p-10GE4 switch ports and slots include:

- 48 front panel PoE+ ports of 10/100/1000BASE-T (ports 1-48).
- Four front panel ports of 10GBASE-X SFP+ (ports 49-52, with two of these ports configurable to be stacking ports).
- One front panel USB port.
- Ethernet management port 1 x 10/100/1000BASE-T.
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One rear panel VIM slot.
- One rear panel TM-CLK (clock) slot.
- Rear dual PSU power slots with front-to-back or back-to-front airflow.
- One rear slot for fan module with front-to-back or back-to-front airflow.

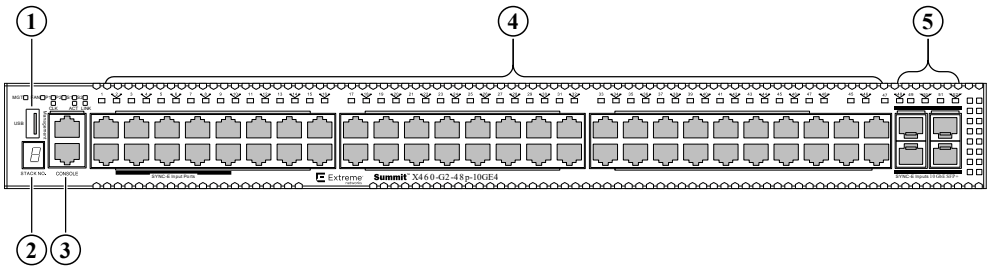


Figure 74: X460-G2-48p-10GE4 Front Panel

1 = USB port	4 = PoE+ 10/100/1000BASE-T ports
2 = Stack number indicator	5 = SFP+ 10GBASE-X ports
3 = Console port/Ethernet management port	

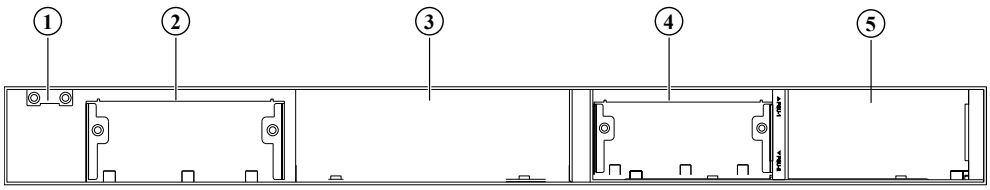


Figure 75: X460-G2-48p-10GE4 Rear Panel

1 = TM-CLK (clock) slot cover	4 = Blank power supply cover
2 = VIM slot cover	5 = Power supply slot
3 = Fan module slot	

ExtremeSwitching X460-G2-24p-24hp-10GE4 Switch Ports and Slots

X460-G2-24p-24hp-10GE4 switch ports and slots include:

- 24 front panel PoE+ ports of 10/100/1000BASE-T (ports 1-24) that support full-duplex communication only
- 24 front panel PoE+ ports of 10/100/1000BASE-T (ports 25-48) that support full-duplex communication and support half-duplex communication at speeds less than 1 Gb
- Four ports of 10GBASE-X SFP+ (ports 49-52, with two of these ports configurable to be stacking ports).
- One front panel USB port.
- Ethernet management port 1 x 10/100/1000BASE-T.
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One rear panel VIM slot.
- One rear panel TM-CLK (clock) slot.
- Rear dual PSU power slots with front-to-back or back-to-front airflow.
- One rear slot for fan module with front-to-back or back-to-front airflow.

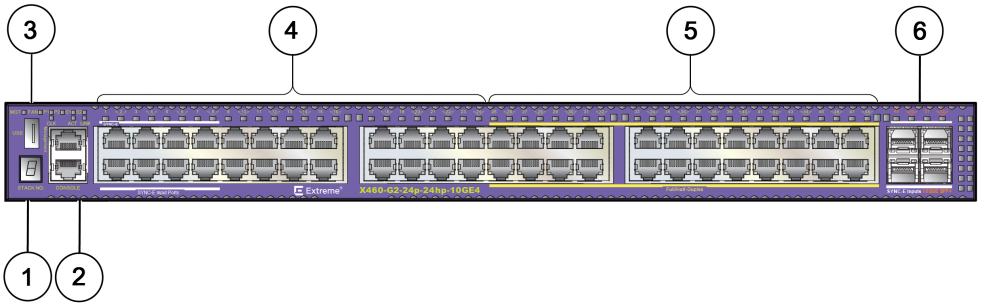


Figure 76: X460-G2-24p-24hp-10GE4 Front Panel

1 = Stack number indicator	4 = PoE+ 10/100/1000BASE-T ports
2 = Console port/Ethernet management port	5 = PoE+ 10/100/1000BASE-T ports with half-duplex
3 = USB port	6 = SFP+ 10GBASE-X ports

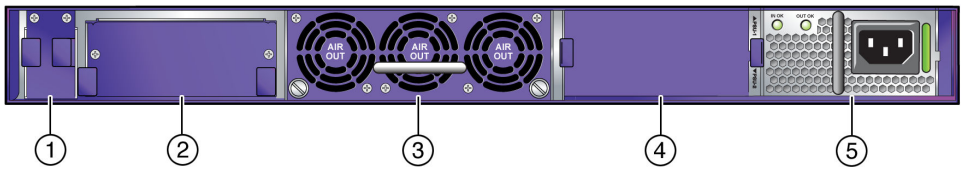


Figure 77: X460-G2-24p-24hp-10GE4 Rear Panel

1 = TM-CLK (clock) slot cover	4 = Blank power supply cover
2 = VIM slot cover	5 = Power supply slot

3 = Fan module slot	

Note
It is not possible to collect statistics on packet collisions for the X460-G2-24p-24hp-10GE4 switch.

ExtremeSwitching X460-G2-16mp-32p-10GE4 Switch Ports and Slots

X460-G2-16mp-32p-10GE4 switch ports and slots include:

- 16 front panel PoE+ ports of 100/1000/2.5G BASE-T (ports 1-16).
- 32 front panel PoE+ ports of 10/100/1000BASE-T (ports 17-48).
- Four ports of 10G SFP+ (ports 49-52, with two of these ports configurable to be stacking ports)
- One front panel USB port
- Ethernet management port 1 x 10/100/1000BASE-T
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- One rear panel VIM slot
- One rear panel TM-CLK (clock) slot
- Rear dual PSU power slots with front-to-back or back-to-front airflow
- One rear slot for fan module with front-to-back or back-to-front airflow

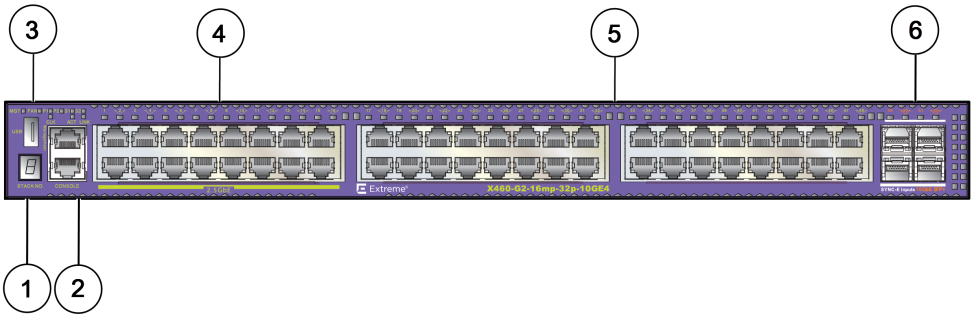


Figure 78: X460-G2-16mp-32p-10GE4 Front Panel

1 = USB port	4 = PoE+ 100/1000/2.5G BASE-T ports
2 = Stack number indicator	5 = PoE+ 10/100/1000BASE-T ports
3 = Console port/Ethernet management port	6 = SFP+ 10GBASE-X ports

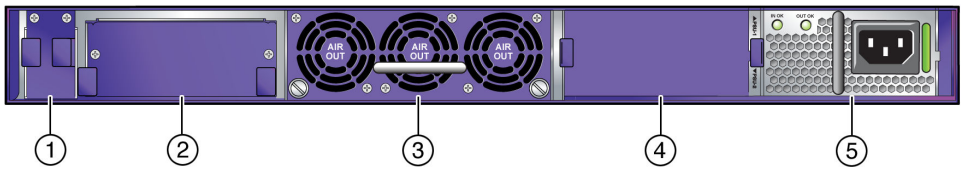


Figure 79: X460-G2-16mp-32p-10GE4 Rear Panel

1 = TM-CLK (clock) slot cover	4 = Blank power supply cover
2 = VIM slot cover	5 = Power supply slot
3 = Fan module slot	

ExtremeSwitching X460-G2 Series Switch LEDs

Table 15 describes the meanings of the front-panel LEDs on all X460-G2 series switches.

Table 15: X460-G2 Front Panel LEDs

Label or Type	Color/State	Meaning
M (Management)	Slow blinking green (1 Hz)	Normal operation
	Fast blinking green (2 Hz)	Power-on self test (POST) in progress or Switch diagnostics are running
	Steady green	POST passed; system is booting image
	Blinking amber	System is disabled: POST failed or system overheated
	Off	No external power is attached
S1, S2 (Stack Management)	Steady green	Link OK on the indicated stacking port
	Blinking green	Activity on the indicated stacking port
FAN	Steady green	Normal operation
	Blinking amber	Failure
	Off	No power
P1, P2 (Power Supply)	Steady green	Normal operation
	Steady amber	Non-PoE models: PSU present, but no input power PoE models: Not supported
	Blinking amber	Power failure
	Off	No power is attached
Ethernet Port 1-32 or 1-52	Steady green	Link OK
	Blinking green	Activity on the indicated port
	Off	No link or port disabled
1G SFP ports or 10G SFP+ ports 29, 30, 31, and 32 or 53, 54, 55, and 56	Steady green	Link OK
	Blinking green	Activity on the indicated port
	Off	No 1G or 10G link, or port disabled

Table 16 on page 76 describes the meanings of additional port LEDs on the following X460-G2 PoE switch models:

- X460-G2-24p-GE4
- X460-G2-24p-10GE4
- X460-G2-48p-GE4
- X460-G2-48p-10GE4
- X460-G2-24p-24hp-10GE4
- X460-G2-16mp-32p-10GE4

Table 16: Additional Port LED Meanings for PoE Switches

Label or Type	Color/State	Meaning
All front panel ports 1-24 or 1-48	Steady green	Link is OK; port is not powered
	Steady amber	Link is OK; port is powered; no traffic
	Blinking green	Link is OK and transmitting packets; port is not powered
	Blinking amber	Link is OK and transmitting packets; port is powered
	Slow blinking amber	No link, or disabled port; port is powered
	Alternating amber and green	Port has a power fault
	Off	Port is not powered, has no link, or is disabled

Table 17 describes the meanings of the two-digit stack number indicator on all X460-G2 series switches.

Table 17: X460-G2 two-digit Stack Number Indicator

Label or Type	Color/State	Meaning
Left digit (1)	*Reserved for future use*	
Right digit (1 – 8)	Indicates the position of this switch in the SummitStack configuration	
	Upper half blinking	This switch is the stack master node
	Lower half blinking	This switch is the stack backup node
	Lit steadily	This switch is a standby node in the stack

ExtremeSwitching X465 Series Switches

The X465 series switches provide 24 or 48 Ethernet ports that can be deployed in either Enterprise LAN or high-density, top-of-rack high-performance enterprise and aggregation applications. In addition, some models offer either 24 or 48 PoE+ ports.

The 10/100/1000BaseT ports on the X465-24W/48T/48P/48W/24MU-24W models can operate in half-duplex mode when operating at 10Mbps or 100Mbps. In addition, these models support IEEE 802.1AE MACsec.

The X465 series switches include the following base models:

- ExtremeSwitching X465-24MU Switch Ports and Slots on page 80
- ExtremeSwitching X465-24MU-24W Switch Ports and Slots on page 80
- ExtremeSwitching X465-24S Switch Ports and Slots on page 81
- ExtremeSwitching X465-24W Switch Ports and Slots on page 81
- ExtremeSwitching X465-24XE Switch Ports and Slots on page 81
- ExtremeSwitching X465-48P Switch Ports and Slots on page 82
- ExtremeSwitching X465-48T Switch Ports and Slots on page 82
- ExtremeSwitching X465-48W Switch Ports and Slots on page 82
- ExtremeSwitching X465i-48W Switch Ports and Slots on page 83

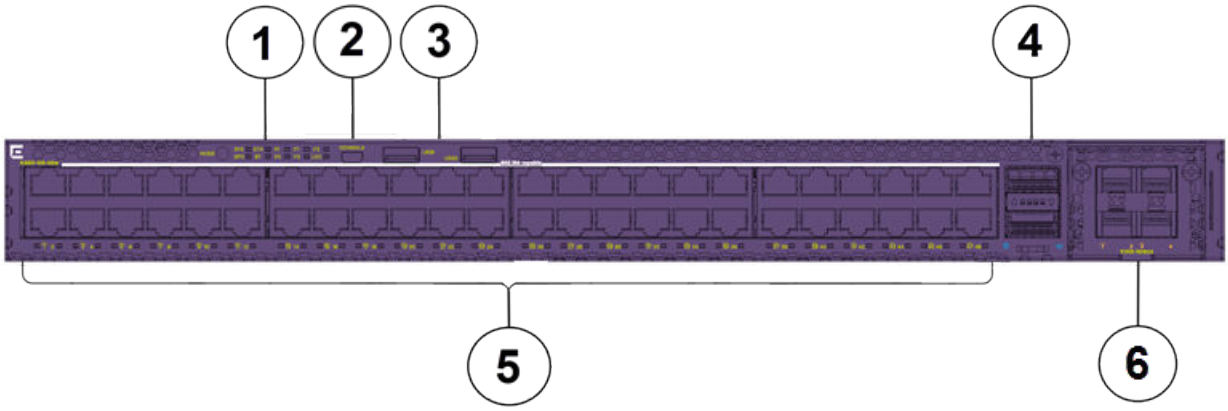


Figure 80: X465 Series Switch: Front Panel (48-port model shown)

1 = Mode Button and System LEDs	3 = USB A ports	5 = Access ports
2 = USB micro B management port	4 = Stacking ports	6 = VIM slot, shown with VIM installed

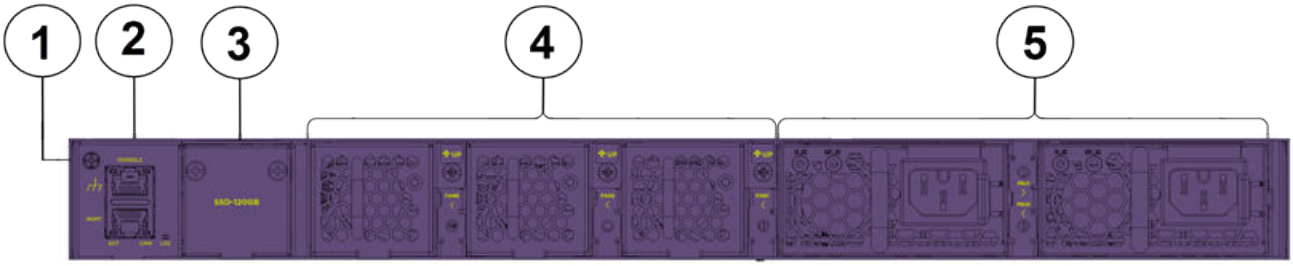


Figure 81: X465 Series Switch: Rear Panel

1 = Grounding lug	3 = SSD slot	5 = Power supplies

2 = RJ45 console and management ports	4 = Fan modules

Management

You can use a serial console port on the rear panel of the X465 series switch to connect a terminal and perform local management. An Ethernet management port can be used to connect the system to a parallel management network for administration. Alternatively, you can use an Ethernet cable to connect this port directly to a laptop to view and locally manage the switch configuration. The Ethernet management port supports 10/100/1000 Mbps speeds.

There is also a USB console port. If the USB console port is connected, it will be selected over the RJ45 console port. The USB console port will disconnect when the switch is rebooted. You can re-connect the port if needed. When the USB console is active, any messages from the switch to the client terminal will be echoed to both the USB console and the rear panel RJ45 serial port; however, no user input will be accepted from the rear panel port.

Cooling

Each base model is available with front-to-back cooling.

Switch cooling is provided by replaceable fan modules. The available fan module uses airflow from front to back. Two modular power supply slots accommodate AC power supplies. Power supplies have integrated cooling fans that operate independently of the switch fan.

A spare fan module (XN-FAN-002-F) with front-to-back airflow is available for X465 switches.

Power Supplies

Two power supply bays accommodate AC power supplies. Power supplies have integrated cooling fans that operate independently of the switch fans. When selecting power supplies to use in the X465 series, the airflow of the power supply must be front to back. When using two power supplies in an X465 switch that both power supplies should be the same wattage. For more information about the power supplies used in the X465 switches, see Replaceable Internal Power Supplies on page 136.

Power supplies are ordered separately.

Caution

Air must flow in the same direction for all installed fan modules and power supplies in a switch.

Versatile Interface Module (VIM5) Options for X465 Series Switches

The following VIM5s are available for X465 series switches:

- VIM5-2Q versatile interface module that provides two 40-GbE (QSFP) ports.
- VIM5-2Y versatile interface module that provides two 25-GbE (SFP28) ports.
- VIM5-4X versatile interface module that provides four 10-GbE (SFP+) ports.
- VIM5-4XE versatile interface module that provides four 10-GbE (SFP+) ports, LRM/MACsec capable.
- VIM5-4Y versatile interface modulethat provides four 25-GbE (SFP28) ports.
- VIM5-4YE versatile interface module that provides four 25-GbE (SFP28) MACsec capable ports.

Warning

The switch must be powered off before you install any interface module options (VIM5s). The interface module options are not hot swappable.

Solid-state Drives (SSD)

Solid-state Drives (SSD) provide modular storage support. Your X465 Series switch accommodates one SSD module using a reserved slot on the rear of the switch, and is supported on EXOS release 30.3 and later.

See Solid-state Drives on page 166 for more information.

Stacking

Each X465 unit comes equipped with two 40GbE stacking ports using a QSFP interface, located on the front panel of the switch. Standard 40 Gb Ethernet Optics and passive and active cables can be used in the QSFP ports for stacking X465s together using SummitStack-V160.

Stacking cables for X465 switches are ordered separately. For a list of X465 ports that can be used with SummitStack-V160, see ExtremeSwitching X465 Stacking on page 212.

For information about QSFP and QSFP+ optical modules, see the *Extreme Networks Pluggable Transceivers Installation Guide*.

Operating Temperatures

All X465 switch models support an operating range from 0°C to 50°C. Temperature restrictions apply for some models at high altitudes.

ExtremeSwitching X465-24MU Switch Ports and Slots

The front panel of the ExtremeSwitching X465-24MU switch includes:

- 24 100Mb/1/2.5/5Gb ports with 802.3bt Type 3 PoE (60W)
- 1 VIM5 slot
- Stacking ports
- 2 USB A ports
- 1 USB micro B management port

The rear panel of the ExtremeSwitching X465-24MU switch includes:

- 2 fan modules
- 2 unpopulated PSU slots
- RJ-45 console and management ports
- 1 SSD port

Solid-state Drives (SSDs)

SSD module support is available with EXOS release 30.3 and later for X465-24MU.

ExtremeSwitching X465-24MU-24W Switch Ports and Slots

The front panel of the ExtremeSwitching X465-24MU-24W switch includes:

- 24 100Mb/1/2.5/5Gb ports with 802.3bt Type 3 PoE (60W)
- 24 10/100/1000Mb full/half duplex MACsec capable ports with 802.3bt Type 4 PoE (90W) capable ports

  Note
  Ports 1-24 offer multi-rate with 60W PoE support. Ports 25-48 support 90 PoE, but do not offer multi-rate support.

- 1 VIM5 slot
- Stacking ports
- 2 USB A ports
- 1 USB micro B management port

The rear panel of the ExtremeSwitching X465-24MU-24W switch includes:

- 3 fan modules
- 2 unpopulated PSU slots
- RJ-45 console and management ports
- 1 SSD port

Solid-state Drives (SSDs)

SSD module support is available with EXOS release 30.3 and later for X465-24MU-24W.

ExtremeSwitching X465-24S Switch Ports and Slots

The front panel of the ExtremeSwitching X465-24S switch includes:

- 24 100Mb/1Gbps SFP ports
- 1 VIM5 slot
- Stacking ports
- 2 USB A ports
- 1 USB micro B management port

The rear panel of the ExtremeSwitching X465-24S switch includes:

- 3 fan modules
- 2 unpopulated PSU slots
- RJ-45 console and management ports

ExtremeSwitching X465-24W Switch Ports and Slots

The front panel of the ExtremeSwitching X465-24W switch includes:

- 24 10/100/1000Mb full/half duplex MACsec capable ports with 802.3bt Type 4 PoE (90W)
- 1 VIM5 slot
- Stacking ports
- 2 USB A ports
- 1 USB micro B management port

The rear panel of the ExtremeSwitching X465-24W switch includes:

- 2 fan modules
- 2 unpopulated PSU slots
- RJ-45 console and management ports

ExtremeSwitching X465-24XE Switch Ports and Slots

The front panel of the ExtremeSwitching X465-24XE switch includes:

- 24 1/10GbE SFP+ MACsec and LRM capable ports
- 1 VIM5 slot
- Stacking ports
- 2 USB A ports
- 1 USB micro B management port

The rear panel of the ExtremeSwitching X465-24XE switch includes:

- 3 fan modules
- 2 unpopulated PSU slots
- RJ-45 console and management ports

ExtremeSwitching X465-48P Switch Ports and Slots

The front panel of the ExtremeSwitching X465-48P switch includes:

- 48 10/100/1000Mb full/half duplex MACsec capable ports with 802.3at Type 2 PoE (30W)
- 1 VIM5 slot
- Stacking ports
- 2 USB A ports
- 1 USB micro B management port

The rear panel of the ExtremeSwitching X465-48P switch includes:

- 3 fan modules
- 2 unpopulated PSU slots
- RJ-45 console and management ports

ExtremeSwitching X465-48T Switch Ports and Slots

The front panel of the ExtremeSwitching X465-48T switch includes:

- 48 10/100/1000Mb full/half duplex MACsec capable ports
- 1 VIM5 slot
- Stacking ports
- 2 USB A ports
- 1 USB micro B management port

The rear panel of the ExtremeSwitching X465-48T switch includes:

- 3 fan modules
- 2 unpopulated PSU slots
- RJ-45 console and management ports

ExtremeSwitching X465-48W Switch Ports and Slots

The front panel of the ExtremeSwitching X465-48W switch includes:

- 48 10/100/1000Mb full/half duplex MACsec capable ports with 802.3bt Type 4 PoE (90W)
- 1 VIM5 slot
- Stacking ports
- 2 USB A ports
- 1 USB micro B management port

The rear panel of the ExtremeSwitching X465-48W switch includes:

- 3 fan modules
- 2 unpopulated PSU slots
- RJ-45 console and management ports

ExtremeSwitching X465i-48W Switch Ports and Slots

The front panel of the ExtremeSwitching X465i-48W switch includes:

- 48 10/100/1000Mb full/half duplex MACsec capable ports with 802.3bt Type 4 PoE (90W)
- 1 VIM5 slot
- Stacking ports
- 2 USB A ports
- 1 USB micro B management port

The rear panel of the ExtremeSwitching X465i-48W switch includes:

- 3 fan modules
- 2 unpopulated PSU slots
- RJ-45 console and management ports

ExtremeSwitching X465 Series Switch LEDs

ExtremeSwitching X465 Front Panel Port LEDs, as described in Table 18:

Table 18: X465 Port LEDs

LED	Color/State	Port State
SYStem status LED (Legacy MGMT function)	Green Flash slowly	POST Passed, normal operation, blinks on standalone switch, stack master, and backup nodes in a stack; off for standby nodes in a stack
	Green Blinking	POST in progress
	Amber Blinking	POST failed or overheat
PSU status LEDs P1/P2	Green	Power On
	Off	Power off and no power attached
	Amber Blinking	Power supply failures
Fan status LEDS (F1, F2 and F3)	Green	Normal operation
	Amber Blinking	Fan failure
Bluetooth Status LED (BT)	Green Blinking	Bluetooth pairing in progress
	Green	Bluetooth connected
Locator LED (LOC)	Blue Blinking	Locator function
Ethernet Port 1-24 or 1-48		
VIM5 Port 25-32 or 49-56		

Figure 82 shows the two alternate mode LEDs for X465 switches: SPD and STK. The Mode button is used to cylce through three display modes for the port LEDs. SPD and STK display modes will expire after 30 seconds, at which time the port LEDs will revert to the default SYS mode.

Figure 82: X465 Mode and System Status LEDs

Note
Front-panel PoE ports use Amber to indicate PoE states.

Port LEDs in Default (SYS) Mode

In the default SYS mode, SPD and STK are OFF, and the port status will display as described in Table 19:

Table 19: Port LEDs in SYS Mode (default)

Color/State	Meaning
Steady green	Link is OK; port is not powered
Steady amber	Link is OK; port is powered; no traffic
Blinking green	Link is OK and transmitting packets; port is not powered
Blinking amber	Link is OK and transmitting packets; port is powered
Slow blinking amber	No link, or disabled port; port is powered
Alternating amber and green	Port has a power fault
Off	Port is not powered, has no link, or is disabled

Port LEDs in SPD Mode

After one press of the Mode button (see Figure 82 on page 84), the port LEDs will enter the SPD Display Mode, indicated by the SPD LED. SPD mode is used to help determine the operational speed of a port. Color and blink pattern indicate speeds, as referenced by Table 20:

Table 20: Port LEDs in SPD Mode

Color/State	Speed
Steady green	10Mbps
Blinking green	100Mbps
Solid amber	1000Mbps
Slow blinking amber	2.5Gbps
Fast blinking amber	5Gbps

Table 20: Port LEDs in SPD Mode (continued)

Color/State	Speed
Slow blinking green	10Gbps
Fast blinking green	25Gbps
Fast blinking green	40Gbps

Port LEDs in STK Mode

After two presses of the Mode button, the port LEDs will enter the STK Display Mode, indicated by the STK LED. STK mode is used to indicate slot presence and slot number via the first eight port LEDs, as referenced by Table 21:

Table 21: Port LEDs Indicating Stack Slot Presence in STK Mode

Port 1-8 Color/ State	Stacking Indication
Steady green	Slot corresponding to the port number of the LED is present
Blinking green	This slot has a slot number corresponding to the port number of the blinking LED

ExtremeSwitching X590 Series Switches

The X590 series switch provides 10 Gb datacenter aggregation with 100 Gb uplinks, ideally suited for use as a "leaf" switch in conjunction with "spine" switches like the X690 and X870 series.

The X590 series switches include the following base models:

- ExtremeSwitching X590-24t-1q-2c Switch Ports and Slots on page 87
- ExtremeSwitching X590-24x-1q-2c Switch Ports and Slots on page 89

Front-panel Ethernet ports provide 40 Gb and 100 Gb Ethernet connectivity using installable QSFP28 and QSFP+ optical modules, respectively. Each X590 switch has:

- One QSFP+ based 40 Gb port. With appropriate cabling, the QSFP+ port can be partitioned into four 10 Gb ports.
- Two QSFP28 based 100 Gb ports. With appropriate cabling, each of the QSFP28 ports can be partitioned into 10 Gb, 25 Gb, 40 Gb, or 50 Gb ports.

For details about the port partitioning options that are available on X590 switches, see Partitioning X590 Switch Ports into Data Lanes on page 86.

Each X590 switch also has 24 front-panel Ethernet ports that provide 10-gigabit Ethernet connectivity. Connectivity is 100Mb/1 Gb/10GBASE-T for the X590-24t-1q-2c model and 1 Gb/10GBASE-X SFP+ for the X590-24x-1q-2c model.

A serial console port on the front panel of the X590 series switch allows you to connect a terminal and perform local management. An Ethernet management port can be used to connect the system to a parallel management network for administration. Alternatively, you can use an Ethernet cable to connect this port directly to a laptop

to view and locally manage the switch configuration. The Ethernet management port supports 10/100/1000 Mbps speeds.

Switch cooling is provided by replaceable fan modules. Fan modules are available in two different models that direct the airflow either from front to back or from back to front.

Note
Ensure that all fan module slots are filled when the switch is powered on. Fan modules can be hot-swapped after power has been turned on.

Two power supply bays accommodate either AC or DC power supplies. Power supplies have integrated cooling fans that operate independently of the switch fans. Like the fan modules, the power supplies are available in models with either front-to-back or back-to-front cooling airflow.

All installed fan modules and power supplies in a X590 series switch must have the same airflow direction.

X590 series switches require ExtremeXOS version 22.6 or later.

Partitioning X590 Switch Ports into Data Lanes

Front-panel ports on X590 series switches can be configured for either 100-gigabit or 40-gigabit mode, and each port can be partitioned into data lanes through the use of split cables. This yields a total of up to 36 ports for each switch.

Port numbers are assigned depending on whether the physical ports are partitioned into data lanes. To illustrate, Figure 83 shows the physical ports on the X590 front panel that can be partitioned. Table 22 on page 87 and Table 23 on page 87 detail how port numbers are assigned for each of the physical ports.

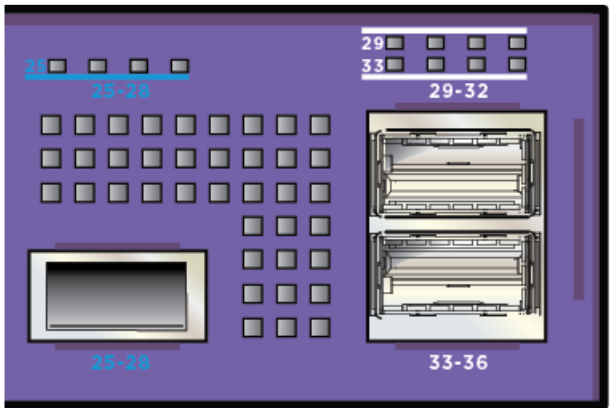


Figure 83: X590 Ports that Can Be Partitioned into Data Lanes

The port labeled 25-28 operates in 40 Gb mode, acting as a single 40 Gb port or multiple 10 Gb ports.

The ports labeled 29-32 and 33-36 operate in 40 Gb mode or 100 Gb mode, with a variety of speeds.

In 40-gigabit mode, each port can be partitioned into four 10-gigabit data lanes.

In 100-gigabit mode, each port can be partitioned into two 50-gigabit data lanes or four 25-gigabit data lanes.

Table 22: Port Number Assignments (in 40 Gb Mode)

Physical Port Number (on Switch)	Has these Assigned Port Number(s)....	...with this Port Speed
25-28	25	40 Gb
	25,26,27,28	10 Gb
29-32	29	40 Gb
	29,30,31,32	10 Gb
33-36	33	40 Gb
	33,34,35,36	10 Gb

Table 23: Port Number Assignments (in 100 Gb Mode)

Physical Port Number (on Switch)	Has these Assigned Port Number(s)....	...with this Port Speed
29-32	29	100 Gb
	29,31	50 Gb
	29,30,31,32	25 Gb
33-36	33	100 Gb
	33,35	50 Gb
	33,34,35,36	25 Gb

Note
See the *ExtremeXOS 30.7 User Guide* and the *ExtremeXOS 30.7 Command Reference Guide* for feature-specific information about the switches and for information regarding switch configuration.

ExtremeSwitching X590-24t-1q-2c Switch Ports and Slots

X590-24t-1q-2c switch ports and slots include:

- 24 fixed autosensing 100Mb/1 Gb/10GBASE-T ports (ports 1-24) that provide 10 Gbps copper connectivity. Two of these ports are configurable as stacking ports.
- One 40-gigabit Ethernet port capable of supporting passive copper QSFP+ and active fiber QSFP+ and configurable for 1x40 Gb or 4x10 Gb Ethernet mode.

- Two 100-gigabit Ethernet ports capable of supporting passive copper QSFP28/QSFP+ and active fiber QSFP28/QSFP+ and configurable for 100 Gb, 40 Gb, 2x50 Gb, 4x25 Gb, and 4x10 Gb modes. For information about QSFP28 and QSFP+ optical modules, see the *Extreme Networks Pluggable Transceivers Installation Guide*.
- Ethernet management port (10/100/1000BASE-T).
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- Front panel USB port.
- Rear dual PSU power slots with front-to-back or back-to-front airflow.
- Four rear slots for fan modules with front-to-back or back-to-front airflow.

Note
Two additional fan slots are unused. Do not remove the cover plate from the unused slots.

Figure 84: X590-24t-1q-2c Front Panel

1 = Console/management port	4 = 10Gb/40Gb QSFP+ port
2 = USB port	5 = 10Gb/25Gb/40Gb/50Gb/100Gb QSFP28 ports
3 = 100Mb/1 Gb/10GBASE-T ports	

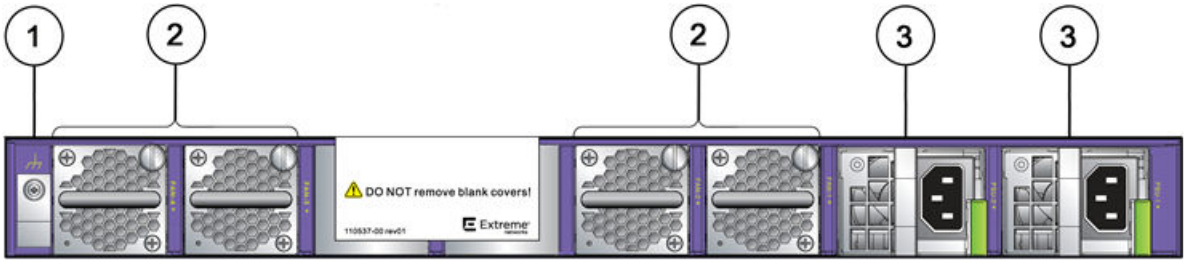


Figure 85: X590-24t-1q-2c Rear Panel

1 = Grounding lug	3 = AC power input
2 = Replaceable fan modules	

ExtremeSwitching X590-24x-1q-2c Switch Ports and Slots

X590-24x-1q-2c switch ports and slots include:

- 24 fixed autosensing 1 Gb/10GBASE-X SFP+ ports (ports 1-24) that provide 10 Gbps copper connectivity. Two of these ports are configurable as stacking ports.
- One 40-gigabit Ethernet port capable of supporting passive copper QSFP+ and active fiber QSFP+ and configurable for 1x40 Gb or 4x10 Gb Ethernet mode.
- Two 100-gigabit Ethernet ports capable of supporting passive copper QSFP28/QSFP+ and active fiber QSFP28/QSFP+ and configurable for 100 Gb, 40 Gb, 2x50 Gb, 4x25 Gb, and 4x10 Gb modes. For information about QSFP28 and QSFP+ optical modules, see the *Extreme Networks Pluggable Transceivers Installation Guide*.
- Ethernet management port (10/100/1000BASE-T).
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- Front panel USB port.
- Rear dual PSU power slots with front-to-back or back-to-front airflow.
- Four rear slots for fan modules with front-to-back or back-to-front airflow.

Note
Two additional fan slots are unused. Do not remove the cover plate from the unused slots.

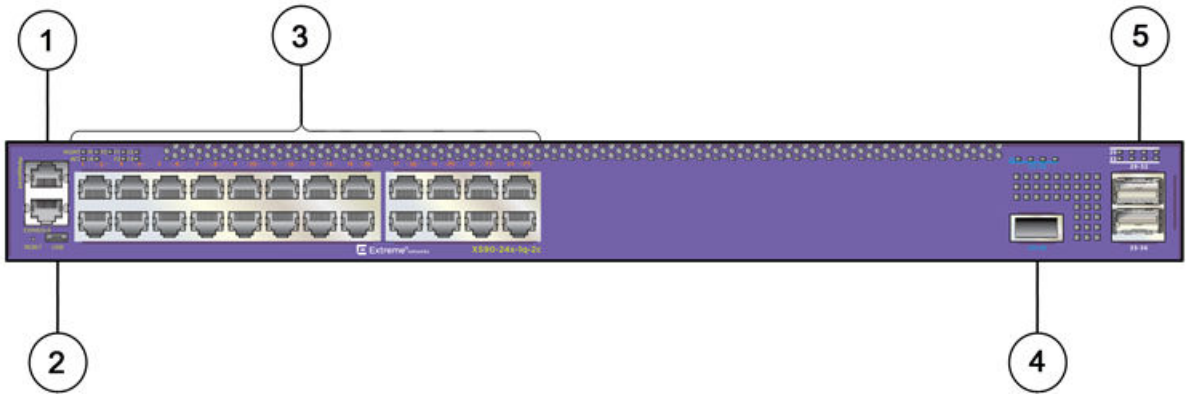


Figure 86: X590-24x-1q-2c Front Panel

1 = Console/management port	4 = 10Gb/40Gb QSFP+ port
2 = USB port	5 = 10Gb/25Gb/40Gb/50Gb/100Gb QSFP28 ports
3 = 1 Gb/10GBASE-X SFP+ ports	

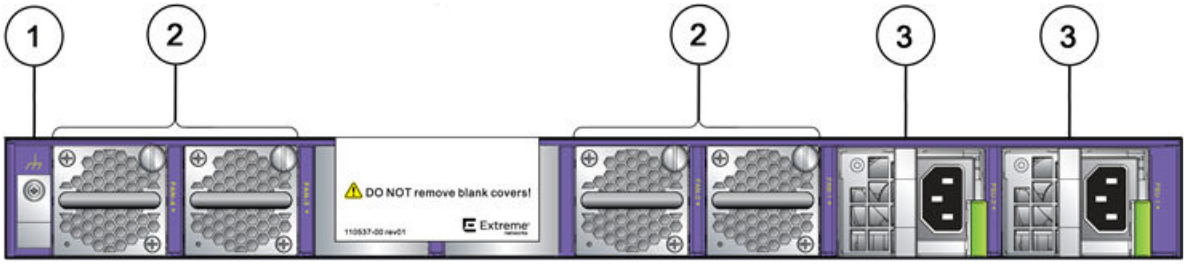


Figure 87: X590-24x-1q-2c Rear Panel

1 = Grounding lug	3 = AC power input
2 = Replaceable fan modules	

ExtremeSwitching X590 Series Switch LEDs

The following tables describe the meanings of the LEDs on the front panel of the X590 series switch.

Table 24: X590 Front Panel System LEDs

Label or Type	Color/State	Meaning
MGMT (Management)	Steady green	Normal operation Power-on self test (POST) passed
	Blinking green	POST or diagnostics in progress
	Blinking amber	Any of the following: • POST failed • System overheated • Power supply failed • Fan unit failed
	Off	No power
ACT	Blinking green	Management port packet transmitting or receiving
	Off	No packet transmitting or receiving
LK (Link)	Steady green	Management port link up
	Off	No link up or port disabled
P1, P2 (Power Supply)	Steady green	Power on
	Blinking amber	Any of the following: • Power supply failure • Over voltage • Over current • Over temperature
	Off	Power off; no power attached

Table 24: X590 Front Panel System LEDs (continued)

Label or Type	Color/State	Meaning
F1 - F4 (Fan)	Steady green	Normal operation; all diagnostics pass
	Blinking amber	Fan module failure
	Off	No power to fan module

Table 25: X590 Front Panel Port LEDs

Location	Speed	Color/State	Meaning
Ports 1-24	10Gb/1Gb	Steady green	Link OK
		Blinking green	Port transmitting or receiving
		Off	No link, or port disabled
Ports 25-28	40Gb (no partition)	Steady blue	Link OK
		Blinking blue	Port transmitting or receiving
		Off	No link, or port disabled
	10Gb (partitioned)	Steady green	Link OK
		Blinking green	Port transmitting or receiving
		Off	No link, or port disabled
Ports 29-36	100Gb/40Gb (no partition)	Steady white	Link OK
		Blinking white	Port transmitting or receiving
		Off	No link, or port disabled
	50Gb/25Gb/10Gb (partitioned)	Steady green	Link OK
		Blinking green	Port transmitting or receiving
		Off	No link, or port disabled

ExtremeSwitching X620 Series Switches

The X620 switches are compact 10 Gb Ethernet switches for 10 Gb edge applications with a small, one rack-unit (1 RU) form factor.

X620 switches support sophisticated and intelligent Layer 2 switching, as well as Layer 3 IPv4/IPv6 routing including policy-based switching/routing, provider bridges, bidirectional ingress and egress Access Control Lists, and bandwidth control.

The X620 series switches include the following base models:

- ExtremeSwitching X620-8t-2x switch
- ExtremeSwitching X620-10x switch
- ExtremeSwitching X620-16p switch
- ExtremeSwitching X620-16t switch
- ExtremeSwitching X620-16x switch

The X620-16p switch requires ExtremeXOS version 22.2.1 or later. Other X620 switch models require ExtremeXOS version 21.1.1 or later.

X620 Stacking

Up to eight X620 switches can be stacked using SummitStack-V. Each X620 unit can use two designated SFP+ interfaces for stacking. Standard 10 Gb Ethernet Optics and passive and active cables can be used in the SFP+ ports for stacking X620 switches using SummitStack-V.

ExtremeXOS supports the SummitStack-V capability using two of the SFP+ ports on the faceplate as stacking ports, enabling the use of standard cabling and optics technologies used for 10 GbE SFP+.

SummitStack-V is compatible with X440-G2, X450-G2 with 10 Gb uplinks, X460-G2 with 10 Gb uplinks,, and X670-G2 switches running the same version of ExtremeXOS. SummitStack-V enabled 10 GbE ports must be physically direct-connected.

Additional X620 Features

All X620 switch models have:

- One 10/100/1000BASE-T RJ45 port implemented as an RJ45 connector.
- One 10/100/1000BASE-T Ethernet management port.

Additional ports on various models include the following:

Table 26: X620 Series Switches and Port Types

	100Mb/1 Gb/10GBASE-T	100Mb/1 Gb/ 2.5Gb/5Gb/10GBASE-T	100Mb/1 Gb/10GBASE-X with SFP+
X620-8t-2x	8		2
X620-10x			10
X620-16t	16		4 (see note)
X620-16x			16
Note: The 100Mb/1 Gb/10GBASE-X ports on the X620-16t and X620-16p are combination ports, shared with the last four 10GBASE-T ports (LRM support; no 100Mb support)			

For all models, a serial console port on the front panel allows you to connect a terminal and perform local management. An Ethernet management port can be used to connect the system to a parallel management network for administration. Alternatively, you can use an Ethernet cable to connect this port directly to a laptop to view and locally manage the switch configurations.

The rear panel provides an AC power input socket. The X620-8t-2x and X620-10x switches support external redundant power options, and the 16-port switches have modular internal redundant power options.

The switch automatically adjusts to the supply voltage. The switches with redundant power connectors can connect to the RPS-150XT or EPS-C2 external power system. When a compatible external power supply is used with the X620 switch, the internal and external power supplies are fully fault tolerant. If one power supply fails, the other power supply will provide sufficient power to operate the switch.

The 16-port switches offer front-to-back or back-to-front airflow options. The X620-8t-2x and X620-10x switches have side-to-side airflow with right-side exhaust.

Note
See the *ExtremeXOS 30.7 User Guide* and the *ExtremeXOS 30.7 Command Reference Guide* for feature-specific information about the switches and for information regarding switch configuration.

ExtremeSwitching X620-8t-2x Switch Ports and Slots

The ExtremeSwitching X620-8t-2x switch ports and slots include:

- Eight front panel ports of 100Mb/1 Gb/10GBASE-T with EEE.
- Two front panel SFP+ ports of 100Mb/1 Gb/10GBASE-X.
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- Ethernet management port (10/100/1000BASE-T).
- One front panel USB 2.0 port, operational on switches running ExtremeXOS version 22.2 or later.
- One rear redundant power supply connector.

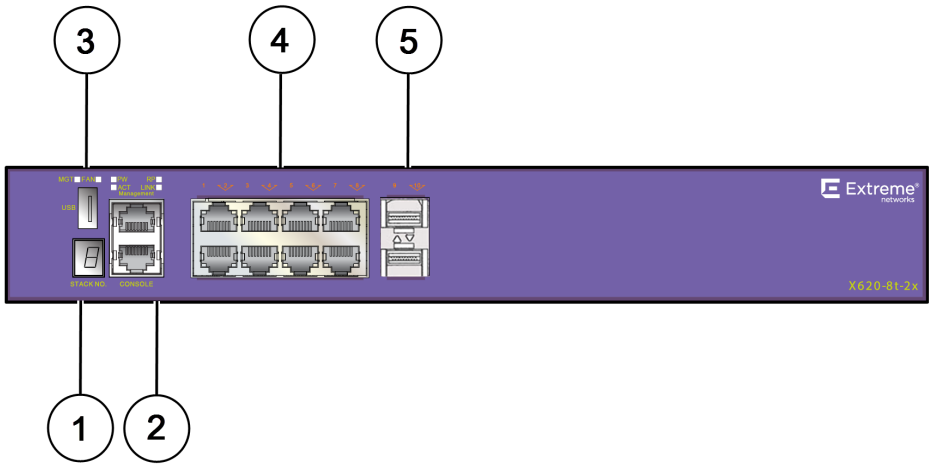


Figure 88: ExtremeSwitching X620-8t-2x Front Panel

1 = Stack number indicator	4 = 100Mb/1 Gb/10GBASE-T ports
2 = Console port/Ethernet management port	5 = 100Mb/1 Gb/10GBASE-X SFP+ ports
3 = USB port (active with ExtremeXOS version 22.2 or later)	

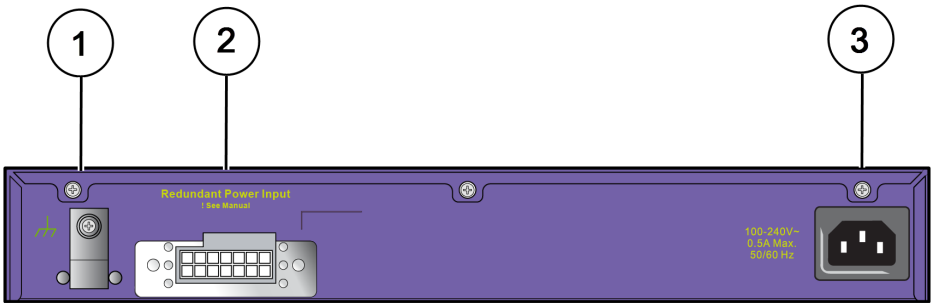


Figure 89: ExtremeSwitching X620-8t-2x Rear Panel

1 = Grounding lug	3 = AC power input socket
2 = Redundant power input	

ExtremeSwitching X620-10x Switch Ports and Slots

The ExtremeSwitching X620-10x switch ports and slots include:

- 10 front panel SFP+ ports of 100Mb/1 Gb/10GBASE-X SFP+.
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- Ethernet management port (10/100/1000BASE-T).
- One front panel USB 2.0 port, operational on switches running ExtremeXOS version 22.2 or later.
- One rear redundant power supply connector.

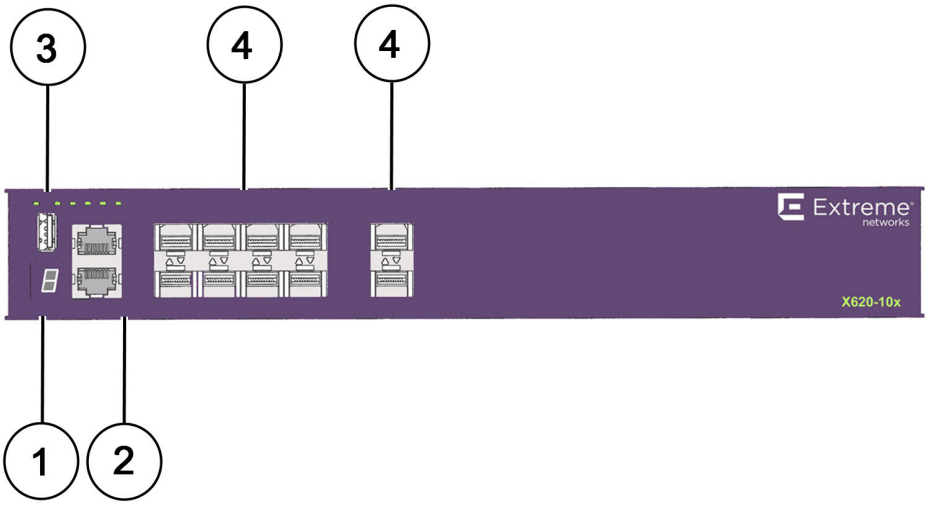


Figure 90: ExtremeSwitching X620-10x Front Panel

1 = Stack number indicator	3 = USB port (active with ExtremeXOS version 22.2 or later)

2 = Console port/Ethernet management port	4 = 100Mb/1 Gb/10GBASE-X SFP+ ports

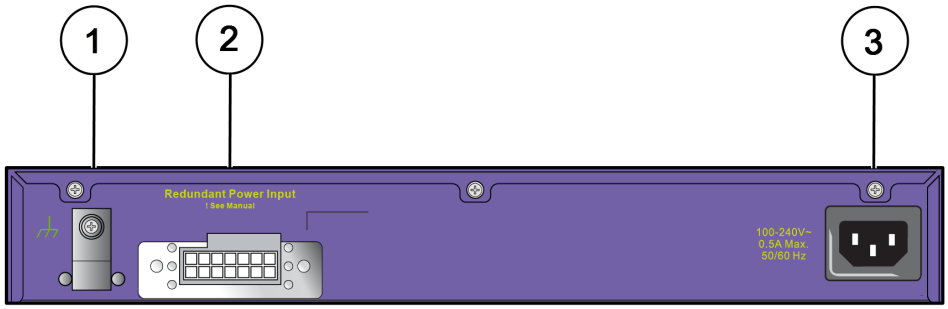


Figure 91: ExtremeSwitching X620-10x Rear Panel

1 = Grounding lug	3 = AC power input socket
2 = Redundant power input	

ExtremeSwitching X620-16t Switch Ports and Slots

The ExtremeSwitching X620-16t switch ports and slots include:

- 12 front panel ports of 100Mb/1 Gb/10GBASE-T with EEE.
- Four front panel ports of 100Mb/1 Gb/10GBASE-T with EEE, shared with four front panel SFP+ ports of 1 Gb/10GBASE-X (with LRM support).
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- Ethernet management port (10/100/1000BASE-T).
- One front panel USB 2.0 port, operational on switches running ExtremeXOS version 22.2 or later.
- One rear slot for fan module with front-to-back or back-to-front airflow.
- Rear dual PSU power slots with front-to-back or back-to-front airflow.

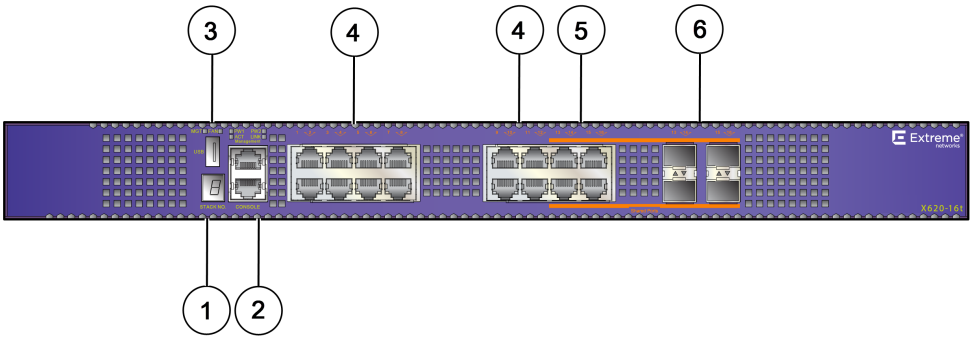


Figure 92: ExtremeSwitching X620-16t Front Panel

1 = Stack number indicator	4 = 100Mb/1 Gb/10GBASE-T ports

2 = Console port/Ethernet management port	5 = 100Mb/1 Gb/10GBASE-T combo ports
3 = USB port (active with ExtremeXOS version 22.2 or later)	6 = 1 Gb/10GBASE-X SFP+ combo ports

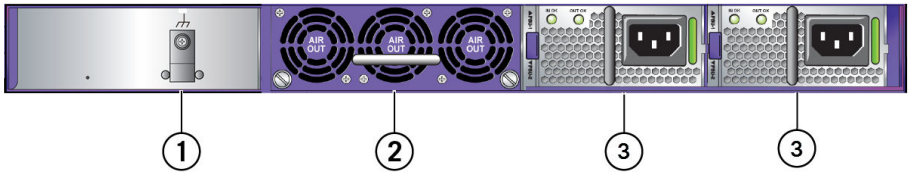


Figure 93: ExtremeSwitching X620-16t Rear Panel

1 = Grounding lug	3 = AC power supplies
2 = Fan module	

ExtremeSwitching X620-16x Switch Ports and Slots

The ExtremeSwitching X620-16x switch ports and slots include:

- 16 front panel SFP+ ports of 100Mb/1 Gb/10GBASE-X.
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- Ethernet management port (10/100/1000BASE-T).
- One front panel USB 2.0 port, operational on switches running ExtremeXOS version 22.2 or later.
- One rear slot for fan module with front-to-back or back-to-front airflow.
- Rear dual PSU power slots with front-to-back or back-to-front airflow.

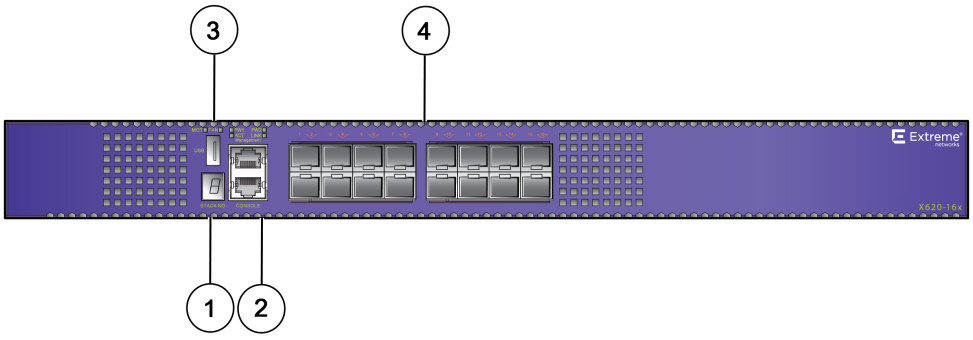


Figure 94: ExtremeSwitching X620-16x Front Panel

1 = Stack number indicator	3 = USB port (active with ExtremeXOS version 22.2 or later)
2 = Console port/Ethernet management port	4 = 100Mb/1 Gb/10GBASE-X SFP+ ports

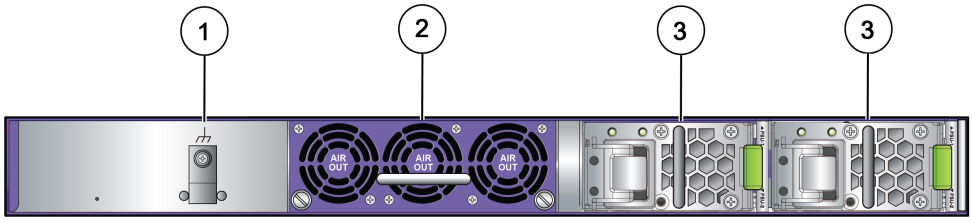


Figure 95: ExtremeSwitching X620-16x Rear Panel

1 = Grounding lug	3 = PSU slots
2 = Fan module	

ExtremeSwitching X620-16p Switch Ports and Slots

The ExtremeSwitching X620-16p switch ports and slots include:

- Eight front panel PoE++ ports of 100Mb/1 Gb/2.5Gb/5Gb/10GBASE-T (with EEE at 10 Gb).
- Four front panel PoE+ ports of 100Mb/1 Gb/2.5Gb/5Gb/10GBASE-T (with EEE at 10 Gb).
- Four front panel PoE+ ports of 100Mb/1 Gb/10GBASE-T, shared with four front panel SFP+ combination ports of 1 Gb/10GBASE-X.
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- Ethernet management port (10/100/1000BASE-T).
- One front panel USB 2.0 port, operational on switches running ExtremeXOS version 22.2 or later.
- One rear slot for fan module with front-to-back or back-to-front airflow.
- Rear dual PSU power slots with front-to-back or back-to-front airflow.

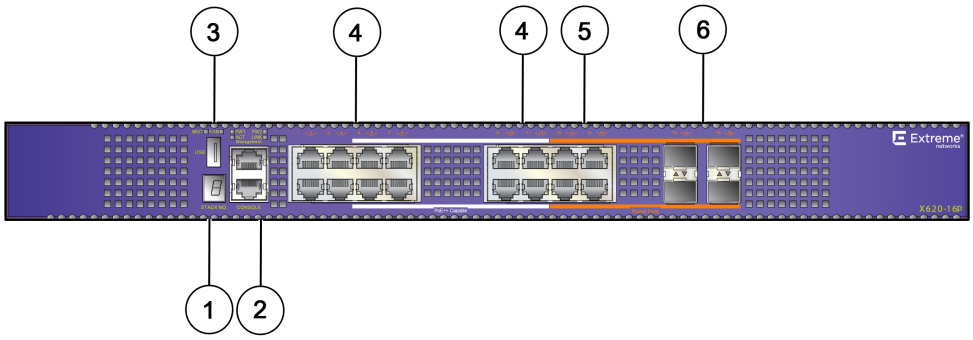


Figure 96: ExtremeSwitching X620-16p Front Panel

1 = Stack number indicator	4 = 100Mb/1 Gb/2.5G/5G/10GBASE-T ports
2 = Console port/Ethernet management port	5 = 100Mb/1 Gb/10GBASE-T ports
3 = USB port	6 = 1 Gb/10GBASE-X SFP+ combo ports

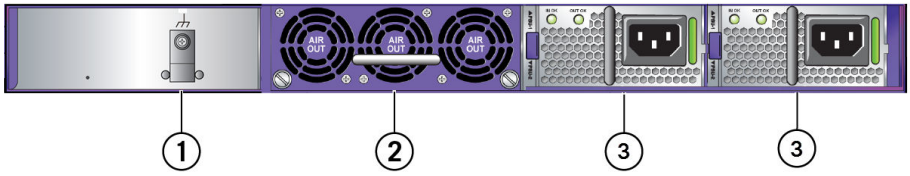


Figure 97: ExtremeSwitching X620-16p Rear Panel

1 = Grounding lug	3 = AC power supplies
2 = Fan module	

ExtremeSwitching X620 Series Switch LEDs

The following sections describe the meanings of the LEDs on the ExtremeSwitching X620 series switches.

Table 27: X620 Front Panel LEDs

Label or Type	Color/State	Meaning
M (Management)	Slow blinking green (1 Hz)	Normal operation
	Fast blinking green (2 Hz)	Power-on self test (POST) in progress or Switch diagnostics are running
	Steady green	POST passed: system is booting image
	Blinking amber	System is disabled: POST failed or system overheated
	Off	No external power is attached
S1, S2 (Stack Management)	Steady green	Link OK on the indicated stacking port
	Blinking green	Activity on the indicated stacking port
FAN	Steady green	Normal operation
	Blinking amber	Failure
	Off	No power
Power Supply Unit (PSU)	Steady green	Normal operation
	Blinking amber	Input or output power failure
	Off	Not present
Redundant Power Supply (RPS)	Steady green	Normal operation
	Blinking amber	When RPS is present, no supply from PSU
	Off	No RPS PSU is attached

Table 27: X620 Front Panel LEDs (continued)

Label or Type	Color/State	Meaning
Ethernet Management Port	Blinking green (left)	Activity on the indicated port Link OK
	Off (left)	Activity on the indicated port
	Steady green (right)	Link OK
	Off (right)	No link, or port disabled
Other ports	Steady green	Link OK
	Blinking green	Activity on the indicated port
	Off	No link, or port disabled

Table 28: ExtremeSwitching X620 2-digit Stack Number Indicator

Label or Type	Color/State	Meaning
Left digit (1)	*Reserved for future use.*	
Right digit (1 – 8)	Indicates the position of this switch in the stack configuration	
	Upper half blinking	This switch is the stack master node
	Lower half blinking	This switch is the stack backup node
	Lit steadily	This switch is a standby node in the stack

ExtremeSwitching X670-G2 Series Switches

The X670-G2 series switches have 48 or 72 front-panel Ethernet ports that can provide 10-gigabit Ethernet connectivity using installable SFP+ optical modules. In addition, the X670-G2-48x-4q series switches offer four QSFP+ ports.

The X670-G2 series switches include the following base models:

- ExtremeSwitching X670-G2-48x-4q Switch Ports and Slots on page 100
- ExtremeSwitching X670-G2-72x Switch Ports and Slots on page 101

Each base model is available with either front-to-back or back-to-front cooling. There is no operational difference between these switch versions.

The X670-G2-48x-4q and X670-G2-72x have SFP+ ports that support dual interface speeds of Gigabit Ethernet and 10-gigabit Ethernet. SFP+ ports can accept both gigabit SFP and 10 gigabit SFP+, and depending upon the pluggable optics you choose, SFP+ ports can work in both modes.

The front panel of the X670-G2-48x-4q switch also provides four QSFP+ based 40 Gb ports. With appropriate cabling, each of the four QSFP+ ports can be partitioned into four 10 Gb ports.

A serial console port on the front panel of the X670-G2 series switch allows you to connect a terminal and perform local management. An Ethernet management

port can be used to connect the system to a parallel management network for administration. Alternatively, you can use an Ethernet cable to connect this port directly to a laptop to view and locally manage the switch configuration. The Ethernet management port supports 10/100/1000 Mbps speeds.

Switch cooling is provided by replaceable fan modules. Fan modules are available in two different models that direct the airflow either from front to back or from back to front. All installed fan modules must be of the same model, so that they all direct the airflow in the same direction.

Note
Ensure that all fan module slots are filled when the switch is powered on. Fan modules can be hot-swapped after power has been turned on.

Two power supply bays accommodate either AC or DC power supplies. Power supplies have integrated cooling fans that operate independently of the switch fans. Like the fan modules, the power supplies are available in models with either front-to-back or back-to-front cooling airflow.

Caution
Air must flow in the same direction for all installed fan modules and power supplies in a X670-G2 series switch.

X670-G2 switches offer Boundary Clock (BC), Transparent Clock (TC), and Ordinary Clock (OC) for synchronizing phase and frequency and allowing the network and the connected devices to be synchronized over Ethernet connections. Precision is +-2 nanoseconds (ns) with time accuracy +50 to -65 ns.

X670-G2 series switches require ExtremeXOS version 15.6.1.4 or later, or version 21.1.1 or later.

Note
See the *ExtremeXOS 30.7 User Guide* and the *ExtremeXOS 30.7 Command Reference Guide* for feature-specific information about the switches and for information regarding switch configuration.

ExtremeSwitching X670-G2-48x-4q Switch Ports and Slots

X670-G2-48x-4q switch ports and slots include:

- 48 fixed autosensing 10GBASE-X SFP+ ports (ports 1-48) that provide 10 Gbps high-density fiber connectivity. Two of these ports are configurable as stacking ports.
- Four 40GBASE-X unpopulated QSFP+ ports (ports 49, 53, 57, and 61 in unpartitioned 40G mode or ports 49 to 64 in partitioned 10G mode) that provide 40 Gbps of fiber connectivity. Of these four ports, two (using SummitStack-V160) or all four (SummitStack-V320) can be configured as stacking ports.
- Ethernet management port (10/100/1000BASE-T).
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.

- Front panel USB port.
- Rear dual PSU power slots with front-to-back or back-to-front airflow.
- Three rear slots for fan modules with front-to-back or back-to-front airflow.
- Two rear panel mini-BNC connectors labeled OUT for connecting a Building Integrated Timing Supply (BITS) or GPS timing source:
  - 1 PPS frame output
  - 10 MHz output

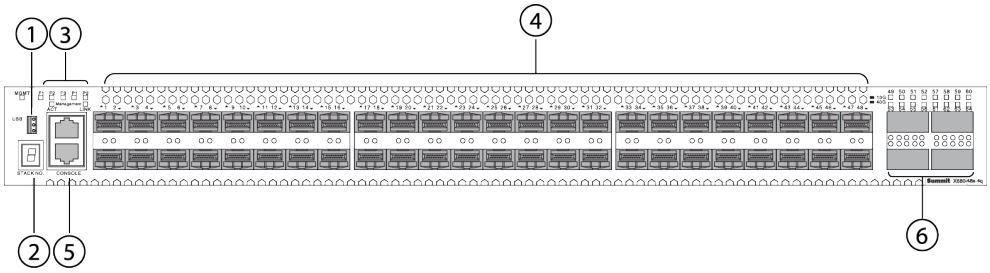


Figure 98: X670-G2-48x-4q Front Panel

1 = USB port	4 = 10GBASE-X SFP+ ports
2 = Stack number indicator	5 = Console port
3 = Ethernet management port	6 = QSFP+ ports

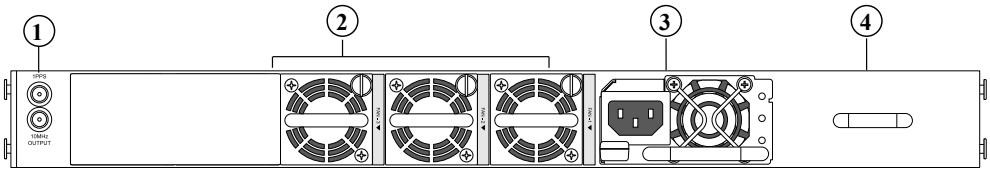


Figure 99: X670-G2-48x-4q Rear Panel

1 = BNC Timing ports	3 = Power supply
2 = Replaceable fan modules	4 = Blank power supply cover

ExtremeSwitching X670-G2-72x Switch Ports and Slots

X670-G2-72x switch ports and slots include:

- 72 fixed autosensing 10GBASE-X SFP+ ports (ports 1-72) that provide 10 Gbps high-density fiber connectivity. Two of these ports are configurable as stacking ports.
- Ethernet management port (10/100/1000BASE-T).
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- Rear panel USB port.
- Rear dual PSU power slots with front-to-back or back-to-front airflow.

- Five rear slots for fan modules with front-to-back or back-to-front airflow.
- Two rear panel mini-BNC connectors labeled OUT for connecting a Building Integrated Timing Supply (BITS) or GPS timing source:
  - 1 PPS frame output
  - 10 MHz output

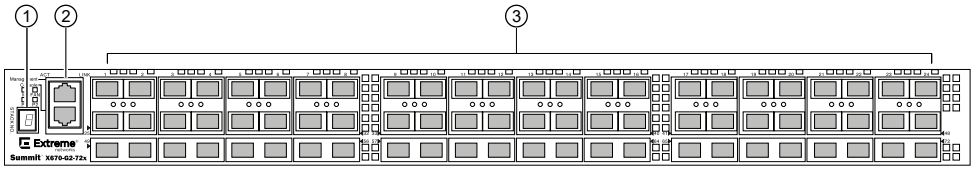


Figure 100: X670-G2-72x Front Panel

1 = Stack number indicator	3 = 10GBASE-X SFP+ ports
2 = Ethernet management port/console port	

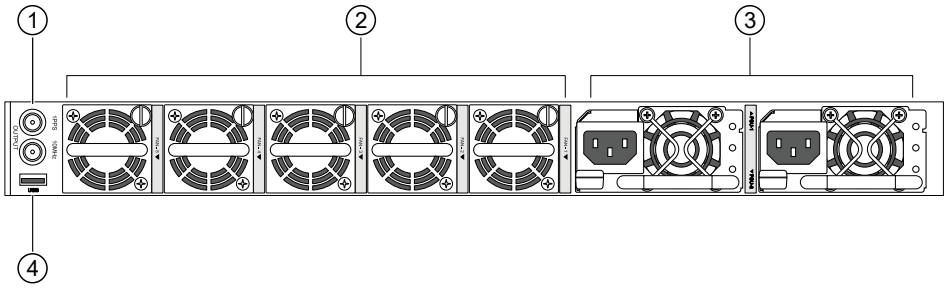


Figure 101: X670-G2-72x Rear Panel

1 = BNC Timing ports	3 = Power supplies
2 = Replaceable fan modules	4 = USB port

ExtremeSwitching X670-G2 Series Switch LEDs

The following sections describe the meanings of the LEDs on the X670-G2 series switches.

Table 29: X670-G2 Front Panel LEDs

Label or Type	Color/State	Meaning
M (Management)	Slow blinking green (1 Hz)	Normal operation
	Fast blinking green (2 Hz)	Power-on self test (POST) in progress or Switch diagnostics are running
	Steady green	POST passed: system is booting image
	Blinking amber	System is disabled: POST failed or system overheated
	Off	No external power is attached
FAN 1, 2, 3, 4, 5	Steady green	Normal operation.
	Blinking amber	Failure.
	Off	No power.
P1, P2 (Power Supply)	Steady green	Normal operation.
	Steady amber	Power is attached, but no power is on.
	Blinking amber	Power failure.
	Off	No power is attached.
Ethernet Port 1-48 or 1-72	Steady green	Link OK.
	Blinking green	Activity on the indicated port.
	Off	No link or port disabled.
670-G2-48x-4q QSFP+ ports 40G mode (49, 53, 57, 61)	Steady blue	Link OK
	Blinking blue	Activity on the indicated port
670-G2-48x-4q QSFP+ ports 10G mode (49-64)	Steady green	Link OK
	Blinking green	Activity on the indicated port

Table 30: X670-G2 2-digit Stack Number Indicator

Label or Type	Color/State	Meaning
Left digit (1)	*Reserved for future use.*	
Right digit (1 – 8)	Indicates the position of this switch in the SummitStack configuration.	
	Upper half blinking	This switch is the stack master node.
	Lower half blinking	This switch is the stack backup node.
	Lit steadily	This switch is a standby node in the stack.

ExtremeSwitching X690 Series Switches

The X690 series switch provides 10 Gb datacenter aggregation with 100 Gb uplinks, ideally suited for use as a "leaf" switch in conjunction with "spine" switches like the X870 series.

The X690 series switches include the following base models:

- ExtremeSwitching X690-48t-2q-4c switch
- ExtremeSwitching X690-48x-2q-4c switch

Front-panel Ethernet ports can provide 100 Gb Ethernet connectivity using installable QSFP28 and QSFP+ optical modules. The front panel of each X690 switch provides the following:

- Two QSFP+ based 40 Gb ports. With appropriate cabling, each of the two QSFP+ ports can be partitioned into four 10 Gb ports.
- Four QSFP28 based 100 Gb ports. With appropriate cabling, each of the four QSFP28 ports can be partitioned into 10 Gb, 25 Gb, 40 Gb, or 50 Gb ports.

For details about the port partitioning options that are available on X690 switches, see Partitioning X690 Switch Ports into Data Lanes on page 105.

X690 series switches also have 48 front-panel Ethernet ports that can provide 10-gigabit Ethernet connectivity using installable optical modules.

A serial console port on the front panel of the X690 series switch allows you to connect a terminal and perform local management. An Ethernet management port can be used to connect the system to a parallel management network for administration. Alternatively, you can use an Ethernet cable to connect this port directly to a laptop to view and locally manage the switch configuration. The Ethernet management port supports 10/100/1000 Mbps speeds.

Switch cooling is provided by replaceable fan modules. Fan modules are available in two different models that direct the airflow either from front to back or from back to front. All installed fan modules must be of the same model, so that they all direct the airflow in the same direction.

Note
Ensure that all fan module slots are filled when the switch is powered on. Fan modules can be hot-swapped after power has been turned on.

Two power supply bays accommodate either AC or DC power supplies. Power supplies have integrated cooling fans that operate independently of the switch fans. Like the fan modules, the power supplies are available in models with either front-to-back or back-to-front cooling airflow.

Caution
Air must flow in the same direction for all installed fan modules and power supplies in a X690 series switch.

X690 series switches require ExtremeXOS version 22.3 or later.

Partitioning X690 Switch Ports into Data Lanes

Front-panel ports on X690 series switches can be configured for either 100-gigabit or 40-gigabit mode, and each port can be partitioned into data lanes through the use of split cables. This yields a total of up to 72 ports.

Port numbers are assigned depending on whether the physical ports are partitioned into data lanes. To illustrate, Figure 102 shows the physical ports on the X690 front panel that can be partitioned. Table 31 on page 105 and Table 32 on page 106 detail how port numbers are assigned for each of the physical ports.

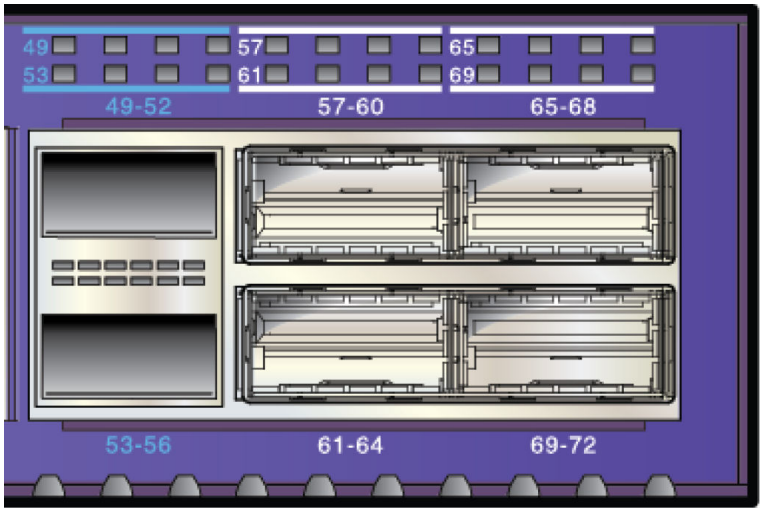


Figure 102: X690 Ports that Can Be Partitioned into Data Lanes

The ports labeled 49-52 and 53-56 operate in 40 Gb mode, acting as single 40 Gb ports or multiple 10 Gb ports.

The ports labeled 57-60 and above operate in 40 Gb mode or 100 Gb mode, with a variety of speeds.

In 40-gigabit mode, each port can be partitioned into four 10-gigabit data lanes.

In 100-gigabit mode, each port can be partitioned into two 50-gigabit data lanes or four 25-gigabit data lanes.

Table 31: Port Number Assignments (in 40 Gb Mode)

Physical Port Number (on Switch)	Has these Assigned Port Number(s)....	...with this Port Speed
49-52	49	40 Gb
	49,50,51,52	10 Gb
53-56	53	40 Gb
	53,54,55,56	10 Gb

Table 31: Port Number Assignments (in 40 Gb Mode) (continued)

Physical Port Number (on Switch)	Has these Assigned Port Number(s)....	...with this Port Speed
57-60	57	40 Gb
	57,58,59,60	10 Gb
61-64	61	40 Gb
	61,62,63,64	10 Gb
65-68	65	40 Gb
	65,66,67,68	10 Gb
69-72	69	40 Gb
	69,70,71,72	10 Gb

Table 32: Port Number Assignments (in 100 Gb Mode)

Physical Port Number (on Switch)	Has these Assigned Port Number(s)....	...with this Port Speed
57-60	57	100 Gb
	57,59	50 Gb
	57,58,59,60	25 Gb
61-64	61	100 Gb
	61,63	50 Gb
	61,62,63,64	25 Gb
65-68	65	100 Gb
	65,67	50 Gb
	65,66,67,68	25 Gb
69-72	69	100 Gb
	69,71	50 Gb
	69,70,71,72	25 Gb

Note
See the *ExtremeXOS 30.7 User Guide* and the *ExtremeXOS 30.7 Command Reference Guide* for feature-specific information about the switches and for information regarding switch configuration.

ExtremeSwitching X690-48t-2q-4c Switch Ports and Slots

The ExtremeSwitching X690-48t-2q-4c switch ports and slots include:

- 48 fixed autosensing 10GBASE-T ports (ports 1-48) that provide 10 Gbps copper connectivity.
- Two 40-gigabit Ethernet ports capable of supporting passive copper QSFP+ and active fiber QSFP+ and configurable for 1x40 Gb or 4x10 Gb Ethernet mode.
- Four 100-gigabit Ethernet ports capable of supporting passive copper QSFP28/QSFP+ and active fiber QSFP28/QSFP+ and configurable for 100 Gb, 40 Gb, 2x50 Gb, 4x25 Gb, and 4x10 Gb modes. For information about QSFP28 and QSFP+ optical modules, see the *Extreme Networks Pluggable Transceivers Installation Guide*.
- Ethernet management port (10/100/1000BASE-T).
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- Front panel USB port.
- Rear dual PSU power slots with front-to-back or back-to-front airflow.
- Six rear slots for fan modules with front-to-back or back-to-front airflow.

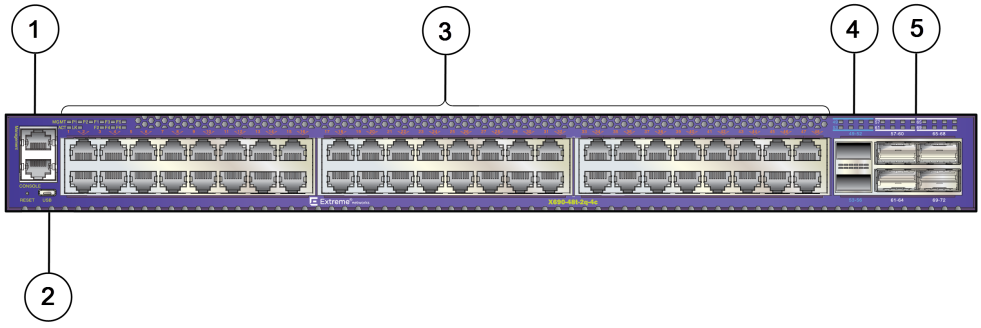


Figure 103: ExtremeSwitching X690-48t-2q-4c Front Panel

1 = Console/management port	4 = 10Gb/40Gb QSFP+ ports
2 = USB port	5 = 10Gb/25Gb/40Gb/50Gb/100Gb QSFP28 ports
3 = 10GBASE-T ports	

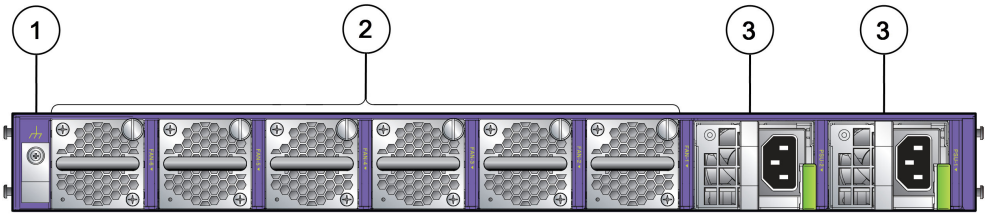


Figure 104: ExtremeSwitching X690-48t-2q-4c Rear Panel

1 = Grounding lug	3 = AC power supplies
2 = Replaceable fan modules	

ExtremeSwitching X690-48x-2q-4c Switch Ports and Slots

The ExtremeSwitching X690-48x-2q-4c switch ports and slots include:

- 48 fixed autosensing 1 Gb/10GBASE-X SFP+ ports (ports 1-48) that provide 10 Gbps high-density fiber connectivity.
- Two 40-gigabit Ethernet ports capable of supporting passive copper QSFP+ and active fiber QSFP+ and configurable for 1x40 Gb or 4x10 Gb Ethernet mode.
- Four 100-gigabit Ethernet ports capable of supporting passive copper QSFP28/QSFP+ and active fiber QSFP28/QSFP+ and configurable for 100 Gb, 40 Gb, 2x50 Gb, 4x25 Gb, and 4x10 Gb modes. For information about QSFP28 and QSFP+ optical modules, see the *Extreme Networks Pluggable Transceivers Installation Guide*.
- Ethernet management port (10/100/1000BASE-T).
- Serial console port implemented as an RJ45 connector used to connect a terminal and perform local management.
- Front panel USB port.
- Rear dual PSU power slots with front-to-back or back-to-front airflow.
- Six rear slots for fan modules with front-to-back or back-to-front airflow.

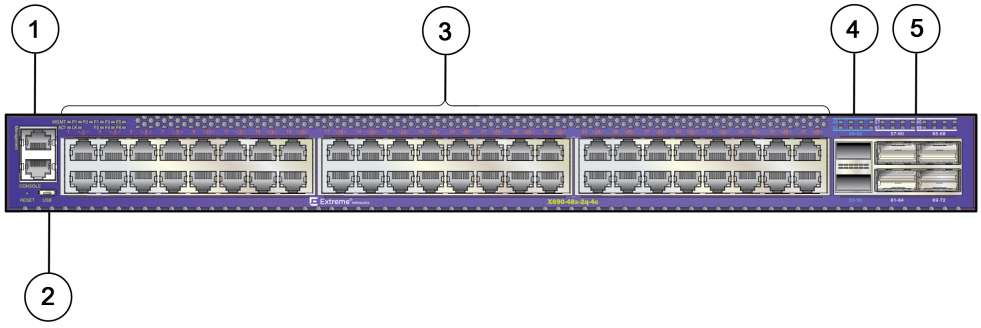


Figure 105: ExtremeSwitching X690-48x-2q-4c Front Panel

1 = Console/management port	4 = 10Gb/40Gb QSFP+ ports
2 = USB port	5 = 10Gb/25Gb/40Gb/50Gb/100Gb QSFP28 ports
3 = 1 Gb/10GBASE-X SFP+ ports	

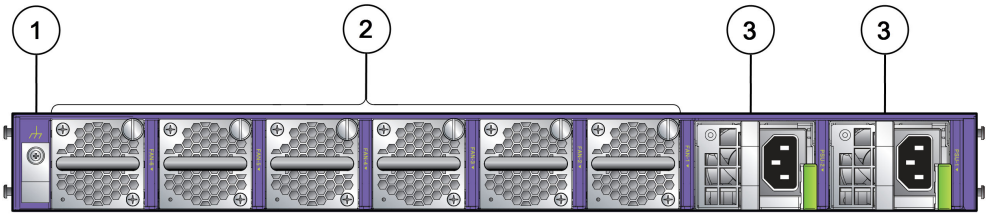


Figure 106: ExtremeSwitching X690-48x-2q-4c Rear Panel

1 = Grounding lug	3 = AC power supplies
2 = Replaceable fan modules	

ExtremeSwitching X690 Series Switch LEDs

The following tables describe the meanings of the LEDs on the front panel of the ExtremeSwitching X690 series switch.

Table 33: X690 Front Panel System LEDs

Label or Type	Color/State	Meaning
MGMT (Management)	Steady green	Normal operation Power-on self test (POST) passed
	Blinking green	POST or diagnostics in progress
	Blinking amber	Any of the following: • POST failed • System overheated • Power supply failed • Fan unit failed
	Off	No power
ACT	Blinking green	Management port packet transmitting or receiving
	Off	No packet transmitting or receiving
LK (Link)	Steady green	Management port link up
	Off	No link up or port disabled
P1, P2 (Power Supply)	Steady green	Power on
	Blinking amber	Any of the following: • Power supply failure • Over voltage • Over current • Over temperature
	Off	Power off; no power attached
F1 - F6 (Fan)	Steady green	Normal operation; all diagnostics pass
	Blinking amber	Fan module failure
	Off	No power to fan module

Table 34: X690 Front Panel Port LEDs

Location	Speed	Color/State	Meaning
Ports 1-48	10Gb/1Gb	Steady green	Link OK
		Blinking green	Port transmitting or receiving
		Off	No link, or port disabled

Table 34: X690 Front Panel Port LEDs (continued)

Location	Speed	Color/State	Meaning
Ports 49-56	40Gb (no partition)	Steady blue	Link OK
		Blinking blue	Port transmitting or receiving
		Off	No link, or port disabled
	10Gb (partitioned)	Steady green	Link OK
		Blinking green	Port transmitting or receiving
		Off	No link, or port disabled
Ports 57-72	100Gb/40Gb (no partition)	Steady white	Link OK
		Blinking white	Port transmitting or receiving
		Off	No link, or port disabled
	50Gb/25Gb/10Gb (partitioned)	Steady green	Link OK
		Blinking green	Port transmitting or receiving
		Off	No link, or port disabled

ExtremeSwitching X695 Switch

The ExtremeSwitching X695 switch offers versatile and efficient aggregation switching functionality for campus environments. The X695 switch runs the EXOS operating platform.

The X695 switch comes in the X695-48Y-8C base model (switch with unpopulated fan and power supply slots).

The front panel of the X695 switch includes:

- 48 10/25-gigabit Ethernet ports capable of supporting passive copper SFP28 and active fiber SFP28.

  These ports are configurable for 1G, 10Gb, and 25Gb modes.
- 8 100-gigabit Ethernet ports capable of supporting passive copper QSFP28 and active fiber QSFP28. These ports are configurable for 10Gb, 25Gb, 40Gb, 50Gb, and 100Gb modes. For information about SFP28 and QSFP28 optical modules, see the *Extreme Networks Pluggable Transceivers Installation Guide*

  For details about the port partitioning or channelizing options that are available on the X695 switch, see Partitioning or Channelizing Switch Ports into Data Lanes on page 112.
- RJ45 serial console port that is used to connect a terminal and perform local management.
- USB port for access to external storage.
- RJ45 out-of-band 10/100/1000BASE-T management Ethernet port.
- LEDs to indicate port status and switch operating conditions. For a description of the LEDs and their operation, see ExtremeSwitching X695 Switch LEDs on page 113.

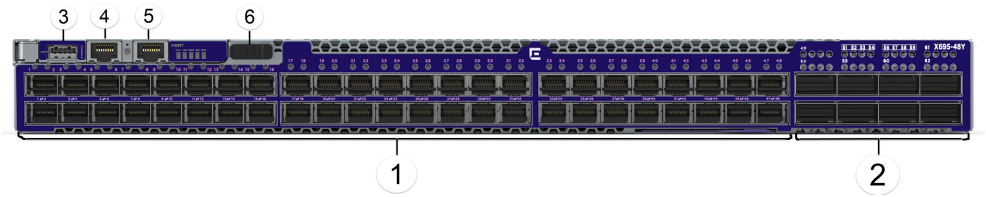


Figure 107: X695 Switch: Front Panel

1 = SFP28 Ethernet ports	3 = USB port	5 = Management port: RJ45
2 = QSFP28 Ethernet ports	4 = Console port: RJ45	6 = Management Set sliding button*

*The Management Set sliding button can be slid to the right in order to free the Management Set for removal.

The rear panel of the X695 switch includes:

- Two power supply bays for 750 W AC or DC power supplies.
- Six bays for replaceable fan modules.

Note

The color of the tab on the fan tray and power supply indicates the airflow direction:

- Red: front-to-back
- Blue: back-to-front

The operating-system software cannot display the airflow direction.

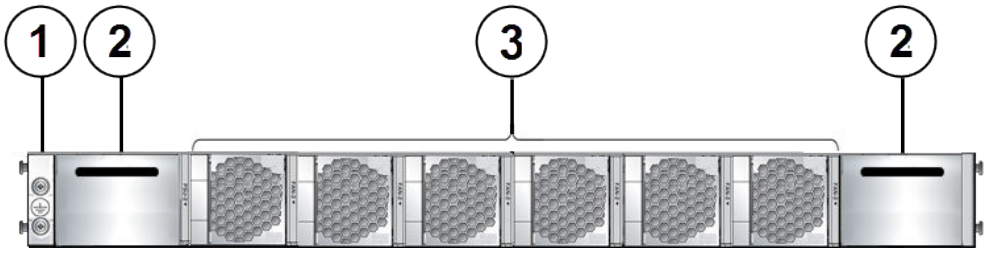


Figure 108: X695 Switch - Rear Panel

1 = Grounding point	3 = Fan modules
2 = Power supply slots (unpopulated)	

Use the serial console port on the front panel to connect a terminal and perform local management. You can use an Ethernet management port to connect the system to a parallel management network for administration. Alternatively, you can use an Ethernet cable to connect this port directly to a laptop to view and locally manage the switch configuration. The Ethernet management port supports 10/100/1000 Mbps speeds.

The USB port can be used for attaching a removable memory module.

Switch cooling is provided by field-replaceable fan modules. Fan modules are available in two different models that direct the airflow either from front to back or from back to front. All installed fan modules must be of the same model, so that they all direct the airflow in the same direction.

Two power supply bays accommodate 750 W AC or DC power supplies. Supported power supply configurations include two AC power supplies, two DC power supplies, or one AC and one DC power supply. Power supplies have integrated cooling fans that operate independently of the switch fans. Like the fan modules, the power supplies are available in models with either front-to-back or back-to-front cooling airflow.

Both front-to-back and back-to-front airflow options are available. However, on any given X695 switch, air must flow in the same direction for all installed fan modules and power supplies.

Partitioning or Channelizing Switch Ports into Data Lanes

Six of the eight 100GbE front-panel ports operate in either 100-gigabit or 40-gigabit mode. Two of the ports can each be partitioned into data lanes through the use of breakout cables. This means that a given physical port can correspond to either two or four logical ports.

Logical port numbers are assigned depending on whether the physical ports are partitioned into data lanes. If there is no partitioning or channelizing, the logical port numbers correspond to the physical port numbers shown on the front of the switch. With partitioning or channelizing, logical port numbers are assigned for each of the physical ports – as shown, for example, in the following table:

Table 35: Port Number Assignments for Physical Ports 51 and 56, when Partitioned

Physical port number (on switch)	Logical port number range when partitioned by...			
	4 x 10 Gb	4 x 25 Gb	1 x 40	2 x 50
51, 56	1,2,3,4	1,2,3,4	1	1,2

Stacking

Each X695 unit comes equipped with two 40GbE or 100GbE stacking ports using a QSFP28 interface, located on the front panel of the switch. Use standard 100 Gb Ethernet Optics and passive and active cables in the QSFP28 ports for stacking X695s together using SummitStack-V400.

Stacking cables for X695 switches are ordered separately. For a list of X695 ports that can be used with SummitStack-V160 and SummitStack-V400, see ExtremeSwitching X695 Stacking on page 216.

For information about QSFP and QSFP+ optical modules, see *Extreme Networks Pluggable Transceivers Installation Guide*.

Operating Temperatures

All X695 switch models support an operating range from 0°C to 50°C for front-to-back cooling, 0°C to 45°C for back-to-front cooling.

Note
See the *ExtremeXOS 30.7 User Guide* and the *ExtremeXOS 30.7 Command Reference Guide* for feature-specific information about the switches and for information regarding switch configuration.

ExtremeSwitching X695 Switch LEDs

The following figure illustrates the X695 front panel LEDs:

Figure 109: X695 Switch LED

The X695 front panel LEDs behave as follows:

Table 36: X695 System LEDs

LED indication	Color	Behavior	Description
SYS	Green	Blinking	POST Passed, normal operation
		Light off	Power Off
	Amber	Blinking	• POST failed • Overheated • System booting • Initial system booting
		Solid	POST or Diagnostics in progress
Power	Green	Solid	Power On
		Light Off	Power Off

Table 36: X695 System LEDs (continued)

LED indication	Color	Behavior	Description
Link (Left of Mgmt port)	Green	Solid	Management port link up
		Light off	No link up or port disabled
		Blinking	Management port packet transmitting or receiving
PSU1, PSU2 (Front Faceplate)	Green	Solid	Power On
	Amber	Blinking	Power supply failure
		Solid	Module not present or POST in progress if SYS is solid amber
PSU1, PSU (Back)	Green	Solid	Operational
	Amber	Solid	Voltage, fan, or temp failure
Fantray 1 (Back) Fantray 2 (Back) Fantray 3 (Back) Fantray 4 (Back) Fantray 5 (Back) Fantray 6 (Back)	Green	Solid	All diagnostics pass and the module is operational
	Red	Solid	Failure, module not receiving power, not present
FAN (front faceplate)	Green	Solid	All modules are operational
	Amber	Blinking	Failure in at least one of the modules or POST in progress if SYS is solid amber
		Solid	POST in progress if SYS is solid amber

The X695 front panel port LEDs behave as follows:

Location	Speed	LED Indication	Color/State	Description
LED Port 1-48 (10G bps)	10G/1Gbps	Link/ Act/ Speed	Solid green	The port has link
			Blinking green	Port is transmitting or receiving
LED Port 49-62. Ports 49, 50, 55, 60-62 are not partitionable	40Gbps/ 100Gpbs (no partition)		Solid green (1) (2, 3, 4 - Off)	The port has link
			Blinking green (1) (2, 3, 4 - Off)	Port is transmitting and/or receiving
LED Partitionable Ports 51-54, 56-59	50 Gbps (partitioned) 51, 53		Solid green (1, 3) (2, 4 - Off)	The port has link
			Blinking green	Port is transmitting or receiving
	10/25Gbps (partitioned)		Solid green (1, 2, 3, 4)	The port has link
			Blinking green (1, 2, 3, 4)	Port is transmitting or receiving
	40 Gbps/ 100Gbps (no partition)		Solid green (1) (2, 3, 4 - Off)	The port has link
			Blinking green (1) (2, 3, 4 - Off)	Port is transmitting or receiving
All	Off or Not Present		Off	No link or port disable

Note
Each QSFP port that can be partitioned has four LEDs.

ExtremeSwitching X870 Series Switches

The X870 series switch is a 100 Gb switch suited for large datacenter applications. Front-panel Ethernet ports can provide 100-gigabit Ethernet connectivity using installable QSFP28 and QSFP+ optical modules. The ports can operate in 40- or 100-gigabit mode and can be partitioned into 10-, 25-, and 50-gigabit data lanes. (See Partitioning X870 Switch Ports into Data Lanes on page 116 for details and an example.)

The X870 provides latency less than 600 nanoseconds and supports cut-through switching to help optimize high frequency trading applications as well as latency sensitive cluster computing.

Native stacking with other X870 series switches is supported using the front panel-ports.

The X870 series includes the following base models:

- ExtremeSwitching X870-32c Switch Ports and Slots on page 118
- ExtremeSwitching X870-96x-8c Switch Ports and Slots on page 119

X870 series switches require ExtremeXOS version 22.2.1 or later.

Partitioning X870 Switch Ports into Data Lanes

Front-panel ports on X870 series switches can be configured for either 100-gigabit or 40-gigabit mode, and each port can be partitioned into data lanes through the use of split cables. This yields a total of up to 128 ports.

Port numbers are assigned depending on whether the physical ports are partitioned into data lanes. To illustrate, Figure 110 shows a portion of the switch's front panel along with the port-number assignments for physical ports P1 through P8.

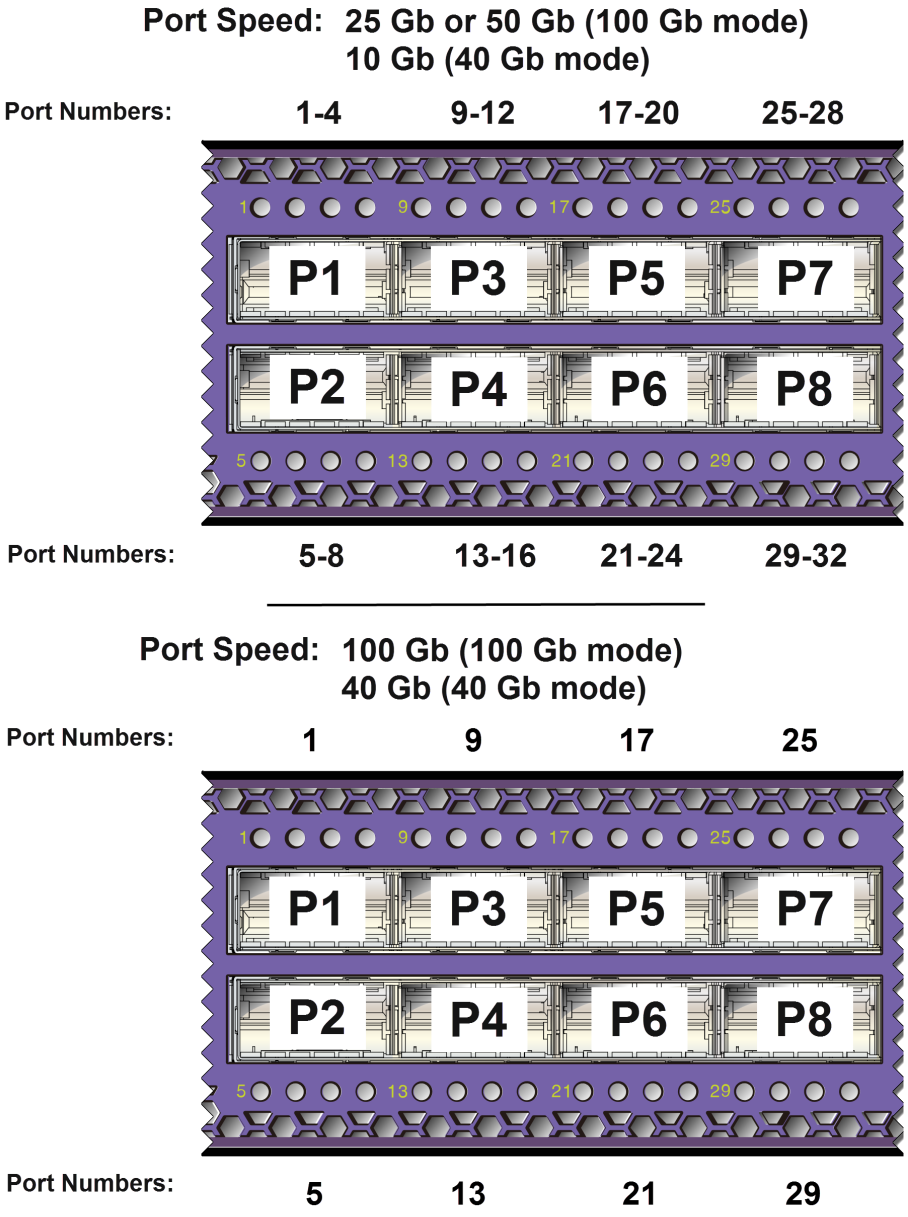


Figure 110: X870 Port Numbers for 100G Mode and 40G Modes when Ports are Partitioned into Data Lanes

In 40-gigabit mode, each port can be partitioned into four 10-gigabit data lanes.

In 100-gigabit mode, each port can be partitioned into two 50-gigabit data lanes or four 25-gigabit data lanes.

Management

A serial console port on the front panel of the X870 series switch allows you to connect a terminal and perform local management. An Ethernet management port can be used to connect the system to a parallel management network for administration.

Alternatively, you can use an Ethernet cable to connect this port directly to a laptop to view and locally manage the switch configuration. The Ethernet management port supports 10/100/1000 Mbps speeds.

There is also a USB console port. If the USB console port is connected, it will be selected over the RJ45 console port.

Cooling

Each base model is available with either front-to-back or back-to-front cooling. There is no operational difference between these switch versions.

Switch cooling is provided by six hot-swappable fan modules providing N+1 redundancy. Fan modules are available in two different models that direct the airflow either from front to back or from back to front. All six installed fan modules must be of the same model, so that they all direct the airflow in the same direction.

Note
Ensure that all fan module slots are filled when the switch is powered on. Fan modules can be hot-swapped after power has been turned on.

Power Supplies

Two power supply bays accommodate either AC or DC power supplies. Power supplies have integrated cooling fans that operate independently of the switch fans. Like the fan modules, the power supplies are available in models with either front-to-back or back-to-front cooling airflow.

Note
Air must flow in the same direction for all installed fan modules and power supplies in a switch.

Note
See the *ExtremeXOS 30.7 User Guide* and the *ExtremeXOS 30.7 Command Reference Guide* for feature-specific information about the switches and for information regarding switch configuration.

ExtremeSwitching X870-32c Switch Ports and Slots

The front panel of the ExtremeSwitching X870-32c switch includes:

- 32 100-gigabit Ethernet ports capable of supporting passive copper QSFP28/QSFP+ and active fiber QSFP28/ QSFP+ and configurable for 100 Gb, 40 Gb, 2x50 Gb, 4x25 Gb, and 4x10 Gb modes. For information about QSFP28 and QSFP+ optical modules, see the *Extreme Networks Pluggable Transceivers Installation Guide*.
- RJ45 Ethernet management port.
- USB port for access to external storage.
- USB console port.

- RJ45 RS-232c serial console port used to connect a terminal and perform local management.
- LEDs to indicate port status and switch operating conditions. For a description of the LEDs and their operation, see ExtremeSwitching X870 Series Switch LEDs on page 120.

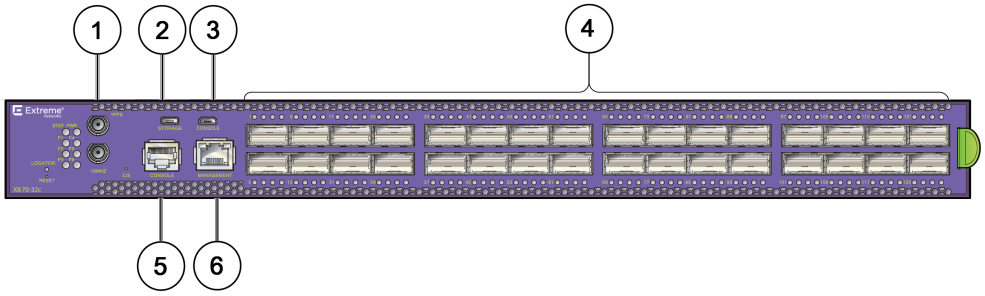


Figure 111: ExtremeSwitching X870-32c Front Panel

1 = Precision Timing ports (not supported)	4 = QSFP28/QSFP+ Ethernet ports
2 = Storage port: micro USB A	5 = Console port: RJ45
3 = Console port: micro USB B	6 = Ethernet management port: RJ45

The rear panel of the ExtremeSwitching X870-32c switch includes:

- Six replaceable fan modules.
- Two power supply bays for either AC or DC power supplies.

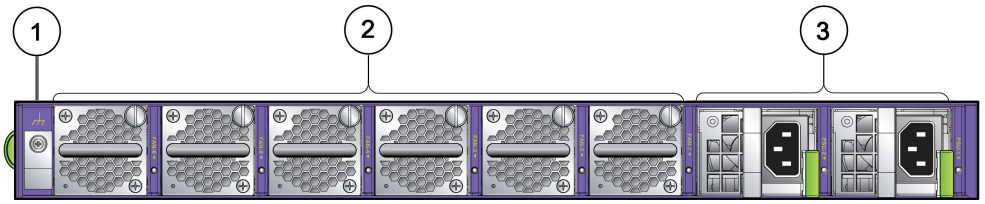


Figure 112: ExtremeSwitching X870-32c Rear Panel

1 = Grounding lug	3 = AC power supplies
2 = Fan modules	

ExtremeSwitching X870-96x-8c Switch Ports and Slots

The front panel of the ExtremeSwitching X870-96x-8c switch includes:

- Eight 100-gigabit Ethernet ports capable of supporting passive copper QSFP28/QSFP+ and active fiber QSFP28/QSFP+ and configurable for 100 Gb, 40 Gb, 2x50 Gb, 4x25 Gb, and 4x10 Gb modes. For information about QSFP28 and QSFP+ optical modules, see the *Extreme Networks Pluggable Transceivers Installation Guide*.
- 24 100-gigabit Ethernet ports capable of supporting passive copper QSFP28/QSFP+ and active fiber QSFP28/QSFP+ and restricted to 4x10 Gb Ethernet mode

Using the optional Switch Port Speed License, these ports can be upgraded to unrestricted 100-gigabit mode in groups of six ports per license. Up to four Switch Port Speed Licenses can be applied for each X870-96x-8c switch.

- RJ45 Ethernet management port.
- USB port for access to external storage.
- USB console port.
- RJ45 RS-232c serial console port used to connect a terminal and perform local management.
- LEDs to indicate port status and switch operating conditions. For a description of the LEDs and their operation, see ExtremeSwitching X870 Series Switch LEDs on page 120.

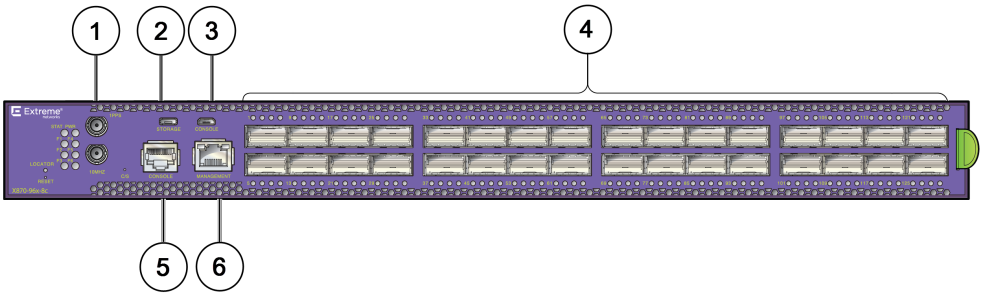


Figure 113: ExtremeSwitching X870-96x-8c Front Panel

1 = Precision Timing ports (not supported)	4 = QSFP28/QSFP+ Ethernet ports
2 = Storage port: micro USB A	5 = Console port: RJ45
3 = Console port: micro USB B	6 = Ethernet management port: RJ45

The rear panel of the ExtremeSwitching X870-96x-8c switch includes:

- Six replaceable fan modules.
- Two power supply bays for either AC or DC power supplies.

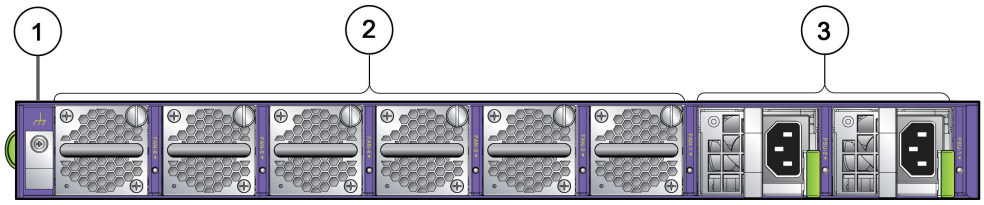


Figure 114: ExtremeSwitching X870-96x-8c Rear Panel

1 = Grounding lug	3 = AC power supplies
2 = Fan modules	

ExtremeSwitching X870 Series Switch LEDs

The following sections describe the meanings of the LEDs on the ExtremeSwitching X870 series switches.

Table 37: X870 Front Panel LEDs

Label or Type	Color/State	Meaning
STAT	Slow blinking green (1 Hz)	Normal operation
	Fast blinking green (2 Hz)	Power-on self test (POST) in progress or Switch diagnostics are running
	Steady green	POST passed: system is booting image
	Blinking amber	System is disabled: POST failed or system overheated
	Off	No external power is attached
PWR	Steady green	Power on
	Blinking amber	Power supply failure – one of: • Over voltage • Over current • Over temperature
	Off	Power off; no power attached
MGMT	Steady green	Link up
	Blinking green	Packet transmitting or receiving
	Off	Link not up or port disabled
FAN 1, 2, 3, 4, 5, 6	Steady green	All diagnostics passed; fan module is operational
	Blinking amber	Failure
	Off	No power to fan module
Locator	Blinking blue	Locator function enabled
	Off	Locator function disabled
Ethernet ports 1-32 (not partitioned)	Steady white	Link up, no activity
	Blinking white	Packet transmitting or receiving
	Off	Link not up or port disabled
Ethernet ports 1-128 (partitioned into data lanes – see Partitioning X870 Switch Ports into Data Lanes on page 116)	Steady green	Link up, no activity
	Blinking green	Packet transmitting or receiving
	Off	Link not up or port disabled

Pluggable Interfaces for the Switches

Many ExtremeSwitching switches include ports that are compatible with a variety of optical modules, including SFP, SFP+, SFP28, QSFP+, and QSFP28 transceivers and cables. Extreme Networks optical modules are tested to work in all supported Extreme

Networks devices. We recommend that all customers use Extreme Networks optical modules in their Extreme Networks devices.

Extreme Networks assumes no liability for third-party optical modules. Although Extreme Networks does not block third-party optical modules, we cannot ensure that all third-party optical modules operate properly in all Extreme Networks devices. The customer assumes all risks associated with using third-party optical modules in Extreme Networks devices.

For more information, refer to *Extreme Networks Pluggable Transceivers Installation Guide*.

Power Supplies for Use with Your Switch

Many Extreme Networks switches are shipped with an internal power supply that supplies all of the power needed for most switch operation. The internal power supply is fixed on some models and replaceable on other models. (See Replaceable Internal Power Supplies on page 136.)

Other switches, such as the X450-G2 and the X460-G2, require power supplies to be ordered separately.

An optional redundant power supply can be added to most models to protect against a power supply failure and to provide increased support for PoE operation on applicable switches.

The following Extreme Networks switches use external power supplies for redundancy:

- X440-G2
- X450-G2 (non-PoE models)
- X620-8t-2x and X620-10x models

V300 Virtual Port Extender high temperature (HT) models use an external power supply for redundancy.

The V400 Virtual Port Extender also uses an external power supply for redundancy.

The following switches provide power redundancy by installing a second replaceable power supply:

- X450-G2 (PoE models)
- X460-G2
- X465
- X620 (16-port models)
- X670-G2

External Power Supplies

The following tables list the compatible power supply models for ExtremeSwitching switches that use external power supplies for redundancy.

Caution
Extreme Redundant Power Supplies (RPS) do not support the ability for the RPS to be connected to an operational switch. Connecting an RPS to an operational switch can have an adverse effect on the switch. It is best practice that both the switch and the RPS be powered down prior to cabling them together. Once the cabling is completed, turn on the RPS, then turn on the switch.

For information about power supplies that work with other Extreme Networks switches, refer to *ExtremeSwitching and Summit Switches: Hardware Installation Guide for Switches Using ExtremeXOS 16 or Earlier*.

Table 38: External Power Supplies for X440-G2 Series Switches

Switch Model	Compatible External Power Supply	Model: Part Number
X440-G2-12t-10GE4	90 W Redundant Power Supply Unit	RPS-90: 10948
X440-G2-12p-10GE4	500 W PoE+ Redundant Power Supply Unit	RPS-500p: 10923
	750 W Power Supply with EPS-C2 chassis	750 W AC PSU: 10931 EPS-C2: 10936
X440-G2-24t-10GE4	150 W Non-PoE Redundant Power Supply	STK-RPS-150PS
	150 W RPS-150XT External Power Supply Unit	RPS-150XT
	500 W PoE+ Redundant Power Supply Unit	RPS-500p: 10923
	750 W Power Supply with EPS-C2 chassis	750 W AC PSU: 10931 EPS-C2: 10936
X440-G2-24x-10GE4	150 W Non-PoE Redundant Power Supply	STK-RPS-150PS
	150 W RPS-150XT External Power Supply Unit	RPS-150XT
	500 W PoE+ Redundant Power Supply Unit	RPS-500p: 10923
	750 W Power Supply with EPS-C2 chassis	750 W AC PSU: 10931 EPS-C2: 10936
X440-G2-24p-10GE4	500 W PoE+ Redundant Power Supply Unit	RPS-500p: 10923
	750 W Power Supply with EPS-C2 chassis	750 W AC PSU: 10931 EPS-C2: 10936

Table 38: External Power Supplies for X440-G2 Series Switches (continued)

Switch Model	Compatible External Power Supply	Model: Part Number
X440-G2-48t-10GE4	150 W Non-PoE Redundant Power Supply	STK-RPS-150PS
	150 W RPS-150XT External Power Supply Unit	RPS-150XT
	500 W PoE+ Redundant Power Supply Unit	RPS-500p: 10923
	750 W Power Supply with EPS-C2 chassis	750 W AC PSU: 10931 EPS-C2: 10936
X440-G2-48p-10GE4	1005 W PoE+ Redundant Power supply	STK-RPS-1005PS
X440-G2-24t-10GE4-DC	150 W Non-PoE Redundant Power Supply	STK-RPS-150PS
	150 W RPS-150XT External Power Supply Unit	RPS-150XT
	500 W PoE+ Redundant Power Supply Unit	RPS-500p: 10923
	750 W Power Supply with EPS-C2 chassis	750 W AC PSU: 10931 EPS-C2: 10936
X440-G2-48t-10GE4-DC	150 W Non-PoE Redundant Power Supply	STK-RPS-150PS
	150 W RPS-150XT External Power Supply Unit	RPS-150XT
	500 W PoE+ Redundant Power Supply Unit	RPS-500p: 10923
	750 W Power Supply with EPS-C2 chassis	750 W AC PSU: 10931 EPS-C2: 10936
X440-G2-12t8fx-GE4	150 W Non-PoE Redundant Power Supply	STK-RPS-150PS
	150 W RPS-150XT External Power Supply Unit	RPS-150XT
	500 W PoE+ Redundant Power Supply Unit	RPS-500p: 10923
	750 W Power Supply with EPS-C2 chassis	750 W AC PSU: 10931 EPS-C2: 10936
X440-G2-24fx-GE4	150 W Non-PoE Redundant Power Supply	STK-RPS-150PS
	150 W RPS-150XT External Power Supply Unit	RPS-150XT
	500 W PoE+ Redundant Power Supply Unit	RPS-500p: 10923
	750 W Power Supply with EPS-C2 chassis	750 W AC PSU: 10931 EPS-C2: 10936

Table 38: External Power Supplies for X440-G2 Series Switches (continued)

Switch Model	Compatible External Power Supply	Model: Part Number
X440-G2-24t-GE4	150 W Non-PoE Redundant Power Supply	STK-RPS-150PS
	150 W RPS-150XT External Power Supply Unit	RPS-150XT
	500 W PoE+ Redundant Power Supply Unit	RPS-500p: 10923
	750 W Power Supply with EPS-C2 chassis	750 W AC PSU: 10931 EPS-C2: 10936

Table 39: External Power Supplies for X450-G2 Series Switches

Switch Model	Compatible External Power Supply	Model: Part Number
X450-G2-24t-GE4	150 W Non-PoE redundant power supply	STK-RPS-150PS
	500 W PoE+ Redundant Power Supply Unit	RPS-500p: 10923
	750 W Power Supply with EPS-C2 chassis	750 W AC PSU: 10931 EPS-C2: 10936
X450-G2-24t-10GE4	150 W Non-PoE redundant power supply	STK-RPS-150PS
	500 W PoE+ Redundant Power Supply Unit	RPS-500p: 10923
	750 W Power Supply with EPS-C2 chassis	750 W AC PSU: 10931 EPS-C2: 10936
X450-G2-48t-GE4	150 W Non-PoE redundant power supply	STK-RPS-150PS
	500 W PoE+ Redundant Power Supply Unit	RPS-500p: 10923
	750 W Power Supply with EPS-C2 chassis	750 W AC PSU: 10931 EPS-C2: 10936
X450-G2-48t-10GE4	150 W Non-PoE redundant power supply	STK-RPS-150PS
	500 W PoE+ Redundant Power Supply Unit	RPS-500p: 10923
	750 W Power Supply with EPS-C2 chassis	750 W AC PSU: 10931 EPS-C2: 10936

Table 40: External Power Supplies for X620 Series Switches

Switch Model	Compatible External Power Supply	Model: Part Number
X620-8t-2x	150 W Non-PoE Redundant Power Supply	STK-RPS-150PS
	150 W RPS-150XT External Power Supply Unit	RPS-150XT
	750 W Power Supply with EPS-C2 chassis	750 W AC PSU: 10931 EPS-C2: 10936

Table 40: External Power Supplies for X620 Series Switches (continued)

Switch Model	Compatible External Power Supply	Model: Part Number
X620-10x	150 W Non-PoE Redundant Power Supply	STK-RPS-150PS
	150 W RPS-150XT External Power Supply Unit	RPS-150XT
	750 W Power Supply with EPS-C2 chassis	750 W AC PSU: 10931 EPS-C2: 10936

Table 41: External Power Supplies for V400 Virtual Port Extenders

Switch Model	Compatible External Power Supply	Model: Part Number
V400 (all models)	VX-RPS-1000 Redundant Power Supply	VX-RPS-1000 Redundant Power Supply on page 135

EPS-C2 Redundant Power System

The EPS-C2 is an external power supply system that supplies redundant power to switches.

It is a standalone unit that can be rack mounted in a regular 19-inch rack system. The EPS-C2 can be populated with up to three 750 W PoE AC PSUs (power supply units) to provide a total redundant power budget of up to 2040 W. The redundant power supply system can connect up to five switches to actively provide power to all five if needed.

The EPS-C2 redundant power system consists of the EPS-C2 chassis (Model 10936) plus one, two, or three installed 750 W AC power supplies (Model 10931).

The EPS-C2 system provides redundant power for up to five switches. Redundant power connectors on the rear panel of the EPS-C2 chassis are specific to the supported switch type; a selection switch toggles between the connector type.

The 750 W AC PoE PSU used on the EPS-C2 has two power rails: 12V and PoE. These two power rails are independent. If the PoE rail overloads, it will shut down all PoE but the 12V rail will continue to function. If the 12V rail overloads, the 12V shuts down and the PoE rail will continue to function.

The following table lists the power capability in watts of the EPS-C2 based on the number of installed PSUs. Check the power requirements of your switches to determine how many PSUs you need to install into the EPS-C2 chassis.

	12V Power (W)	PoE Power (W)
1 PSU	300	380
2 PSUs	600	760
3 PSUs	900	1140

For technical specifications, see EPS-C2 Redundant Power Supply Technical Specifications on page 494.

EPS-C2 connectors

The EPS-C2 delivers power in the following ways.

2x7 connector

The 2x7 connector is compatible with ExtremeSwitching X440-G2 and X620 switches. Using the 2x7 connector, the EPS-C2 provides redundant PoE power at the same level no matter how many PSUs are installed. That is, if there are one, two, or three PSUs installed into the EPS-C2, the EPS-C2 will provide redundant PoE power capability at the same 380-watt capacity as the internal power supply of the connected switches. The PoE power supplied does not increase more than 380-watt even if additional PSUs are installed.

Internal-to-External Power Supply Transfer

When a EPS-C2 is connected to the switch and the internal power supply fails, power is drawn from the EPS-C2 without power interruption to the switch or PoE connected devices.

External-to-Internal Power Supply Transfer

When a EPS-C2 is connected to the switch and the EPS-C2 fails or is disconnected, power is drawn from the internal power supply without interruption to the switch or PoE connected devices.

Single 750 W PoE PSU Configuration: Redundant PoE Power

A single 750 W PoE PSU provides redundant PoE power capability up to a 380-watt maximum capacity. This is sufficient to supply up to 15.4 watts per port for a 24-port configuration and up to 7.7 watts per port for a 48-port configuration.

If the internal power supply fails, the external power module will provide power to the switch and PoE devices at the same power levels as the internal power supply without any power interruptions.

If the 750 W PoE PSU fails or is removed, the internal power supply of the switch continues to provide PoE power without any power interruptions.

Dual 750 W PoE PSUs Configuration: Full Power

Two 750 W PoE PSUs provide full power at 760 watts; this power level allows 15.4 watts of PoE power to all 48 ports. In this full-power configuration, the internal power supply is disabled, and therefore redundant power is not available.

Triple 750 W PoE PSUs Configuration: Full Redundant Power

Three 750 W PoE PSUs provide the full 760 watts of power for 15.4 watts of PoE power to all 48 ports. In addition, this configuration provides 2:1 redundancy. If one of the 750 W PoE PSU fails, the third power module continues to provide uninterrupted full PoE power. The internal power supply of the switch is disabled in this configuration.

For information on installing the EPS-C2, see Installing an EPS-C2 Power Supply on page 278.

Each EPS-C2 power supply is shipped with a special redundant power supply cord.

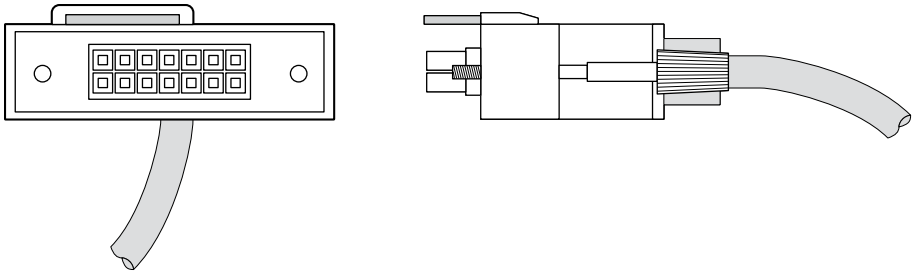


Figure 115: EPS-C2 2x7 Pin Redundant Power Cable

RPS-90 Redundant Power Supply

Tip
Extreme Redundant Power Supplies (RPS) do not support the ability for the RPS to be connected to an operational switch. Connecting an RPS to an operational switch can have an adverse effect on the switch. It is best practice that both the switch and the RPS be powered down prior to cabling them together. Once the cabling is completed, turn on the RPS, then turn on the switch.

The Extreme Networks RPS-90 (model 10948) is supported as a power source for the ExtremeSwitching X440-G2-12t-10GE4 switch. It plugs into the RPS connector (coaxial barrel connector) on the rear panel of the switch.

Note
Only the Extreme Networks RPS-90 RPS is supported for use with the X440-G2-12t-10GE4 switch. RPS-90 devices from other manufacturers are not supported.

The RPS-90 power supply has a C6-format AC power input connector. As a result, you will need to obtain both a standard C13 AC power cord and a C5-to-C14 converter (Extreme Networks model 10947).

Note
The converter is not available in China. A special power cord is available for use with the RPS-90 in China.

The RPS-90 cannot be mounted in a rack.

For technical specifications, refer to RPS-90 Redundant Power Supply Technical Specifications on page 494.

RPS-150XT Redundant Power Supply

Tip
Extreme Redundant Power Supplies (RPS) do not support the ability for the RPS to be connected to an operational switch. Connecting an RPS to an operational switch can have an adverse effect on the switch. It is best practice that both the switch and the RPS be powered down prior to cabling them together. Once the cabling is completed, turn on the RPS, then turn on the switch.

The RPS-150XT provides backup power to Extreme Networks stackable switches. If for some reason the switch loses power from its internal power supply, the RPS-150XT can provide up to 150 W maximum operating power to support switch operation.

The power supply ships with the following:

- RPS cable
- Four rubber feet (for flat surface installation)

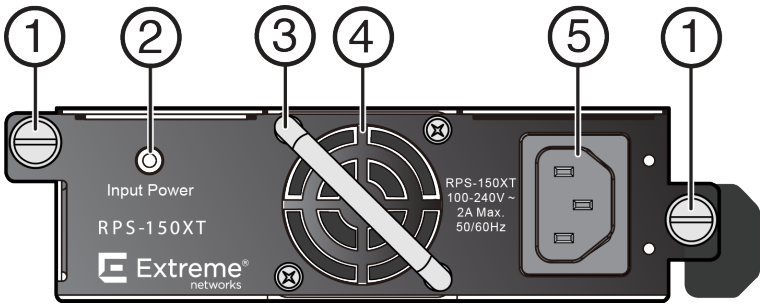


Figure 116: RPS-150XT Front Panel

1 = Captive screws	4 = Fan
2 = Status LEDs	5 = AC power input connector
3 = Handle	

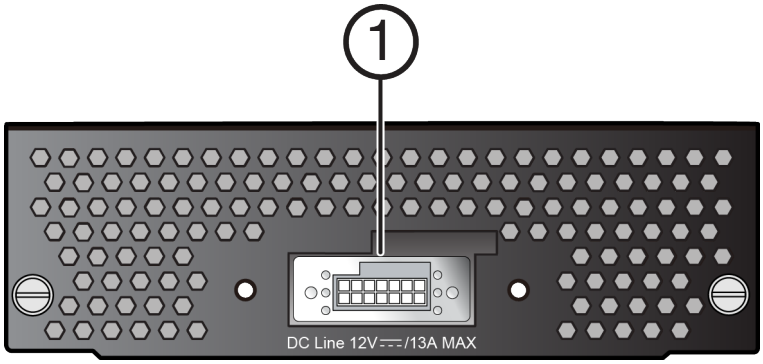


Figure 117: RPS-150XT Rear Panel

1 = 14-pin Redundant Power Supply connector

See RPS-150XT Redundant Power Supply Technical Specifications on page 495 for pin locations and function.

Table 42: RPS-150XT LED Status Definitions

LED	LED Color	Status
AC OK	Green	AC input within operational range
	Off	No AC voltage or AC voltage is outside the operational range

For technical specifications, see RPS-150XT Redundant Power Supply Technical Specifications on page 495.

RPS-500p Redundant Power Supply

Tip

Extreme Redundant Power Supplies (RPS) do not support the ability for the RPS to be connected to an operational switch. Connecting an RPS to an operational switch can have an adverse effect on the switch. It is best practice that both the switch and the RPS be powered down prior to cabling them together. Once the cabling is completed, turn on the RPS, then turn on the switch.

The RPS-500p (model 10923) is a 500 watt DC power redundant power supply for use with Extreme 802.3at PoE-compliant stackable or standalone switches. The RPS-500p is a standalone unit that can be rack mounted in a standard 19-inch rack.

The power supply provides power backup to an Extreme stackable or standalone fixed switch. If for some reason the switch loses power from its internal power supply, the RPS-500p can provide up to 500 watts maximum operating power to support switch operation and the 55 VDC necessary to support 55 VDC/data connections to PDs (powered devices). The RPS-500p has one 2x7 power connector.

The power supply ships with the following:

- RPS cable (1 meter long)
- Four rubber feet (for flat surface installation)

- Two rack mount brackets
- Eight flathead screws (M3x6mm)

Table 43: RPS-500p LED Status Definitions

Power LED	Meaning	Recommended Action
Green, solid	AC input to power supply is within specifications	None
Off	AC input power to power supply is out of specification.	1. Check AC power cord connection to the power supply. 2. Check AC power at the power outlet. 3. Swap power cord for a known good one. 4. If the problem persists, contact Extreme Networks for support.

For technical specifications, see RPS-500p Redundant Power Supply Technical Specifications on page 497.

STK-RPS-150PS Redundant Power Supply

Tip
Extreme Redundant Power Supplies (RPS) do not support the ability for the RPS to be connected to an operational switch. Connecting an RPS to an operational switch can have an adverse effect on the switch. It is best practice that both the switch and the RPS be powered down prior to cabling them together. Once the cabling is completed, turn on the RPS, then turn on the switch.

The STK-RPS-150PS is a 150 watt DC power redundant power supply for use with Extreme Networks stackable or standalone fixed switch models that do not support PoE. The STK-RPS-150PS can be used as a standalone unit, or it can be installed into a two or eight slot shelf and then mounted in a standard 19-inch rack.

The STK-RPS-150PS system is compatible with the following switch models:

- X440-G2-24t-10GE4 switch
- X440-G2-24x-10GE4 switch
- X440-G2-48t-10GE4 switch
- X440-G2-24t-10GE4-DC switch
- X440-G2-48t-10GE4-DC switch
- X440-G2-12t8fx-GE4 switch
- X440-G2-24fx-GE4 switch
- X440-G2-24t-GE4 switch
- X450-G2-24t-GE4 switch
- X450-G2-24t-10GE4 switch

- X450-G2-48t-GE4 switch
- X450-G2-48t-10GE4 switch
- X620-8t-2x switch
- X620-10x switch

Table 44: STK-RPS-150PS LED Status Definitions

Power LED	Meaning	Recommended Action
Green, solid	AC input to power supply is within specifications	None
Off	AC input power to power supply is out of specification.	1. Check AC power cord connection to the power supply. 2. Check AC power at the power outlet. 3. Swap power cord for a known good one. 4. If the problem persists, contact Extreme Networks for support.

For technical specifications, see STK-RPS-150PS and RPS Shelves Technical Specifications on page 498.

STK-RPS-1005PS Redundant Power Supply

Tip
Extreme Redundant Power Supplies (RPS) do not support the ability for the RPS to be connected to an operational switch. Connecting an RPS to an operational switch can have an adverse effect on the switch. It is best practice that both the switch and the RPS be powered down prior to cabling them together. Once the cabling is completed, turn on the RPS, then turn on the switch.

The STK-RPS-1005PS provides load sharing, backup, or additive PoE power to some Extreme Networks 802.3at PoE-compliant stackable switch models. If the switch loses power from its internal power supply, the STK-RPS-1005PS can provide up to 1005 W maximum operating power (180 W system power and 740 W PoE power) to support switch operation and the 55 VDC necessary to support 55 VDC/data connections to powered devices.

The power supply ships with the following:

- RPS cable
- Four rubber feet (for flat surface installation)

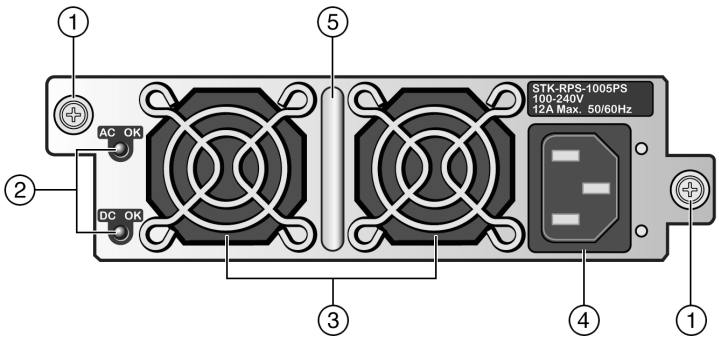


Figure 118: STK-RPS-1005PS Front Panel

1 = Captive screws	4 = AC power input connector
2 = Status LEDs	5 = Handle
3 = Fans	

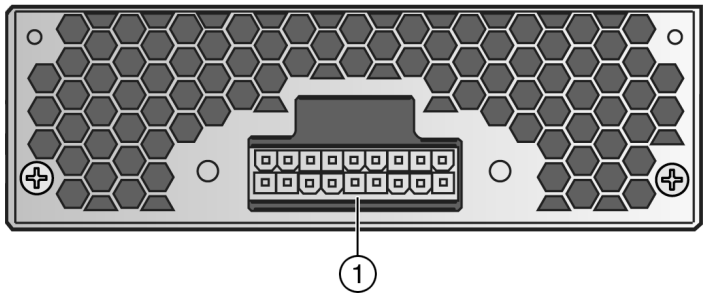


Figure 119: STK-RPS-1005PS Rear Panel

1 = 18-pin Redundant Power Supply connector

Table 45: STK-RPS-1005PS LED Status Definitions

LED	LED Color	Status
AC OK	Green	AC input within operational range
	Off	No AC voltage or AC voltage is outside the operational range
DC OK	Green	Power supply successfully providing 55 VDC to the system
	Off	Power supply malfunctioning

For technical specifications, including pin locations and functions, see STK-RPS-1005PS Redundant Power Supply Technical Specifications on page 500.

VX-RPS-1000 Redundant Power Supply

Tip
Extreme Redundant Power Supplies (RPS) do not support the ability for the RPS to be connected to an operational switch. Connecting an RPS to an operational switch can have an adverse effect on the switch. It is best practice that both the switch and the RPS be powered down prior to cabling them together. Once the cabling is completed, turn on the RPS, then turn on the switch.

The VX-RPS-1000 provides load sharing, backup, or additive power for the V400 Virtual Port Extender.

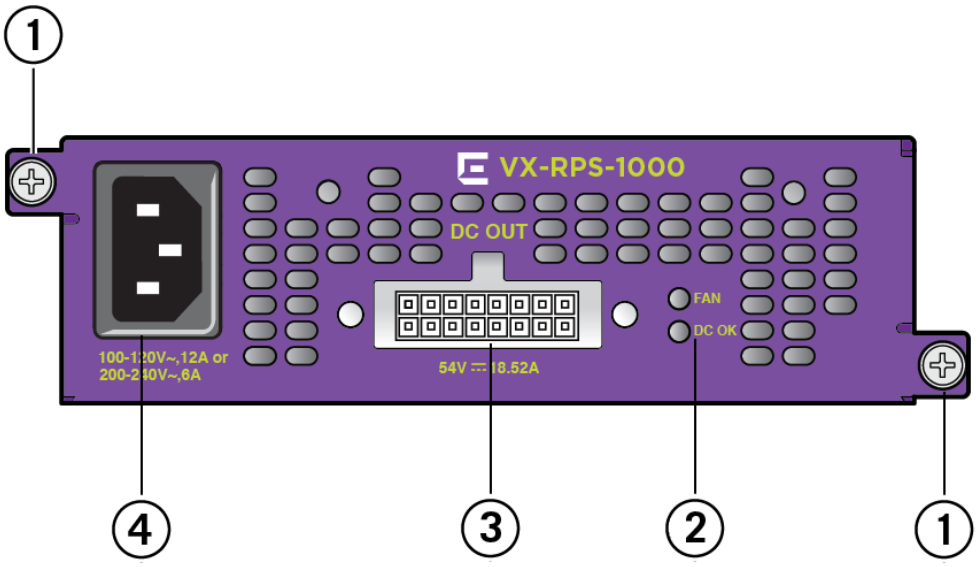


Figure 120: VX-RPS-1000 Front Panel

1 = Captive screws	3 = Connector to port extender
2 = Status LEDs	4 = AC power input connector

Table 46: VX-RPS-1000 LED Status Definitions

LED	LED Color	Status
AC OK	Green	AC input within operational range
	Off	No AC voltage or AC voltage is outside the operational range
DC OK	Green	DC input within operational range
	Off	No DC voltage or DC voltage is outside the operational range

For technical specifications, including pin locations and functions, see VX-RPS-1000 Redundant Power Supply Technical Specifications on page 502.

Replaceable Internal Power Supplies

Several ExtremeSwitching switch models have two bays for installing one or two replaceable AC or DC power supplies.

In a redundant power configuration, both power supplies are fully fault-tolerant and load-sharing. You can remove one power supply without interrupting switch operation.

Specific switch series and models are compatible with different power supply models, as shown in the following table:

Table 47: Replaceable Internal Power Supply Compatibility

Hardware Model	AC Power Supplies: Part No.	DC Power Supplies: Part No.
X450-G2 switch (PoE models)	715 W AC-FB: 10951 1100 W AC-FB: 10941	
X460-G2 switch (non-PoE models)	300 W AC-FB: 10930A 300 W AC-BF: 10943	300 W DC-FB: 10933 300 W DC-BF: 10944
X460-G2 switch (PoE models)	350 W AC-FB: 10953 350 W AC-BF: 10954 715 W AC-FB: 10951 715 W AC-BF: 10952 1100 W AC-FB: 10941 1100 W AC-BF: 10942	
X465 Switch (non-PoE model)	350 W AC-FB: XN-ACPWR-350W-FB and 10953	
X465 Switch (PoE models)	715 W AC-FB: XN-ACPWR-715W-FB and 10951 1100 W AC-FB: XN-ACPWR-1100W-FB and 10941 ExtremeSwitching 2000 W AC Power Supply on page 144 -FB: XN-ACPWR-2000W-FB and XN-ACPWR-2000W-F	
X590 switches (all models)	770 W AC-FB: 10960 770 W AC-BF: 10961	1100 W DC-FB: 10962 1100 W DC-BF: 10963
X620-16t switch X620-16x switch	300 W AC-FB: 10930A 300 W AC-BF: 10943	300 W DC-FB: 10933 300 W DC-BF: 10944
X670-G2 switch	550 W AC-FB: 10925 550 W AC-BF: 10927	550 W DC-FB: 10926 550 W DC-BF: 10928
X690 switches (all models)	770 W AC-FB: 10960 770 W AC-BF: 10961	1100 W DC-FB: 10962 1100 W DC-BF: 10963

Table 47: Replaceable Internal Power Supply Compatibility (continued)

Hardware Model	AC Power Supplies: Part No.	DC Power Supplies: Part No.
X695 switch	750 W AC and DC Power Supplies on page 140 -FB:XN-ACPWR-750W-F 750 W AC and DC Power Supplies on page 140 -FB:XN-ACPWR-750W-R	750 W AC and DC Power Supplies on page 140 -BF:XN-DCPWR-750W-F 750 W AC and DC Power Supplies on page 140 -BF:XN-DCPWR-750W-R
X870 switches (all models)	770 W AC-FB: 10960 770 W AC-BF: 10961	1100 W DC-FB: 10962 1100 W DC-BF: 10963
EPS-C2 RPS	750 W AC: 10931	

Note
AC power input cords are not provided with an AC power supply. You can order an appropriate cord from Extreme Networks or from your local supplier. The power cord must meet the requirements listed in Power Cord Requirements for AC-Powered Switches and AC Power Supplies on page 504.

Summit 300 W AC and DC Power Supplies

The following 300 W power supplies are available:

- Summit 300 W AC power supply: front-to-back airflow (Model 10930A)
- Summit 300 W AC power supply: back-to-front airflow (Model 10943)
- Summit 300 W DC power supply: front-to-back airflow (Model 10933)
- Summit 300 W DC power supply: back-to-front airflow (Model 10944)

These power supplies are compatible with the following switch models:

- X460-G2 switches (non-PoE models)
- X620-16t and X620-16x switches

The Summit 300 W power supplies (AC and DC) have the status LEDs listed in the following table.

Table 48: Summit 300 W Power Supply LED Status Indications

LED Label and Color		Meaning
In OK Green	Out DC OK Green/red bicolor	
Off	Off	No input power
Off	Steady red	No input power; receiving standby output from system.
On	Off	Input good; 12 V output is disabled. Standby output is ON.
On	Steady red	Input good; fault in 12 V output.

Table 48: Summit 300 W Power Supply LED Status Indications (continued)

LED Label and Color		Meaning
In OK Green	Out DC OK Green/red bicolor	
On	Flashing green and red	Input good, 12 V output good. Power supply alert: power supply is likely to fail because of a developing fault, such as abnormal thermal conditions or poor fan performance.
On	Steady green	Input good; DC outputs good.

Summit 350 W AC Power Supplies

Summit 350 W AC power supplies are available in the following models:

- 350 W AC PSU-FB (models XN-ACPWR-350W-FB and 10953)—AC power supply with front-to-back ventilation airflow
- 350 W AC PSU-BF (Model 10954)—AC power supply with back-to-front ventilation airflow

The Summit 350 W AC PSU-FB (models XN-ACPWR-350W-FB and 10953) is compatible with the X465-24S, X465-24XE, and X465-48T switch models that have the same airflow direction as the power supply.

The Summit 350 W AC power supplies have the status LEDs listed in Table 49.

Table 49: Summit 350 W AC Power Supply LED Status Indications

IN_OK (Green)	OUT_OK (Green or Red)	Description
Off	Off	No AC input power connection or low AC voltage
On	Off	AC input good; output disabled
On	(Red) On	AC input good; output fault
On	(Green) On	AC input good; output good

Summit 550 W AC and DC Power Supplies

Summit 550 W power supplies are available in the following models:

- 550 W AC PSU-FB (Part number 10925)—AC power supply with front-to-back ventilation airflow
- 550 W DC PSU-FB (Part number 10926)—DC power supply with front-to-back ventilation airflow
- 550 W AC PSU-BF (Part number 10927)—AC power supply with back-to-front ventilation airflow
- 550 W DC PSU-BF (Part number 10928)—DC power supply with back-to-front ventilation airflow

These power supplies are compatible with the following switch models:

- X670-G2 switches (all models)

The power supply must have the same airflow direction (front-to-back or back-to-front) as the switch with which it is being used. In a redundant power configuration, the airflow direction must be the same for both power supplies, and it must match the airflow direction of the fans in the switch.

The Summit 550 W power supplies (AC and DC) have the status LEDs listed in Table 50.

Table 50: Summit 550 W Power Supply LED Status Indications

Position	Color and State	Meaning
Top Power Good	Steady Green	+3.3VSB ok; 12 V ok; power supply is working properly.
Middle Power Supply Fail	Steady Amber	Fault condition (for example, 3.3VSB OCP/UCP, 12V OCP/UCP, or fan failure).
Bottom AC OK	Steady Green	Power supply is connected to power. If the cord is connected and this LED is off, the power supply is defective.

Summit 715 W AC Power Supplies

Summit 715 W AC power supplies are available in the following models:

- 715 W AC PSU-FB (models XN-ACPWR-715W-FB and 10951)—AC power supply with front-to-back ventilation airflow
- 715 W AC PSU-BF (Model 10952)—AC power supply with back-to-front ventilation airflow

The Summit 715 W AC PSU-FB power supply (models XN-ACPWR-715W-FB and 10951) is compatible with the X450-G2 PoE and X465 PoE (-48P, X465-48W, X465-24MU, X465-24MU-24W, X465-24W, X465i-48W) switch models.

The Summit 715 W AC power supplies have a keyed power inlet (C16) that requires a notched (C15) power cord.

The Summit 715 W AC power supplies have the status LEDs listed in Table 51.

Table 51: Summit 715 W AC Power Supply LED Status Indications

IN_OK (Green)	OUT_OK (Green or Red)	Description
Off	Off	No AC input power connection or low AC voltage.
On	Off	AC input good, 54V output disabled.
On	(Red) On	AC input good, output (54V) fault.
On	(Green) On	AC input good, DC outputs in spec.

Summit 750 W AC Power Supply

The Summit 750 W AC power supply is used in the EPS-C2 external power system (see EPS-C2 Redundant Power System on page 127). Each installed Summit 750 W AC power supply can provide up to 380 watts of PoE power budget.

The Summit 750 W AC power supply has the status LEDs listed in the following table.

Table 52: Summit 750 W AC Power Supply LED Status Indications

Label and Color	State	Meaning
AC OK Green	Off	No AC input
	On	AC input is good.
DC OK Green	Off	Both DC outputs (55 V and 12 V) are bad or not enabled.
	Blinking	One output is enabled and good; the second output is bad or not enabled.
	On	Both the 55 V and 12 V outputs are enabled and good.
ALM Red	Off	No fault condition exists.
	Blinking	Power supply alert: power supply is likely to fail because of a developing fault, such as abnormal thermal conditions or poor fan performance. or One output (55 V or 12 V) is bad.
	On	Both outputs (55 V and 12 V) are bad. Power supply is receiving 3.3 VSB from the system. (AC OK and DC OK are off.) Thermal shutdown, fan failure, or any fault condition when both 55 V and 12 V are turned OFF.

750 W AC and DC Power Supplies

750 W power supplies are available for the ExtremeSwitching X695 switch in the following models:

- 750W AC power supply - front-to-back airflow (part no. XN-ACPWR-750W-F)
- 750W AC power supply - back-to-front airflow (part no. XN-ACPWR-750W-R)
- 750W DC power supply - front-to-back airflow (part no. XN-DCPWR-750W-F)
- 750W DC power supply - back-to-front airflow (part no. XN-DCPWR-750W-R)

Note
AC power input cords are not provided with AC power supplies. You can order an appropriate cord from Extreme Networks or from your local supplier. The power cord must meet the requirements listed in Power Cord Requirements for AC-Powered Switches and AC Power Supplies on page 504.

The power supply must have the same airflow direction (front-to-back or back-to-front) as the switch with which it is being used. In a redundant power configuration, the

airflow direction must be the same for both power supplies, and it must match the airflow direction of the fans in the switch.

For information on installing or replacing an AC or DC power supply, see the following topics:

- Install a 300 W or 750 W Internal AC Power Supply on page 265
- Install a 750 W DC Power Supply on page 255

The following tables describe the meanings of the LEDs on the 750 W AC power supply (part number XN-ACPWR-750W-F or XN-ACPWR-750W-R).

The LEDs are located on the end of the power supply unit, arranged vertically to the left of the terminal block.

Table 53: 750 W AC and DC Power Supplies LED Status Indications

Label and Color	Description	State	Meaning
! Amber	Fault Indicator	On (Solid)	PSU fault
		Off	No PSU fault
DC (Green)	DC output Good	On (solid)	DC output OK
		Off or Blinking	DC output fail
AC (Green)	AC input Good	On	AC input OK
		Off	AC input fail

The following tables describe the meanings of the LEDs on the 750 W DC power supply (part number XN-DCPWR-750W-F or XN-DCPWR-750W-R).

The LEDs are located on the end of the power supply unit, arranged vertically to the left of the terminal block.

Table 54: 750 W DC Power Supply LED Status Indications

Label and Color	Description	State	Meaning
! Amber	Fault Indicator	On (Solid)	PSU fault
		Off	No PSU fault
OUT OK (Green)	DC output Good	On (solid)	DC output OK
		Off or Blinking	DC output fail

Table 54: 750 W DC Power Supply LED Status Indications (continued)

Label and Color	Description	State	Meaning
IN OK (Green)	DC input Good "IN OK"	On	DC input OK
		Off	DC input fail

Summit 770 W AC Power Supplies

Summit 770 W AC power supplies are available in the following models:

- 770 W AC PSU-FB (Model 10960)—AC power supply with front-to-back ventilation airflow
- 770 W AC PSU-BF (Model 10961)—AC power supply with back-to-front ventilation airflow

These power supplies are compatible with X590, X690 and X870 switches that have the same airflow direction as the power supply.

The Summit 770 W AC power supplies employ a single, bi-color LED to indicate power supply status, as seen in Table 55:

Table 55: Summit 770 W AC Power Supply LED Status Indications

LED Indicator Status	DC Power Redundancy Status (Green)	Power Supply Failures and warnings (Amber)
Off	No AC power to all power supplies or PSU is ON but with warning events	PSU is Healthy or No AC power to all power supplies
Flashing (1 Hz)	PSU is OFF but 5VSB is ON	PSU warning events: high temp, high power, high current, slow fan, under input voltage
On	PSU is switched on and is running (Output ON and OK)	PSU critical event causing a shutdown: failure, OCP, OTP, OVP, UVP, Fan Fail

Summit 1100 W AC Power Supplies

Summit 1100 W AC power supplies are available in the following models:

- 1100 W AC PSU-FB (models XN-ACPWR-1100W-FB and 10941)—power supply with front-to-back ventilation airflow
- 1100 W AC PSU-BF (Model 10942)—power supply with back-to-front ventilation airflow

Both power supplies are compatible with X460-G2 PoE switch models that have the same airflow direction as the power supply.

The Summit 1100 W AC PSU-FB power supply (models XN-ACPWR-1100W-FB and 10941) is compatible with the X450-G2 PoE and X465 PoE (-48P, X465-48W, X465-24MU, X465-24MU-24W, X465-24W, X465i-48W) switch models.

The Summit 1100 W AC power supplies have a keyed power inlet (C16) that requires a notched (C15) power cord.

The Summit 1100 W AC power supplies have the status LEDs listed in Table 56.

Table 56: Summit 1100 W AC Power Supply LED Status Indications

IN_OK (Green)	OUT_OK (Green or Red)	Description
Off	Off	No AC input power connection or low AC voltage.
On	Off	AC input good, 54V output disabled.
On	(Red) On	AC input good, output (54V) fault.
On	(Green) On	AC input good, DC outputs in spec.

Summit 1100 W DC Power Supplies

Summit 1100 W DC power supplies are available in the following models:

- 1100 W DC PSU-FB (Model 10962)—DC power supply with front-to-back ventilation airflow
- 1100 W DC PSU-BF (Model 10963)—DC power supply with back-to-front ventilation airflow

These power supplies are compatible with X690 and X870 switches that have the same airflow direction as the power supply.

The Summit 1100 W power supplies have the status LEDs listed in Table 57.

Table 57: Summit 1100 W DC Power Supply LED Status Indications

IN_OK (Green)	OUT_OK (Green or Red)	Description
Off	Off	No DC input power connection or low DC voltage
On	Off	DC input good; output disabled
On	(Red) On	DC input good; output fault
On	(Green) On	DC input good; output good

ExtremeSwitching 2000 W AC Power Supply

The ExtremeSwtiching 2000 W AC power supply is available in models XN-ACPWR-2000W-FB and XN-ACPWR-2000W-F with front-to-back ventilation airflow:

Note

In order to obtain 2000W output from this power supply, the PSU must be connected to a 200-240VAC source.

This power supply is compatible with all X465 PoE (X465-48P, X465-48W, X465-24MU, X465-24MU-24W, X465-24W, X465i-48W) switch models that have the same airflow direction as the power supply.

The ExtremeSwitching 2000 W AC power supply has a keyed power inlet (C16) that requires a notched (C15) power cord.

The ExtremeSwitching 2000 W AC power supply has the status LEDs listed in

Table 58: ExtremeSwitching 2000 W AC Power Supply LED Status Indications

IN_OK (Green)	OUT_OK (Green or Red)	Description
Off	Off	No AC input power connection or low AC voltage.
On	Off	AC input good, 54V output disabled.
On	(Red) On	AC input good, output (54V) fault.
On	(Green) On	AC input good, DC outputs in spec.

Displaying the Status of Installed Power Supplies

Using the `show power` command, you can view detailed information about the power supplies your switch is using. This status information may be useful for your technical support representative if you have a network problem.

The switch collects the following power supply information:

- The current state of the power supply (powered off or powered on).
- Whether the unit is an internal or external power supply.
- Power input, output, and usage statistics.
- Airflow direction (for internal power supplies).
- Additional details for switches in stacked configurations.

For more information, see the *ExtremeXOS 30.7 Command Reference Guide*.

Expansion Modules

Several different hardware accessories are available for expanding the capabilities of your Extreme Networks switch. Collectively, they are referred to as *expansion modules*.

- The LRM/MACsec Adapter offers:
  - Increased flexibility by supporting 10Gb Long Reach Multimode (LRM) connections. The adapter plugs into SFP+ ports that do not support LRM, effectively turning them into LRM-capable ports.
  - Improved security through MACsec link encryption for connections leaving a building or campus.
- Port option cards and versatile interface modules (VIMs) are installed in dedicated slots at the back of the switch to provide optional I/O ports or stacking ports. These optional items add 10-Gbps copper or fiber I/O ports to the back panel of compatible switches. If no card or module is installed, the option slot is covered by a blank panel.
- Solid-state Drives (SSDs) provide modular storage support.
- The TM-CLK Clock Module is required for Synchronous Ethernet (SyncE) processing on the X460-G2 switch.

For information about option cards, VIMs, and stacking modules that work with other Extreme Networks switches, refer to *ExtremeSwitching and Summit Switches: Hardware Installation Guide for Switches Using ExtremeXOS 16 or Earlier*.

The following table lists the types of expansion modules and the switch series with which they are compatible.

Table 59: Compatibility of Expansion Modules

Module Type	Name	No. of Ports	Type of Ports	Compatible Switch Series
Bridge Port Extender	V300 Virtual Port Extender	up to 8	8 10/100/1000BASE-T ports and: • 2 1000BASE-T 802.3bt Type 4 uplink ports for PoE model • 2 10Gb SFP+ uplink ports for non-PoE models	X465 (PoE model) X465, X590, X670-G2, X690 (non-PoE models)
Bridge Port Extender	V400 Virtual Port Extender	up to 48	48 10/100/1000BASE-T ports and: • 2 10Gb SFP+ uplink ports for V400-24 port models • 4 10Gb SFP+ uplink ports for V400-48 port models	X465 X590 X670-G2 X690
LRM/MACsec Adapter	LRM MACsec Adapter	2	SFP+ ports	Refer to Table 61 on page 156
VIM2	VIM-2q	2	40 gigabit QSFP+ optical ports	X460-G2
	VIM-2ss	2	high-performance SummitStack ports	X460-G2
	VIM-2t	2	10-gigabit copper BASE-T ports	X460-G2
	VIM-2x	2	10-gigabit SFP+ optical ports	X460-G2
Clock	TM-CLK Clock Module	NA	Reference frequency for SyncE and 1588v2 precision time features	X460-G2
SSD	XN-SSD-001-120	1	Modular 120GB SSD	X465

Table 59: Compatibility of Expansion Modules (continued)

Module Type	Name	No. of Ports	Type of Ports	Compatible Switch Series
VIM5	VIM5-2Q	2	40GbE QSFP optical ports	X465
	VIM5-2Y	2	25GbE SFP28 optical ports	X465
	VIM5-4X	4	10GbE SFP+ optical ports	X465
	VIM5-4XE	4	10GbE SFP+ LRM MACsec capable optical ports	X465
	VIM5-4Y	4	25GbE SFP28 optical ports	X465
	VIM5-4YE	4	25GbE SFP28 LRM MACsec capable optical ports	X465
	SSD module	1	Modular 120GB SSD	X465

V300 Virtual Port Extender

Bridge port extenders (BPEs) are devices that do not fully process packets, nor make forwarding or filtering decisions. Instead, they simply receive packets from extended ports and forward packets toward the upstream controlling bridge (an ExtremeXOS-based switch) for L2/L3 processing. This scheme, based on the IEEE 802.1BR specification, is known as extended edge switching.

The V300 Virtual Port Extender offers the following models:

- V300-8P-2X Model on page 148
- V300-8T-2X Model on page 148
- V300-8P-2T-W Model on page 149
- V300HT-8P-2X Model on page 150
- V300HT-8T-2X Model on page 151

In general, the V300 Virtual Port Extender offers the following features:

- Eight 10/100/1000BASE-T half/full duplex ports or 10/100/1000BASE-T half/full duplex PoE+ ports
- Two 10Gb SFP+ uplinks
- PoE+ power on some models
- Fixed internal power-supply (non-PoE models), fanless

With the exception of the V300-8P-2T-W model, the V300 Virtual Port Extender requires that ExtremeXOS (EXOS) version 30.5 (or later) be installed on the switch to which it is attached. For more information about configuring EXOS for use with this equipment, see the *ExtremeXOS 30.7 User Guide*.

V300-8P-2X Model

The Virtual Port Extender V300-8P-2X model offers the following features:

- Eight 10/100/1000BASE-T half/full duplex PoE+ ports
- Two 10Gb SFP+ ports
- One USB port
- One console/management port
- One DC input port

The V300-8P-2X model requires that ExtremeXOS (EXOS) version 30.6 (or later) be installed on the switch to which it is attached. For more information about configuring EXOS for use with this equipment, see the *ExtremeXOS 30.7 User Guide*.

The V300-8P-2X model is shipped with one 40W AC PS FRU (Model XN-ACPWR-280W).

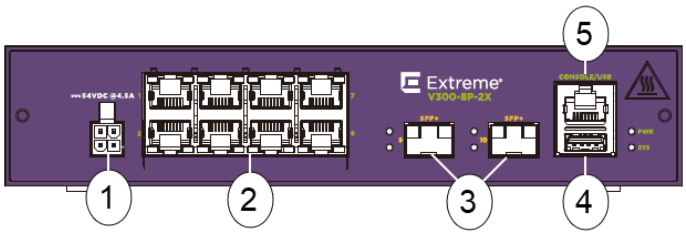


Figure 121: V300-8P-2X Front Panel

1 = DC input	2 = 10/100/1000BASE-T PoE+ ports
3 = 10Gb SFP+ ports	4 = USB port
5 = Console/Management port	

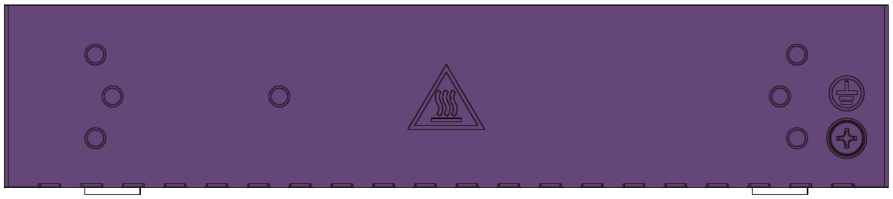


Figure 122: V300 Virtual Port Extender Rear Panel

V300-8T-2X Model

The Virtual Port Extender V300-8T-2X model offers the following features:

- Eight 10/100/1000BASE-T half/full duplex ports
- Two 10Gb SFP+ ports
- One USB port
- One console/management port
- One DC input jack

The V300-8T-2X model requires that ExtremeXOS (EXOS) version 30.6 (or later) be installed on the switch to which it is attached. For more information about configuring EXOS for use with this equipment, see the *ExtremeXOS 30.7 User Guide*.

The V300-8T-2X model is shipped with one 40W AC PS FRU (Model XN-ACPWR-40W).

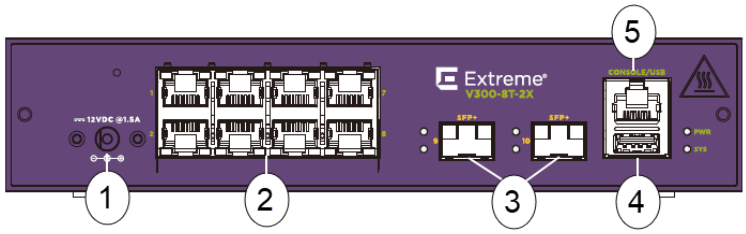


Figure 123: V300-8T-2X Front Panel

1 = DC input	2 = 10/100/1000BASE-T ports
3 = 10Gb SFP+ ports	4 = USB port
5 = Console/Management port	

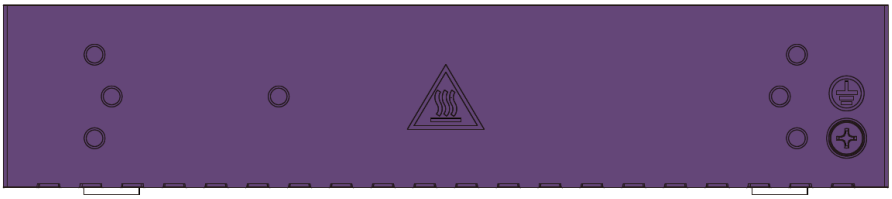


Figure 124: V300 Virtual Port Extender Rear Panel

V300-8P-2T-W Model

The Virtual Port Extender V300-8P-2T-W model offers the following features:

- 8 10/100/1000BASE-T half duplex PoE+ ports
- 2 1000/BASE-T 802.3bt Type 4 ports
- PoE power
- Fanless

The V300-8P-2T-W model requires that ExtremeXOS (EXOS) version 30.2.2 (or later) be installed on the switch to which it is attached. For more information about configuring EXOS for use with this equipment, see the *ExtremeXOS 30.7 User Guide*.

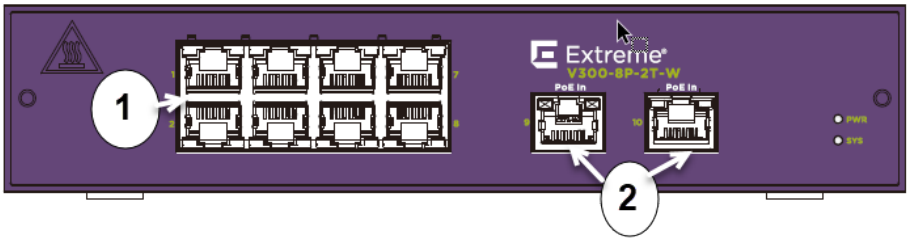


Figure 125: V300-8P-2T-W Front Panel

1 = 10/100/1000BASE-T PoE ports	2 = 1000/BASE-T 802.3bt PD up-link

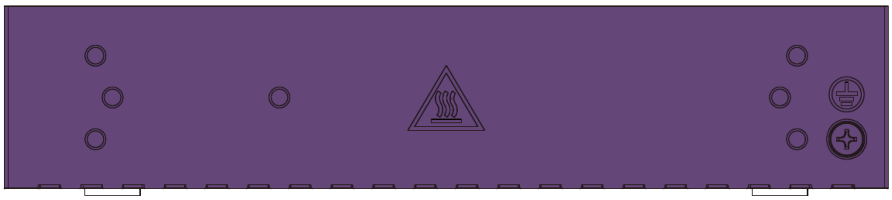


Figure 126: V300-8P-2T-W Rear Panel

V300HT-8P-2X Model

The Virtual Port Extender V300HT-8P-2X model is a high-temperature model that offers the following features:

- Eight 10/100/1000BASE-T half/full duplex PoE+ ports
- Two 10Gb SFP+ ports
- One USB port
- One console/management port
- Two DC input ports

The V300HT-8P-2X model requires that ExtremeXOS (EXOS) version 30.5 (or later) be installed on the switch to which it is attached. For more information about configuring EXOS for use with this equipment, see the *ExtremeXOS 30.7 User Guide*.

The V300HT-8P-2X model is compatibile with the following power supplies: 40W AC PS FRU (Model XN-ACPWR-40W).

- Model XN-ACPWR-320W-HT - a 320W AC power supply high temperature
- Model 16807 - an IS AC-DC power supply with 240W output and DIN rail compatible

Important
The high temperature power supplies for the V300HT models require field wiring. Power supplies must be installed in accordance with local electrical codes by a licensed electrician.

Note
Power supplies for this model are sold separately.

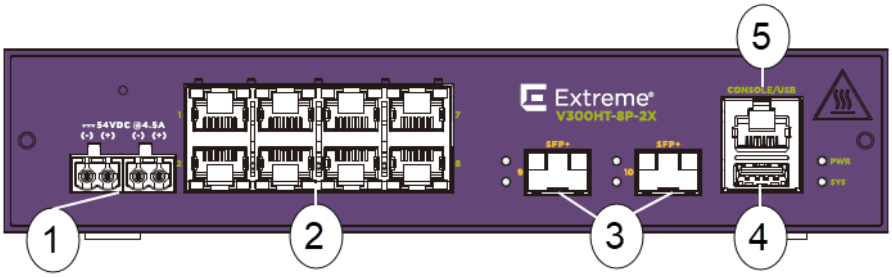


Figure 127: V300HT-8P-2X Front Panel

1 = DC inputs	2 = 10/100/1000BASE-T PoE+ ports

3 = 10Gb SFP+ ports	4 = USB port
5 = Console/Management port	

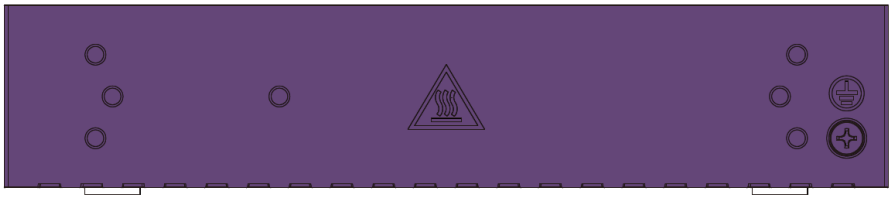


Figure 128: V300 Virtual Port Extender Rear Panel

V300HT-8T-2X Model

The Virtual Port Extender V300HT-8T-2X model is a high-temperature model that offers the following features:

- Eight 10/100/1000BASE-T half/full duplex ports
- Two 10Gb SFP+ ports
- One USB port
- One console/management port
- Two DC input ports

The V300HT-8T-2X model requires that ExtremeXOS (EXOS) version 30.6 (or later) be installed on the switch to which it is attached. For more information about configuring EXOS for use with this equipment, see the *ExtremeXOS 30.7 User Guide*.

The V300HT-8T-2X model is compatibile with the following power supplies:

- Model XN-ACPWR-40W-HT - a 40W AC power supply high temperature
- Model XN-ACPWR-60W-HT-DIN - a 60W AC power supply high temperature DIN rail compatible

Important
The high temperature power supplies for the V300HT models require field wiring. Power supplies must be installed in accordance with local electrical codes by a licensed electrician.

Note
Power supplies for this model are sold separately.

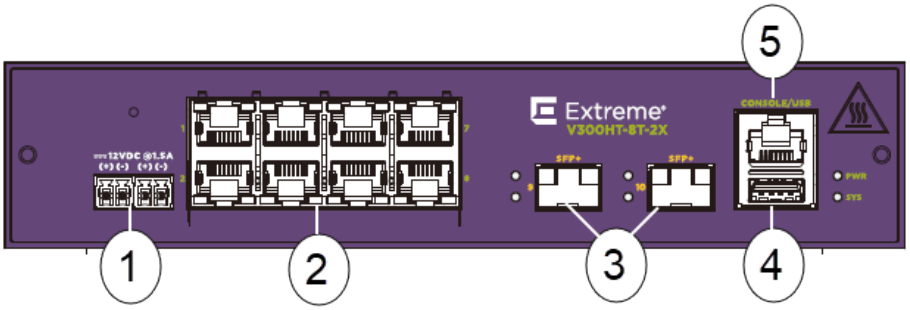


Figure 129: V300HT-8T-2X Front Panel

1 = DC inputs	2 = 10/100/1000BASE-T ports
3 = 10Gb SFP+ ports	4 = USB port
5 = Console/Management port	

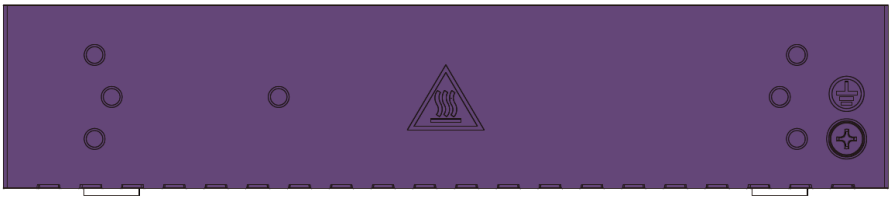


Figure 130: V300 Virtual Port Extender Rear Panel

V300 Virtual Port Extender LEDs

The V300 Virtual Port Extender front panel LEDs observe the following behavior:

Table 60: V300 Virtual Port Extender LEDs

Location	LED Indicative	Color	Status	Description
LED Per device	PWR LED (Top)	Green	Off	Power off
			Solid	Power on
		Amber	Solid	External PSU 2 fail (For non-PD model)
			Flash	External PSU 1 fail (For non-PD model)
	System LED (Bottom)	Green	Off	System off
			Solid	System on and ready
			Flash	Booting
		Amber	Flash	Fail (Controlled by MPP)

Table 60: V300 Virtual Port Extender LEDs (continued)

Location	LED Indicative	Color	Status	Description
LED Per RJ45 Port 1-8 (PSE)	Link/Act (left)	Green	Off	No Link
			Solid	Link is established
			Flash	Link activity
	PoE (right)	Amber	Off	No PD detected
			Solid	PD is detected
LED Per RJ45 Port 9-10 (PD)	Link/Act (left)	Green	Off	No link
			Solid	Link is established
			Flash	Link activity
	PoE (right) PoE model	Amber	Off	No PSE power is provided
			Solid	PSE power is supplied

V400 Virtual Port Extender

Bridge port extenders (BPEs) are devices that do not fully process packets, nor make forwarding or filtering decisions. Instead, they simply receive packets from extended ports and forward packets toward the upstream controlling bridge (an ExtremeXOS-based switch) for L2/L3 processing. This scheme, based on the IEEE 802.1BR specification, is known as extended edge switching.

The V400 Virtual Port Extender offers the following features:

- 24 or 48 10/100/1000 Base-T ports that provide 10 Gbps copper connectivity.
- Two or four 1000/10G Base-X SFP+ ports that provide 10 Gbps high-density fiber connectivity.
- Serial console port.
- Front panel USB port.
- PoE+ power on some models.
- Fixed internal power-supply and fan modules.

All models include either two or four SFP+ ports on the faceplate of each base unit, which can be provisioned either as uplink or cascade ports. This gives administrators the option to create redundant links or downstream cascade ports to other V400 units. The SFP+ ports are the only ones that can be used as uplink ports in a cascading configuration.

The V400 Virtual Port Extender requires that ExtremeXOS (EXOS) version 22.5 (or later) be installed on the switch to which it is attached. For more information about configuring EXOS for use with this equipment, see the *ExtremeXOS 30.7 User Guide*.

Optionally, you can use the VX-RPS-1000 redundant power supply to provide backup or additive power for the V400 Virtual Port Extender. For more information, see VX-RPS-1000 Redundant Power Supply on page 135.

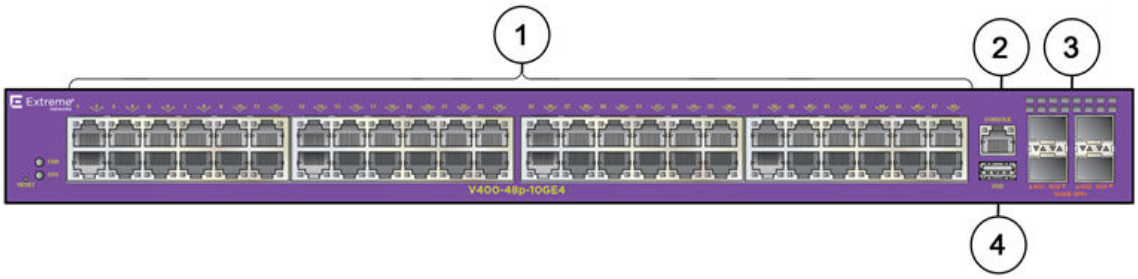


Figure 131: V400 Virtual Port Extender Front Panel (48-port Model Shown)

1 = 10/100/1000BASE-T ports	3 = 10Gb SFP+ ports
2 = Console/management port	4 = USB port

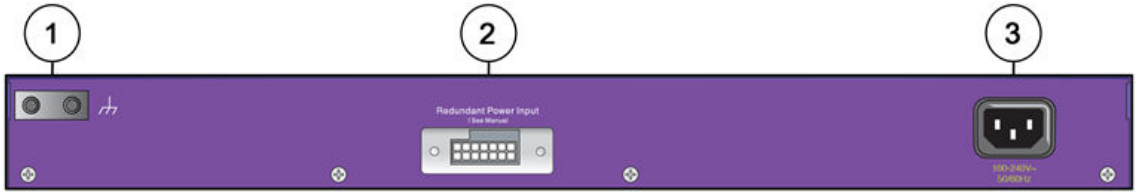


Figure 132: V400 Virtual Port Extender Rear Panel

1 = Grounding lug	3 = AC power input connector
2 = RPS connector (some models	

LRM/MACsec Adapter

The LRM/MACsec Adapter offers:

- Support for 10Gb Long Reach Multimode (LRM) connections. The adapter plugs into SFP+ ports that do not support LRM, effectively turning them into LRM-capable ports.
- Improved security through MACsec link encryption for connections leaving a building or campus.

Deploy the LRM/MACsec Adapter by connecting both ports – using a dedicated SFP cable called the *host cable* – to SFP or SFP+ ports on a switch that does not natively support LRM and MACsec connections. The switch is referred to as the *host switch*.

Caution
Connect the adapter to the host switch using only the host cable that is provided for this purpose. The use of other cables can damage the equipment.

The LRM/MACsec Adapter can be physically mounted on a standard equipment rack. You can also purchase a bracket that attaches to the rack and holds up to five adapters together. For installation instructions, see Installing an LRM/MACsec Adapter on page 332.

The LRM/MACsec Adapter receives power through its connection to the host switch's SFP port. Auxiliary power is supplied through a USB (micro-B) cable that connects the adapter to a power source that is capable of providing at least 0.5A of current. The

auxiliary power cable is required for MACsec connections. It is optional for LRM-only connections.

To use the LRM/MACsec Adapter, you must have ExtremeXOS (EXOS) version 30.1 installed on the host switch to which the adapter is attached. An ExtremeXOS feature pack license is required if you use the adapter to provide MACsec support.

Note
LRM/MACsec Adapter initialization may take extended time - about 40-85 seconds per adapter plus 15-35 seconds per transceiver, depending on the platform type used with the adapter.

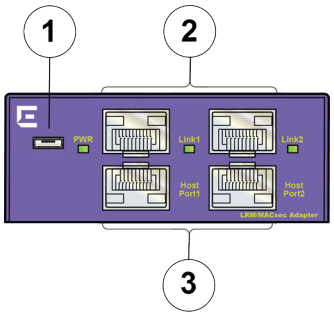


Figure 133: LRM/MACsec Adapter: Front Panel

1 = Auxiliary power connector	3 = SFP+ ports (connect to the host switch)
2 = SFP+ ports (connect to the network)	

Maximum Capacity for Using the LRM/MACsec Adapter with Supported Switch Models

The following table details the maximum number of LRM/MACsec Adapters you can use with each supported host switch model. The maximum number varies according to:

- Whether you are running in LRM mode only, or in LRM plus MACsec mode.

- Whether you are using an auxiliary power (USB) cable to draw additional power beyond what is provided by the host switch.

Note

- The figures listed assume that, in every case, both adapter ports are connected to the host switch. The adapter will not operate properly if only one port is connected to the host switch.
- Unless noted otherwise, all switch models listed have SFP+ ports that can be configured for 10Gb. For some X440-G2 models, a license upgrade is required for 10 Gb functionality.
- For X460-G2 switches, connecting the LRM/MACsec Adapter to SFP+ ports on the VIM-2x module is not supported.

Table 61: Maximum Number of LRM/MACsec Adapters, by Switch Model and Connection Type

Switch Model	Mode: LRM Only		Mode: LRM and MACsec	
	Two ports no aux. power	Two ports 0.5A aux. power	Two ports aux. power (see note 1)	One port One bypass aux. power (see note 1)
X440-G2-12t X440-G2-12p Four 10Gb SFP+ ports (see note 2)	1	2	1	2
X440-G2-24t-GE4 Four 1Gb SFP ports	NA	NA	1	2
X440-G2-24t X440-G2-24p Four1Gb SFP ports Four10Gb SFP+ ports (see note 2)	2	2	3	3
X440-G2-24x 24 1Gb SFP ports Four10Gb SFP+ ports (see note 2)	2	2	9	10
X440-G2-48t X440-G2-48p Four1Gb SFP ports Four10Gb SFP+ ports (see note 2)	2	2	3	3

Table 61: Maximum Number of LRM/MACsec Adapters, by Switch Model and Connection Type (continued)

Switch Model	Mode: LRM Only		Mode: LRM and MACsec	
	Two ports no aux. power	Two ports 0.5A aux. power	Two ports aux. power (see note 1)	One port One bypass aux. power (see note 1)
X450-G2-24t X450-G2-24p Four10Gb SFP+ ports	Already LRM		2	2
X450-G2-48t X450-G2-48p Four10Gb SFP+ ports	Already LRM		2	2
X460-G2-24t Eight1Gb SFP ports Four10Gb SFP+ ports	2	2	5	6
X460-G2-24p Eight1Gb SFP ports Four10Gb SFP+ ports	2	2	6	6
X460-G2-24x 24 1Gb SFP ports Four10Gb SFP+ ports	2	2	10	12
X460-G2-48t Four10Gb SFP+ ports	2	2	2	2
X460-G2-48p Four10Gb SFP+ ports	2	2	2	2
X460-G2-48x 48 1Gb SFP ports Four10Gb SFP+ ports	2	2	17	20
X590-24x 24 10Gb SFP+ ports	9	12	11	12
X620-8t-2x Two 10Gb SFP+ ports	1	1	1	1
X620-10x 10 10Gb SFP+ ports	2	4	3	4

Table 61: Maximum Number of LRM/MACsec Adapters, by Switch Model and Connection Type (continued)

Switch Model	Mode: LRM Only		Mode: LRM and MACsec	
	Two ports no aux. power	Two ports 0.5A aux. power	Two ports aux. power (see note 1)	One port One bypass aux. power (see note 1)
X620-16t X620-16p Four10Gb SFP+ ports	Already LRM		2	2
X620-16x 16 10Gb SFP+ ports	4	7	5	6
X670-G2-48x 48 10Gb SFP+ ports	14	24	18	20
X670-G2-72x 72 10Gb SFP+ ports	21	34	26	29
X690-48x 48 10Gb SFP+ ports	16	24	20	23
X695-48Y 48 10Gbp SFP28 ports	16	24	20	23

Notes:

1. With 1W optics modules (SR, LR, LRM, 10 km bidirectional, AOC, DAC, and most 1 Gb optics), use 0.5A auxiliary power sources.

   With 1.5W optics modules (ZR, ER, 40 km bidirectional, DWDM ZR, 1 Gb - 120km bidirectional), use 1.0A auxiliary power sources. Refer also to temperature limitations in Limitations for Some Optical Devices on page 158.
2. This model requires a license upgrade for 10 Gb functionality on the SFP+ ports.

Limitations for Some Optical Devices

Temperature Limitations

In most circumstances, the LRM/MACsec Adapter can operate at temperatures up to 45°C (113°F). However, the maximum operating temperature is 40°C (104°F) when the adapter is used with any of the following optical transceivers:

- 10Gb ER SMF (part no. 10309)
- 10Gb ZR SMF (part no. 10310)
- 10Gb Tunable DWDM ZR (part no. 10325)
- 1000BASE-BX-U bidirectional SFP 120 km (part no. MGBIC-BX120-U)
- 1000BASE-BX-D bidirectional SFP 120 km (part no. MGBIC-BX120-D)

You can find a complete listing of cables and optical transceivers that are compatible with the LRM/MACsec Adapter in the *Extreme Hardware/Software Compatibility and Recommendation Matrices*.

Power Limitations

When the host switch is an X590 or X690, and when both ports on the LRM/MACsec Adapter are used with the optical transceivers listed in Temperature Limitations, ensure that you are using the USB (micro-B) cable to supply auxiliary power. The host switch, by itself, will not provide sufficient power for the transceivers.

LRM/MACsec Adapter LEDs

The LEDs on the front panel of the LRM/MACsec Adapter have the following meanings:

Table 62: LRM/MACsec Adapter LEDs

LED	Meaning
PWR	Green: Normal operation. The adapter is receiving power, either from the host switch or through the USB connector. Amber: The adapter is receiving insufficient power. Off: The adapter is not receiving power.
Link1	Steady green: The Link1 connection – from the host switch, through the adapter, to the network – is ready. Blinking green: Link1 is active. Off: Link1 is not ready.
Link2	Steady green: The Link2 connection – from the host switch, through the adapter, to the network – is ready. Blinking green: Link2 is active. Off: Link2 is not ready.

Versatile Interface Modules for ExtremeSwitching X465 Series Switches

You can install a VIM5 versatile interface module in a dedicated slot in the front panel of the ExtremeSwitching X465 series switch to provide a dedicated high speed port. The front panel of every X465 switch proves one slot to install the following:

- VIM5-2Q versatile interface module that provides two 40-GbE (QSFP) ports.
- VIM5-2Y versatile interface module that provides two 25-GbE (SFP28) ports.
- VIM5-4X versatile interface module that provides four 10-GbE (SFP+) ports.
- VIM5-4XE versatile interface module that provides four 10-GbE (SFP+) ports, LRM/MACsec capable.
- VIM5-4Y versatile interface modulethat provides four 25-GbE (SFP28) ports.
- VIM5-4YE versatile interface module that provides four 25-GbE (SFP28) MACsec capable ports.

For 48-port models, the VIM5 ports are 49-56. For 24-port models, the VIM5 ports are 25-32.

VIM5s are ordered separately. Each VIM5's label can be found on the bottom side of the device, as seen in the following figure:

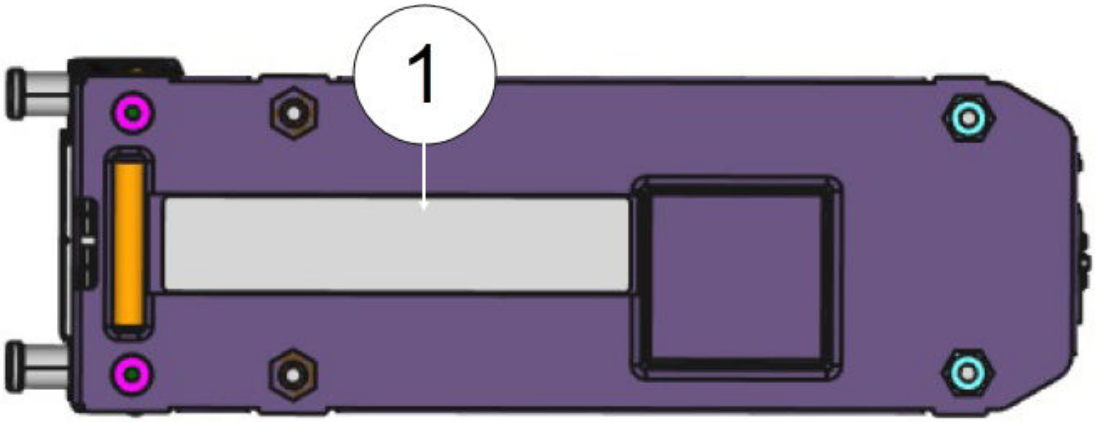


Figure 134: VIM5 Label

1 = VIM5 label

VIM5-2Q Versatile Interface Module

The VIM5-2Q versatile interface module provides two 40-GbE (QSFP) ports.

Note

For the VIM5-2Q versatile interface module, only the first 40-GbE (QSFP) port is supported on the X465-48T/48P/48W, X465i-48W, and X465-24W/24S models. Both 40-GbE (QSFP) ports are supported on the X465-24MU-24W and X465-24MU/24XE models.

For information about the supported optical modules, refer to the most recent version of the *Extreme Hardware/Software Compatibility and Recommendation Matrices*.

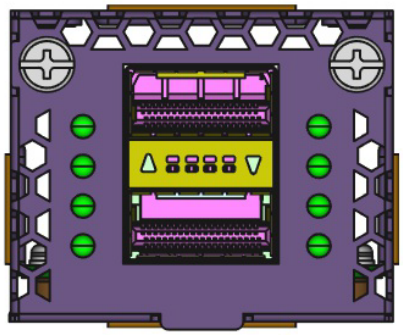


Figure 135: VIM5-2Q Versatile Interface Module

Table 63: Port Numbers for Ports on the VIM5-2Q Module

ExtremeSwitching X465 Port Number for 24-port Models	ExtremeSwitching X465 Port Number for 48-port Models
25, 29 in 1x40 mode 25-28, 29-32 in 4x10 mode	49, 53 in 1x40 mode 49-52, 53-56 in 4x10 mode

VIM5-2Y Versatile Interface Module

The VIM5-2Y versatile interface module provides two 25-GbE (SFP28) ports.

The VIM5-2Y can be configured to provide two 10GbE ports using the port partitioning CLI. For details about the `configure ports partition` command, see the *ExtremeXOS 30.7 Command Reference Guide*.

For information about the supported optical modules, refer to the most recent version of the *Extreme Hardware/Software Compatibility and Recommendation Matrices*.

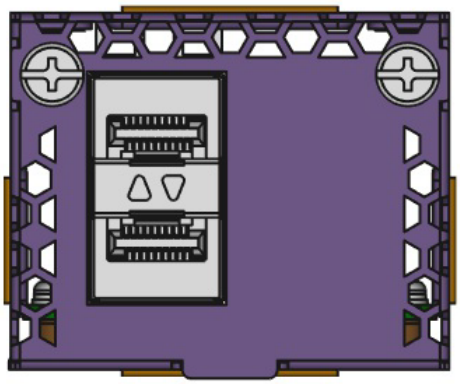


Figure 136: VIM5-2Y Versatile Interface Module

Table 64: Port Numbers for Ports on the VIM5-2Y Module

ExtremeSwitching X465 Port Number for 24-port Models	ExtremeSwitching X465 Port Number for 48-port Models
25, 26	49, 50

VIM5-4X Versatile Interface Module

The VIM5-4X versatile interface module provides four 10-GbE (SFP+) ports.

For information about the supported optical modules, refer to the most recent version of the *Extreme Hardware/Software Compatibility and Recommendation Matrices*.

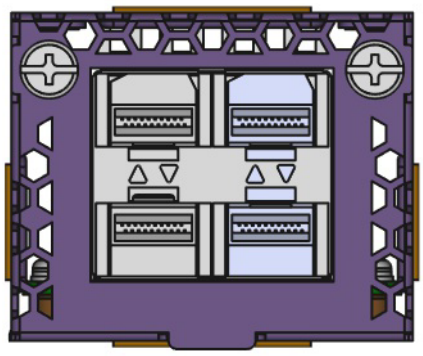


Figure 137: VIM5-4X Versatile Interface Module

Table 65: Port Numbers for Ports on the VIM5-4X Module

ExtremeSwitching X465 Port Number for 24-port Models	ExtremeSwitching X465 Port Number for 48-port Models
25-28	49-52

VIM5-4XE Versatile Interface Module

The VIM5-4XE versatile interface module provides four 10-GbE (SFP+) ports, LRM/MACsec capable.

For information about the supported optical modules, refer to the most recent version of the *Extreme Hardware/Software Compatibility and Recommendation Matrices*.

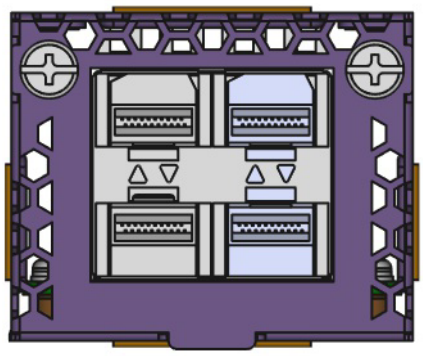


Figure 138: VIM5-4XE Versatile Interface Module

Table 66: Port Numbers for Ports on the VIM5-4XE Module

ExtremeSwitching X465 Port Number for 24-port Models	ExtremeSwitching X465 Port Number for 48-port Models
25-28	49-52

VIM5-4Y Versatile Interface Module

The VIM5-4Y versatile interface module provides four 25-GbE (SFP28) ports.

Note

For the VIM5-4Y versatile interface module, only the first two 25-GbE (SFP28) ports are supported on the X465-48T/48P/48W, X465i-48W, and X465-24W/24S models. All four 25-GbE (SFP28) ports are supported on the X465-24MU-24W and X465-24MU/24XE models.

The VIM5-4Y can be configured to provide four 10GbE ports using the port partitioning CLI. For details about the `configure ports partition` command, see the *ExtremeXOS 30.7 Command Reference Guide*.

For information about the supported optical modules, refer to the most recent version of the *Extreme Hardware/Software Compatibility and Recommendation Matrices*.

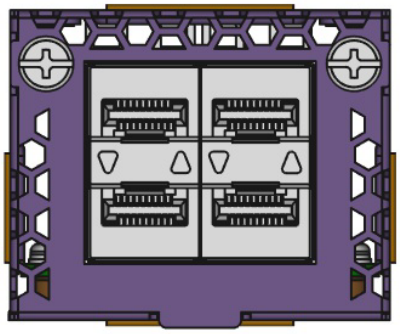


Figure 139: VIM5-4Y Versatile Interface Module

Table 67: Port Numbers for Ports on the VIM5-4Y Module

ExtremeSwitching X465 Port Number for 24-port Models	ExtremeSwitching X465 Port Number for 48-port Models
25-28	49-52

VIM5-4YE Versatile Interface Module

The VIM5-4YE versatile interface module provides four 25-GbE (SFP28) LRM/MACsec capable ports.

Note

For the VIM5-4YE versatile interface module, only the first two 25-GbE (SFP28) ports are supported on the X465-48T/48P/48W, X465i-48W, and X465-24W/24S models. All four 25-GbE (SFP28) ports are supported on the X465-24MU-24W and X465-24MU/24XE models.

The VIM5-4YE can be configured to provide four 10GbE ports using the port partitioning CLI. For details about the `configure ports partition` command, see the *ExtremeXOS 30.7 Command Reference Guide*.

For information about the supported optical modules, refer to the most recent version of the *Extreme Hardware/Software Compatibility and Recommendation Matrices*.

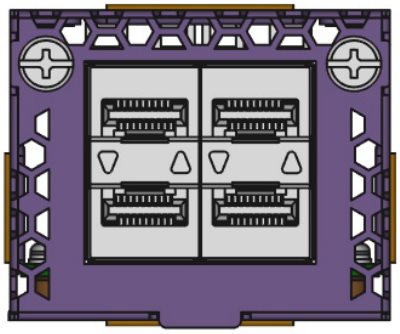


Figure 140: VIM5-4YE Versatile Interface Module

Table 68: Port Numbers for Ports on the VIM5-4YE Module

ExtremeSwitching X465 Port Number for 24-port Models	ExtremeSwitching X465 Port Number for 48-port Models
25-28	49-52

Solid-state Drives

Solid-state drives (SSD) provide modular storage support. X465 Series switches accommodate one SSD module using a reserved slot on the rear of the switch, which is supported on EXOS release 30.3 and later.

The following SSD module is available for X465 switches:

Table 69: Available SSD Module

SSD Module	Description	Compatible Switch Models
XN-SSD-001-120	Modular 120GB SSD	X465-24MU X465-24MU-24W

Optional Ports for X460-G2 Switches

The rear panel of every X460-G2 switch provides slots to install the following:

- VIM-2q Ethernet Module with 2x40G ports
- VIM-2ss SummitStack Module with stacking ports
- VIM-2t Ethernet Module with 2x10GBASE-T ports

- VIM-2x Ethernet Module with 2x10GSFP+ ports
- TM-CLK Clock Module to support SyncE and 1588

Note
Optional VIM and clock modules for the X460-G2 series switches are not compatible with X460 series switches.

Caution
The switch must be powered off before you install any interface module options (VIMs or clock modules). The interface module options are not hot swappable.

VIM-2q Port Option Card

The VIM-2q Ethernet Module option card allows you to add one or two 40 gigabit QSFP+ optical ports to the VIM (Versatile Interface Module) slot on the rear panel of an X460-G2 series switch. The VIM-2q option card supports QSFP+ optical modules.

The ports on the VIM-2q option card can be configured as high speed stacking ports in a SummitStack configuration with a stack link speed of 40G. For more information about stacking ExtremeSwitching switches, see Building Stacks on page 189.

Note
40G ports on the VIM-2q cannot be partitioned into four 10G ports.

Caution
VIM modules are not hot swappable. You must power down the switch before installing any VIM modules.

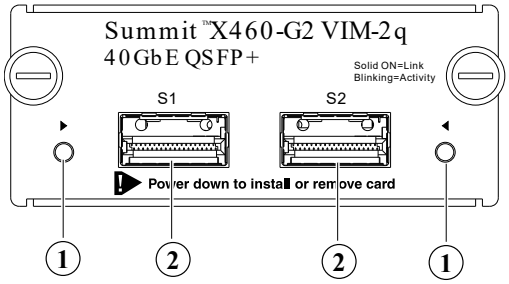


Figure 141: VIM-2q Port Option Card

1 = LEDs	2 = QSFP+ Ports

For current information about compatible QSFP+ modules and the minimum required software, refer to the most recent version of the *Extreme Hardware/Software Compatibility and Recommendation Matrices*.

For more information about QSFP+ modules, refer to the *Extreme Networks Pluggable Transceivers Installation Guide*.

VIM-2ss Port Option Card

X460-G2 series stacking modules allow you to add two high-performance SummitStack ports to the VIM (Versatile Interface Module) slot on the rear panel of an X460-G2 series switch. These ports allow you to combine multiple units into a single SummitStack management entity, using stacking cables that are available from Extreme Networks. The VIM-2ss stacking module, shown in Figure 142, provides two integrated CX4 SummitStack 10-Gbps bidirectional stacking ports for stacking connections using Extreme Networks SummitStack cables.

Caution
VIM modules are not hot swappable. You must power down the switch before installing any VIM modules.

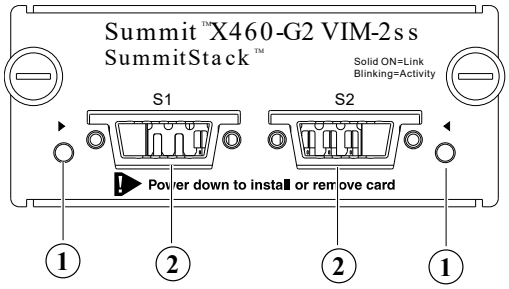


Figure 142: VIM-2ss SummitStack Module

1 = LEDs	2 = Stacking Ports

VIM-2t Port Option Card

The VIM-2t Ethernet Module option allows you to add one or two 10-gigabit copper BASE-T ports to the VIM (Versatile Interface Module) slot on the rear panel of an X460-G2 series switch. These ports support 10G BASE-T RJ45 cables. SyncE support is available on the S1 port.

Caution
VIM modules are not hot swappable. You must power down the switch before installing any VIM modules.

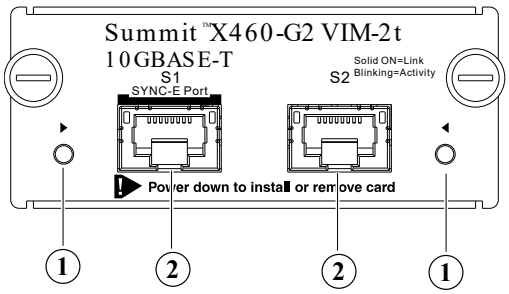


Figure 143: VIM-2t Ethernet Module Option

1 = LEDs	2 = 10G BASE-T ports

VIM-2x Ethernet Module Port Option Card

The VIM-2x Ethernet Module option card, shown in Figure 144, allows you to add up to two 10-gigabit SFP+ optical ports to the VIM slot on the rear panel of the X460-G2 series switch. These ports support 1 GbE and 10 GbE SFP and SFP+ transceivers.

Caution
VIM modules are not hot swappable. You must power down the switch before installing any VIM modules.

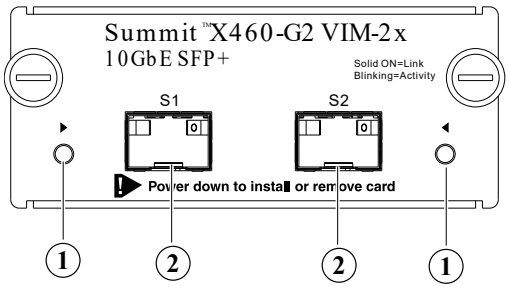


Figure 144: VIM-2x Ethernet Module Option

1 = LEDs	2 = SFP+ Ports

TM-CLK Clock Module

The TM-CLK Clock Module provides an Oven-controlled Crystal Oscillator (OCXO) for use as a reference frequency for SyncE and 1588v2 precision time features. The OCXO is precise to +-2 nanoseconds (ns) with time accuracy +50 to -65 ns. The ExtremeXOS configuration selects the input to the clock module from a SyncE master port or a 1588v2 grandmaster clock. The TM-CLK module is required for SyncE on the X460-G2. The 1588v2 Precision Time feature on the X460-G2 requires the TM-CLK module and the Network Timing Feature Pack, and does not support stacking.

Two mini-BNC outputs deliver the following signals:

- 10MHz frequency reference

- 1 PPS signal at the top of each second

Caution
The clock module is not hot swappable. You must power down the switch before installing any VIM modules.

Note
The TM-CLK module has no inputs for timing signals, and it cannot act as a 1588v2 grandmaster clock. The module provides no RJ45 Building Integrated Timing System (BITS) output, and in particular does not provide the serial time of day output.

Note
The X460-G2 TM-CLK clock module does not accept both 10MHz and 1PPS signals at the same time, so it can take 10 to 20 minutes or more to lock onto a 1588v2 1PPS signal from the Apollo2 chip in addition to the usual 15 minutes or more for the 1588v2 servo to lock onto the remote grandmaster clock.

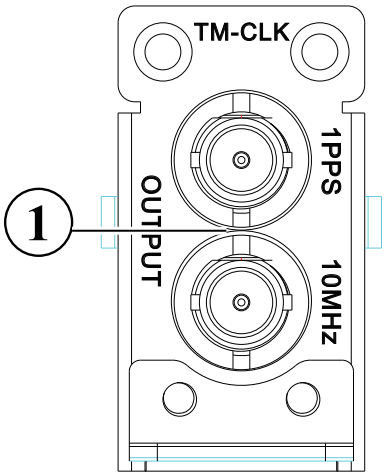


Figure 145: TM-CLK Module Option

1 = Timing signal mini-BNC outputs

Site Preparation

By carefully planning your site, you can maximize the performance of your existing network and ensure that it is ready to migrate to future networking technologies.

The information in this chapter is intended for the system administrator, network equipment technician, network manager, or facilities manager responsible for installing and managing the network hardware. The chapter assumes a working knowledge of local area network (LAN) operations, and a familiarity with communications protocols that are used on interconnected LANs.

Only qualified service personnel should install, maintain, or remove a switch, chassis, or its components. Qualified service personnel have had appropriate technical training and experience that is necessary to be aware of the hazards to which they are exposed when performing a task and of measures to minimize the danger to themselves or other people.

Note
Before installing or removing any components of the system, and before carrying out any maintenance procedures, read the safety information in "Technical Specifications."

Planning Your Site

To install your equipment successfully, you should plan the site carefully. The site planning process has three major parts:

1. Meeting site requirements.

   The physical installation site must meet the following requirements for a safe and successful installation:

   - Building and electrical code requirements
   - Environmental, safety, and thermal requirements for the equipment you plan to install

- Equipment rack requirements

2. Evaluating and meeting cable requirements.

   After examining your physical site and verifying that all environment requirements are met, evaluate and compare your existing cable plant with the requirements of the Extreme Networks equipment to determine if you need to install new cables.
3. Meeting power requirements.

   To run your equipment safely, you must meet the specific power requirements for each switch and external power supply unit installed in the system.

   For power specifications of the switches, see the specific switch listings in Technical Specifications on page 395.

Operating Environment Requirements

Verify that your site meets all environmental and safety requirements.

Virtually all areas of the United States are regulated by building codes and standards. During the early planning stages of installing or modifying your network, it is important that you develop a thorough understanding of the regulations that pertain to your location and industry.

Meet Building and Electrical Codes

Building and electrical codes vary depending on your location. Comply with all code specifications when planning your site and installing cable. This section lists resources for obtaining additional information.

For information about major building codes, consult the following organization:

International Code Council (ICC)
5203 Leesburg Pike
Falls Church, VA 22041 USA
www.iccsafe.org

The organizations listed in Table 70 are authorities on electrical codes.

Table 70: Authorities on Electrical Codes

Organization	Address	Web Site URL
National Electrical Code (NEC) Classification (USA only) Recognized authority on safe electrical wiring. Federal, state, and local governments use NEC standards to establish their own laws, ordinances, and codes on wiring specifications. The NEC classification is published by the National Fire Protection Association (NFPA).	NFPA 1 Batterymarch Park Quincy, MA 02169 USA	www.nfpa.org/
Underwriters' Laboratory (UL) Independent research and testing laboratory. UL evaluates the performance and capability of electrical wiring and equipment to determine whether they meet certain safety standards when properly used. Acceptance is usually indicated by the words "UL Approved" or "UL Listed."	UL 333 Pfingsten Road Northbrook, IL 60062 USA	www.ul.com
National Electrical Manufacturing Association (NEMA) (USA only) Organization of electrical product manufacturers. Members develop consensus standards for cables, wiring, and electrical components.	NEMA 1300 N. 17th Street Rosslyn, VA 22209 USA	www.nema.org
Electronic Components Industry Association (ECIA) Trade association that develops technical standards, disseminates marketing data, and maintains contact with government agencies in matters relating to the electronics industry.	ECIA 111 Alderman Drive Suite 400 Alpharetta, GA 30005 USA	www.ecianow.org
Federal Communications Commission (FCC) (USA only) Commission that regulates all interstate and foreign electrical communication systems that originate in the United States according to the Communications Act of1934. The FCC regulates all U.S. telephone and cable systems.	FCC 445 12th Street S.W. Washington, DC 20554 USA	www.fcc.gov

Set up the Wiring Closet

Be aware of the following recommendations for your wiring closet:

- Make sure that your system is easily accessible for installation and service. See Rack Specifications and Recommendations on page 176 for more information.
- Use appropriate AC or DC power, power distribution, and grounding for your specific installation.

- Use a vinyl floor covering in your wiring closet. (Concrete floors accumulate dust, and carpets can cause static electricity.)
- Prevent unauthorized access to wiring closets by providing door locks. Install the equipment in a secured, enclosed, and restricted access location, ensuring that only qualified service personnel have access to the equipment.
- Provide adequate overhead lighting for easy maintenance.
- Be sure that each wiring closet has a suitable ground. All equipment racks and equipment installed in the closet should be grounded.
- Be sure that all system environmental requirements are met, such as ambient temperature and humidity.

Note
Consult an electrical contractor for commercial building and wiring specifications.

Controlling the Temperature

Extreme Networks equipment generates a significant amount of heat. It is essential that you provide a temperature-controlled environment for both performance and safety.

Install the equipment only in a temperature- and humidity-controlled indoor area that is free of airborne materials that can conduct electricity. Too much humidity can cause a fire. Too little humidity can produce electrical shock and fire.

Observe these additional thermal recommendations for the location where you plan to install your equipment:

- Ensure that the ventilation in the wiring closet is adequate to maintain a temperature below 40°C (104°F).
- Install a reliable air conditioning and ventilation system.
- Keep the ventilation in the wiring closet running during non-business hours; otherwise, the equipment can overheat.
- Maintain a storage temperature between -40°C (-40°F) and 70°C (158°F).

Table 71 on page 175 summarizes the behavior of ExtremeSwitching switches when they experience high operating temperatures.

Table 72 on page 175 lists the ambient temperature range for ExtremeSwitching switches. As with all electrical equipment, however, Extreme Networks product lifetimes degrade with increased temperature. Ideally, therefore, temperatures should be kept at or below 25°C (77°F).

Safeguards are built into all Extreme Networks switches and power supply units to minimize the risk of fire.

Table 71: Thermal Shutdown and Restart Behavior

Switch Model(s)	Behavior
All models except those listed below	When internal system temperatures exceed the thermal shutdown temperature limit (typically about 20°C higher than normal system operating temperatures), the system's power supplies are turned off and the switch shuts down. The system remains in the OFF state until the system has sufficient time to cool and the internal thermal sensor measures a temperature lower than the maximum specified ambient temperature, at which time the system restarts automatically. Alternately, you can restart the system immediately by removing and then restoring all line power to the system.
X460-G2 (all models)	When internal system temperatures exceed the thermal shutdown temperature limit (typically about 20°C higher than normal system operating temperatures), the system's power supplies are turned off and the switch shuts down. The switch does not restart automatically, even after cooling. It remains in the OFF state until you remove and then restore all line power to the system.

Table 72: Ambient Temperature Range for Switches

Switch Series	Ambient Operating Temperature Range
X440-G2	0°C (32°F) to 50°C (122°F) **Note:** The maximum temperature is 60°C (140°F) for the following models: X440-G2-12t8fx-GE4, X440-G2-24fx-GE4, X440-G2-24t-GE4.
X450-G2	0°C (32°F) to 50°C (122°F)
X460-G2	0°C (32°F) to 50°C (122°F)
X590	0°C (32°F) to 45°C (113°F)
X620	0°C (32°F) to 50°C (122°F)
X670-G2	0°C (32°F) to 45°C (113°F)
X690	0°C (32°F) to 45°C (113°F)
X870	0°C (32°F) to 45°C (113°F)

Controlling the Humidity Level

To maximize equipment life, keep operating humidity between 50% and 70% relative humidity (non-condensing) during typical operation.

The equipment can operate between 10% and 95% relative humidity (non-condensing) for short intervals.

Protect Your System from ESD (Electrostatic Discharge)

Your system must be protected from static electricity or ESD. Take the following measures to ensure optimum system performance:

- Remove materials that can cause electrostatic generation (such as synthetic resins) from the wiring closet.

  Check the appropriateness of floor mats and flooring.
- Connect metal chassis, conduit, and other metals to ground using dedicated grounding lines.
- Use electrostatically safe equipment.

  If you are working with pluggable interface modules, wear an ESD-preventive wrist strap and connect the metal end to a grounded equipment rack or other source of ground.

Rack Specifications and Recommendations

Racks should conform to conventional standards.

In the United States, use EIA Standard RS-310C: Racks, Panels, and Associated Equipment. In countries other than the United States, use IEC Standard 297. In addition, verify that your rack meets the basic mechanical, space, and earthquake requirements that are described in this section.

Mechanical Recommendations for the Rack

Use equipment racks that meet the following mechanical recommendations:

- Use an open style, 19-inch rack to facilitate easy maintenance and to provide proper ventilation.
- Use a rack made of steel or aluminum.
- The rack should use the universal mounting rail hole pattern that is identified in IEC Standard 297.
- The rack should have designated earth grounding connections (typically on the base).
- The rack must meet earthquake safety requirements equal to that of the installed chassis.
- The mounting holes should be flush with the rails to accommodate the chassis.
- The rack should support approximately 270 kg (600 lb).

Ground the Rack

The rack must be properly grounded.

Use a rack grounding kit and a ground conductor that is carried back to earth or to another suitable building ground.

At a minimum, follow these guidelines to ground equipment racks to the earth ground:

- CAD weld appropriate wire terminals to building I-beams or earth ground rods.
- For a DC-powered switch, use a minimum 14 AWG stranded copper wire for grounding.

  AC-powered switches do not need separate chassis grounding.
- Position the earth ground as close to the equipment rack as possible to maintain the shortest wiring distance possible.
- Use a ground impedance tester or micro-ohm meter to test the quality of earth ground connection at the chassis. This will ensure good grounding between the chassis, rack, and earth ground.

Note
Because building codes vary worldwide, consult an electrical contractor to ensure proper equipment grounding for your specific installation.

Providing Adequate Space for the Rack

Provide enough space in front of and behind the switch so that you can service it easily.

Allow a minimum of 48 inches (122 cm) in front of the rack and 30 inches (76 cm) behind the rack. When using a relay (two-post) rack, provide a minimum of 24 inches (61 cm) of space behind the mounted equipment. Extra room on each side is optional.

Warning
Extreme Networks switches do not have a switch for turning power to the unit on and off. For systems using an AC power supply, power to the switch is disconnected by removing the wall plug from the electrical outlet.

Be sure that cables and other equipment do not block the switch's air intake or outflow.

Warning
The DC-powered switches include the following models:

- X440-G2-24t-10GE4-DC and X440-G2-48t-10GE4-DC

For these switches and the EPS-150DC power supply, turn off power to the chassis by de-energizing the circuit that feeds the power supply. This is usually accomplished by turning off a circuit breaker. Disconnecting the DC power cable from the DC power source must be done by a qualified, licensed electrician.

Depending on other conditions in the equipment room, it may be possible to install the switches closer to each other; consult your Extreme Networks Customer Support representative for guidance.

Secure the Rack

The rack should be attached to the wiring closet floor with 9.5 mm (3/8 in) lag screws or equivalent hardware. The floor under the rack should be level within 5 mm (3/16 in). Use a floor-leveling cement compound if necessary or bolt the racks to the floor as shown.

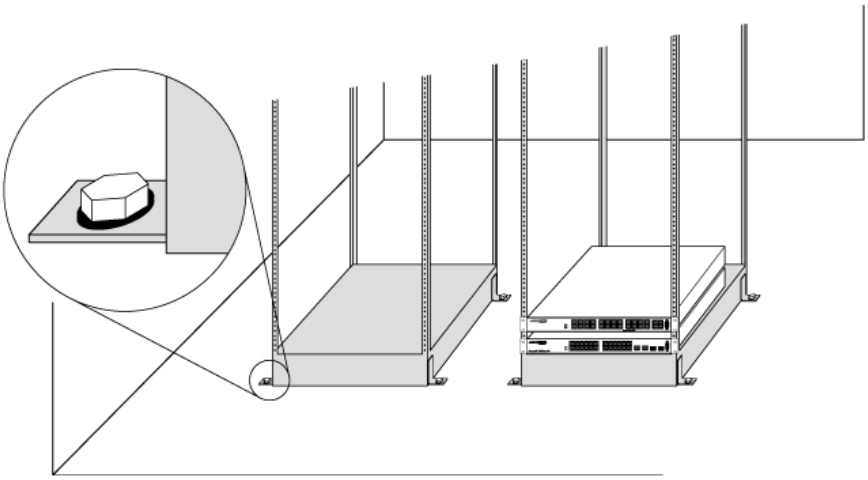


Figure 146: Properly Secured Rack

Brace open equipment racks if the channel thickness is less than 6.4 mm (1/4 in).

Evaluate and Meet Cable Requirements

Use professional consultants for site planning and cabling.

The Building Industry Consulting Service International (BICSI) Registered Communications Distribution Designer (RCDD), which is globally recognized as a standard in site planning and cabling, can be used.

For information, visit www.bicsi.org.

Label Cables and Keep Accurate Records

A reliable cable labeling system is essential when planning and installing a network.

Keeping accurate records helps you to:

- Relocate devices easily.
- Make changes quickly.
- Isolate faults in the distribution system.
- Locate the opposite end of any cable.
- Know the types of network devices that your cabling infrastructure can support.

Follow these guidelines when setting up a cable labeling system suitable for your installation:

- Identify cables by securely attaching labels to all cable ends.
- Assign a unique block of sequential numbers to the group of cables that run between each pair of wiring closets.
- Assign a unique identification number to each equipment rack.
- Identify all wiring closets by labeling the front panel of your Extreme Networks equipment and other hardware.
- Keep accurate and current cable identification records.
- Post records near each equipment rack. For each cable drop, include information about the cable source, destination, and jumper location.

Install Cable

When you connect cable to your network equipment, keep the following things in mind.

- Examine cable for cuts, bends, and nicks.
- Support cable using a cable manager that is mounted above connectors to avoid unnecessary weight on the cable bundles.
- Use cable managers to route cable bundles to the left and right of the network equipment to maximize accessibility to the connectors.
- Provide enough slack, approximately 5 to 7.5 cm (2 to 3 in), to provide proper strain relief as shown in Figure 147 on page 180.
- Bundle cable using hook-and-loop straps to avoid injuring cables.
- If you build your own cable, be sure that connectors are properly crimped.
- When installing a patch panel using twisted pair wiring, untwist no more than 2.5 cm (1 in) of the cable to avoid radio frequency (RF) interference.
- Discharge the RJ45 Ethernet cable before plugging it into a port on the switch.

Caution
Unshielded twisted pair (UTP) cable can build up electrostatic charges when being pulled into a new installation. Before connecting any category 5 UTP cable to the switch, discharge ESD from the cable by plugging the RJ45 connector into a LAN static discharge device or use an equivalent method.

- Use plenum-rated cable when it is necessary for safety and fire rating requirements. Consult your local building codes to determine when it is appropriate to use plenum-rated cable, or refer to IEC standard 850.
- Keep all ports and connectors free of dust.

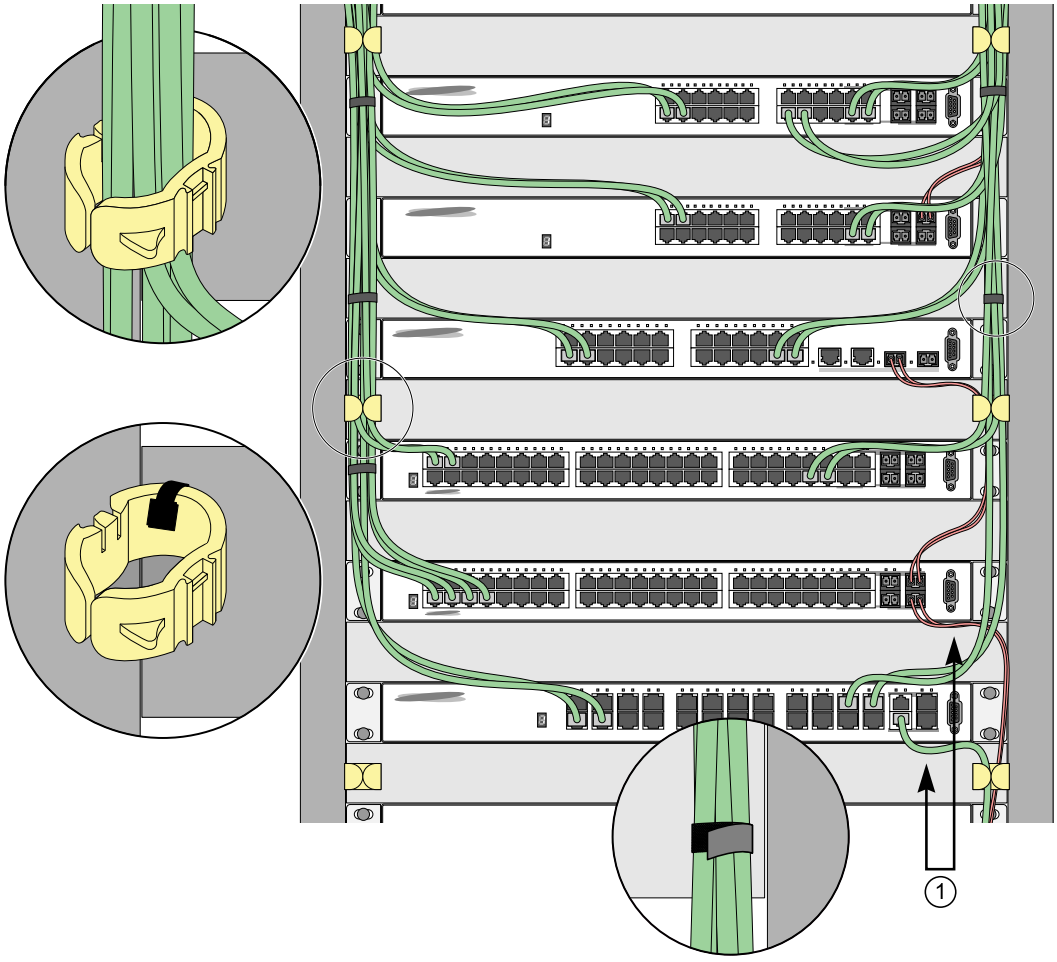


Figure 147: Properly Installed and Bundled Cable

1 = Ensure adequate slack and bend radius

Handle Fiber Optic Cable

Fiber optic cable must be handled carefully during installation.

Every cable has a minimum bend radius and fibers will be damaged if the cables are bent too sharply. It is also important not to stretch the cable during installation. Ensure

that the bend radius for fiber optic cables is equal to at least 5 cm (2 in) for each 90-degree turn as shown in Figure 148.

Note
Kinks and sharp bends can destroy or impair the cable's ability to convey light pulses accurately from one end of the cable to the other. Use care in dressing the optical fiber cables: provide satisfactory strain relief to support the cable and maintain an adequate bend radius at all cable turns, particularly where the cable connects to the I/O module.

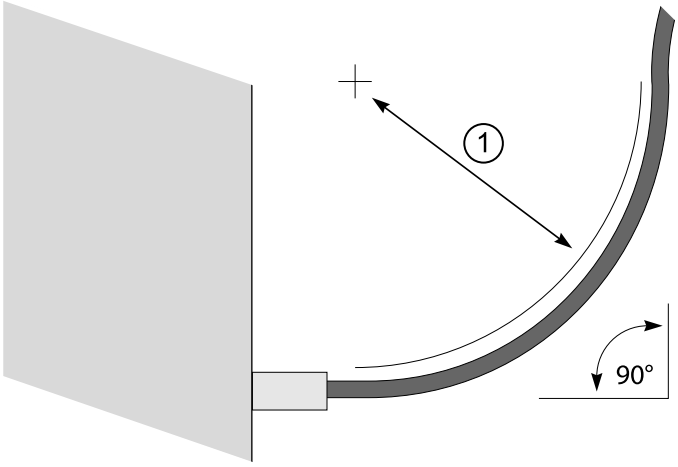


Figure 148: Bend Radius for Fiber Optic Cable

1 = Minimum 5 cm (2 in) radius in 90° bend

Cable Distances and Types

Table 73 on page 181 shows one example of cable media types and maximum distances that support reliable transmission in accordance with international standards (except where noted). Refer to *Extreme Networks Pluggable Transceivers Installation Guide* for descriptions of optics and cables, as well as a complete list of supported cable lengths.

Refer to *Extreme Hardware/Software Compatibility and Recommendation Matrices* for a list of the cable types that are compatible with your equipment.

Table 73: Cable Distances and Types

Standard	Media Type	MHz·km Rating	Maximum Distance (Meters)
1000BASE-SX (850nm optical window)	50/125 µm multimode fiber	400	500
	50/125 µm multimode fiber	500	550
	62.5/125 µm multimode fiber	160	220
	62.5/125 µm multimode fiber	200	275

Table 73: Cable Distances and Types (continued)

Standard	Media Type	MHz·km Rating	Maximum Distance (Meters)
1000BASE-LX (1300nm optical window)	50/125 µm multimode fiber	400	550
	50/125 µm multimode fiber	500	550
	62.5/125 µm multimode fiber	500	550
	10/125 µm single-mode fiber	–	5,000
	10/125 µm single-mode fiber	–	10,000
1000BASE-ZX (1550nm optical window)	10/125 µm single-mode fiber	–	80,000
100BASE-LX100 (1550nm optical window)	10/125 µm single-mode fiber	–	100,000
1000BASE-BX10 (1490nm optical window) (1310nm optical window)	10/125 µm single-mode fiber	–	10,000
1000BASE-LX70 (1550nm optical window)	10/125 µm single-mode fiber	–	70,000
10/100/1000BASE-T SFP	(1 Gbps link) Category 5 and higher UTP cable	–	100
	(100 Mbps link) Category 5 and higher UTP cable	–	150
	(10 Mbps link) Category 5 and higher UTP cable	–	250
10GBASE-T SFP+	(10 Gb links) Category 6A and higher UTP cable	–	30
10GBASE-SR SFP+ (850nm optical window)	62.5 mm multimode fiber	160	26
	62.5 mm multimode fiber (OM1)	200	33
	50 mm multimode fiber	400	66
	50 mm multimode fiber (OM2)	500	82
	50 mm multimode fiber (OM3)	2000	300
10GBASE-LR SFP+ (1310nm optical window)	10/125 µm single-mode fiber	–	10,000

[1] Proprietary to Extreme Networks. Connections between two Extreme Networks 1000BASE-LX interfaces that use 10/125 µm single-mode fiber can use a maximum distance of 10,000 meters.

Table 73: Cable Distances and Types (continued)

Standard	Media Type	MHz·km Rating	Maximum Distance (Meters)
10GBASE-ER SFP+ (1550nm optical window)	10/125 µm single-mode fiber	–	40,000
40GBASE-SR4 QSFP+ (850nm optical window)	50 mm multimode fiber (OM3)	–	100
	50 mm multimode fiber (OM4)		150
1000BASE-T	Category 5 and higher UTP cable	–	100
100BASE-TX	Category 5 and higher UTP cable	–	100
10BASE-T	Category 3 and higher UTP cable	–	100

Table 74 and Table 75 on page 183 list direct-attach cables available from Extreme Networks.

Table 74: Extreme Networks 100Gb Direct-Attach Cables

Cable Type	Part Number	Length
QSFP28-QSFP28 Direct attach passive copper cable	10411 or AA1405029-E6	1 meter
	10413 or AA1405031-E6	3 meters
	10414 or AA1405032-E6	5 meters
QSFP28-4xSFP28 (4x25Gb) Direct attach passive copper breakout	10421	1 meter
	10423	3 meters
	10424	5 meters
QSFP28-4xSFP28 (4x25Gb) Active optical breakout cable	10444	20 meters

Table 75: Extreme Networks 40Gb Direct-Attach Cables

Cable Type	Part Number	Length
QSFP+ to QSFP+ Direct attach cable	AA1404037-E6	0.5 meter
	AA1404029-E6	1 meter
	AA1404030-E6	2 meters
	AA1404031-E6	3 meters
	AA1404032-E6	5 meters

Table 75: Extreme Networks 40Gb Direct-Attach Cables (continued)

Cable Type	Part Number	Length
QSFP+ to QSFP+ Active optical cable	AA1404028-E6	10 meters active optical
QSFP+ to 4xSFP+ Breakout cable	AA1404033-E6	1 meter
	AA1404035-E6	3 meters
	AA1404036-E6	5 meters
	AA1404041-E6	10 meters active optical

Use RJ45 Connector Jackets

Use RJ45 cable with connector jackets that are flush with the connector or that have connectors with a no-snag feature.

Using cable with jackets that are wider than the connectors can cause:

- Connectors that are not properly aligned with the port.
- Crowded cable installation, which can cause connectors to pop out of the port.

Figure 149 shows examples of recommended and non-recommended connector jacket types.

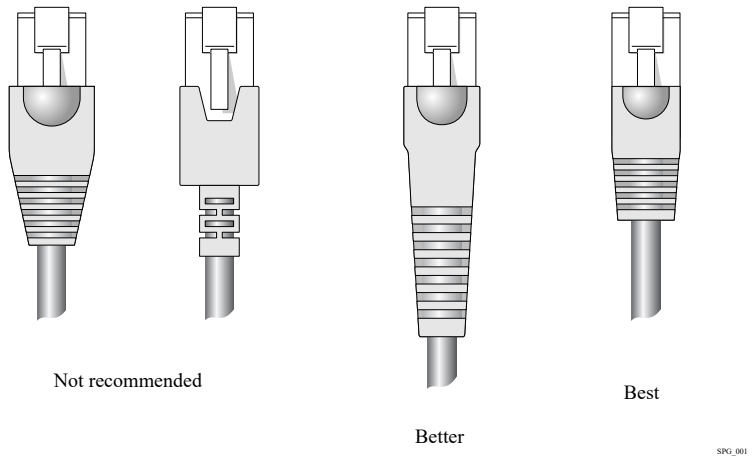


Figure 149: RJ45 Connector Jacket Types

Prevent Radio Frequency Interference (RFI)

If you use UTP cabling in an installation, take precautions to avoid radio frequency (RF) interference.

RF interference can cause degradation of signal quality, and, in an Ethernet network environment, can cause excessive collisions, loss of link status, or other physical layer problems that can lead to poor performance or loss of communication.

To prevent RF interference, avoid the following situations:

- Attaching UTP cable to AC power cables
- Routing UTP cable near antennas, such as a ham radio antenna
- Routing UTP cable near equipment that could exhibit RF interference, such as ARC welding equipment
- Routing UTP cable near electrical motors that contain coils
- Routing UTP cable near air conditioner units
- Routing UTP cable near electrical transformers

In areas or applications where these situations cannot be avoided, use fiber optic cabling or shielded twisted pair cabling.

Meeting Power Requirements

Observe the following requirements and precautions for powering your hardware.

Requirements for PoE Devices

When connecting PoE devices to a PoE switch, all connections between the PoE device and the switch must remain within the same building and use a low-voltage power distribution system per IEEE 802.3af.

Power Supply Requirements

Follow these recommendations when you plan power supply connections for your equipment:

- Place the equipment in an area that accommodates the power consumption and component heat dissipation specifications.
- Be sure that your power supply meets the site DC power or AC power requirements of the network equipment.
- When you connect power to installed equipment, do not make this connection through an extension cord or power strip.
- If your switch includes more than one power supply, connect each power supply to a different, independent power source.

  If a power source fails, it will affect only the switch power supply to which it is connected. If all switch power supplies are connected to a single power source, the entire switch is vulnerable to a power source failure.
- In regions that are susceptible to electrical storms, plug your system into a surge suppressor.

For detailed power specifications for your equipment, see "Technical Specifications."

Requirements for Power Cords

Most ExtremeSwitching switches do not ship with power cords. Visit www.extremenetworks.com/product/powercords/ for information on selecting and

purchasing the correct power cords for use with specific Extreme Networks equipment. The web page provides specifications for power cords in each country so that you can purchase cords locally.

AC power cords must meet the requirements listed in Power Cord Requirements for AC-Powered Switches and AC Power Supplies on page 504.

UPS (Uninterruptible Power Supply) Requirements

A UPS (uninterruptible power supply) is a device that sits between a power supply (such as a wall outlet) and a device (such as a switch) to prevent outages, sags, surges, and bad harmonics from adversely affecting the performance of the device.

A UPS traditionally can perform the following functions:

- Absorb relatively small power surges.
- Smooth out noisy power sources.
- Continue to provide power to equipment during line sags.
- Provide power for a period of time after a blackout has occurred.

In addition, some UPS devices or UPS-plus-software combinations provide the following functions:

- Automatically shut down equipment during long power outages.
- Monitor and log power supply status.
- Display the voltage (current draw) of the equipment.
- Restart equipment after a long power outage.
- Display the voltage currently on the line.
- Provide alarms on certain error conditions.
- Provide short-circuit protection.

Select a UPS

To determine UPS requirements for your switch, answer these questions:

- What are the amperage requirements?
- What is the longest potential time period that the UPS would be required to supply backup power?
- Where will the UPS be installed?
- What is the maximum transition time that the installation will allow? (See Provide a Suitable UPS Transition Time on page 187.)

Note
Use a UPS that provides online protection.

Calculate Volt-Amperage Requirements

To determine the size of UPS that you need:

1. Locate the voltage and amperage requirements for each piece of equipment.

   These numbers are usually found on a sticker on the back or bottom of your equipment.
2. Multiply the numbers together to get Volt-Amperes (VA):

   VA = Volts x Amperes
3. Add the VA from all the pieces of equipment together to find the total VA requirement.

   To determine the minimum volt-amperage requirements for your UPS, add 30% to the total.

Provide a Suitable UPS Transition Time

UPS transition time is the time required for the UPS to change from providing AC power derived from the utility (or mains) supply to providing AC power derived from the battery backup. UPS transition time is sometimes called *UPS transfer time*.

UPS transition times vary between UPS models and implementations, but shorter transition times are preferred. For Extreme Networks stacking products, a UPS transition time of 20 milliseconds or less ensures optimum performance and minimizes service interruptions.

For high-availability and fault-tolerant installations in which the switches use redundant power supply units (PSUs), ensure that each PSU in a switch is connected to a different UPS and that each UPS is powered by an independent AC supply. This will prevent service interruptions when a power source is lost, or when a UPS unit fails. (Note that a single, appropriately sized UPS can power PSUs in multiple switches. The recommendation is simply that for any given switch, the two PSUs should be connected to different UPS units.)

DC Power Requirements

This system should be installed in a DC-I battery return configuration.

In a DC-I configuration, the battery return conductor should be connected directly to the central office power return bus, and not to the equipment frame or the grounding means of the equipment.

Follow Applicable Industry Standards

Always follow applicable industry standards.

For more information, see the following ANSI/TIA/EIA standards:

- ANSI/TIA/EIA-568-A—the six subsystems of a structured cabling system
- ANSI/TIA/EIA-569-A—design considerations
- ANSI/TIA/EIA-606—cabling system administration
- ANSI/TIA/EIA-607—commercial building grounding and bonding requirements

You can access these standards at: www.ansi.org or www.tiaonline.org.

Building Stacks

A stack consists of a group of up to eight switches that are connected to form a ring. The stack offers the combined port capacity of the individual switches. But it operates as if it were a single switch, making network administration easier.

Stacking is facilitated by the SummitStack feature – part of the ExtremeXOS Edge license.

This chapter describes the supported configurations for stacking switches, the considerations for planning a stack, and the steps for setting up the hardware. We recommend that you read this chapter before installing the switches that will make up the stack.

Refer to the Stacking chapter in the *ExtremeXOS 30.7 User Guide* for information about configuring a stack, maintaining the stack configuration, and troubleshooting.

Introduction to Stacking

Using the SummitStack feature—part of the ExtremeXOS Edge license—a stack can combine switches from different series, provided that every switch in the stack:

- Runs in the same partition (primary or secondary).
- Runs the same version of ExtremeXOS.
- Includes support for stacking.

The stack operates as if it were a single switch with a single IP address and a single point of authentication. One switch – called the master switch – is responsible for running network protocols and managing the stack. The master runs ExtremeXOS software and maintains all the software tables for all the switches in the stack.

All switches in the stack, including the master switch, are called nodes. Figure 150 shows four nodes in a stack, connected to each other by SummitStack cables.

All connections between stack ports must be directly between switches. A stacking connection cannot pass through a third device, for example a Virtual Port Extender or an LRM/MACsec Adapter.

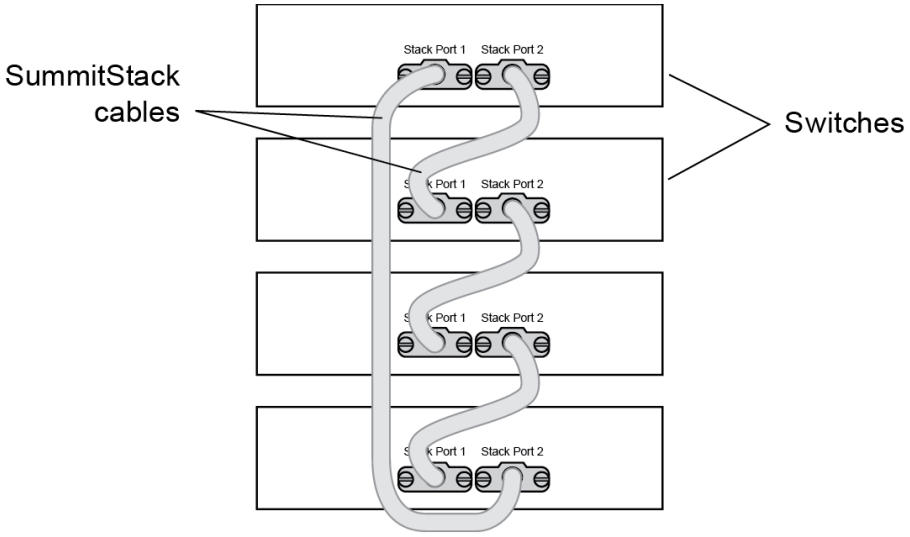


Figure 150: Switches Connected to Form a Stack

The following sections introduce you to the basic principles of stacking and provide recommendations for creating stacks.

More information to answer your questions about stacking and help you plan your configuration is available on the Extreme Networks GTAC Knowledge Base.

Building Basic Stacks

A stack can be created in either of two ways:

- In *native stacking*, switches are connected using either designated Ethernet data ports or dedicated stacking connectors.
- In *alternate stacking*, switches are connected using 10-Gbps Ethernet data ports that have been configured for stacking. These ports are located either on the switch itself or on option cards installed on the rear of the switch.

When planning and building your stack, be sure to follow port compatibility and cabling recommendations as described in this chapter.

See Combining Switches from Different Series on page 218 for information about which switch series can be combined to form a stack.

Slot Numbers in Stacks

A switch stack can be thought of as a virtual chassis. Each switch (node) operates as if it were occupying a slot in a chassis and is controlled by the master. The high-speed stacking links function like the backplane links of a chassis.

Each switch in the stack is assigned a “slot number” during the initial software configuration of the stack. Starting at the switch with the console connection, numbers are assigned in numerical order following the physical path of the connected stacking cables. For example, if you follow the cabling recommendations presented in Connecting the Switches to Form the Stack Ring on page 224 and configure a vertical

stack from the console on the switch at the top of the physical stack, the switches will be assigned slot numbers 1 through 8 from the top down.

Some stackable switches have a seven-segment LED, called the stack number indicator on the front panel. See Figure 151. When a stack is operating, the indicator displays the switch's slot number. This LED does not light on switches that are not currently operating as part of a stack.

The top half of the number blinks if the switch is the master, and the bottom half blinks if it is the backup. If the LED is steadily lit, the switch is a standby. If the LED is off the switch is not configured as a member of a stack.

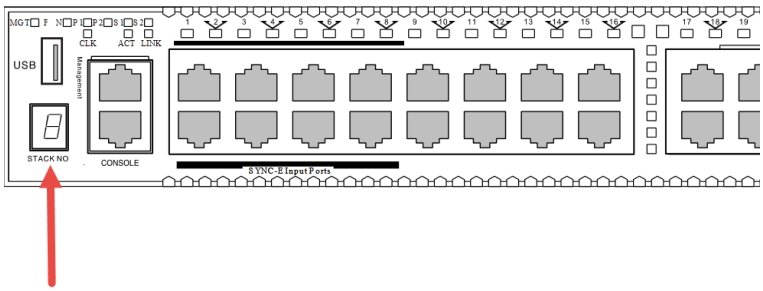


Figure 151: Position of the Stack Number Indicator (X460-G2 Switch Shown)

In addition to the Stack Number Indicator, each stacking port has an LED. The LED is steady green if the link is OK, blinking green if traffic is present, and off if no signal is present.

A quick way to verify that the cable connections match the software configuration is to check the stack number indicator on each switch. If the slot numbers do not line up in the order you arranged the switches, this might indicate that the stacking cable setup differs from what you intended when you configured the software. In this case, reconnect the cables in the correct order and perform the software configuration again.

Master/Backup Switch Redundancy

When your stack is operational, one switch is the master switch, responsible for running network protocols and managing the stack.

To provide recovery in case of a break in the stack connections, you can configure redundancy by designating a backup switch to take over as master if the master switch fails. When you perform the initial software configuration of the stack, the “easy setup” configuration option automatically configures redundancy, with slot 1 as the master and slot 2 as the backup. You can also configure additional switches as “master-capable,” meaning they can become a stack master in case the initial backup switch fails.

When assigning the master and backup roles in mixed stacks, consider the feature scalability and the speed of each switch model. The easy setup configuration process

selects master and backup switches, based on capability and speed, in the following order:

1. X590, X690, X695, and X870
2. X670-G2 and X465
3. X460-G2
4. X450-G2
5. X440-G2 and X620

For example, in a stack that combines X460-G2 or X670-G2 switches with other switch models, an X460-G2 or X670-G2 switch might provide more memory and more features than other switches in the stack. Consider these differences when selecting a master node, selecting a backup node, and configuring failover operation.

Note
We recommend that the master and backup roles be assigned to switches from the same series. For example, if the master node is an X460-G2 switch, the backup node should also be an X460-G2 switch. Similarly, if the master node is an X670-G2 series switch, the backup node should also be an X670-G2 switch.

Note
ExtremeSwitching X590, X690, X695, and X870 series switches can be stacked with themselves and each other using V400, but they cannot be stacked with other switch models.

Note
The ExtremeSwitching X465 series switches can only be stacked with themselves, and with ExtremeSwitching X590, X695, and X690 using V160.

When easy setup compares two switches that have the same capability, the lower slot number takes precedence.

We recommend that you follow the same ranking hierarchy when you plan the physical placement of the switches in the stack.

SummitStack Topologies

Figure 152 presents a graphical representation of a stack and some of the terms that describe stack conditions.

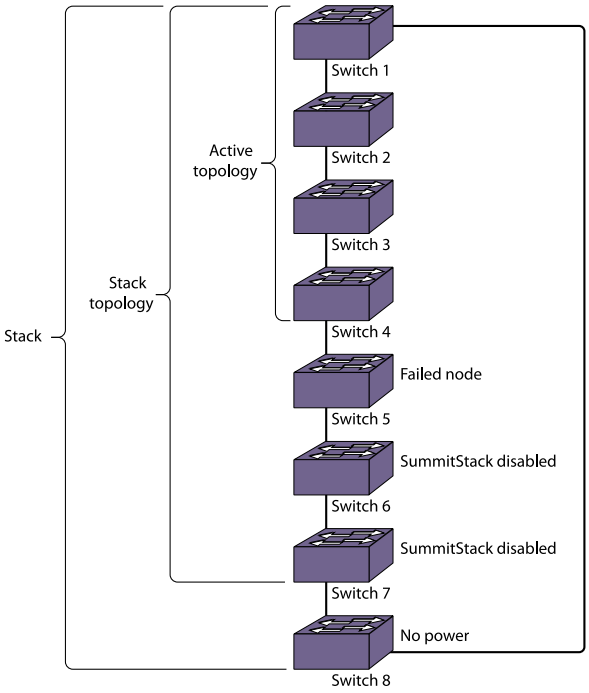


Figure 152: Example of a Stack, Showing the Active Topology and the Stack Topology

A stack is the collection of all switches, or nodes, that are cabled together to form one virtual switch using the ExtremeXOS SummitStack feature.

The maximum cable length supported between switches depends on the types of switches in your stack, the installed option cards, and the configured stacking ports. For more information, see Plan to Create Your Stack on page 203.

A stack topology is the set of contiguous nodes that are powered up and communicating with each other. In the example shown, Switch 8 is not part of the stack topology because it is not powered up.

An active topology is the set of contiguous nodes that are active. An active node is powered up, is configured for stack operation, and is communicating with the other active nodes.

Switch 5 in the example has failed, stacking is disabled on Switches 6 and 7, and Switch 8 has no power. As a result, the active topology includes Switches 1 through 4 only.

For more information about SummitStack terminology, see SummitStack Terms on page 200.

Ring Topology: Recommended for Stacking

SummitStack nodes should be connected to each other in a ring topology. In a ring topology, one link is used to connect to a node and the other link is used to connect to another node. The result forms a physical ring connection. This topology is highly recommended for normal operation.

Figure 153 represents a maximal ring topology of eight active nodes.

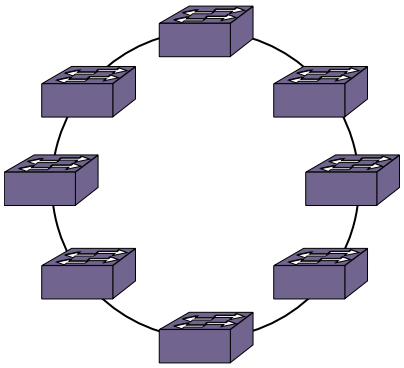


Figure 153: Graphical Representation of a Ring Topology

Figure 154 shows what the same ring topology would look in actual practice. Each switch in the rack is connected to the switch above it and the switch below it. To complete the ring, a longer cable connects Switch 1 with Switch 8.

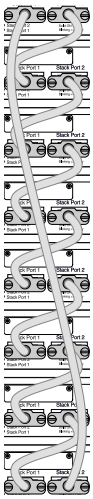


Figure 154: Switches Connected to Each Other in a Ring Topology

Note that, while a physical ring connection may be present, a ring active topology exists only when all nodes in the stack are active.

Daisy Chain Topology: Not Recommended for Stacking

Stackable switches can be connected in a daisy-chain topology. This is a ring topology with one of the links disconnected, inoperative, or disabled. A daisy chain can be created when a link fails or a node reboots in a ring topology, but the daisy chain topology is not recommended for normal operation.

Connect your stack nodes in a ring topology, not a daisy-chain topology, for normal operation.

In Figure 155, the nodes delineated as the active topology are operating in a daisy-chain configuration, even though there is physically a ring connection in the stack.

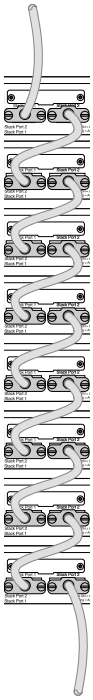


Figure 155: Daisy Chain Topology

You might need to use a daisy chain topology while adding a new node, removing a node, or joining two stacks.

If you are using a daisy chain topology, the possibility of a dual primary condition increases. Before you create a daisy chain topology, read "Managing a Dual Primary Situation" in the *ExtremeXOS 30.7 User Guide*.

Using Ethernet Ports for Stacking (SummitStack-V Feature)

On many Extreme Networks switches, you can reconfigure one or two 10-Gbps Ethernet data ports to operate as stacking ports.

This feature, known as *SummitStack-V* or *alternate stacking*, means that you can use less expensive cables to connect the switches in a stack. Because copper and fiber Ethernet ports support longer cable distances, you can also extend the physical distance between stack nodes – connecting, for example, switches on different floors in a building or in different buildings on a campus.

The SummitStack-V feature means that you can stack switches that have no dedicated (or *native*) stacking ports but that do have at least two Ethernet ports. The ports can be configured to support either data communications or stacking. When configured to support stacking, they are called alternate stacking ports to distinguish them from the native stacking ports that use custom cables.

A single stack can use both native stacking ports and alternate stacking ports. On one switch, for example, you can use a native stacking port to connect to a switch in the

same rack, and you can use an alternate stacking port to connect to a switch on a different floor.

Note
When you connect distant nodes using alternate stacking ports, be sure to run the cables over physically different pathways to reduce the likelihood of a cut affecting multiple links.

On each switch model, only specific data ports can be used as alternate stacking ports. The alternate stacking ports must be 10-Gbps Ethernet ports, either on the front panel of the switch or on installed port option cards or versatile interface modules at the rear of the switch. Switch models that do not have native stacking ports can still use alternate stacking if they have 10-Gbps Ethernet ports.

Alternate stacking ports on different switches must be directly connected, with no intervening switch connections. This is because alternate stacking ports use the proprietary ExtremeXOS protocol for stacking, not the standard Ethernet protocol.

Table 76 lists the data ports that can be used as native and alternate stacking ports for each switch model.

When the stacking-support option is enabled (with the `enable stacking-support` command), data communication stops on the physical data ports that are designated for alternate stacking. Then, when stacking is enabled (with the `enable stacking` command), those ports – listed in the Alternate Stacking Ports column of Table 76 – operate as stacking ports.

Table 76: Native and Alternate Stacking Ports

Switch Model	Type or location of Native Stacking Ports	Alternate Stacking Ports	Location of Alternate Stacking Ports
X440-G2-12t-10GE4 X440-G2-12p-10GE4	Fixed (front panel)	15,16	Front panel
X440-G2-24t-10GE4 X440-G2-24p-10GE4 X440-G2-24x-10GE4 X440-G2-24t-10GE4-DC	Fixed (rear panel)	27,28	Rear panel
X440-G2-48t-10GE4 X440-G2-48p-10GE4 X440-G2-48t-10GE4-DC	Fixed (rear panel, dedicated SFP+ port)	49,50	Rear panel
X450-G2-24t-GE4 X450-G2-48t-GE4 X450-G2-24p-GE4 X450-G2-48p-GE4	Fixed (rear panel)	Not applicable	Not applicable
X450-G2-24t-10GE4 X450-G2-24p-10GE4	Fixed (rear panel)	27,28	Front panel

Table 76: Native and Alternate Stacking Ports (continued)

Switch Model	Type or location of Native Stacking Ports	Alternate Stacking Ports	Location of Alternate Stacking Ports
X450-G2-48t-10GE4 X450-G2-48p-10GE4	Fixed (rear panel)	51,52	Front panel
X460-G2-24t-GE4 X460-G2-24p-GE4	VIM-2ss or VIM-2q	33,34	VIM-2x
X460-G2-48t-GE4 X460-G2-48p-GE4	VIM-2ss or VIM-2q	53,54	VIM-2x
X460-G2-24t-10GE4 X460-G2-24x-10GE4 X460-G2-24p-10GE4	VIM-2ss or VIM-2q	31,32	Front panel
X460-G2-48t-10GE4 X460-G2-48x-10GE4 X460-G2-48p-10GE4	VIM-2ss or VIM-2q	51,52	Front panel
X465	S1 and S2 on front panel	N/A	N/A
X590-24t-1q-2c X590-24x-1q-2c	Ports 29, 33	None	Not applicable
X620-8t-2x X620-10x	None	9,10	Front panel
X620-16t X620-16x X620-16p	None	15,16	Front panel
X670-G2-48x-4q	Ports 49,53,57,61	47,48	Front panel
X670-G2-72x	None	71,72	Front panel
X690-48t-2q-4c	Ports 61,69	None	Not applicable
X690-48x-2q-4c	Ports 61,69	None	Not applicable
X695-48Y-8C	61, 62	None	Front panel
X870-32c	Ports 121,125	None	Not applicable
X870-96x-8c	Ports 121,125	None	Not applicable

Available Stacking Methods

Most Extreme Networks switch models can use various methods of stacking.

Table 77 shows the switch models that can participate in each stacking method.

Table 77: SummitStack Methods

Stacking Method	Speed per Link (HDX)	Cable Type and Lengths	Switch Models
SummitStack	10 Gbps	0.5 m, 1.5 m, 3.0 m, 5.0 m, 20 Gb Stacking Cable	X460-G2
SummitStack-V	10 Gbps	0.5 m - 40 km SFP+, XENPAK (with SR, LR, and ER)	X440-G2 X450-G2 (10G models) X460-G2 (1G models with VIM-2x, VIM-2ss) X460-G2 (10G models) X620 X670-G2
SummitStack-V80 (supported in EXOS 30.1 and prior releases only)	20 Gbps	0.5 m - 100 m QSFP+ only	X670-G2-48x-4q (ports 57, 61)
SummitStack-V84	21 Gbps	0.5 m - 5 m QSFP+ passive copper	X450-G2 (rear panel 21G stacking ports)
SummitStack-V160	40 Gbps	0.5 m - 40 km QSFP+ only	X460-G2 (VIM-2q) X670-G2-48x-4q (ports 57, 61)
SummitStack-V160	42 Gbps	0.5 m - 40 km QSFP+	X590 X465 X690 X695 5520
SummitStack-V320	80 Gbps	0.5 m - 100 m QSFP+ only	X670-G2-48x-4q (ports 49, 53, 57, 61)

[2] Combined over paired ports

Table 77: SummitStack Methods (continued)

Stacking Method	Speed per Link (HDX)	Cable Type and Lengths	Switch Models
SummitStack-V400	106 Gbps	0.5 m - 20 m QSFP28 only	X590 (ports 61, 69) X690 (ports 61, 69) X695 (ports 61, 62) X870 (ports 121, 125)
SummitStack-V400 Alternative Configuration	100 Gbps	V400 Alternative Configuration is required when using specific fiber cables. This mode sets the stack ports to 100G, enables pre-emphasis, and FEC (clause_91). • QSFP28 SR4 • QSFP28 LR4 • QSFP28 CWDM4 • QSFP28 PSM4 • QxQ AOC cable - 5m • QxQ AOC cable - 7m • QxQ AOC cable - 10m • QxQ AOC cable - 20m	X590 (ports 61, 69) X690 (ports 61, 69) X695 (ports 61, 62) X870 (ports 121, 125)

For more details about the stacking methods that are available for each switch series, see the topics listed in Stacking Considerations for Each Switch Model on page 205.

Note

Because all switches in the stack must run the same version of ExtremeXOS, it is not possible to stack switches that require ExtremeXOS version 21, for example the X440-G2 and the X620, with switches that are incompatible with ExtremeXOS version 21, for example the X440 and the X460.

SummitStack Terms

Table 78 describes the terms used for the SummitStack feature. These terms are listed in the recommended reading sequence.

Table 78: List of Stacking Terms

Term	Description
Stackable switch	An ExtremeSwitching switch that provides two stacking ports and can participate in a stack.
Stacking port	A physical interface of a stackable switch that is used to allow the connection of a stacking link. Stacking ports are point-to-point links that are dedicated for the purpose of forming a stack.
Native stacking	A stacking configuration in which stack members are connected using either designated Ethernet data ports or dedicated stacking connectors.
Alternate stacking	A stacking configuration in which stack members are connected using 10-Gbps Ethernet data ports that have been configured for stacking. These ports are located either on the switch itself or on option cards installed on the rear of the switch.
Stacking link	A cable that connects a stacking port of one stackable switch to a stacking port of another stackable switch, plus the stacking ports themselves.
Node	A switch that runs the ExtremeXOS operating system and is part of a stack. Synonymous with *stackable switch*.
Stack	A set of stackable switches and their connected stacking links made with the intentions that: (1) all switches are reachable through their common connections; (2) a single stackable switch can manage the entire stack; and (3) configurable entities such as VLANs and link trunk groups can have members on multiple stackable switches. A stack consists of all connected nodes regardless of the state of the nodes.
Stack topology	A contiguously connected set of nodes in a stack that are currently communicating with one another. All nodes that appear in the `show stacking` command display are present in the stack topology.
Stack path	A data path that is formed over the stacking links for the purpose of determining the set of nodes that are present in the stack topology and their locations in the stack. Every node is always present in a stack path whether or not stacking is enabled on the node.
Control path	A data path that is formed over the stacking links that is dedicated to carrying control traffic, such as commands to program hardware or software image data for software upgrade. A node must join the control path to fully operate in the stack. A node that is disabled for stacking does not join the control path, but does communicate over the stack path.

Table 78: List of Stacking Terms (continued)

Term	Description
Active node	A node that has joined the control path. The active node can forward the control path messages or can process them. It can also forward data traffic. Only an active node can appear as a card inserted into a slot when the `show slot {slot {detail} | detail }` command is executed on the master node of the stack.
Active topology	A contiguous set of active nodes in a stack topology plus the set of stacking links that connect them. When an active topology consists of more than one node, each node in the active topology is directly and physically connected to at least one other node in the active topology. Thus, the active topology is a set of physically contiguous active nodes within a stack topology.
Candidate node	A node that is a potential member of an active topology, or an active node that is already a member of an active topology. A candidate node may or may not be an active mode – that is, it may or may not have joined the control path.
Node role	The role that each active node plays in the stack – either master (or primary), backup, or standby.
Master node	The node that is elected as the master (or primary) node in the stack. The master node runs all of the configured control protocols such as OSPF (Open Shortest Path First), RIP (Routing Information Protocol), Spanning Tree, and EAPS (Extreme Automatic Protection Switching). The master node controls all of its own data ports as well as all data ports on the backup and standby nodes. To accomplish this, the master node issues specific programming commands over the control path to the backup and standby nodes.
Backup node	The node assigned to take over the role of master if the master node fails. The master node keeps the backup node's databases synchronized with its own databases in preparation for such an event. If and when the master node fails, the backup node becomes the master node and begins operating with the databases it has previously received. In this way, all other nodes in the stack can continue operating.
Standby node	A node that is prepared to become a backup node in the event that the backup node becomes the master node. When a backup node becomes a master node, the new master node synchronizes all of its databases to the new backup node. When a node operates in a standby role, most databases are not synchronized – except those few that directly relate to hardware programming.

Table 78: List of Stacking Terms (continued)

Term	Description
Acquired node	A standby or backup node that is acquired by a master node. This means that the master node has used its databases to program the hardware of the standby or backup node. The standby or backup node has acted as a hardware programming proxy, accepting the instructions of the master node to do so. An acquired backup node maintains the databases needed to reflect why the hardware is programmed as it is. However, a standby node does not. An acquired node can be re-acquired (without a reboot) by the backup node only when the backup node becomes the master node, and only when both the backup and standby nodes were already acquired by the same master node at the time of its failure.
Data ports	The set of ports on a stackable switch that are available for connection to your data networks. Such ports can be members of a user-configured VLAN or trunk group. They can be used for Layer 2 and 3 forwarding of user data traffic, for mirroring, or other features you can configure. Data ports are different from stacking ports.
Failover	The process of changing the backup node to the master node when the original master node has failed. When a master node fails, if a backup node is present, and if that node has completed its initial synchronization with the master node, then the backup node assumes the role of master node. The standby nodes continue their operation and their data ports do not fail.
Hitless failover	A failover in which all data ports in the stack, except those of the failing master node, continue normal operation when the master node fails.
Node address	The unique MAC address that is factory-assigned to each node.
Node role election	The process that determines the role for each node. The election takes place during initial stack startup and elects one master node and one backup node. An election also takes place after a master node failover, when a new backup node is elected from the remaining standby nodes.
Node role election priority	A priority assigned to each node, to be used in node role election. The node with the highest node role election priority during a role election becomes the master node. The node with the second highest node role election priority becomes the backup.
Operational node	A node that has achieved operational state as a card in a slot. The operational state can be displayed using the `show slot {slot {detail} | detail }`command.
System uptime	The amount of time that has passed since the last node role election. You can display the system uptime by entering the `show switch {detail }` command on the master node.

Table 78: List of Stacking Terms (continued)

Term	Description
Stack segment	A collection of nodes that form a stack topology. The term is useful when a stack is severed. Each severed portion of the stack is referred to as a stack segment.
Stack state	A state assigned by the stack to a node. You can display the stack state by entering the `show stacking` command.
Easy Setup	A procedure that automatically configures the essential stacking parameters on every node for initial stack deployment, and then automatically reboots the stack to put the parameters into effect. The choice to run Easy Setup is offered when you run the `enable stacking {`**`node-address`** *`node-address`*`}` command and the essential stacking parameters are unconfigured or inconsistent. It can also be invoked directly by running the `configure stacking easy-setup` command.

Plan to Create Your Stack

Use the information in the following topics to plan the physical makeup of your stack – switches, versatile interface modules (VIMs), and cables – and the stacking protocols you will use. Included are:

- Guidelines and other information for each switch model in your stack
- Considerations for combining different switch models in a stack
- Information about stacking cables

Enabling and Disabling the Stacking-Support Option

The stacking-support option is enabled by default for many switch and option card configurations. However, some configurations require you to enable the stacking-support option before a switch can participate in a stack.

The topics in Stacking Considerations for Each Switch Model on page 205 describe whether or not each switch model has stacking support enabled by default.

- To enable stacking-support, issue the `enable stacking-support` command.

  You must enable stacking-support individually for every switch in the stack that does not have stacking support enabled by default.
- To disable stacking support, configure the switch data ports to use the Ethernet protocol instead of the stacking protocol.

  Use the `disable stacking-support` command.

Recommendations for Placing Switches for Stacked Operation

For best results in a SummitStack configuration, follow these recommendations for physically situating your equipment:

- Use the shortest possible stacking cables to connect the switches in the stack. This reduces the likelihood that the stacking cables might accidentally be damaged or disconnected. Stacking cables are available in lengths ranging from 0.3 meters to 100 meters.
- When possible, place all switches for the stack in the same rack or in adjacent racks. This facilitates using shorter stacking cables.
- The stack master is the switch, or node, through which you will perform the initial stack configuration, using the console port. For simplicity and ease of connecting the stacking cables, plan to designate the top switch in a vertical physical stack as the stack master. If switches are installed in several adjacent racks, place the stack master at one end of the row.
- Physically locate the intended master and backup nodes adjacent to each other, and plan to connect these nodes to each other directly so that ExtremeXOS application synchronization traffic is localized to a single stack link.
- On the master node, connect the Ethernet management port to your management network.
- To provide management access to the stack in case of a failure in the master switch, connect all switches that will participate in redundancy to your management network using the Ethernet management port on each switch.
- Use stacking cables to interconnect the stack nodes into a ring topology (see Ring Topology: Recommended for Stacking on page 193). Include only the nodes that you expect to be active in the stack.
- When you use the SummitStack 128G cable, SummitStack 64G cable, or SummitStack 128G/64G cable, we strongly recommend the use of cable management hardware to support the weight of the cables and to provide strain relief at the connectors.

Follow the recommendations in Recommendations for Configuring Stacks on page 204 to configure the software for your stack.

The recommended procedures for installing and interconnecting a stack are found in Set up the Physical Stack on page 224.

Recommendations for Configuring Stacks

When deploying a new stack, follow these recommendations for configuring the software:

- Plan to use the stack as if it were a single multi-slot switch. You need to decide the number and type of stackable switches in the stack and how the stack ports will be connected to the network.
- You can physically connect the stack to your networks before the nodes are configured. However, the default configuration on a switch in non-stacking mode assumes a default untagged VLAN that contains all switch ports. When first powered on, the switch acts as a Layer 2 switch, possibly resulting in network loops.

- Make sure all nodes support the SummitStack feature and are running the same ExtremeXOS software version. (See the *ExtremeXOS 30.7 Feature License Requirements*.) To view the ExtremeXOS software version on a node, restart the node and run the command:

  ```
  show version {detail | process name | images {partition partition}
  {slot slot_number} } .
  ```

  If any node does not have the right version, install the correct version on that node. Use the same image partition on all nodes. After stacking is enabled, images can be upgraded from the stack only if the same image is selected on all nodes.
- If you intend to deploy new units that might be part of a stack in the future, turn on stacking mode during initial deployment to avoid the need for a future restart. The only disadvantages of stacking mode are the loss of QoS (quality of service) profile QP7 and the reservation of some of the packet buffer space for stacking control traffic.
- You can configure the stack by logging into the master or any of the other nodes.
- If the master-capable stackable switches have different purchased license levels, you might need to configure license level restrictions on some nodes before those nodes can join the stack. See the *ExtremeXOS 30.7 User Guide* for more information about managing licenses.
- If the stack supports any feature pack license (such as MPLS or Direct Attach), that feature pack license must be installed on all master-capable nodes to support that feature and to prevent traffic interruption if a failover event occurs.
- Most stacking specific configurations are effective only after a restart. However, most non-stacking configuration commands take effect immediately and require no restart.
- A basic stack configuration can be achieved by using the Easy Setup procedure, as described in the *ExtremeXOS 30.7 User Guide*.
- If EAPS, Spanning Tree, or any Layer 2 redundancy protocol is not running on the network, make sure that your network connections do not form a network loop.

Follow the recommendations in Recommendations for Placing Switches for Stacked Operation on page 204 for physically situating your equipment.

Stacking Considerations for Each Switch Model on page 205 contains additional recommendations for the specific switch models in your stack.

Stacking Considerations for Each Switch Model

The following topics list basic information and special considerations pertaining to stacking for each of the ExtremeSwitching switch models.

- X620 Stacking on page 213
- X670-G2 Stacking on page 214
- X690 Stacking on page 216
- ExtremeSwitching X695 Stacking on page 216
- X870 Stacking on page 217

X440-G2 Stacking

The stacking-support option is not enabled by default for X440-G2 10G switch models. For more information, see Enabling and Disabling the Stacking-Support Option on page 203.

The stacking port selection option, which allows you to choose between native and alternate ports, is enabled by default for X440-G2 10G switch models. For more information, see Selecting Native and Alternate Stacking Ports on page 217.

Table 79: Stacking Methods for X440-G2 Switches

Stacking Method	Speed per Link (HDX)	Cable Type and Lengths
SummitStack-V (Front panel 10G models)	10 Gbps	0.5m–40km SFP+

Alternate stacking support is available on all X440-G2 10-gigabit models (10GE4) using two SFP+ ports, when the switch has been enabled for stacking (`enable stacking-support` command). 10G upgrade licensing is not required to enable stacking on the designated stack ports. Table 80 summarizes alternate stacking support for the various X440-G2 switch models.

Table 80: Alternate Stacking Ports for X440-G2 Switches

Switch Model	Type or location of Native Stacking Ports	Alternate Stacking Ports	Location of Alternate Stacking Ports
X440-G2-12t-10GE4 X440-G2-12p-10GE4	Fixed (front panel)	15,16	Front panel
X440-G2-24t-10GE4 X440-G2-24p-10GE4 X440-G2-24x-10GE4 X440-G2-24t-10GE4-DC	Fixed (rear panel)	27,28	Rear panel
X440-G2-48t-10GE4 X440-G2-48p-10GE4 X440-G2-48t-10GE4-DC	Fixed (rear panel, dedicated SFP+ port)	49,50	Rear panel

X450-G2 Stacking

The stacking-support option is enabled by default for X450-G2 switches. For more information, see Enabling and Disabling the Stacking-Support Option on page 203.

The stacking port selection option, which allows you to choose between native and alternate ports, is enabled by default for X450-G2 switches. For more information, see Selecting Native and Alternate Stacking Ports on page 217.

Table 81: Stacking Methods for X450-G2 Switches

Stacking Method	Speed per Link (HDX)	Cable Type and Lengths
SummitStack-V84 Uses rear panel dedicated 21 Gb stacking ports Available only in stacks of X450-G2 switches running the same version of ExtremeXOS	21 Gbps	0.5m, 1.0m, 3.0m. 5.0m QSFP+ passive copper cable
SummitStack-V (Front panel 10G models)	10 Gbps	0.5m–40km SFP+

Native Stacking for X450-G2 Switches

For native stacking with the X450-G2 switch, use the two fixed 21 Gb QSFP+ stacking ports on the rear of the switch, as shown in Figure 156. These stacking ports provide SummitStack-V84 stacking and can be stacked natively only with other X450-G2 switches.

SummitStack-V84 connections require direct-connect QSFP+ copper cables.

The X450-G2 is the only Extreme Networks switch that supports SummitStack-V84.

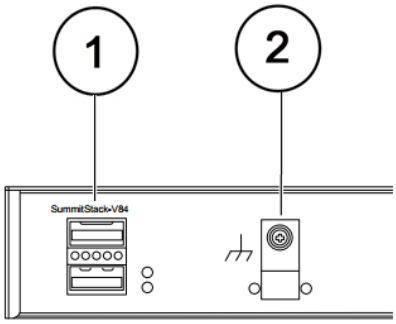


Figure 156: X450-G2 Switch: Native Stacking Ports

1 = 21 Gb QSFP+ stacking ports	2 = Grounding lug

Alternate Stacking for X450-G2 Switches

Alternate stacking (SummitStack-V) is supported for the X450-G2 10GE4 switch models, as summarized in Table 82. Use the front-panel 10G ports for alternate stacking.

Table 82: Alternate Stacking Ports for X450-G2 Switches

Switch Model	Type or location of Native Stacking Ports	Alternate Stacking Ports	Location of Alternate Stacking Ports
X450-G2-24t-10GE4 X450-G2-24p-10GE4	Fixed (rear panel)	27,28	Front panel
X450-G2-48t-10GE4 X450-G2-48p-10GE4	Fixed (rear panel)	51,52	Front panel

Additional Stacking Considerations for X450-G2 switches

Before deploying a new stack with X450-G2 switches, consider the following guidelines:

- Only the SummitStack-V and SummitStack-V84 stacking protocols are supported for the X450-G2 switch. SummitStack-V80 is not supported.
- In a stack that contains X450-G2 switches and other switch models, the X450-G2 switch might provide more memory and more features than the other switch models. Take this into account when you decide which switches will serve as the master and backup nodes, and when you configure failover operation.
- To use the failover feature in the stack, a second X450-G2 switch is recommended. It must be the backup node.
- If any supported feature pack is installed on the master-capable X450-G2 nodes, the following guidelines apply:
  - Every switch in the stack must meet the software and hardware requirements listed in the Feature License Requirements document.
  - Only the enhanced stacking protocol is supported for the X450-G2 switch. Every node that shares a stack with an X450-G2 switch must have enhanced stacking configured.
  - We recommend against mixing X450-G2, X460-G2, and X670-G2 switches in a stack.
  - X450-G2 switches support multiple types of QSFP+ stacking cables for connection between rear stacking ports (21 Gb ports) and QSFP+ ports on other Extreme Networks switches. For information on which cables to use with each type of Summit family switch, see Selecting Stacking Cables on page 220.

X460-G2 Stacking

The stacking-support option is enabled by default for X460-G2 switches. For more information, see Enabling and Disabling the Stacking-Support Option on page 203.

The stacking port selection option, which allows you to choose between native and alternate ports, is enabled by default for X460-G2 switches. For more information, see Selecting Native and Alternate Stacking Ports on page 217.

Table 83: Stacking Methods for X460-G2 Switches

Stacking Method	Speed per Link (HDX)	Cable Type and Lengths
SummitStack (rear panel, with VIM) See Native Stacking for X460-G2 Switches on page 209.	10 Gbps	0.5m, 1.5m, 3.0m, 5.0m
SummitStack-V160 (rear panel, with VIM) See Native Stacking for X460-G2 Switches on page 209.	40 Gbps	QSFP+
SummitStack-V (front panel 10G models) See Alternate Stacking for X460-G2 Switches on page 210.	10 Gbps	0.5m–40km SFP+

Native Stacking for X460-G2 Switches

X460-G2 1-gigabit switch models (GE4) support native stacking through an attached VIM-2ss or VIM-2q module.

The VIM-2ss module permits stacking using the standard SummitStack cables.

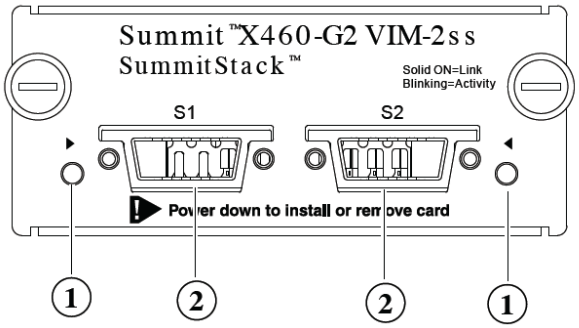


Figure 157: VIM-2ss SummitStack Module

1 = LEDs	2= Stacking ports

The VIM-2q module connects to QSFP+ cables to form stacks using the SummitStack-V160 protocol.

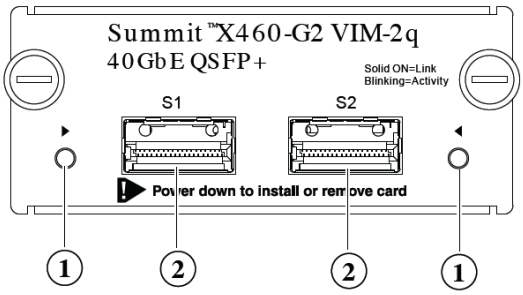


Figure 158: VIM-2q Port Option Card

1 = LEDs	2= QSFP+ ports

Note
VIMs are not hot swappable. You must power down the switch before installing any VIMs.

Alternate Stacking for X460-G2 Switches

X460-G2 10-gigabit switch models (10GE4) support alternate stacking (SummitStack-V feature) through the 10G SFP+ ports located on the front panel. See Summit X460-G2 (10G Models) Stack Configuration Guidelines on page 211 for additional considerations.

X460-G2 1-gigabit switch models (GE4) support alternate stacking through an attached VIM-2x module. See Summit X460-G2 (1G Models Using VIM Ports) Stack Configuration Guidelines on page 212 for additional considerations.

Note
40G ports on the VIM-2q cannot be partitioned into four 10G ports.

Table 84 summarizes alternate stacking support for X460-G2 switches.

When the stacking-support option is enabled (with the `enable stacking-support` command), data communication stops on the physical data ports that are designated for alternate stacking. Then, when stacking is enabled (with the `enable stacking` command), those ports – listed in the Alternate Stacking Ports column of Table 84 – operate using the stacking protocol for the logical stacking ports.

Table 84: Alternate Stacking Ports for X460-G2 Switches

Switch Model	Type or location of Native Stacking Ports	Alternate Stacking Ports	Location of Alternate Stacking Ports
X460-G2-24t-GE4 X460-G2-24p-GE4	VIM-2ss or VIM-2q	33,34	VIM-2x
X460-G2-48t-GE4 X460-G2-48p-GE4	VIM-2ss or VIM-2q	53,54	VIM-2x

Table 84: Alternate Stacking Ports for X460-G2 Switches (continued)

Switch Model	Type or location of Native Stacking Ports	Alternate Stacking Ports	Location of Alternate Stacking Ports
X460-G2-24t-10GE4 X460-G2-24x-10GE4 X460-G2-24p-10GE4	VIM-2ss or VIM-2q	31,32	Front panel
X460-G2-48t-10GE4 X460-G2-48x-10GE4 X460-G2-48p-10GE4	VIM-2ss or VIM-2q	51,52	Front panel

Note

- On X460-G2 24-port 10GE4 switches, ports 31 and 32 are not available as data ports when the alternate stacking ports are used.
- On X460-G2 48-port 10GE4 switches, ports 51 and 52 are not available as data ports when the alternate stacking ports are used.

Additional Stacking Considerations for X460-G2 Switches

When planning to use X460-G2 switches in a stack, note the following additional considerations:

- When using the VIM-2ss module, you can enable stacking without enabling stacking-support because the ports are native to the switch. All other VIMs require stacking-support to be enabled.
- The X460-G2 switch has “protocol enhanced” set by default. (Older switches, such as the X460, have “protocol standard” set by default. When you add a switch to a stack, make sure the new switch has "protocol enhanced" set so that it can communicate with the X460-G2 switch and the other switches in the stack.)
- See also Summit X460-G2 (10G Models) Stack Configuration Guidelines on page 211.
- See also Summit X460-G2 (1G Models Using VIM Ports) Stack Configuration Guidelines on page 212.

Summit X460-G2 (10G Models) Stack Configuration Guidelines

Before deploying a new stack with Summit X460-G2 10-gigabit switch models (10GE4), consider the following guidelines:

- In a stack that contains X460-G2 switches and other switch models, the X460-G2 switch might provide more memory and more features than the other switch models. Take this into account when you decide which switches will serve as the master and backup nodes, and when you configure failover operation.
- To use the failover feature in the stack, a second Summit X460-G2 switch is recommended. It must be the backup node.
- X460-G2 (10GE4) switches support SummitStack-V stacking on front panel 10G SFP+ ports, as well as native stacking through an attached VIM-2q or VIM-2ss module.

- Only the master and master-capable nodes require a license to support special features such as MPLS (Multiprotocol Label Switching).
- If the MPLS feature pack is installed on the master-capable nodes, the following guidelines apply:
  - Every switch in the stack must meet the software and hardware requirements listed in the Feature License Requirements document.
  - Only the enhanced stacking protocol is supported for the X460-G2 switch. Every node that shares a stack with an X460-G2 switch must have enhanced stacking configured.
  - We recommend against mixing X450-G2, X460-G2, and X670-G2 switches in a stack.
  - Summit X460-G2 switches support multiple types of QSFP+ stacking cables for connection between VIM-2q ports and QSFP+ ports on other Summit switches. For information on which cables to use with each type of Summit family switch, see Selecting Stacking Cables on page 220.
  - The last two front panel 10G ports are used for alternate stacking (SummitStack-V feature).
  - VIM-2q ports are used for SummitStack-V160G stacking.
  - VIM-2t ports are not used for stacking. These ports are used for user data.
  - A VIM-2q module attached to an X460-G2 switch supports LR4 PSM in 40G mode.
  - The X460-G2 switch supports the LR4 Parallel Single Mode (PSM) optical transceiver on 40G optical QSFP+ ports.
  - The LR4 PSM is supported on the following platforms: X440-G2, X450-G2, X460-G2, X620, X670-G2.

Summit X460-G2 (1G Models Using VIM Ports) Stack Configuration Guidelines

Before deploying a new stack with Summit X460-G2 1-gigabit switch models (GE4), consider the following guidelines:

- SummitStack-V stacking is supported through an attached VIM: VIM-2x, VIM-2q, or VIM-2ss.
- We recommend against mixing X450-G2, X460-G2, and X670-G2 switches in a stack if the desired routing table exceeds the supported limit.
- Support is available on ExtremeXOS version 16.1 or later.

ExtremeSwitching X465 Stacking

The stacking-support option is enabled by default for X465 switches. For more information, see Enabling and Disabling the Stacking-Support Option on page 203.

Table 85: Stacking Methods for X465 Switches

Stacking Method	Type or Location of Dedicated Stacking Ports	Speed per Link (HDX)	Cable Type and Lengths
ExtremeSwitching (front panel, dedicated)	S1, S2	42 Gbps	.5m, 1.0m, 3.0m, 5.0m, 10m, 20m QSFP+

For details about the `configure stacking-support` command, see the *ExtremeXOS 30.7 Command Reference Guide*.

X590 Stacking

X590 series switches can be stacked with other X590 switches, with X690 switches, X695 switches, and with X870 switches. X590 series switches support native stacking using front-panel data ports 29 and 33.

Alternate stacking is not supported for X590 switches.

The stacking-support option is disabled by default for all X590 switches. For more information, see Enabling and Disabling the Stacking-Support Option on page 203.

Table 86 summarizes stacking support for X590 switches.

Note
Only QSFP+ or QSFP28 direct-attach passive copper cable, at lengths up to 5 meters, can be used in X590 stacking ports.

Table 86: Stacking Methods for X590 Switches

Stacking Method	Speed per Link (HDX)	Cable Type and Lengths
SummitStack-V400 (Front panel ports 29, 33)	106 Gbps	0.5m - 20m QSFP28
SummitStack-V160 (Front panel ports 29, 33)	42 Gbps	0.5m - 40Km QSFP+

X620 Stacking

See X620 Stacking on page 92 for a full description of the X620 switch's stacking capabilities.

The stacking-support option is enabled by default for X620 switches. For more information, see Enabling and Disabling the Stacking-Support Option on page 203.

The stacking port selection option, which allows you to choose between native and alternate ports, is enabled by default for X620 switches. For more information, see Selecting Native and Alternate Stacking Ports on page 217.

Table 87: Stacking Methods for X620 Switches

Stacking Method	Speed per Link (HDX)	Cable Type and Lengths
SummitStack-V (Front panel 10G models)	10 Gbps	0.5m–40km SFP+

Table 88 summarizes alternate stacking support for X620 switches.

Table 88: Alternate Stacking Ports for X620 Switches

Switch Model	Type or location of Native Stacking Ports	Alternate Stacking Ports	Location of Alternate Stacking Ports
X620-8t-2x X620-10x	None	9,10	Front panel
X620-16t X620-16x X620-16p	None	15,16	Front panel

Note
The stacking ports on X620 switches do not support 10GBASE-T optics.

X670-G2 Stacking

The stacking-support option is enabled by default for X670-G2 switches. For more information, see Enabling and Disabling the Stacking-Support Option on page 203.

The stacking port selection option, which allows you to choose between native and alternate ports, is enabled by default for X670-G2 switches. For more information, see Selecting Native and Alternate Stacking Ports on page 217.

Table 89: Stacking Methods for X670-G2 Switches

Stacking Method	Speed per Link (HDX)	Cable Type and Lengths
SummitStack-V all X670-G2 switch models	10 Gbps	SFP+ to SFP+
SummitStack-V80 (supported in EXOS 30.1 and prior releases only) model 48x-4q only	20 Gbps	QSFP+ to QSFP+
SummitStack-V160 model 48x-4q only	40 Gbps	QSFP+ to QSFP+
SummitStack-V320 model 48x-4q only	80 Gbps	QSFP+ to QSFP+

Native Stacking for X670-G2 Switches

For X670-G2 native stacking, use the 4 x 40 Gb interfaces that are fixed on the front of the switch. Use any Extreme Networks certified 40G QSFP+ cable or optical transceiver to make the connections among the switches to be stacked.

For a complete listing of compatible cables and optical transceivers, see the *Extreme Hardware/Software Compatibility and Recommendation Matrices*.

[3] Combined over paired ports

X670-G2-48x-4q switches support native stacking using V160 and V320.

- For SummitStack-V160 stacking, use ports 57 and 61.
- For SummitStack-V320 stacking, use ports 49, 53, 57, and 61.

X670-G2-72x switches support do not support native stacking.

Alternate Stacking for X670-G2 Switches

Table 90 summarizes alternate stacking support for X670-G2 switches.

Table 90: Alternate Stacking Ports for X670-G2 Switches

Switch Model	Type or location of Native Stacking Ports	Alternate Stacking Ports	Location of Alternate Stacking Ports
X670-G2-48x-4q	Ports 49,53,57,61	47,48	Front panel
X670-G2-72x	None	71,72	Front panel

Note

- On X670-G2-48x-4q switches, ports 47 and 48 are not available as data ports when the alternate stacking ports are used.
- On X670-G2-72x switches, ports 71 and 72 are not available as data ports when the alternate stacking ports are used.

Additional Stacking Considerations for X670-G2 Switches

Before deploying a new stack with X670-G2 switches, consider the following guidelines:

- In a stack that contains X670-G2 switches and other switch models, the X670-G2 switch might provide more memory and more features than the other switch models. Take this into account when you decide which switches will serve as the master and backup nodes, and when you configure failover operation.
- To use the failover feature in the stack, a second X670-G2 switch is recommended. It must be the backup node.
- Only the master and master-capable nodes require a license to support special features such as MPLS.
- If the MPLS feature pack is installed on the master-capable nodes, the following guidelines apply:
  - Every switch in the stack must meet the software and hardware requirements listed in the Feature License Requirements document.
  - Every node that shares a stack with an X450-G2 switch must have enhanced stacking configured.
  - We recommend against mixing X450-G2, X460-G2, and X670-G2 switches in a stack.
  - The X670-G2-48x-4q switch supports the LR4 Parallel Single Mode (PSM) optical transceiver on 40G optical QSFP+ ports.

X690 Stacking

X690 series switches can be stacked with other X690 switches, with X590 switches, X695 switches, and with X870 switches. They support native stacking using front-panel data ports 61 and 69.

Note
The front-panel ports used for stacking on the X690 switch are located side by side, rather than above and below as on most other switch models.

Note
Only QSFP28 direct-attach passive copper cable, at lengths up to 5 meters, can be used in X690 stacking ports.

Alternate stacking is not supported for X690 switches.

The stacking-support option is disabled by default for all X690 switches. For more information, see Enabling and Disabling the Stacking-Support Option on page 203.

Table 91 summarizes stacking support for X690 switches.

Table 91: Stacking Methods for X690 Switches

Stacking Method	Speed per Link (HDX)	Cable Type and Lengths
SummitStack-V400 (Front panel ports 61,69)	106 Gbps	0.5m - 20m QSFP28
SummitStack-V160 (Front panel ports 61,69)	42 Gbps	0.5m - 40Km QSFP+

ExtremeSwitching X695 Stacking

The stacking-support option is disabled by default for X695 switches. For more information, see Enabling and Disabling the Stacking-Support Option on page 203.

Table 92: Stacking Methods for the X695 Switch

Stacking method	Type or location of dedicated stacking ports	Speed per link (HDX)	Cable type and lengths
ExtremeSwitching (front panel, dedicated)	61, 62	42 Gbps	0.5m - 40Km QSFP+
		106 Gbps	0.5m - 20m QSFP28

For details about the `enable stacking-support` command, see the *ExtremeXOS 30.7 Command Reference Guide*.

X870 Stacking

X870 series switches support native stacking using front-panel data ports 121 and 125. They can be stacked with other X870 switches, with X590 switches, and with X690 switches. Alternate stacking is not supported.

The stacking-support option is disabled by default for all X870 switches. For more information, see Enabling and Disabling the Stacking-Support Option on page 203.

Table 93 summarizes stacking support for X870 switches.

Note
Only QSFP28 direct-attach passive copper cable, at lengths up to 5 meters, can be used in X870 stacking ports.

Table 93: Stacking Methods for X870 Switches

Stacking Method	Speed per Link (HDX)	Cable Type and Lengths
SummitStack-V400 (Front panel ports 121,125)	106 Gbps	0.5m - 20m QSFP28

Selecting Native and Alternate Stacking Ports

On switches that provide both native stacking ports and alternate stacking ports (described in Stacking Considerations for Each Switch Model on page 205), you can configure each logical stacking port to use either the native stacking port or the alternate stacking port. You can configure logical stacking ports to use any of the following physical stacking port configurations:

- Two native stacking ports
- Two alternate stacking ports
- One native stacking port and one alternate stacking port

When the Stacking Port Selection Control option is enabled in a switch's configuration, you can choose between native and alternate stacking ports. The default selection is the native stacking ports.

- To select between the native and alternate stacking ports, use the following command for each switch in the stack:
  ```
  configure stacking-support stack-port [stack-ports | all] selection
  [native { | V160 |V320 | V400} | alternate]
  ```

  Note
  Not all options are available for all switches. Refer to Stacking Considerations for Each Switch Model on page 205 for details.

- To display the stacking and stacking-support configuration, use the following commands:
  ```
  show stacking-support

  show stacking stack-ports
  ```

`show stacking {`**`node-address`** *`node_address`* `|` **`slot`** *`slot_number`*`}` **`detail`**

- To unconfigure the stacking-support feature, use the following command:

  `unconfigure stacking-support`

  Note
  Commands that contain the **`stacking-support`** keyword apply to the local switch only. This means that each switch that will use alternate stacking ports must be configured separately. When the stack is fully active, you can use the `telnet slot` *`slot-number`* command to log in to another node over the stack to unconfigure SummitStack-V on that node only. There is no way to intentionally or accidentally unconfigure the stacking-support options on all nodes in a stack.

- When the stacking-support feature has been configured as required on all nodes in a stack, reboot each node.
- Run the `show stacking stack-ports` command to verify that the stack has been properly connected.

Combining Switches from Different Series

ExtremeSwitching switches can be stacked in the combinations listed in Table 94 on page 219. For each combination, one or more of the following stacking methods are displayed:

40G
40G mode (X460-G2 switches with VIM)

SS
SummitStack

V
SummitStack-V

V80
SummitStack-V80

V84
SummitStack-V84 (X450-G2 switches)

V160
SummitStack-V160

V320
SummitStack-V320

V400

SummitStack-V400

Table 94: Matrix of Switches and Stacking Methods

Stack with	X440-G2[1]	X450-G2[2]	X460-G2[1]	X590[3]	X465	X620	X670-G2[4]	X690	X695	X870
X440-G2[1]	V	V	V			V	V			
X450-G2[2]	V	V V84	V			V	V			
X460-G2[1]	V	V	40G SS V V160			V	V V160			
X590[3]				V400	V160			V400	V400	V400
X465				V160				V160	V160	
X620	V	V	V			V	V			
X670-G2[4]	V	V	V V160			V	V V80 (supported in EXOS 30.1 and prior releases) V160 V320			
X690				V400	V160			V400	V400	V400
X695				V400	V160			V400	V400	V400
X870				V400				V400	V400	V400

Note

1. For X440-G2 and X460-G2, SummitStack-V is available only on 10G models.
2. For X450-G2, SummitStack-V is available only on 10G models. SummitStack-V84 is available only in stacks that consist entirely of X450-G2 switches.
3. The X590 is not supported with ExtremeXOS version 30.1.
4. The X670-G2-72x can stack only with SummitStack V using front panel 10G ports.

In a stack that has switch models from more than one series, we recommend that the stack master and backup nodes be from the same switch series. For example, if an X460-G2 switch is the stack master, the backup node should also be an X460-G2 switch. Refer to the list in Master/Backup Switch Redundancy on page 191.

Stack configuration, easy setup, and redundancy are fully described in the *ExtremeXOS 30.7 User Guide*.

Selecting Stacking Cables

Depending on the switch model and the number and type of stacking ports, the bidirectional stacking link provides 40 Gbps, 80 Gbps, or 160 Gbps full-duplex bandwidth.

Stacking connections using the native stacking ports require stacking cables that are specific to the type of stacking port. These cables are available from Extreme Networks in lengths from 0.5 meter to 100 meters.

Table 95 lists the cable types that have been verified by Extreme Networks for use as stack connection hardware, along with the switches or modules with which each type is compatible.

Caution
Use of non-recommended cables or optics could cause stack instability.

Note
You can use certain other fiber cables and optical transceivers for stacking on X590, X690, and X870 switches. Additional configuration is required. For details, see Alternative Configuration for Optics on X590, X690, X695, and X870 Switches on page 222.

Table 95: Available Stacking Cables for Extreme Networks Switches

Part Number	Cable Type, Length	Compatible Ports and Devices
16105	SummitStack, 5 meter	20-Gbps stacking ports on VIM-2ss on X460-G2 switches
16106	SummitStack, 0.5 meter	
16107	SummitStack, 1.5 meter	
16108	SummitStack, 3 meter	
10304	10GBASE-CR SFP+ pre-terminated twin-ax copper cable, 1 meter	10G stacking ports on X440-G2, X450-G2 10G, and X620 switches
10305	10GBASE-CR SFP+ pre-terminated twin-ax copper cable, 3 meters	
10306	10GBASE-CR SFP+ pre-terminated twin-ax copper cable, 5 meters	
10307	10GBASE-CR SFP+ pre-terminated twin-ax copper cable, 10 meters	10G stacking ports on X440-G2 (48-port switches only) and X450-G2 10G switches

Table 95: Available Stacking Cables for Extreme Networks Switches (continued)

Part Number	Cable Type, Length	Compatible Ports and Devices
10311	QSFP+ direct-attach passive copper cable, 0.5 meter	21-Gbps stacking ports on X450-G2 switches, QSFP+ ports on X670-G2-48x-4q switches 40-Gbps stacking ports on X465, VIM5-4x, and VIM5-4XE
10312	QSFP+ direct-attach passive copper cable, 1 meter	21-Gbps stacking ports on X450-G2 switches, QSFP+ ports on X670-G2-48x-4q switches 40-Gbps stacking ports on X465, VIM5-4x, and VIM5-4XE
10313	QSFP+ direct-attach passive copper cable, 3 meters	21-Gbps stacking ports on X450-G2 switches, QSFP+ ports on X670-G2-48x-4q switches 40-Gbps stacking ports on X465, VIM5-4x, and VIM5-4XE
10313A	QSFP+ direct-attach passive copper cable, 3 meters, 26 AWG	21-Gbps stacking ports on X450-G2 switches, QSFP+ ports on X670-G2-48x-4q switches
10315	QSFP+ direct-attach active optical cable, 10 meters	40-Gbps stacking ports on X465, VIM5-4x, and VIM5-4XE QSFP+ ports on X670-G2-48x-4q switches
10316	QSFP+ direct-attach active optical cable, 20 meters	40-Gbps stacking ports on X465, VIM5-4x, and VIM5-4XE
10317	QSFP+ direct-attach active optical cable, 50 meters	QSFP+ ports on X670-G2-48x-4q switches
10318	QSFP+ direct-attach active optical cable, 100 meters	
10323	QSFP+ direct-attach passive copper cable, 5 meters	21-Gbps stacking ports on X450-G2 switches 40-Gbps stacking ports on X465, VIM5-4x, and VIM5-4XE
10336	QSFP+ active optical cable, 3 meters	40-Gbps ports on X670-G2 switches; 40-Gbps VIM ports on X460-G2 switches
10337	QSFP+ active optical cable, 5 meters	
10410	QSFP28 passive copper cable, 0.5 meters	100-Gbps ports on X590, X690, and X870 switches
10411	QSFP28 passive copper cable, 1 meter	
10413	QSFP28 passive copper cable, 3 meters	
10414	QSFP28 passive copper cable, 5 meters	
10441	QSFP28 x 4SFP28 (4x25Gb) active optical breakout cable, 5 meters	100-Gbps ports on X590, X690, and X870 switches (see Alternative Configuration for Optics on X590, X690, X695, and X870 Switches on page 222 for more information)

Table 95: Available Stacking Cables for Extreme Networks Switches (continued)

Part Number	Cable Type, Length	Compatible Ports and Devices
10442	QSFP28 x 4SFP28 (4x25Gb) active optical breakout cable, 7 meters	
10443	QSFP28 x 4SFP28 (4x25Gb) active optical breakout cable, 10 meters	
10444	QSFP28 x 4SFP28 (4x25Gb) active optical breakout cable, 20 meters	

Note
For the most recent information about available cables, contact your Extreme Networks sales representative or refer to *Extreme Hardware/Software Compatibility and Recommendation Matrices*.

Alternative Configuration for Optics on X590, X690, X695, and X870 Switches

To use certain fiber cables and optical transceivers for stacking on X590, X690, X695, and X870 switches, you must use the `V400 alternative-configuration` option on the `configure stacking-support` command. This option sets the stacking ports to 100 Gb, enables pre-emphasis, and enables error correction using IEEE 802.3bj Clause 91 RS-FEC.

Table 96 lists cables and transceivers that require the use of `V400 alternative-configuration`:

Table 96: Cables and Transceivers that Require Alternative Configuration

Part Number	Cable or Transceiver
10401	100Gb SR4 QSFP28 MMF transceiver
10403	100Gb LR4 QSFP28 transceiver
10404	100Gb CWDM4 QSFP28 SMF transceiver
10405	100Gb PSM4 QSFP28 SMF transceiver
10441	QSFP28 x 4SFP28 (4x25Gb) active optical breakout cable - 5 meters
10442	QSFP28 x 4SFP28 (4x25Gb) active optical breakout cable - 7 meters
10443	QSFP28 x 4SFP28 (4x25Gb) active optical breakout cable - 10 meters
10444	QSFP28 x 4SFP28 (4x25Gb) active optical breakout cable - 20 meters

For details about the `configure stacking-support` command, see the *ExtremeXOS 30.7 Command Reference Guide*.

Using the Extreme Stacking Tool

The Extreme Stacking Tool provides an easy way to plan your stack. As you select various switch models and stacking methods, the tool shows you:

- What switch models can be stacked together and which cannot.
- Whether switching methods – for example, SummitStack-V and SummitStack-V80 (supported in EXOS 30.1 and prior releases only) – are compatible with the selected switches.
- Statistics showing the routing options that are available with every stack combination.
- Recommendations about which switches should be the stack master and backup.
- Information about the supported versions of ExtremeXOS for every combination.

To use the Stacking Tool, follow these steps.

1. Open the Stacking Tool (https://stackingtool.extremenetworks.com/StackingTool/) in a web browser.

   Note
   The Stacking Tool is also available in the Support Tools section of the Extreme Portal.

2. Find a switch model in the **Switches** column.

   Each switch model is represented by a rectangle, as shown in the example in the following figure. In this example, stacking ports are represented by S1 and S2 on the right side.

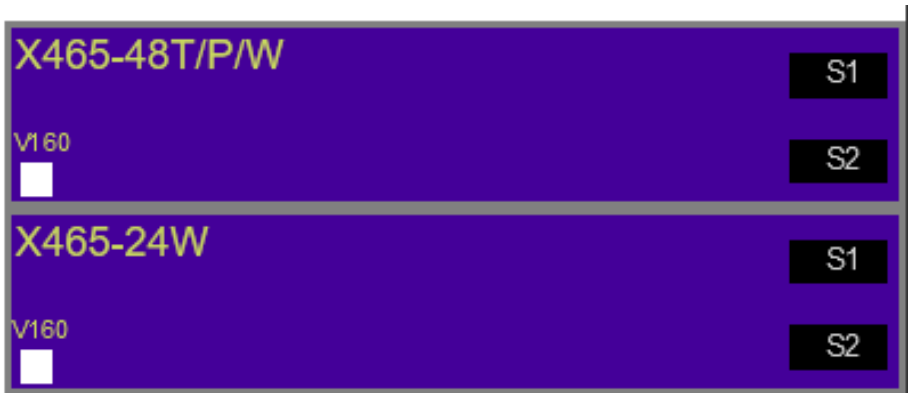


Figure 159: X465 Switches Shown in the Stacking Tool

Tip
Click a rectangle to display more information about the switch model and the VIMs (if any) that it can use for stacking.

3. Drag the rectangle to the first slot in the Stack column in the middle of the page.
   To the right of the Stack column, the tool displays statistics about available routes, supported software versions, and master/backup recommendations.

   Tip
   If you don't see statistics and other information, click the arrow (> symbol) to the immediate right of the Stack column.

4. Use the tool in any of the following ways:
   - Select other switches and drag them to the slots in the stacking column.
   - For any switch in the stack, click the S1 and S2 symbols to choose stacking methods – for example, SummitStack-V and SummitStack-V80 (supported in EXOS 30.1 and prior releases only).
   - To remove a switch from the stack, drag it away from the stacking column.

   Whenever you add or remove a switch from the stack, the statistics and recommendations update automatically.

In addition to statistics and recommendations, colors in the display show whether the selected switch models and stacking methods are compatible.

Table 97: Colors in the Stacking Tool Display

Color	Meaning
Green	Compatible and preferred
Blue	Compatible
Yellow	Incompatible with the selected master node
Red	Incompatible

Set up the Physical Stack

After you have installed the individual switches (see "Installing Your Switch"), follow these steps to create the physical stack.

1. Connect the switches that will form the stack.
   See Connecting the Switches to Form the Stack Ring on page 224.
2. Connect the switches to your management network.
   See Connect Your Stack to the Management Network on page 232.

After setting up and connecting the switches, perform software configuration for the stack. See "Configuring a New Stack" in the *ExtremeXOS 30.7 User Guide*.

Connecting the Switches to Form the Stack Ring

After you have installed the individual switches, connect them together using the stacking cables.

The examples in this section show cable connections and the recommended order for connecting ports to facilitate the easy setup configuration.

In general, it is best to connect Stack Port 2 on one switch to Stack Port 1 on the switch with the next higher slot number. Although you can connect the switches in any order, connecting them as shown in these examples will produce better predictability and easier software configuration.

All connections between stack ports must be directly between switches. A stacking connection cannot pass through a third device, for example a Virtual Port Extender or an LRM/MACsec Adapter.

It is essential to create an unbroken data path through all the switches in the stack.

For instructions to connect specific types of stacking cables, see Connect Stacking Cables on page 230.

Combine Different Types of Stacking Ports

Figure 160 shows an example stack configuration using the following switches: X440-G2, X450-G2, X460-G2, and X620.

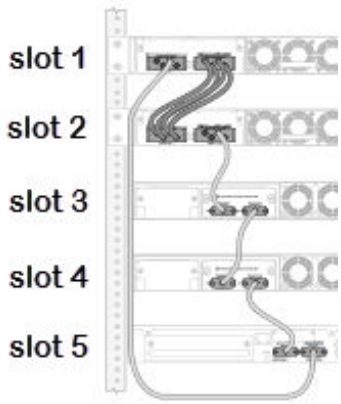


Figure 160: Combining Stacking Port Types: Example

Note
The figure is intended to show cable connections between switches. Details of the switches themselves, such as the location of the stacking ports and fan modules, might differ from those of the switches that actually would be used.

The following cables are used to make the stacking connections:

- QSFP+ cable connecting the two switches at the top (slot 1 and slot 2)
- SFP+ cable connecting the switch in slot 2 with the switch in slot 3
- SFP+ cable connecting the switch in slot 3 with the switch in slot 4
- SFP+ cable connecting the switch in slot 4 with the switch in slot 5
- SFP+ cable connecting the switch in slot 5 with the switch in slot 1

Table 98 lists the recommended order for connecting the stacking ports in this example.

Table 98: Combining Stacking Port Types: Connections

Connect this slot and port . . .		. . . To this slot and port	
Slot 1	Stack Port 2	Slot 2	Stack Port 1
Slot 2	Stack Port 2	Slot 3	Stack Port 1
Slot 3	Stack Port 2	Slot 4	Stack Port 1
Slot 4	Stack Port 2	Slot 5	Stack Port 1
Slot 5	Stack Port 2	Slot 1	Stack Port 1

Use SummitStack-V160 Stacking

A stacking rate of 160 Gbps can be achieved using certain configurations of Extreme Networks switches. For example, an X460-G2 switch can be connected to an X670-G2-48x-4q switch through 40-Gbps stacking connections that provide 160 Gbps full-duplex bandwidth. This connection is performed using the VIM-2q module in the X460-G2 switch and the QSFP+ ports on the X670-G2-48x-4q switch.

Using SummitStack-V320 Stacking

A stacking rate of 320 Gbps can be achieved across a stack of X670-G2-48x-4q switches using the QSFP+ connection and cables. These switches can use 80-Gbps stacking connections that provide 320 Gbps full-duplex bandwidth.

Examples of Valid Stacking Configurations

The X460-G2 accommodates the VIM-2ss SummitStack module, which provides SummitStack ports.

The examples in the following sections show various physical stacking arrangements: all switches in a single rack, switches in two adjacent racks, and switches at the tops of several racks in a row.

Example: Basic Stack with Four Switches

This example shows a stack of four switches in a single rack.

The slot numbers presume a console connection to the switch at the top of the physical stack.

Figure 161 shows cable connections for a 4-node stack using SummitStack 40G cables to connect switches with integrated SummitStack ports.

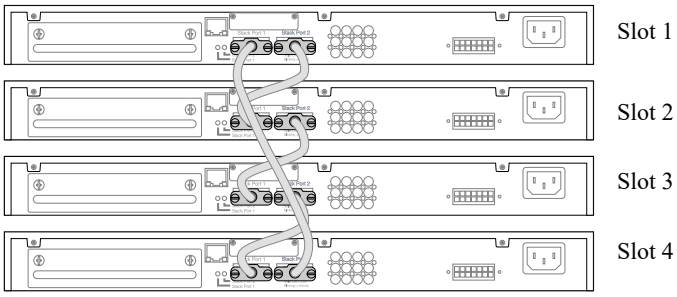


Figure 161: SummitStack Cable Connections Using Four Switches with Integrated SummitStack Ports

Table 99 lists the recommended order for connecting the stacking ports in this example.

Table 99: Basic Stack with Four Switches: Connections

Connect this slot and port . . .		. . . To this slot and port	
Slot 1	Stack Port 2	Slot 2	Stack Port 1
Slot 2	Stack Port 2	Slot 3	Stack Port 1
Slot 3	Stack Port 2	Slot 4	Stack Port 1
Slot 4	Stack Port 2	Slot 1	Stack Port 1

Example: Basic Stack with Eight Switches

Figure 162 shows cable connections for an 8-node stack using SummitStack 40G cables to connect switches with integrated SummitStack ports.

Figure 162: SummitStack Cable Connections Using Eight Switches with Integrated SummitStack Ports

Table 100 lists the recommended order for connecting the stacking ports in this example.

Table 100: Basic Stack with Eight Switches: Connections

Connect this slot and port . . .		. . . To this slot and port	
Slot 1	Stack Port 2	Slot 2	Stack Port 1
Slot 2	Stack Port 2	Slot 3	Stack Port 1
Slot 3	Stack Port 2	Slot 4	Stack Port 1
Slot 4	Stack Port 2	Slot 5	Stack Port 1
Slot 5	Stack Port 2	Slot 6	Stack Port 1
Slot 6	Stack Port 2	Slot 7	Stack Port 1
Slot 7	Stack Port 2	Slot 8	Stack Port 1
Slot 8	Stack Port 2	Slot 1	Stack Port 1

Example: Stack with VIM1-SummitStack Modules

Figure 163 shows an example of a four-switch stack that combines two different switch models: two of each model; four switches in all. For the first switch model, the stacking ports are on installed VIM1-SummitStack modules. For the second switch model, the stacking ports are on installed SummitStack stacking modules. The recommended order for connecting the stacking ports is the same as for the example in Example: Basic Stack with Eight Switches on page 227.

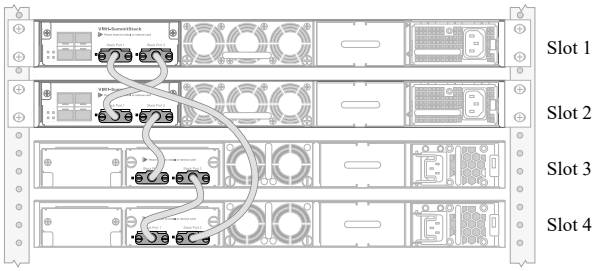


Figure 163: SummitStack Configuration Using Different Switch Models and SummitStack 40G Cables

Example: Stacked Switches across Two Racks

The following example shows four switches – two of one model, two of another model – physically located in two adjacent racks.

Each rack has a switch of one model at the top, with a switch of another model below it. The switches are connected into a stack using SummitStack ports on installed VIM2-SummitStack and VIM1-SummitStack modules. In this example, start by connecting the top switches together; they will be designated the stack primary and backup nodes (slot 1 and slot 2, respectively).

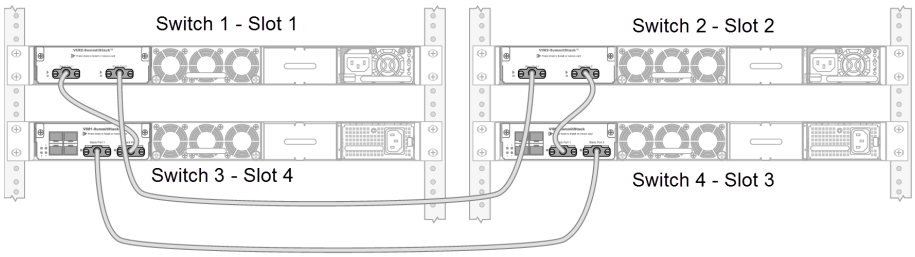


Figure 164: SummitStack Connections Using Four Switches with SummitStack Ports on VIMs

Table 101 lists the recommended order for connecting the stacking ports in this example.

Table 101: Stacked Switches across Two Racks: Connections

Connect this slot and port . . .		. . . To this slot and port	
Slot 1	Stack Port 2	Slot 2	Stack Port 1
Slot 2	Stack Port 2	Slot 3	Stack Port 1
Slot 3	Stack Port 2	Slot 4	Stack Port 1
Slot 4	Stack Port 2	Slot 1	Stack Port 1

Example: Stacked Switches across Several Racks

Figure 165 shows five switches installed at the tops of five adjacent racks. To accommodate the shortest possible cables, immediately adjacent switches are not always connected together. Port 2 on one switch is connected to Port 1 on the next

connected switch. If the easy setup feature is used to configure the stack parameters, the assigned slot numbers will be as shown in the figure.

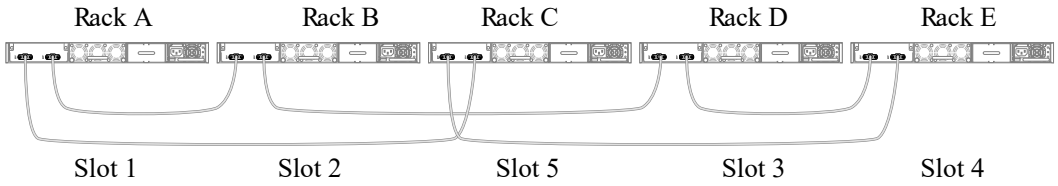


Figure 165: Top-of-Rack Stack Installation

Table 102 lists the recommended order for connecting the stacking ports in this example.

Table 102: Stacked Switches across Several Racks: Connections

Connect this slot and port . . .			. . . To this slot and port		
Slot 1	Rack A	Port 2	Slot 2	Rack B	Port 1
Slot 2	Rack B	Port 2	Slot 3	Rack D	Port 1
Slot 3	Rack D	Port 2	Slot 4	Rack E	Port 1
Slot 4	Rack E	Port 2	Slot 5	Rack C	Port 1
Slot 5	Rack C	Port 2	Slot 1	(Rack A	Port 1

Connect Stacking Cables

To connect switches in a SummitStack configuration, use the appropriate stacking cables for the specific stacking ports on the switches.

Connect a SummitStack Cable to a Stacking Port

SummitStack cables are used to connect 20-Gbps SummitStack ports on the X460-G2 switch with the SummitStack plug-in module.

To connect a SummitStack cable, follow these steps:

1. Align the cable connector with the stacking port connector on the rear of the first switch (see Figure 166).
2. Firmly press the cable connector into place on the mating stacking port connector.
3. Align and tighten the retaining screws on the cable connector.

4. Repeat steps 1 through 3 to connect the cable to the second switch.

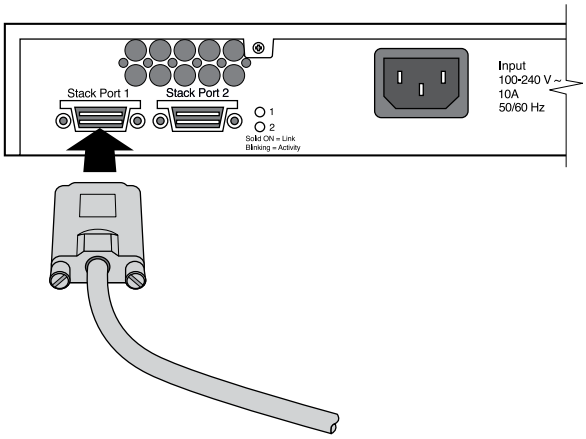


Figure 166: Connecting a SummitStack Cable

Caution
Avoid making sharp bends in the cable. Sharp bends can stress the cable and cause damage.

Connect Active or Passive QSFP+ Cables

The QSFP+ direct-attach cable is used to connect ports on any of the following modules:

- X460-G2 switch with VIM-2q module, which supports SummitStack-V160
- X670-G2-48x-4q switch, which supports SummitStack-V80, V-160, or V-320

Follow these steps to connect a QSFP+ direct-attach cable.

1. Holding the QSFP+ connector by its sides, insert the connector into the port on the switch as shown in the following figures.

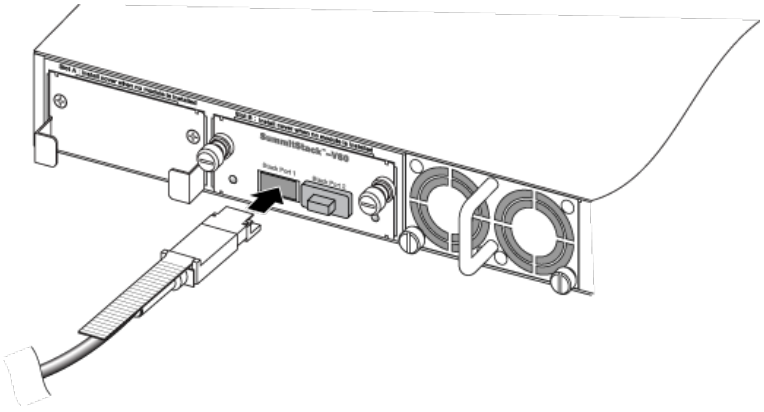


Figure 167: Connecting a QSFP+ Passive Copper Direct-Attach Cable to a SummitStack-V Module

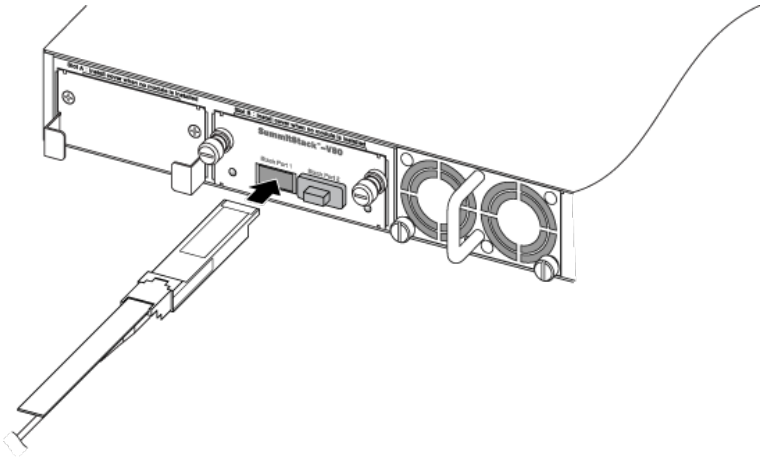


Figure 168: Connecting a QSFP+ Active Optical Direct-Attach Cable to a SummitStack-V Module

2. Push the connector into the port until you hear it click into place.

Connect Your Stack to the Management Network

Before you can configure ExtremeXOS for a new stack, your management console must be connected to at least one switch in the stack.

Connect your management console to the Ethernet management port on the switch that will become the stack primary node. If you plan to configure redundancy, connect to the console ports of all switches in the stack that will be primary-capable.

If you followed the cabling examples in Connecting the Switches to Form the Stack Ring on page 224, and if you use the Easy Setup configuration procedure, only slots 1 and 2 can become the primary node. However, you can connect all switch management ports in the stack if you choose to do so. There is an alternate IP address configuration that will enable you to log in directly to each switch in the stack through its Ethernet management port.

See the *ExtremeXOS 30.7 User Guide* for instructions to perform the software configuration for your stack.

Installing Your Extreme Networks Switch

Before you attempt to install or remove an Extreme Networks switch, read the precautions in Safety Considerations for Installing Switches on page 234.

If you are installing switches for use in a SummitStack configuration, read Building Stacks on page 189 before you install the switches.

Note
For information about installing older Summit-branded switches, refer to *ExtremeSwitching and Summit Switches: Hardware Installation Guide for Switches Using ExtremeXOS 16 or Earlier*.

Extreme Networks switches fit into standard 19-inch equipment racks.

A four-post fixed rack-mounting kit (XN-46-RKMT-001) is provided with the X465 Series switch. A two-post kit (XN-2P-RMKIT-001) can be ordered separately.

The provided rack-mounting brackets attach to the front of the switch and are adaptable to either a front-mount or mid-mount installation. Optional rear-mounting brackets are also included for four-post racks or cabinets.

The installation process includes the following tasks:

1. Prepare the site for installing the switch.

   See Pre-installation Requirements on page 235.
2. Install the switch in the rack.

   See Attaching the Switch to a Rack or Cabinet on page 236.

3. Install optional components: optical transceivers, port option cards, versatile interface modules (VIMs), and stacking modules.

   See the instructions in Installing Optional Components on page 240.
4. Install one or two power supplies (for switches that require them) and connect to an electrical source.

   See Installing Internal Power Supplies on page 240.

   Note
   Be aware of whether you are installing an AC-powered switch or a DC-powered switch. The installation instructions are different depending upon what type of power is used.

5. Connect power to the switch.

   See Connecting Power to the Switch on page 271.
6. For a stacked configuration, connect stacking cables.

   See Connecting the Switches to Form the Stack Ring on page 224.
7. Connect network interface cables.

   See Connect Network Interface Cables on page 272.
8. Perform initial network connection and configuration.

   See Performing Initial Management Tasks on page 272.

Safety Considerations for Installing Switches

Read the information in this chapter thoroughly before you attempt to install or remove an Extreme Networks switch.

Ensure that proper ESD (electrostatic discharge) controls are in use before switch maintenance is performed. This includes but is not limited to wrist straps that are grounded to the switch housing and earth grounds.

Warning
Connect the chassis ground wire **before** you connect any DC power cables.
Disconnect the ground wire **after** you disconnect all DC power cables.

Take care to load the equipment rack so that it is not top-heavy. Start installing equipment at the bottom of the rack and work up.

Do not cover vents that would restrict airflow.

Note
See Safety and Regulatory Information on page 507 for additional safety information.
See Technical Specifications on page 395 for additional information regarding regulatory compliance certifications.

Pre-installation Requirements

Prepare the site for the installation, and ensure that you have the appropriate people and tools on hand.

Installing most ExtremeSwitching series switches requires two people to maneuver the switch and attach mounting hardware.

Provide enough space in front of and behind the switch so that you can service it easily. Allow a minimum of 48 inches (122 cm) in front of the rack and 30 inches (76 cm) behind the rack.

Some ExtremeSwitching switches give you the option of choosing the airflow direction: front-to-back or back-to-front. If your switch has internal power supplies, make sure they have the same airflow direction as the fans in the switch.

Other switches support airflow in only one direction. If your switch model supports only front-to-back airflow and requires the purchase of internal power supplies, make sure that the power supplies are for front-to-back ventilation airflow.

The following items are provided with ExtremeSwitching switches:

- Screws for attaching mounting brackets to the switch housing.
- Two rack mounting brackets adaptable for either a front-mount or mid-mount installation.
- Two rear mounting brackets (rails) for rear mounting in a four-post or cabinet installation.

Note

Rails are supplied only with the following switches:

- X450-G2
- X460-G2 PoE models:
  - X460-G2-24p-GE4
  - X460-G2-24p-10GE4
  - X460-G2-24p-24hp-10GE4
  - X460-G2-16mp-32p-10GE4
  - X460-G2-48p-GE4
  - X460-G2-48p-10GE4
- X465
- X670-G2
- X690
- X870

You need the following additional tools and equipment. These are not provided with your switch.

- Rack mounting screws: eight for a four-post installation; four for other installations. The screw size will vary based on your organization's rack system. Screws are not provided.
- Screwdriver for securing the switch to the rack. The screwdriver size will vary based on the requirements for the rack system you are using.
- #2 Phillips screwdriver to attach bracket screws that are provided with the switch. We recommend using a magnetic screwdriver.
- AC power cord. For switches with removable AC power supplies, a separate power cord is needed for each installed power supply. The cord must meet the requirements listed in Power Cord Requirements for AC-Powered Switches and AC Power Supplies on page 504.
- ESD-preventive wrist strap for installing optional ports at the back of the switch.

Attaching the Switch to a Rack or Cabinet

To attach a switch to a two-post rack, a four-post rack, or a cabinet, follow these steps.

Take care to load the rack so that it is not top-heavy. Start installing equipment at the bottom and work up.

Note
The X440-G2 and X620 switches can be front-mounted or mid-mounted to a two-post rack only. They cannot be attached to a four-post rack or cabinet.

1. On one side of the switch, set a mounting bracket against the switch housing.

   Set the flange even with the front panel of the switch – or, if you are mid-mounting the switch in a two-post rack, set the flange toward the back of the switch.

   The following figures illustrate how to attach the brackets for two common mounting options.

   - Figure 169 shows a mid-mount configuration using a long mounting bracket.
   - Figure 170 shows a front-mount configuration using a short mounting bracket.

   Note
   For some switch models, only short mounting brackets are provided.

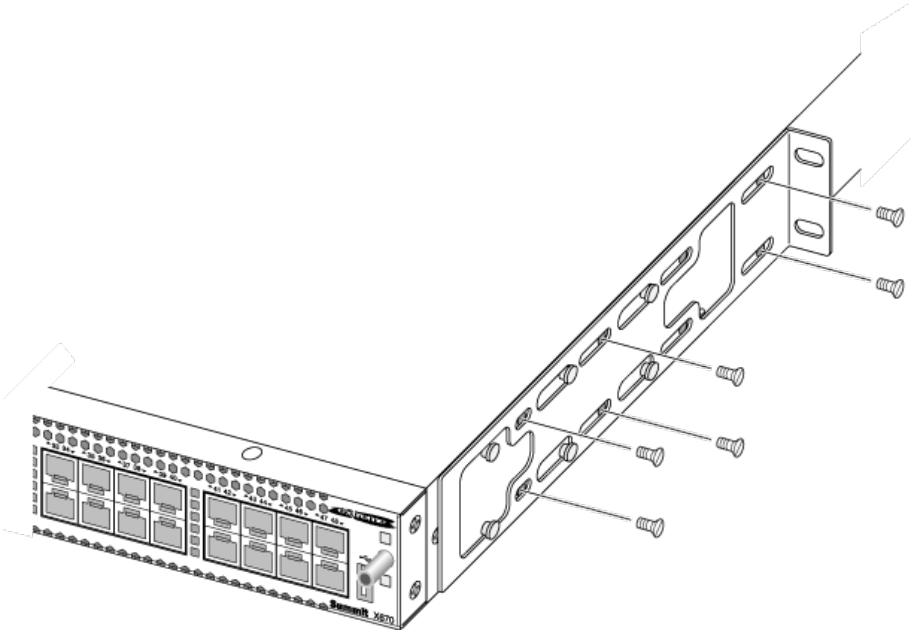


Figure 169: Mid-Mount: Attaching a Long Mounting Bracket

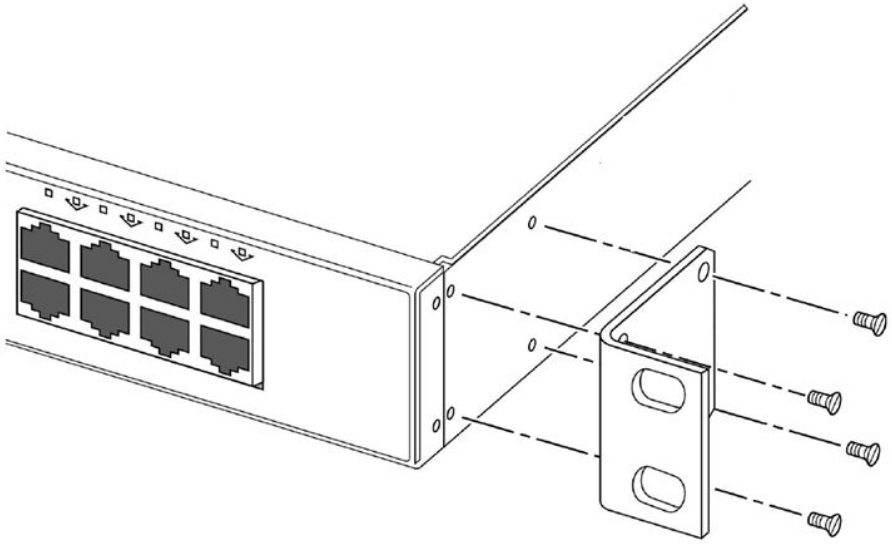


Figure 170: Front Mount: Attaching a Short Mounting Bracket

2. Use the small bracket-mounting screws (provided) to secure the bracket to the switch housing.
3. Repeat step 1 and step 2 to attach the other bracket to the other side of the switch.

4. Slide the switch into the equipment rack or cabinet.

   Figure 171 shows an example of a mid-mount installation.

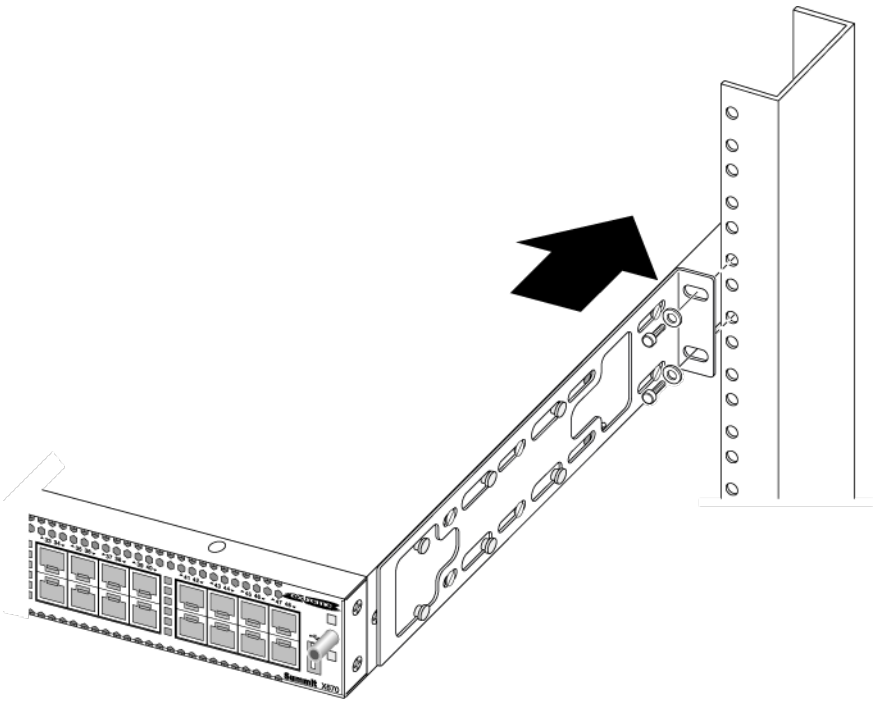


Figure 171: Sliding the Switch into the Rack

5. Secure the mounting bracket flanges to the rack, using screws that are appropriate for the rack.

   (Rack-mounting screws are not provided.)

6. If you are mounting the switch in a four-post rack or a cabinet, secure the rear mounting brackets (rails).

   Otherwise, skip to step 7 on page 239.

   a. At the rear of the rack or cabinet, for each side, slide the rails between the two rows of pegs on either side of the switch.

      Note
      It is best practice to extend the rear rails no more than 33 inches (83cm) from the front of the chassis.

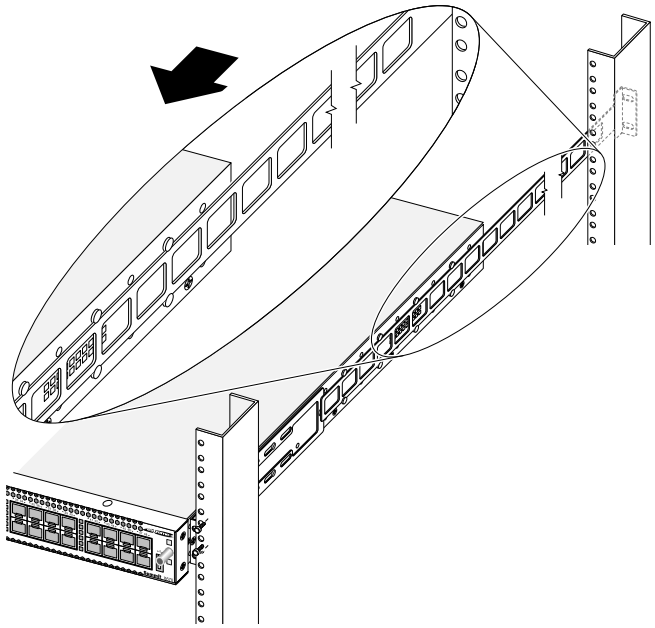


Figure 172: Inserting the Rear Mounting Brackets Between the Pegs on the Side of the Switch

   b. Secure the rear mounting brackets to the rack posts using suitable screws.

      Be sure the switch is level.

7. If a grounding lug is present, ground the switch.

   For X450-G2 series switches, ground the switch as follows:

   a. At one end of the wire, strip the insulation to expose 1/2 inch (12 mm) of bare wire.
   b. Identify the grounding lug on the back of the switch.
   c. Insert the stripped wire into the grounding lug.
   d. Using a straight-tip torque screwdriver, tighten the retaining screw to 20 in-lb (2.25 N m).
   e. Connect the other end of the wire to a known reliable earth ground point at your site.

After the switch is secured to the rack or cabinet, install optional components using the instructions in Installing Optional Components on page 240.

Then, if your switch does not have an installed power supply, install one or two power supplies using the instructions in Installing Internal Power Supplies on page 240.

To determine which internal power supplies are compatible with your switch, see Replaceable Internal Power Supplies on page 136.

Installing Optional Components

After the switch is secured to the rack or cabinet, install optional components.

Pluggable Transceiver Modules

Extreme Networks offers several optical transceiver modules for transmitting and receiving data over optical fiber rather than through electrical wires. Install these modules using the instructions in *Extreme Networks Pluggable Transceivers Installation Guide*.

Other Optional Components

To install other optional components – port option cards, versatile interface modules (VIMs), and stacking modules – refer to the instructions in Installing Expansion Modules on page 309.

What to Do Next

After you have installed optional components, if your switch comes with an installed power supply, skip to Connecting Power to the Switch on page 271.

If your switch does not come with an installed power supply, install one or two power supplies using the instructions in Installing Internal Power Supplies on page 240.

To see which internal power supplies are compatible with your switch, see Table 47 on page 136 .

Installing Internal Power Supplies

If your switch does not have an installed internal power supply, you can install one or two power supplies.

To see which internal power supplies are compatible with your switch, see Table 47 on page 136.

Follow the instructions in the following sections to install the appropriate power supply and connect power to the switch.

Install a 300 W Internal DC Power Supply

Caution
Make sure that the DC power supply circuit is not overloaded. Use proper overcurrent protection, such as a circuit breaker, to prevent overcurrent conditions. You may use up to a 30-Amp breaker.

To install a 300 W DC power supply (part no. 10933 or 10944) in a switch, perform the following tasks in the order listed:

1. Make sure you have the tools and materials you need.

   See Required Tools and Materials for Installing a 300 W DC Power Supply on page 241.
2. Prepare the power cables and ground cable by attaching the provided connection lugs to the cables.

   See Preparing the Cables for a 300 W DC Power Supply on page 242.
3. Insert the power supply into the switch.

   See Installing a 300 W DC Power Supply on page 242.
4. Connect the ground wire.

   See Connecting the Ground Wire to a 300 W DC Power Supply on page 244.
5. Connect the power supply to the DC source voltage.

   See Connecting a 300 W DC Power Supply to the Source Voltage on page 244.
6. Energize the DC circuit.

Required Tools and Materials for Installing a 300 W DC Power Supply

You need the following tools and materials to install or remove a 300 W DC power supply.

- Two spade terminals #8, M4 stud size, 16-14 AWG (1.25 to 2mm) wire size (Tyco part number 325199 or equivalent) for connecting the input power cables
- One ring terminal #8, M4 stud size, 16-14 AWG (1.25 to 2mm) wire size (Tyco part number 1-51864 or equivalent) and screw with captive lock washer for connecting the ground wire (both provided)
- #14 AWG copper cable for grounding the power supply and connecting the power supply to the DC power source. (DC power and grounding cables are not included with the power supply.) Recommended insulation colors are:
  - Red for the –48 V connection (–)
  - Black for the –48 V RTN connection (+)
  - Green or green with yellow stripe for the ground connection
- Connection hardware appropriate to the installation site:
  - Hardware for connecting the power wires to the DC source
  - Hardware for connecting the ground wire to the site grounding point
- Stripping tool
- Crimping tool for attaching the lug to the ground wire
- #2 Phillips screwdriver

- Torque screwdriver and wrench or torque driver with attachments for tightening screws and nuts
- ESD-preventive wrist strap
- Thermal protective gloves (required for removal of a power supply)

Connection lugs for power and ground and a screw for connecting the ground wire are shipped with the power supply.

Preparing the Cables for a 300 W DC Power Supply

You need a crimping tool to attach the terminals to the power and ground cables.

To prepare the cable wires, follow these steps:

1. On each cable wire, strip 6 mm (0.25 inch) of insulation from one end.
2. Insert the end of one power cable wire all the way into the barrel of a spade terminal and crimp the terminal securely to the wire.

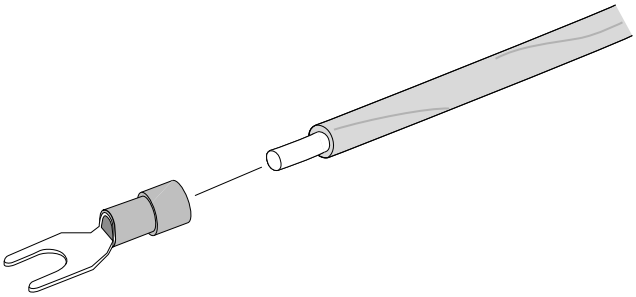


Figure 173: Attaching a Spade Terminal to a Cable

3. Repeat step Preparing the Cables for a 300 W DC Power Supply on page 242 for the other power cable wire.
4. Insert the end of the stripped ground wire (green or green and yellow) all the way into the barrel of the ring terminal and crimp the terminal securely to the wire.

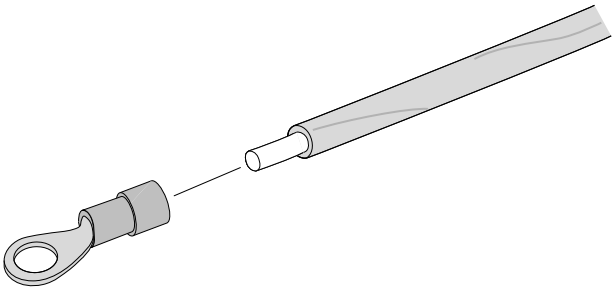


Figure 174: Attaching a Ring Terminal to a Ground Cable

Installing a 300 W DC Power Supply

Before installing a Summit 300 W power supply (part no. 10933 or 10944):

- Verify that the switch chassis has been grounded.
- Verify that the airflow direction for the power supply is the same as the airflow direction of the installed fan modules in the switch.

To install the power supply, follow these steps:

Caution
The handle on the power supply is not designed to be used to lift or carry the power supply or the switch to which it is attached.

1. Attach an ESD-preventive wrist strap to your bare wrist and connect the metal end to an appropriate ground point on the rack.
2. If necessary, remove a blank panel from the rear of the switch.

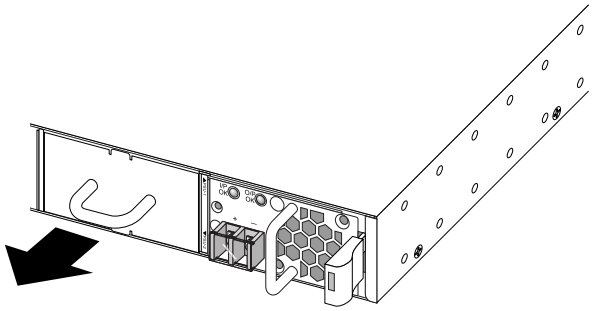


Figure 175: Removing a Blank Panel

3. Verify that the power supply is right side up.

   The power supply should be oriented as shown in Figure 176.
4. Carefully slide the power supply all the way into the power supply bay.

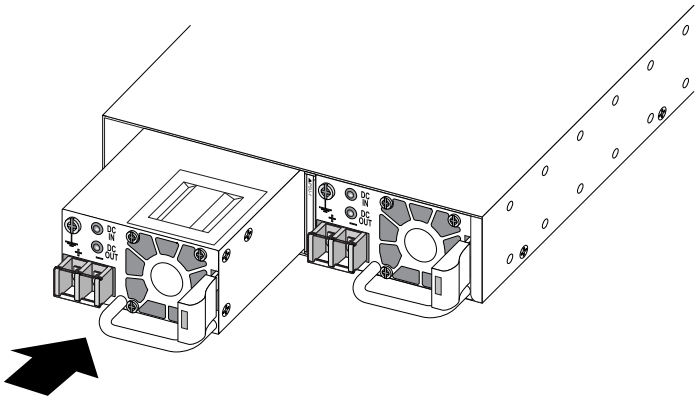


Figure 176: Installing a Summit 300 W DC Power Supply (Back-to-Front Model 10933 Shown)

5. Push the power supply in until the latch snaps into place.

Caution
Do not slam the power supply into the switch.

6. To install a second power supply, repeat the procedure.
7. Connect the ground wire, following the steps in Connecting the Ground Wire to a 300 W DC Power Supply on page 244.

Connecting the Ground Wire to a 300 W DC Power Supply

Follow these steps to connect the ground wire to a Summit 300 W DC power supply.

Warning
Be sure to connect the chassis ground wire before you connect any power cables.

Warning
Be sure to disconnect the ground wire after you disconnect all power cables.

1. Verify that the DC circuit is de-energized.
2. Attach an ESD-preventive wrist strap to your bare wrist and connect the metal end to an appropriate ground point on the rack.
3. Pull the cover off the terminal block.
4. Identify the grounding point on the front panel of the power supply.
5. Connect the ground wire to the grounding point as follows:
   a. Insert a 6-32 UNC screw (provided) through the ring terminal and into the grounding point on the power supply.

      See Figure 177.

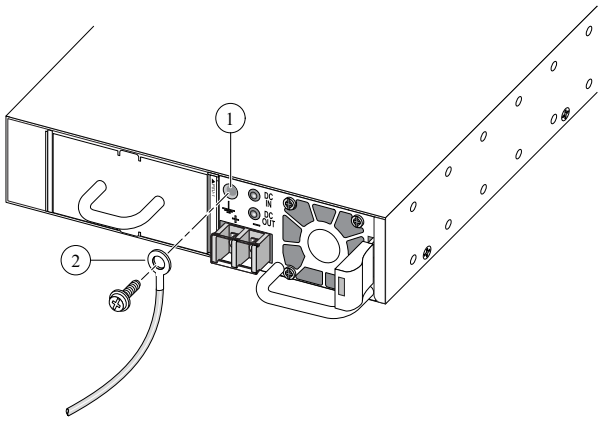


Figure 177: Connecting the Ground Wire (Front-to-Back Model 10933 Shown)

1 = Grounding point	2 = Ground wire

   b. Tighten the screw to 12.6 in-lb (1.42 N m).
6. Connect the other end of the wire to a known reliable earth ground point at your site.
7. Connect the power supply to the source, following the instructions in Connecting a 300 W DC Power Supply to the Source Voltage on page 244.

Connecting a 300 W DC Power Supply to the Source Voltage

Two 300 W DC power supplies are available: model 10933 (front-to-back airflow) and model 10944 (back-to-front airflow). Both can connect to either a +24 V or a –48 V power source.

The connection instructions, starting at step 4 on page 245, are different depending upon whether you are connecting to a +24 V power source or a –48 V power source.

The DC power connection at your facility must be made by a qualified electrician, following these instructions.

Warning
Always make sure that the DC circuit is de-energized before connecting or disconnecting the DC power cables on the DC power supply.

Caution
Provide proper connection and strain relief on the DC power cables in accordance with all local and national electrical codes.

1. Verify that the DC circuit is de-energized.
2. Attach an ESD-preventive wrist strap to your bare wrist and connect the metal end to an appropriate ground point on the rack.
3. Slide the cover off the terminal block.
4. Connect the DC power input cables as follows:

   When connecting the power supply to a +24 V source:

   a. On each terminal, loosen the screw enough to so that the spade terminal can slide underneath the captive square washer.

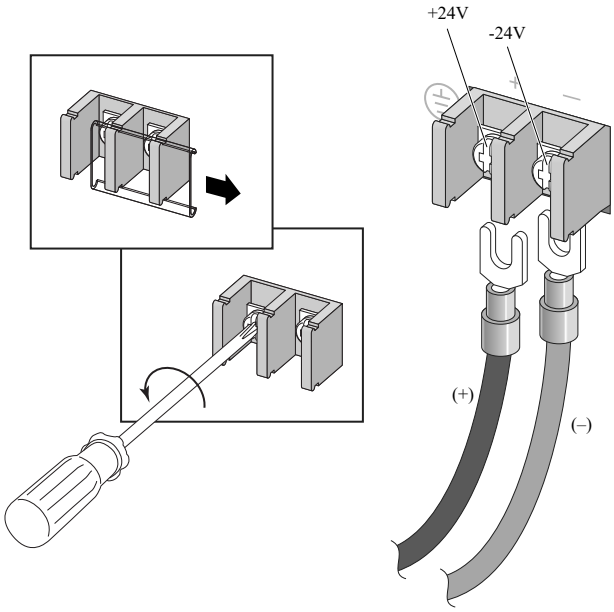


Figure 178: Loosening Terminal Screws (Connecting to a +24 V Source)

   b. Slide the spade terminal of the **negative** wire (–24 V) under the captive square washer on the **negative** terminal (labeled –24 V).

c. Slide the spade terminal of the **positive** wire (+24 V) under the captive square washer on the **positive** terminal (+24 V).
d. Tighten both screws on the terminal block to 11 in-lb (1.25 N m).

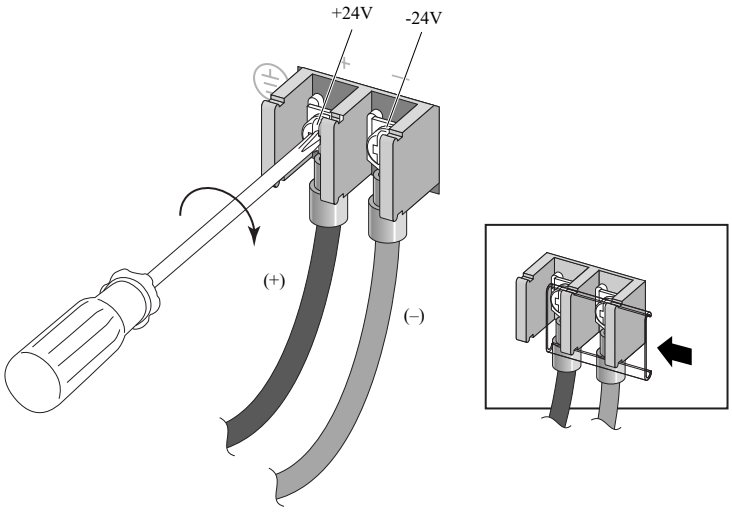


Figure 179: Tightening Terminal Screws (Connecting to a +24 V Source)

When connecting the power supply to a –48 V source:

a. On each terminal, loosen the screw enough to so that the spade terminal can slide underneath the captive square washer.

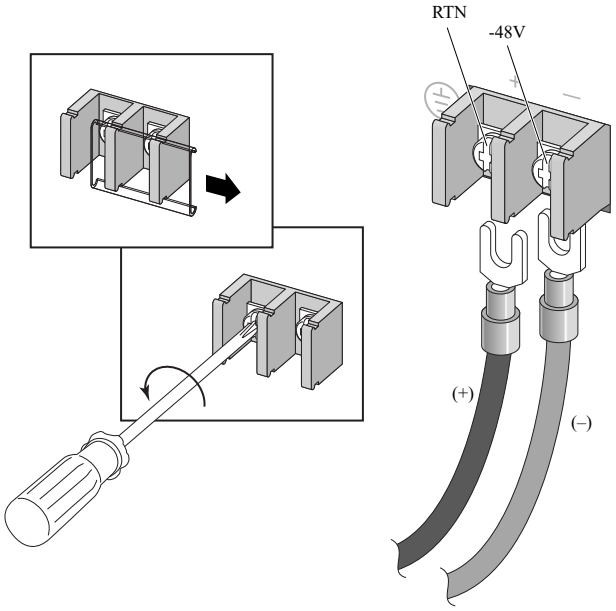


Figure 180: Loosening Terminal Screws (Connecting to a –48 V Source)

b. Slide the spade terminal of the **negative** wire (–48 V) under the captive square washer on the **negative** terminal (labeled –48 V).

c. Slide the spade terminal of the **positive** wire (–48 V RTN) under the captive square washer on the **positive** terminal (labeled RTN).
d. Tighten both screws on the terminal block to 11 in-lb (1.25 N m).

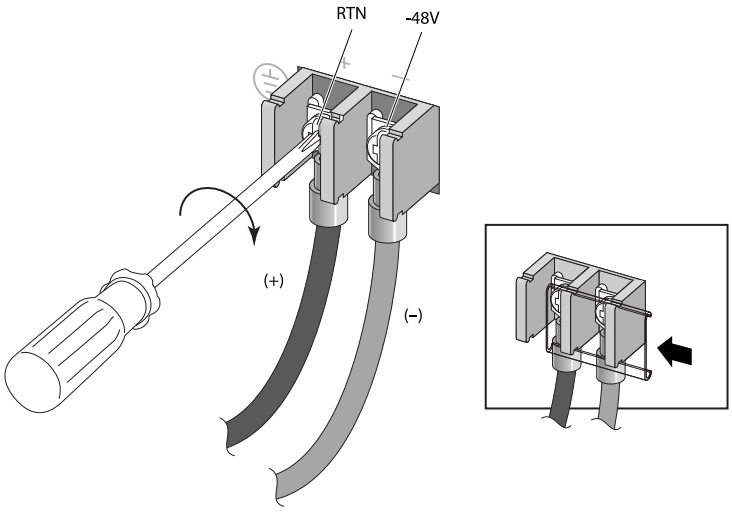


Figure 181: Tightening Terminal Screws (Connecting to a –48 V Source)

5. Slide the cover into place over the terminal block.
6. Connect the cables to the DC source voltage, using hardware appropriate to the installation site and following local and national electrical codes.
7. Energize the DC circuit.

Leave the ESD strap permanently connected to the rack, so that the strap is always available when you need to handle ESD-sensitive components.

You can now connect network interface cables to the switch, using the instructions in Connect Network Interface Cables on page 272.

Install a 450 W or 550 W Internal DC Power Supply

Summit 550 W power supply units (PSUs) are available with either front-to-back or back-to-front airflow. If you install two PSUs, both must have the same airflow direction.

Note
You cannot combine power supplies of different wattages in the same switch.

To install a Summit 450 W or 550 W DC power supply, refer to the following sections as needed:

1. Make sure you have the tools and materials you need.

   See Required Tools and Materials for Installing a 450 W or 550 W DC Power Supply on page 248.
2. Prepare the power cables and ground cable by attaching the provided connection lugs to the cables.

   See Preparing the Cables for a 450 W or 550 W DC Power Supply on page 248.

3. Insert the power supply into the switch.

   See Installing a 450 W or 550 W DC Power Supply on page 249.
4. Connect the ground wire.

   See Connecting the Ground Wire to a 450 W or 550 W DC Power Supply on page 250.
5. Connect the power supply to the electrical source and energize the DC circuit.

   See Connecting a 450 W or 550 W DC Power Supply to the Source Voltage on page 252.

Required Tools and Materials for Installing a 450 W or 550 W DC Power Supply

You need the following tools and materials to install or remove a 450 W or 550 W DC power supply.

- Three spade terminals (Panduit part number PN14-6FN or equivalent) for connecting the ground and input power cables (provided)
- #14 AWG copper cable for grounding the power supply and connecting the power supply to the DC power source. (DC power and grounding cables are not included with the power supply.) Recommended insulation colors are:
  - Red for the –48 V connection (–)
  - Black for the –48 V RTN connection (+)
  - Green or green with yellow stripe for the ground connection
- Connection hardware appropriate to the installation site:
  - Hardware for connecting the power wires to the DC source
  - Hardware for connecting the ground wire to the site grounding point
- Stripping tool
- Crimping tool for attaching the lug to the ground wire
- #2 Phillips screwdriver
- Torque screwdriver and wrench or torque driver with attachments for tightening screws and nuts
- ESD-preventive wrist strap
- Thermal protective gloves (required for removal of a power supply)

Spade-type connection lugs for power and ground are shipped with the power supply.

Preparing the Cables for a 450 W or 550 W DC Power Supply

Three spade-type terminals are provided with the power supply.

You need a crimping tool to attach the terminals to the power and ground cables.

To prepare the cable wires, follow these steps:

1. On each cable wire, strip 6 mm (0.25 inch) of insulation from one end.

2. Insert the end of one power cable wire all the way into the barrel of a spade terminal and crimp the terminal securely to the wire.

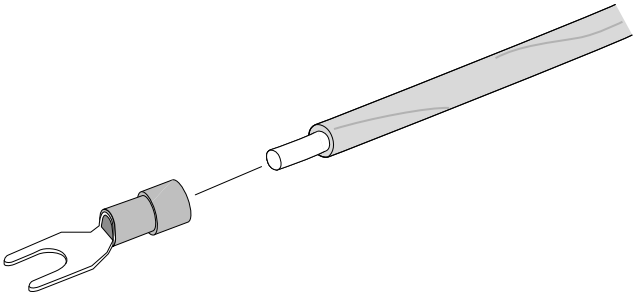


Figure 182: Attaching a Spade Terminal to a Cable

3. Repeat step 2 for the other power cable wire and for the ground wire.

Installing a 450 W or 550 W DC Power Supply

Before installing a Summit 450 W or 550 W DC power supply:

- Verify that the switch rack or chassis has been grounded.
- Verify that the airflow direction for the power supply is the same as the airflow direction of the installed fan modules in the switch.

To install the power supply, follow these steps:

1. Attach an ESD-preventive wrist strap to your bare wrist and connect the metal end to an appropriate ground point on the rack.
2. If necessary, remove a blank panel from the rear of the switch.

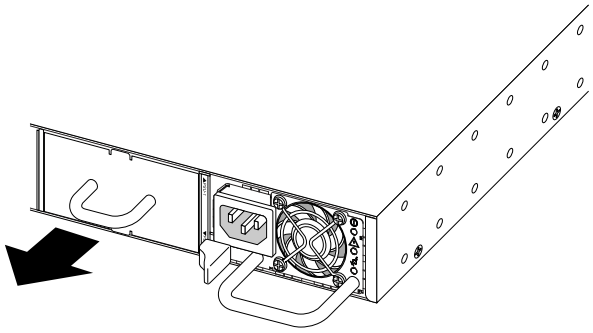


Figure 183: Removing a Blank Panel

3. Verify that the power supply is right side up.

   The power supply should be oriented as shown in Figure 184.

4. Carefully slide the power supply all the way into the power supply bay.

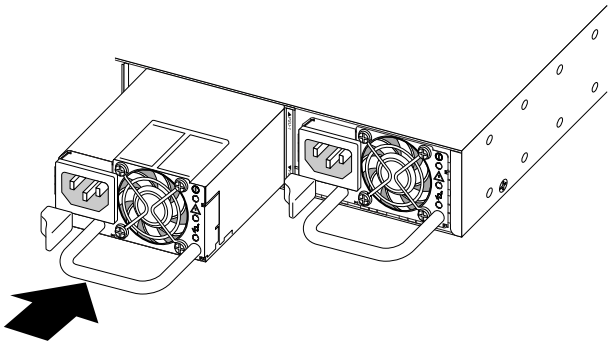


Figure 184: Installing a Power Supply

5. Push the power supply in until the latch snaps into place.

Caution
Do not slam the power supply into the switch.

6. To install a second power supply, repeat the procedure.

Note
If power supplies are not installed in both power supply bays, be sure to install a cover over the unoccupied bay. Unoccupied bays must always be covered to maintain proper system ventilation and EMI levels.

7. Connect the ground wire, following the steps in Connecting the Ground Wire to a 450 W or 550 W DC Power Supply on page 250.

Connecting the Ground Wire to a 450 W or 550 W DC Power Supply

You need a #1 Phillips screwdriver to secure the ground wire to the power supply.

Warning
Be sure to connect the chassis ground wire before you connect any power cables.

Warning
Be sure to disconnect the ground wire after you disconnect all power cables.

To connect the ground wire to a Summit 450 W or 550 W DC power supply, follow these steps:

1. Verify that the DC circuit is de-energized.
2. Attach an ESD-preventive wrist strap to your bare wrist and connect the metal end to an appropriate ground point on the rack.
3. Slide the cover off the terminal block.
4. Identify the grounding point at the left of the terminal block.

   See Figure 185.

5. Connect the ground wire to the grounding point as follows:
   a. Loosen the screw enough to allow the spade terminal to slide underneath the captive square washer.

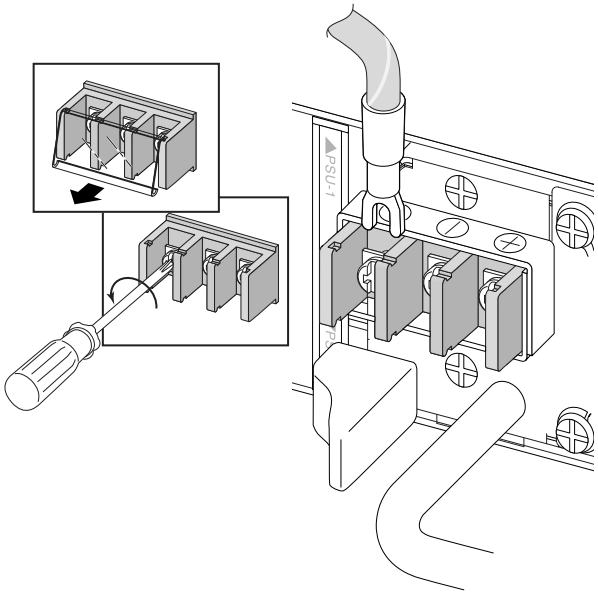


Figure 185: Connecting the Ground Wire

   b. Slide the spade terminal of the ground wire under the captive square washer.
   c. Tighten the screw to 7 in-lb (0.79 N m) as shown in Figure 186.

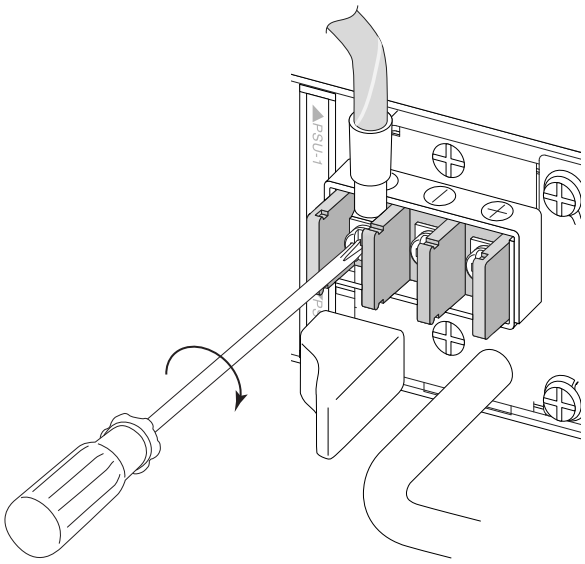


Figure 186: Securing the Ground Wire

6. Connect the other end of the wire to a known reliable earth ground point at your site.
7. Connect the power supply to the source, following the instructions in Connecting a 450 W or 550 W DC Power Supply to the Source Voltage on page 252.

Connecting a 450 W or 550 W DC Power Supply to the Source Voltage

Summit 450 W or 550 W DC power supply units must connect to a –48V source.

The DC power connection at your facility must be made by a qualified electrician, following these instructions.

Warning
Always make sure that the DC circuit is de-energized before connecting or disconnecting the DC power cables on the DC power supply.

Caution
Provide proper connection and strain relief on the DC power cables in accordance with all local and national electrical codes.

1. Verify that the DC circuit is de-energized.
2. Attach an ESD-preventive wrist strap to your bare wrist and connect the metal end to an appropriate ground point on the rack.
3. Slide the cover off the terminal block.
4. On each terminal, loosen the screw enough to so that the spade terminal can slide underneath the captive square washer.
5. Connect the DC power input cables as follows:
   a. Slide the spade terminal of the **negative** wire (–48 V) under the captive square washer on the **negative** terminal (labeled **–**).

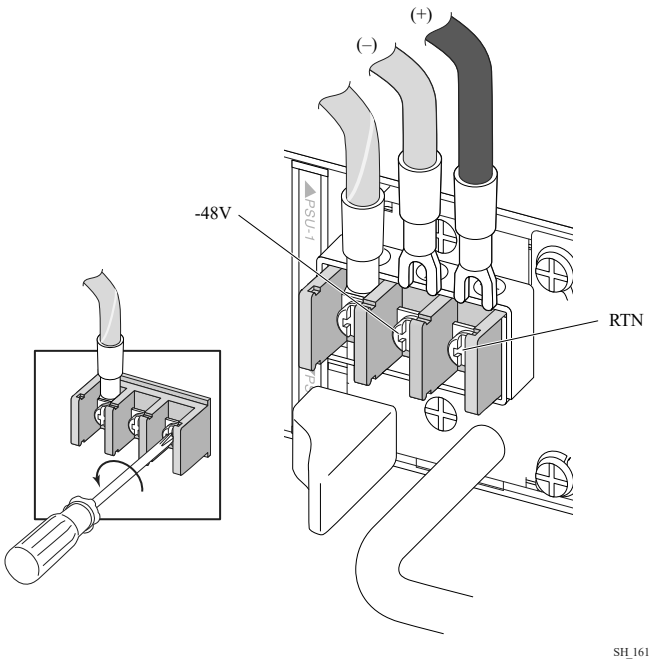


Figure 187: Connecting the Negative Power Wire to a –48V Source (450 W or 550 W DC Power Source)

b. Slide the spade terminal of the **positive** wire (–48 V RTN) under the captive square washer on the **positive** terminal (labeled **+**).

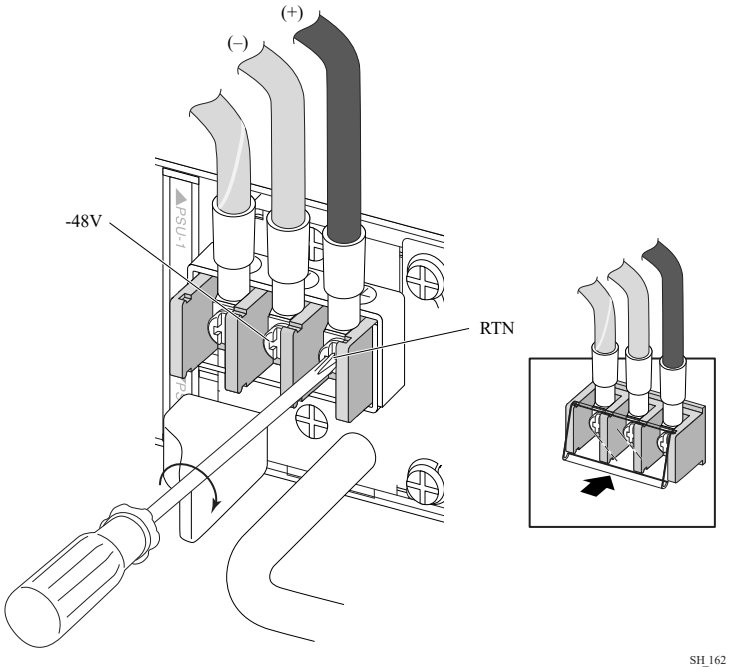


Figure 188: Connecting the Positive Power Wire to a –48V Source (450 W or 550 W DC Power Source)

6. Tighten both screws on the terminal block to 7 in-lb (0.79 N m).
7. Snap the cover into place over the terminal block.
8. Connect the cables to the DC source voltage, using hardware appropriate to the installation site and following local and national electrical codes.
9. Energize the DC circuit.

Leave the ESD strap permanently connected to the rack, so that the strap is always available when you need to handle ESD-sensitive components.

You can now connect network interface cables to the switch, using the instructions in Connect Network Interface Cables on page 272.

Installing a 750 W Internal DC Power Supply

Caution
Make sure that the DC power supply circuit is not overloaded. Use proper overcurrent protection, such as a circuit breaker, to prevent overcurrent conditions. You may use up to a 30-Amp breaker.

To install a 750 W DC power supply in a switch, perform the following tasks in the order listed:

1. Make sure you have the tools and materials you need.

   See Required Tools and Materials for Installing a 750 W DC Power Supply on page 254.
2. Prepare the power cables and ground cable by stripping off the insulation.

   See Preparing the Cables for a 750 W DC Power Supply on page 254.
3. Ground the switch chassis.

   See Grounding the Switch Chassis on page 255.
4. Insert the power supply into the switch.

   See Installing a 750 W Internal DC Power Supply on page 253.
5. Connect the ground wire.

   See Connecting the Ground Wire to a 750 W DC Power Supply on page 256.
6. Connect the power supply to the DC source voltage.

   See Connecting a 750 W DC Power Supply to the Source Voltage on page 257.
7. Energize the DC circuit.

Required Tools and Materials for Installing a 750 W DC Power Supply

You need the following tools and materials to install or remove a 750 W DC power supply in an ExtremeSwitching X695 switch.

- #14 AWG copper cable for grounding the power supply and connecting the power supply to the DC power source. (DC power cables and grounding cables are not included with the power supply.) Recommended insulation colors are:
  - Red for the –48 V connection (–)
  - Black for the –48 V RTN connection (+)
  - Green or green with yellow stripe for the ground connection
- Connection hardware appropriate to the installation site:
  - Hardware for connecting the power wires to the DC source
  - Hardware for connecting the ground wire to the site grounding point
- Stripping tool
- Cross-head (Phillips) torque screwdriver
- #1 cross-head (Phillips) screwdriver
- ESD-preventive wrist strap
- Thermal protective gloves (for removal of a warm power supply)

Preparing the Cables for a 750 W DC Power Supply

You will need three cable wires for each installed DC power supply: two input cables and a grounding cable. We recommend that each cable have differently colored insulation, as described in Required Tools and Materials for Installing a 750 W DC Power Supply on page 254.

To prepare the cable wires, follow these steps:

1. On each cable wire, strip 6 mm (0.25 inch) of insulation from one end.
2. Repeat the previous step for the other two cable wires.

Grounding the Switch Chassis

Before installing DC power supply units in your switch, perform these steps:

1. Verify that the DC circuit is de-energized.
2. Identify the grounding lug on the rear of the switch.

   The grounding lug is identified by the international symbol for earth ground: 
3. Attach the ground wire to the grounding lug as follows.

   Use stranded copper wire, sized between 14 AWG and 6 AWG.

   a. At one end of the ground wire, strip the insulation to expose 12 mm (1/2 in) of bare wire.
   b. Insert the stripped wire into the grounding lug.
   c. Using a straight-tip torque screwdriver, tighten the retaining screw to 2.25 N m (20 in-lb).
4. Connect the other end of the wire to a known reliable earth ground point at your site.

You can now install one or two DC power supplies, following the steps in Install a 750 W DC Power Supply on page 255.

Install a 750 W DC Power Supply

Before installing a 750 W DC power supply (part no. XN-DCPWR-750W-F or XN-DCPWR-750W-R):

- Verify that the switch chassis has been grounded (see Grounding the Switch Chassis on page 255).
- Verify that the airflow direction for the power supply is the same as the airflow direction of the installed fan modules in the switch.

To install the power supply, follow these steps:

Caution
The handle on the power supply is not designed to be used to lift or carry the power supply or the switch to which it is attached.

1. Attach an ESD-preventive wrist strap to your bare wrist and connect the metal end to an appropriate ground point on the rack.
2. If necessary, remove a blank panel from the rear of the switch.
3. Verify that the power supply is right side up.
4. Carefully slide the power supply all the way into the power supply bay.

5. Push the power supply in until the latch snaps into place.

Caution
Do not slam the power supply into the switch.

6. To install a second power supply, repeat the procedure.

When you are finished, connect the ground wire to each power supply. See Connecting the Ground Wire to a 750 W DC Power Supply on page 256.

Connecting the Ground Wire to a 750 W DC Power Supply

Follow these steps to connect the ground wire to a 750 W DC power supply.

Warning
Be sure to connect the chassis ground wire before you connect any power cables.

Warning
Be sure to disconnect the ground wire after you disconnect all power cables.

1. Verify that the DC circuit is de-energized.
2. Attach an ESD-preventive wrist strap to your bare wrist and connect the metal end to an appropriate ground point on the rack.
3. Connect the ground wire to the grounding point on the power supply.

   The grounding point is the middle of the three slots. Directly beneath it, you will see the international symbol for earth ground – – on the body of the switch.

   Refer to Figure 189 for the slot location.

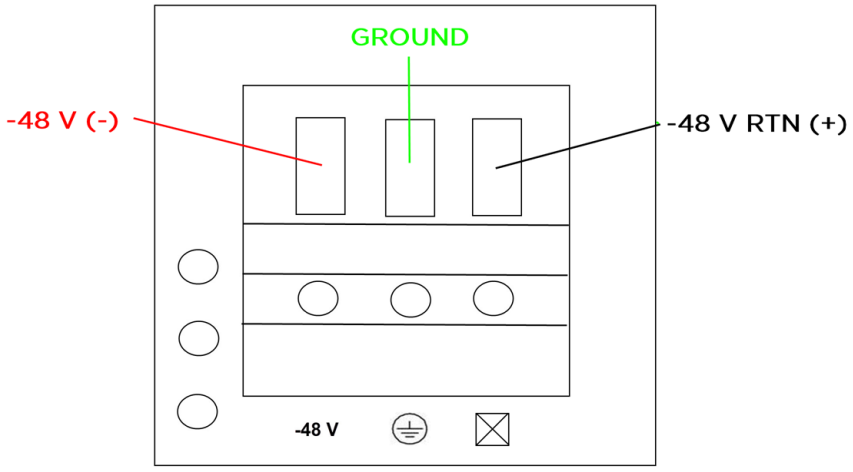


Figure 189: Slots for Connecting Wires to the 750 W DC Power Supply

a. Insert the stripped end of the ground wire all the way into the slot.
b. Insert a #1 Phillips screwdriver into the hole below the slot, and tighten.

c. Gently tug the ground wire to make sure it is fastened securely.

4. Connect the other end of the wire to a known reliable earth ground point at your site.

When you have connected the ground wire, connect the power supply to the power source using the two input cables. Follow the instructions in Connecting a 750 W DC Power Supply to the Source Voltage on page 257.

Connecting a 750 W DC Power Supply to the Source Voltage

Two 750 W DC power supplies are available: model XN-DCPWR-750W-F (front-to-back airflow) and model XN-DCPWR-750W-R (back-to-front airflow). Both can connect to a –48 V power source.

The DC power connection at your facility must be made by a qualified electrician, following these instructions.

Warning
Always make sure that the DC circuit is de-energized before connecting or disconnecting the DC power cables on the DC power supply.

Caution
Provide proper connection and strain relief on the DC power cables in accordance with all local and national electrical codes.

1. Verify that the DC circuit is de-energized.
2. Attach an ESD-preventive wrist strap to your bare wrist and connect the metal end to an appropriate ground point on the rack.
3. Connect the **negative** wire (–48 V) to the power supply as follows:
   a. Insert the stripped end of the wire all the way into the leftmost of the three slots on the terminal block.

      Refer to Figure 190 for slot locations.

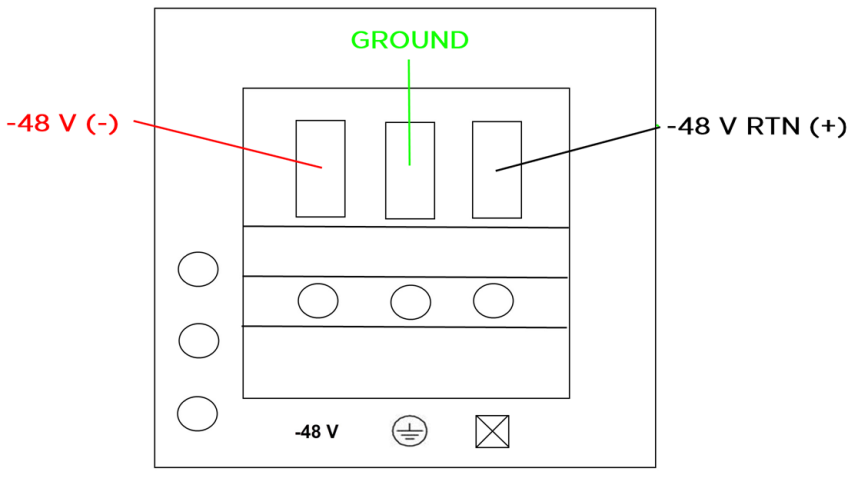


Figure 190: Slots for Connecting Wires to the 750 W DC Power Supply

b. Insert a #1 Phillips screwdriver into the hole below the slot, and tighten.
c. Gently tug the wire to make sure it is fastened securely.

4. Connect the **positive** wire (–48 V) as follows:
   a. Insert the stripped end of the wire all the way into the rightmost of the three slots on the terminal block.
   b. Insert a #1 Phillips screwdriver into the hole below the slot, and tighten.
   c. Gently tug the wire to make sure it is fastened securely.
5. Connect the cables to the DC source voltage, using hardware appropriate to the installation site and following local and national electrical codes.

Turn on the switch, following the steps in Connecting Power to the Switch on page 271.

Leave the ESD strap permanently connected to the rack, so that the strap is always available when you need to handle ESD-sensitive components.

Install an 1100 W Internal DC Power Supply

The ExtremeSwitching X690 and X870 series switches accommodate one or two Summit 1100 W power supply units (PSUs) with either front-to-back or back-to-front airflow.

Note
You cannot combine power supplies of different wattages in the same switch.

To install a Summit 1100 DC power supply, refer to the following sections as needed:

1. Make sure you have the tools and materials you need.

   See Required Tools and Materials for Installing an 1100 W DC Power Supply on page 258.
2. Prepare the power cables and ground cable by attaching the provided connection lugs to the cables.

   See Preparing the Cables for an 1100 W DC Power Supply on page 259.
3. Insert the power supply into the switch.

   See Installing an 1100 W DC Power Supply on page 259.
4. Connect the ground wire.

   See Connecting the Ground Wire to an 1100 W DC Power Supply on page 261.
5. Connect the power supply to the electrical source and energize the DC circuit.

   See Connecting an 1100 W DC Power Supply to the Source Voltage on page 261.

Required Tools and Materials for Installing an 1100 W DC Power Supply

You need the following tools and materials to install or remove an 1100 W DC power supply.

- Three copper cables, between #10 and #24 AWG, for grounding the power supply and connecting the power supply to the DC power source. (DC power

and grounding cables are not included with the power supply.) Recommended insulation colors are:
  - Red for the –48 V connection (–)
  - Black for the –48 V RTN connection (+)
  - Green or green with yellow stripe for the ground connection
- Connection hardware appropriate to the installation site:
  - Hardware for connecting the power wires to the DC source
  - Hardware for connecting the ground wire to the site grounding point
- Stripping tool
- #2 Phillips screwdriver
- Torque screwdriver and wrench or torque driver with attachments for tightening screws and nuts
- ESD-preventive wrist strap
- Thermal protective gloves (required for removal of a power supply)

Preparing the Cables for an 1100 W DC Power Supply

You need three cable wires: two power input cables and one ground cable. Refer to Required Tools and Materials for Installing an 1100 W DC Power Supply on page 258 for details.

To prepare the cable wires for the 1100 W DC power supply unit, follow these steps:

1. Strip 0.4 inch (10 mm) of insulation from one end of each cable wire.
2. Insert the end of the stripped ground wire (green or green and yellow) all the way into the barrel of the ring terminal and crimp the terminal securely to the wire.

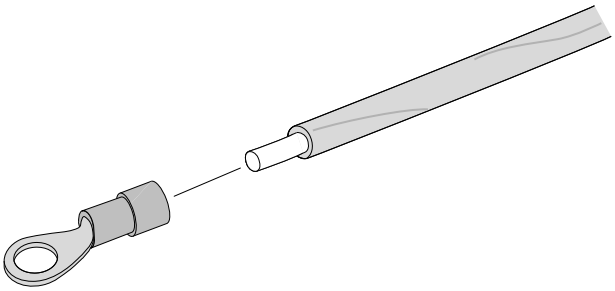


Figure 191: Attaching a Ring Terminal to a Ground Cable

No ring terminal is required to connect the cable wires (non-ground wires) to the 1100 W DC power supply.

Installing an 1100 W DC Power Supply

Before installing a Summit 1100 W DC power supply:

- Verify that the switch rack or chassis has been grounded.
- Verify that the airflow direction for the power supply is the same as the airflow direction of the installed fan modules in the switch.

To install the power supply, follow these steps:

1. Attach an ESD-preventive wrist strap to your bare wrist and connect the metal end to an appropriate ground point on the rack.
2. If necessary, remove a blank panel from the rear of the switch.
3. Verify that the power supply is right side up.

   The power supply should be oriented as shown in Figure 192 on page 260.
4. Verify that the direction of ventilation airflow is the same for both the power supply and the switch.

   In a switch with front-to-back airflow, the fan modules are labeled **Air Out**.

   In a switch with back-to-front airflow, the fan modules are labeled **Air In**.
5. Carefully slide the power supply all the way into the power supply bay.

   See Figure 192.

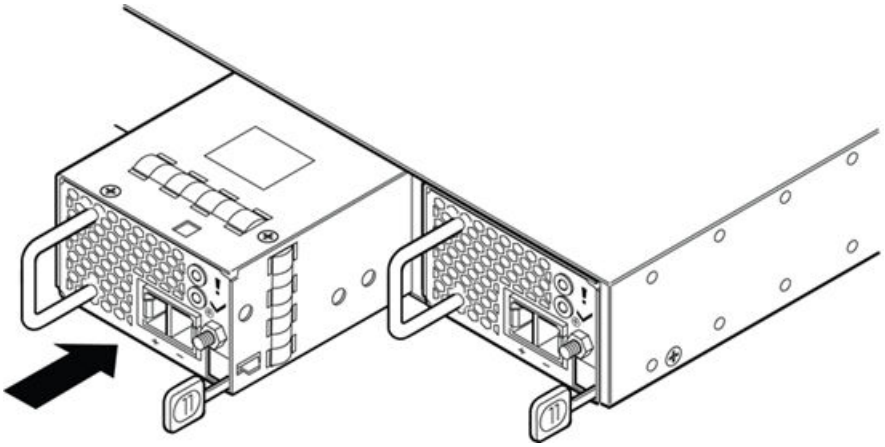


Figure 192: Installing an 1100 W DC Power Supply

6. Push the power supply in until the latch snaps into place.

   Caution
   Do not slam the power supply into the switch.

7. To install a second power supply, repeat the procedure.

   Note
   If power supplies are not installed in both power supply bays, be sure to install a cover over the unoccupied bay. Unoccupied bays must always be covered to maintain proper system ventilation and EMI levels.

8. Connect the ground wire, following the steps in Connecting the Ground Wire to a 450 W or 550 W DC Power Supply on page 250.

Connecting the Ground Wire to an 1100 W DC Power Supply

To connect the ground wire to the 1100 W DC power supply, follow these steps:

Warning
Be sure to connect the ground wire before you connect any power cables to the power supply.

1. Verify that the DC circuit is de-energized.
2. Identify the grounding post on the right side of the power supply, above the latching tab.
3. Connect the ground wire to the grounding post as follows:
   a. Remove the nut from the grounding post.
   b. Slide the ring terminal of the ground wire onto the grounding post (callout 1 in Figure 193).

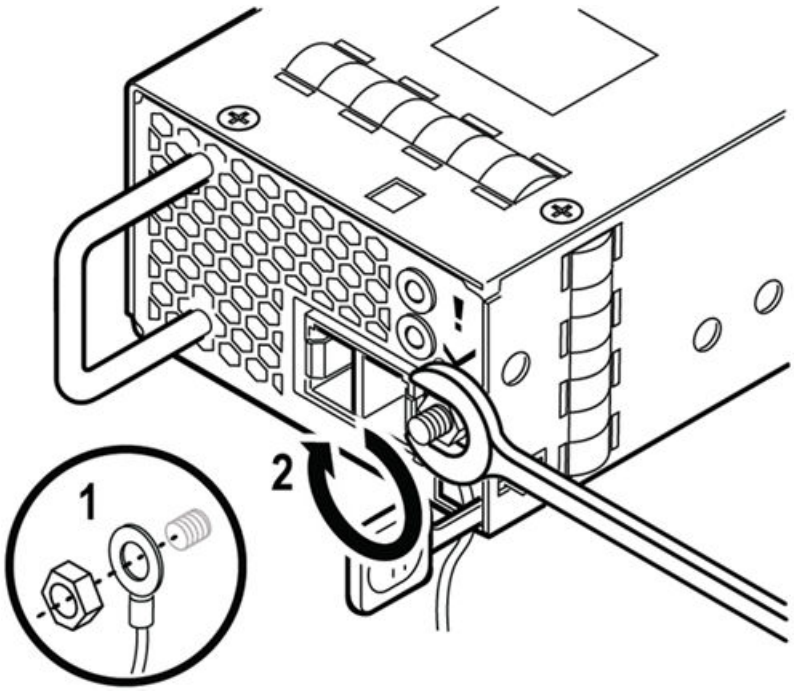


Figure 193: Securing the Ground Wire

   c. Screw the nut onto the grounding post (callout 2).
   d. Tighten the nut to 7 in-lb (0.79 N m).
4. Connect the other end of the wire to a known reliable earth ground point at your site.

Connect the power supply to the power source, following the instructions in Connecting an 1100 W DC Power Supply to the Source Voltage on page 261.

Connecting an 1100 W DC Power Supply to the Source Voltage

Summit 1100 W DC power supply units must connect to a –48V source.

The DC power connection at your facility must be made by a qualified electrician, following these instructions.

Warning
Always make sure that the DC circuit is de-energized before connecting or disconnecting the DC power cables on the DC power supply.

Caution
Provide proper connection and strain relief on the DC power cables in accordance with all local and national electrical codes.

1. Verify that the DC circuit is de-energized.
2. Attach an ESD-preventive wrist strap to your bare wrist and connect the metal end to an appropriate ground point on the rack.
3. Verify that the ground wire is attached to the power supply.

   See Figure 193 on page 261.
4. Insert a screwdriver into both slots on the top of the terminal connector and loosen the screws enough to accommodate a stripped power input cable.
5. Insert the DC power cables into the connector.
   a. Slide the end of the **positive** wire (–48 V RTN) into the **positive** terminal (labeled **+**, on the left side of the connector).
   b. Tighten the screw on the top of the positive terminal connector to between 4.4 in-lb (0.50 N m) and 7.1 in-lb (0.8 N m).

      See Figure 194.

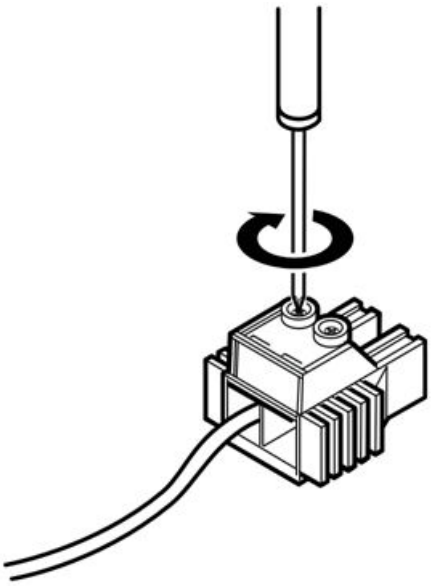


Figure 194: Inserting the DC Power Cables into the Connector

   c. Slide the end of the **negative** wire (–48 V) into the **negative** terminal (labeled **–**, on the right side of the connector).
   d. Tighten the screw on the top of the negative terminal connector to between 4.4 in-lb (0.50 N m) and 7.1 in-lb (0.8 N m).

6. Insert the connector into the slot on the power supply.

   See Figure 195.

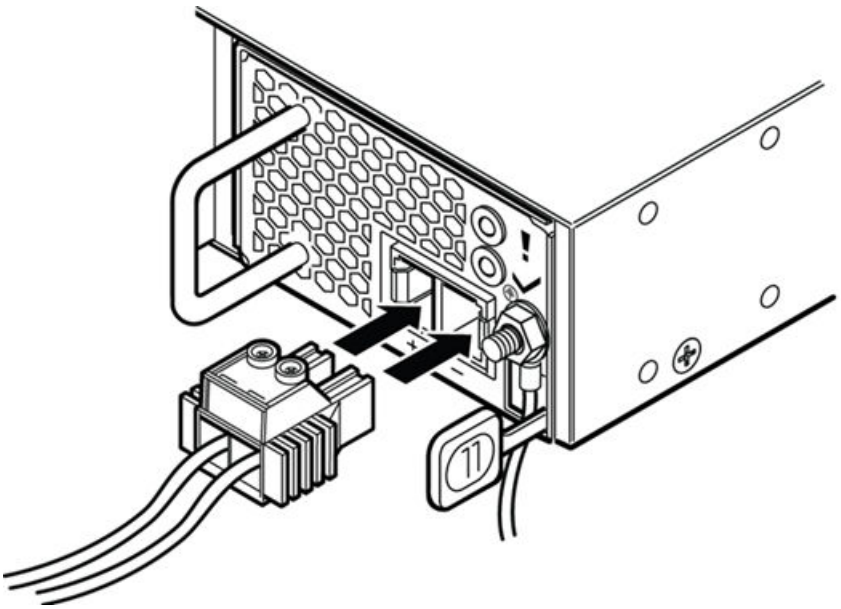


Figure 195: Inserting the Connector into the Power Supply

7. Connect the cables to the DC source voltage, using hardware appropriate to the installation site and following local and national electrical codes.
8. Energize the DC circuit.

Leave the ESD strap permanently connected to the rack, so that the strap is always available when you need to handle ESD-sensitive components.

Connect network interface cables to the switch, using the instructions in Connect Network Interface Cables on page 272.

Installing Internal AC Power Supplies

The following AC internal power supplies (PSUs) are available for Extreme Networks switches:

300 W AC PSU

Part numbers 10930 and 10930A. Compatible with X460-G2 switches, X620-16t switches, and X620-16x switches. For installation instructions, see Install a 300 W or 750 W Internal AC Power Supply on page 265.

350 W AC PSU

Part numbers XN-ACPWR-350W-FB, 10953, and 10954 are compatible with X460-G2 PoE switches. Part numbers XN-ACPWR-350W-FB and 10953 are compatible with X465-48T the switch model. For installation instructions, see Installing a 350 W, 715 W, 770 W, 1100 W, or 2000 W Internal AC Power Supply on page 270.

550 W AC PSU

Part numbers 10925 through 10928. Compatible with X670-G2 switches. For installation instructions, see Install a 450 W or 550 W Internal AC Power Supply on page 268.

715 W AC PSU

Part numbers XN-ACPWR-715W-FB, 10951, and 10952 are compatible with X450-G2 and X460-G2 PoE switches. Part numbers XN-ACPWR-715W-FB and 10951 are compatible with ExtremeSwitching X465 PoE switch models. For installation instructions, see Installing a 350 W, 715 W, 770 W, 1100 W, or 2000 W Internal AC Power Supply on page 270.

750 W AC PSU

Part number 10931. For PoE switches. Compatible with the EPS-C2 external power supply.

Part numbers XN-ACPWR-750W-F and XN-ACPWR-750W-R are compatible with the X695 switch. For installation instructions, see Install a 300 W or 750 W Internal AC Power Supply on page 265.

770 W AC PSU

Part numbers 10960 and 10961. Compatible with X690 and X870 series switches. For installation instructions, see Installing a 350 W, 715 W, 770 W, 1100 W, or 2000 W Internal AC Power Supply on page 270.

1100 W AC PSU

Part numbers XN-ACPWR-1100W-FB, 10941, and 10942 are compatible with X450-G2 and X460-G2 PoE switches. Part numbers XN-ACPWR-1100W-FB and 10941 are compatible with ExtremeSwitching X465 PoE switch models. For installation instructions, see Installing a 350 W, 715 W, 770 W, 1100 W, or 2000 W Internal AC Power Supply on page 270.

2000 W AC PSU

Part numbers XN-ACPWR-2000W-FB and XN-ACPWR-2000W-F are compatible with ExtremeSwitching X465 PoE switches. For installation instructions, see Installing a 350 W, 715 W, 770 W, 1100 W, or 2000 W Internal AC Power Supply on page 270.

Selecting Power Cords for AC Power Supplies

An AC power cord is not included with an AC power supply.

You can purchase AC power cords for use in the US and Canada from Extreme Networks or from your local supplier. The cord must meet the requirements listed under Power Cord Requirements for AC-Powered Switches and AC Power Supplies on page 504.

Install a 300 W or 750 W Internal AC Power Supply

To install a 300 W or 750 W AC power supply in a switch, follow these instructions.

Warning

To prevent an electrical hazard, make sure that the AC power cord is not connected to the power supply before you install the power supply in the power supply bay.

Caution

Make sure that the AC power supply circuit is not overloaded. Use proper over-current protection, such as a circuit-breaker, to prevent over-current conditions.

1. If necessary, remove a blank panel from the back of the switch (see the following figures).

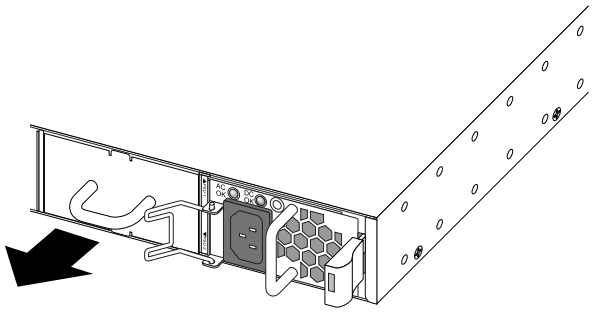


Figure 196: Removing a Blank Panel (300 W Power Supply Unit)

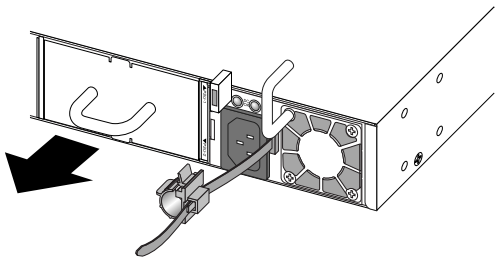


Figure 197: Removing a Blank Panel (750 W Power Supply Unit)

2. Verify that the power supply is right side up.
3. Verify that the power supply's airflow direction (front-to-back or back-to-front) is compatible with the switch.

4. Carefully slide the power supply all the way into the power supply bay (see the following figures).

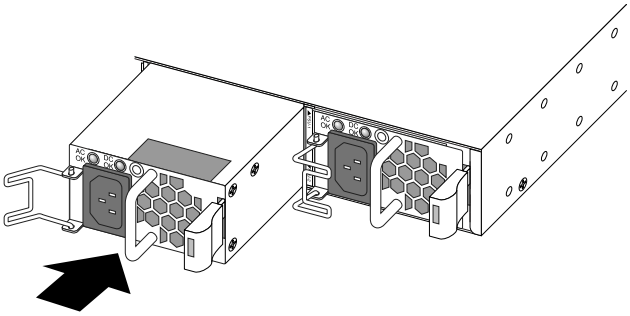


Figure 198: Installing a 300 W AC Power Supply

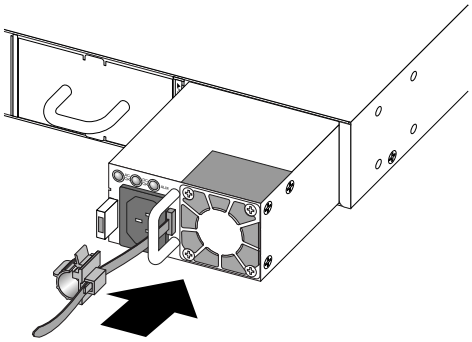


Figure 199: Installing a 750 W AC Power Supply

5. Push the power supply in until the latch snaps into place.

Caution
Do not slam the power supply into the switch.

Note
If power supplies are not installed in both power supply bays, be sure to install a cover over the unoccupied bay. Unoccupied bays must always be covered to maintain proper system ventilation and EMI levels.

6. Connect the AC power cord.

   For 300 W AC power supplies: connect the AC power cord to the input connector on the power supply and rotate the wire clip into place over the power cord connector.

For 750 W AC power supplies:

a. If necessary, slide the plastic cord retainer farther away from the back of the switch (see Figure 200).

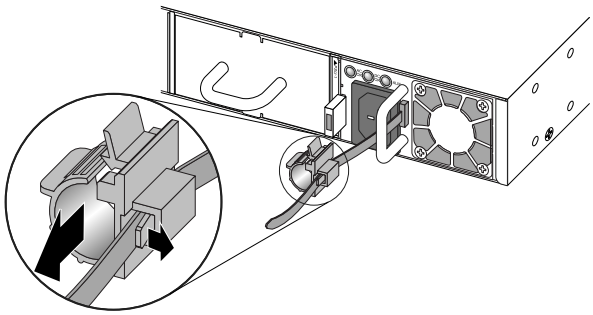


Figure 200: Moving the Power Cord Retainer

b. Connect the AC power cord to the input connector (see Figure 201).

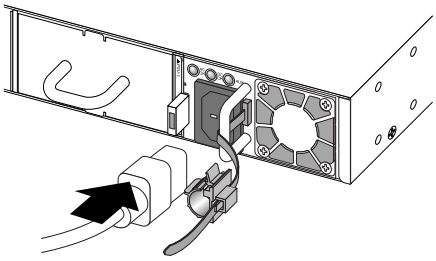


Figure 201: Connecting the Power Cord

c. Open the clip and slip it over the barrel of the connector (see Figure 202).

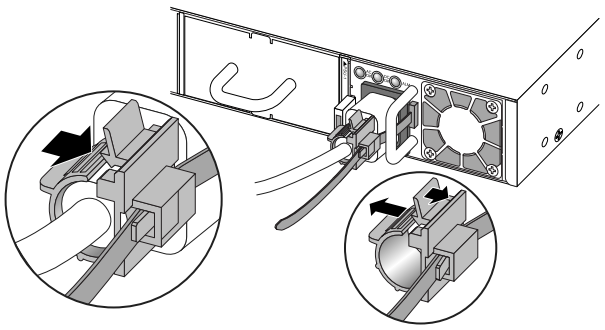


Figure 202: Attaching the Power Cord Retainer

d. Snap the clip firmly around the connector.

7. Connect the other end of the power cord to an AC power outlet.

Warning
Always make sure that the source outlet is properly grounded before plugging the AC power cord into the AC power supply.

To install a second power supply, repeat step 1 on page 265 through step 7.

Install a 450 W or 550 W Internal AC Power Supply

Some switches are shipped without installed power supplies. They accommodate one or two Summit 450 W or 550 W AC power supply units.

Summit 550 W AC power supplies are available for switches with either front-to-back or back-to-front airflow.

An AC power cord is not included with the AC power supply. You can purchase AC power cords for use in the US and Canada from Extreme Networks or from your local supplier. The cord must meet the requirements listed in Power Cord Requirements for AC-Powered Switches and AC Power Supplies on page 504.

Before installing the power supply:

- Verify that the switch rack or chassis has been grounded.
- Verify that the airflow direction for the power supply is the same as the airflow direction of the installed fan modules in the switch.

When installing an AC power supply, be sure to observe the following precautions:

Warning
To prevent an electrical hazard, make sure that the AC power cord is not connected to the power supply before you install the power supply in the power supply bay.

Caution
Make sure the AC power supply circuit is not overloaded. Use proper overcurrent protection, such as a circuit breaker, to prevent overcurrent conditions.

To install a Summit 450 W or 550 W power supply (AC power), follow these steps:

1. Attach an ESD-preventive wrist strap to your bare wrist and connect the metal end to an appropriate ground point on the rack.
2. If necessary, remove a blank panel from the rear of the switch.

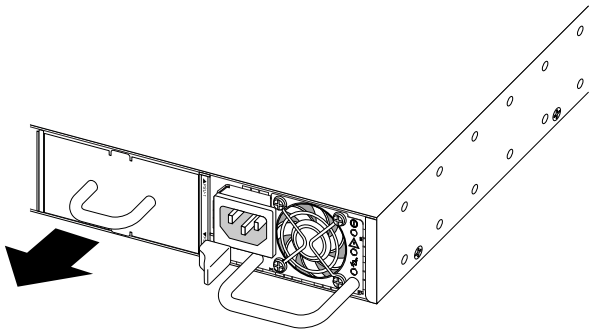


Figure 203: Removing a Blank Panel

3. Verify that the power supply is right side up.

   The power supply should be oriented as shown in Figure 204.
4. Carefully slide the power supply all the way into the power supply bay.

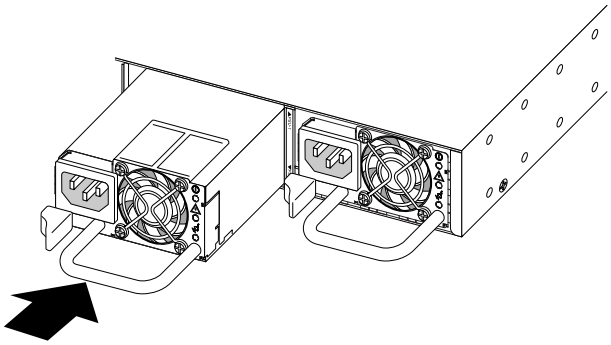


Figure 204: Installing a Power Supply

5. Push the power supply in until the latch snaps into place.

Caution
Do not slam the power supply into the switch.

6. To install a second power supply, repeat the procedure.

Note
If power supplies are not installed in both power supply bays, be sure to install a cover over the unoccupied bay. Unoccupied bays must always be covered to maintain proper system ventilation and EMI levels.

7. Connect the AC power cord to the input connector on the power supply.

   Warning
   Always be sure that the source outlet is properly grounded before plugging the AC power cord into the AC power supply.

8. Connect power. See Connecting Power to the Switch on page 271.

Installing a 350 W, 715 W, 770 W, 1100 W, or 2000 W Internal AC Power Supply

Warning
To prevent an electrical hazard, make sure that the AC power cord is not connected to the power supply before you install the power supply in the power supply bay.

Caution
Make sure the AC power supply circuit is not overloaded. Use proper overcurrent protection, such as a circuit breaker, to prevent overcurrent conditions.

An AC power cord is not included with the AC power supply. You can purchase AC power cords for use in the US and Canada from Extreme Networks or from your local supplier. The cord must meet the requirements listed in Power Cord Requirements for AC-Powered Switches and AC Power Supplies on page 504.

To install a 350 W, 715 W, 770 W, 1100 W, or 2000 W AC power supply in a switch, follow these steps:

1. If necessary, remove a blank panel from the back of the switch.
2. Verify that the power supply is right side up.
3. Verify that the power supply's airflow direction (front-to-back or back-to-front) is compatible with the switch.
4. Carefully slide the power supply all the way into the power supply bay, as shown in Figure 205.

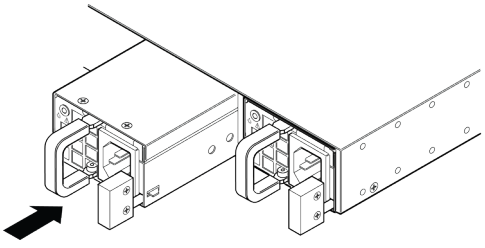


Figure 205: Installing a Summit AC Power Supply (770 W Model Shown)

5. Push the power supply in until the latch snaps into place.

Caution
Do not slam the power supply into the switch.

Note
If power supplies are not installed in both power supply bays, be sure to install a cover over the unoccupied bay. Unoccupied bays must always be covered to maintain proper system ventilation and EMI levels.

6. Connect the power cord to the power supply.

   If the power supply is equipped with a power cord retainer, use the retainer to secure the power cord to the power supply.
7. Connect the power cord to a grounded AC power outlet.

Warning
Always make sure that the source outlet is properly grounded before plugging the AC power cord into the AC power supply.

8. To install a second power supply, repeat the procedure.

Connecting Power to the Switch

An AC power cord is not included with the AC power supply. You can purchase AC power cords for use in the US and Canada from Extreme Networks or from your local supplier. The cord must meet the requirements listed in Power Cord Requirements for AC-Powered Switches and AC Power Supplies on page 504.

To turn on an Extreme Networks switch, do the following.

1. For switches that are connected to AC power, connect the power cord to the AC power input socket on the switch (or power supply) and to an AC power outlet.
2. For switches that are connected to DC power, do the following:
   a. Verify that the DC circuit is de-energized.
   b. Identify the grounding lug on the rear of the switch.

      The grounding lug is identified by the international symbol for earth ground: 
   c. Connect the spade terminal end of the ground wire to the grounding lug with the M4x0.7 screw provided. Connect the other end to a reliable earth ground.

      Use stranded copper wire, sized between 14 AWG and 6 AWG.
   d. Using a cross-head (Phillips) torque screwdriver, tighten the retaining screw to 20 in-lb (2.25 N m).
   e. Connect the DC power input cables to the DC input terminal block on the rear of the switch.
   f. Energize the circuit.
3. If applicable, attach the cable from your redundant power supply (RPS) into the switch's redundant power supply receptacle.

4. When power is connected, verify that the PSU LED and RPS LED (if applicable) turns green.

When both LEDs have turned green, follow the instructions in Connect Network Interface Cables on page 272.

If the PSU and RPS LEDs do not turn green, see the *Switch LEDs* topic for your switch model (in the ExtremeSwitching Switches on page 19 section) for troubleshooting information.

Connect Network Interface Cables

Use the appropriate type of cable to connect the ports of your switch to another switch or router.

Cable Type	Maximum Distance
CAT5E	55 meters
CAT6	55 meters
CAT6A	100 meters

Working carefully, one port at a time, do the following:

1. Verify that you have identified the correct cable for the port.
2. Use an alcohol wipe or other appropriate cleaning agent to clean the cable connectors; make sure they are free of dust, oil, and other contaminants.
3. If you are using optical fiber cable, align the transmit (Tx) and receive (Rx) connectors with the correct corresponding connectors on the switch or the I/O module.
4. Press the cable connectors into their mating connectors on the switch or I/O module until the cable connector is firmly seated.
5. Repeat the preceding steps for the remaining cables on this or other switches or I/O modules.
6. Dress and secure the cable bundle to provide appropriate strain relief and protection against bends and kinks.

Performing Initial Management Tasks

When you set up a switch for the first time, you must connect to the console to access the switch and log in to perform initial security configuration.

Check http://ezcloudx.com/supportedhardware to see what switch models can be managed with ExtremeCloud. If your switch is entitled for management by ExtremeCloud, you can optionally use the installation instructions at http://ezcloudx.com/quickstart.

Otherwise, to perform normal setup and configuration, follow the instructions in these topics:

- Connecting a Switch to the Management Console on page 273
- Logging in for the First Time on page 273

You can also:

- Configuring the Switch's IP Address for the Management VLAN on page 275
- Configuring ExtremeXOS on the Switch on page 275

Connecting a Switch to the Management Console

Connect each switch to a central console to enable direct local management of the switch.

Each switch should be connected to a management console – a terminal or PC with terminal-emulation software. For all Extreme Networks switches, the terminal or PC must be configured with the following settings:

- Baud rate: 115200 (for X465, X590, X690, or X870) or 9600 (for other models) (see note)
- Data bits: 8
- Stop bit: 1
- Parity: None
- Flow control: XON/XOFF

Note
Set the baud rate to 115200 when using the RJ45 Ethernet management port on an X465, X590, X690 or X870 series switch.

For information about setting the proper values, refer to the documentation supplied with the terminal or PC.

Ensure that the connection between the switch and the management console is over either an RJ45-to-serial adapter or a DB9 serial cable. Appropriate cables are available from your local supplier, or you can make your own. To ensure the electromagnetic compatibility of the unit, use only shielded serial cables. For connector pinouts associated with the console port, see Console Connector Pinouts on page 504.

Logging in for the First Time

After your switch has completed all power-on self-tests, it is operational. Before logging in, verify that the switch LEDs are on (solid green or blinking green) and that it is connected to a management console as described in Connecting a Switch to the Management Console on page 273.

To perform the initial login and complete initial configuration tasks, follow these steps.

1. Using a terminal emulator such as PuTTY or TeraTerm, connect to the switch using the serial port connection.

   Be sure that your serial connection is set properly:

   - Baud rate: Baud rate: 115200 (for X465, X590, X690, or X870) or 9600 (for other models) (see note)
   - Data bits: 8
   - Stop bit: 1

   Note
   Set the baud rate to 115200 when using the RJ45 Ethernet management port on an X465, X590, X690 or X870 series switch.

2. At the management console, press **[Enter]** one or more times until you see the login prompt.
3. At the login prompt, log in using the default user name `admin`.

   For example:

   ```
   login: admin
   ```

   Note
   For the initial password, simply press **[Enter]**.

   When you have successfully logged on to the system, the command line prompt displays the system name (for example, `SummitX670-G2#`) in its prompt. You are logged in with administrator privileges, which gives you access to all switch functions.
4. Respond to the screen prompts to configure the level of security you need.

   Note
   For more information about logging in to the switch and configuring switch management access, see the *ExtremeXOS 30.7 User Guide*.

5. Enter `show version`.

   The switch serial number is displayed, as highlighted in the following example. Make a note of this number for future reference.

   ```
   Transit.3 # show version
   Switch : 800444-00-05 0723G-01234 Rev 5.0 BootROM:
   ```

Configure the switch's IP address for the management virtual LAN (VLAN) by following the steps in Configuring the Switch's IP Address for the Management VLAN on page 275.

Configuring the Switch's IP Address for the Management VLAN

You can configure the switch's IP address for the management virtual LAN (VLAN).

Note
The management port is part of the `mgmt` VLAN. This VLAN membership cannot be changed.

Log in to the management console, connect to the switch, and follow these steps.

1. Assign a name, IP address, and default subnetwork mask for the VLAN as shown in the following example.

   ```
   configure vlan vlan_name ipaddress nn.nn.nn.nn 255.255.255.0
   ```

   Your changes take effect immediately.
2. Enter `save` to save your configuration changes so that they will be in effect after the next system reboot.

   Note
   For more information about saving configuration changes, see the *ExtremeXOS 30.7 User Guide*.

The configuration is saved to the configuration database of the switch.

Configure the ExtremeXOS software on the switch by following the steps in Configuring ExtremeXOS on the Switch on page 275.

Configuring ExtremeXOS on the Switch

To make a switch ready for use, ExtremeXOS must be downloaded and configured. To do this, log in to the management console, connect to the switch, and follow these steps.

Note
The management console can run on a terminal or a PC with terminal-emulation software. In these steps, the term *PC* is used to refer to both.

1. Go to the Product Registration page and provide the requested information.
2. Enter the serial number of the switch.

   You can obtain the serial number by entering `show version` on the management console, as described in step 5 on page 274.
3. From the Software Download page, download the ExtremeXOS image file to the PC.

4. When the download is complete, connect back to the switch through the management console.

   Then connect an Ethernet cable from the switch's management port to a serial port on your PC. (Alternatively, you can connect to the PC using a serial-USB adapter.)

   Note
   To avoid an IP address conflict, you might need to change the IP address for the PC, for example to `10.10.10.10 255.255.255.0`.

5. Start a TFTP session using a program such as TFTPD64.

   Set the TFTP Server's IP address option to match the one configured in step 4.
6. At the switch, download the new software to the switch, for example:

   ```
   download image 10.10.10.10 summitX-22.2.1.5.xos
   ```
7. When you are asked whether you want to install the downloaded software, enter `y`.
8. When the download and installation have completed, use the **`reboot`** command to begin using the version just installed.

The switch is ready for use.

Installing External Power Supplies

Read the information in the following sections thoroughly before you attempt to install or remove an external power supply.

For information about installing external power supplies that work with other Extreme Networks switches, refer to *ExtremeSwitching and Summit Switches: Hardware Installation Guide for Switches Using ExtremeXOS 16 or Earlier*.

Safety Considerations for Installing Power Supplies

Only trained service personnel should perform service to Extreme Networks switches and their components.

Trained service personnel have read all related installation manuals, have the technical training and experience necessary to be aware of the hazards to which they are exposed in performing a task, and are aware of measures to minimize the danger to themselves or other persons.

Caution
Extreme Redundant Power Supplies (RPS) do not support the ability for the RPS to be connected to an operational switch. Connecting an RPS to an operational switch can have an adverse effect on the switch. It is best practice that both the switch and the RPS be powered down prior to cabling them together. Once the cabling is completed, turn on the RPS, then turn on the switch.

Warning
Extreme Networks AC power supplies do not have switches for turning the unit on and off. To disconnect the power to an Extreme Networks AC power supply, remove the wall plug from the electrical outlet. Make sure that this connection is easily accessible.

Warning
When the power supply is outside the chassis (not installed), do not plug the power supply into an electrical outlet. Plugging an uninstalled AC power supply into an electrical outlet exposes you to a hazardous energy and is a potential fire hazard.

Caution
Before installing or removing any components of the system, or before carrying out any maintenance procedures, read the safety information provided in Safety and Regulatory Information on page 507. Not following these precautions can result in equipment damage or shock.

Caution
Be sure that proper ESD controls are in use before switch maintenance is performed. This includes but is not limited to wrist straps that are grounded to the switch chassis and earth grounds.

Note
See "Technical Specifications" for additional information regarding regulatory compliance certifications.

Pre-installation Requirements

You need the following tools and equipment to install an external power supply:

- # 1 Phillips screwdriver
- Rack mount screws suitable for your organization’s equipment rack
- Screwdriver suitable for use with your rack-mount screws
- AC power cord

  An AC power cord is not included with the external power supply. Obtain a power supply cord that meets the requirements listed under Power Cord Requirements for AC-Powered Switches and AC Power Supplies on page 504.

Note
When you connect an external power supply, consider all of the equipment that is connected to the power supply circuit to ensure that the circuit is not overloaded. Use proper overcurrent protection, such as a circuit breaker, to prevent overcurrent conditions.

The switch and each redundant power supply source should be plugged into separate branch circuits to provide redundancy.

Installing an EPS-C2 Power Supply

Install one, two, or three Summit 750 W AC power supplies (model 10931) in the EPS-C2 chassis (model 10936) to build an external redundant power system for one or more compatible switches

One redundant power cable is shipped with the EPS-C2 chassis to provide the connection between the external power system and the redundant power input connector on the back of a switch. Additional redundant power cables are available from Extreme Networks.

When installing an EPS-C2 chassis at the same time as a switch, install the components in the following order:

1. Install the switch into a rack.
2. Install the EPS-C2 chassis into a rack.
3. Install power supplies into the EPS-C2 chassis.
4. Attach the redundant power cable from the EPS-C2 chassis to the switch.
5. Attach an AC power cord to the switch's internal power supply.

   Then plug it into an AC power source.
6. Connect AC power cords to the internal power supplies of the EPS-C2 chassis.

   Then plug each cord into an AC power source.

Warning

Be sure to attach power to components in the order listed in this section. If you attach power out of the order listed, you can damage your equipment.

The following sections describe the specific steps for installing the EPS-C2 chassis.

Note

An AC power cord is not provided with the Summit 750 W AC power supply. See Selecting Power Supply Cords on page 513 for information about selecting a power cord.

Installing an EPS-C2 Chassis

To mount the EPS-C2 chassis in a 19-inch rack, follow these steps:

1. Place the EPS-C2 chassis upright on a secure work surface.
2. Remove the mounting bracket kit from the packaging.
3. Attach the mounting brackets as follows:
   a. Place a mounting bracket over the mounting holes on one side of the EPS-C2 (see Figure 206).

b. Insert the screws and fully tighten them using a screwdriver.

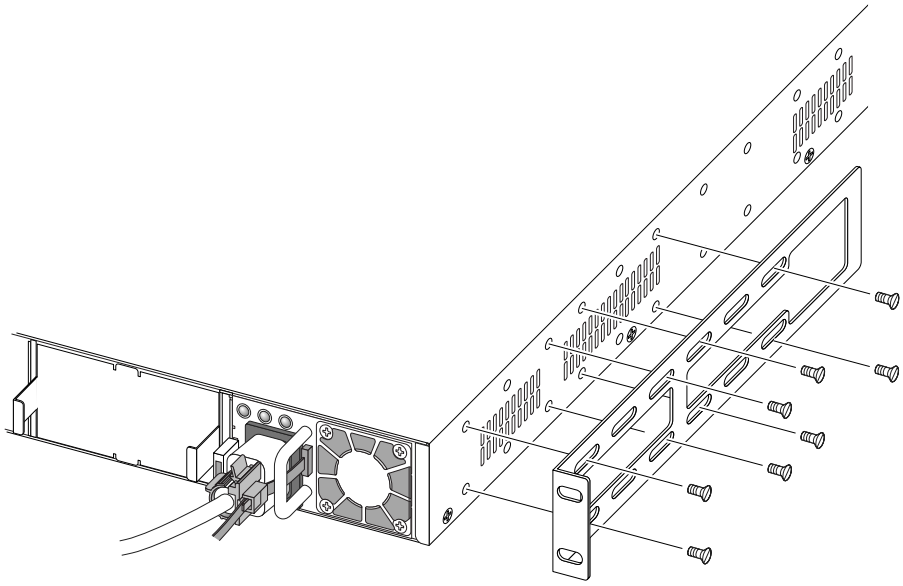


Figure 206: Attaching the Mounting Bracket to the EPS-C2 Chassis

c. Attach the mounting bracket for the other side of the EPS-C2.

4. Slide the EPS-C2 into the rack and secure it using appropriate rack-mount screws.

   See Figure 207.

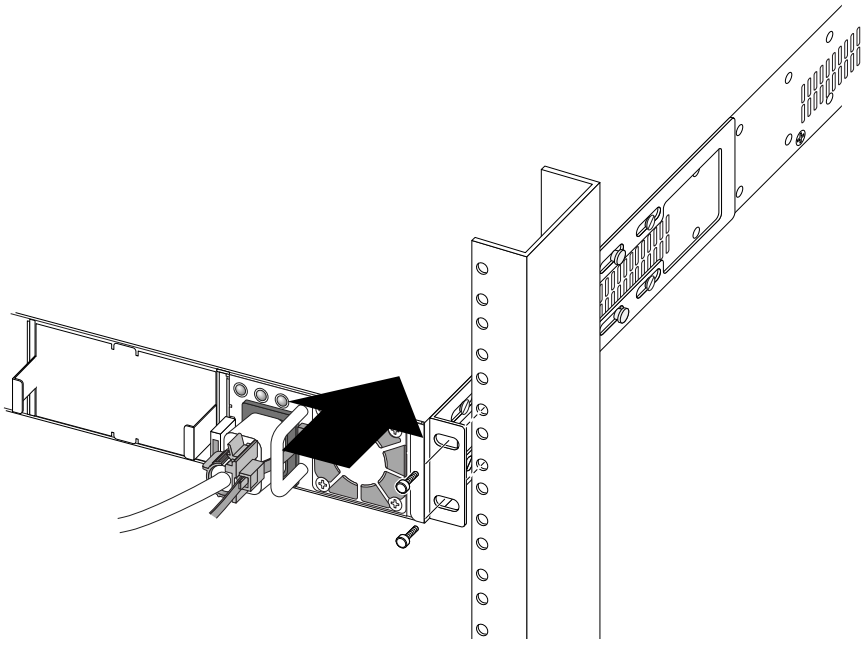


Figure 207: Sliding the EPS-C2 into the Rack and Securing it

Installing a Summit 750 W AC Power Supply into the EPS-C2

The EPS-C2 chassis is shipped with slots 2 and 3 covered and slot 1 open.

We recommend that you install a power supply first in slot 1, but this is not required. You can install power supplies into any of the slots in the EPS-C2 chassis. The installation sequence does not affect the performance of the power supply units, but empty slots must be covered at all times.

Warning
To prevent an electrical hazard, make sure that the AC power cord is not connected to the power supply before you install the power supply in the power supply bay.

After the EPS-C2 has been installed in a rack, do the following to install a 750 W AC power supply in an EPS-C2 chassis:

1. If necessary, grasp the two tabs on either side of the slot cover and pull gently to remove it from the front of the EPS-C2 chassis.

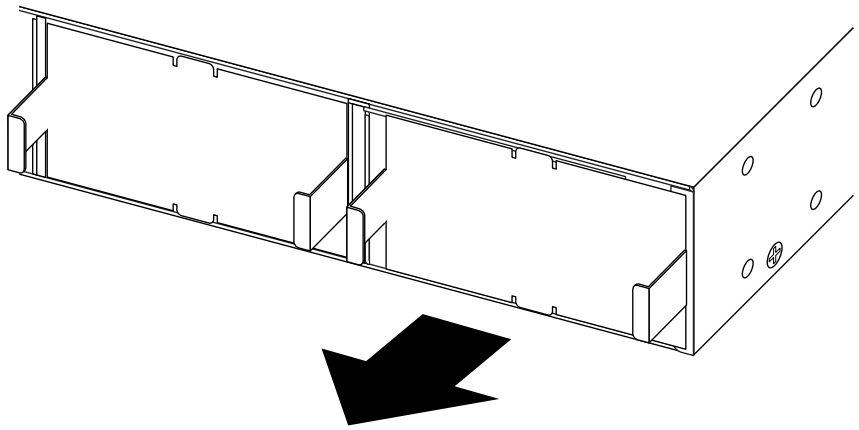


Figure 208: Removing a Blank Panel from the EPS-C2 Chassis

2. Verify that the power supply is right side up (there is a sticker labeled “This Side Up”).
3. Carefully slide the power supply all the way into the slot in the EPS-C2 chassis (see Figure 209).

4. Push the power supply in until the latch snaps into place.

Caution
Do not slam the power supply into the chassis.

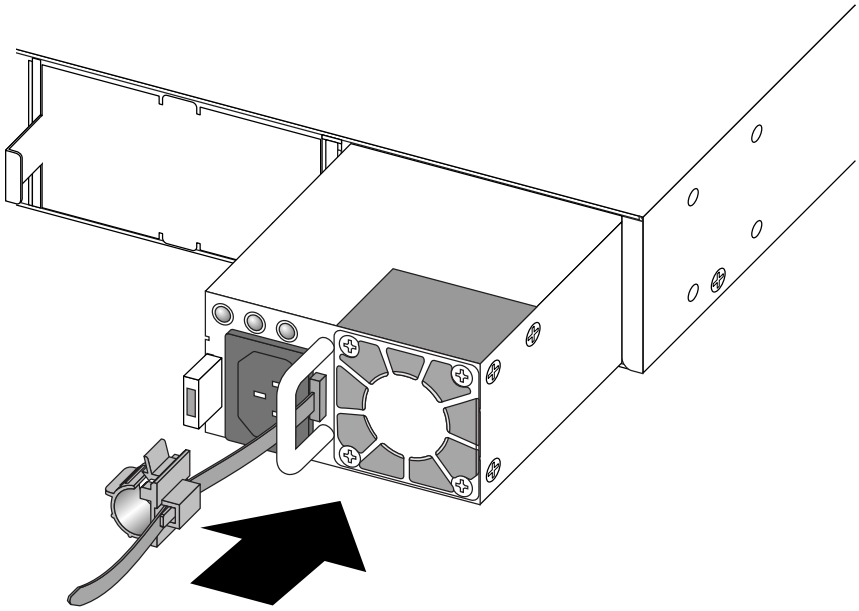


Figure 209: Installing a 750 W AC Power Supply in an EPS-C2 Chassis

Note
If power supplies are not installed in all three slots, be sure to install a cover over each unoccupied slot. Unoccupied slots must always be covered to maintain proper system ventilation and EMI levels.

Repeat the procedure to install each additional power supply.

Connecting Redundant Power Cables for the EPS-C2 Chassis

The EPS-C2 chassis can use up to five 2x7-pin redundant power connectors, shown in Figure 210, which connect the power supply to ExtremeSwitching X440-G2 and X620 switches.

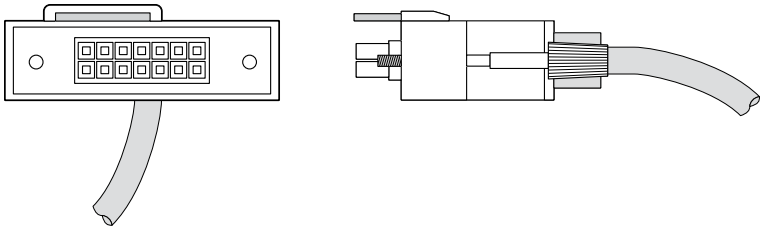


Figure 210: EPS-C2 2x7 Pin Redundant Power Cable with Connector Key Tab

The redundant power cable has keyed ends. The key is a plastic tab on the cable connector housing to ensure correct alignment of the connector. The keyed ends of the 2x7 cable are not symmetrical; one end of the cable will fit into the EPS-C2 chassis and the other end will fit into the switch.

After the EPS-C2 has been installed in a rack and the power supplies have been installed, do the following to connect the redundant power cables:

1. Set the connector selection switch, located on the front of the EPS-C2 chassis, for the 2x7 connector.

   See Figure 211.

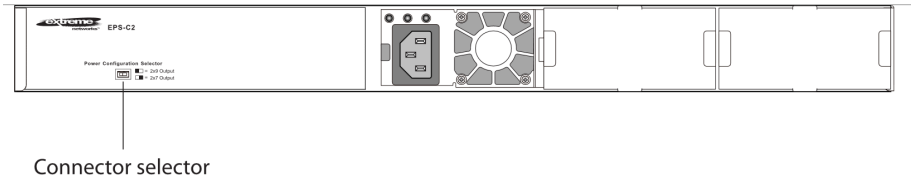


Figure 211: EPS-C2 Connector Selector Switch

2. Connect the keyed end (for the 2x7 connector cable, the end with the tab offset from the edge of the connector pins) of the redundant power cord to the EPS-C2 chassis.

   See Figure 212.
3. Verify that the side of the connector marked TOP is facing up.

4. Connect the other end of the redundant power cable (for the 2x7 connector cable, the end with the key flush with the edge of the connector pins) to the switch.

   See Figure 212.

   Be sure that the side of the connector marked TOP is facing up.

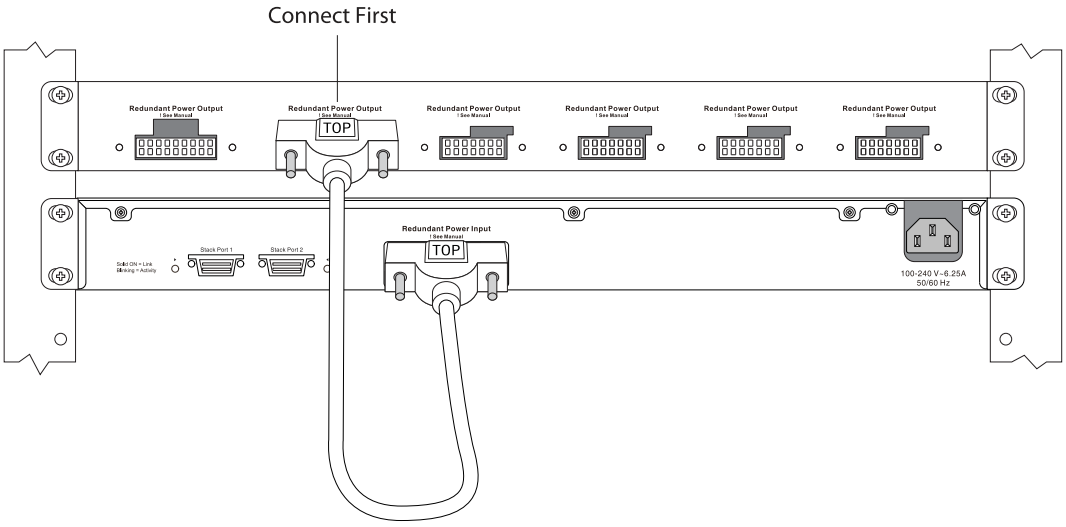


Figure 212: Installing the Redundant Power Cord

Note
The EPS-C2 2x9 connector, shown in the figure to the left of where the cable is connected, is used only with older switch models that are not compatible with ExtremeXOS version 21.1 and later.

5. Repeat the preceding steps to connect any additional redundant power cords.

Connecting the AC Power cord to the EPS-C2

Important
When performing this task, observe all of the precautions listen in Safety Considerations for Installing Power Supplies on page 277.

After the redundant power cord is connected between the EPS-C2 and the switch, and an AC power cord to the internal power supply of the switch is attached to a power source, install the AC power cord to the power supplies in the EPS-C2 as follows:

1. If necessary, slide the plastic cord retainer farther away from the back of the power supply.

   See Figure 213.

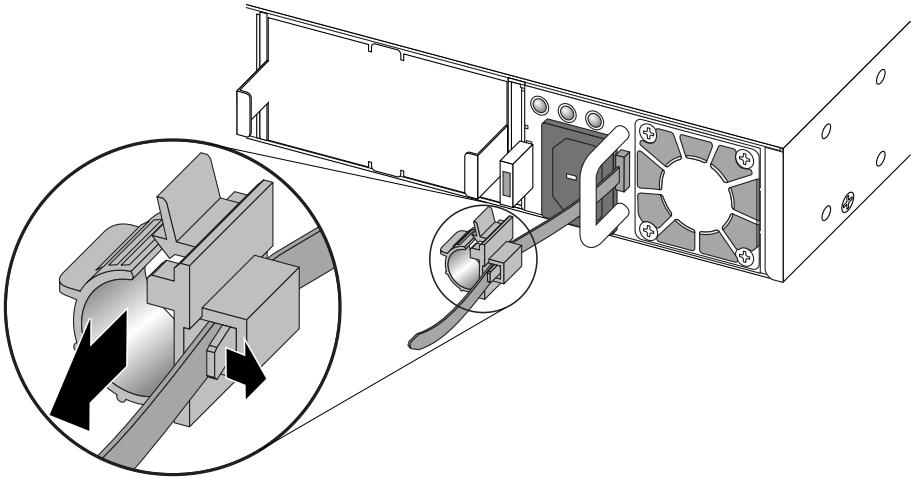


Figure 213: Moving the Power Cord Retainer on the 750 W AC Power Supply

2. Connect the AC power cord to the input connector.

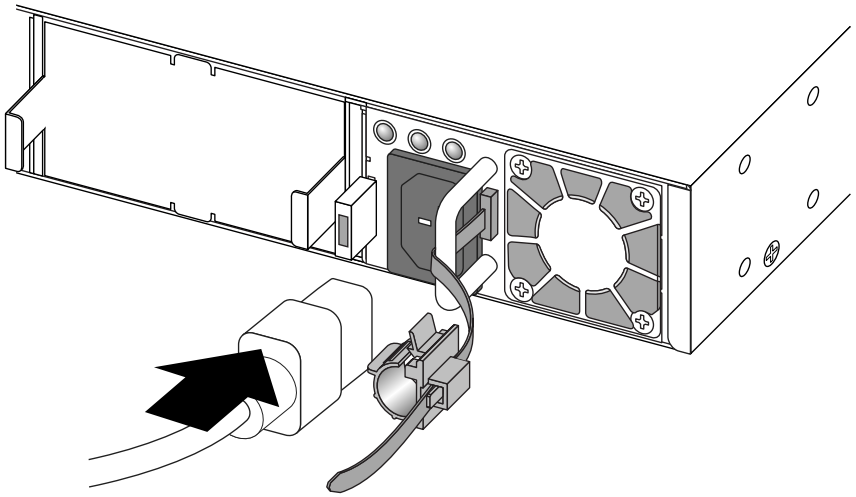


Figure 214: Connecting the Power Cord on the 750 W AC Power Supply

3. Open the clip and slip it over the barrel of the connector.

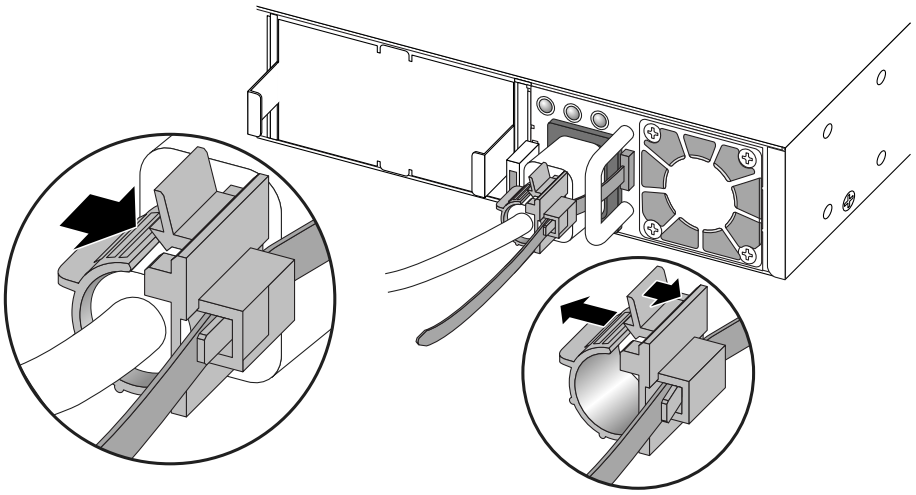


Figure 215: Attaching the Power Cord Retainer on the 750 W AC Power Supply

4. Snap the clip firmly around the connector.

5. Connect the other end of the power cord to an AC power outlet.

Warning
Always be sure that the source outlet is properly grounded before plugging the AC power cord into the AC power supply.

Caution
Make sure that the AC power supply circuit is not overloaded. Use proper overcurrent protection, such as a circuit breaker, to prevent overcurrent conditions.

Installing an RPS-150XT Redundant Power Supply

You can install the RPS-150XT power supply on a flat surface or in a 19-inch rack in the three-slot modular shelf (STK-RPS-1005CH3), which is available for purchase separately.

Caution
Observe all ESD precautions when handling sensitive electronic equipment.

Only qualified personnel should install redundant power supply (RPS) units.

Unpacking the RPS-150XT

To prevent electrostatic damage, attach an electrostatic discharge (ESD) wrist strap to your wrist before handling the RPS-150XT.

Unpack the power supply as follows:

1. Remove the packing material protecting the power supply.
2. Perform a visual inspection of the power supply for any signs of physical damage. Contact Extreme Networks if there are any signs of damage.

Installation Requirements

The installation site must be within reach of the network cabling and meet the following requirements:

- Appropriate grounded power receptacles must be located within six feet of the site.
- A temperature of between 0°C (32°F) to 60°C (140°F) with fluctuations of less than 10°C (18°F) per hour must be maintained.
- A readily accessible disconnect device shall be incorporated into the building wiring.

A Phillips screwdriver and four rack screws (not supplied) are needed to install the RPS-150XT in a rack using the three-slot modular shelf.

Installing an RPS-150XT in a Rack

To install the RPS-150XT in the three-slot modular shelf (STK-RPS-1005CH3), you must first install the shelf in a 19-inch rack.

Caution
Observe all ESD precautions when handling sensitive electronic equipment.

Caution
Before rack-mounting the device, ensure that the rack can support it without compromising stability. Otherwise, personal injury and/or equipment damage can result.

To install the RPS-150XT in a rack, follow these steps.

1. Secure the front of the three-slot modular shelf (STK-RPS-1005CH3) to the rack by screwing four rack screws into the mounting ears on the right and left front of the shelf.

   See Figure 4.

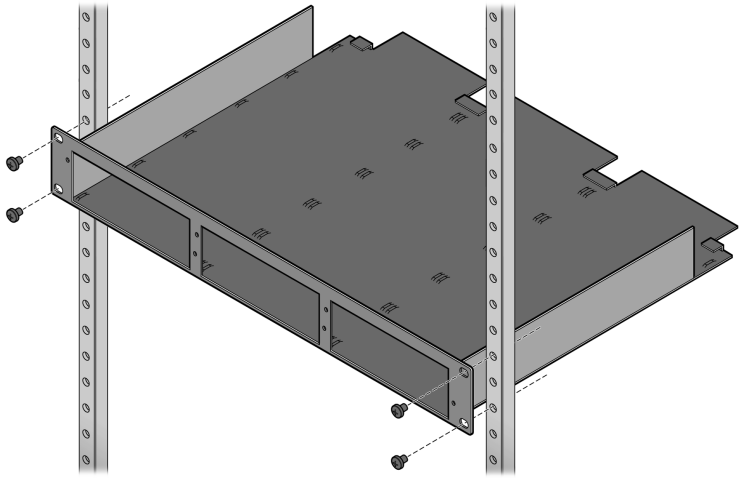


Figure 216: Securing the Three-slot Modular Shelf to a Rack

2. Slide the power supply into an empty bay in the shelf.

   See Figure 217.

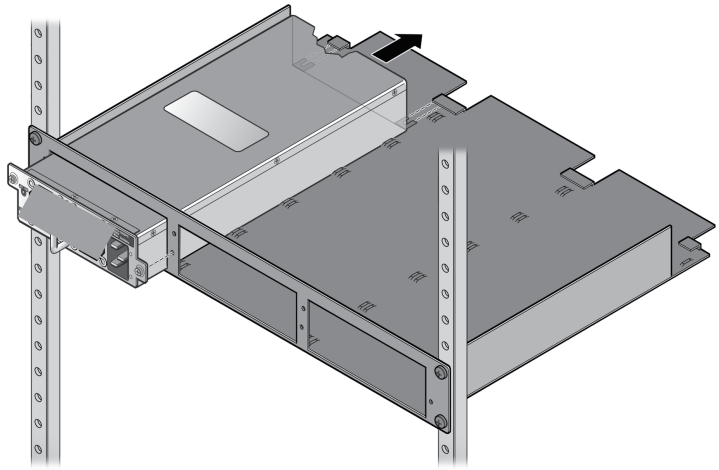


Figure 217: Installing an RPS-150XT Power Supply Unit in a Shelf

3. Tighten the captive screws to secure the power supply to the shelf.
4. Connect the RPS-150XT to its power source.

   See Connecting the RPS Cable and AC Power Cord to an RPS-150XT on page 290.

Installing an RPS-150XT on a Flat Surface

Caution
Observe all ESD precautions when handling sensitive electronic equipment.

When installing the RPS-150XT power supply on a flat surface, we recommend installing the rubber feet to prevent the power supply from sliding.

Note
Do not install the rubber feet on the power supply if you are installing the power supply in the three-slot modular shelf (STK-RPS-1005CH3).

To prepare the RPS-150XT for use on a flat surface, follow these steps.

1. On a sturdy flat surface, lay the power supply on its top.
2. Remove the four rubber feet from their plastic bag in the shipping box.
3. Remove the protective strip from the back of one rubber foot and position it on a bottom corner of the power supply.

   Press the rubber foot firmly into place.

   Repeat this step for each of the remaining three rubber feet.
4. After installing the rubber feet, return the power supply to its upright position.
5. Connect the RPS-150XT to its power source.

   See Connecting the RPS Cable and AC Power Cord to an RPS-150XT on page 290.

Connecting the RPS Cable and AC Power Cord to an RPS-150XT

The RPS-150XT power supply is connected to the switch using the supplied RPS cable, as follows.

Caution
Observe all ESD precautions when handling sensitive electronic equipment.

Note
The switch should not be powered on during installation or removal of the power supply. This is not a hot-swap procedure. Follow the steps in the order specified.

Warning
For some X440-G2 models, when the RPS is not powered on and is connected to a powered switch, there is potential for a sudden load change that causes the switch to reset. It is best practice to unplug the switch before connecting the RPS.

1. Connect one end of the RPS cable to the Redundant Power Supply connector at the rear of the power supply.
2. Connect the other end of the RPS cable to the Redundant Power Supply connector on the switch.

   See Figure 218.

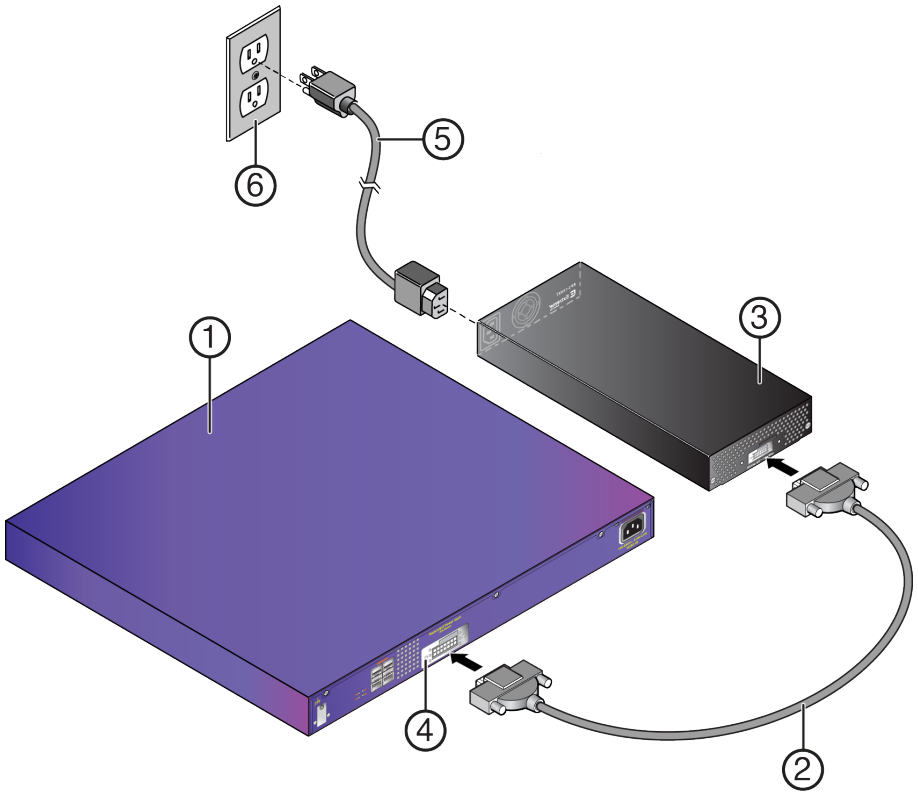


Figure 218: RPS Cable and AC Power Cord Connections for the RPS-150XT

1 = Switch	4 = Redundant Power Supply connector
2 = RPS cable	5 = AC power cord
3 = RPS-150XT	6 = AC power outlet with ground connection

Note
AC power cords and outlets vary depending on country.

3. Connect the AC power cord to the AC input power connector on the power supply.
4. Plug the AC power cord into the main AC power outlet.

The AC OK and DC OK LEDs on the front of the power supply turn green to indicate that the connection was successful and the power supply is operating properly.

If the LEDs do not light properly, follow these steps to troubleshoot:

- Check the AC power cord connection at the AC power source and make sure the power source is within specification.
- Check the AC power connection to the power supply.
- Swap the AC power cord with one that is known to work properly.

Installing an RPS-500p Redundant Power Supply

You can install the RPS-500p power supply on a flat surface or in a 19-inch rack.

Caution
Observe all ESD precautions when handling sensitive electronic equipment.

Locate the RPS-500p within 6 ft (1.8 m) of its power source.

Only qualified personnel should install redundant power supply (RPS) units.

Installing an RPS-500p in a Rack

To install the RPS-500p power supply in a 19-inch rack, you need the following:

- Two rack-mounting brackets and mounting screws (rack-mounting kit) shipped with the power supply
- Four customer-supplied screws to attach the power supply to a standard 19-inch rack

Caution
Observe all ESD precautions when handling sensitive electronic equipment.

Caution
Before rack-mounting the device, ensure that the rack can support it without compromising stability. Otherwise, personal injury and/or equipment damage can result.

To install the RPS-500p in a rack, follow these steps.

1. Attach the rack-mounting brackets to the RPS-500p using the eight M3x6mm flathead screws shipped with the power supply.
   See Figure 219.

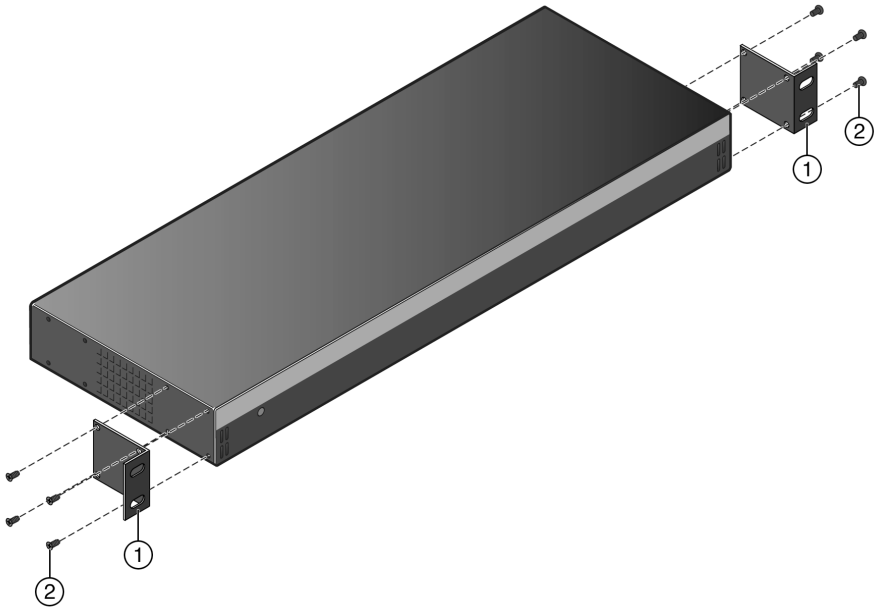


Figure 219: Attaching the Rack-Mounting Brackets

1 = Rack-mounting brackets (2)	2 = M3x6mm flathead screws (8)

2. With the rack-mounting brackets attached, position the RPS-500p between the vertical rack rails of the 19-inch rack as shown in Figure 220.

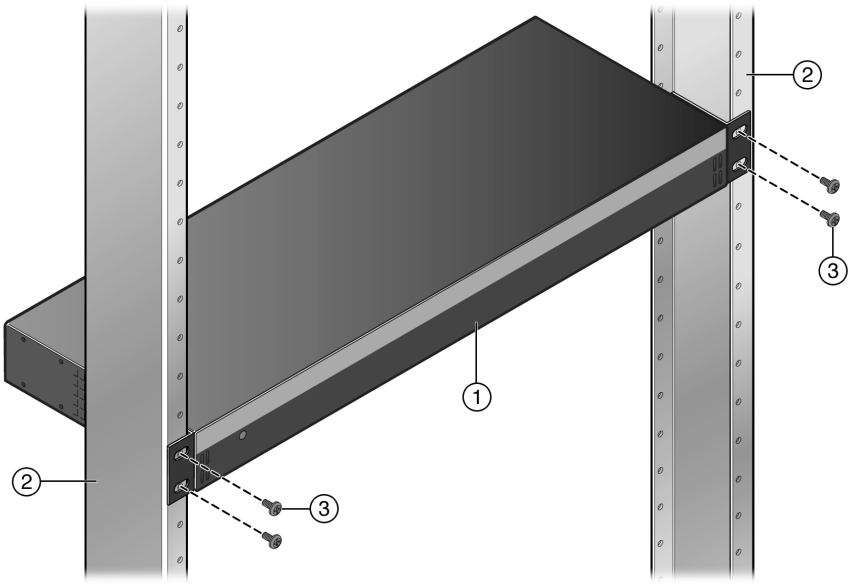


Figure 220: Fastening the RPS-500p to the Rack

1 = RPS-500p	3 = Mounting screws (4)
2 = Rails of 19-inch rack	

3. Fasten the RPS-500p securely to the rack rails using four customer-supplied rack screws.
4. Connect the RPS-500p to its power source.

   See Connecting the RPS Cable and AC Power Cord to an RPS-500p on page 293.

Installing an RPS-500p on a Flat Surface

Caution
Observe all ESD precautions when handling sensitive electronic equipment.

When installing the RPS-500p power supply on a flat surface, we recommend installing the rubber feet to prevent the power supply from sliding.

To prepare the RPS-500p for use on a flat surface, follow these steps.

1. On a sturdy flat surface, lay the power supply on its top.
2. Remove the four rubber feet from their plastic bag in the shipping box.
3. Remove the protective strip from the back of one rubber foot and position it on a bottom corner of the power supply.

   Press the rubber foot firmly into place.

   Repeat this step for each of the remaining three rubber feet.
4. After installing the rubber feet, return the power supply to its upright position.
5. Connect the RPS-500p to its power source.

   See Connecting the RPS Cable and AC Power Cord to an RPS-500p on page 293.

Connecting the RPS Cable and AC Power Cord to an RPS-500p

Important
When performing this task, observe all of the precautions listen in Safety Considerations for Installing Power Supplies on page 277.

Connect the RPS-500p power supply to the PoE-compliant switch using the supplied RPS cable, as follows.

Caution
Observe all ESD precautions when handling sensitive electronic equipment.

1. Connect one end of the RPS cable to the Redundant Power Supply connector at the rear of the power supply.
2. Connect the other end of the RPS cable to the Redundant Power Supply connector on the switch.

   See Figure 221.

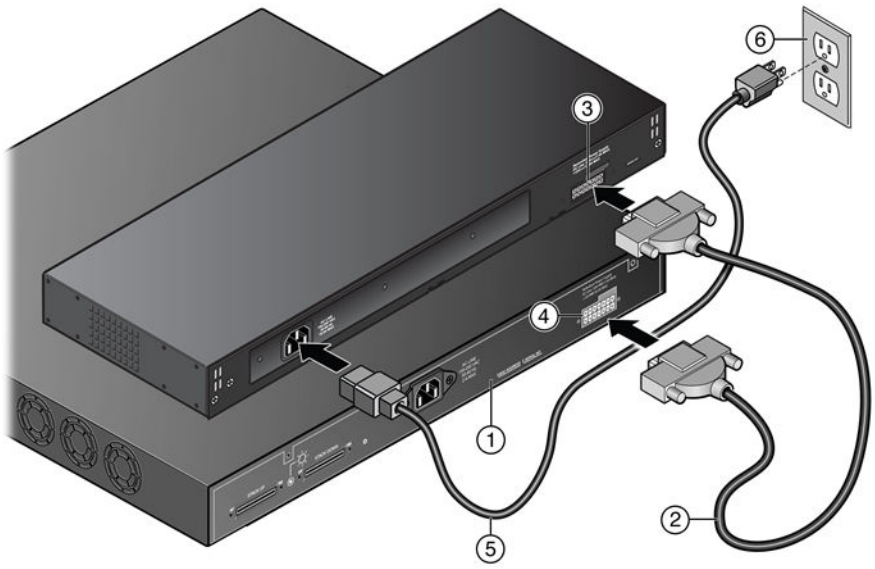


Figure 221: RPS Cable and AC Power Cord Connections for the RPS-500p

1 = PoE-compliant switch	4 = Redundant Power Supply connector on switch
2 = RPS cable	5 = AC power cord
3 = Redundant Power Supply connector on power supply	6 = AC power outlet with ground connection

Note
AC power cords and outlets vary depending on country.

3. Connect the AC power cord to the AC input power connector on the power supply.
4. Plug the AC power cord into the main AC power outlet.

The AC OK and DC OK LEDs on the front of the power supply turn green to indicate that the connection was successful and the power supply is operating properly.

If the LEDs do not light properly, follow these steps to troubleshoot:

- Check the AC power cord connection at the AC power source and make sure the power source is within specification.
- Check the AC power connection to the power supply.
- Swap the AC power cord with one that is known to work properly.

Installing an STK-RPS-150PS Redundant Power Supply

You can install an STK-RPS-150PS as a standalone unit or in one of the following RPS shelves:

- STK-RPS-150CH2, a two-slot shelf
- STK-RPS-150CH8, an eight-slot shelf

If you are installing the STK-RPS-150PS as a standalone unit, see Connecting the RPS Cable and AC Power Cord on page 299.

To install an STK-RPS-150PS in an RPS shelf, see Installing an STK-RPS-150PS in an RPS Shelf on page 295.

Required Tools

A flat-blade screwdriver is required to install the STK-RPS-150CH2 or STK-RPS-150CH8 shelf and STK-RPS-150PS power supplies.

Unpacking the Shelf and Power Supply

The shelf and the power supply are shipped separately. To unpack them, follow these steps:

1. Open the box and remove the packing material protecting the shelf or power supply.
2. Verify that the unit your ordered and a quick reference guide is included in the package.
3. Perform a visual inspection of the contents for any signs of physical damage. Contact Extreme Networks if there are any signs of damage.

Installing an STK-RPS-150PS in an RPS Shelf

Caution
Observe all ESD precautions when handling sensitive electronic equipment.

On the STK-RPS-150CH8 shelf, a cover plate will be in place over each power-supply slot.

To install the power supplies:

1. Place the RPS shelf on a sturdy flat surface where you plan to install power supplies.

2. Align the power supply with one of the slots, then slide the power supply forward until its front panel is flush against the RPS shelf front panel.

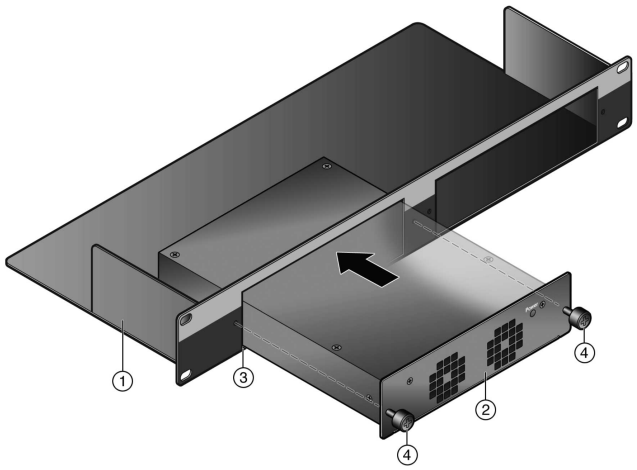


Figure 222: STK-RPS-150PS Installation in an STK-RPS-150CH2 Shelf

1 = STK-RPS-150CH2 shelf	3 = Shelf power supply slot
2 = STK-RPS-150PS power supply	4 = Captive screws (2)

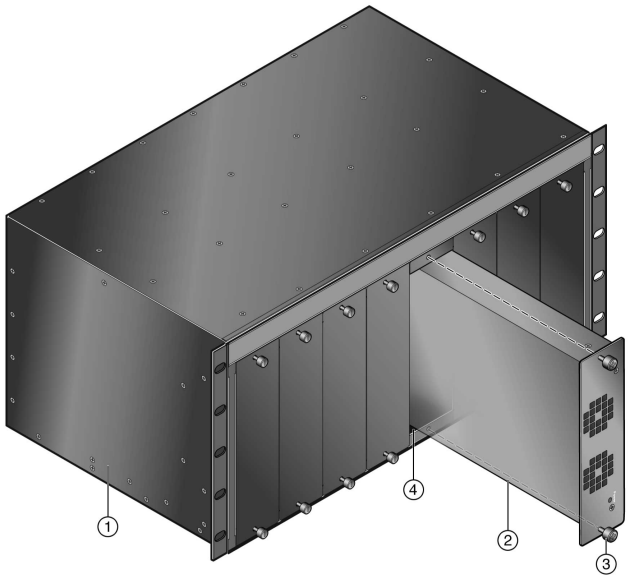


Figure 223: STK-RPS-150PS Installation in an STK-RPS-150CH8 Shelf

1 = STK-RPS-150CH8 shelf	3 = Captive screws (2)
2 = STK-RPS-150PS power supply	4 = Shelf power supply slot

3. Fasten the power supply to the RPS shelf using the captive screws on the PSM front panel.
4. Repeat the two previous steps for each additional power supply.

5. Proceed to Installing the RPS Shelf into the Rack on page 297.

Installing the RPS Shelf into the Rack

To install an STK-RPS-150CH2 or STK-RPS-150CH8 into a 19-inch (48.3 cm) rack, you need the following:

- For the STK-RPS-150CH2: four customer-supplied screws to fasten the shelf to the rack rails.
- For the STK-RPS-150CH8: ten customer-supplied screws to fasten the shelf to the rack rails.

After installing the power supplies as described in Installing an STK-RPS-150PS in an RPS Shelf on page 295, rack mount the RPS shelf as follows:

1. Refer to the installation guidelines (Guidelines for Rack Mount Installation).
2. Install the RPS shelf into the rack (Rack Mounting the RPS Shelf on page 298).
3. Connect the RPS cables and AC power cords of the power supplies (Connecting the RPS Cable and AC Power Cord on page 299).

Guidelines for Rack Mount Installation

The installation site must be within reach of the network cabling and meet the requirements listed below:

- Shelf placement must be close enough to connect the 6.6-foot (2-meter) AC power cords from the power supplies to the AC power source.
- One or two three-pronged power receptacles capable of delivering the current and voltage specified in STK-RPS-150PS and RPS Shelves Technical Specifications on page 498. One or two AC outlets on independently-fused circuits must be within 6 feet (1.8 meters) from the installation site. If there is an AC power source failure, this will prevent the powering down of redundant power supplies due to a single source power failure.
- Power cords and type of outlet are dependent on the country. In the United States, one power cord with an NEMA 5-15P plug is provided with each STK-RPS-150PS.
- An ambient temperature of between 32°F (0°C) and 122°F (50°C) must be maintained at the installation site with fluctuations of less than 18°F (10°C) per hour.

Caution
To ensure proper ventilation and prevent overheating, leave a minimum clearance space of 3 inches (7.6 cm) at the front and rear of the unit.

Warning
Before installing the shelf into a rack, ensure that the rack can support the device(s) without compromising the stability of the rack. Otherwise, personal injury and/or equipment damage may result.

Rack Mounting the RPS Shelf

To install the RPS shelf into a 19-inch (48.3 cm) rack:

1. Position the RPS shelf between the vertical rails and align the mounting holes in the RPS shelf brackets with those in the rack frame.
2. Fasten the RPS shelf securely to the rails using the customer-supplied mounting screws (four for the STK-RPS-150CH2, ten for the STK-RPS-150CH8).

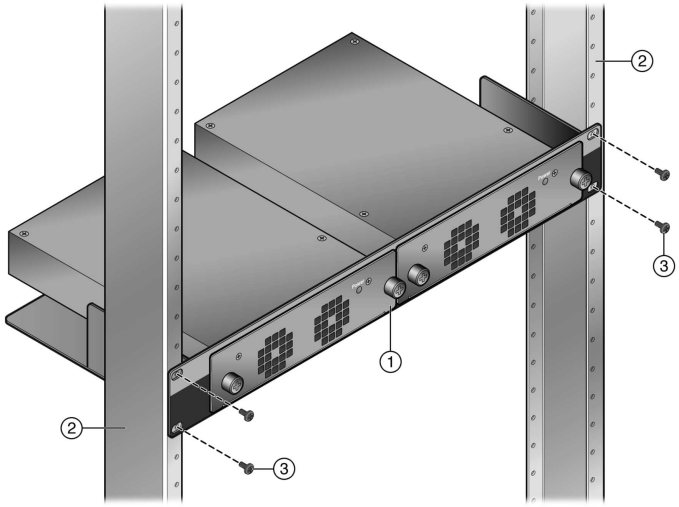


Figure 224: Fastening the STK-RPS-150CH2 to the Rack

1 = STK-RPS-150CH2 shelf	3 = Mounting screws
2 = Rails of rack	

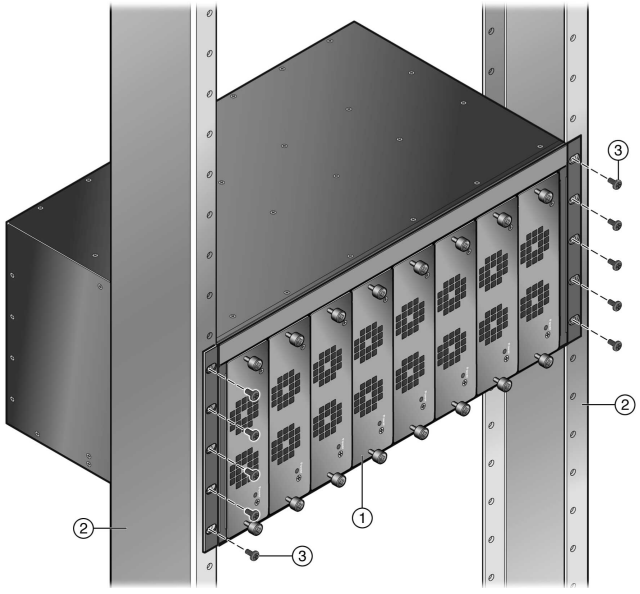


Figure 225: Fastening the STK-RPS-150CH8 to the Rack

1 = STK-RPS-150CH8 shelf	3 = Mounting screws
2 = Rails of rack	

Connecting the RPS Cable and AC Power Cord

Important
When performing this task, observe all of the precautions listen in Safety Considerations for Installing Power Supplies on page 277.

The redundant power supply is connected to a switch using a 1-meter RPS cable.

To connect a redundant power supply, proceed as follows:

Note
No change in switch configuration is necessary for this installation.

1. Connect one end of the RPS cable to the redundant power supply connector at the rear of the RPS.

   Then connect the other end of the cable to the redundant power supply connector on the switch.

   See the following figures.

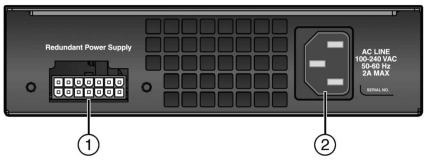


Figure 226: Power Connectors on STK-RPS-150PS (rear view)

1 = Redundant power supply connector	2 = AC power connector

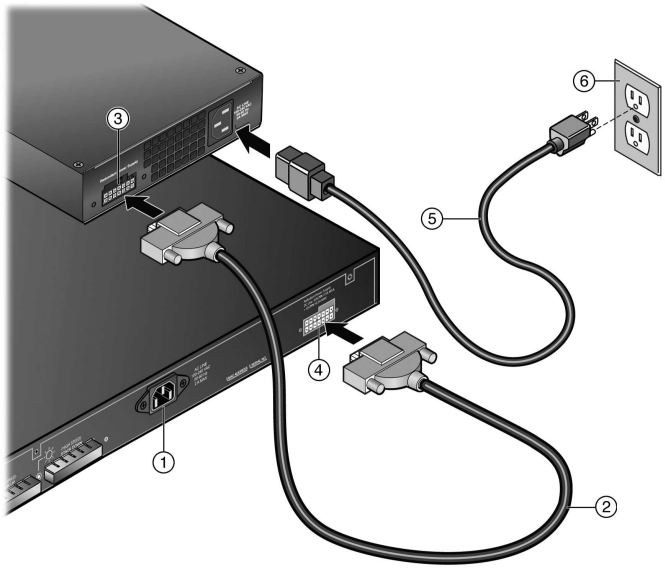


Figure 227: RPS and AC Power Cord Connections

1 = Switch	4 = Switch Redundant Power Supply connector (location varies depending upon switch)
2 = High speed RPS cable (1 meter)	5 = AC power cord (type varies depending on country)
3 = RPS Redundant Power Supply connector	6 = AC power outlet with ground connection (type varies depending on country)

2. Connect the AC power cord to the AC input power connector on the RPS shown in the figure above.
3. Plug the AC power cord into the main AC power outlet.

The green Power LED on the front of the RPS will illuminate to indicate a successful connection. On certain switches, an LED indicator on the switch will show that a redundant power supply is now in operation.

If the green power LED is not lit, proceed as follows:

- Check the AC power cord connection at the AC power source and make sure the power source is within specification.
- Check the AC power connection to the power supply.
- Swap the AC power cord with one that is known to work properly.

If the green LED remains off, contact Extreme Networks support.

Installing an STK-RPS-1005PS Redundant Power Supply

You can install the STK-RPS-1005PS power supply on a flat surface or in a 19-inch rack in the three-slot modular shelf (STK-RPS-1005CH3), which is available for purchase separately.

Caution
Observe all ESD precautions when handling sensitive electronic equipment.

Locate the STK-RPS-1005PS within 6 ft (1.8 m) of its power source.

Only qualified personnel should install redundant power supply (RPS) units.

Installation Requirements

A Phillips screwdriver and four rack screws (not supplied) are needed to install the STK-RPS-1005PS in a rack using the three-slot modular shelf.

Installing an STK-RPS-1005PS in a Rack

To install the STK-RPS-1005PS in the three-slot modular shelf (STK-RPS-1005CH3), you must first install the shelf in a 19-inch rack.

Caution
Observe all ESD precautions when handling sensitive electronic equipment.

Caution
Before rack-mounting the device, ensure that the rack can support it without compromising stability. Otherwise, personal injury and/or equipment damage can result.

To install the STK-RPS-1005PS in a rack, follow these steps.

1. Secure the front of the three-slot modular shelf (STK-RPS-1005CH3) to the rack by screwing four rack screws into the mounting ears on the right and left front of the shelf.

   See Figure 4.

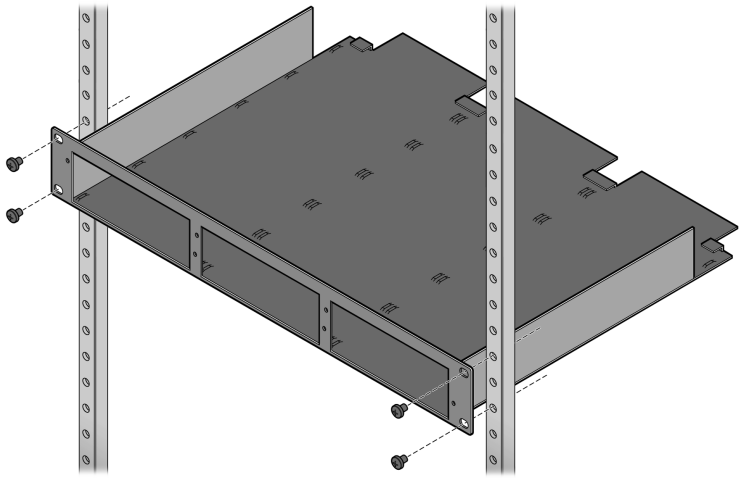


Figure 228: Securing the Three-slot Modular Shelf to a Rack

2. Slide the power supply into an empty bay in the shelf.

   See Figure 229.

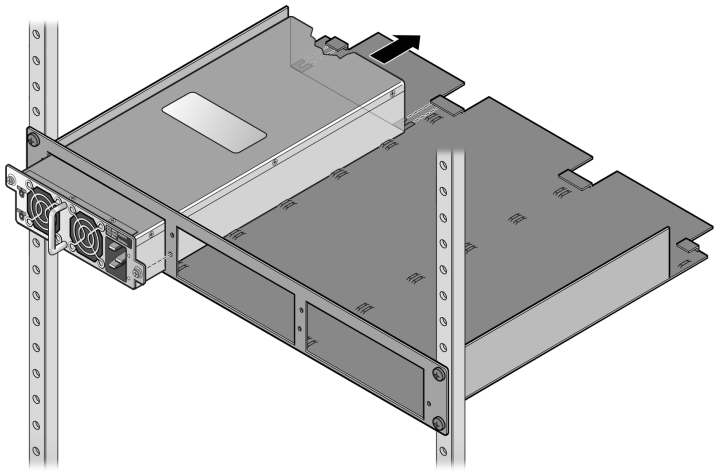


Figure 229: Installing an STK-RPS-1005PS Power Supply Unit in a Shelf

3. Tighten the captive screws to secure the power supply to the shelf.
4. Connect the STK-RPS-1005PS to its power source.

   See Connecting the RPS Cable and AC Power Cord to an STK-RPS-1005PS on page 303.

Installing an STK-RPS-1005PS on a Flat Surface

Caution
Observe all ESD precautions when handling sensitive electronic equipment.

When installing the STK-RPS-1005PS power supply on a flat surface, we recommend installing the rubber feet to prevent the power supply from sliding.

Note
Do not install the rubber feet on the power supply if you are installing the power supply in the three-slot modular shelf (STK-RPS-1005CH3).

To prepare the STK-RPS-1005PS for use on a flat surface, follow these steps.

1. On a sturdy flat surface, lay the power supply on its top.
2. Remove the four rubber feet from their plastic bag in the shipping box.
3. Remove the protective strip from the back of one rubber foot and position it on a bottom corner of the power supply.

   Press the rubber foot firmly into place.

   Repeat this step for each of the remaining three rubber feet.
4. After installing the rubber feet, return the power supply to its upright position.
5. Connect the STK-RPS-1005PS to its power source.

   See Connecting the RPS Cable and AC Power Cord to an STK-RPS-1005PS on page 303.

Connecting the RPS Cable and AC Power Cord to an STK-RPS-1005PS

Important
When performing this task, observe all of the precautions listen in Safety Considerations for Installing Power Supplies on page 277.

The STK-RPS-1005PS RPS (redundant power supply) is connected to the switch using the supplied RPS cable. Use Figure 230 to guide you through the steps.

Caution
Observe all ESD precautions when handling sensitive electronic equipment.

Note
The switch should not be powered on during installation of the power supply. This is not a hot-swap procedure. Follow the steps in the order specified.

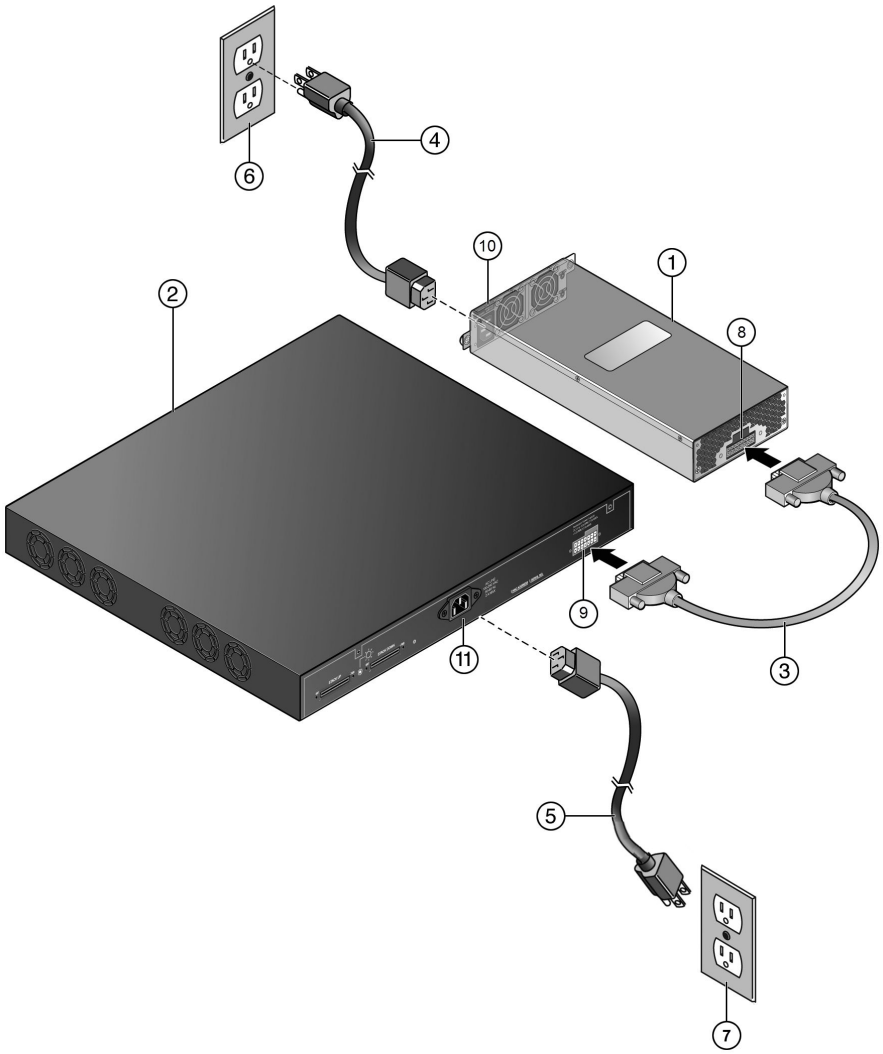


Figure 230: RPS Cable and AC Power Cord Connections for the STK-RPS-1005PS

1 = STK-RPS-1005PS power supply	7 = AC power outlet with ground connection for switch
2 = Switch	8 = Redundant power supply connector on power supply
3 = RPS cable	9 = Redundant power supply connector on switch
4 = RPS AC power cord	10 = AC connector on power supply
5 = Switch AC power cord	11 = AC connector on switch
6 = AC power outlet with ground connection for power supply	

1. Connect one end of the RPS cable (3) to the RPS connector at the rear of the power supply (8).

2. Connect the other end of the RPS cable (3) to the RPS connector on the switch (9).

Note
AC power cords and outlets vary depending on country. See Selecting Power Supply Cords on page 513 for more information.

3. Connect the AC power cord (4) to the AC input power connector on the power supply (10).
4. Plug the AC power cord (4) into the main AC power outlet (6).
5. Connect the second AC power cord (5) to the AC input power connector on the switch (11).
6. Plug the AC power cord (5) into the main AC power outlet (7), preferably on a different circuit for better redundancy.

The AC OK and DC OK LEDs on the front of the power supply turn green to indicate that the connection was successful and the power supply is operating properly.

If the LEDs do not light properly, follow these steps to troubleshoot:

- Check the AC power cord connection at the AC power source and make sure the power source is within specification.
- Check the AC power connection to the power supply.
- Swap the AC power cord with one that is known to work properly.

Installing a VX-RPS-1000 Redundant Power Supply

The VX-RPS-1000 redundant supply (Part no. 18202) is designed as a backup power source for the V400 Virtual Port Extender.

You can install the VX-RPS-1000 in a 19-inch rack in either of two ways:

- Installing a Single VX-RPS-1000 Power Supply in a Rack on page 305
- Installing up to Three VX-RPS-1000 Power Supplies on a Shelf on page 306

Caution
Observe all ESD precautions when handling sensitive electronic equipment.

Locate each VX-RPS-1000 unit within 6 ft (1.8 m) of its power source.

Only qualified personnel should install redundant power supply (RPS) units.

Installing a Single VX-RPS-1000 Power Supply in a Rack

To install the VX-RPS-1000 power supply in a 19-inch rack, you need four customer-supplied screws to attach the power supply to a standard 19-inch rack.

Caution
Observe all ESD precautions when handling sensitive electronic equipment.

Caution
Before rack-mounting the device, ensure that the rack can support it without compromising stability. Otherwise, personal injury and/or equipment damage can result.

To install a single VX-RPS-1000 power supply in a rack, follow these steps.

1. Use screws (provided) to attach a long bracket to one side of the power supply.

   Use the holes closest to the rear of the power supply.
2. Attach the other bracket to the other side of the power supply.

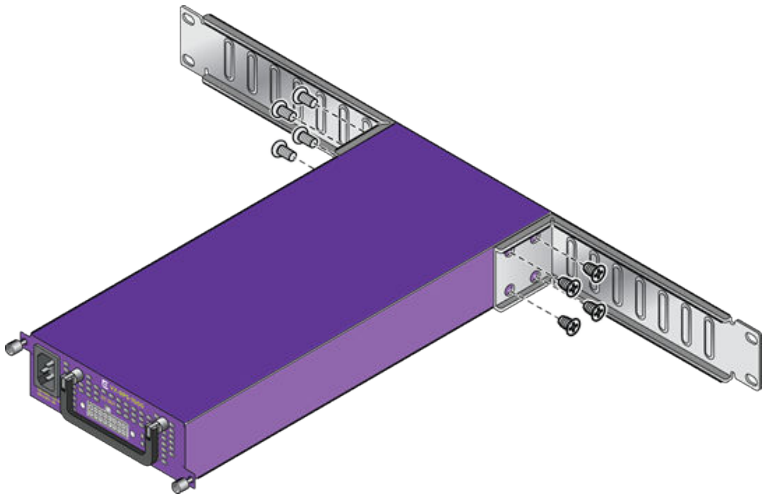


Figure 231: Long Brackets Attached to VX-RPS-1000 Power Supply

3. Align the holes at the end of each bracket with the rack post holes.
4. Secure the power supply to the rack with rack-mounting screws.
5. Connect a power cable (included with the power supply) to the output socket on the power supply and the RPS input connector on the rear of the V400 unit.
6. Connect an AC power cord (not included) to the AC power input socket on the power supply and to an AC power outlet.

   When power is connected, verify that the power supply's DC OK LED turns green. Verify that the port extender's PWR LED turns green.

Installing up to Three VX-RPS-1000 Power Supplies on a Shelf

You can install up to three VX-RPS-1000 power supplies in the 3-Slot Modular Shelf (Part no. 18201). The shelf is mounted in a standard equipment rack.

You will need four customer-supplied screws to attach the shelf to a standard 19-inch rack.

Caution
Observe all ESD precautions when handling sensitive electronic equipment.

Caution
Before rack-mounting the device, ensure that the rack can support it without compromising stability. Otherwise, personal injury and/or equipment damage can result.

To install the VX-RPS-1000 in the 3-slot shelf, follow these steps.

1. Attach mounting brackets to the shelf, following the instructions included in the shelf packaging.
2. Attach the shelf to the rack, using the screws provided, as shown in Figure 232.

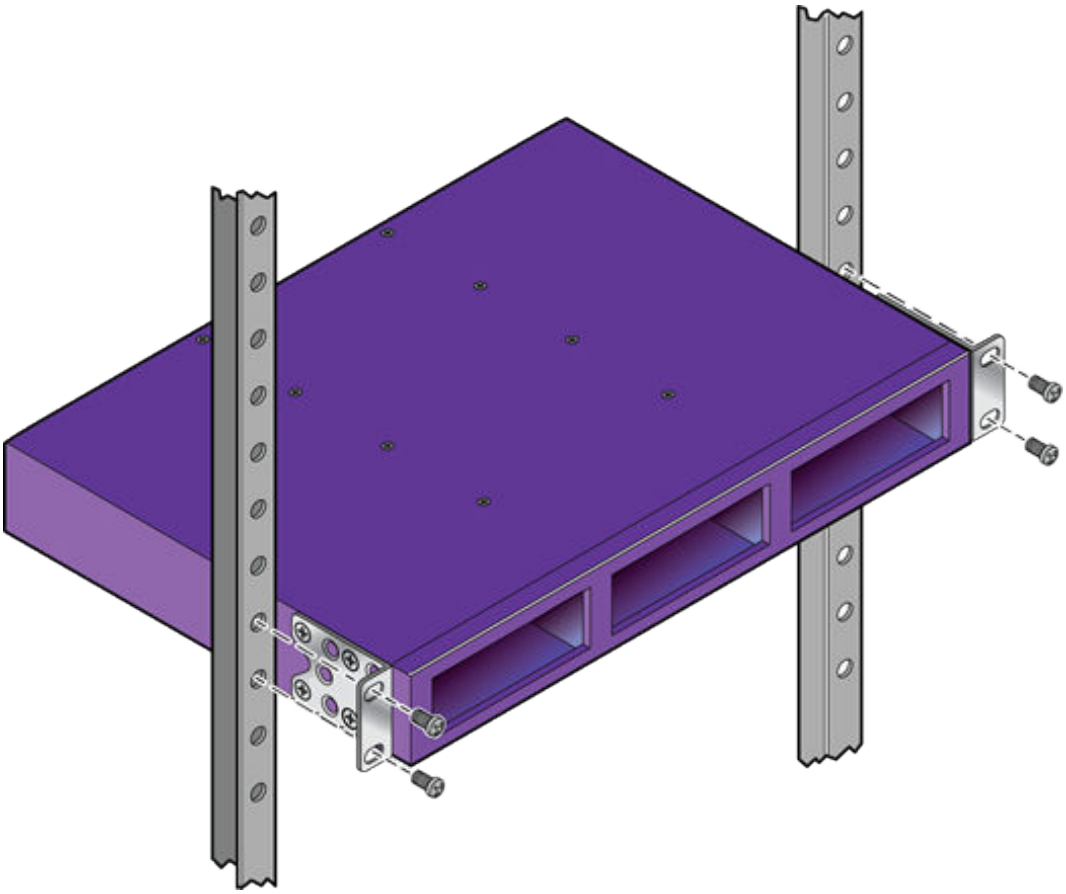


Figure 232: VX-RPS-1000 Shelf Mounted in a Rack

3. Slide a power supply into an empty bay in the shelf, as shown in Figure 233.

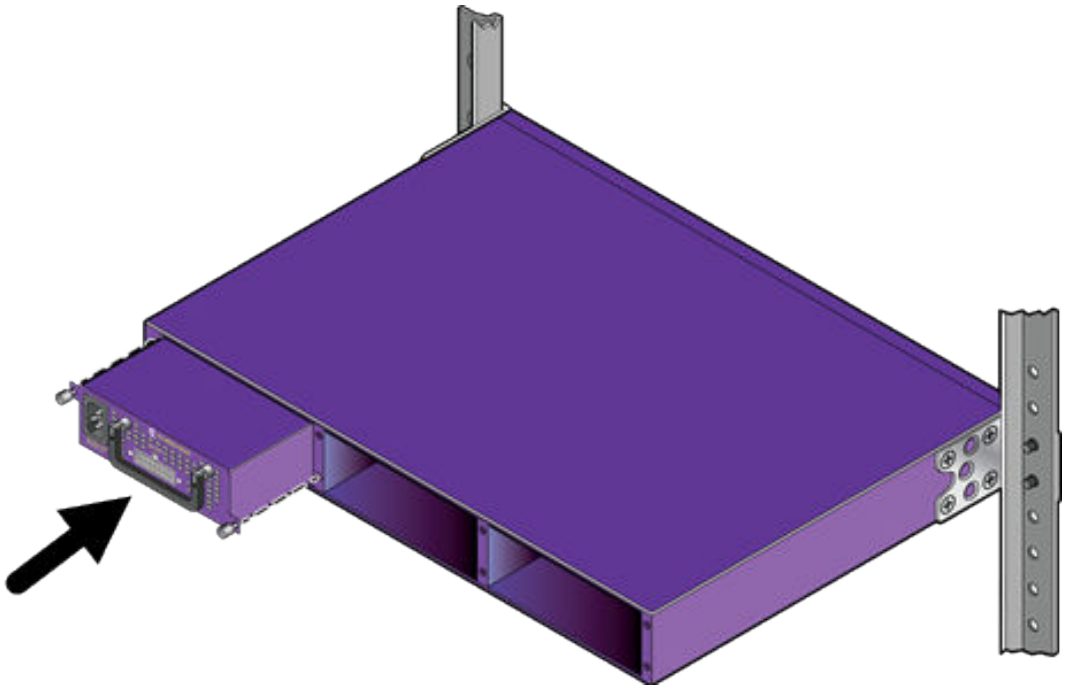


Figure 233: Inserting a VX-RPS-1000 Power Supply into the Shelf

4. Tighten the two retaining screws until the power supply is firmly attached to the shelf.
5. Connect a power cable (included with the power supply) to the output socket on the power supply and the RPS input connector on the rear of the V400 unit.
6. Connect an AC power cord (not included) to the AC power input socket on the power supply and to an AC power outlet.

   When power is connected, verify that the power supply's DC OK LED turns green. Verify that the port extender's PWR LED turns green.
7. Secure the power supply to the shelf using two captive screws on the front panel of the power supply.
8. Optionally, install additional power supplies on the shelf – up to three in all.

Installing Expansion Modules

This chapter describes how to install expansion modules:

- The V300 Virtual Port Extender
- The V400 Virtual Port Extender
- The LRM/MACsec Adapter
- The Half-Duplex to Full-Duplex Converter
- Versatile interface modules (VIM/VIM5s)
- Solid-state Drive (SSD) modules

Note
Read the information in this chapter thoroughly before trying install or remove an expansion module.

To install port option cards, VIMs, and stacking modules that work with other Extreme Networks switches, refer to *ExtremeSwitching and Summit Switches: Hardware Installation Guide for Switches Using ExtremeXOS 16 or Earlier*.

Install a V300 Virtual Port Extender

The following installation instructions are applicable to the V300-8P-2T-W (PoE) model. The V300-8P-2X, V300-8T-2X, V300HT-8P-2X, and V300HT-8T-2X models will be referred to as non-PoE models from this point on.

You need the following tools and materials to install a V300 Virtual Port Extender:

- ESD-preventive wrist strap
- M3.5 or M4 #2 Phillips screwdriver (magnetic screwdriver recommended)

The V300 Virtual Port Extender comes with two mounting brackets and screws for attaching them. Mount the equipment in a standard equipment rack, in either a front-mount or mid-mount configuration, in the same way you would mount a switch.

To install a V300 Virtual Port Extender, follow these steps:

1. Attach the mounting brackets to the sides of the port extender using four screws (included) for each bracket.
2. Align the holes in the brackets with the rack post holes.
3. Secure the port extender to each post with rack-mounting screws (not provided).
4. Connect an AC power cord to the AC power input socket on the port extender and to an AC power outlet.
5. When power is connected, verify that the SYS LED on the port extender turns green.

   If the SYS LED does not turn green, verify that the power source is on and the connection was made properly.
6. Optionally, connect the port extender to a redundant power source, depending on the model.

The following mounting kits are available for non-PoE V300 models:

Table 103: V300 Mounting Kits

Kit part number	Description
XN-2P-RMTKIT-1CS-001	Single rack mount kit
XN-2P-RMTKIT-2CS-001	Dual rack mount kit
XN-DIN-MT-001	DIN Rail mount kit
XN-MTKIT-CS-001	Replacement surface mount kit
XN-PS-MT-001	PSU mount kit

For additional installation options, including non-PoE V300 Mounting Kit installation, see the following topics:

- Install a V300 Virtual Port Extender on a Wall on page 310
- Install a V300 Virtual Port Extender Under or on a Table Surface on page 314
- Install a V300 Virtual Port Extender in a VESA Mount on page 316
- Install a V300 in a Single Rack Mount on page 318
- Install a V300 in a Dual Rack Mount on page 321
- Install a V300 in a DIN Rail Mount on page 324
- Install a V300-8P-2T-W Model in a Single or Dual Rack Mount on page 327
- Install a V300-8P-2T-W Model in a DIN Rail Mount on page 328

Install a V300 Virtual Port Extender on a Wall

The following tools and materials are required to install a V300 Virtual Port Extender to a wall:

- ESD-preventive wrist strap

- M3.5 #2 Phillips screwdriver (magnetic screwdriver recommended)
- M4 #2 Phillips screwdriver (magnetic screwdriver recommended) for non-PoE models

Note
The mounting surface, item, and hardware must be able to support the extender in all environmental conditions. The mounting surface must also be flat.

Typical installation for the V300-8P-2T-W model include wall or table installations, in addition to VESA mounting.

There are several orientations for installation on a wall. To install the V300-8P-2T-W model on a wall:

1. Attach the short brackets to both sides of the extender

   The orientation for wall mounting should be front panel facing down.

   Two short brackets attached to the extender by 4 wood screws and 4 anchors, provided in the accessory kit.

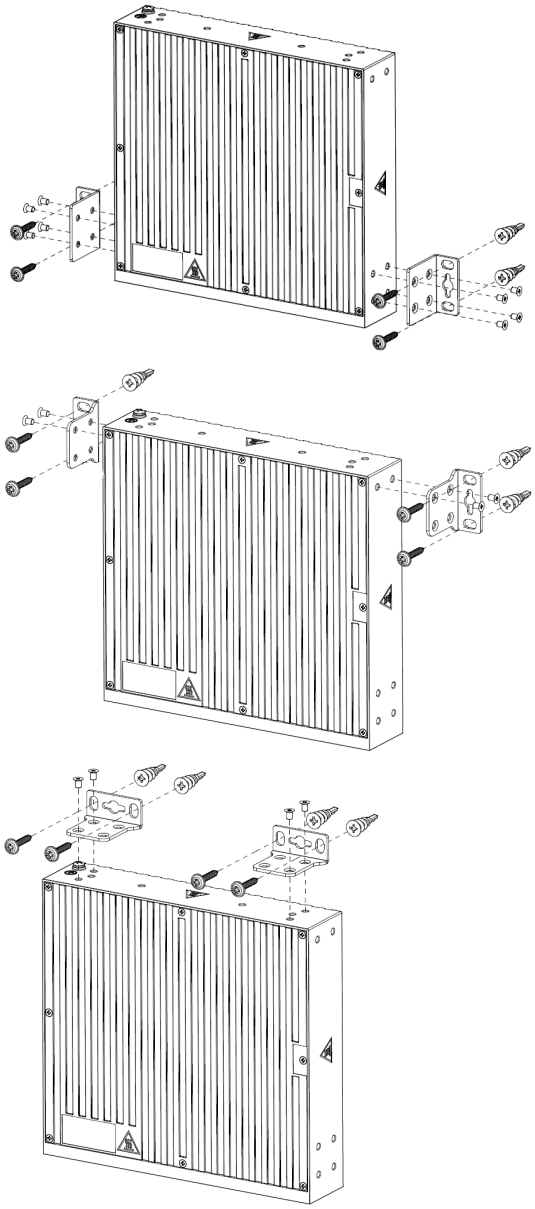


Figure 234: V300-8P-2T-W Wall Mounting

2. Use the optional short bracket as a template and mark the holes to be used. Extreme recommends using 2 holes per short rack ear.

3. For non-PoE models, after attaching the short brackets, attach the PSUs to the PSU mounting brackets using two cable ties.

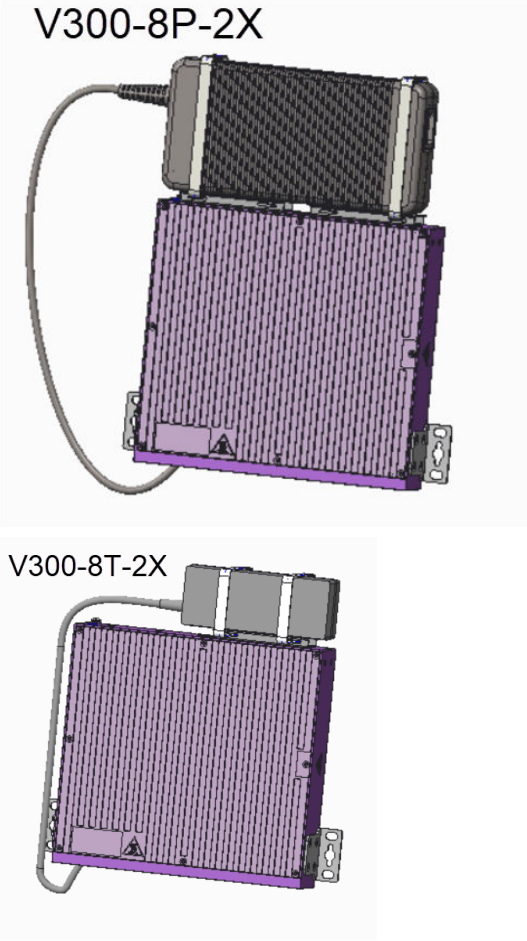


Figure 235: V300-8P/8T-2X Wall Mount with PSU

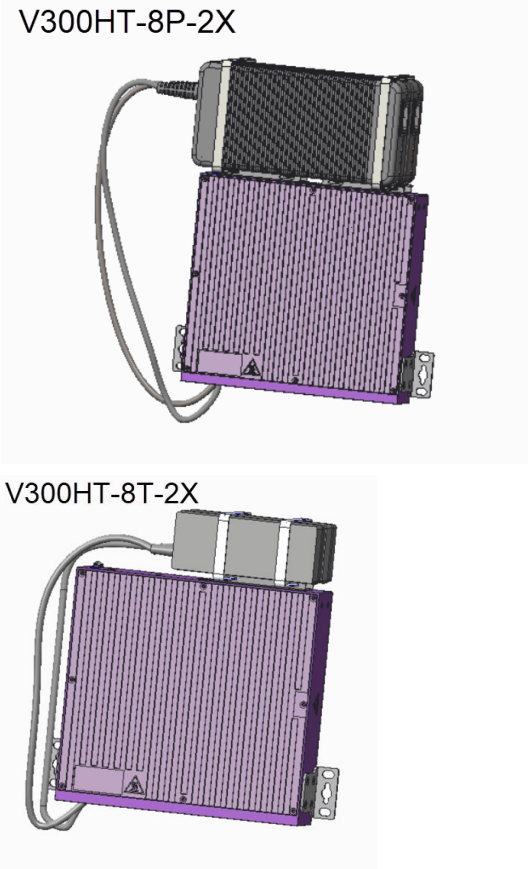


Figure 236: V300HT-8P/8T-2X Wall Mount with PSU

4. Drill the holes and attach the bracket using the provided woodscrews and anchors.
5. Connect the LAN/Ethernet cables to the extender.
6. When power is connected, verify that the SYS LED on the port extender turns green.

Install a V300 Virtual Port Extender Under or on a Table Surface

The following tools and materials are required to install a V300 Virtual Port Extender under a table:

- ESD-preventive wrist strap
- M3.5 #2 Phillips screwdriver (magnetic screwdriver recommended) for PoE model
- M4 #2 Phillips screwdriver (magnetic screwdriver recommended) for non-PoE models

Typical installation for the V300-8P-2T-W model include wall or table installations, in addition to VESA mounting.

For table surface or other flat surface installation, attach the rubber feet to the underside of the virtual port extender, then place the device to the table or flat surface:

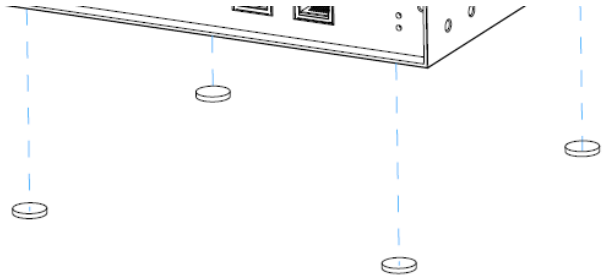


Figure 237: Table Surface Mounting

There are several orientations for installation under a table. To install a V300-8P-2T-W model under a table:

1. Attach the short mounting brackets (included in kit) to the sides of the port extender using four screws (included) for each bracket.

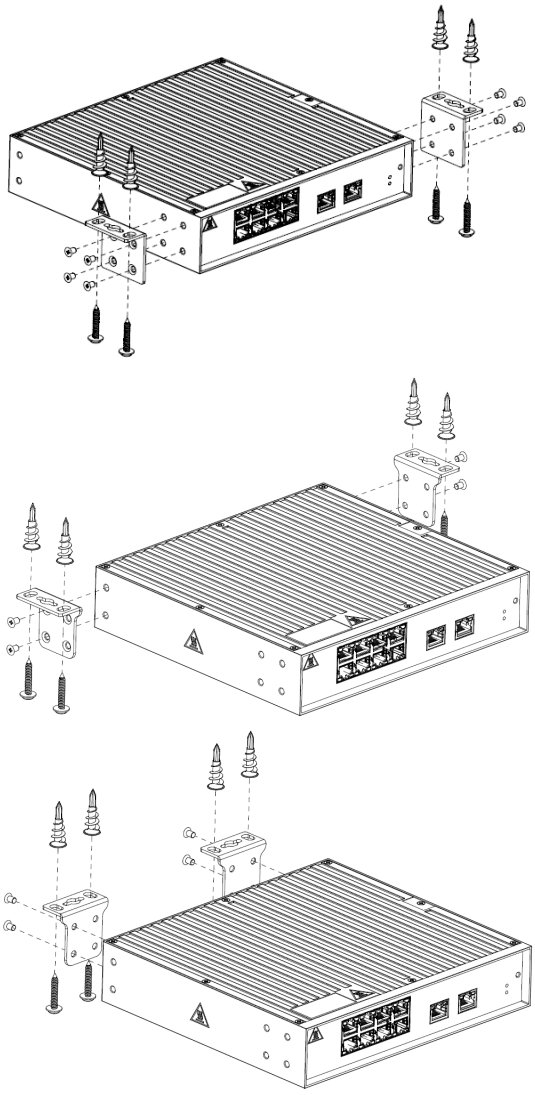


Figure 238: Under Table Mounting

2. For non-PoE models, after attaching short brackets and PSU bracket to the V300, attach the PSU(s) to the PSU mounting bracket using two cable ties:

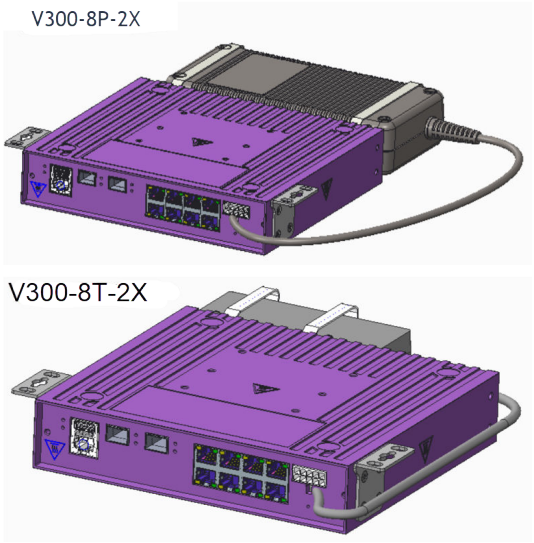


Figure 239: V300-8P/8T-2X Under Table Mounting with PSU

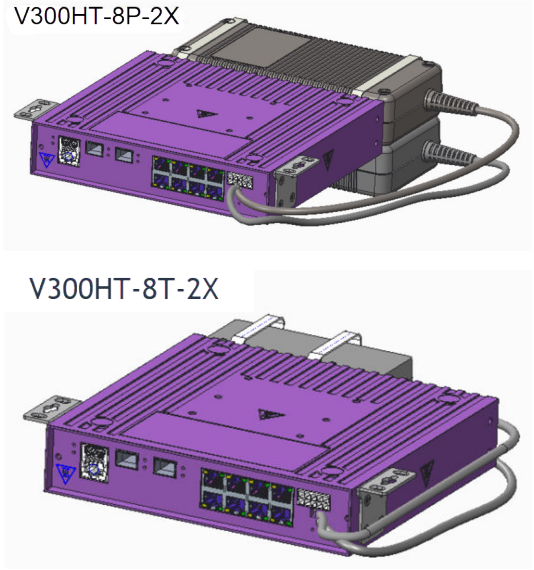


Figure 240: V300HT-8P/8T-2X Under Table Mounting with PSU

3. Secure the port extender to the underside of the table using the provided 4 wood screws and 4 anchors.
4. When power is connected, verify that the SYS LED on the port extender turns green.

Install a V300 Virtual Port Extender in a VESA Mount

The following tools and materials are required to install a V300 Virtual Port Extender with a VESA mount:

- ESD-preventive wrist strap

- M4 #2 Phillips screwdriver (magnetic screwdriver recommended)

The VESA mount comes with 4 screws and should be used when mounting the V300 Virtual Port Extender to a VESA mount for 75mm x 75mm or 35mm x 75mm mounting dimensions. To install a V300 Virtual Port Extender in a VESA Mount:

1. Attach the VESA mount to the underside of the port extender using four screws (included):

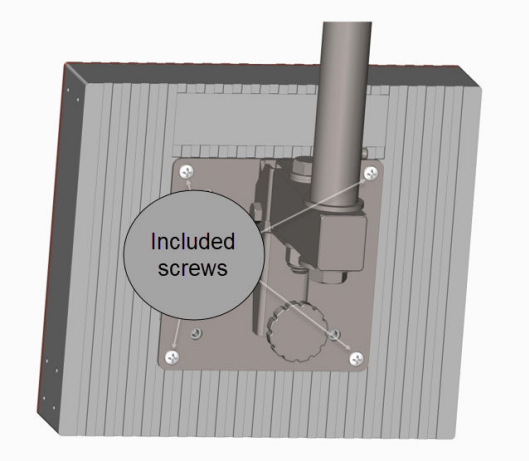


Figure 241: VESA Mounting

2. For non-PoE models, after attaching the PSU bracket to the V300, attach the PSU(s) to the PSU mounting brackets using two cable ties:

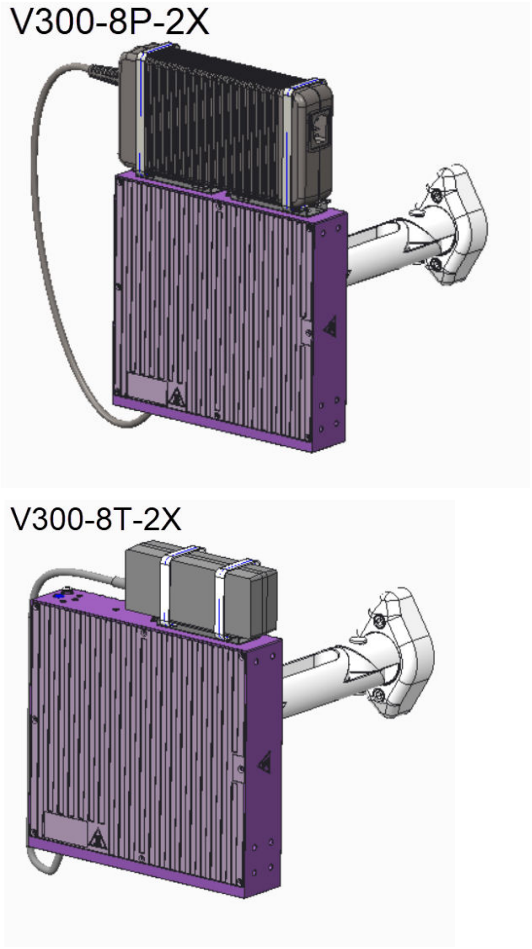


Figure 242: V300-8P/8T-2X VESA Mounting with PSU

3. Connect the LAN/Ethernet cables to the extender.
4. When power is connected, verify that the SYS LED on the port extender turns green.

Install a V300 in a Single Rack Mount

The following tools and materials are required to install a non-PoE V300 Virtual Port Extender to a single rack mount:

- ESD-preventive wrist strap
- M4 #2 Phillips screwdriver (magnetic screwdriver recommended)
- XN-2P-RMTKIT-1CS-001 - Single rack mount kit

1. Remove all contents of the single rack mount kit (XN-2P-RMTKIT-1CS-001).
2. Attach the short and long ear brackets to the V300 using the screws provided.
3. Secure the bracket flanges to the rack using the customer-provided screws appropriate for the rack you are using.

4. After attaching the PSU bracket to the V300, attach the PSU to the PSU mounting brackets using two or four cable ties:

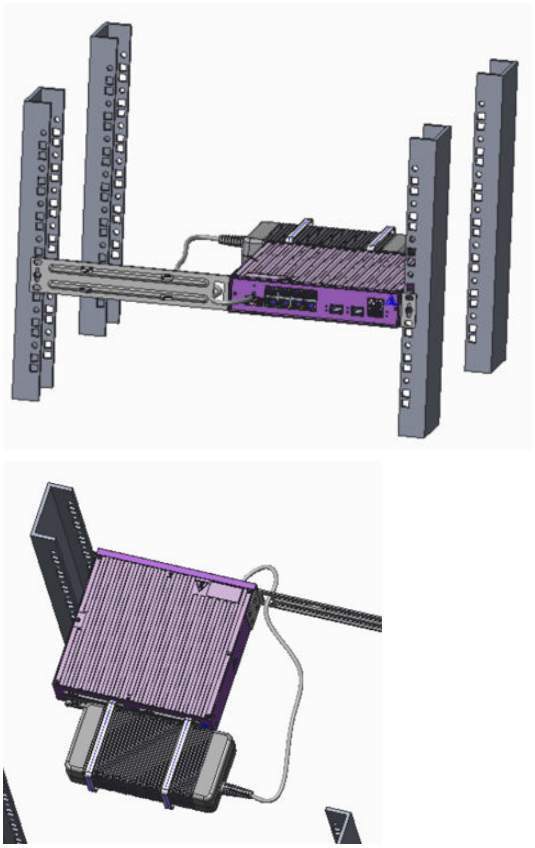


Figure 243: V300-8P-2X Single Rack Mounting with PSU

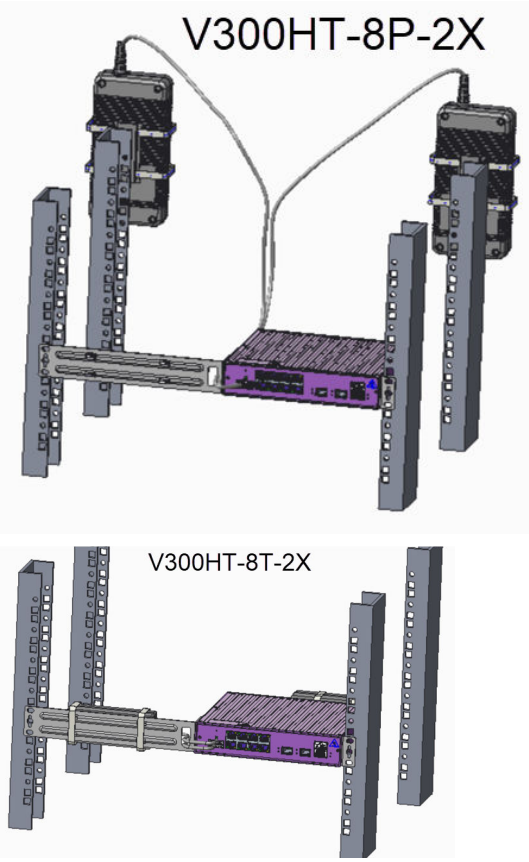


Figure 244: V300HT-8P/8T-2X Single Rack Mounting with PSUs

5. For a more secure attachment, attach the two PSU mounting brackets to the rack using customer-provided screws:

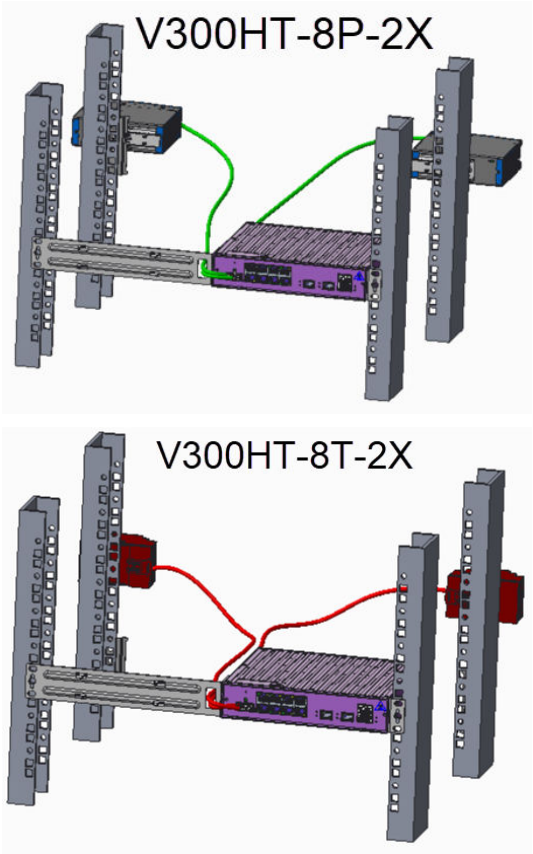


Figure 245: V300HT-8P/8T-2X Single Rack Mounting with DIN Rail and PSUs

6. Alternatively, the PSU can be mounted to the long rack ear using cable ties.

Install a V300 in a Dual Rack Mount

The following tools and materials are required to install a non-PoE V300 Virtual Port Extender to a dual rack mount:

- ESD-preventive wrist strap
- M4 #2 Phillips screwdriver (magnetic screwdriver recommended)
- XN-2P-RMTKIT-2CS-001 - Dual rack mount kit

1. Remove all contents of the dual rack mount kit (XN-2P-RMTKIT-2CS-001).
2. Attach one short ear bracket to the outer side of each V300 using the screws provided.
3. Attach the joint brackets to the inward side of each V300 (one with tapped screw holes facing forward, one facing rearward, using the screws provided).
4. Attach the two joint brackets together using the screws provided.

5. After attaching the PSU bracket to the V300 using the provided screws, attach the PSU to the PSU mounting brackets using two, four, or eight cable ties:

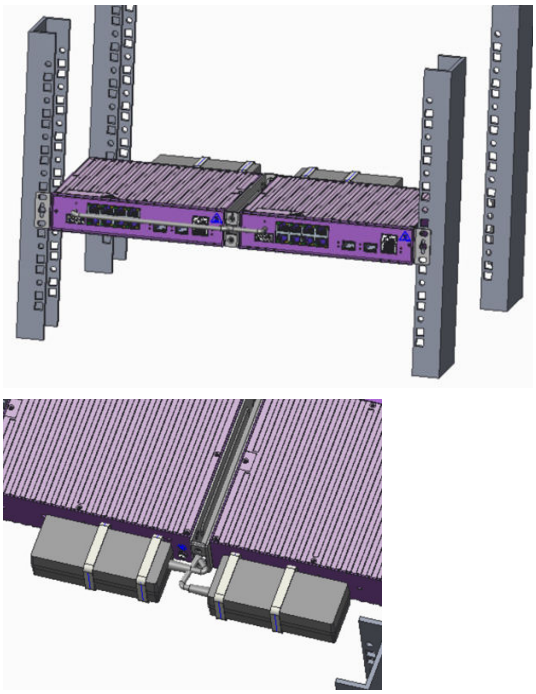


Figure 246: V300-8T-2X Dual Rack Mounting with PSU

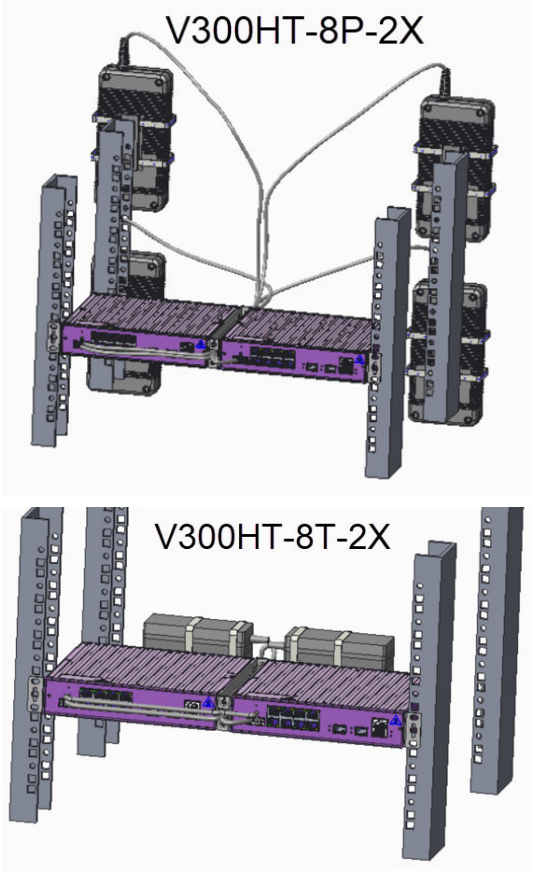


Figure 247: V300HT-8P/8T Dual Rack Mounting with PSUs

6. For a more secure attachment, attach the PSU mounting brackets to the rack using customer-provided screws:

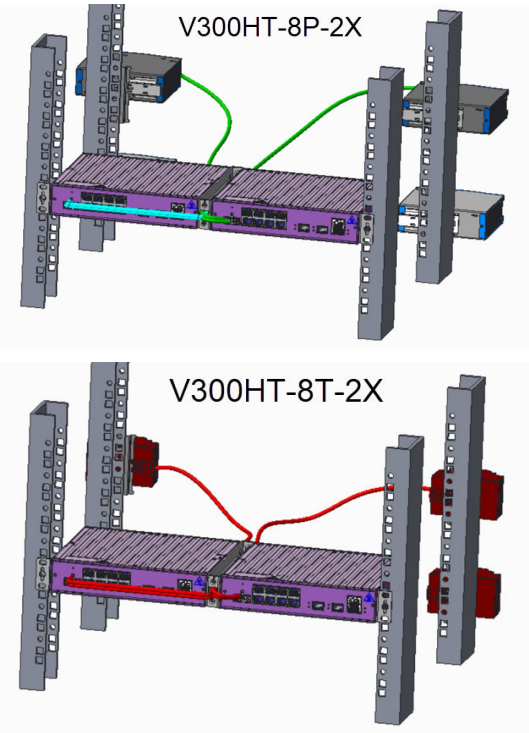


Figure 248: V300HT-8P/8T Dual Rack Mounting with DIN Rail and PSUs

Install a V300 in a DIN Rail Mount

The following tools and materials are required to install a non-PoE V300 Virtual Port Extender to a DIN Rail mount:

- ESD-preventive wrist strap
- M4 #2 Phillips screwdriver (magnetic screwdriver recommended)
- XN-DIN-MT-001 - DIN Rail mount kit

For PSU XN-ACPWR-320W-HT or XN-ACPWR-40W-HT:

1. Remove all contents of the DIN Rail mount kit (XN-DIN-MT-001).
2. Attach the port extender to the DIN Rail using one DIN bracket and the screws provided.

3. Attach the PSUs to the DIN bracket using cable ties, and then attach the bracket to the DIN Rail:

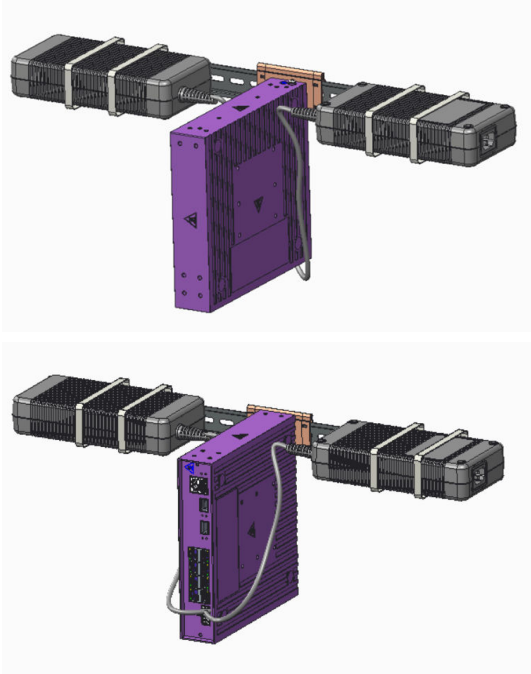


Figure 249: V300HT-8P-2X DIN Rail Mount with dual XN-ACPWR-320W-HT PSUs

4. For PSU 16807, attach the port extender to the DIN Rail using one DIN bracket and the screws provided.

5. Attach the PSUs directly to the DIN rail:

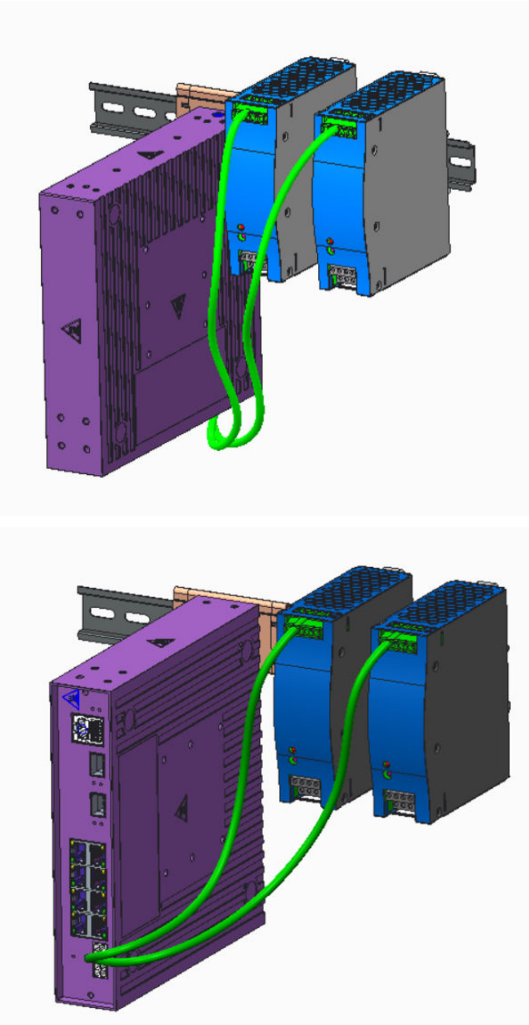


Figure 250: V300HT-8P-2X DIN Rail Mount with dual 16807 PSUs

6. For XN-ACPWR-60W-HT-DIN, attach the port extender to the DIN Rail using one DIN bracket and the screws provided.

7. Attach the PSUs directly to the DIN rail:

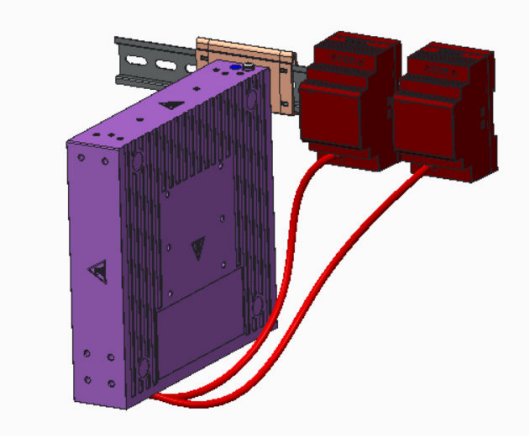


Figure 251: V300HT-8T-2X DIN Rail Mount with dual XN-ACPWR-60W-HT-DIN PSUs

Install a V300-8P-2T-W Model in a Single or Dual Rack Mount

You need the following tools and materials to install a V300-8P-2T-W model to a rack mount:

- ESD-preventive wrist strap
- M4 #2 Phillips screwdriver (magnetic screwdriver recommended)

Typical installation for the V300-8P-2T-W model include wall or table installations, in addition to VESA mounting. In order to rack-mount this model, an accessory mounting kit is required.

To install the V300-8P-2T-W model in a single or dual rack mount kit:

1. Remove all contents of the single rack mount kit (XN-1S-RKMT-V300) or dual rack mount kit (XN-2S-RKMT-V300).
2. Attach the short mounting brackets (included) to the sides of the port extender using the four screws (included) for each bracket.

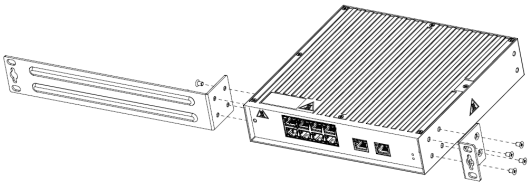


Figure 252: Single Rack Mounting

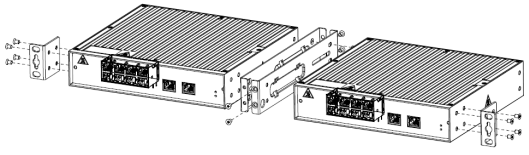


Figure 253: Dual Rack Mounting

3. Align the holes in the brackets with the rack post holes.
4. Secure the port extender to each post with rack-mounting screws (not provided).
5. Connect the LAN/Ethernet cables to the extender.
6. When power is connected, verify that the SYS LED on the port extender turns green.

Install a V300-8P-2T-W Model in a DIN Rail Mount

You need the following tools and materials to install a V300 Virtual Port Extender to a DIN Rail mount:

- ESD-preventive wrist strap
- M4 #2 Phillips screwdriver (magnetic screwdriver recommended)

There are two DIN Rail mounting options. To install a V300-8P-2T-W model in a DIN Rail Mount:

1. Remove all contents of the DIN Rail Mount Kit (XN-DIN-MT-V300).
2. For option 1, attach the DIN mounting bracket to the rear of the port extender using the two screws (included) for each bracket:

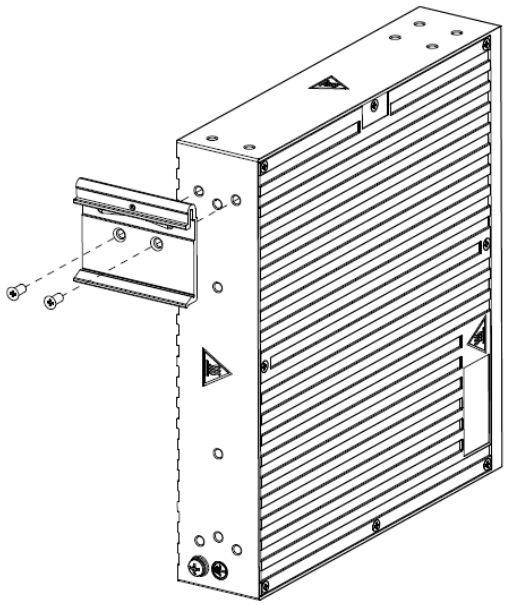


Figure 254: DIN Rail Mounting Option 1: Attach the Bracket

3. Align the DIN bracket with the DIN rail and attach the port extender:

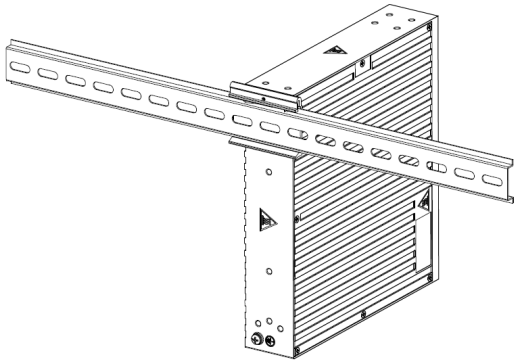


Figure 255: DIN Rail Mounting Option 1: Secure the Port Extender

4. For option 2, attach the DIN mounting bracket to the side panel of the port extender:

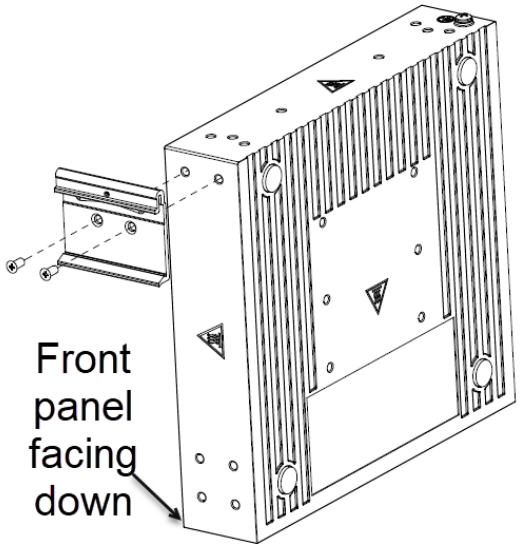


Figure 256: Din Rail Mounting Option 2: Attach the Bracket

5. Align the DIN bracket with the DIN rail and attach the port extender:

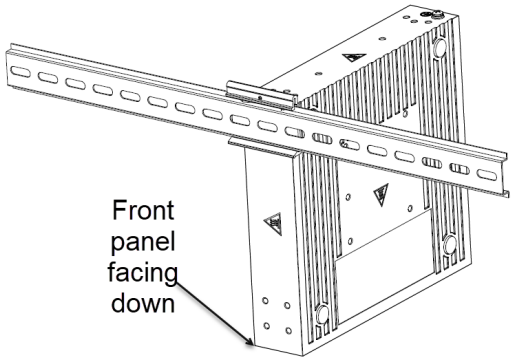


Figure 257: DIN Rail Mounting Option 2: Secure the Port Extender

6. When power is connected, verify that the SYS LED on the port extender turns green.

Connect the V300 Virtual Port Extender to Power

V300-8P-2W and V300-8T-2W models run on AC power with included power supply unit(s).

V300HT-8P-2W and V300HT-8T-2W models can run on redundant power supplies (RPS). HT model power supplies are sold separately.

See the following topics to connect non-PoE V300 models to power:

- Connect the V300 to a Primary Power Source on page 330
- Connect the V300 to a Redundant Power Source on page 331

Connect the V300 to a Primary Power Source

Note
Installing the system as described in this guide meets the protective earth grounding requirements of the National Electrical Code (NEC) UL 60950 and IEC 60950 standards. However, in some cases, it may be necessary to use an alternative grounding method. In these cases, a 14 AWG wire can be connected between the grounding lug on the chassis and a nearby building ground point.

To attach the V300 switch to a power source, do the following:

1. Connect the PSU to the V300 with the integrated power cable.
2. Connect the AC power cord to the AC power input socket on the power supply and plug the other end into an AC power outlet.

   To attach the V300HT model to a primary power source, do the following:
3. Connect the PSU to the included screw terminal connector (use adequate AWG wire for DIN PSUs).
4. Plug the screw terminal connector into the port extender DC input (PSU1 recommended).
5. Connect the:
   - AC power cord to the AC power input socket on the PSU and plug the other end into an AC power outlet for non-DIN PSUs; or
   - PSU to an AC power source using the instructions included with the PSU for DIN PSUs.

When power is connected, verify that the PWR LED on the switch turns green. If the PWR LED does not turn green, verify that the power source is powered on and the connection was made properly.

Connect the V300 to a Redundant Power Source

Note
Installing the system as described in this guide meets the protective earth grounding requirements of the National Electrical Code (NEC) UL 60950 and IEC 60950 standards. However, in some cases, it may be necessary to use an alternative grounding method. In these cases, a 14 AWG wire can be connected between the grounding lug on the chassis and a nearby building ground point.

To attach the V300 switch to a redundant power source (HT models only), do the following:

1. Connect the RPS to the included screw terminal connector (use adequate AWG wire for DIN PSUs).
2. Plug the screw terminal connector into the port extender DC input (PSU2 recommended).
3. Connect the:
   - AC power cord to the AC power input socket on the PSU and plug the other end into an AC power outlet for non-DIN PSUs; or
   - PSU to an AC power source using the instructions included with the PSU for DIN PSUs.

When power is connected, verify that the PWR LED on the switch turns green. If the PWR LED does not turn green, verify that the power source is powered on and the connection was made properly.

Install a V400 Virtual Port Extender

You need the following tools and materials to install a V400 Virtual Port Extender:

- ESD-preventive wrist strap
- #1 Phillips screwdriver (for clock module) or flat-bladed screwdriver (for all other VIM modules)

Your V400 Virtual Port Extender comes with two mounting brackets and screws for attaching them. Mount the equipment in a standard equipment rack, in either a front or mid-mount configuration, in the same way you would mount a switch.

To install a V400 Virtual Port Extender, follow these steps:

1. Attach the mounting brackets to the sides of the port extender using four screws (included) for each bracket.
2. Align the holes in the brackets with the rack post holes.
3. Secure the port extender to each post with rack-mounting screws (not provided).
4. Connect an AC power cord to the AC power input socket on the port extender and to an AC power outlet.
5. When power is connected, verify that the SYS LED on the port extender turns green.

   If the SYS LED does not turn green, verify that the power source is powered on and the connection was made properly.

6. Optionally, connect the port extender to a redundant power source.

   PoE models (V400-24p-10GE2 and V400-48p-10GE4) can be connected to the VX-RPS-1000 redundant power supply, using an AC power cord. For information about installing the VX-RPS-1000 unit, see Installing a VX-RPS-1000 Redundant Power Supply on page 305.

Installing an LRM/MACsec Adapter

The three options for attaching the LRM/MACsec Adapter to a standard equipment rack are shown in Figure 258 on page 332.

Before installing the LRM/MACsec Adapter, refer to Maximum Capacity for Using the LRM/MACsec Adapter with Supported Switch Models on page 155 to understand the requirements for connecting the adapter to your host switch.

See the following sections for installation instructions.

1. Attaching the adapter to the rack so that it is oriented horizontally.

   See Installing an LRM/MACsec Adapter Horizontally on page 333.
2. Attaching up to five adapters to the five-slot mounting bracket (part no. 10966).

   See Installing LRM/MACsec Adapters in the Five-Slot Bracket on page 333.
3. Attaching the adapter to the rack so that it is oriented vertically.

   See Installing an LRM/MACsec Adapter Vertically on page 334.

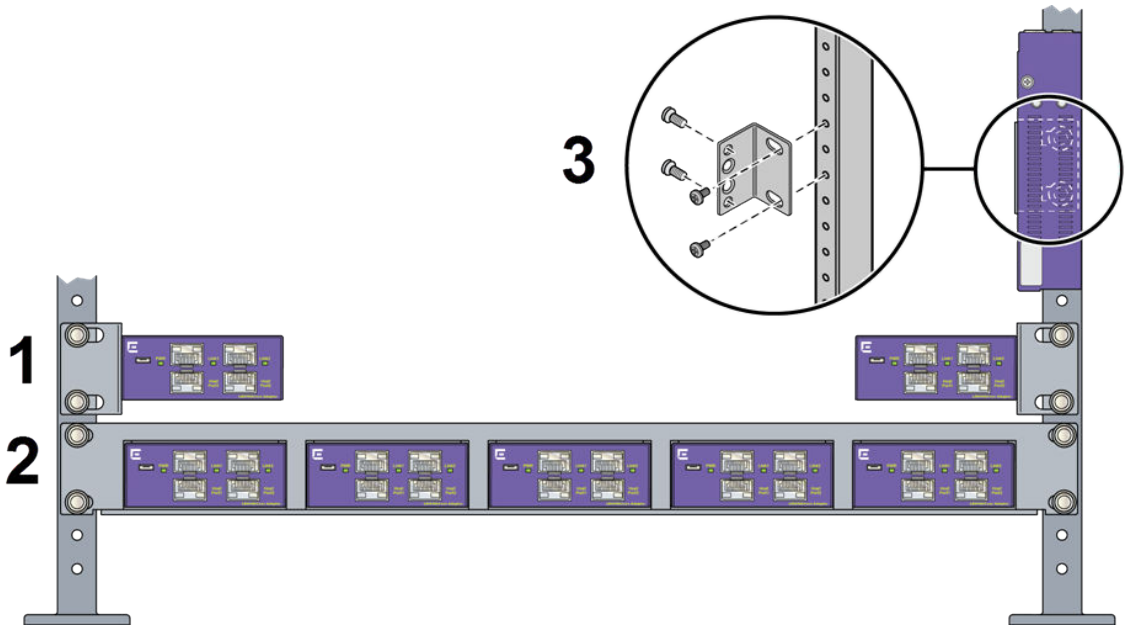


Figure 258: Three Ways to Install the LRM/MAC Adapter

Note
The LRM/MACsec Adapter is hot-swappable.

Installing an LRM/MACsec Adapter Horizontally

Refer to Installing an LRM/MACsec Adapter on page 332 for installation options for the LRM/MACsec Adapter.

To install an LRM/MACsec Adapter horizontally in an equipment rack, follow these steps:

1. Using two small M 4 x 6.5 mm screws (included), attach the bracket to the holes in one side of the adapter so that the mounting ear extends away from the adapter.

   Figure 259 shows the bracket attached to the adapter.

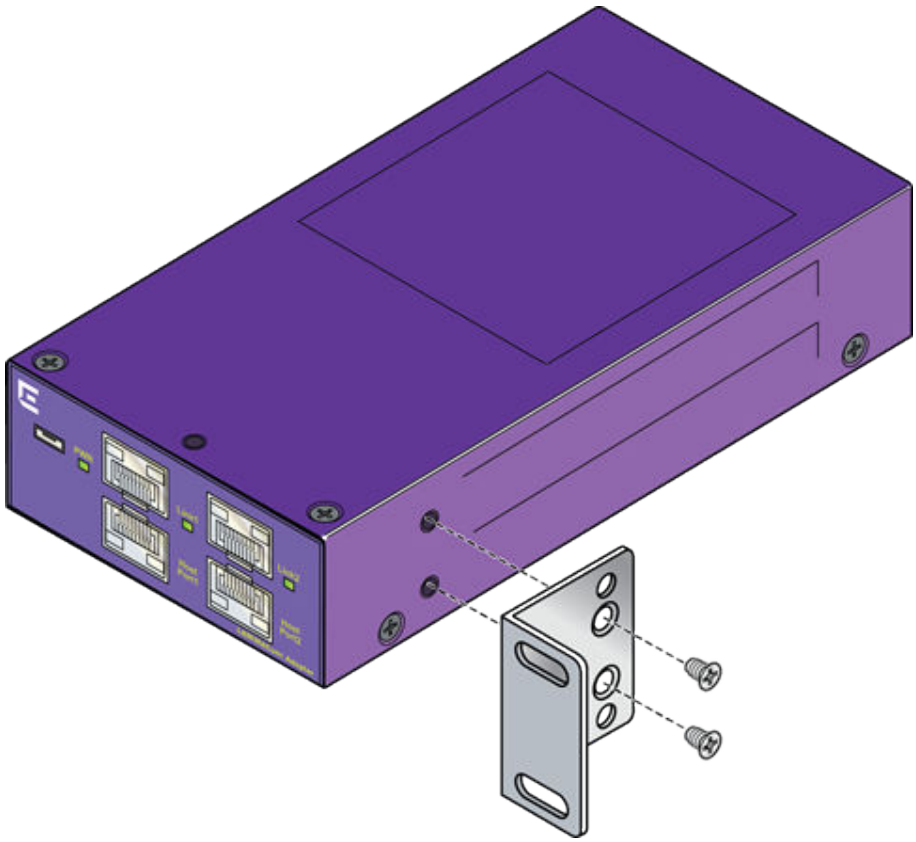


Figure 259: Attaching the Mounting Bracket to the LRM/MACsec Adapter

2. Using two rack mounting screws (not included) attach the mounting ear to the rack.

   The adapter ports should face toward the front.
3. Connect the adapter to the switch, following the instructions in Connecting the LRM/MACsec Adapter to the Host Switch and to Power on page 334.

Installing LRM/MACsec Adapters in the Five-Slot Bracket

Refer to Installing an LRM/MACsec Adapter on page 332 for installation options for the LRM/MACsec Adapter.

To install up to five LRM/MACsec Adapter units in the five-slot bracket (part no. 10966), follow these steps:

1. Using standard rack mounting screws (not included), secure the bracket to the rack.
2. Set an LRM/MACsec Adapter in one of the bracket slots.
3. Secure the adapter to the bracket using one of the M4 x 6.5 mm screws provided with the bracket.
4. Mount up to four additional LRM/MACsec Adapter units on the bracket, as described in steps 2 and 3.
5. Connect the adapters to the switch, following the instructions in Connecting the LRM/MACsec Adapter to the Host Switch and to Power on page 334.

Installing an LRM/MACsec Adapter Vertically

Refer to Installing an LRM/MACsec Adapter on page 332 for installation options for the LRM/MACsec Adapter.

To install an LRM/MACsec Adapter vertically in an equipment rack, follow these steps:

1. Using two rack mounting screws (not included), attach the vertical mounting bracket to the rack so that the mounting ear extends outward from the front of the rack.
2. Using two small M4 x 6.5 mm screws (included), attach the bracket to the holes in the bottom of the adapter.

   The adapter ports can face upward or downward as needed.
3. Connect the adapter to the switch, following the instructions in Connecting the LRM/MACsec Adapter to the Host Switch and to Power on page 334.

Connecting the LRM/MACsec Adapter to the Host Switch and to Power

Before connecting the LRM/MACsec Adapter to the host switch, install it in the equipment rack using one of the options described in Installing an LRM/MACsec Adapter on page 332.

The LRM/MACsec Adapter connects to two ports the host switch, providing LRM and/or MACsec functionality for those ports. The adapter also draws power from the host switch.

Caution

Connect the adapter to the host switch using only the SFP cable that is provided for this purpose. The use of other cables can damage the equipment.

To connect an LRM/MACsec Adapter to its host switch, follow these steps:

1. Insert one of the 50 cm SFP cables, included with the adapter, into Host Port1 on the front of the LRM/MACsec Adapter.

   This SFP cable is provided especially for use with the LRM/MACsec Adapter, and is labeled as such. It is not a standard SFP cable.
2. Insert the other end of the cable into an SFP port on the switch.

3. Repeat steps 1 and 2 to connect Host Port2 to the switch.

   Both Host Port1 and Host Port2 must be connected to the same host switch.
4. If additional power is needed, attach a USB cable to the adapter's USB connector and to a power source.

   The LRM/MACsec Adapter receives power through its connection to the host switch's SFP port. Additional power is supplied through a USB cable that connects the adapter to a power source. The USB cable is required for MACsec connections. It is optional for LRM-only connections.
5. When the LRM/MACsec Adapter is connected to the host switch, verify that the adapter's power LED turns on.

   If the power LED does not turn on, recheck the connections from the adapter to the switch and to the optional power source.

Refer to the Security chapter in the *ExtremeXOS 30.7 User Guide* for information about configuring the host switch to work with the LRM/MACsec Adapter.

Install a Half-Duplex to Full-Duplex Converter

The following options are available for installing the Half-Duplex to Full-Duplex Converter:

1. On a shelf that is mounted in an equipment rack. (The shelf can accommodate up to three converters.)

   See Install Half-Duplex to Full-Duplex Converters in a 3-Slot Modular Shelf on page 335.
2. On a flat surface.

   See Mount a Half-Duplex to Full-Duplex Converter on a Flat Surface on page 336.
3. On a wall.

   See Mount a Half-Duplex to Full-Duplex Converter on a Wall on page 336.

Install Half-Duplex to Full-Duplex Converters in a 3-Slot Modular Shelf

Refer to Install a Half-Duplex to Full-Duplex Converter on page 335 for installation options for the Half-Duplex to Full-Duplex Converter.

Before installing the converter in the 3-slot modular shelf (part no. STK-RPS-1005CH3), mount the shelf in the rack. Follow the steps in the 3-Slot Modular Shelf Quick Reference Guide.

To install up to three Half-Duplex to Full-Duplex Converter units in the 3-slot modular shelf, follow these steps:

1. Attach the four rubber feet (included) to the bottom of the converter, one at each corner.
2. Set the converter on the shelf.
3. Connect the converter to its power adapter, following the instructions in Connect a Half-Duplex to Full-Duplex Converter to its Power Adapter on page 336.

4. Secure the converter to the shelf using cable ties (included with the shelf).

   Pass the ties through the holes in the shelf and secure them firmly around the converter.
5. Connect the full-duplex ports (FD1 - FD4) to the switch.
6. Connect the half-duplex ports (HD1 - HD4) to your half-duplex devices.
7. Install one or two additional Half-Duplex to Full-Duplex Converter units in the shelf, as described in steps 1 on page 335 through 4.

Mount a Half-Duplex to Full-Duplex Converter on a Flat Surface

Refer to Install a Half-Duplex to Full-Duplex Converter on page 335 for installation options for the Half-Duplex to Full-Duplex Converter.

To install a Half-Duplex to Full-Duplex Converter unit on a flat surface, follow these steps:

1. Attach the four rubber feet (included) to the bottom of the converter, one at each corner.
2. Set the converter on a flat, stable surface.
3. Connect the converter to its power adapter, following the instructions in Connect a Half-Duplex to Full-Duplex Converter to its Power Adapter on page 336.
4. Connect the full-duplex ports (FD1 - FD4) to the switch.
5. Connect the half-duplex ports (HD1 - HD4) to your half-duplex devices.

Mount a Half-Duplex to Full-Duplex Converter on a Wall

Refer to Install a Half-Duplex to Full-Duplex Converter on page 335 for installation options for the Half-Duplex to Full-Duplex Converter.

To mount a Half-Duplex to Full-Duplex Converter unit on a wall, follow these steps:

1. Drill two holes in the wall, each 4 mm (0.16 in.) in diameter.

   The holes should be 10.5 cm (4.13 in.) apart so that they correspond to the locations of the holes in the bottom of the converter.
2. Insert an anchor bolt (not provided) into each hole in the wall.
3. Place a screw (not provided) into each anchor bolt and tighten so that the screw head protrudes slightly from the wall.
4. Place the converter onto the screws and gently lower it so that it locks into place.
5. Connect the converter to its power adapter, following the instructions in Connect a Half-Duplex to Full-Duplex Converter to its Power Adapter on page 336.
6. Connect the full-duplex ports (FD1 - FD4) to the switch.
7. Connect the half-duplex ports (HD1 - HD4) to your half-duplex devices.

Connect a Half-Duplex to Full-Duplex Converter to its Power Adapter

Before connecting the Half-Duplex to Full-Duplex Converter to power, install it using one of the options described in Install a Half-Duplex to Full-Duplex Converter on page 335.

The Half-Duplex to Full-Duplex Converter operates on DC power, which it receives from its power adapter.

Connection points to the power adapter are located on the sides of the converter, as shown in Figure 260.

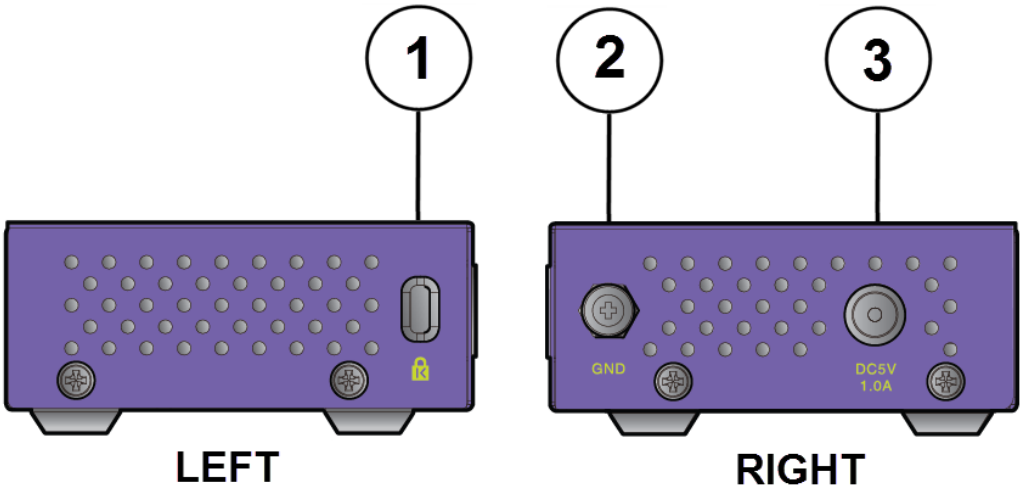


Figure 260: Half-Duplex to Full-Duplex Converter: Side Panels

1 = Kensington lock point	3 = DC power connector
2 = Grounding point	

To connect your Half-Duplex to Full-Duplex Converter to power, follow these steps:

1. Attach a grounding wire to the grounding point on the side of the converter.
2. Connect a DC power cable to the DC input socket on the same side of the converter.
3. Connect the other end of the DC power cable to the power adapter.
4. Connect the power adapter to an AC power source.
5. When power is connected, verify that the converter's power LED turns green.

   If the power LED does not turn on, recheck the connections from the connector to the power source.

Installing a Versatile Interface Module or Clock Module in an X460-G2 Series Switch

This section describes how to install a versatile interface module (VIM) or a clock module in the rear slot of an X460-G2 switch.

Note
Clock module ports are output ports. They are not to be used as input ports.

You need the following tools and materials to install a VIM or clock module:

- ESD-preventive wrist strap

- #1 Phillips screwdriver (for clock module) or flat-bladed screwdriver (for all other VIM modules)

Caution
Extreme Networks VIMs and clock modules are not hot-swappable. Disconnect power to the switch before removing an installed VIM or clock module or installing a new VIM or clock module.

The installation procedure is the same for all X460-G2 VIMs and clock modules, with the exception that the VIMs use slotted retaining screws and the clock module uses Phillips retaining screws.

To install a versatile interface module or clock module, follow these steps:

1. Attach an ESD-preventive wrist strap to your wrist and connect the metal end to an appropriate ground point on the rack.
2. Disconnect the switch power.
3. Remove the cover plate from the VIM or clock module slot:
   a. Remove the retaining screws at the top corners of the slot cover plate, and set the screws aside in a safe place.
   b. Save the retaining screws to secure the new module in the switch.
   c. Pull the cover plate away from the module slot.

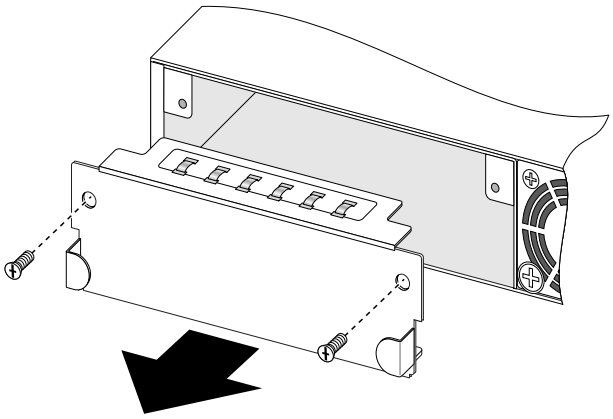


Figure 261: Removing a slot Cover Plate (VIM slot cover shown)

4. Remove the new VIM or clock module from its anti-static packaging.
5. Install the VIM or clock module in the switch:
   a. Carefully slide the module into the switch.
   b. Insert and tighten the retaining screws you removed in step 3. The clock module uses Phillips screws and the VIM modules use slotted screws.

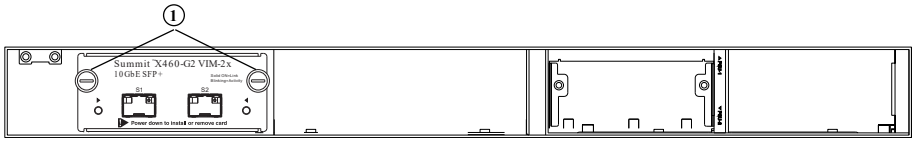


Figure 262: Tighten Screws on the Inserted VIM Module

1 = VIM module retaining screw locations

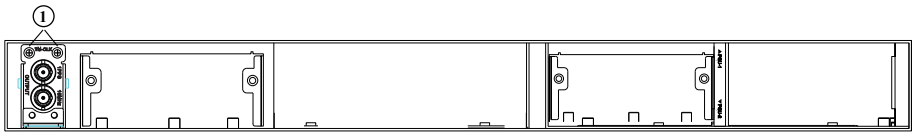


Figure 263: Tighten Screws on the Inserted Clock Module

1 = clock module retaining screw locations

Installing a Versatile Interface Module in an X465 Series Switch

This section describes how to install a versatile interface module (VIM5) in the front slot of an X465 switch.

You need the following tools and materials to install a VIM5:

- ESD-preventive wrist strap
- #2 Phillips screwdriver

Caution

Extreme Networks VIM5s are not hot-swappable. Disconnect power to the switch before removing an installed VIM5 or installing a new VIM5.

To install a versatile interface module, follow these steps:

1. Attach the ESD wrist strap to your wrist and connect the metal end to an appropriate ground point on the rack.
2. Ensure that the switch is completely powered down.
3. Remove the cover plate from the VIM5 slot (#2 Phillips screwdriver required).
   a. Remove the retaining screws at the top corners of the slot cover plate, and set the screws aside in a safe place.
   b. Save the retaining screws to secure the new module in the switch.
   c. Pull the cover plate away from the module slot.

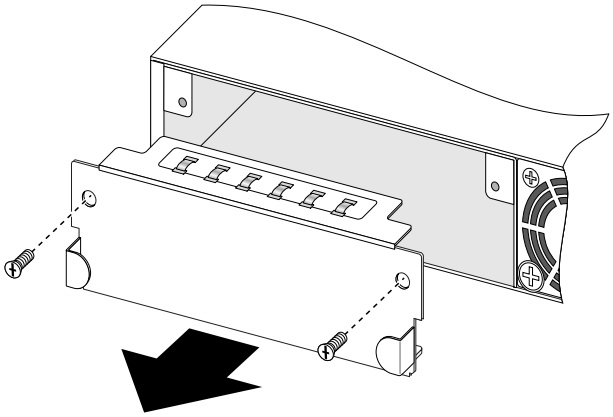


Figure 264: Removing a slot Cover Plate (VIM slot cover shown)

4. Remove the new VIM5 from its anti-static packaging.
5. Install the VIM5 in the switch:
   a. Carefully slide the VIM5 module into the switch.
   b. Insert and tighten the retaining screws you removed in step 3.a on page 339, using the screws provided.

Figure 265: Tighten Screws on the Inserted VIM5 Module

1 = VIM5 module retaining screw locations

Install an SSD Module

This section describes how to install a Solid-state Drive (SSD) module in the rear slot of a switch.

You need the following tools and materials to install an SSD module:

- ESD-preventive wrist strap
- #2 Phillips screwdriver

Warning
To prevent damage to the switch or VIM, the switch must be powered OFF when removing or installing SSD modules.

To install an SSD module, follow these steps:

1. Attach the ESD wrist strap to your wrist and connect the metal end to an appropriate ground point on the rack.
2. Ensure that the switch is completely powered down.
3. Remove the cover plate from the SSD slot (#2 Phillips screwdriver required).

Figure 266: Switch with SSD Rear Panel

4. Remove the SSD module from its packaging.

5. Carefully slide the SSD module into the slot on the rear panel until it is firmly in place.

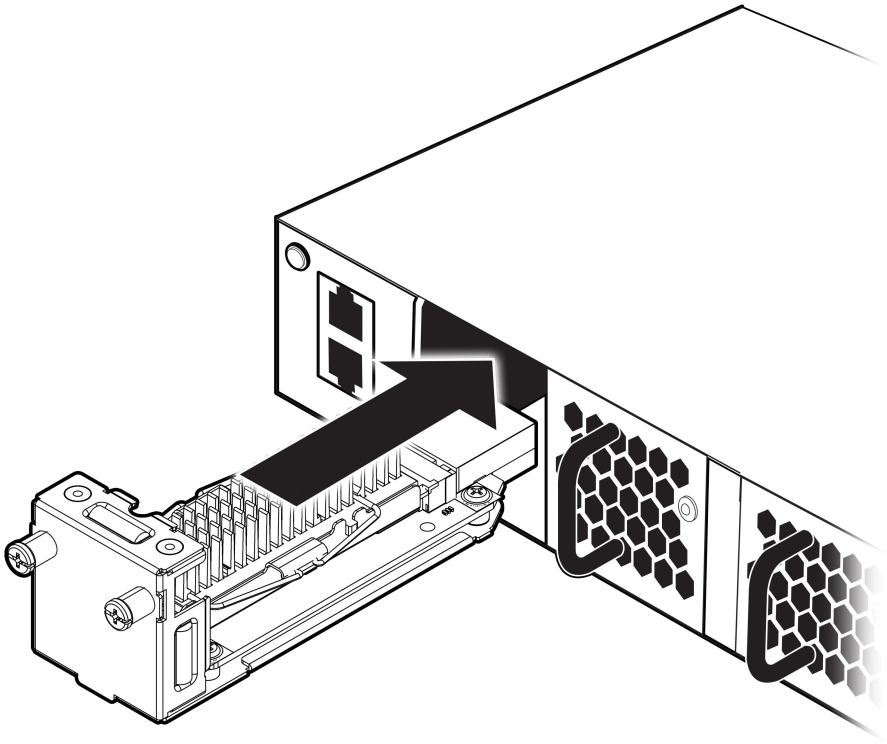


Figure 267: Insert SSD Module

6. Secure the SSD module using the screws provided.

Replacing AC Power Supplies

This chapter describes how to replace AC power supplies in a switch. It also describes how to remove EPS series AC redundant power supplies and the STK-RPS-150PS.

To replace and remove AC power supplies that work with other Extreme Networks switches, refer to *ExtremeSwitching and Summit Switches: Hardware Installation Guide for Switches Using ExtremeXOS 16 or Earlier*.

Replacing a Summit 300 W AC Power Supply

You need the following tools and materials to replace a Summit 300 W AC power supply:

- Thermal protective gloves
- AC power cord, if you will not be re-using the cord from the removed power supply

  An AC power cord is not included with a Summit AC power supply. You must obtain a power supply cord that meets the requirements listed in Power Cord Requirements for AC-Powered Switches and AC Power Supplies on page 504.

These switches have two bays for hot-swappable power supplies. In a switch with a redundant power configuration, you can replace one Summit AC power supply without powering down the switch. To replace a Summit 300 W AC power supply:

1. Disconnect the AC power cord from the wall outlet and from the power supply.
2. Note the orientation of the installed power supply.

3. Push the latching tab toward the power supply handle and pull outward on the handle to disengage the power supply internal connectors.

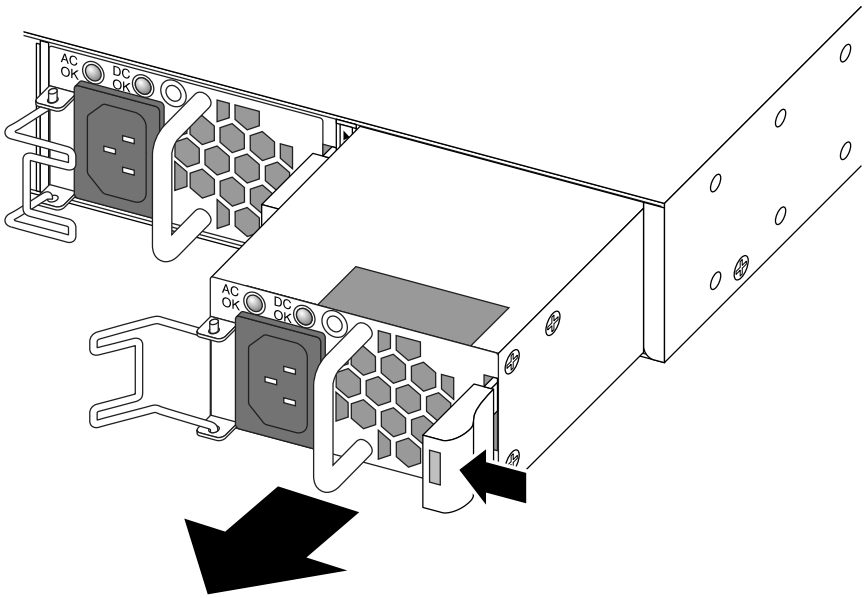


Figure 268: Removing a Summit 300 W AC Power Supply

4. Carefully slide the power supply the rest of the way out of the switch.

Caution

Power supplies can become very hot during operation. Wear thermal protective gloves when you remove a power supply from an operating switch.

Note

If you are not installing a replacement power supply, install a cover over the unoccupied power supply bay. Unoccupied bays must always be covered to maintain proper system ventilation and EMI levels.

5. Verify that the replacement power supply is oriented the same way as the unit you removed.

6. Carefully slide the power supply all the way into the power supply bay.
   See Figure 269

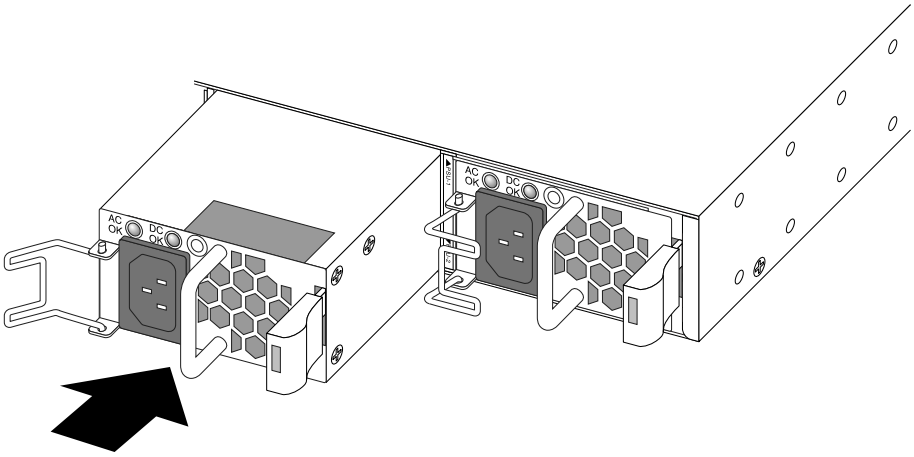


Figure 269: Installing a Summit 300 W AC Power Supply

7. Push the power supply in until the latch snaps into place.

   Caution
   Do not slam the power supply into the switch.

8. Connect the AC power cord to the input connector on the power supply and rotate the wire clip into place over the power cord connector.
9. Connect the other end of the power cord to an AC power outlet.

   Warning
   Always be sure that the source outlet is properly grounded before plugging the AC power cord into the AC power supply.

Replacing a Summit 350 W or 715 W AC Power Supply

The Summit 350 W AC power supplies are compatible with X460-G2 PoE switch models that have the same airflow direction as the power supply. Part numbers XN-ACPWR-350W-FB and 10953 are compatible with the X465-24S, X465-24XE, and X465-48T model switches.

The Summit 715 W AC power supplies are compatible with the X450-G2, X460-G2, and X465 PoE series switches.

These switches have two bays for hot-swappable power supplies. In a switch with a redundant power configuration, you can replace one Summit AC power supply without powering down the switch.

You need the following tools and materials to replace a Summit 715 W AC power supply:

- Thermal protective gloves
- AC power cord, if you will not be re-using the cord from the removed power supply

To replace a Summit 350 W or 715 W AC power supply, follow these steps:

1. Disconnect the AC power cord from the wall outlet and from the power supply.
2. Note the orientation of the installed power supply, and the location of the latching tab at the right of the unit.
3. Push the latching tab toward the power supply handle and pull outward on the handle to disengage the power supply internal connectors.

   See Figure 270.

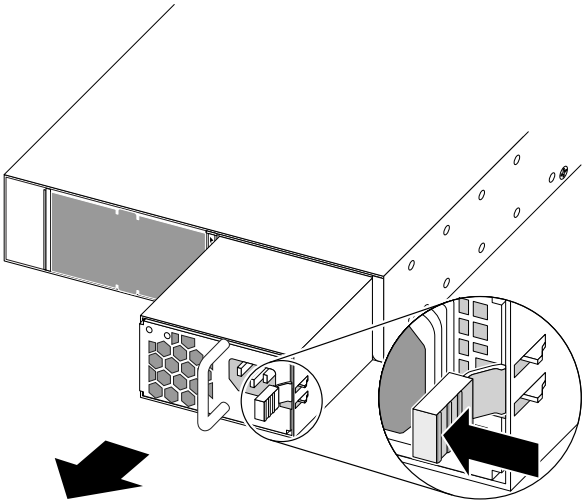


Figure 270: Removing a Summit 350 W or 715 W AC Power Supply

4. Carefully slide the power supply the rest of the way out of the switch.

Caution
Power supplies can become very hot during operation. Wear thermal protective gloves when you remove a power supply from an operating switch.

Note
If you are not installing a replacement power supply, install a cover over the unoccupied power supply bay. Unoccupied bays must always be covered to maintain proper system ventilation and EMI levels.

5. Verify that the replacement power supply is oriented the same way as the unit you removed, and has the same airflow direction.
6. Carefully slide the power supply all the way into the power supply bay, as shown in Figure 271.

7. Push the power supply in until the latch snaps into place.

Caution
Do not slam the power supply into the switch.

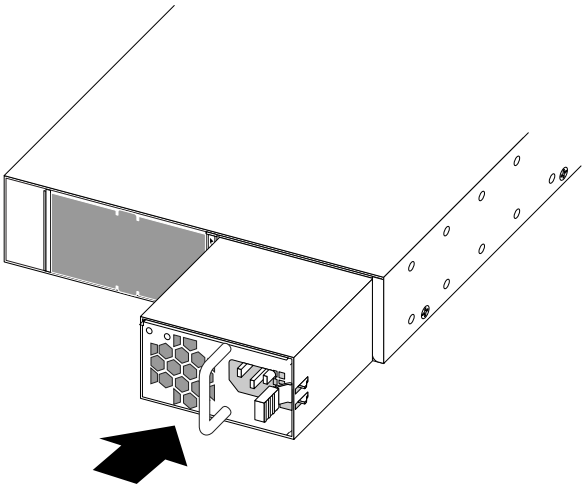


Figure 271: Installing A Summit 350 W or 715 W AC Power Supply

8. Connect the power cord to the power supply and to a grounded AC power outlet.

Warning
Always be sure that the source outlet is properly grounded before plugging the AC power cord into the AC power supply.

9. If the power supply is equipped with a power cord retainer, use the retainer to secure the power cord to the power supply.

Replacing a Summit 450 W or 550 W AC Power Supply

Summit 550 W power supplies are available for switches with either front-to-back or back-to-front airflow.

You need the following tools and materials to replace a 450 W or 550 W AC power supply:

- Thermal protective gloves
- AC power cord, if you will not be re-using the cord from the removed power supply

  An AC power cord is not included with the Summit AC power supply. You must obtain a power supply cord that meets the requirements listed in Power Cord Requirements for AC-Powered Switches and AC Power Supplies on page 504.

In a switch with a redundant power configuration, you can replace one Summit AC power supply without powering down the switch.

To replace a 450 W or 550 W AC power supply:

1. Disconnect the AC power cord from the wall outlet and from the power supply.

2. Note the orientation of the installed power supply.
3. Push the latching tab toward the power supply handle and pull outward on the handle to disengage the power supply internal connectors.

   See Figure 272.

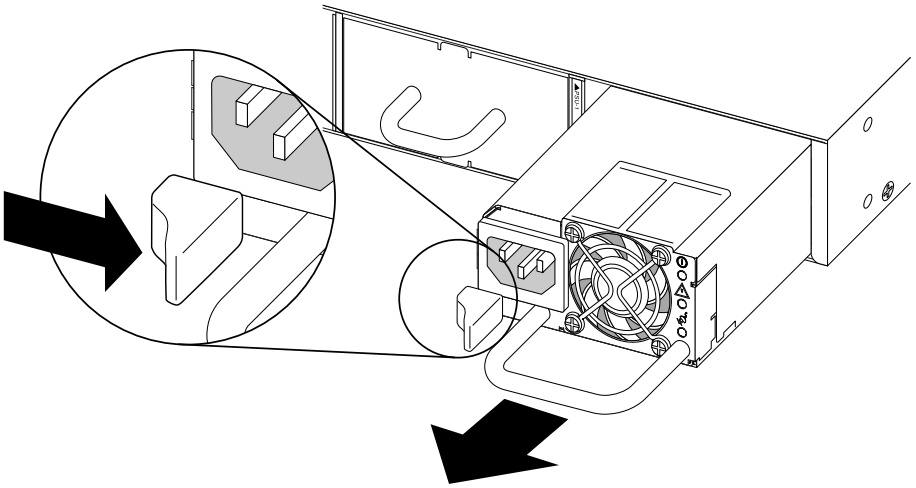


Figure 272: Removing a 450 W or 550 W AC Power Supply

4. Carefully slide the power supply the rest of the way out of the switch.

Caution

Power supplies can become very hot during operation. Wear thermal protective gloves when you remove a power supply from an operating switch.

Note

If you are not installing a replacement power supply, install a cover over the unoccupied power supply bay. Unoccupied bays must always be covered to maintain proper system ventilation and EMI levels.

5. Verify that the replacement power supply is oriented the same way as the unit you removed.

6. Carefully slide the power supply all the way into the power supply bay.
   See Figure 273.

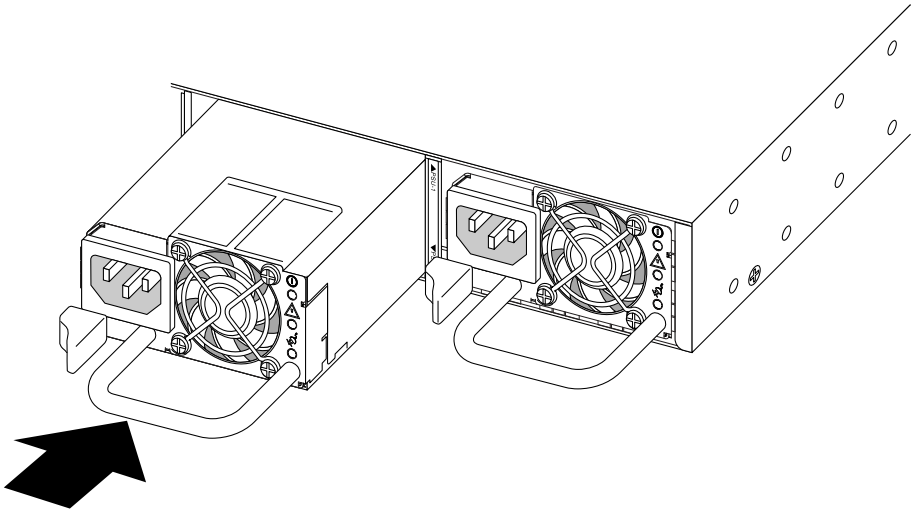


Figure 273: Installing a 450 W or 550 W AC Power Supply

7. Push the power supply in until the latch snaps into place.

   Caution
   Do not slam the power supply into the switch.

8. Connect the power cord to the power supply and to a grounded AC power outlet.

   Warning
   Always be sure that the source outlet is properly grounded before plugging the AC power cord into the AC power supply.

9. If the power supply is equipped with a power cord retainer, use the retainer to secure the power cord to the power supply.

Replacing a 750 W AC Power Supply

You need the following tools and materials to replace a 750 W AC power supply:

- Thermal protective gloves
- AC power cord, if you will not be re-using the cord from the removed power supply

  An AC power cord is not included with an AC power supply. You must obtain a power supply cord that meets the requirements listed in Power Cord Requirements for AC-Powered Switches and AC Power Supplies on page 504.

These switches have two bays for hot-swappable power supplies. In a switch with a redundant power configuration, you can replace one AC power supply without powering down the switch.

To replace a 750 W AC power supply, follow these steps:

1. Disconnect the AC power cord from the wall outlet and from the power supply.
2. Note the orientation of the installed power supply.
3. Push the latching tab toward the power supply handle and pull outward on the handle to disengage the power supply internal connectors.

   See Figure 274.

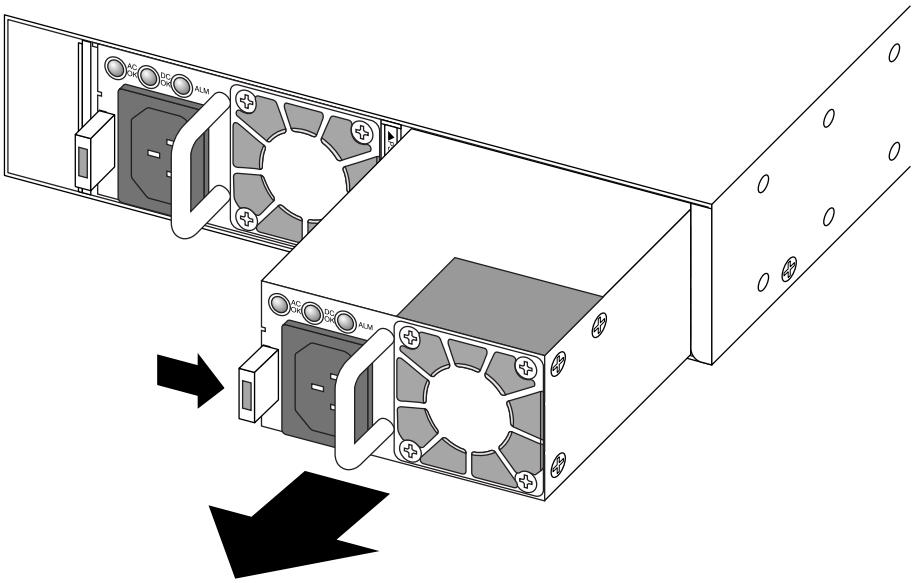


Figure 274: Removing a 750 W AC Power Supply

4. Carefully slide the power supply the rest of the way out of the switch.

Caution
Power supplies can become very hot during operation. Wear thermal protective gloves when you remove a power supply from an operating switch.

Note
If you are not installing a replacement power supply, install a cover over the unoccupied power supply bay. Unoccupied bays must always be covered to maintain proper system ventilation and EMI levels.

5. Verify that the replacement power supply is oriented the same way as the unit you removed.

6. Carefully slide the power supply all the way into the power supply bay.
   See Figure 275.

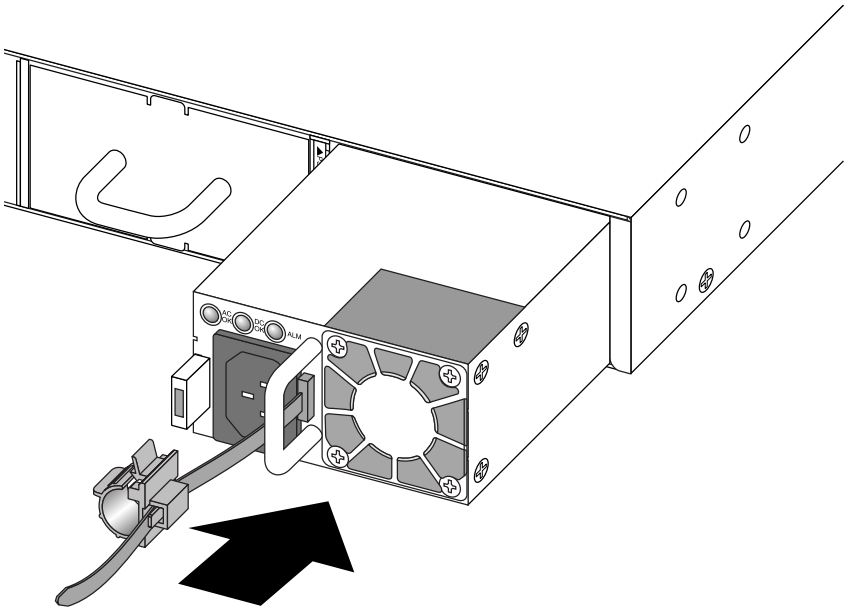


Figure 275: Installing a 750 W AC Power Supply

7. Push the power supply in until the latch snaps into place.

Caution
Do not slam the power supply into the switch.

8. If necessary, slide the plastic cord retainer farther away from the back of the switch. See Figure 276.

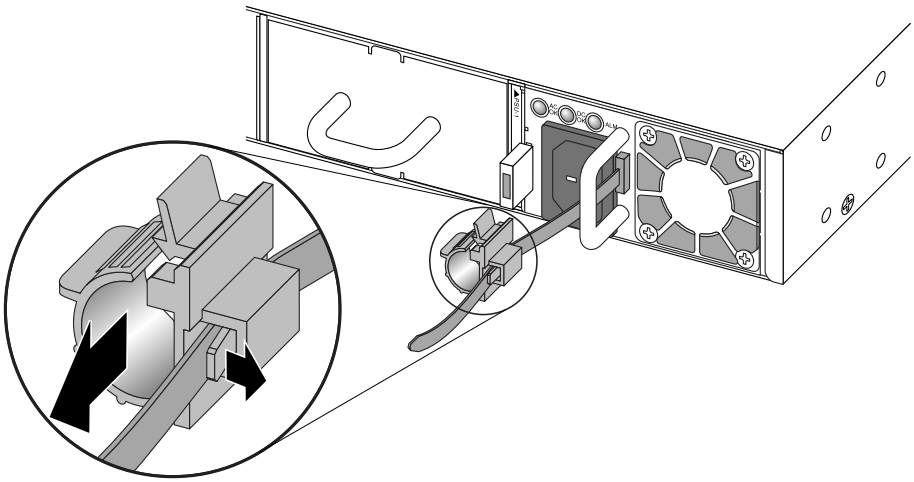


Figure 276: Moving the Power Cord Retainer

9. Connect the AC power cord to the input connector. See Figure 277.

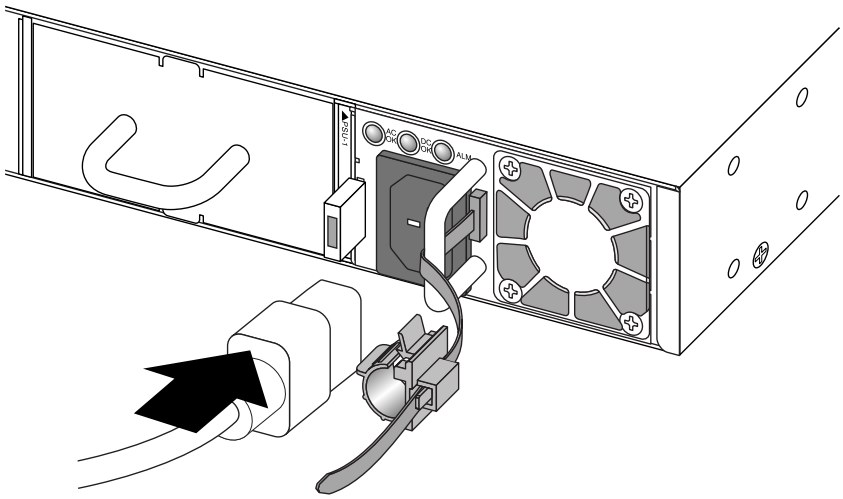


Figure 277: Connecting the Power Cord

10. Open the clip and slip it over the barrel of the connector.

    See Figure 278.

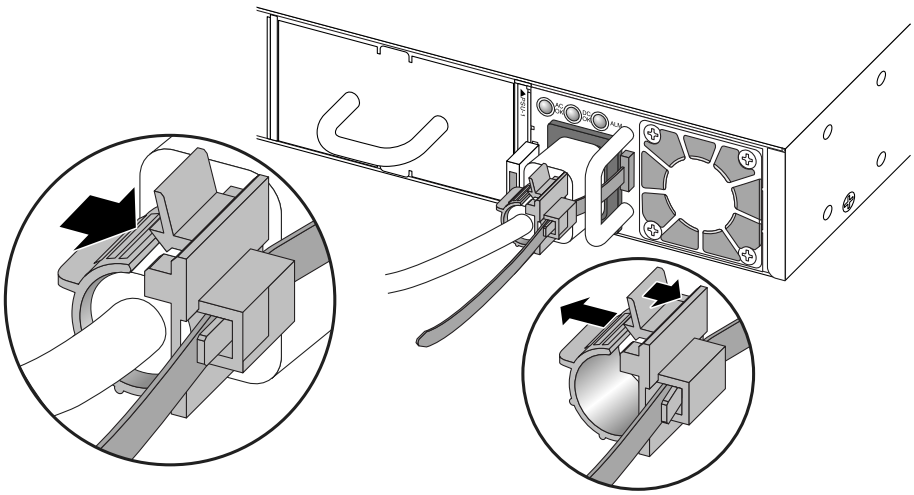


Figure 278: Attaching the Power Cord Retainer

11. Snap the clip firmly around the connector.
12. Connect the other end of the power cord to an AC power outlet.

Replacing a Summit 770 W AC Power Supply

The Summit 770 W AC power supplies are compatible with the ExtremeSwitching X690 and X870 series switches.

Note
The X690 and X870 models also can accommodate one or two 1100 W DC PSUs. For information on replacing those units, see Replacing a Summit 1100 W DC Power Supply on page 379. Bear in mind that you cannot combine power supplies of different wattages in the same switch.

These switches have two bays for hot-swappable power supplies. In a switch with a redundant power configuration, you can replace one Summit AC power supply without powering down the switch.

You need the following tools and materials to replace a Summit 770 W AC power supply:

- Thermal protective gloves
- AC power cord, if you will not be re-using the cord from the removed power supply

To replace a Summit 770 W AC power supply, follow these steps:

1. Disconnect the AC power cord from the wall outlet and from the power supply.
2. Note the orientation of the installed power supply, and the location of the latching tab at the right of the unit.
3. Push the latching tab toward the power supply handle and pull outward on the handle to disengage the power supply internal connectors.

   See Figure 279.

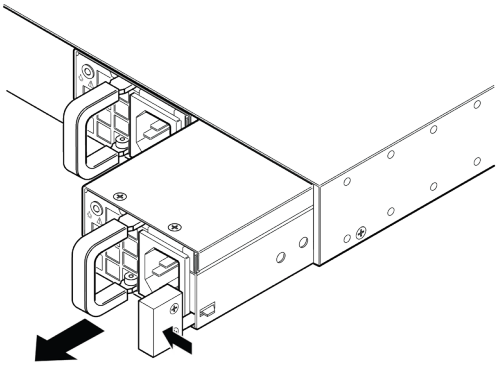


Figure 279: Removing a Summit 770 W AC Power Supply

4. Carefully slide the power supply the rest of the way out of the switch.

Caution
Power supplies can become very hot during operation. Wear thermal protective gloves when you remove a power supply from an operating switch.

Note
If you are not installing a replacement power supply, install a cover over the unoccupied power supply bay. Unoccupied bays must always be covered to maintain proper system ventilation and EMI levels.

5. Verify that the replacement power supply is oriented the same way as the unit you removed, and has the same airflow direction.
6. Carefully slide the power supply all the way into the power supply bay.

   See Figure 280.

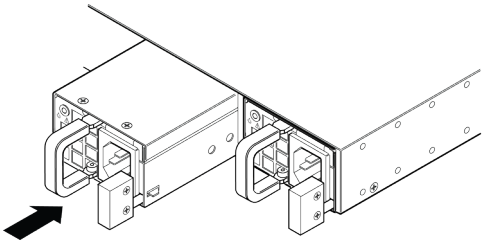


Figure 280: Installing A Summit 770 W AC Power Supply

7. Push the power supply in until the latch snaps into place.

Caution
Do not slam the power supply into the switch.

8. Connect the power cord to the power supply and to a grounded AC power outlet.

Warning
Always be sure that the source outlet is properly grounded before plugging the AC power cord into the AC power supply.

9. If the power supply is equipped with a power cord retainer, use the retainer to secure the power cord to the power supply.

Replacing a Summit 1100 W AC Power Supply

The Summit 1100 W AC power supplies are compatible with the X450-G2 and X460-G2 PoE switches. Part numbers XN-ACPWR-1100W-FB and 10941 are compatible with ExtremeSwitching X465 PoE switch models.

These switches have two bays for hot-swappable power supplies. In a switch with a redundant power configuration, you can replace one Summit AC power supply without powering down the switch.

You need the following tools and materials to replace a Summit 1100 W AC power supply:

- Thermal protective gloves
- AC power cord, if you will not be re-using the cord from the removed power supply

To replace a Summit 1100 W AC power supply, follow these steps:

1. Disconnect the AC power cord from the wall outlet and from the power supply.
2. Note the orientation of the installed power supply, and the location of the latching tab at the right of the unit.

3. Push the latching tab toward the power supply handle and pull outward on the handle to disengage the power supply internal connectors.

   See Figure 281.

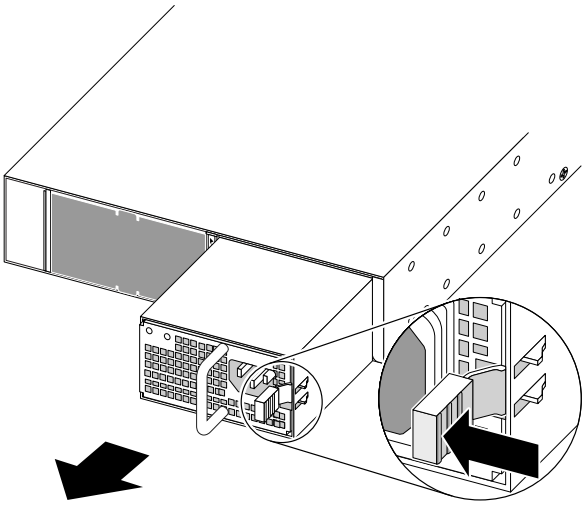


Figure 281: Removing a Summit 1100 W AC Power Supply

4. Carefully slide the power supply the rest of the way out of the switch.

Caution
Power supplies can become very hot during operation. Wear thermal protective gloves when you remove a power supply from an operating switch.

Note
If you are not installing a replacement power supply, install a cover over the unoccupied power supply bay. Unoccupied bays must always be covered to maintain proper system ventilation and EMI levels.

5. Verify that the replacement power supply is oriented the same way as the unit you removed, and has the same airflow direction.

6. Carefully slide the power supply all the way into the power supply bay.
   See Figure 282.

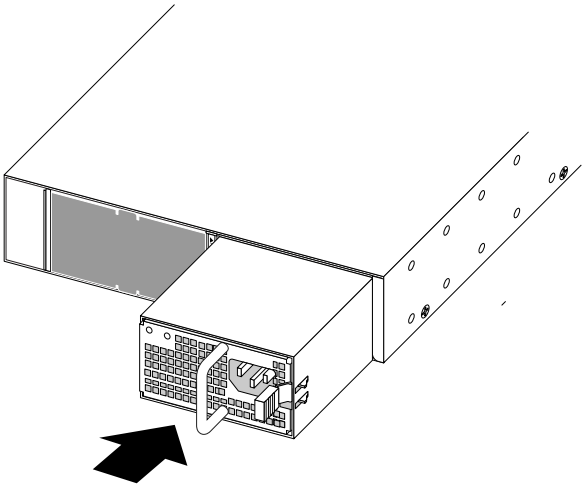


Figure 282: Installing a Summit 1100 W AC Power Supply

7. Push the power supply in until the latch snaps into place.

   Caution
   Do not slam the power supply into the switch.

8. Connect the power cord to the power supply and to a grounded AC power outlet.

   Warning
   Always be sure that the source outlet is properly grounded before plugging the AC power cord into the AC power supply.

9. If the power supply is equipped with a power cord retainer, use the retainer to secure the power cord to the power supply.

Replacing an ExtremeSwitching 2000 W AC Power Supply

The ExtremeSwitching 2000 W AC power supplies are compatible with the X465 PoE (-48P, X465-48W, X465-24MU, X465-24MU-24W, X465-24W) switch models.

These switches have two bays for hot-swappable power supplies. In a switch with a redundant power configuration, you can replace one Summit or ExtremeSwitching AC power supply without powering down the switch.

You need the following tools and materials to replace an ExtremeSwitching 2000 W AC power supply:

- Thermal protective gloves
- AC power cord, if you will not be re-using the cord from the removed power supply

To replace an ExtremeSwitching 2000 W AC power supply, follow these steps:

1. Disconnect the AC power cord from the wall outlet and from the power supply.

2. Note the orientation of the installed power supply, and the location of the latching tab at the right of the unit.
3. Push the latching tab toward the power supply handle and pull outward on the handle to disengage the power supply internal connectors.

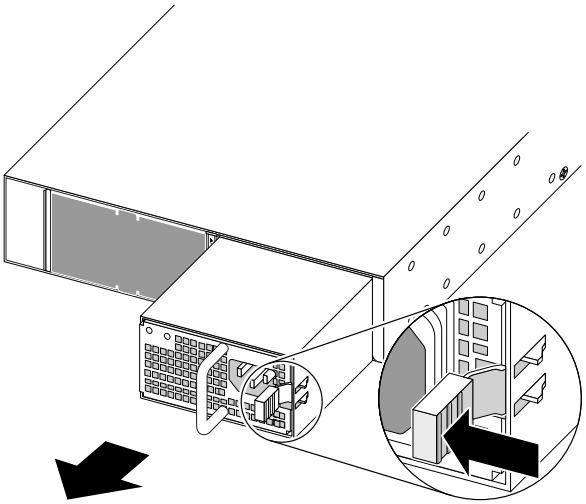


Figure 283: Removing an ExtremeSwitching 2000 W AC Power Supply

4. Carefully slide the power supply the rest of the way out of the switch.

Caution
Power supplies can become very hot during operation. Wear thermal protective gloves when you remove a power supply from an operating switch.

Note
If you are not installing a replacement power supply, install a cover over the unoccupied power supply bay. Unoccupied bays must always be covered to maintain proper system ventilation and EMI levels.

5. Verify that the replacement power supply is oriented the same way as the unit you removed, and has the same airflow direction.

6. Carefully slide the power supply all the way into the power supply bay.

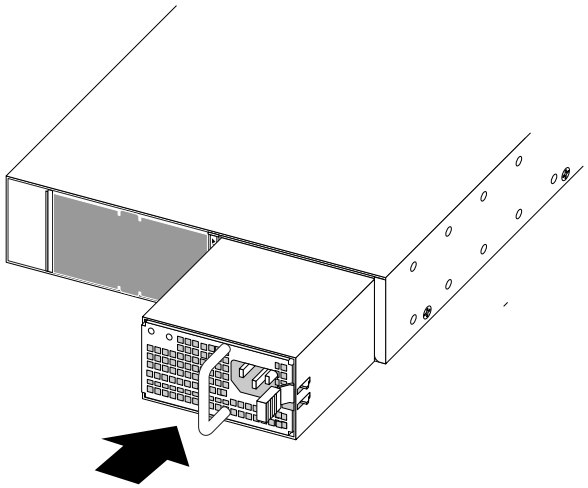


Figure 284: Installing an ExtremeSwitching 2000 W AC Power Supply

7. Push the power supply in until the latch snaps into place.

Caution
Do not slam the power supply into the switch.

8. Connect the power cord to the power supply and to a grounded AC power outlet.

Warning
Always be sure that the source outlet is properly grounded before plugging the AC power cord into the AC power supply.

9. If the power supply is equipped with a power cord retainer, use the retainer to secure the power cord to the power supply.

Removing an RPS-150XT Redundant Power Supply

To remove an installed RPS-150XT that is attached to a switch, follow these steps.

Caution
Observe all ESD precautions when handling sensitive electronic equipment.

Note
The switch should not be powered on during installation or removal of the power supply. This is not a hot-swap procedure. Follow the steps in the order specified.

1. Unplug the AC power cord from the AC power source first and then from the power supply.
2. Disconnect the RPS cable from the Redundant Power Supply connector at the rear of the power supply.
3. Disconnect the RPS cable from the Redundant Power Supply connector on the switch.

4. If the power supply is installed in a rack, remove it from the rack:
   a. Holding the power supply securely, remove the captive screws that secure it to the STK-RPS-1005CH3 shelf.
   b. Carefully slide the power supply out of the shelf.
5. If you want to replace the power supply with another one, follow the instructions in Installing an RPS-150XT Redundant Power Supply on page 287.

Removing an RPS-500p Redundant Power Supply

To remove an installed RPS-500p that is attached to a switch, follow these steps.

Caution
Observe all ESD precautions when handling sensitive electronic equipment.

1. Unplug the AC power cord from the AC power source first and then from the power supply.
2. Disconnect the RPS cable from the Redundant Power Supply connector at the rear of the power supply.
3. Disconnect the RPS cable from the Redundant Power Supply connector on the switch.
4. If the power supply is installed in a rack, remove it from the rack:
   a. Holding the power supply securely, remove the screws that attach it to the rack rails.
   b. Place the power supply onto a sturdy flat surface.
   c. Optionally, remove the rack-mounting brackets from the power supply.
5. If you want to replace the power supply with a new one, follow the instructions in Installing an RPS-500p Redundant Power Supply on page 291.

Removing an STK-RPS-150PS Redundant Power Supply

Caution
Observe all ESD precautions when handling sensitive electronic equipment.

Note
The switch should not be powered on during installation or removal of the power supply. This is not a hot-swap procedure. Follow the steps in the order specified.

To remove a power supply installed in an operating system, proceed as follows:

1. Unplug the AC power cord of the power supply from the AC power source first, then from the rear of the power supply.
2. Loosen the captive screws securing the power supply until it is released from the RPS shelf front panel.
3. Pull the power supply out and remove it from the RPS shelf.
4. Repeat steps 1 through 3 for each additional power supply you plan to remove.

Removing an STK-RPS-1005PS Redundant Power Supply

To remove an installed STK-RPS-1005PS that is attached to a switch, follow these steps.

Caution
Observe all ESD precautions when handling sensitive electronic equipment.

Note
The switch should not be powered on during installation or removal of the power supply. This is not a hot-swap procedure. Follow the steps in the order specified.

1. Unplug the AC power cord from the AC power source first and then from the power supply.
2. Disconnect the RPS cable from the Redundant Power Supply connector at the rear of the power supply.
3. Disconnect the RPS cable from the Redundant Power Supply connector on the switch.
4. If the power supply is installed in a rack, remove it from the rack:
   a. Holding the power supply securely, remove the captive screws that secure it to the STK-RPS-1005CH3 shelf.
   b. Carefully slide the power supply out of the shelf.
5. If you want to replace the power supply with another one, follow the instructions in Installing an STK-RPS-1005PS Redundant Power Supply on page 301.

Removing a VX-RPS-1000 Redundant Power Supply

To remove an installed VX-RPS-1000 power supply that is attached to a V400 Virtual Port Extender, follow these steps.

Caution
Observe all ESD precautions when handling sensitive electronic equipment.

1. Unplug the AC power cord from the AC power source first and then from the power supply.
2. Disconnect the power cable from the output socket at the rear of the power supply.
3. Disconnect the power cable from the RPS input connector on the rear of the V400 unit..
4. Remove the power supply from the rack:
   a. If the power supply is attached to the rack with mounting brackets, hold it securely and remove the screws that attach the brackets to the rack posts.
   b. If the power supply is installed on a shelf, loosen the two retaining screws and carefully slide the power supply out of the shelf..
   c. Place the power supply onto a sturdy flat surface.
   d. Optionally, remove the rack-mounting brackets from the power supply.
5. If you want to replace the power supply with a new one, follow the instructions in Installing a VX-RPS-1000 Redundant Power Supply on page 305.

Replacing DC Power Supplies

This chapter describes how to replace internal DC power supplies in an Extreme Networks switch. These switches have two bays for hot-swappable power supplies. In a switch with a redundant power configuration, you can replace one DC power supply without powering down the switch.

See Replaceable Internal Power Supplies on page 136 for a list of which internal DC power supplies are compatible with the switch you are using.

Replacing a Summit 300 W DC Power Supply

The following instructions apply to both of the 300 W DC power supplies (part numbers 10933 and 10944).

You need the following tools and materials to replace a Summit 300 W DC power supply:

- #2 Phillips screwdriver
- Torque screwdriver and wrench or torque driver with attachments for tightening screws and nuts
- Thermal protective gloves (required for removal of a power supply)

Warning
Be sure to disconnect all power cables before you disconnect the chassis ground wire.

Removing a 300 W DC Power Supply

To remove an installed Summit 300 W DC power supply, follow these steps:

1. De-energize the DC circuit.
2. Disconnect the DC power cables:
   a. Pull the cover off the terminal block.
   b. Loosen the screws that secure the cable terminals to the terminal block.

c. Slide the wires out from under the captive washers.

Warning
Be sure to disconnect all power cables before you disconnect the chassis ground wire.

3. Disconnect the ground wire:
   a. Remove the screw that secures the ground wire to the power supply.
   b. Move the wire away from the power supply.
4. Push the latching tab toward the power supply handle and pull outward on the handle to disengage the power supply internal connectors.

   See Figure 285.

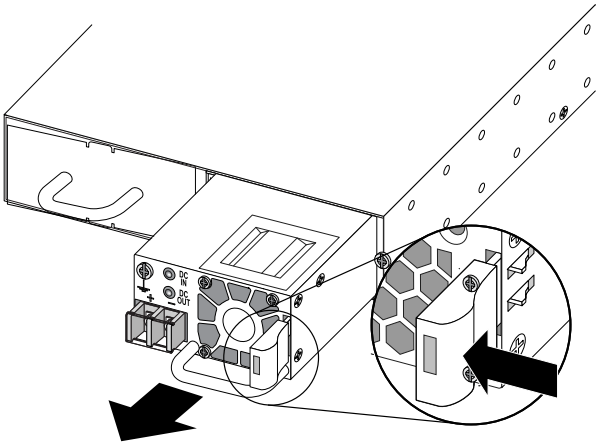


Figure 285: Removing a Summit 300 W DC Power Supply (Front-to-Back Model 10933 Shown)

5. Carefully slide the power supply the rest of the way out of the switch.

Installing a Replacement 300 W DC Power Supply

To install a replacement Summit 300 W DC power supply, follow these steps:

1. Verify that the power supply is right side up.

2. Carefully slide the power supply all the way into the power supply bay.

   See Figure 286.

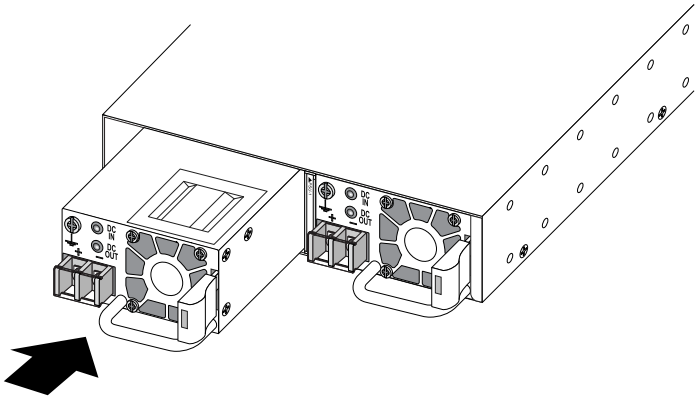


Figure 286: Installing a Summit 300 W DC Power Supply (Front-to-Back Model 10933 Shown)

3. Push the power supply in until the latch snaps into place.

   Caution
   Do not slam the power supply into the switch.

4. Reconnect the ground wire as described in Connecting the Ground Wire to a 300 W DC Power Supply on page 363.

Connecting the Ground Wire to a 300 W DC Power Supply

To connect the ground wire to the Summit 300 W DC power supply, follow these steps:

1. Verify that the DC circuit is de-energized.
2. Identify the grounding point on the front panel of the power supply.

   See Figure 287.

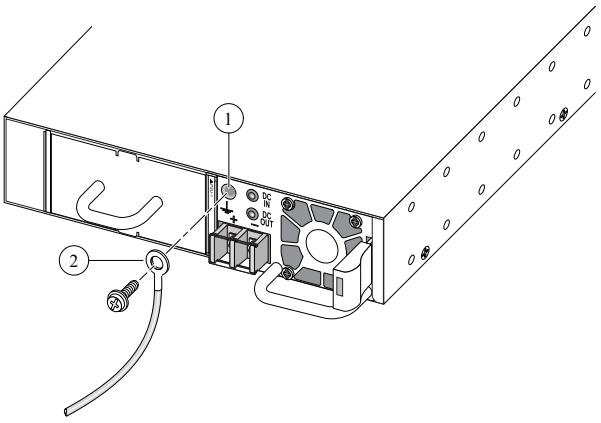


Figure 287: Connecting the Ground Wire (Front-to-Back Model 10933 Shown)

1 = Grounding point	2 = Ground wire

3. Insert an M4 screw (provided) through the ring terminal on the ground and into the grounding point on the power supply.
4. Tighten the screw to 15.9 in-lb (1.8 N-m).
5. Connect the other end of the wire to a known reliable earth ground point at your site.
6. Connect the switch to the DC power source. See the instructions in Connecting DC Power Cables to a 300 W DC Power Supply on page 364.

Connecting DC Power Cables to a 300 W DC Power Supply

Your Summit 300 W DC power supply (part no. 10933 or 10944) can connect to both +24 V and -48 V power sources. The connection instructions are different depending upon the power source voltage.

For connection instructions, refer to the appropriate topic:

- Connecting the DC Power Cables to a +24 V Source on page 364
- Connecting the DC Power Cables to a -48 V Source on page 366

Connecting the DC Power Cables to a +24 V Source

To connect the DC power cables for the 300 W Summit DC power supply (part no. 10933 or 10944) to a +24 V source, follow these steps:

1. Verify that the DC circuit is de-energized.
2. Attach an ESD-preventive wrist strap to your bare wrist and connect the metal end to an appropriate ground point on the rack.
3. Verify that the ground wire is attached to the power supply.

   See Connecting the Ground Wire to a 300 W DC Power Supply on page 363.
4. Slide the cover off the terminal block.
5. Connect the DC power input cables as follows:
   a. On each terminal, loosen the screw enough to allow the spade terminal to slide underneath the captive square washer.
   b. Slide the spade terminal of the **negative** wire (–24 V) under the captive square washer on the **negative** terminal (labeled –24 V).

c. Slide the spade terminal of the **positive** wire (+24 V) under the captive square washer on the **positive** terminal (labeled +24 V).

See Figure 288.

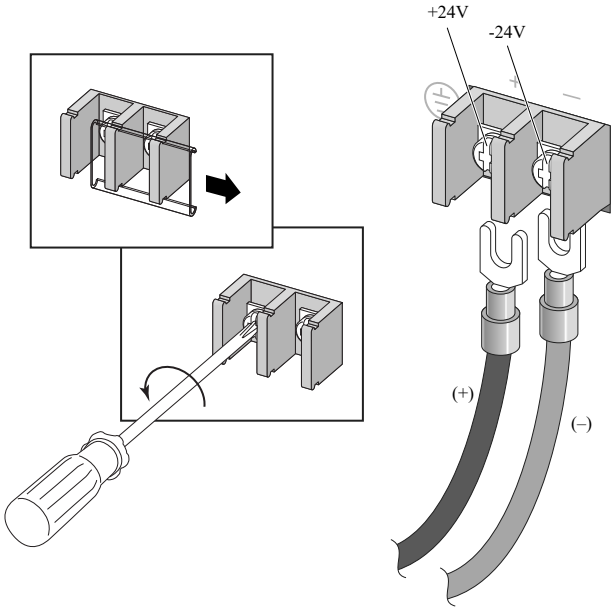


Figure 288: Connecting the DC Power Cables: Part 1

d. Tighten both screws on the terminal block to 15.9 in-lb (1.8 N-m) as shown in Figure 289.

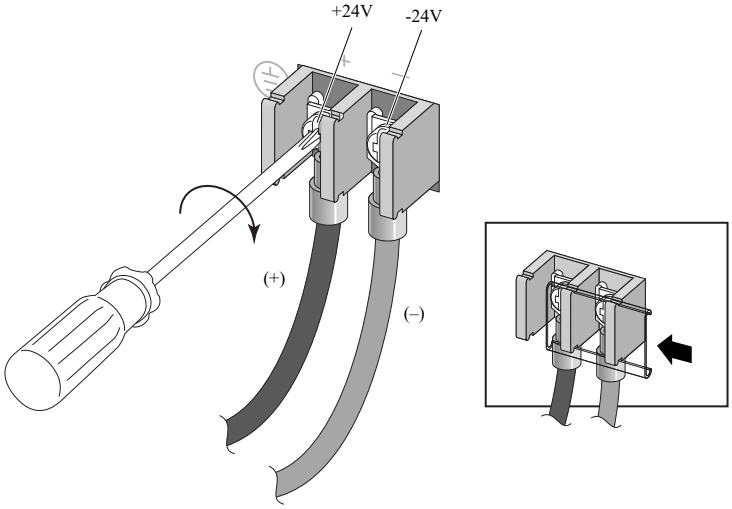


Figure 289: Connecting the DC Power Cables: Part 2

6. Slide the cover into place over the terminal block.
7. Energize the DC circuit.

Connecting the DC Power Cables to a -48 V Source

To connect the DC power cables for the 300 W Summit DC power supply (part no. 10933 or 10944) to a -48 V source, follow these steps:

1. Verify that the DC circuit is de-energized.
2. Attach an ESD-preventive wrist strap to your bare wrist and connect the metal end to an appropriate ground point on the rack.
3. Verify that the ground wire is attached to the power supply.

   See Connecting the Ground Wire to a 300 W DC Power Supply on page 363.
4. Slide the cover off the terminal block.
5. Connect the DC power input cables as follows:
   a. On each terminal, loosen the screw enough to allow the spade terminal to slide underneath the captive square washer.
   b. Slide the spade terminal of the **negative** wire (–48 V) under the captive square washer on the **negative** terminal (labeled –48 V).

c. Slide the spade terminal of the **positive** wire (–48 V RTN) under the captive square washer on the **positive** terminal (labeled RTN).

See Figure 290.

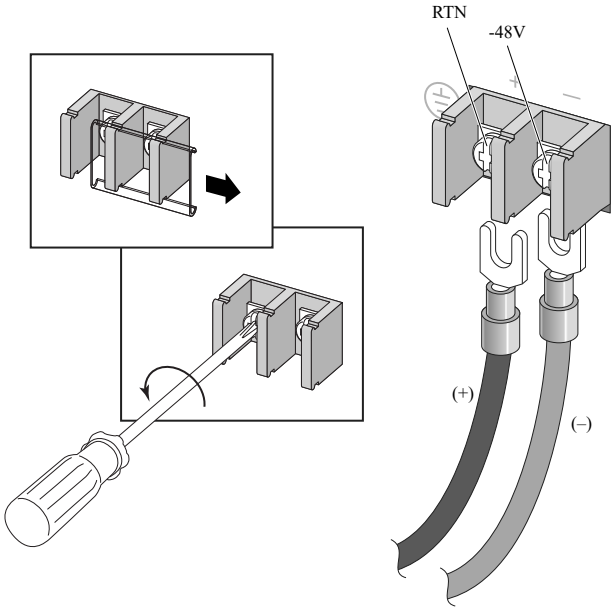


Figure 290: Connecting the DC Power Cables: Part 1

d. Tighten both screws on the terminal block to 15.9 in-lb (1.8 N-m) as shown in Figure 291.

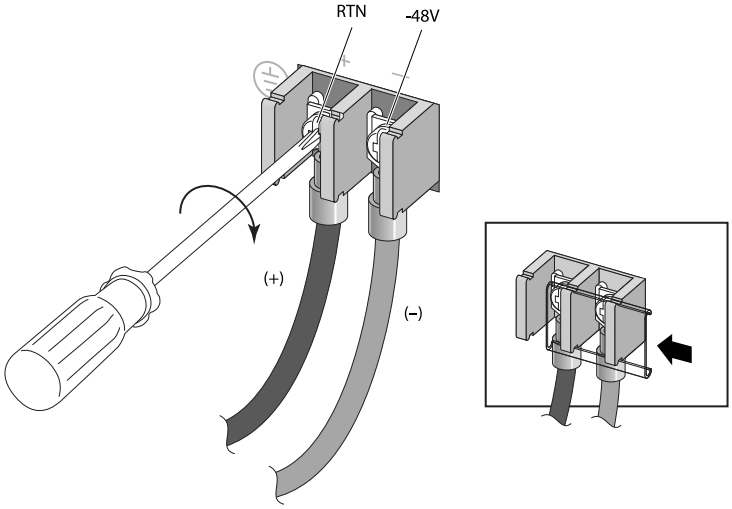


Figure 291: Connecting the DC Power Cables: Part 2

6. Slide the cover into place over the terminal block.
7. Energize the DC circuit.

Replacing a Summit 450 W or 550 W DC Power Supply

Summit 550 W power supply units (PSUs) are available with either front-to-back or back-to-front airflow. If you install two PSUs, both must have the same airflow direction.

Note
You cannot combine power supplies of different wattages in the same switch.

You need the following tools and materials to replace a 450 W or 550 W DC power supply:

- #1 Phillips screwdriver
- Torque screwdriver and wrench or torque driver with attachments for tightening screws and nuts
- Thermal protective gloves (required for removal of a power supply)

Removing a 450 W or 550 W DC Power Supply

To remove an installed 450 W or 550 W DC power supply, follow these steps:

Caution
The DC power supply may be hot to the touch; use thermal protective gloves when handling the power supply during removal.

1. De-energize the DC circuit.
2. Disconnect the DC power cables:
   a. Pull the cover off the terminal block.
   b. Loosen the screws that secure the cable terminals to the terminal block.
   c. Slide the wires out from under the captive washers.

   Warning
   Be sure to disconnect all power cables before you disconnect the chassis ground wire.

3. Disconnect the ground wire as follows:
   a. Loosen the screw that secures the ground wire to the terminal block.
   b. Slide the wire out from under the captive washer.
4. Note the orientation of the installed power supply.

5. Push the latching tab toward the power supply handle and pull outward on the handle to disengage the power supply internal connectors.

   See Figure 292.

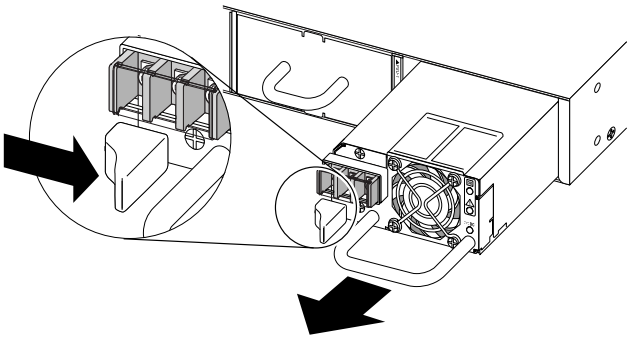


Figure 292: Removing a Summit 450 W or 550 W Power Supply

6. Carefully slide the power supply the rest of the way out of the switch.
7. If a replacement power supply will not be installed, install a cover over the unoccupied power supply bay.

Note
Unoccupied power supply bays must always be covered to maintain proper system ventilation and EMI levels.

Installing a Replacement 450 W or 550 W DC Power Supply

To install a replacement 450 W or 550 W DC power supply, follow these steps:

1. Verify that the replacement power supply is oriented the same as the unit you removed and that it has the same airflow direction as the switch.
2. Carefully slide the power supply all the way into the power supply bay.

   See Figure 293.

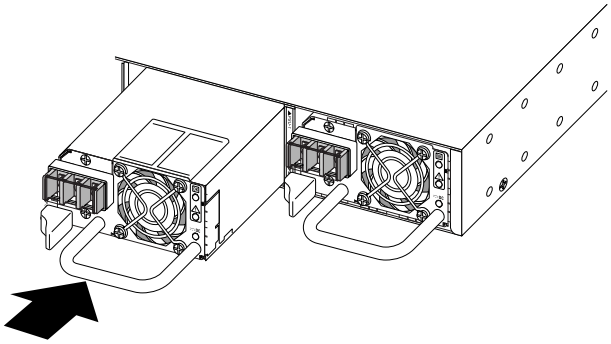


Figure 293: Installing a 450 W or 550 W DC Power Supply

3. Push the power supply in until the latch snaps into place.

   Caution
   Do not slam the power supply into the switch.

4. Reconnect the ground wire as described in Connecting the Ground Wire to a 450 W or 550 W DC Power Supply on page 370.

Connecting the Ground Wire to a 450 W or 550 W DC Power Supply

To connect the ground wire to the 450 W or 550 W DC power supply:

Warning
Be sure to connect the chassis ground wire before you connect any power cables.

1. Verify that the DC circuit is de-energized.
2. Pull the cover off the terminal block.
3. Identify the grounding point on the front panel of the power supply.

   See Figure 294.

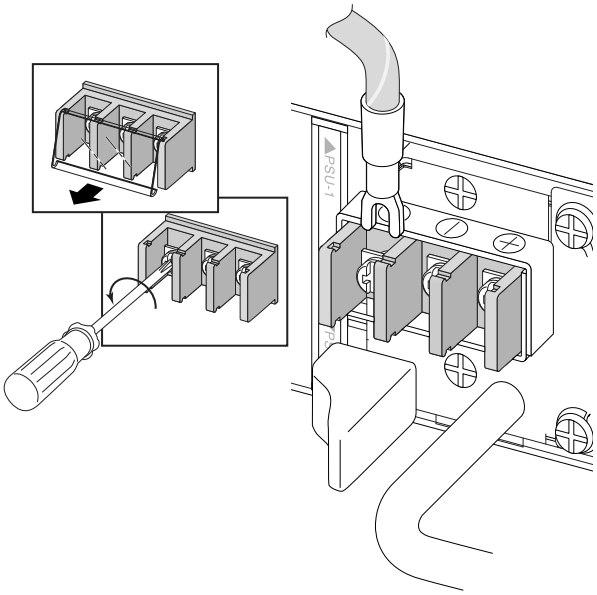


Figure 294: Connecting the Ground Wire

1 = Grounding point	2 = Ground wire

4. Connect the ground wire to the grounding point as follows:
   a. Loosen the screw enough to allow the spade terminal to slide underneath the captive square washer (see Figure 295).
   b. Slide the spade terminal of the ground wire under the captive square washer.

c. Tighten the screw to 7 in-lb (0.79 N m).

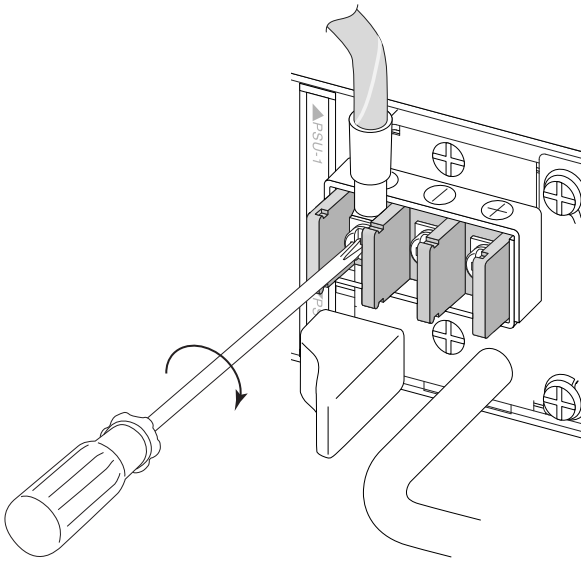


Figure 295: Securing the Ground Wire

5. Connect the other end of the wire to a known reliable earth ground point at your site.
6. Connect the switch to the DC power source. See the instructions in Connecting DC Power Cables to a 450 W or 550 W DC Power Supply on page 371.

Connecting DC Power Cables to a 450 W or 550 W DC Power Supply

The DC power connection at your facility must be made by a qualified electrician.

Warning
Always make sure that the DC circuit is de-energized before connecting or disconnecting the DC power cables on the 450 W or 550 W DC power supply.

Caution
Provide proper connection and strain relief on the DC power cables in accordance with all local and national electrical codes.

To connect the DC power cables to the 450 W or 550 W DC power supply, follow these steps:

1. Verify that the DC circuit is de-energized.
2. Attach an ESD-preventive wrist strap to your bare wrist and connect the metal end to an appropriate ground point on the rack.
3. Verify that the ground wire is attached to the power supply.

   See Connecting the Ground Wire to a 450 W or 550 W DC Power Supply on page 370.

4. Connect the DC power input cables as follows:
   a. On each terminal, loosen the screw enough to allow the spade terminal to slide underneath the captive square washer (see Figure 296 on page 373).
   b. Slide the spade terminal of the **negative** wire (–48 V) under the captive square washer on the **negative** terminal (labeled **–**).

c. Slide the spade terminal of the **positive** wire (–48 V RTN) under the captive square washer on the **positive** terminal (labeled **+**).

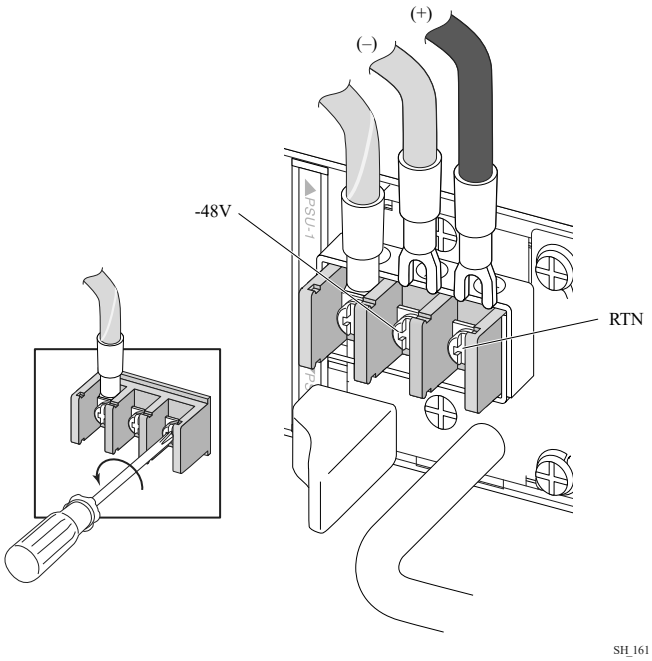


Figure 296: Connecting the DC Power Cables: Part 1

d. Tighten both screws on the terminal block to 7 in-lb (0.79 N m), as shown in Figure 297.

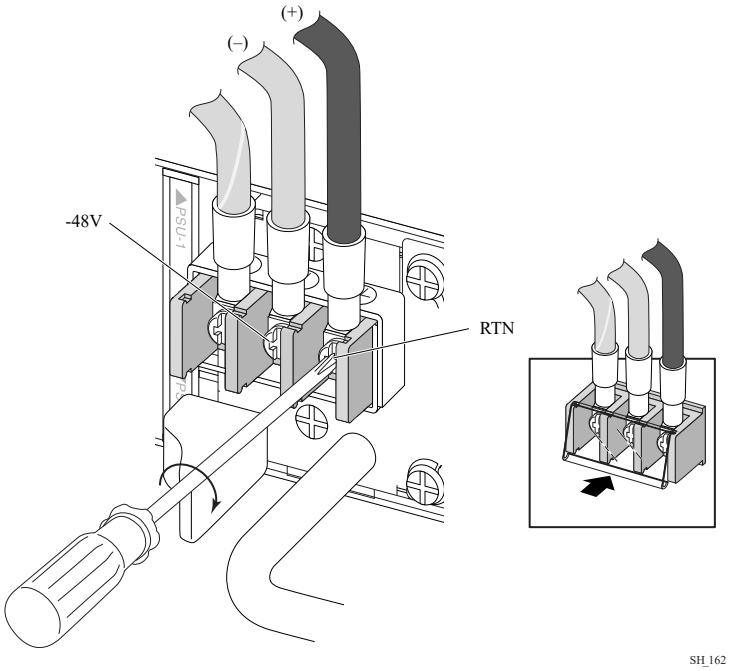


Figure 297: Connecting the DC Power Cables: Part 2

5. Snap the cover into place over the terminal block.

6. Energize the DC circuit.

Replacing a 750 W Internal DC Power Supply

The ExtremeSwitching X695 switch can accommodate two 750 W DC power supply units (PSU) with either front-to-back or back-to-front airflow.

Note
For information on replacing those units, see Install a Replacement 750 W DC Power Supply on page 375. Bear in mind that you cannot combine power supplies of different wattages in the same switch.

You need the following tools and materials to replace an 750 W DC power supply:

- #1 Phillips screwdriver
- Torque screwdriver and wrench or torque driver with attachments for tightening screws and nuts
- Thermal protective gloves (required for removal of a power supply)

Remove a 750 W DC Power Supply

To remove an installed 750 W DC power supply, follow these steps:

Caution
The DC power supply may be hot to the touch; use thermal protective gloves when handling the power supply during removal.

1. De-energize the DC circuit.
2. Disconnect the DC power cables:
   a. Pull the cover off the terminal block.
   b. Loosen the screws that secure the cable terminals to the terminal block.
   c. Slide the wires out from under the captive washers.

   Warning
   Be sure to disconnect all power cables before you disconnect the chassis ground wire.

3. Disconnect the ground wire as follows:
   a. Loosen the screw that secures the ground wire to the terminal block.
   b. Slide the wire out from under the captive washer.

4. Push the latching tab toward the power supply handle and pull outward on the handle to disengage the power supply internal connectors.

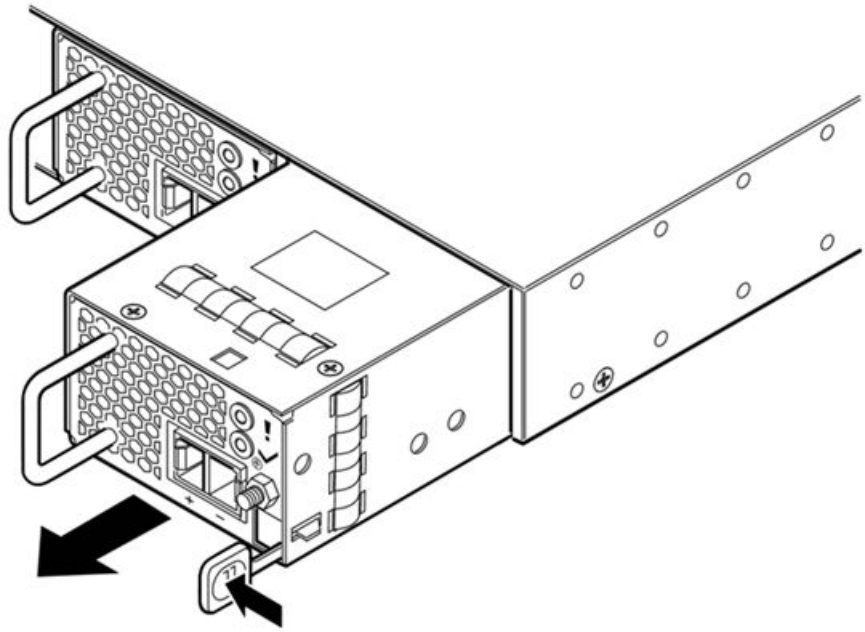


Figure 298: Removing a Summit 750 W Power Supply

5. Carefully slide the power supply the rest of the way out of the switch.
6. If a replacement power supply will not be installed, install a cover over the unoccupied power supply bay.

Note
Unoccupied power supply bays must always be covered to maintain proper system ventilation and EMI levels.

Install a Replacement 750 W DC Power Supply

To install a replacement 750 W DC power supply unit (PSU), follow these steps:

1. Verify that the replacement power supply is oriented the same as the one you removed.
2. Verify that the direction of ventilation airflow is the same for both the power supply and the switch.

   In a switch with front-to-back airflow, the fan modules are labeled Air Out.

   In a switch with back-to-front airflow, the fan modules are labeled Air In.

3. Carefully slide the power supply all the way into the power supply bay.

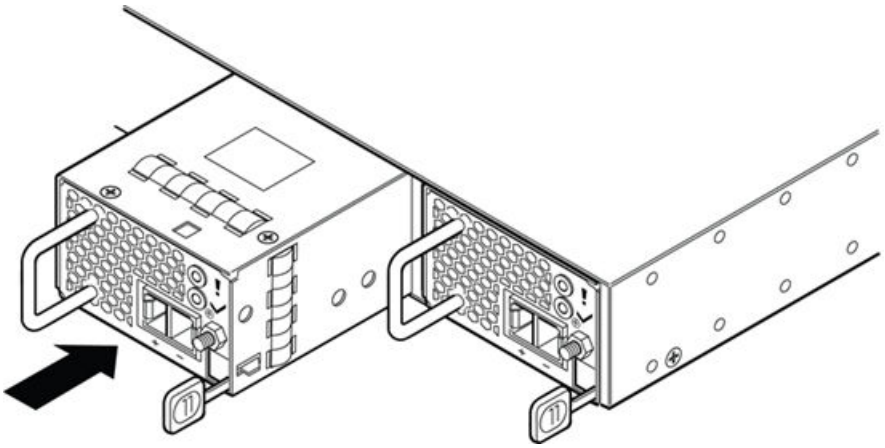


Figure 299: Installing an 750 W DC Power Supply

4. Push the power supply in until the latch snaps into place.

Caution
Do not slam the power supply into the switch.

5. Reconnect the ground wire as described in Connect the Ground Wire to an 750 W DC Power Supply on page 376.

Connect the Ground Wire to an 750 W DC Power Supply

To connect the ground wire to the 750 W DC power supply, follow these steps:

Warning
Be sure to connect the ground wire before you connect any power cables to the power supply.

1. Verify that the DC circuit is de-energized.
2. Attach an ESD-preventive wrist strap to your bare wrist and connect the metal end to an appropriate ground point on the rack.
3. Identify the grounding post on the right side of the power supply, above the latching tab.

4. Connect the ground wire to the grounding post as follows:
   a. Remove the nut from the grounding post.
   b. Slide the ring terminal of the ground wire onto the grounding post (callout 1 in the following figure).

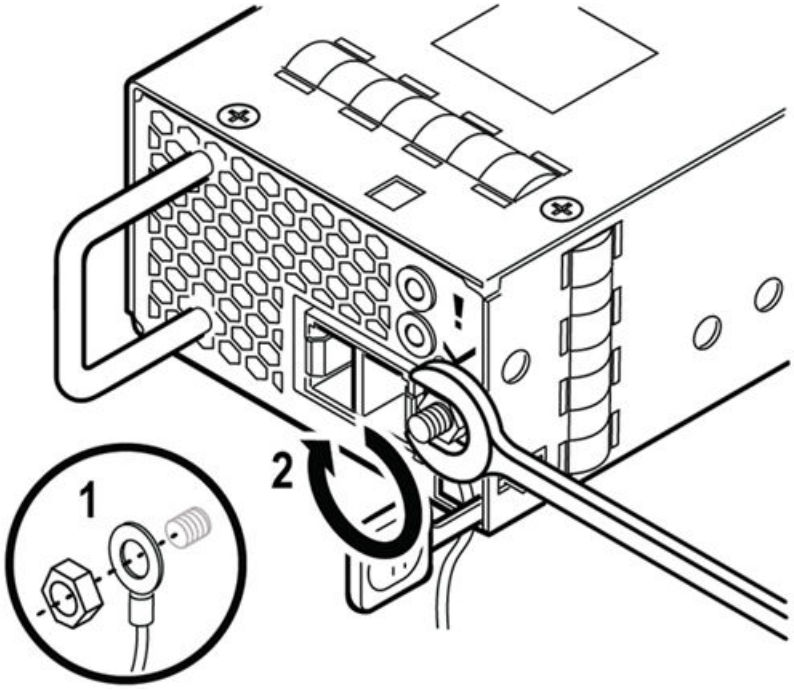


Figure 300: Securing the Ground Wire

   c. Screw the nut onto the grounding post (callout 2).
   d. Tighten the nut to 7 in-lb (0.79 N m).
5. Connect the other end of the wire to a known reliable earth ground point at your site.
6. Connect the power supply to the DC power source. See the instructions in Connect DC Power Cables to an 750 W DC Power Supply on page 377.

Connect DC Power Cables to an 750 W DC Power Supply

The DC power connection at your facility must be made by a qualified electrician.

Warning
Always make sure that the DC circuit is de-energized before connecting or disconnecting the DC power cables on the 750 W DC power supply.

Caution
Provide proper connection and strain relief on the DC power cables in accordance with all local and national electrical codes.

To connect the DC power cables to the 750 W DC power supply, follow these steps:

1. Verify that the DC circuit is de-energized.

2. Attach an ESD-preventive wrist strap to your bare wrist and connect the metal end to an appropriate ground point on the rack.
3. Verify that the ground wire is attached to the power supply.

   See Connect the Ground Wire to an 750 W DC Power Supply on page 376.
4. Insert a screwdriver into both slots on the top of the terminal connector and loosen the screws enough to accommodate a stripped power input cable.
5. Insert the DC power cables into the connector.
   a. Slide the end of the **positive** wire (–48 V RTN) into the **positive** terminal (labeled **+**, on the left side of the connector).
   b. Tighten the screw on the top of the positive terminal connector to between 4.4 in-lb (0.50 N m) and 7.1 in-lb (0.8 N m).

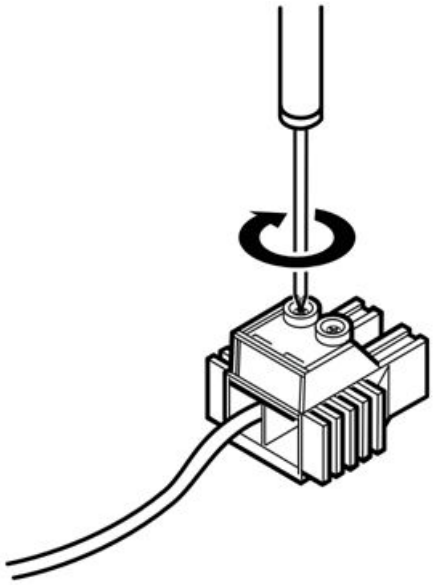


Figure 301: Inserting the DC Power Cables into the Connector

   c. Slide the end of the **negative** wire (–48 V) into the **negative** terminal (labeled **–**, on the right side of the connector).
   d. Tighten the screw on the top of the negative terminal connector to between 4.4 in-lb (0.50 N m) and 7.1 in-lb (0.8 N m).

6. Insert the connector into the slot on the power supply.

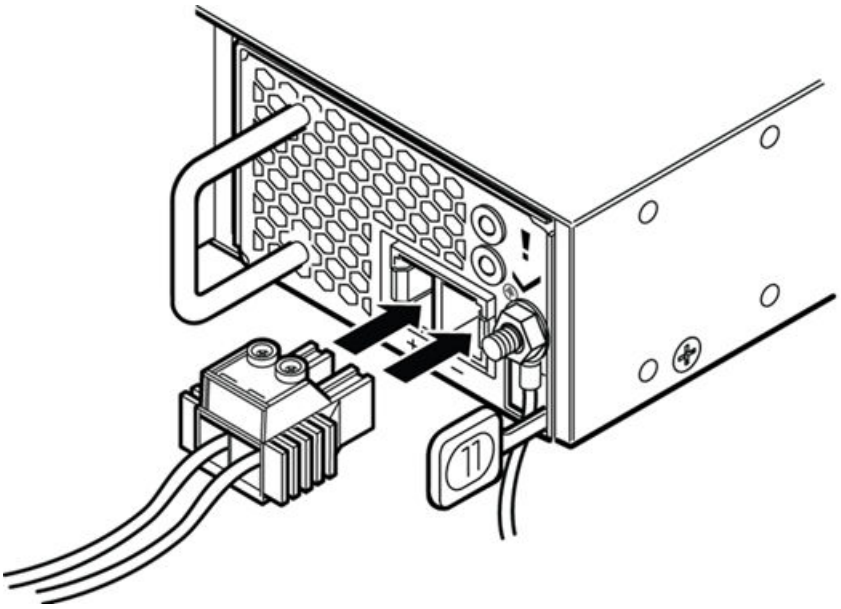


Figure 302: Inserting the Connector into the Power Supply

7. Connect the cables to the DC source voltage, using hardware appropriate to the installation site and following local and national electrical codes.
8. Energize the DC circuit.

Replacing a Summit 1100 W DC Power Supply

The ExtremeSwitching X690 and X870 series switches accommodate one or two Summit 1100 W DC power supply units (PSUs) with either front-to-back or back-to-front airflow.

Note
The X690 and X870 models also can accommodate one or two 770 W AC PSUs. For information on replacing those units, see Replacing a Summit 770 W AC Power Supply on page 352. Bear in mind that you cannot combine power supplies of different wattages in the same switch.

You need the following tools and materials to replace an 1100 W DC power supply:

- #1 Phillips screwdriver
- Torque screwdriver and wrench or torque driver with attachments for tightening screws and nuts
- Thermal protective gloves (required for removal of a power supply)

Removing an 1100 W DC Power Supply

To remove an installed 1100 W DC power supply, follow these steps:

Caution
The DC power supply may be hot to the touch; use thermal protective gloves when handling the power supply during removal.

1. De-energize the DC circuit.
2. Disconnect the DC power cables:
   a. Pull the cover off the terminal block.
   b. Loosen the screws that secure the cable terminals to the terminal block.
   c. Slide the wires out from under the captive washers.

   Warning
   Be sure to disconnect all power cables before you disconnect the chassis ground wire.

3. Disconnect the ground wire as follows:
   a. Loosen the screw that secures the ground wire to the terminal block.
   b. Slide the wire out from under the captive washer.
4. Push the latching tab toward the power supply handle and pull outward on the handle to disengage the power supply internal connectors.

   See Figure 303.

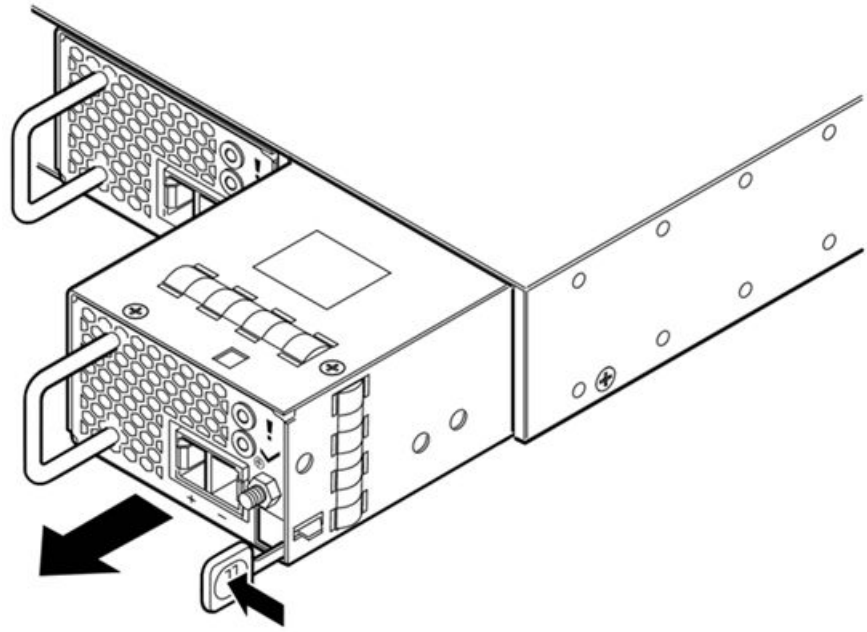


Figure 303: Removing a Summit 1100 W Power Supply

5. Carefully slide the power supply the rest of the way out of the switch.

6. If a replacement power supply will not be installed, install a cover over the unoccupied power supply bay.

Note
Unoccupied power supply bays must always be covered to maintain proper system ventilation and EMI levels.

Install a Replacement 1100 W DC Power Supply

To install a replacement 1100 W DC power supply unit (PSU), follow these steps:

1. Verify that the replacement power supply is oriented the same as the one you removed.
2. Verify that the direction of ventilation airflow is the same for both the power supply and the switch.

   In a switch with front-to-back airflow, the fan modules are labeled **Air Out**.

   In a switch with back-to-front airflow, the fan modules are labeled **Air In**.
3. Carefully slide the power supply all the way into the power supply bay.

   See Figure 304.

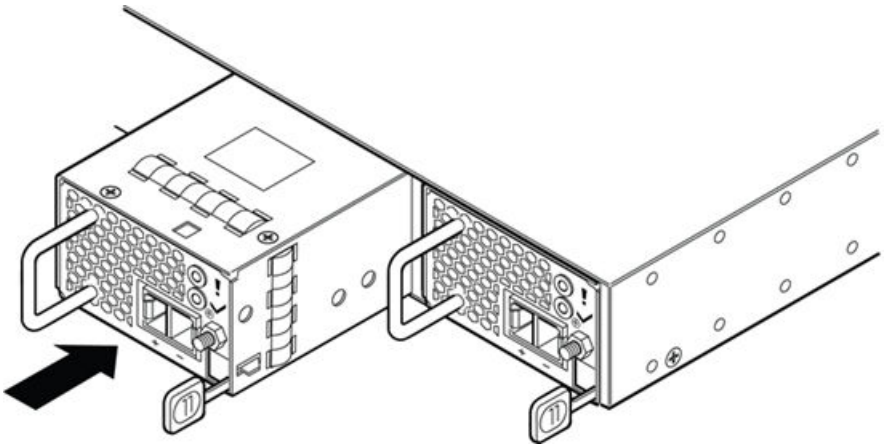


Figure 304: Installing an 1100 W DC Power Supply

4. Push the power supply in until the latch snaps into place.

Caution
Do not slam the power supply into the switch.

5. Reconnect the ground wire as described in Connect the Ground Wire to an 1100 W DC Power Supply on page 382.

Connect the Ground Wire to an 1100 W DC Power Supply

To connect the ground wire to the 1100 W DC power supply, follow these steps:

Warning
Be sure to connect the ground wire before you connect any power cables to the power supply.

1. Verify that the DC circuit is de-energized.
2. Attach an ESD-preventive wrist strap to your bare wrist and connect the metal end to an appropriate ground point on the rack.
3. Identify the grounding post on the right side of the power supply, above the latching tab.
4. Connect the ground wire to the grounding post as follows:
   a. Remove the nut from the grounding post.
   b. Slide the ring terminal of the ground wire onto the grounding post (callout 1 in Figure 305).

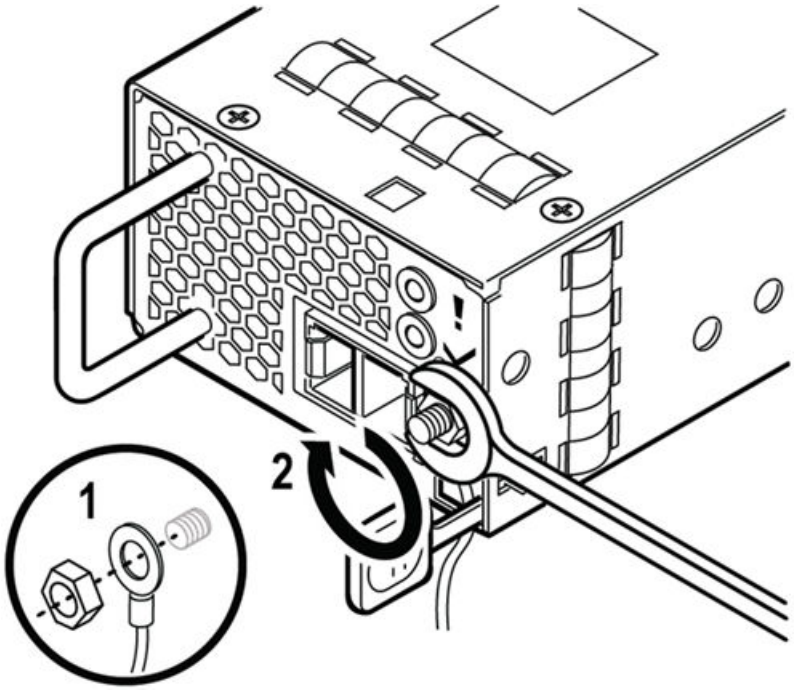


Figure 305: Securing the Ground Wire

   c. Screw the nut onto the grounding post (callout 2).
   d. Tighten the nut to 7 in-lb (0.79 N m).
5. Connect the other end of the wire to a known reliable earth ground point at your site.
6. Connect the power supply to the DC power source. See the instructions in Connect DC Power Cables to an 1100 W DC Power Supply on page 383.

Connect DC Power Cables to an 1100 W DC Power Supply

The DC power connection at your facility must be made by a qualified electrician.

Warning
Always make sure that the DC circuit is de-energized before connecting or disconnecting the DC power cables on the 1100 W DC power supply.

Caution
Provide proper connection and strain relief on the DC power cables in accordance with all local and national electrical codes.

To connect the DC power cables to the 1100 W DC power supply, follow these steps:

1. Verify that the DC circuit is de-energized.
2. Attach an ESD-preventive wrist strap to your bare wrist and connect the metal end to an appropriate ground point on the rack.
3. Verify that the ground wire is attached to the power supply.

   See Connect the Ground Wire to an 1100 W DC Power Supply on page 382.
4. Insert a screwdriver into both slots on the top of the terminal connector and loosen the screws enough to accommodate a stripped power input cable.
5. Insert the DC power cables into the connector.
   a. Slide the end of the **positive** wire (–48 V RTN) into the **positive** terminal (labeled **+**, on the left side of the connector).
   b. Tighten the screw on the top of the positive terminal connector to between 4.4 in-lb (0.50 N m) and 7.1 in-lb (0.8 N m).

      See Figure 306.

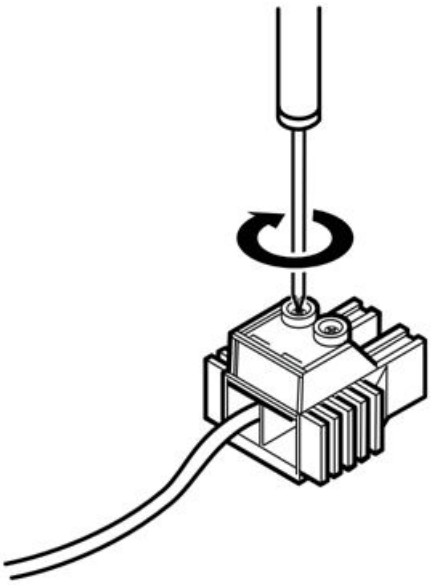


Figure 306: Inserting the DC Power Cables into the Connector

c. Slide the end of the **negative** wire (–48 V) into the **negative** terminal (labeled **–**, on the right side of the connector).
d. Tighten the screw on the top of the negative terminal connector to between 4.4 in-lb (0.50 N m) and 7.1 in-lb (0.8 N m).

6. Insert the connector into the slot on the power supply.

   See Figure 307.

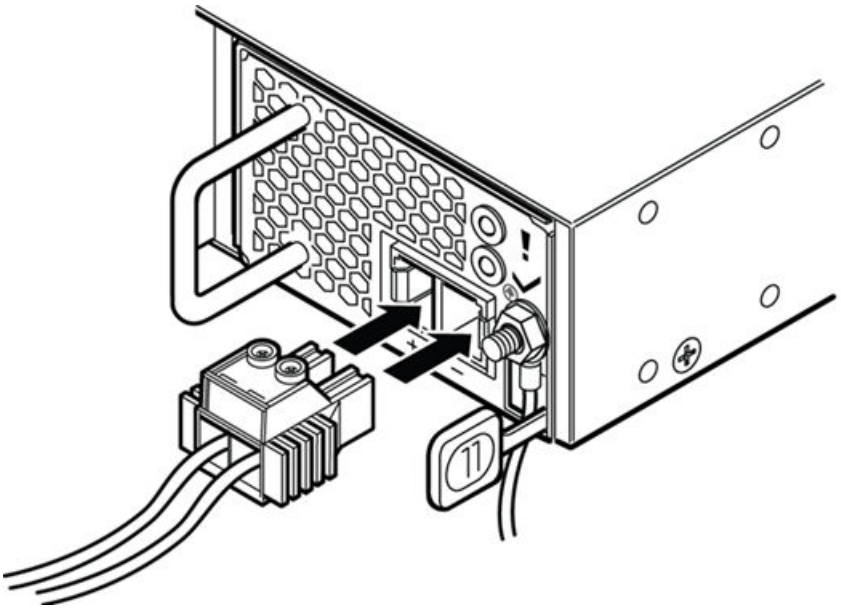


Figure 307: Inserting the Connector into the Power Supply

7. Connect the cables to the DC source voltage, using hardware appropriate to the installation site and following local and national electrical codes.
8. Energize the DC circuit.

Replace Fan Modules

For switches with replaceable fan modules, refer to the following information to replace the fan modules.

Note
Read all of the information in this chapter thoroughly before attempting to replace a fan module.

Pre-Installation Requirements

You need a 1/4-inch flat-blade screwdriver to replace a fan module.

Caution
Be sure to finish the replacement procedure promptly. The switch could overheat if left without cooling for an extended period.

Airflow Direction Requirements

- The air flows from front to back. In these switch models, the fan modules are labeled **Air Out**.
- The air flows from back to front. In these switch models, the fan modules are labeled **Air In**.

X465 switches are available with front-to-back airflow. In this switch, the fan modules are labled **Air Out**.

All installed fan modules must blow air in the same direction and must match the airflow direction of the installed power supplies.

Replacing a Fan Module

To replace the fan module in a switch, do the following:

1. Completely loosen the captive retaining screws on the fan module.

   On most switch models, the fan module has two retaining screws at the bottom corners of the module, as shown in Figure 308.

   On some switch models, the fan module has a single retaining screw at the top right corner of the module.
2. Slide the fan module out of the switch and set it aside.

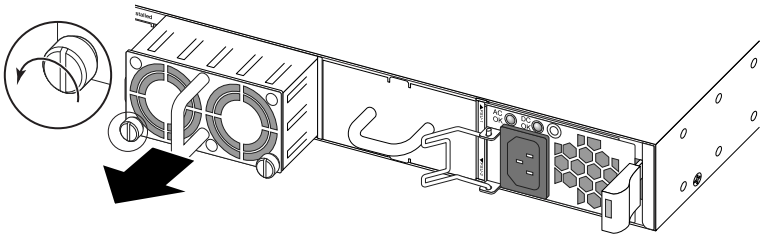


Figure 308: Removing a Fan Module

3. Verify that the airflow direction on the replacement fan module matches that of the installed fan modules.

   Fans with front-to-back airflow are labeled Air Out.

   Fans with back-to-front airflow are labeled Air In.
4. Carefully slide the replacement fan module into the switch.

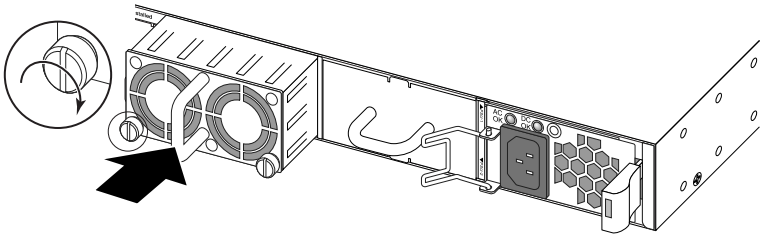
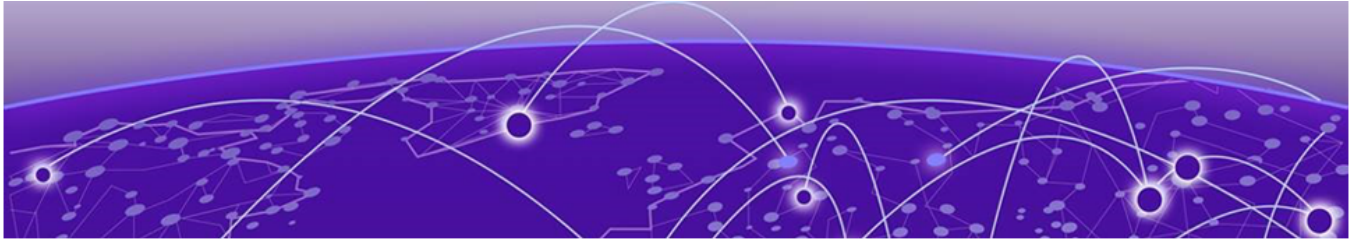


Figure 309: Installing a Fan Module

5. Align and fully tighten the captive retaining screws.



Removing and Replacing Expansion Modules

This chapter describes how to replace the following equipment:

- Removing or Replacing a V300 Virtual Port Extender on page 387
- Removing or Replacing a V400 Virtual Port Extender on page 387
- Removing or Replacing an LRM/MACsec Adapter on page 388
- Removing or Replacing a Half-Duplex to Full-Duplex Converter on page 388
- Replacing a Versatile Interface Module, Solid-state Drive, or Clock Module in an X460-G2 Series or X465 Series Switch on page 389

Removing or Replacing a V300 Virtual Port Extender

For instructions on installing a V300 Virtual Port Extender, refer to Install a V300 Virtual Port Extender on page 309.

To replace a V300 Virtual Port Extender or remove it from service, follow these steps:

1. Disconnect the port extender from its power source and, if applicable, from its redundant power supply.
2. Support the port extender while you remove the rack-mounting screws that hold the front mounting brackets in place against the rack posts.
3. Carefully slide the port extender out of the rack.
4. Place the port extender on a secure, flat surface.

   Optionally, remove the mounting brackets from the sides.
5. Install a new port extender using the instructions in Install a V300 Virtual Port Extender on page 309.

Removing or Replacing a V400 Virtual Port Extender

For instructions for installing a V400 Virtual Port Extender, refer to Install a V400 Virtual Port Extender on page 331.

To replace a V400 Virtual Port Extender or remove it from service, follow these steps:

1. Disconnect the port extender from its power source and, if applicable, from its redundant power supply.
2. Support the port extender while you remove the rack-mounting screws that hold the front mounting brackets in place against the rack posts.
3. Carefully slide the port extender out of the rack.
4. Place the port extender on a secure, flat surface.

   Optionally, remove the mounting brackets from the sides.
5. Install a new port extender using the instructions in Install a V400 Virtual Port Extender on page 331.

Removing or Replacing an LRM/MACsec Adapter

Refer to Installing an LRM/MACsec Adapter on page 332 for installation options for the LRM/MACsec Adapter.

Note
The LRM/MACsec Adapter is hot-swappable.

To replace an LRM/MACsec Adapter or remove it from service, follow these steps:

1. If a USB cable is used to supply power to the adapter, unplug the USB cable from the front of the adapter.
2. Disconnect network cables or transceivers from the Link1 and Link2 slots on the front of the adapter.
3. Disconnect the 50 cm SFP cables from the HostPort1 and HostPort2 slots on the front of the adapter.
4. Carefully holding the adapter, loosen and remove the screws that secure the adapter to the rack posts or to the five-slot bracket.
5. Remove the adapter.
6. Install a new adapter using any of the installation options listed in Installing an LRM/MACsec Adapter on page 332.
7. Connect the new adapter to the switch and to power, following the instructions in Connecting the LRM/MACsec Adapter to the Host Switch and to Power on page 334.

   Caution
   Connect the adapter to the host switch using only the SFP cable that is provided for this purpose. The use of other cables can damage the equipment.

8. Reconnect network cables and transceivers to the Link1 and Link2 slots on the front of the new adapter.

Removing or Replacing a Half-Duplex to Full-Duplex Converter

Refer to Install a Half-Duplex to Full-Duplex Converter on page 335 for installation options for the Half-Duplex to Full-Duplex Converter.

To replace a Half-Duplex to Full-Duplex Converter or remove it from service, follow these steps:

1. Disconnect the half-duplex ports (HD1 - HD4) from your half-duplex devices.
2. Disconnect the full-duplex ports (FD1 - FD4) from the switch.
3. Disconnect the converter to its power adapter.
   a. Disconnect the power adapter from its AC power source.
   b. Disconnect the DC power cable from the power adapter and from the DC input socket on the side of the converter.
   c. Remove the grounding wire from the converter.
4. If the converter is attached to a 3-slot modular shelf, loosen the cable ties and remove it from the shelf.
5. Optionally, install a new converter using the instructions in Install a Half-Duplex to Full-Duplex Converter on page 335.

Replacing a Versatile Interface Module, Solid-state Drive, or Clock Module in an X460-G2 Series or X465 Series Switch

This section describes how to replace versatile interface modules (VIMs) or a clock module in the rear slot of an X460-G2 switch, or VIM5 in the front and SSD in the rear slot of an X465 switch.

Note
Clock module ports are output ports; clock module ports are not to be used as input ports.

You need the following tools and materials to install a VIM or clock module:

- ESD-preventive wrist strap
- #2 Phillips screwdriver

Caution
VIMs, SSDs, and clock modules are not hot-swappable. Disconnect power to the switch before removing an installed VIM, SSD, or clock module or installing a new one.

The replacement procedure is the same for all X460-G2 VIMs and clock modules, and all X465 VIM5s and SSDs, with the exception that the VIMs and SSDs use slotted retaining screws and the clock module uses Phillips retaining screws.

To replace a VIM, SSD, or clock module:

1. Attach an ESD-preventive wrist strap to your wrist and connect the metal end to an appropriate ground point on the rack.
2. Disconnect the switch power.
3. Remove the existing VIM, SSD, or clock module:
   a. Remove the retaining screws holding the existing module in place.
   b. Save the retaining screws to secure the new module in the switch.
   c. Pull the old module out of the module slot.

4. Remove the new VIM, SSD, or clock module from its anti-static packaging.
5. Install the VIM, SSD, or clock module in the switch:
   a. Carefully slide the module into the switch.
   b. Insert and tighten the retaining screws you removed in step 3. The clock module uses Phillips screws and the VIM and SSD modules use slotted screws.

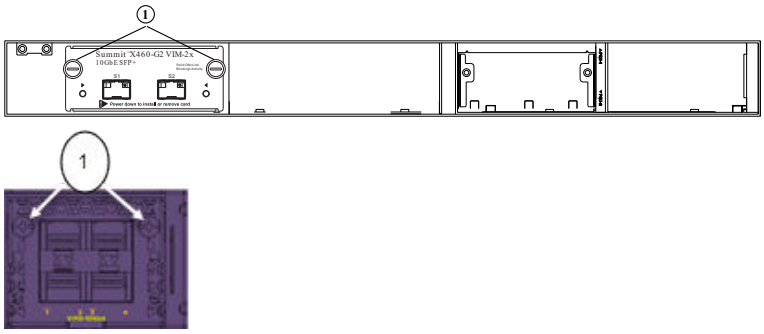


Figure 310: Tighten Screws on the Inserted VIM5 Module

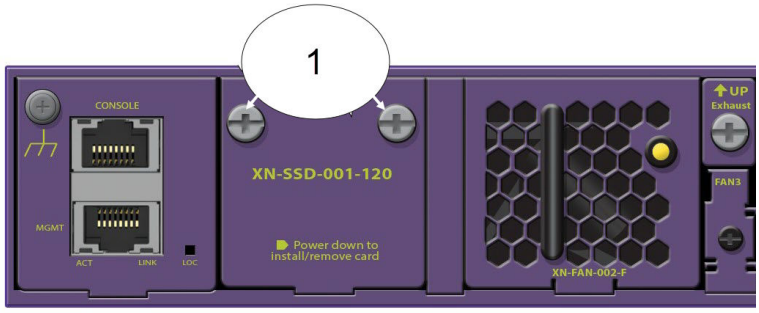


Figure 311: Tighten Screws on the Inserted SSD Module

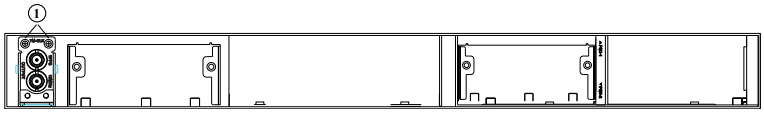


Figure 312: Tighten Screws on the Inserted Clock Module

1= retaining screw locations

Removing Switches from Service

Removing a switch from service is a two-step process:

1. Disconnect the switch from its power source, following these steps as applicable:
   - Disconnect and remove the switch's removable AC power supply. See Removing an AC Power Supply on page 391.
   - Disconnect and remove the switch's removable DC power supply. See Removing a DC Power Supply on page 392.
   - Disconnect the switch from its redundant power supply.
2. Remove the switch from the rack, following the steps in Removing a Switch from a Rack on page 393.

Note
Read the information in this chapter thoroughly before you attempt to remove a switch.

Removing an AC Power Supply

To remove an AC power supply unit (PSU) from a switch, follow these steps:

1. Disconnect the AC power cord from the wall outlet and from the power input connector on the power supply.

2. Push the latching tab to the right as you pull outward on the handle to disengage the power supply internal connectors.

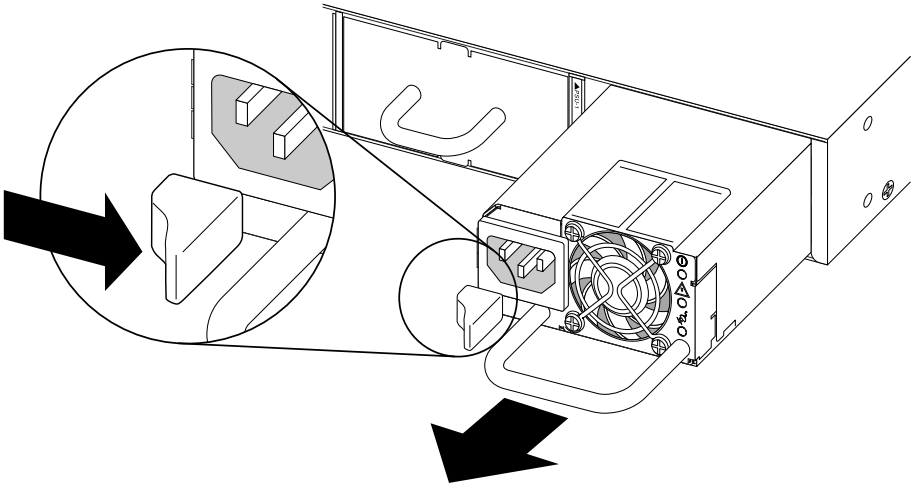


Figure 313: Removing an AC Power Supply

3. Carefully slide the power supply the rest of the way out of the switch.

Removing a DC Power Supply

To remove a DC power supply unit (PSU) from a switch, follow these steps:

1. De-energize the DC circuit.

   Warning
   Removing the DC wiring harness from your facility's DC source voltage must be performed by a qualified, licensed electrician.

2. Disconnect the DC power cables as follows:
   a. Slide the cover off the terminal block.
   b. Loosen the screws that secure the cable terminals to the terminal block.
   c. Slide the wires out from under the captive washers.
3. Disconnect the ground wire as follows:
   a. Remove the screw that secures the ground wire to the power supply.
   b. Move the wire away from the power supply.

4. Push the latching tab to the left as you pull outward on the handle to disengage the power supply internal connectors.

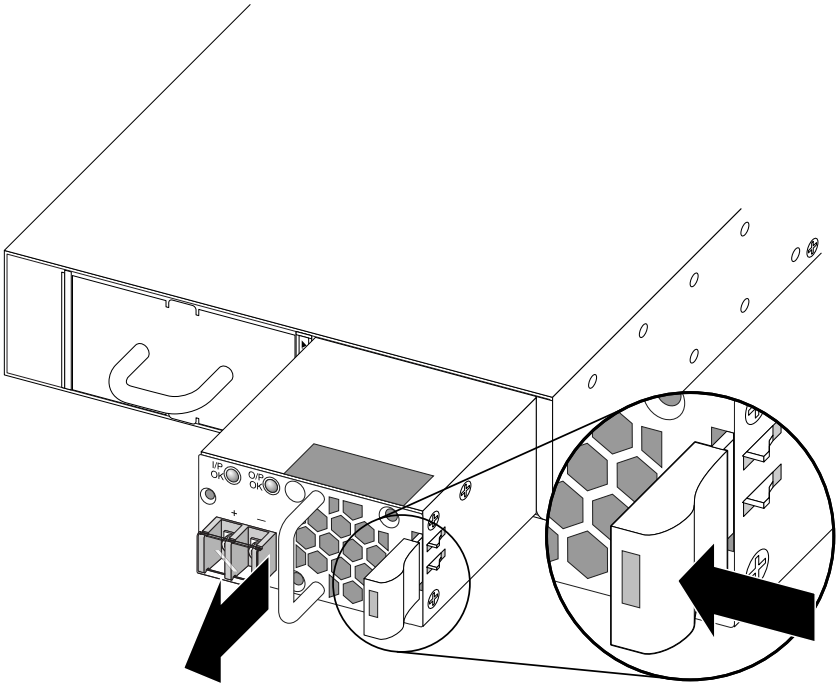


Figure 314: Removing a DC Power Supply

5. Carefully slide the power supply the rest of the way out of the switch.

Removing a Switch from a Rack

Before removing a switch from a rack, verify that:

- All removable power supplies have been removed. See Removing an AC Power Supply on page 391 or Removing a DC Power Supply on page 392.
- The switch has been disconnected from any redundant power supplies.
- The switch has been disconnected from all other sources of electrical power.

Note
Read the following steps thoroughly before you attempt to remove a switch from a rack.

To remove a switch from a rack, follow these steps:

1. Support the switch while you remove the rack-mounting screws that hold the front mounting brackets in place against the rack posts.
2. Remove the switch from the rack.
   - For two-post installations, carefully slide the switch out of the rack.
   - For four-post installations, carefully slide the switch forward out of the cabinet and off the rear mounting brackets.

   See the following figures.

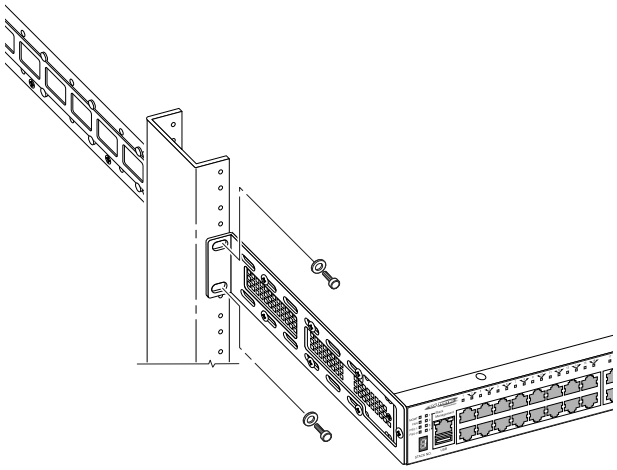


Figure 315: Removing a Front-Mounted Switch from a Two-Post Rack

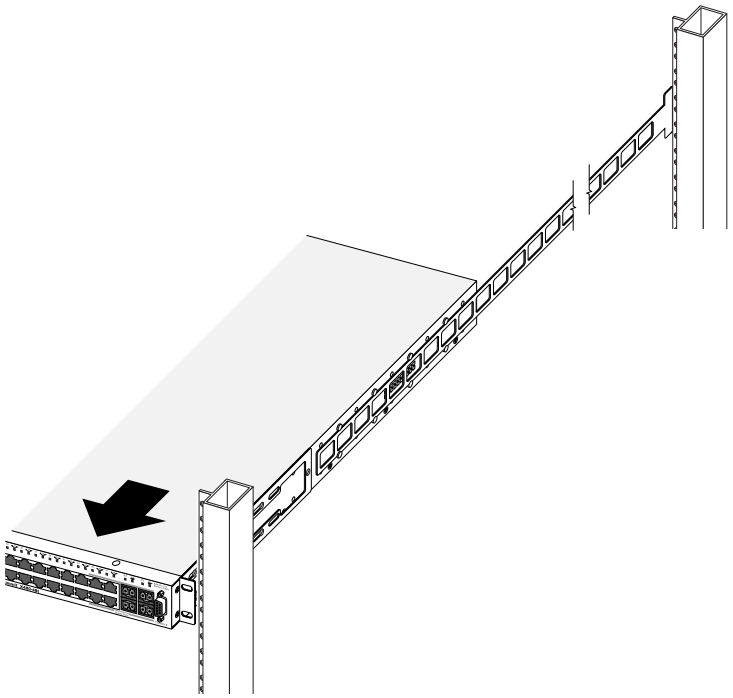
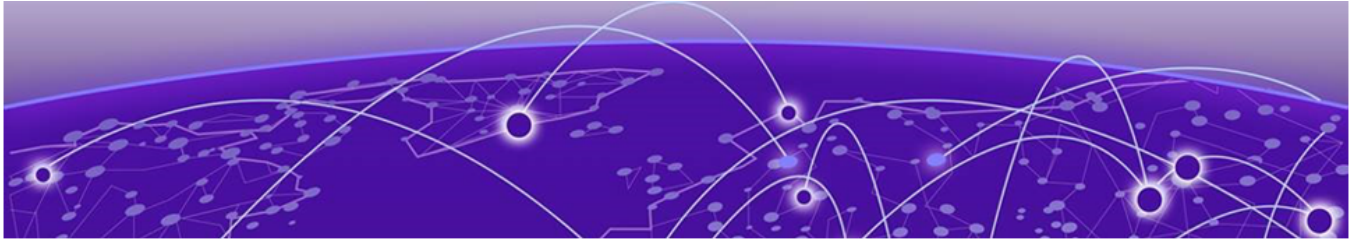


Figure 316: Removing the Switch from a Four-Post Rack

3. Place the switch on a secure, flat surface.
4. Using a #2 Phillips screwdriver, remove the front mounting brackets from the sides of the switch.
5. For four-post installations, remove the rear mounting brackets from the rear rack posts.



Technical Specifications

Console Connector Pinouts on page 504

This section lists technical specifications for the hardware products described in this document.

ExtremeSwitching X435 Series Switches Technical Specifications

The ExtremeSwitching X435 series includes the following switches:

- X435-8T-4S switch
- X435-8P-4S switch
- X435-8P-2T-W switch
- X435-24T-4S switch
- X435-24P-4S switch

Table 104: X435 Unpackaged Dimensions

X435-8T-4S switch X435-8P-4S switch	Height: 1.71 inches (4.34 cm) Width: 12.6 inches (32.0 cm) Length: 7.9 inches (20.06 cm)
X435-8P-2T-W switch	Height: 1.73 inches (4.39 cm) Width: 8.2 inches (20.82 cm) Length: 10.1 inches (25.65 cm)
X435-24T-4S switch X435-24P-4S switch	Height: 1.73 inches (4.39 cm) Width: 17.4 inches (44.19 cm) Length: 10.0 inches (25.4 cm)

Table 105: X435 Unpackaged Weight (With Blanks; No PSU or Fan Module)

X435-8T-4S switch	4.12 lb (1.87 kg)
X435-8P-4S switch	4.85 lb (2.2 kg)
X435-8P-2T-W switch	3.15 lb (1.43 kg)

Table 105: X435 Unpackaged Weight (With Blanks; No PSU or Fan Module) (continued)

X435-24T-4S switch	6.5 lb (2.95 kg)
X435-24P-4S switch	7.67 lb (3.48 kg)

Table 106: X435 Packaged Dimensions

X435-8T-4S switch X435-8P-4S switch X435-8P-2T-W switch	Height: 5.24 inches (13.3 cm) Width: 16.78 inches (42.6 cm) Length: 12.73 inches (32.3 cm)
X435-24T-4S switch X435-24P-4S switch	Height: 5.20 inches (13.2 cm) Width: 22.18 inches (56.3 cm) Length: 15.13 inches (38.4 cm)

Table 107: X435 Packaged Weight (No PSU or Fan Module)

X435-8T-4S switch	6 lb (2.72 kg)
X435-8P-4S switch	6.72 lb (3.05 kg)
X435-8P-2T-W switch	4.41 lb (2 kg)
X435-24T-4S switch	8.86 lb (4.02 kg)
X435-24P-4S switch	10.03 (4.55 kg)

Table 108: Fan and Acoustic Noise

Switch Model	Ambient Temp	PoE	Main Fan Speed (% of max)	PSU1 + PSU2	Bystander Sound Pressure	Declared Sound Power (L_{WAd})
X435-24P-4S switch	25C	370W	45%	1100W (½ of max PoE power	45.4	56
Note: Acoustic noise levels shown here represent noise emitted by the switch at room ambient temperatures. Normal operating temperature range: 0°C to 45°C.						

[4] Bystander Sound pressure is presented for comparison to other products measured using Bystander Sound Pressure.
[5] Declared Sound Power is presented in accordance with ISO 7779:2010(E), ISO 9296:2010 per ETSI/EN 300 753:2012-01.

Table 109: X435-24P-4S Fan Speed and Power Consumption

Fan Speed	Fan Module RPM (typical)		Power	
	Inlet Fan	Outlet Fan	Typical	
Full	16,000 (typ)	13,500 (typ)	15.8W per module*	
Low	3,200 (typ)	2,800 (typ)		

* Some units are equipped with (1) fan module, while others are equipped with 2. Total fan power is equal to the number of installed fan modules multiplied by the fan power for each module.

Power Options

Table 110: X435 Power Supply Options

Switch Model	Nominal input ratings
X435-8T-4S switch	100 to 240 V~, 50-60 Hz, 0.7 A
X435-8P-4S switch	100 to 240 V~, 50-60 Hz, 3 A
X435-8P-2T-W switch	802.3bt PD input power 46-57VDC 1.8AX2: • PoE ports load to 0W, 25W, or 45W for 1 input • PoE ports load to 25W, 65W, or 100W for 2 inputs
X435-24T-4S switch	100 to 240 V~, 50-60 Hz, 0.7 A
X435-24P-4S switch	100 to 240 V~, 50-60 Hz, 6 A

Table 111: X435 Power Consumption

Switch Model	Minimum Heat Dissipation (BTU/hr)	Minimum Power Consumption (W)	Maximum Heat Dissipation (BTU/hr)	Maximum Power Consumption (W)
X435-8T-4S switch	257	75	963	1722
X435-8P-4S switch	326	96	1614	3941
X435-8P-2T-W switch				
X435-24T-4S switch	236	61	1110	2485
X435-24P-4S switch				

Table 112: Power Cords

Extreme Networks equipment does not ship with power cords. Click the following link for locating the correct power cord for purchase and use on specific Extreme Networks equipment. Specifications for power cords in each country are also provided within this link allowing end user to purchase cords locally. www.extremenetworks.com/product/powercords/

Table 113: X435 PoE Power Budget

Switch Model	Max PoE Budget
X435-8P-4S	124W
X435-8P-2T-W	100W*
X435-24P-4S	370W

* See the following table:

Table 114: X435-8P-2T-W PoE Power Budget

Source Wattage (P9 + P10)	Output (W)
0+0	0W
30+0	0W
60+0	25W
90+0	45W
0+30	0W
30+30	25W
60+30	45W
90+30	65W
0+60	25W
30+60	45W
60+60	65W
90+60	85W
0+90	45W
30+90	65W

Table 114: X435-8P-2T-W PoE Power Budget (continued)

Source Wattage (P9 + P10)	Output (W)
60+90	85W
90+90	100W

Table 115: CPU, Memory

CPU/Memory
ARM Cortex A9, 1.2 GHz CPU
512MB DDR3 memory
128MB Flash Memory
512KB packet buffer per chip

Standards and Environmental Data

Table 116: Safety Standards

North American Safety of ITE	UL 60950-1 2nd Ed., A2:2014 (US) CSA 22.2 No. 60950-1-07 2nd Ed. 2014-10(Canada) Complies with FCC 21CFR 1040.10 (US Laser Safety) CDRH Letter of Approval (US FDA Approval)
European Safety of ITE	IEC 60950-1:2005 2nd+A1:2009+A2:2013 IEC 60950-1:2006+A11+A1+A12+A2 EN 60825-1:2007 (Lasers Safety)
International Safety of ITE	CB Report & Certificate per IEC 60950-1:2005 2nd Ed., + National Differences AS/NZX 60950-1 (Australia /New Zealand)

Table 117: EMI/EMC Standards

North America EMC for ITE	FCC CFR 47 part 15 Class A (USA) ICES-003 Class A (Canada)
European EMC standards	EN 55032: 2015, Class A EN 55024:1998+A1:2001+A2:2003 EN 55035:2017 (Multimedia Equipment Immunity) Class A includes IEC 61000-4-2, 3, 4, 5, 6, 11 EN 61000-3-2: 2006+A2:2009 (Harmonics) EN 61000-3-3:2008 (Flicker) ETSI EN 300 386: v1.4.1 (2008-04) (EMC Telecommunications) 2014/35/EU Low Voltage Directive

Table 117: EMI/EMC Standards (continued)

International EMC certifications	CISPR 32: 2015, Class A (International Emissions) EN 55024:1998+A1:2001+A2:2003 Class A (International Immunity) IEC/EN 61000-4-2:2008 Electrostatic Discharge, 8kV Contact, 15 kV Air, Criteria A IEC/EN 61000-4-3:2008 Radiated Immunity 10V/m, Criteria IEC/EN 61000-4-4:2004 Transient Burst, 1 kV, Criteria A IEC/EN 61000-4-5:2005 Surge, 2 kV L-L, 2 kV L-G, Level 3, Criteria A IEC/EN 61000-4-6:2008 Conducted Immunity, 0.15-80 MHz, 10V/m unmod. RMS, Criteria A IEC/EN 61000-4-11:2004 Power Dips & Interruptions, >30%, 25 periods, Criteria C
Country-specific	VCCI Class A (Japan Emissions) BSMI (Taiwan Emissions) ACMA (C-Tick) (Australia Emissions) CCC Mark (China) KCC Mark, EMC Approval (Korea)

Table 118: Telecom Standards

	EN/ETSI 300 386:2008 (EMC Telecommunications) EN/ETSI 300 019 (Environmental for Telecommunications) MEF9 and MEF14 certified for EPL, EVPL, and ELAN

Table 119: IEEE 802.3 Media Access Standards

	IEEE 802.3ab 1000BASE-T IEEE 802.3z 1000BASE-X IEEE 802.3ae 10GBASE-X IEEE 802.3ba 40GBASE-X IEEE 802.3bz 2.5GBASE-T and 5GBASE-T (for X460-G2-16mp-32p-10GE4) IEEE 802.3at PoE Plus IEEE 802.3az (EEE)

Table 120: Environmental Data

Environmental standards	EN/ETSI 300 019-2-1 v2.1.2 (2000 - 2009) - Class 1.2 Storage EN/ETSI 300 019-2-2 v2.1.2 (1999 - 09) - Class 2.3 Transportation EN/ETSI 300 019-2-3 v2.1.2 (2003 - 04) - Class 3.1e Operational EN/ETSI 300 753 (1997-10) - Acoustic Noise

Table 120: Environmental Data (continued)

	ASTM D3580 Random Vibration Unpackaged 1.5G
Operating conditions	Temperature range: 0°C to 40°C (32°F to 104°F) up to 3000 m (9,842 ft.) for X435-8T/8P-4S, and X435-8P-2T-W 0°C to 45°C (32°F to 113°F) up to 3000 m (9,842 ft) for X435-24T/24P-4S Humidity: 10% to 93% relative humidity, non-condensing Altitude: 0 to 3,000 meters (9,842 feet) Operational shock (half sine): 30 m/s^2 (3 G), 11 ms, 60 shocks Operational random vibration: 3 to 500 Hz at 1.5 G rms
Storage & transportation conditions (packaged)	Transportation temperature: -40°C to 70°C (-40°F to 158°F) Storage and transportation humidity: 10% to 93% relative humidity, non-condensing Packaged shock (half sine): 180 m/s^2 (18 G), 6 ms, 600 shocks Packaged sine vibration: 5 to 62 Hz at velocity 5 mm/s, 62 to 500 Hz at 0.2 G Packaged random vibration: 5 to 20 Hz at 1.0 ASD w/–3 dB/oct. from 20 to 200 Hz 14 drops minimum on sides and corners at 42 inches (<15 kg box)

ExtremeSwitching X440-G2 Series Switches Technical Specifications

The ExtremeSwitching X440-G2 series includes the following switches:

- X440-G2-12t-10GE4 switch
- X440-G2-12p-10GE4 switch
- X440-G2-24t-10GE4 switch
- X440-G2-24x-10GE4 switch
- X440-G2-24p-10GE4 switch
- X440-G2-48t-10GE4 switch
- X440-G2-48p-10GE4 switch
- X440-G2-24t-10GE4-DC switch
- X440-G2-48t-10GE4-DC switch
- X440-G2-12t8fx-GE4 switch
- X440-G2-24fx-GE4 switch
- X440-G2-24t-GE4 switch

Physical Dimensions

Table 121: Physical Dimensions (Unpackaged)

X440-G2-12t-10GE4 X440-G2-12p-10GE4 X440-G2-12t8fx-GE4	Height: 1.73 inches (4.4 cm) Width: 12.01 inches (30.51 cm) Length: 10.28 inches (26.11 cm)
X440-G2-24t-10GE4 X440-G2-24p-10GE4 X440-G2-24t-10GE4-DC X440-G2-24x-10GE4 X440-G2-24fx-GE4 X440-G2-24t-GE4	Height: 1.73 inches (4.4 cm) Width: 17.38 inches (44.15 cm) Length: 10.01 inches (25.43 cm)
X440-G2-48t-10GE4 X440-G2-48p-10GE4 X440-G2-48t-10GE4-DC	Height: 1.73 inches (4.4 cm) Width: 17.38 inches (44.15 cm) Length: 14.51 inches (36.86 cm)

Weight (Unpackaged)

Table 122: Weight

X440-G2-12t-10GE4	5.82 lb (2.64 kg)
X440-G2-12p-10GE4	6.66 lb (3.04 kg)
X440-G2-24t-10GE4	8.07 lb (3.66 kg)
X440-G2-24p-10GE4	9.44 lb (4.28 kg)
X440-G2-24x-10GE4	8.22 lb (3.77 kg)
X440-G2-48t-10GE4	11.22 lb (5.09 kg)
X440-G2-48p-10GE4	14.55 lb (6.60 kg)
X440-G2-24t-10GE4-DC	8.07 lb (3.66 kg)
X440-G2-48t-10GE4-DC	11.20 lb (5.08 kg)
X440-G2-12t8fx-GE4	6.50 lb (2.95 kg)
X440-G2-24fx-GE4	8.66 lb (3.97 kg)
X440-G2-24t-GE4	7.98 lb (3.62 kg)

Physical Dimensions (Packaged)

Table 123: Physical Dimensions (Packaged)

X440-G2-12t-10GE4 X440-G2-12p-10GE4 X440-G2-12t8fx-GE4	Height: 6.07 inches (15.42 cm) Width:14.78 inches (37.54 cm) Length: 17.53 inches (44.53 cm)
X440-G2-24t-10GE4 X440-G2-24p-10GE4 X440-G2-24t-10GE4-DC X440-G2-24x-10GE4 X440-G2-24fx-GE4 X440-G2-24t-GE4	Height: 5.48 inches (13.92 cm) Width: 14.85 inches (37.72 cm) Length: 22.38 inches (56.85 cm)
X440-G2-48t-10GE4 X440-G2-48p-10GE4 X440-G2-48t-10GE4-DC	Height: 7.09 inches (18.01 cm) Width: 19.09 inches (48.49 cm) Length: 22.83 inches (57.99 cm)

Packaged Weight

Table 124: Packaged Weight

X440-G2-12t-10GE4	8.86 lb (4.07 kg)
X440-G2-12p-10GE4	9.66 lb (4.43 kg)
X440-G2-24t-10GE4	11.40 lb (5.29 kg)
X440-G2-24p-10GE4	12.81 lb (5.88 kg)
X440-G2-24x-10GE4	11.57 lb (5.31 kg)
X440-G2-48t-10GE4	16.42 lb (7.53 kg)
X440-G2-48p-10GE4	19.62 lb (9.00 kg)
X440-G2-24t-10GE4-DC	11.35 lb (5.21 kg)
X440-G2-48t-10GE4-DC	16.23 lb (7.44 kg)
X440-G2-12t8fx-GE4	9.57 lb (4.39 kg)
X440-G2-24fx-GE4	12.08 lb (5.54 kg)
X440-G2-24t-GE4	11.33 lb (5.20 kg)

Fan and Acoustic Sound

Table 125: Fan and Acoustic Sound

	Bystander Sound Pressure[6] in dB(A)	Declared Sound Power (L_{WAd})[6] in bels
X440-G2-12t-10GE4	14.7 fan off	2.7 fan off
X440-G2-12p-10GE4	14.7 fan off	2.7 fan off
X440-G2-24t-10GE4	28.1	4.3
X440-G2-24p-10GE4	39.4	5.5
X440-G2-24x-10GE4	26.8	4.0
X440-G2-48t-10GE4	37.9	5.4
X440-G2-48p-10GE4	48.7	6.4
X440-G2-24t-10GE4-DC	28.1	4.3
X440-G2-48t-10GE4-DC	37.9	5.4
X440-G2-12t8fx-GE4	23.3	4.0
X440-G2-24fx-GE4	24.7	3.9
X440-G2-24t-GE4	28.1	4.3

Power Specifications

Table 126: Power Specifications

	Minimum[7] Heat Dissipation (BTU/hr)	Minimum[7] Power Consumption (Watts)	Maximum[7] Heat Dissipation (BTU/hr)	Maximum[7] Power Consumption (Watts)
X440-G2-12t-10GE4	52	15	109	32
X440-G2-24t-10GE4	87	26	136	40
X440-G2-48t-10GE4	141	41	208	61
X440-G2-12p-10GE4	72	21	216 (@ 200 W PoE)	264
X440-G2-24p-10GE4	121	35	410 (@ 380 W PoE)	500
X440-G2-48p-10GE4	196	53	755 (@ 740 W PoE)	961

[6] At 25°C and 50% PoE load where applicable

Table 126: Power Specifications (continued)

	Minimum[7] Heat Dissipation (BTU/hr)	Minimum[7] Power Consumption (Watts)	Maximum[7] Heat Dissipation (BTU/hr)	Maximum[7] Power Consumption (Watts)
X440-G2-24t-10GE4-DC	77	23	134	39
X440-G2-48t-10GE4-DC	137	40	207	61
X440-G2-24x-10GE4	87	26	172	51
X440-G2-24fx-GE4	166	49	223	65
X440-G2-12t8fx-GE4	108	32	159	47
X440-G2-24t-GE4	76	22	130	38

The following power specifications pertain to all X440-G2 switches, both PoE and non-PoE.

Table 127: Power Specifications: Fixed Internal Power Supply

Voltage input range	100-240 VAC[8]
Line frequency range	50 to 60 Hz
Power supply input socket	IEC 320 C14
Power cord input plug	IEC 320 C13
Operating temperature	0° to 60°C (extended temperature[9] switches) 0° to 50°C (all other switches)

[7] Minimum is defined as idle, with no ports linked. Maximum is defined as fans high, all ports 100% traffic.

[8] The power supplies will continue to operate at +/- 10% of the rated input to accommodate temporary loss of input voltage regulation.

[9] The extended temperature switches are the X440-G2-24fx-GE4, X440-G2-12p-10GE4, and X440-G2-24t-GE4.

PoE + Power Budget

Table 128: PoE + Power Budget

	Internal Power Supply	External RPS
X440-G2-12p-10GE4	200 W	200 W - Redundant power only
X440-G2-24p-10GE4	380 W	380 W - Redundant power only
X440-G2-48p-10GE4	740 W	1440 W - Additive power 740 W - Redundant power

External Redundant Power Supplies for Non-PoE Switches

All X440-G2 series non-PoE switches ship with one fixed internal power supply. If redundancy is required, an external RPS can be attached to the switch.

CPU, Memory

Table 129: CPU, Memory

CPU/Memory
64-bit MIPS processor, 1 GHz clock, single core
1 GB ECC DDR3 DRAM
4 GB eMMC Flash
1.5 MB packet buffer

Environmental Data

Table 130: Environmental Data

Environmental specifications	EN/ETSI 300 019-2-1 v2.1.2 - Class 1.2 Storage EN/ETSI 300 019-2-2 v2.1.2 - Class 2.3 Transportation EN/ETSI 300 019-2-3 v2.1.2 - Class 3.1e Operational EN/ETSI 300 753 (1997-10) - Acoustic Noise ASTM D3580 Random Vibration Unpackaged 1.5 G
Operating conditions	Temp: 0°C to 50°C (32°F to 122°F) – all models Temp: 0°C to 60°C (32°F to 140°F) – extended temperature range models only (16539, 16540 and 16541) Humidity: 10% to 95% relative humidity, non-condensing Altitude: 0 to 3,000 meters (9,842 feet) – All switch models Shock (half sine): 30 m/s2 (3 G), 11 ms, 6 shocks Random vibration: 3 to 500 Hz at 1.5 G rms
Packaging and storage specifications	Temp: -40°C to 70°C (-40°F to 158°F) Humidity: 10% to 95% relative humidity, non-condensing Packaged Shock (half sine): 180 m/s2 (18 G), 6 ms, 600 shocks Packaged Vibration: 5 to 62 Hz at velocity 5 mm/s, 62 to 500 Hz at 0.2 G Packaged Random Vibration: 5 to 20 Hz at 1.0 ASD w/–3 dB/ oct. from 20 to 200 Hz Packaged Drop Height: 14 drops minimum on sides and corners at 42 inches (<15 kg box)

Standards

Table 131: Safety Standards

North American Safety of ITE	UL 60950-1 UL/Cul 62368-1 Listed CSA 22.2 No. 60950-1-2nd edition 2014 (Canada) Complies with FCC 21CFR 1040.10 (US Laser Safety) CDRH Letter of Approval (US FDA Approval)
European Safety of ITE	EN 60950-1-2nd edition EN 60825-1 Class 1 (Lasers Safety) EN 62368-1 2014/35/EU Low Voltage Directive
International Safety of ITE	CB Report & Certificate CB Report & Certificate IEC 62368-1 CB Report & Certificate per IEC 60950-1 AS/NZX 60950-1 (Australia /New Zealand)

Table 132: EMI/EMC Standards

North America EMC for ITE	FCC CFR 47 part 15 Class A (USA) ICES-003 Class A (Canada)
European EMC standards	EN 55032 Class A EN 55024, EN 55035 EN 61000-3-2,2014 (Harmonics) EN 61000-3-3,2013 (Flicker) EN 300 386 (EMC Telecommunications) 2014/30/EU EMC Directive

Table 132: EMI/EMC Standards (continued)

International EMC certifications	CISPR 22: 2006 Ed 5.2, Class A (International Emissions) CISPR 24:A2:2003 Class A (International Immunity) IEC 61000-4-2:2008/EN 61000-4-2:2009 Electrostatic Discharge, 8kV Contact, 15 kV Air, Criteria A IEC 61000-4-3:2008/EN 61000-4-3:2006+A1:2008 Radiated Immunity 10V/m, Criteria A IEC 61000-4-4:2004 am1 ed.2./EN 61000-4-4:2004/ A1:2010 Transient Burst, 1 kV, Criteria A IEC 61000-4-5:2005 /EN 61000-4-5:2006 Surge, 2 kV L-L, 2 kV L-G, Level 3, Criteria A IEC 61000-4-6:2008/EN 61000-4-6:2009 Conducted Immunity, 0.15-80 MHz, 10V/m unmod. RMS, Criteria A IEC/EN 61000-4-11:2004 Power Dips & Interruptions, >30%, 25 periods, Criteria C
Country-specific	VCCI Class A (Japan Emissions) BSMI (Taiwan Emissions) ACMA (C-Tick) (Australia Emissions) CCC Mark (China) KCC Mark, EMC Approval (Korea) Anatel (Brazil) NoM (Mexico) EAC (Russia, Belarus, Kazakhstan) NRCS (South Africa)

Table 133: Telecom Standards

CE 2.0 Compliant

Table 134: IEEE 802.3 Media Access Standards

	IEEE 802.3ab 1000BASE-T IEEE 802.3z 1000BASE-X IEEE 802.3ae 10GBASE-X IEEE 802.3at PoE-Plus IEEE 802.3az IEEE 802.3u, 100BASE-FX

ExtremeSwitching X450-G2 Series Switches Technical Specifications

The ExtremeSwitching X450-G2 series includes the following switches:

- X450-G2-24t-GE4
- X450-G2-24t-10GE4
- X450-G2-48t-GE4
- X450-G2-48t-10GE4
- X450-G2-24p-GE4

- X450-G2-24p-10GE4
- X450-G2-48p-GE4
- X450-G2-48p-10GE4

Table 135: X450-G2 Unpackaged Dimensions

X450-G2-24t-GE4 X450-G2-24t-10GE4 X450-G2-48t-GE4 X450-G2-48t-10GE4 X450-G2-24p-GE4 X450-G2-24p-10GE4 X450-G2-48p-GE4 X450-G2-48p-10GE4	Height: 1.73 inches (4.4 cm) Width: 17.4 inches (44.1 cm) Depth: 19.2 inches (43.2 cm)

Table 136: X450-G2 Unpackaged Weight

X450-G2-24t-GE4 X450-G2-24t-10GE4	13.71 lb (6.22 kg)
X450-G2-48t-GE4 X450-G2-48t-10GE4	14.22 lb (6.45 kg)
X450-G2-24p-GE4 X450-G2-24p-10GE4	13.93 lb (6.32 kg)
X450-G2-48p-GE4 X450-G2-48p-10GE4	14.51 lb (6.58 kg)

Table 137: X450-G2 Packaged Dimensions

X450-G2-24t-GE4 X450-G2-24t-10GE4 X450-G2-48t-GE4 X450-G2-48t-10GE4 X450-G2-24p-GE4 X450-G2-24p-10GE4 X450-G2-48p-GE4 X450-G2-48p-10GE4	Height: 6.70 inches (17.02 cm) Width: 22.85 inches (58.04 cm) Depth: 24.03 inches (60.96 cm)

Table 138: X450-G2 Packaged Weight

X450-G2-24t-GE4 X450-G2-24t-10GE4	20.72 lb (9.50 kg)
X450-G2-48t-GE4 X450-G2-48t-10GE4	21.23 lb (9.74 kg)

Table 138: X450-G2 Packaged Weight (continued)

X450-G2-24p-GE4 X450-G2-24p-10GE4	20.94 lb (9.61 kg)
X450-G2-48p-GE4 X450-G2-48p-10GE4	21.52 lb (9.87 kg)

Table 139: Fan and Acoustic Noise

Switch Model	Bystander Sound Pressure	Declared Sound Power
X450-G2-24t-GE4 X450-G2-24t-10GE4 Fixed AC or DC power supply with front-to-back (FB) airflow	49.8 dB(A), 0°C to 39°C 64.9 dB(A), 50°C	6.1 bels, 0°C to 39°C 7.6 bels, 50°C
X450-G2-48t-GE4 X450-G2-48t-10GE4 Fixed AC or DC power supply with front-to-back (FB) airflow	49.9 dB(A), 0°C to 39°C 64.8 dB(A), 50°C	6.1 bels, 0°C to 39°C 7.6 bels, 50°C
X450-G2-24p-GE4 X450-G2-24p-10GE4 Dual 715 W AC or DC power supply with front-to-back (FB) airflow	51.1 dB(A), 0°C to 39°C 65.5 dB(A), 50°C	6.2 bels, 0°C to 39°C 7.7 bels, 50°C
X450-G2-24p-GE4 X450-G2-24p-10GE4 Dual 715 W AC or DC power supply with front-to-back (FB) airflow with applied PoE load	50.1 dB(A), 0°C to 39°C 64.5 dB(A), 50°C	6.1 bels, 0°C to 39°C 7.6 bels, 50°C
X450-G2-48p-GE4 X450-G2-48p-10GE4 Dual 1100 W AC or DC power supply with front-to-back (FB) airflow	50.8 dB(A), 0°C to 39°C 65.4 dB(A), 50°C	6.2 bels, 0°C to 39°C 7.6 bels, 50°C
X450-G2-48p-GE4 X450-G2-48p-10GE4 Dual 1100 W AC or DC power supply with front-to-back (FB) airflow with applied PoE load	56.5 dB(A), 0°C to 39°C 66.8 dB(A), 50°C	6.8 bels, 0°C to 39°C 7.8 bels, 50°C

Note
Acoustic noise levels represent noise emitted by the switch at room ambient temperatures. Values are based on a fully configured system consisting of two PSUs operating under full load. Normal operating temperature range: 0°C to 50°C.

[10] Sound pressure is presented for comparison per ISO 7779
[11] Declared Sound Power is presented in accordance with ISO 7779, ISO 9296 per ETSI/EN 300 753

Table 140: X450-G2 Fan Speed and Power Consumption

Fan Speed	Fan Module RPM (typical)		Power	
	Inlet Fan	Outlet Fan	Maximum	Typical
Full	14,000 (±15%)	7,000 (±15%)	36 W	30.6
Low	6,400 (±15%)	2,900 (±15%)	3.96 W (typical)	

Power Options

Table 141: X450-G2 Power Supply Options

Switch Model	Power Supply
Fixed power supply with front-to-back airflow	
X450-G2-24t-GE4 X450-G2-24t-10GE4	100-240 V, 50/60 Hz, 1.0 A
X450-G2-48t-GE4 X450-G2-48t-10GE4	100-240 V, 50/60 Hz, 1.0 A
Modular power supply with front-to-back airflow	
X450-G2-24p-GE4 X450-G2-24p-10GE4	1100 W AC PS FB (front-to-back) Part # 10941, Model: PSSF112101A 100-127V/200-240 V, 50/60 Hz, 10.0 A/5.0 A max per PS
X450-G2-24p-GE4 X450-G2-24p-10GE4	715 W AC PS FB (front-to-back) Part # 10951, Model: PSSF711101A 100-127V/200-240 V, 50/60 Hz, 7.0 A/3.5 A max per PS
X450-G2-48p-GE4 X450-G2-48p-10GE4	1100 W AC PS FB (front-to-back) Part # 10941, Model: PSSF112101A 100-127V/200-240 V, 50/60 Hz, 12.0 A/6.0 A max per PS
X450-G2-48p-GE4 X450-G2-48p-10GE4	715 W AC PS FB (front-to-back) Part # 10951, Model: PSSF711101A 100-127V/200-240 V, 50/60 Hz, 8.0 A/4.0 A max per PS

Table 142: X450-G2 Power Consumption

Switch Model	Minimum Heat Dissipation	Minimum Power Consumption	Maximum Heat Dissipation	Maximum Power Consumption
X450-G2-24t-GE4 X450-G2-24t-10GE4	149.4 BTU/hr	43.8 W	244.6 BTU/hr	71.1 W
X450-G2-48t-GE4 X450-G2-48t-10GE4	178.1 BTU/hr	52.2 W	290.0 BTU/hr	85.0 W

Table 142: X450-G2 Power Consumption (continued)

Switch Model	Minimum Heat Dissipation	Minimum Power Consumption	Maximum Heat Dissipation	Maximum Power Consumption
X450-G2-24p-GE4 (@ 720 W PoE)	214.3 BTU/hr	62.8 W	604.7 BTU/hr	127.2 W
X450-G2-24p-10GE4 (@ 720 W PoE)	214.3 BTU/hr	62.8 W	604.7 BTU/hr	847.2 W
X450-G2-48p-GE4 (@ 1440 W PoE)	238.8 BTU/hr	70.0 W	778 BTU/hr	228 W
X450-G2-48p-10GE4 (@ 1440 W PoE)	238.8 BTU/hr	70.0 W	778 BTU/hr	1668 W

Table 143: X450-G2 PoE Power Budget

Switch Model	1 PSU of 715 W	1 PSU of 1100 W	2 PSUs of 715 W	1 PSU of 715 W & 1 PSU of 1100 W	2 PSUs of 1100 W
X450-G2-24p-GE4	500 W	720 W	720 W	720 W	720 W
X450-G2-24p-10GE4	500 W	720 W	720 W	720 W	720 W
X450-G2-48p-GE4	500 W	850 W	1031 W	1350 W	1440 W
X450-G2-48p-10GE4	500 W	850 W	1031 W	1350 W	1440 W
X450-G2-24p-GE4	16 ports @ 30 W 24 ports @ 15.4 W	24 ports @ 30 W 24 ports @ 15.4 W	24 ports @ 30 W 24 ports @ 15.4 W	24 ports @ 30 W 24 ports @ 15.4 W	24 ports @ 30 W 24 ports @ 15.4 W
X450-G2-24p-10GE4	16 ports @ 30 W 24 ports @ 15.4 W	24 ports @ 30 W 24 ports @ 15.4 W	24 ports @ 30 W 24 ports @ 15.4 W	24 ports @ 30 W 24 ports @ 15.4 W	24 ports @ 30 W 24 ports @ 15.4 W
X450-G2-48p-GE4	16 ports @ 30 W 32 ports @ 15.4 W	28 ports @ 30 W 48 ports @ 15.4 W	34 ports @ 30 W 48 ports @ 15.4 W	45 ports @ 30 W 48 ports @ 15.4 W	48 ports @ 30 W 48 ports @ 15.4 W
X450-G2-48p-10GE4	16 ports @ 30 W 32 ports @ 15.4 W	28 ports @ 30 W 48 ports @ 15.4 W	34 ports @ 30 W 48 ports @ 15.4 W	45 ports @ 30 W 48 ports @ 15.4 W	48 ports @ 30 W 48 ports @ 15.4 W

Table 144: CPU, Memory

CPU/Memory
1 GHz 64-bit CPU
1 GB DDR3 ECC DRAM

Table 144: CPU, Memory (continued)

CPU/Memory
4 GB eMMC Flash Memory
4 MB packet buffer per chip

Standards and Environmental Data

Table 145: Safety Standards

North American Safety of ITE	UL 60950-1 1st Ed., Listed Device (US) CSA 22.2 #60950-1-07 2nd Ed.(Canada) Complies with FCC 21CFR 1040.10 (US Laser Safety) CDRH Letter of Approval (US FDA Approval)
European Safety of ITE	EN 60950-1:2006 2nd Ed. TUV-R GS EN 60825-1:2007 (Lasers Safety) 2006/95/EC Low Voltage Directive
International Safety of ITE	CB Report & Certificate per IEC 60950-1:2005 2nd Ed., + National Differences AS/NZX 60950-1 (Australia /New Zealand)

Table 146: EMI/EMC Standards

North America EMC for ITE	FCC CFR 47 part 15 Class A (USA) ICES-003 Class A (Canada)
European EMC standards	EN 55022:2006+A1:2007 Class A EN 55024:1998+A1:2001+A2:2003 Class A includes IEC 61000-4-2, 3, 4, 5, 6, 11 EN 61000-3-2: 2006+A2:2009 (Harmonics) EN 61000-3-3:2008 (Flicker) ETSI EN 300 386: v1.4.1 (2008-04) (EMC Telecommunications) 2004/108/EC EMC Directive

Table 146: EMI/EMC Standards (continued)

International EMC certifications	CISPR 22: 2008 (Ed 6.0), Class A (International Emissions) EN 55024:1998+A1:2001+A2:2003 Class A (International Immunity) IEC/EN 61000-4-2:2008 Electrostatic Discharge, 8kV Contact, 15 kV Air, Criteria A IEC/EN 61000-4-3:2008 Radiated Immunity 10V/m, Criteria IEC/EN 61000-4-4:2004 Transient Burst, 1 kV, Criteria A IEC/EN 61000-4-5:2005 Surge, 2 kV L-L, 2 kV L-G, Level 3, Criteria A IEC/EN 61000-4-6:2008 Conducted Immunity, 0.15-80 MHz, 10V/m unmod. RMS, Criteria A IEC/EN 61000-4-11:2004 Power Dips & Interruptions, >30%, 25 periods, Criteria C
Country-specific	VCCI Class A (Japan Emissions) BSMI (Taiwan Emissions) ACMA (C-Tick) (Australia Emissions) CCC Mark (China) KCC Mark, EMC Approval (Korea)

Table 147: Telecom Standards

EN/ETSI 300 386:2008 (EMC Telecommunications)
EN/ETSI 300 019 (Environmental for Telecommunications)
MEF9 and MEF14 certified for EPL, EVPL, and ELAN

Table 148: IEEE 802.3 Media Access Standards

IEEE 802.3ab 1000BASE-T
IEEE 802.3z 1000BASE-X
IEEE 802.3ae 10GBASE-X
IEEE 802.3at PoE Plus
IEEE 802.3az (EEE)

Table 149: Environmental Data

Environmental standards	EN/ETSI 300 019-2-1 v2.1.2 (2000 - 2009) - Class 1.2 Storage EN/ETSI 300 019-2-2 v2.1.2 (1999 - 09) - Class 2.3 Transportation EN/ETSI 300 019-2-3 v2.1.2 (2003 - 04) - Class 3.1e Operational EN/ETSI 300 753 (1997-10) - Acoustic Noise ASTM D3580 Random Vibration Unpackaged 1.5G
Operating conditions	Temperature range: 0°C to 50°C (32°F to 122°F) Humidity: 10% to 95% relative humidity, non-condensing

Table 149: Environmental Data (continued)

	Altitude: 0 to 5,000 meters (16,404 feet) – PoE switches Altitude: 0 to 2,000 meters (6,562 feet) – non-PoE switches Operational shock (half sine): 30 m/s^2 (3 G), 11 ms, 60 shocks Operational random vibration: 3 to 500 Hz at 1.5 G rms
Storage & transportation conditions (packaged)	Transportation temperature: -40°C to 70°C (-40°F to 158°F) Storage and transportation humidity: 10% to 95% relative humidity, non-condensing Packaged shock (half sine): 180 m/s^2 (18 G), 6 ms, 600 shocks Packaged sine vibration: 5 to 62 Hz at velocity 5 mm/s, 62 to 500 Hz at 0.2 G Packaged random vibration: 5 to 20 Hz at 1.0 ASD w/–3 dB/oct. from 20 to 200 Hz 14 drops minimum on sides and corners at 42 inches (<15 kg box)

ExtremeSwitching X460-G2 Series Switches Technical Specifications

The ExtremeSwitching X460-G2 series includes the following switches:

- X460-G2-24t-24ht-10GE4 switch
- X460-G2-24p-24hp-10GE4 switch
- X460-G2-16mp-32p-10GE4 switch
- X460-G2-24t-GE4 switch
- X460-G2-24t-10GE4 switch
- X460-G2-24x-10GE4 switch
- X460-G2-24p-GE4 switch
- X460-G2-24p-10GE4 switch
- X460-G2-48t-GE4 switch
- X460-G2-48t-10GE4 switch
- X460-G2-48x-10GE4 switch

- X460-G2-48p-GE4 switch
- X460-G2-48p-10GE4 switch

Table 150: X460-G2 Unpackaged Dimensions

X460-G2-24t-GE4 X460-G2-24t-10GE4 X460-G2-24x-10GE4 X460-G2-48t-GE4 X460-G2-48t-10GE4 X460-G2-24t-24ht-10GE4 X460-G2-48x-10GE4	Height: 1.73 inches (4.4 cm) Width: 17.38 inches (44.1 cm) Length: 16.94 inches (43.0 cm)
X460-G2-24p-GE4 X460-G2-24p-10GE4 X460-G2-48p-GE4 X460-G2-48p-10GE4 X460-G2-24p-24hp-10GE4 X460-G2-16mp-32p-10GE4	Height: 1.73 inches (4.4 cm) Width: 17.38 inches (44.1 cm) Length: 19.11 inches (48.5 cm)

Table 151: X460-G2 Unpackaged Weight (With Blanks; No PSU or Fan Module)

X460-G2-24t-GE4 X460-G2-24t-10GE4	12.92 lb (5.86 kg)
X460-G2-24x-10GE4	13.14 lb (5.96 kg)
X460-G2-24p-GE4 X460-G2-24p-10GE4	14.68 lb (6.66 kg)
X460-G2-48t-GE4 X460-G2-48t-10GE4	13.27 lb (6.02 kg)
X460-G2-48x-10GE4	13.62 lb (6.18 kg)
X460-G2-48p-GE4 X460-G2-48p-10GE4	15.21 lb (6.90 kg)
X460-G2-24t-24ht-10GE4	14.77 lb (6.70 kg)
X460-G2-24p-24hp-10GE4	16.31 lb (7.40 kg)
X460-G2-16mp-32p-10GE4	15.43 lb (7.00 kg)

Table 152: X460-G2 Packaged Dimensions

X460-G2-24t-GE4 X460-G2-24t-10GE4 X460-G2-24x-10GE4 X460-G2-48t-GE4 X460-G2-48t-10GE4 X460-G2-24t-24ht-10GE4 X460-G2-48x-10GE4	Height: 6.70 inches (17.0 cm) Width: 21.87 inches (55.5 cm) Length: 22.85 inches (58.0 cm)
X460-G2-24p-GE4	Height: 6.70 inches (17.0 cm)

Table 152: X460-G2 Packaged Dimensions (continued)

X460-G2-24p-10GE4 X460-G2-48p-GE4 X460-G2-48p-10GE4 X460-G2-24p-24hp-10GE4 X460-G2-16mp-32p-10GE4	Width: 22.85 inches (58.0 cm) Length: 24.03 inches (61.0 cm)

Table 153: X460-G2 Packaged Weight (No PSU or Fan Module)

X460-G2-24t-GE4 X460-G2-24t-10GE4	18.83 lb (8.56 kg)
X460-G2-24x-10GE4	18.70 lb (8.50 kg)
X460-G2-24p-GE4 X460-G2-24p-10GE4	21.83 lb (9.92 kg)
X460-G2-48t-GE4 X460-G2-48t-10GE4	19.27 lb (8.76 kg)
X460-G2-48x-10GE4	18.96 lb (8.62 kg)
X460-G2-48p-GE4 X460-G2-48p-10GE4	22.4 lb (10.2 kg)
X460-G2-24t-24ht-10GE4	18.52 lb (8.40 kg)
X460-G2-24p-24hp-10GE4	20.50 lb (9.30 kg)
X460-G2-16mp-32p-10GE4	20.94 lb (9.50 kg)

Table 154: VIM and Clock Module Weights and Dimensions

VIM/Module	Weight	Dimensions
X460-G2 VIM-2x	0.5 lb (0.23 kg)	Height: 1.4 inches (3.55 cm) Width: 3.4 inches (8.6 cm) Length: 5.5 inches (13.9 cm)
X460-G2 VIM-2t	0.5 lb (0.23 kg)	Height: 1.4 inches (3.55 cm) Width: 3.4 inches (8.6 cm) Length: 5.5 inches (13.9 cm)
X460-G2 VIM-2ss	0.5 lb (0.23 kg)	Height: 1.4 inches (3.55 cm) Width: 3.4 inches (8.6 cm) Length: 5.5 inches (13.9 cm)
X460-G2 VIM-2q	0.5 lb (0.23 kg)	Height: 1.4 inches (3.55 cm) Width: 3.4 inches (8.6 cm) Length: 5.5 inches (13.9 cm)
X460-G2 TM-CLK	0.25 lb (0.12 kg)	Height: 1.4 inches (3.55 cm) Width: 1.0 inches (2.54 cm) Length: 6.5 inches (16.6 cm)

Table 155: Fan and Acoustic Noise

Switch Model	Bystander Sound Pressure	Declared Sound Power (L_{WAd})
X460-G2-24t-GE4 X460-G2-24t-10GE4 Dual 300 W AC or DC power supply with front-to-back (FB) airflow	49.1 dB(A), 0°C to 45°C 54.9 dB(A), 50°C	6.0 bels, 0°C to 45°C 6.6 bels, 50°C
X460-G2-24t-GE4 X460-G2-24t-10GE4 Dual 300 W AC or DC power supply with back-to-front (BF) airflow	48.9 dB(A), 0°C to 35°C 59.5 dB(A), 45°C 65.5 dB(A), 50°C	5.9 bels, 0°C to 35°C 7.2 bels, 45°C 7.8 bels, 50°C
X460-G2-24x-10GE4 Dual 300 W AC or DC power supply with front-to-back (FB) airflow	48.8 dB(A), 0°C to 45°C 61.9 dB(A), 50°C	6.0 bels, 0°C to 45°C 7.5 bels, 50°C
X460-G2-24x-10GE4 Dual 300 W AC or DC power supply with back-to-front (BF) airflow	48.8 dB(A), 0°C to 35°C 58.7 dB(A), 45°C 66.7 dB(A), 50°C	6.0 bels, 0°C to 35°C 6.9 bels, 45°C 7.8 bels, 50°C
X460-G2-24p-GE4 X460-G2-24p-10GE4 Dual 715 W or 1100 W AC power supply with front-to-back (FB) airflow	52.2 dB(A), 0°C to 45°C 61.8 dB(A), 50°C	7.3 bels, 0°C to 45°C 7.4 bels, 50°C
X460-G2-24p-GE4 X460-G2-24p-10GE4 Dual 715 W or 1100 W AC power supply with back-to-front-to-back (BF) airflow	50.8 dB(A), 0°C to 35°C 69.8 dB(A), 50°C	7.3 bels, 0°C to 35°C 8.1 bels, 50°C
X460-G2-48t-GE4 X460-G2-48t-10GE4 X460-G2-24t-24ht-10GE4 Dual 300 W AC or DC power supply with front-to-back (FB) airflow	47.6 dB(A), 0°C to 45°C 64.5 dB(A), 50°C	5.9 bels, 0°C to 45°C 7.7 bels, 50°C
X460-G2-48t-GE4 X460-G2-48t-10GE4 X460-G2-24t-24ht-10GE4 Dual 300 W AC or DC power supply with back-to-front (BF) airflow	47.7 dB(A), 0°C to 35°C 58.7 dB(A), 45°C 65.3 dB(A), 50°C	5.9 bels, 0°C to 35°C 7.2 bels, 45°C 7.8 bels, 50°C
X460-G2-48x-10GE4 Dual 300 W AC or DC power supply with front-to-back (FB) airflow	48.9 dB(A), 0°C to 45°C 60.5 dB(A), 50°C	6.0 bels, 0°C to 45°C 7.4 bels, 50°C

12 Bystander Sound pressure is presented for comparison to other products measured using Bystander Sound Pressure.

13 Declared Sound Power is presented in accordance with ISO 7779:2010(E), ISO 9296:2010 per ETSI/EN 300 753:2012-01.

Table 155: Fan and Acoustic Noise (continued)

Switch Model	Bystander Sound Pressure	Declared Sound Power (L_{WAd})
X460-G2-48x-10GE4 Dual 300 W AC or DC power supply with back-to-front (BF) airflow	48.8 dB(A), 0°C to 35°C 57.5 dB(A), 45°C 66.1 dB(A), 50°C	6.0 bels, 0°C to 35°C 6.9 bels, 45°C 7.8 bels, 50°C
X460-G2-48p-GE4 X460-G2-48p-10GE4 X460-G2-24p-24hp-10GE4 X460-G2-16mp-32p-10GE4 Dual 715 W or 1100 W AC power supply with front-to-back (FB) airflow	52.2 dB(A), 0°C to 45°C 64.3 dB(A), 50°C	6.9 bels, 0°C to 45°C 7.6 bels, 50°C
X460-G2-48p-GE4 X460-G2-48p-10GE4 X460-G2-24p-24hp-10GE4 X460-G2-16mp-32p-10GE4 Dual 715 W or 1100 W AC power supply with back-to-front-to-back (BF) airflow	50.9 dB(A), 0°C to 31°C 64.2 dB(A), 35°C 70.8 dB(A), 50°C	7.2 bels, 0°C to 31°C 7.6 bels, 35°C 7.9 bels, 50°C
X460-G2-24p-GE4 X460-G2-24p-10GE4 X460-G2-24p-24hp-10GE4 X460-G2-48p-GE4 X460-G2-48p-10GE4 X460-G2-16mp-32p-10GE4 Dual 350 W AC power supply with front-to-back (FB) airflow	52.2 dB(A), 0°C to 45°C 64.3 dB(A), 50°C	6.9 bels, 0°C to 45°C 7.6 bels, 50°C
X460-G2-24p-GE4 X460-G2-24p-10GE4 X460-G2-24p-24hp-10GE4 X460-G2-48p-GE4 X460-G2-48p-10GE4 X460-G2-16mp-32p-10GE4 Dual 350 W AC power supply with back-to-front (FB) airflow	50.9 dB(A), 0°C to 31°C 64.2 dB(A), 35°C 70.8 dB(A), 50°C	7.2 bels, 0°C to 31°C 7.6 bels, 35°C 7.9 bels, 50°C
Note: Acoustic noise levels shown here represent noise emitted by the switch at room ambient temperatures. Values are based on a fully configured system consisting of two PSUs and two I/O modules operating under full load. Normal operating temperature range: 0°C to 50°C.		

12 Bystander Sound pressure is presented for comparison to other products measured using Bystander Sound Pressure.

13 Declared Sound Power is presented in accordance with ISO 7779:2010(E), ISO 9296:2010 per ETSI/EN 300 753:2012-01.

Table 156: X460-G2 Fan Speed and Power Consumption

Fan Speed	Fan Module RPM (typical)		Power	
	Inlet Fan	Outlet Fan	Maximum	Typical
Full	14,000 (±15%)	7,000 (±15%)	36W	30.6
Low	6,400 (±15%)	2,900 (±15%)	3.96W (typical)	

Power Options

Table 157: X460-G2 Power Supply Options

Switch Model	Power Supply
X460-G2-24t-GE4 X460-G2-24t-10GE4 X460-G2-24t-24ht-10GE4 X460-G2-24x-10GE4 X460-G2-48t-GE4 X460-G2-48t-10GE4 X460-G2-48x-10GE4	300 W AC power supply: Part no. 10930A 300 W AC PS FB (front-to-back) Model EDPS-300AB CA Part no. 10943 300 W AC PS BF (back-to-front) Model EDPS-300AB A 100-240 V~, 50/60 Hz, 1.25 A max per PS
X460-G2-24t-GE4 X460-G2-24t-10GE4 X460-G2-24x-10GE4	300 W DC power supply: Part no. 10933 300 W DC PS FB (front-to-back) Model PSSW301201A Part no. 10944 300 W DC PS BF (back-to-front) Model PSSW301202A +24 VDC or -48 VDC, 4.75 A max per PS
X460-G2-24t-24ht-10GE4 X460-G2-48t-GE4 X460-G2-48t-10GE4 X460-G2-48x-10GE4	300 W DC power supply: Part no. 10933 300 W DC PS FB (front-to-back) Model PSSW301201A Part no. 10944 300 W DC PS BF (back-to-front) Model PSSW301202A +24 VDC or -48 VDC, 4.75 A max per PS
X460-G2-24p-GE4 X460-G2-24p-10GE4 X460-G2-24p-24hp-10GE4 X460-G2-48p-GE4 X460-G2-48p-10GE4 X460-G2-16mp-32p-10GE4	350 W AC power supply: Part no. 10953 350 W AC PS FB (front-to-back) Model PSSF351101A Part no. 10954 350 W AC PS BF (back-to-front) Model PSSF351102A 100-240 V~ 200-240 V~ 50/60 Hz, 1.25 A max per PS

Table 157: X460-G2 Power Supply Options (continued)

Switch Model	Power Supply
X460-G2-24p-GE4 X460-G2-24p-10GE4	715 W AC power supply: Part no. 10951 715 W AC PS FB (front-to-back) Model PSSF711101A Part no. 10952 715 W AC PS BF (back-to-front) Model PSSF711102A 100-127 V~ 200-240 V~ 50/60 Hz, 5.75A/2.75 A max per PS
X460-G2-24p-24hp-10GE4 X460-G2-48p-GE4 X460-G2-48p-10GE4	715 W AC power supply: Part no. 10951 715 W AC PS FB (front-to-back) Model PSSF711101A Part no. 10952 715 W AC PS BF (back-to-front) Model PSSF711102A 100-127 V~ 200-240 V~ 50/60 Hz, 7.5A/3.75 A max per PS
X460-G2-16mp-32p-10GE4	715 W AC power supply: Part no. 10951 715 W AC PS FB (front-to-back) Model PSSF711101A Part no. 10952 715 W AC PS BF (back-to-front) Model PSSF711102A 100-127 V~ 200-240 V~ 50/60 Hz, 7.7A/3.7 A max per PS
X460-G2-24p-GE4 X460-G2-24p-10GE4	1100 W AC power supply: Part no. 10941 1100 W AC PS FB (front to back), Model PSSF112101A Part no. 10942 1100 W AC PS BF (back to front), Model PSSF112102A 100-127 V~ 200-240 V~ 50/60 Hz, 10.5A/5.0 A max per PS
X460-G2-24p-24hp-10GE4 X460-G2-48p-GE4 X460-G2-48p-10GE4	1100 W AC power supply: Part no. 10941 1100 W AC PS FB (front to back), Model PSSF112101A Part no. 10942 1100 W AC PS BF (back to front), Model PSSF112102A 100-127 V~ 200-240 V~ 50/60 Hz, 10.75A/5.0 A max per PS
X460-G2-16mp-32p-10GE4	1100 W AC power supply: Part no. 10941 1100 W AC PS FB (front to back), Model PSSF112101A Part no. 10942 1100 W AC PS BF (back to front), Model PSSF112102A 100-127 V~ 200-240 V~ 50/60 Hz, 11.5A/5.5 A max per PS

Table 158: X460-G2 Power Consumption

Switch Model	Minimum Heat Dissipation	Minimum Power Consumption	Maximum Heat Dissipation	Maximum Power Consumption
X460-G2-24t-GE4	215 BTU/hr	63 W	427 BTU/hr	125 W
X460-G2-24t-10GE4	229 BTU/hr	67 W	427 BTU/hr	125 W
X460-G2-24x-10GE4	209 BTU/hr	61 W	443 BTU/hr	130 W
X460-G2-24p-GE4 (@ 720 W PoE)	250 BTU/hr	73 W	761 BTU/hr	943 W
X460-G2-24p-10GE4 (@ 720 W PoE)	260 BTU/hr	76 W	761 BTU/hr	943 W
X460-G2-48t-GE4	243 BTU/hr	71 W	427 BTU/hr	127 W
X460-G2-48t-10GE4	250 BTU/hr	73 W	427 BTU/hr	125 W
X460-G2-24t-24ht-10GE4	250 BTU/hr	73 W	427 BTU/hr	125 W
X460-G2-48x-10GE4	202 BTU/hr	59 W	485 BTU/hr	143 W
X460-G2-48p-GE4 (@ 1440 W PoE)	284 BTU/hr	83 W	1116 BTU/hr	1767 W
X460-G2-48p-10GE4 (@ 1440 W PoE)	287 BTU/hr	84 W	1116 BTU/hr	1767 W
X460-G2-24p-24hp-10GE4 (@ 1440 W PoE)	287 BTU/hr	84 W	1116 BTU/hr	1767 W
X460-G2-16mp-32p-10GE4 (@ 1440 W PoE)	287 BTU/hr	84 W	1116 BTU/hr	1767 W

Table 159: X460-G2 PoE Power Budget

PSU Configuration	X460-G2-24p-GE4 X460-G2-24p-10GE4	X460-G2-48p-GE4 X460-G2-48p-10GE4	X460-G2-24p-24hp-10GE4	X460-G2-16mp-32p-10GE4
1 PSU of 350 W	168 W 5 ports @ 30 W 10 ports @ 15.4 W	168 W 5 ports @ 30 W 10 ports @ 15.4 W	168 W 5 ports @ 30 W 10 ports @ 15.4 W	118 W 3 ports @ 30 W 7 ports @ 15.4 W
1 PSU of 715 W	500 W 16 ports @ 30 W 24 ports @ 15.4 W	500 W 16 ports @ 30 W 32 ports @ 15.4 W	500 W 16 ports @ 30 W 32 ports @ 15.4 W	450 W 15 ports @ 30 W 29 ports @ 15.4 W

Table 159: X460-G2 PoE Power Budget (continued)

PSU Configuration	X460-G2-24p-GE4 X460-G2-24p-10GE4	X460-G2-48p-GE4 X460-G2-48p-10GE4	X460-G2-24p-24hp-10GE4	X460-G2-16mp-32p-10GE4
1 PSU of 1100 W	720 W 24 ports @ 30 W 24 ports @ 15.4 W	850 W 28 ports @ 30 W 48 ports @ 15.4 W	850 W 28 ports @ 30 W 48 ports @ 15.4 W	800 W 26 ports @ 30 W 48 ports @ 15.4 W
2 PSUs of 350 W	NA	NA	428 W 14 ports @ 30 W 27 ports @ 15.4 W	378 W 12 ports @ 30 W 24 ports @ 15.4 W
2 PSUs of 715 W	720 W 24 ports @ 30 W 24 ports @ 15.4 W	1031 W 34 ports @ 30 W 48 ports @ 15.4 W	1031 W 34 ports @ 30 W 48 ports @ 15.4 W	981 W 32 ports @ 30 W 48 ports @ 15.4 W
2 PSUs of 1100 W	720 W 24 ports @ 30 W 24 ports @ 15.4 W	1668 W 48 ports @ 30 W 48 ports @ 15.4 W	1668 W 48 ports @ 30 W 48 ports @ 15.4 W	1440 W 48 ports @ 30 W 48 ports @ 15.4 W
1 PSU of 350 W & 1 PSU of 715 W	NA	NA	730 W 24 ports @ 30 W 47 ports @ 15.4 W	680 W 22 ports @ 30 W 44 ports @ 15.4 W
1 PSU of 350 W & 1 PSU of 1100 W	NA	NA	1048 W 34 ports @ 30 W 48 ports @ 15.4 W	998 W 33 ports @ 30 W 48 ports @ 15.4 W
1 PSU of 715 W & 1 PSU of 1100 W	720 W 24 ports @ 30 W 24 ports @ 15.4 W	1350 W 45 ports @ 30 W 48 ports @ 15.4 W	1350 W 45 ports @ 30 W 48 ports @ 15.4 W	1300 W 43 ports @ 30 W 48 ports @ 15.4 W

Table 160: CPU, Memory

CPU/Memory
1 GHz 64-bit CPU
1 GB DDR3 ECC SDRA
4 GB eMMC Flash Memory
4 MB packet buffer per chip

Standards and Environmental Data

Table 161: Safety Standards

North American Safety of ITE	UL 60950-1 2nd Ed., A2:2014 (US) CSA 22.2 No. 60950-1-07 2nd Ed. 2014-10(Canada) Complies with FCC 21CFR 1040.10 (US Laser Safety) CDRH Letter of Approval (US FDA Approval)
European Safety of ITE	IEC 60950-1:2005 2nd+A1:2009+A2:2013 IEC 60950-1:2006+A11+A1+A12+A2 EN 60825-1:2007 (Lasers Safety)
International Safety of ITE	CB Report & Certificate per IEC 60950-1:2005 2nd Ed., + National Differences AS/NZX 60950-1 (Australia /New Zealand)

Table 162: EMI/EMC Standards

North America EMC for ITE	FCC CFR 47 part 15 Class A (USA) ICES-003 Class A (Canada)
European EMC standards	EN 55032: 2015, Class A EN 55024:1998+A1:2001+A2:2003 Class A includes IEC 61000-4-2, 3, 4, 5, 6, 11 EN 61000-3-2: 2006+A2:2009 (Harmonics) EN 61000-3-3:2008 (Flicker) ETSI EN 300 386: v1.4.1 (2008-04) (EMC Telecommunications) 2014/35/EU Low Voltage Directive

Table 162: EMI/EMC Standards (continued)

International EMC certifications	CISPR 32: 2015, Class A (International Emissions) EN 55024:1998+A1:2001+A2:2003 Class A (International Immunity) IEC/EN 61000-4-2:2008 Electrostatic Discharge, 8kV Contact, 15 kV Air, Criteria A IEC/EN 61000-4-3:2008 Radiated Immunity 10V/m, Criteria IEC/EN 61000-4-4:2004 Transient Burst, 1 kV, Criteria A IEC/EN 61000-4-5:2005 Surge, 2 kV L-L, 2 kV L-G, Level 3, Criteria A IEC/EN 61000-4-6:2008 Conducted Immunity, 0.15-80 MHz, 10V/m unmod. RMS, Criteria A IEC/EN 61000-4-11:2004 Power Dips & Interruptions, >30%, 25 periods, Criteria C
Country-specific	VCCI Class A (Japan Emissions) BSMI (Taiwan Emissions) ACMA (C-Tick) (Australia Emissions) CCC Mark (China) KCC Mark, EMC Approval (Korea)

Table 163: Telecom Standards

	EN/ETSI 300 386:2008 (EMC Telecommunications) EN/ETSI 300 019 (Environmental for Telecommunications) MEF9 and MEF14 certified for EPL, EVPL, and ELAN

Table 164: IEEE 802.3 Media Access Standards

	IEEE 802.3ab 1000BASE-T IEEE 802.3z 1000BASE-X IEEE 802.3ae 10GBASE-X IEEE 802.3ba 40GBASE-X IEEE 802.3bz 2.5GBASE-T and 5GBASE-T (for X460-G2-16mp-32p-10GE4) IEEE 802.3at PoE Plus IEEE 802.3az (EEE)

Table 165: Environmental Data

Environmental standards	EN/ETSI 300 019-2-1 v2.1.2 (2000 - 2009) - Class 1.2 Storage EN/ETSI 300 019-2-2 v2.1.2 (1999 - 09) - Class 2.3 Transportation EN/ETSI 300 019-2-3 v2.1.2 (2003 - 04) - Class 3.1e Operational EN/ETSI 300 753 (1997-10) - Acoustic Noise

Table 165: Environmental Data (continued)

	ASTM D3580 Random Vibration Unpackaged 1.5G
Operating conditions	Temperature range: 0°C to 50°C (32°F to 122°F) Humidity: 10% to 95% relative humidity, non-condensing Altitude: 0 to 3,000 meters (9,850 feet) Operational shock (half sine): 30 m/s^2 (3 G), 11 ms, 60 shocks Operational random vibration: 3 to 500 Hz at 1.5 G rms
Storage & transportation conditions (packaged)	Transportation temperature: -40°C to 70°C (-40°F to 158°F) Storage and transportation humidity: 10% to 95% relative humidity, non-condensing Packaged shock (half sine): 180 m/s^2 (18 G), 6 ms, 600 shocks Packaged sine vibration: 5 to 62 Hz at velocity 5 mm/s, 62 to 500 Hz at 0.2 G Packaged random vibration: 5 to 20 Hz at 1.0 ASD w/–3 dB/ oct. from 20 to 200 Hz 14 drops minimum on sides and corners at 42 inches (<15 kg box)

ExtremeSwitching X465 Series Switches Technical Specifications

The ExtremeSwitching X465 series includes the following switches:

- X465-24MU switch
- X465-24MU-24W switch
- X465-24S switch
- X465-24W switch
- X465-24XE switch
- X465-48P switch
- X465-48T switch

- X465-48W switch
- X465i-48W switch

Table 166: X465 Unpackaged Dimensions

X465-24MU switch X465-24MU-24W switch X465-24S switch X465-24W switch X465-24XE switch X465-48P switch X465-48T switch X465-48W switch X465i-48W switch	Height: 1.72 inches (4.36 cm) Width: 17.33 inches (44 cm) Length: 19.26 inches (48.9 cm)

Table 167: X465 Unpackaged Weight (With Blanks; No PSU or Fan Module)

X465-24MU switch	17.54 lb (7.96 kg)
X465-24MU-24W switch	18.85 lb (8.55 kg)
X465-24S switch	17.02 lb (7.72 kg)
X465-24W switch	17.42 lb (7.90 kg)
X465-24XE switch	18.33 lb (8.32 kg)
X465-48P switch	17.38 lb (7.88 kg)
X465-48T switch	17.73 lb (8.04 kg)
X465-48W switch	18.70 lb (8.48 kg)
X465i-48W switch	18.33 lb (8.32 kg)

Table 168: X465 Packaged Dimensions

X465-24MU switch X465-24MU-24W switch X465-24S switch X465-24W switch X465-24XE switch X465-48P switch X465-48T switch X465-48W switch X465i-48W switch	Height: 6.22 inches (15.8 cm) Width: 21.58 inches (54.8 cm) Length: 23.39 inches (59.4 cm)

Table 169: X465 Packaged Weight (No PSU or Fan Module)

X465-24MU switch	21.81 lb (9.89 kg)
X465-24MU-24W switch	23.13 lb (10.49 kg)

Table 169: X465 Packaged Weight (No PSU or Fan Module) (continued)

X465-24S switch	21.83 lb (9.9 kg)
X465-24W switch	21.70 lb (9.84 kg)
X465-24XE switch	22.22 lb (10.08 lb)
X465-48P switch	21.63 lb (9.81 kg)
X465-48T switch	22.00 lb (9.98 kg)
X465-48W switch	22.97 lb (10.42 kg)
X465i-48W switch	23.17 lb (10.51 kg)

Table 170: VIM5 Module Unpacked Weights and Dimensions

VIM5/Module	Weight	Dimensions
VIM5-2Q	0.40 lb (0.18 kg)	Height: 1.57 inches (3.99 cm) Width: 1.92 inches (4.88 cm) Length: 6.16 inches (15.64 cm)
VIM5-2Y	0.42 lb (0.19 kg)	Height: 1.57 inches (3.99 cm) Width: 1.92 inches (4.88 cm) Length: 6.16 inches (15.64 cm)
VIM5-4X	0.40 lb (0.18 kg)	Height: 1.57 inches (3.99 cm) Width: 1.92 inches (4.88 cm) Length: 6.16 inches (15.64 cm)
VIM5-4XE	0.45 lb (0.20 kg)	Height: 1.57 inches (3.99 cm) Width: 1.92 inches (4.88 cm) Length: 6.16 inches (15.64 cm)
VIM5-4Y	0.47 lb (0.21 kg)	Height: 1.57 inches (3.99 cm) Width: 1.92 inches (4.88 cm) Length: 6.16 inches (15.64 cm)
VIM5-4YE	0.47 lb (0.21 kg)	Height: 1.57 inches (3.99 cm) Width: 1.92 inches (4.88 cm) Length: 6.16 inches (15.64 cm)

Table 171: VIM5 Module Packed Weight and Dimensions

VIM5/Module	Weight	Dimensions
VIM5-2Q	17.02 lb (7.72 kg)	Height: 9.21 inches (23.39 cm) Width: 18.54 inches (47.01 cm) Length: 21.26 inches (54 cm)
VIM5-2Y	17.42 lb (7.90 kg)	Height: 1.57 inches (3.99 cm) Width: 1.92 inches (4.88 cm) Length: 6.16 inches (15.64 cm)
VIM5-4X	17.06 lb (7.74 kg)	Height: 1.57 inches (3.99 cm) Width: 1.92 inches (4.88 cm) Length: 6.16 inches (15.64 cm)

Table 171: VIM5 Module Packed Weight and Dimensions (continued)

VIM5/Module	Weight	Dimensions
VIM5-4XE	18.14 lb (8.23 kg)	Height: 1.57 inches (3.99 cm) Width: 1.92 inches (4.88 cm) Length: 6.16 inches (15.64 cm)
VIM5-4Y	18.77 lb (8.51 kg)	Height: 1.57 inches (3.99 cm) Width: 1.92 inches (4.88 cm) Length: 6.16 inches (15.64 cm)
VIM5-4YE	18.77 lb (8.51 kg)	Height: 1.57 inches (3.99 cm) Width: 1.92 inches (4.88 cm) Length: 6.16 inches (15.64 cm)

Table 172: Fan and Acoustic Noise

Switch Model	Ambient Temp	VIM	PoE	Main Fan Speed (% of max)	PSU1 + PSU2	Bystander Sound Pressure	Declared Sound Power (L_{WAd})
X465-24MU switch	25C	VIM5-4XE	720W	20%	1100W (½ of max PoE power	45.4	56
X465-24MU-24W switch	25C	VIM5-4XE	1800W	20%	2000W (½ of max PoE power	54.1	65.4
X465-24S switch							
X465-48P switch	25C	VIM5-4XE	720W	20%	1100W (½ of max PoE power	45.8	56.6
X465-24XE switch							
X465-24W switch	25C	VIM5-4XE	1080W	20%	2000W (½ of max PoE power	47.2	58.8
X465-48T switch	25C	VIM5-4XE	0W	20%	350W	41.6	52.5
X465-48W switch	25C	VIM5-4XE	1800W	20%	2000W (½ of max PoE power	56.3	68.5
X465i-48W							

Note: Acoustic noise levels shown here represent noise emitted by the switch at room ambient temperatures. Values are based on a fully configured system consisting of two PSUs and two I/O modules operating under full load. Normal operating temperature range: 0°C to 50°C.

14 Bystander Sound pressure is presented for comparison to other products measured using Bystander Sound Pressure.

15 Declared Sound Power is presented in accordance with ISO 7779:2010(E), ISO 9296:2010 per ETSI/EN 300 753:2012-01.

Table 173: X465 Fan Speed and Power Consumption

Fan Speed	Fan Module RPM (typical)		Power	
	Inlet Fan	Outlet Fan	Typical	
Full	16,000 (typ)	13,500 (typ)	15.8W per module*	
Low	3,200 (typ)	2,800 (typ)		

* Some units are equipped with (1) fan module, while others are equipped with 2. Total fan power is equal to the number of installed fan modules multiplied by the fan power for each module.

Power Options

Table 174: X465 Power Supply Options

Switch Model	Power Supply
X465-24S switch X465-24XE switch X465-48T switch	350 W AC power supply: Part nos. XN-ACPWR-350W-FB and 10953 350 W AC PS FB (front-to-back) Model PSSF351101A 100-240 V~ 200-240 V~ 50/60 Hz, 1.25 A max per PS
X465-24W switch X465-24MU switch X465-24MU-24W switch X465-48P switch X465-48W switch X465i-48W	715 W AC power supply: Part nos. XN-ACPWR-715W-FB and 10951 715 W AC PS FB (front-to-back) Model PSSF711101A 100-127 V~ 200-240 V~ 50/60 Hz, 5.75A/2.75 A max per PS

Table 174: X465 Power Supply Options (continued)

Switch Model	Power Supply
X465-24W switch X465-24MU switch X465-24MU-24W switch X465-48P switch X465-48W switch X465i-48W	**1100 W AC power supply:** Part nos. XN-ACPWR-1100W-FB and 10941 1100 W AC PS FB (front to back), Model PSSF112101A 100-127 V~ 200-240 V~ 50/60 Hz, 10.5A/5.0 A max per PS
X465-24W switch X465-24MU switch X465-24MU-24W switch X465-48P switch X465-48W switch X465i-48W	**2000 W AC power supply:** Part nos. XN-ACPWR-2000W-FB and XN-ACPWR-2000W-F 2000 W AC PS FB (front to back), Model 100-127 V~ 200-240 V~ 50/60 Hz, 11.5A/5.5 A max per PS

Note
XN-ACPWR-xxx-FB PSUs cannot be used with the 10941, 10951, 10953, or XN-ACPWR-2000W-F PSUs on the same switch.

The following are the minimum software versions that are required for use with XN-ACPWR-xxx-FB PSUs and the switch:

- EXOS version 31.3.1, EXOS version 30.7.2 for X465 only
- VOSS version 8.3

Previous software versions are not supported with XN-ACPWR-xxx-FB PSUs. You must upgrade to the listed minimum software version or later to use any of the XN-ACPWR-xxx-FB PSUs with the switch.

The following table lists supported PSU combinations when dual redundant PSUs are used on the switch.

Refer to the switch datasheet for appropriate PSUs for the switch.

Table 175: PSU Redundancy Compatibility Notes

Switch Model	Primary PSU	Secondary PSU
Non-PoE models	XN-ACPWR-350W-FB	XN-ACPWR-350W-FB
PoE models	XN-ACPWR-715W-FB or XN-ACPWR-1100W-FB or XN-ACPWR-2000W-FB	XN-ACPWR-715W-FB or XN-ACPWR-1100W-FB or XN-ACPWR-2000W-FB

Table 176: X465 Power Consumption

Switch Model	Minimum Heat Dissipation (BTU/hr)	Minimum Power Consumption (W)	Maximum Heat Dissipation (BTU/hr)	Maximum Power Consumption (W)
X465-24MU switch	257	75	963	1722
X465-24MU-24W switch	326	96	1614	3941
X465-24S	178	52	589	172
X465-24W switch	236	61	1110	2485
X465-24XE	271	79	707	207
X465-48P switch	280	82	1046	1747
X465-48T switch	250	74	600	176
X465-48W switch	316	93	1708	4016
X465i-48W	261	76	1762	4031

Table 177: X465 PoE Power Budget

X465-24W			X465-48P			X465-48W X465i-48W			X465-24MU			X465-24MU-24W		
System pwr: 229W			System pwr: 255W			System pwr: 285W			System pwr: 275W			System pwr: 332W		
PSU 1	PSU 2	PoE max	PSU 1	PSU 2	PoE max	PSU 1	PSU 2	PoE max	PSU 1	PSU 2	PoE max	PSU 1	PSU 2	PoE max
2000W high line	2000W high line	2160W	2000W high line	2000W high line	1440W	2000W high line	2000W high line	3515W*	2000W high line	2000W high line	1440W	2000W high line	2000W high line	3468W*
2000W high line	2000W low line	2160W	2000W high line	2000W low line	1440W	2000W high line	2000W low line	2660W*	2000W high line	2000W low line	1440W	2000W high line	2000W low line	2613W*
2000W high line	1100W	2160W	2000W high line	1100W	1440W	2000W high line	1100W	2616W*	2000W high line	1100W	1440W	2000W high line	1100W	2569W*
2000W high line	715W	2160W*	2000W high line	715W	1440W	2000W high line	715W	2265W*	2000W high line	715W	1440W	2000W high line	715W	2218W*

Table 177: X465 PoE Power Budget (continued)

X465-24W			X465-48P			X465-48W X465i-48W			X465-24MU			X465-24MU-24W		
2000W high line	350W	1989W*	2000W high line	350W	1440W	2000W high line	350W	1933W*	2000W high line	350W	1440W	2000W high line	350W	1886W*
2000W high line	0W	1771W*	2000W high line	0W	1440W	2000W high line	0W	1715W*	2000W high line	0W	1440W	2000W high line	0W	1668W*
2000W low line	2000W low line	1861W	2000W low line	2000W low line	1440W	2000W low line	2000W low line	1805W	2000W low line	2000W low line	1440W	2000W low line	2000W low line	1758W
2000W low line	1100W	1817W	2000W low line	1100W	1440W	2000W low line	1100W	1761W	2000W low line	1100W	1440W	2000W low line	1100W	1714W
2000W low line	715W	1466W	2000W low line	715W	1440W	2000W low line	715W	1410W	2000W low line	715W	1420W	2000W low line	715W	1363W
2000W low line	350W	1134W	2000W low line	350W	1108W	2000W low line	350W	1078W	2000W low line	350W	1088W	2000W low line	350W	1031W
2000W low line	0W	871W	2000W low line	0W	845W	2000W low line	0W	815W	2000W low line	0W	825W	2000W low line	0W	768W
1100W	1100W	1773W	1100W	1100W	1440W	1100W	1100W	1717W	1100W	1100W	1440W	1100W	1100W	1670W
1100W	715W	1422W	1100W	715W	1396W	1100W	715W	1366W	1100W	715W	1376W	1100W	715W	1319W
1100W	350W	1090W	1100W	350W	1064W	1100W	350W	1034W	1100W	350W	1044W	1100W	350W	987W
1100W	0W	871W	1100W	0W	845W	1100W	0W	815W	1100W	0W	825W	1100W	0W	768W
715W	715W	1071W	715W	715W	1045W	715W	715W	1015W	715W	715W	1025W	715W	715W	968W
715W	350W	739W	715W	350W	713W	715W	350W	683W	715W	350W	693W	715W	350W	636W
715W	0W	486W	715W	0W	460W	715W	0W	430W	715W	0W	440W	715W	0W	383W

Table 177: X465 PoE Power Budget (continued)

X465-24W			X465-48P			X465-48W X465i-48W			X465-24MU			X465-24MU-24W		
350 W	350 W	407 W	350 W	350 W	381 W	350 W	350 W	351 W	350 W	350 W	361 W	350 W	350 W	304 W
350 W	0W	121 W	350 W	0W	95W	350 W	0W	65W	350 W	0W	75W	350 W	0W	0W

* - Required altitude/temperature derating due to 2000W PSU.

When utilizing the 2000W (XN-ACPWR-2000W-FB or XN-ACPWR-2000W-F) power supply at an input voltage greater than 208VAC, the ambient temperature of the operating environment should not exceed 45°C at sea level up to 1,500 meters elevation.

At altitudes from 1,500 meter to 3,000 meters, the ambient temperature range should not exceed 40°C.

At altitudes above 3,000 meters, the ambient temperature should not exceed 35°C.

When using X465 models with the 350W, 715W, or 1100W power supplies, the ambient temperature of the operating environment can be in the range of 0°C to 50°C at any altitude.

Table 178: CPU, Memory

CPU/Memory for Multi-Rate Models	CPU/Memory for 1G Models
4-Core, 2.1GHz x86 CPU	2-core, 1.5GHz x86 CPU
8 GB DDR4 memory	2 GB DDR4 memory
8 GB eMMC Flash Memory	8 GB eMMC Flash Memory
12MB packet buffer per chip	12MB packet buffer per chip

Standards and Environmental Data

Table 179: Safety Standards

North American Safety of ITE	UL 60950-1 2nd Ed., A2:2014 (US) CSA 22.2 No. 60950-1-07 2nd Ed. 2014-10(Canada) Complies with FCC 21CFR 1040.10 (US Laser Safety) CDRH Letter of Approval (US FDA Approval)
European Safety of ITE	IEC 60950-1:2005 2nd+A1:2009+A2:2013 IEC 60950-1:2006+A11+A1+A12+A2 EN 60825-1:2007 (Lasers Safety)
International Safety of ITE	CB Report & Certificate per IEC 60950-1:2005 2nd Ed., + National Differences AS/NZX 60950-1 (Australia /New Zealand)

Table 180: EMI/EMC Standards

North America EMC for ITE	FCC CFR 47 part 15 Class A (USA) ICES-003 Class A (Canada)
European EMC standards	EN 55032: 2015, Class A EN 55024:1998+A1:2001+A2:2003 Class A includes IEC 61000-4-2, 3, 4, 5, 6, 11 EN 61000-3-2: 2006+A2:2009 (Harmonics) EN 61000-3-3:2008 (Flicker) ETSI EN 300 386: v1.4.1 (2008-04) (EMC Telecommunications) 2014/35/EU Low Voltage Directive

Table 180: EMI/EMC Standards (continued)

International EMC certifications	CISPR 32: 2015, Class A (International Emissions) EN 55024:1998+A1:2001+A2:2003 Class A (International Immunity) IEC/EN 61000-4-2:2008 Electrostatic Discharge, 8kV Contact, 15 kV Air, Criteria A IEC/EN 61000-4-3:2008 Radiated Immunity 10V/m, Criteria IEC/EN 61000-4-4:2004 Transient Burst, 1 kV, Criteria A IEC/EN 61000-4-5:2005 Surge, 2 kV L-L, 2 kV L-G, Level 3, Criteria A IEC/EN 61000-4-6:2008 Conducted Immunity, 0.15-80 MHz, 10V/m unmod. RMS, Criteria A IEC/EN 61000-4-11:2004 Power Dips & Interruptions, >30%, 25 periods, Criteria C
Country-specific	VCCI Class A (Japan Emissions) BSMI (Taiwan Emissions) ACMA (C-Tick) (Australia Emissions) CCC Mark (China) KCC Mark, EMC Approval (Korea)

Table 181: Telecom Standards

	EN/ETSI 300 386:2008 (EMC Telecommunications) EN/ETSI 300 019 (Environmental for Telecommunications) MEF9 and MEF14 certified for EPL, EVPL, and ELAN

Table 182: IEEE 802.3 Media Access Standards

	IEEE 802.3ab 1000BASE-T IEEE 802.3z 1000BASE-X IEEE 802.3ae 10GBASE-X IEEE 802.3ba 40GBASE-X IEEE 802.3bz 2.5GBASE-T and 5GBASE-T (for X460-G2-16mp-32p-10GE4) IEEE 802.3at PoE Plus IEEE 802.3az (EEE)

Table 183: Environmental Data

Environmental standards	EN/ETSI 300 019-2-1 v2.1.2 (2000 - 2009) - Class 1.2 Storage EN/ETSI 300 019-2-2 v2.1.2 (1999 - 09) - Class 2.3 Transportation EN/ETSI 300 019-2-3 v2.1.2 (2003 - 04) - Class 3.1e Operational EN/ETSI 300 753 (1997-10) - Acoustic Noise

Table 183: Environmental Data (continued)

	ASTM D3580 Random Vibration Unpackaged 1.5G
Operating conditions	Temperature range: 0°C to 50°C (32°F to 122°F) Humidity: 10% to 95% relative humidity, non-condensing Altitude: 0 to 3,000 meters (9,850 feet) Operational shock (half sine): 30 m/s^2 (3 G), 11 ms, 60 shocks Operational random vibration: 3 to 500 Hz at 1.5 G rms
Storage & transportation conditions (packaged)	Transportation temperature: -40°C to 70°C (-40°F to 158°F) Storage and transportation humidity: 10% to 95% relative humidity, non-condensing Packaged shock (half sine): 180 m/s^2 (18 G), 6 ms, 600 shocks Packaged sine vibration: 5 to 62 Hz at velocity 5 mm/s, 62 to 500 Hz at 0.2 G Packaged random vibration: 5 to 20 Hz at 1.0 ASD w/–3 dB/ oct. from 20 to 200 Hz 14 drops minimum on sides and corners at 42 inches (<15 kg box)

ExtremeSwitching X590 Series Switches Technical Specifications

The ExtremeSwitching X590 series includes the following switches:

- X590-24t-1q-2c

- X590-24x-1q-2c

Table 184: X590 Unpackaged Dimensions

X590-24t-1q-2c X590-24x-1q-2c	Height: 1.71 in (4.35 cm) Width: 19.19 in (48.7 cm) Length: 17.38 in (44.1 cm)

Table 185: X590 Unpackaged Weight

X590-24t-1q-2c	14.99 lb (6.8 kg)
X590-24x-1q-2c	14.55 lb (6.6 kg)

Table 186: X590 Packaged Dimensions

X590-24t-1q-2c X590-24x-1q-2c	Height: 6.07 in (15.4 cm) Width: 21.35 in (54.2 cm) Length: 23.17 in (58.8 cm)

Table 187: X590 Packaged Weight

X590-24t-1q-2c	20.5 lb (9.3 kg)
X590-24x-1q-2c	19.5 lb (8.85 kg)

Fan and Acoustic Noise

Table 188: Fan and Acoustic Noise

Switch Model	Bystander Sound Pressure (at 25°C)	Declared Sound Power (at 25°C)
X590-24t-1q-2c (part no. 16791) FB airflow	54.7 db(A) up to 25°C 61.9 db(A) up to 35°C 79.4 db(A) at 45°C (max)	6.8 bels up to 25°C 7.6 bels up to 35°C 9.4 bels at 45°C (max)
X590-24t-1q-2c (part no. 16791) BF airflow	55.5 db(A) up to 25°C 62.6 db(A) up to 35°C 79.7 db(A) at 45°C (max)	6.8 bels up to 25°C 7.5 bels up to 35°C 9.2 bels at 45°C (max)
X590-24x-1q-2c (part no. 16790) FB airflow	55.6 db(A) up to 30°C 57.8 db(A) up to 40°C 79.8 db(A) at 45°C (max)	6.9 bels up to 30°C 7.1 bels up to 40°C 9.5 bels at 45°C (max)
X590-24x-1q-2c (part no. 16790) BF airflow	55.8 db(A) up to 30°C 57.9 db(A) up to 40°C 79.1 db(A) at 45°C (max)	6.9 bels up to 30°C 7.1 bels up to 40°C 9.4 bels at 45°C (max)

Power Options

Table 189: X590 Power Options

X590-24t-1q-2c (part # 16791) X590-24x-1q-2c (part # 16790)	770 W AC power supply: Part # 10960 770 W AC PS FB (front-back) Part # 10961 770 W AC PS FB (back-front) AC Input: 100-240 VAC, 50/60 Hz PSU Input Socket: IEC 320 C14 Power cord input plug: IEC 320 C13
	1100 W DC power supply: Part # 10962 1100 W DC PS FB (front-back) Part # 10963 1100 W DC PS FB (back-front) DC Input: -48 VDC

Table 190: Power Specifications

Switch Model	
X590-24t-1q-2c X590-24x-1q-2c	AC Input: 100-127 VAC, 2.5 A max. per PSU, 50/60 Hz AC Input: 200-240 VAC, 1.25 A max. per PSU, 50/60 Hz DC Input: -48 to -60 VDC, 5.0 A max. per PSU

Table 191: Power and Heat Dissipation

	Minimum[16] Heat Dissipation (1 PSU)	Minimum[16] Power Consumption	Maximum[16] Heat Dissipation (2 PSUs)	Maximum[16] Power Consumption
X590-24t-1q-2c-AC	310.97 BTU/hr	91.14 W	792.27 BTU/hr	232.20 W
X590-24t-1q-2c-DC	332.63 BTU/hr	97.49 W	833.62 BTU/hr	244.32 W
X590-24x-1q-2c-AC	278.42 BTU/hr	81.60 W	743.82 BTU/hr	218.00 W
X590-24x-1q-2c-DC	286.61 BTU/hr	84.00 W	786.12 BTU/hr	230.40 W

CPU, Memory

CPU/Memory
1GHz 64-bit CPU
2GB DDR3 ECC SDRA memory
4GB eMMC Flash Memory
12 MB buffer, per chip

[16] Minimum is defined as idle, with no ports linked. Maximum is defined as fans high, all ports 100% traffic.

Standards and Environmental Data

Table 192: Safety Standards

North American Safety of ITE	UL 60950-1 2nd Ed., A2:2014, Listed Device (US) CSA 22.2 #60950-1-07 2nd Ed., 2014-10 Canada) Complies with FCC 21CFR 1040.10 (US Laser Safety) CDRH Letter of Approval (US FDA Approval)
European Safety of ITE	EN 60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013 2nd Ed. EN 60825-1:2007 IEC 60825-1:2007 Class 1 (Lasers Safety) 2014/35/EU Low Voltage Directive
International Safety of ITE	CB Report & Certificate per IEC 60950-1:2005+A1:2009+A2:2013 + National Differences AS/NZX 60950-1 (Australia /New Zealand)

Table 193: EMI/EMC Standards

North America EMC for ITE	FCC 47 CFR part 15 Class A (USA) ICES-003 Class A (Canada)
European EMC standards	EN 55032:2015 Class A EN 55024:2010 EN 61000-3-2,2014 (Harmonics) EN 61000-3-3,2013 (Flicker) 2014/30/EU EMC Directive EN 300 386: v1.6.1 (EMC Telecommunications)
International EMC certifications	CISPR 32: 2015, Class A (International Emissions) CISPR 24: 2010, Class A (International Immunity) AS/NZS CISPR32:2015 IEC 61000-4-2:2008/EN 61000-4-2:2009 Electrostatic Discharge, 8kV Contact, 15 kV Air, Criteria A IEC 61000-4-3:2010/EN 61000-4-3:2006+A1:2008+A2:2010 Radiated Immunity 10V/m, Criteria A IEC 61000-4-4:2012/EN 61000-4-4:2012 Transient Burst, 1 kV, Criteria A IEC 61000-4-5:2014/EN 61000-4-5:2014 Surge, 2 kV L-L, 2 kV L-G, Level 3, Criteria A IEC 61000-4-6:2013/EN 61000-4-6:2014 Conducted Immunity, 0.15-80 MHz, 10V/m unmod. RMS, Criteria A IEC/EN 61000-4-11:2004 Power Dips & Interruptions, >30%, 25 periods, Criteria C
Country-specific	ACMA RCM (Australia Emissions) VCCI Class A (Japan Emissions) CCC mark (China) KCC mark, EMC Approval (Korea)

Table 194: Telecom Standards

Table 194: Telecom Standards (continued)

CE 2.0 Compliant

Table 195: IEEE 802.3 Media Access Standards

IEEE 802.3ba /802.3bm 40GBASE-X and 100GBASE-X
IEEE 802.3ae 10GBASE-X
IEEE 802.3 10GBASE-T (up to 100 m using Cat 6a cabling or better)
25Gb and 50Gb Ethernet implemented per 25G/50G Ethernet Consortium specification and IEEE 802.3 standard

Table 196: Environmental Data

Environmental standards	EN/ETSI 300 019-2-1 v2.1.2 - Class 1.2 Storage EN/ETSI 300 019-2-2 v2.1.2 - Class 2.3 Transportation EN/ETSI 300 019-2-3 v2.1.2 - Class 3.1e Operational EN/ETSI 300 753 (1997-10) - Acoustic Noise ASTM D3580 Random Vibration Unpackaged 1.5G
Environmental compliance	EU RoHS - 2011/65/EU EU WEEE - 2012/19/EU China RoHS - SJ/T 11363-2006 Taiwan RoHS - CNS 15663 (2013.7)
Operating conditions	Temperature range: 0°C to 45°C (32°F to 113°F) Humidity: 5% to 95% relative humidity, non-condensing Altitude: 0 to 3,000 meters (9,850 feet) Operational shock (half sine): 30 m/s^2 (3 G), 11 ms, 60 shocks Operational random vibration: 3 to 500 Hz at 1.5 G rms
Storage & transportation conditions (packaged)	Transportation temperature: -40°C to 70°C (-40°F to 158°F) Storage and transportation humidity: 10% to 95% relative humidity, non-condensing Packaged shock (half sine): 180 m/s^2 (18 G), 6 ms, 600 shocks Packaged vibration: 5 to 62 Hz at velocity 5 mm/s, 62 to 500 Hz at 0.2 G Packaged random vibration: 5 to 20 Hz at 1.0 ASD w/–3 dB/oct. from 20 to 200 Hz 14 drops minimum on sides and corners at 42 in (<15 kg box)

ExtremeSwitching X620 Series Switches Technical Specifications

The ExtremeSwitching X620 series includes the following switches:

- X620-8t-2x switch
- X620-10x switch
- X620-16t switch
- X620-16x switch

Physical Dimensions

Table 197: Physical Dimensions

X620-8t-2x X620-10x	Height: 1.73 inches (4.4 cm) Width: 12.01 inches (30.5 cm) Depth: 10.28 inches (26.1 cm)
X620-16t X620-16x	Height: 1.73 inches (4.4 cm) Width: 17.38 inches (44.1 cm) Depth: 16.94 inches (43.0 cm)

Weight

Table 198: Weight

X620-8t-2x	6.37 lb (2.92 kg)
X620-10x	6.04 lb (2.77 kg)
X620-16t	12.04 lb (5.52 kg)
X620-16x	11.11 lb (5.10 kg)

Packaged Dimensions

Table 199: Packaged Dimensions

X620-8t-2x X620-10x	Height: 6.23 inches (15.8 cm) Width: 15.17 inches (38.5 cm) Depth: 22.46 inches (57.0 cm)
X620-16t X620-16x	Height: 6.66 inches (16.9 cm) Width: 21.63 inches (54.9 cm) Depth: 22.93 inches (58.2 cm)

Packaged Weight

Table 200: Packaged Weight

X620-8t-2x	9.41 lb (4.32 kg)
X620-10x	9.04 lb (4.15 kg)
X620-16t	17.79 lb (8.16 kg)
X620-16x	16.91 lb (7.76 kg)

Fan Speed

Table 201: Fan Speed

X620-8t-2x	Continuously variable speed as needed
X620-10x	Continuously variable speed as needed
X620-16t	Continuously variable speed as needed
X620-16x	Continuously variable speed as needed

Acoustic Sound

Table 202: Acoustic Sound

	Bystander Sound Pressure	Declared Sound Power
X620-8t-2x (side-side airflow)	35.6 db(A) up to 25°C 38.8 db(A) up to 30°C 65.4 db(A) at 50°C (max)	4.8 bels up to 25°C 5.2 bels up to 30°C 7.9 bels at 50°C (max)
X620-10x (side-side airflow)	28.2 db(A) up to 35°C 66.3 db(A) at 50°C (max)	3.8 bels up to 35°C 7.9 bels at 50°C (max)
X620-16t (front-back airflow)	47.2 db(A) up to 35°C 65.6 db(A) at 50°C (max)	6.2 bels up to 35°C 8.0 bels at 50°C (max)
X620-16t (back-front airflow)	46.9 db(A) up to 30°C 65.2 db(A) at 50°C (max)	6.2 bels up to 30°C 8.1 bels at 50°C (max)
X620-16x (front-back airflow)	47.0 db(A) up to 40°C 65.7 db(A) at 50°C (max)	6.1 bels up to 40°C 8.0 bels at 50°C (max)
X620-16x (back-front airflow)	46.9 db(A) up to 40°C 64.8 db(A) at 50°C (max)	6.1 bels up to 40°C 8.0 bels at 50°C (max)

Power Specifications

Table 203: Power Specifications

	Minimum[17] Heat Dissipation (BTU/hr)	Minimum[17] Power Consumption (Watts)	Maximum[17] Heat Dissipation (BTU/hr)	Maximum[17] Power Consumption (Watts)
X620-8t-2x	74	22	177	52
X620-10x	60	18	123	36

[17] Minimum is defined as idle, with no ports linked. Maximum is defined as fans high, all ports 100% traffic.

Table 203: Power Specifications (continued)

	Minimum[17] Heat Dissipation (BTU/hr)	Minimum[17] Power Consumption (Watts)	Maximum[17] Heat Dissipation (BTU/hr)	Maximum[17] Power Consumption (Watts)
X620-16t	175	51	347	102
X620-16t (DC)	148	43	326	96
X620-16x	111	33	214	63
X620-16x (DC)	80	23	180	53

Power Supplies

Table 204: Power Supplies

	Power Supplies
X620-8t-2x	Integrated 100 W AC PSU RPS connector for external redundant PSU Side-to-side airflow
X620-10x	
X620-16t	Modular 300 W power supply (up to two PSU) AC and DC power options Mix AC and DC configuration Front-to-back or back-to-front airflow options
X620-16x	

CPU, Memory

Table 205: CPU, Memory

CPU/Memory
1 GHz CPU
1 GB DDR3 ECC memory
4 GB eMMC Flash memory

Environmental Data

Table 206: Environmental Data

Environmental specifications	EN/ETSI 300 019-2-1 v2.1.2 - Class 1.2 Storage EN/ETSI 300 019-2-2 v2.1.2 - Class 2.3 Transportation EN/ETSI 300 019-2-3 v2.1.2 - Class 3.1e Operational EN/ETSI 300 753 (1997-10) - Acoustic Noise ASTM D3580 Random Vibration Unpackaged 1.5 G
Operating conditions	Temp: 0°C to 50°C (32°F to 122°F) – all models Humidity: 10% to 95% relative humidity, non-condensing Altitude: 0 to 3,000 meters (9,842 feet) – All switch models Shock (half sine): 30 m/s2 (3 G), 11 ms, 6 shocks Random vibration: 3 to 500 Hz at 1.5 G rms
Packaging and storage specifications	Temp: -40°C to 70°C (-40°F to 158°F) Humidity: 10% to 95% relative humidity, non-condensing Packaged Shock (half sine): 180 m/s2 (18 G), 6 ms, 600 shocks Packaged Vibration: 5 to 62 Hz at velocity 5 mm/s, 62 to 500 Hz at 0.2 G Packaged Random Vibration: 5 to 20 Hz at 1.0 ASD w/–3 dB/ oct. from 20 to 200 Hz Packaged Drop Height: 14 drops minimum on sides and corners at 42 inches (<15 kg box)

Scaling and Performance

For scaling and performance specifications, refer to the product data sheet.

Safety Standards

Table 207: Safety Standards

North American ITE	UL 60950-1 2nd Ed., Listed Device (US) CSA 22.2 #60950-1-03 2nd Ed.(Canada) Complies with FCC 21CFR 1040.10 (US Laser Safety) CDRH Letter of Approval (US FDA Approval)
European ITE	EN 60950-1:2007 2nd Ed. EN 60825-1+A2:2001 (Lasers Safety) 2014/35/EU Low Voltage Directive
International ITE	CB Report & Certificate per IEC 60950-1 2nd Ed. + National Differences AS/NZX 60950-1 (Australia /New Zealand)

EMI/EMC Standards

Table 208: EMI/EMC Standards

North America EMC for ITE	FCC CFR 47 part 15 Class A (USA) ICES-003 Class A (Canada)
European EMC standards	EN 55022:2006+A1:2007 Class A EN 55024:A2-2003 Class A includes IEC 61000-4-2, 3, 4, 5, 6, 11 EN 61000-3-2,8-2006 (Harmonics) EN 61000-3-3:2008 (Flicker) ETSI EN 300 386 v1.4.1, 2008-04 (EMC Telecommunications) 2014/30/EUC EMC Directive
International EMC certifications	CISPR 22: 2006 Ed 5.2, Class A (International Emissions) CISPR 24:A2:2003 Class A (International Immunity) IEC 61000-4-2:2008/EN 61000-4-2:2009 Electrostatic Discharge, 8kV Contact, 15 kV Air, Criteria A IEC 61000-4-3:2008/EN 61000-4-3:2006+A1:2008 Radiated Immunity 10V/m, Criteria A IEC 61000-4-4:2004 am1 ed.2./EN 61000-4-4:2004/ A1:2010 Transient Burst, 1 kV, Criteria A IEC 61000-4-5:2005 /EN 61000-4-5:2006 Surge, 2 kV L-L, 2 kV L-G, Level 3, Criteria A IEC 61000-4-6:2008/EN 61000-4-6:2009 Conducted Immunity, 0.15-80 MHz, 10V/m unmod. RMS, Criteria A IEC/EN 61000-4-11:2004 Power Dips & Interruptions, >30%, 25 periods, Criteria C
Country-specific	VCCI Class A (Japan Emissions) ACMA RCM (Australia Emissions) CCC Mark KCC Mark, EMC Approval (Korea)

Telecom Standards

Table 209: Telecom Standards

CE 2.0 compliant

IEEE 802.3 Media Access Standards

Table 210: IEEE 802.3 Media Access Standards

IEEE 802.3ab 1000BASE-T IEEE 802.3z 1000BASE-X IEEE 802.3ae 10GBASE-X IEEE 802.3at PoE-Plus IEEE 802.3az (EEE) IEEE 802.3u, 100BASE-FX

Summit X670-G2 Series Switches Technical Specifications

The Summit X670-G2 series includes the following switches:

- X670-G2-48x-4q
- X670-G2-72x

Table 211: X670-G2 Unpackaged Dimensions

X670-G2-48x-4q X670-G2-72x	Height: 1.73 inches (4.4 cm) Width: 17.38 inches (44.1 cm) Length: 19.20 inches (48.7 cm)

Table 212: X670-G2 Unpackaged Weight

X670-G2-48x-4q	14.7 lb (6.7 kg)
X670-G2-72x	15.42 lb (7.0 kg)

Table 213: X670-G2 Packaged Dimensions

X670-G2-48x-4q X670-G2-72x	Height: 13.99 inches (35.5 cm) Width: 24.23 inches (61.5 cm) Length: 27.58 inches (70.0 cm)

Table 214: X670-G2 Packaged Weight

X670-G2-48x-4q	20.1 lb (9.1 kg)
X670-G2-72x	20.7 lb (9.4 kg)

Table 215: Fan and Acoustic Noise

Switch Model	Bystander Sound Pressure	Declared Sound Power (L_{WAd})
X670-G2-48x-4q Dual 550 W AC power supply with front-to-back (FB) airflow	60.2 dB(A), 0°C to 45°C	7.3 bels, 0°C to 45°C
X670-G2-48x-4q Dual 550 W DC power supply with front-to-back (FB) airflow	61.3 dB(A), 0°C to 45°C	7.4 bels, 0°C to 45°C
X670-G2-48x-4q Dual 550 W AC power supply with back-to-front (BF) airflow	58.3 dB(A), 0°C to 35°C 70.1 dB(A), 45°C	7.0 bels, 0°C to 35°C 8.4 bels, 45°C
X670-G2-48x-4q Dual 550 W DC power supply with back-to-front (BF) airflow	55.0 dB(A), 0°C to 35°C 68.7 dB(A), 45°C	6.5 bels, 0°C to 35°C 8.1 bels, 45°C
X670-G2-72x Dual 550 W AC power supply with front-to-back (FB) airflow	58.9 dB(A), 0°C to 35°C 62.5 dB(A), 45°C	7.3 bels, 0°C to 35°C 7.6 bels, 45°C
X670-G2-72x Dual 550 W DC power supply with front-to-back (FB) airflow	58.5 dB(A), 0°C to 35°C 62.4 dB(A), 45°C	7.3 bels, 0°C to 35°C 7.6 bels, 45°C
X670-G2-72x Dual 550 W AC power supply with back-to-front (BF) airflow	59.8 dB(A), 0°C to 35°C 72.6 dB(A), 45°C	7.3 bels, 0°C to 35°C 8.2 bels, 45°C
X670-G2-72x Dual 550 W DC power supply with back-to-front (BF) airflow	56.4 dB(A), 0°C to 35°C 73.0 dB(A), 45°C	6.7 bels, 0°C to 35°C 8.3 bels, 45°C

18 Bystander Sound pressure is presented for comparison to other products measured using Bystander Sound Pressure.

19 Declared Sound Power is presented in accordance with ISO 7779:2010(E), ISO 9296:2010 per ETSI/EN 300 753:2012-01.

Power Options

Table 216: Summit X670-G2 Power Options

X670-G2-48x-4q (part # 17310)	550 W AC power supply: Part # 10925 550 W AC PS FB (front-to-back), Model # DS550HE-3 Part # 10927 550 W AC PS BF (back-to-front), Model # DS550HE-3-02 100-240 V, 50/60 Hz, 2.25 A max per PS
	550 W DC power supply: Part # 10926 550 W DC PS FB (front-to-back), Model # DS550DC-3 Part # 10928 550 W DC PS BF (back-to-front), Model # DS550DC-3-003 -48 VDC, 5.75 A max per PS
X670-G2-72x (part # 17300)	550 W AC power supply: Part # 10925 550 W AC PS FB (front-to-back), Model # DS550HE-3 Part # 10927 550 W AC PS BF (back-to-front), Model # DS550HE-3-02 100-240 V, 50/60 Hz, 2.75 A max per PS
	550 W DC power supply: Part # 10926 550 W DC PS FB (front-to-back), Model # DS550DC-3 Part # 10928 550 W DC PS BF (back-to-front), Model # DS550DC-3-003 -48 VDC, 6.75 A max per PS

Table 217: Power Consumption

Switch Model	Minimum Heat Dissipation	Minimum Power Consumption	Maximum Heat Dissipation	Maximum Power Consumption
X670-G2-48x-4q	325 BTU/hr	95 W	768 BTU/hr	225 W
X670-G2-72x	325 BTU/hr	95 W	939 BTU/hr	275 W

Table 218: CPU, Memory

CPU/Memory
1 GHz 64-bit CPU
2 GB DDR3 ECC SDRA memory
4 GB eMMC Flash Memory
12 MB buffer, per chip

Standards and Environmental Data

Table 219: Safety Standards

North American Safety of ITE	UL 60950-1 1st Ed., Listed Device (US) CSA 22.2 #60950-1-07 2nd Ed.(Canada) Complies with FCC 21CFR 1040.10 (US Laser Safety) CDRH Letter of Approval (US FDA Approval)
European Safety of ITE	EN 60950-1:2006 2nd Ed. TUV-R GS EN 60825-1:2007 (Lasers Safety) 2006/95/EC Low Voltage Directive
International Safety of ITE	CB Report & Certificate per IEC 60950-1:2005 2nd Ed., + National Differences AS/NZX 60950-1 (Australia /New Zealand)

Table 220: EMI/EMC Standards

North America EMC for ITE	FCC CFR 47 part 15 Class A (USA) ICES-003 Class A (Canada)
European EMC standards	EN 55022:2006+A1:2007 Class A EN 55024:1998+A1:2001+A2:2003 Class A includes IEC 61000-4-2, 3, 4, 5, 6, 11 EN 61000-3-2: 2006+A2:2009 (Harmonics) EN 61000-3-3:2008 (Flicker) ETSI EN 300 386: v1.4.1 (2008-04) (EMC Telecommunications) 2004/108/EC EMC Directive

Table 220: EMI/EMC Standards (continued)

International EMC certifications	CISPR 22: 2008 (Ed 6.0), Class A (International Emissions) EN 55024:1998+A1:2001+A2:2003 Class A (International Immunity) IEC/EN 61000-4-2:2008 Electrostatic Discharge, 8kV Contact, 15 kV Air, Criteria A IEC/EN 61000-4-3:2008 Radiated Immunity 10V/m, Criteria IEC/EN 61000-4-4:2004 Transient Burst, 1 kV, Criteria A IEC/EN 61000-4-5:2005 Surge, 2 kV L-L, 2 kV L-G, Level 3, Criteria A IEC/EN 61000-4-6:2008 Conducted Immunity, 0.15-80 MHz, 10V/m unmod. RMS, Criteria A IEC/EN 61000-4-11:2004 Power Dips & Interruptions, >30%, 25 periods, Criteria C
Country-specific	VCCI Class A (Japan Emissions) BSMI (Taiwan Emissions) ACMA (C-Tick) (Australia Emissions) CCC Mark (China) KCC Mark, EMC Approval (Korea)

Table 221: Telecom Standards

EN/ETSI 300 386:2008 (EMC Telecommunications)
EN/ETSI 300 019 (Environmental for Telecommunications)
MEF9 and MEF14 certified for EPL, EVPL, and ELAN

Table 222: IEEE 802.3 Media Access Standards

IEEE 802.3ab 1000BASE-T
IEEE 802.3z 1000BASE-X
IEEE 802.3ae 10GBASE-X
IEEE 802.3ba 40GBASE-X

Table 223: Environmental Data

Environmental standards	EN/ETSI 300 019-2-1 v2.1.2 (2000 - 2009) - Class 1.2 Storage EN/ETSI 300 019-2-2 v2.1.2 (1999 - 09) - Class 2.3 Transportation EN/ETSI 300 019-2-3 v2.1.2 (2003 - 04) - Class 3.1e Operational EN/ETSI 300 753 (1997-10) - Acoustic Noise ASTM D3580 Random Vibration Unpackaged 1.5G
Operating conditions	Temperature range: 0°C to 45°C (32°F to 113°F) Humidity: 10% to 95% relative humidity, non-condensing Altitude: 0 to 3,000 meters (9,850 feet)

Table 223: Environmental Data (continued)

	Operational shock (half sine): 30 m/s^2 (3 G), 11 ms, 60 shocks Operational random vibration: 3 to 500 Hz at 1.5 G rms
Storage & transportation conditions (packaged)	Transportation temperature: -40°C to 70°C (-40°F to 158°F) Storage and transportation humidity: 10% to 95% relative humidity, non-condensing Packaged shock (half sine): 180 m/s^2 (18 G), 6 ms, 600 shocks Packaged sine vibration: 5 to 62 Hz at velocity 5 mm/s, 62 to 500 Hz at 0.2 G Packaged random vibration: 5 to 20 Hz at 1.0 ASD w/–3 dB/ oct. from 20 to 200 Hz 14 drops minimum on sides and corners at 42 inches (<15 kg box)

ExtremeSwitching X690 Series Switches Technical Specifications

The ExtremeSwitching X690 series includes the following switches:

- X690-48t-2q-4c
- X690-48x-2q-4c

Table 224: X690 Unpackaged Dimensions

X690-48t-2q-4c X690-48x-2q-4c	Height: 1.71 inches (4.35 cm) Width: 19.19 inches (48.7 cm) Length: 17.38 inches (44.1 cm)

Table 225: X690 Unpackaged Weight

X690-48t-2q-4c	15.65 lb (7.1 kg)
X690-48x-2q-4c	14.88 lb (6.8 kg)

Table 226: X690 Packaged Dimensions

X690-48t-2q-4c X690-48x-2q-4c	Height: 6.07 inches (15.4 cm) Width: 21.35 inches (54.2 cm) Length: 23.17 inches (58.8 cm)

Table 227: X690 Packaged Weight

X690-48t-2q-4c	21.01 lb (9.5 kg)
X690-48x-2q-4c	20.28 lb (9.2 kg)

Fan and Acoustic Noise

Table 228: Fan and Acoustic Noise

Switch Model	Bystander Sound Pressure (at 25°C)	Declared Sound Power (at 25°C)
X690-48t-2q-4c (front-back airflow)	76.3 db(A)	9.0 bels
X690-48t-2q-4c (back-front airflow)	77.5 db(A)	9.0 bels
X690-48x-2q-4c (front-back airflow)	76.8 db(A)	9.0 bels
X690-48x-2q-4c (back-front airflow)	77.4 db(A)	9.1 bels

Power Options

Table 229: X690 Power Options

X690-48t-2q-4c (part # 17360) X690-48x-2q-4c (part # 17350)	770 W AC power supply: Part # 10960 770 W AC PS FB (front-back) Part # 10961 770 W AC PS FB (back-front) AC Input: 100-240 VAC, 50/60 Hz PSU Input Socket: IEC 320 C14 Power cord input plug: IEC 320 C13
	1100 W DC power supply: Part # 10962 1100 W DC PS FB (front-back) Part # 10963 1100 W DC PS FB (back-front) DC Input: -48 VDC

Table 230: Power Specifications

Switch Model	
X690-48t-2q-4c	AC Input: 100-127 VAC, 4.0 A max. per PSU, 50/60 Hz AC Input: 200-240 VAC, 2.0 A max. per PSU, 50/60 Hz DC Input: -48 to 60 VDC, 8.0 A max. per PSU
X690-48x-2q-4c	AC Input: 100-127 VAC, 3.0 A max. per PSU, 50/60 Hz AC Input: 200-240 VAC, 1.5 A max. per PSU, 50/60 Hz DC Input: -48 to 60 VDC, 6.0 A max. per PSU

Table 231: X690 Power Consumption

Switch Model	Minimum Heat Dissipation (BTU/hr)	Minimum Power Consumption (W)	Maximum Heat Dissipation (BTU/hr)	Maximum Power Consumption (W)
X690-48x-2q-4c AC	282 BTU/hr	83 W	1124 BTU/hr	329 W
X690-48x-2q-4c DC	311 BTU/hr	91 W	1178 BTU/hr	345 W
X690-48t-2q-4c AC	425 BTU/hr	125 W	1271 BTU/hr	373 W
X690-48t-2q-4c DC	421 BTU/hr	123 W	1315 BTU/hr	385 W
	1 PSU		2 PSU	

CPU, Memory

CPU/Memory
1 GHz 64-bit CPU
2 GB DDR3 ECC SDRA memory
4 GB eMMC Flash Memory
12 MB buffer, per chip

Standards and Environmental Data

Table 232: Safety Standards

North American Safety of ITE	UL 60950-1 1st Ed., Listed Device (US) CSA 22.2 #60950-1-07 2nd Ed.(Canada) Complies with FCC 21CFR 1040.10 (US Laser Safety) CDRH Letter of Approval (US FDA Approval)
European Safety of ITE	EN 60950-1:2006 2nd Ed. TUV-R GS EN 60825-1:2007 (Lasers Safety) 2006/95/EC Low Voltage Directive
International Safety of ITE	CB Report & Certificate per IEC 60950-1:2005 2nd Ed., + National Differences AS/NZX 60950-1 (Australia /New Zealand)

Table 233: EMI/EMC Standards

North America EMC for ITE	FCC 47 CFR part 15 subpart B Class A (USA) ICES-003 (Canada)
European EMC standards	EN 55022:2006+A1:2007 Class A EN 55024:1998+A1:2001+A2:2003 Class A includes IEC 61000-4-2, 3, 4, 5, 6, 11 EN 61000-3-2: 2006+A2:2009 (Harmonics) EN 61000-3-3:2008 (Flicker) 2014/30/EU EMC Directive ETSI EN 300 386: v1.4.1 (2008-04) (EMC Telecommunications) ETSI EN 50121-1 (Railroad) EN 55011 (ISM) EN 61000-6-2 (Industrial Immunity

Table 233: EMI/EMC Standards (continued)

International EMC certifications	CISPR 22: 2008 (Ed 6.0), Class A (International Emissions) EN 55024:1998+A1:2001+A2:2003 Class A (International Immunity) IEC/EN 61000-4-2:2008 Electrostatic Discharge, 8kV Contact, 15 kV Air, Criteria A IEC/EN 61000-4-3:2008 Radiated Immunity 10V/m, Criteria IEC/EN 61000-4-4:2004 Transient Burst, 1 kV, Criteria A IEC/EN 61000-4-5:2005 Surge, 2 kV L-L, 2 kV L-G, Level 3, Criteria A IEC/EN 61000-4-6:2008 Conducted Immunity, 0.15-80 MHz, 10V/m unmod. RMS, Criteria A IEC/EN 61000-4-11:2004 Power Dips & Interruptions, >30%, 25 periods, Criteria C
Country-specific	RCM (Australia) VCCI Class A (Japan Emissions) KCC mark, EMC Approval (Korea) BSMI (Taiwan Emissions) ANATEL (Brazil) CCC mark (China)

Table 234: Telecom Standards

EN/ETSI 300 386:2008 (EMC Telecommunications)
EN/ETSI 300 019 (Environmental for Telecommunications)
MEF9 and MEF14 certified for EPL, EVPL, and ELAN

Table 235: IEEE 802.3 Media Access Standards

IEEE 802.3ab 1000BASE-T
IEEE 802.3z 1000BASE-X
IEEE 802.3ae 10GBASE-X
IEEE 802.3ba 40GBASE-X

Table 236: Environmental Data

Environmental standards	EN/ETSI 300 019-2-1 v2.1.2 (2000 - 2009) - Class 1.2 Storage EN/ETSI 300 019-2-2 v2.1.2 (1999 - 09) - Class 2.3 Transportation EN/ETSI 300 019-2-3 v2.1.2 (2003 - 04) - Class 3.1e Operational EN/ETSI 300 753 (1997-10) - Acoustic Noise ASTM D3580 Random Vibration Unpackaged 1.5G
Operating conditions	Temperature range: 0°C to 45°C (32°F to 113°F) Humidity: 5% to 95% relative humidity, non-condensing Altitude: 0 to 3,000 meters (9,850 feet)

Table 236: Environmental Data (continued)

	Operational shock (half sine): 30 m/s^2 (3 G), 11 ms, 60 shocks Operational random vibration: 3 to 500 Hz at 1.5 G rms
Storage & transportation conditions (packaged)	Transportation temperature: -40°C to 70°C (-40°F to 158°F) Storage and transportation humidity: 10% to 95% relative humidity, non-condensing Packaged shock (half sine): 180 m/s^2 (18 G), 6 ms, 600 shocks Packaged sine vibration: 5 to 62 Hz at velocity 5 mm/s, 62 to 500 Hz at 0.2 G Packaged random vibration: 5 to 20 Hz at 1.0 ASD w/–3 dB/ oct. from 20 to 200 Hz 14 drops minimum on sides and corners at 42 inches (<15 kg box)

ExtremeSwitching X695 Series Switch Technical Specifications

The ExtremeSwitching X695-48Y-8C switch includes six unpopulated fan slots and two unpopulated power supply slots.

Table 237: X695 Unpackaged Dimensions

X695-48Y-8C switch	Height: 4.34 cm (1.71 in) Width: 43.96 cm (17.31 in) Length: 53.95 cm (21.24 in)
Fan unit, front-to-back or back-to-front	Height: 4.0 cm (1.57 in) Width: 4.0 cm (1.57 in) Length: 13.4 cm (5.28 in)
Four-post rack mount kit (included with switch)	Height: 2.1 cm (0.83 in) Width: 4.4 cm (17.3 in) Length: 63.0 cm - 90.0 cm (24.80 in - 35.43 in)
Two-post rack mount kit (ordered separately)	Height: 4.2 cm (1.65 in) Width: 2.4 cm (0.93 in) Length: 12.5 cm (4.92 in)

Table 238: X695 Unpackaged Weight

X695-48Y-8C switch with no PSUs	7.39 kg (16.29 lb)
Fan unit, front-to-back or back-to-front	0.14 kg (0.31 lb)

Table 238: X695 Unpackaged Weight (continued)

Four-post rack mount kit (included with switch)	2.65 kg (5.84 lb)
Two-post rack mount kit (ordered separately)	0.45 kg (0.99 lb)

Table 239: X695 Packaged Dimensions

X695-48Y-8C switch	Height: 18.5 cm (7.28 in) Width: 60.0 cm (23.62 in) Length: 88.0 cm (34.65 in)
Fan unit, front-to-back or back-to-front	Height: 24.0 cm (9.45 in) Width: 20.6 cm (8.11 in) Length: 22.1 cm (8.70 in)
Four-post rack mount kit (included with switch)	Height: 7.0 cm (2.76 in) Width: 11.0 cm (4.33 in) Length: 84.0 cm (33.07 in)
Two-post rack mount kit (ordered separately)	Height: 24.0 cm (9.45 in) Width: 20.6 cm (8.11 in) Length: 22.1 cm (8.70 in)

Table 240: X695 Packaged Weight

X695-48Y-8C switch with no PSUs	14.59 kg (32.17 lb)
Fan unit, front-to-back or back-to-front	1.82 kg (4.01 lb)
Four-post rack mount kit (included with switch)	2.71 kg (5.97 lb)
Two-post rack mount kit (ordered separately)	3.20 kg (7.05 lb)

Fan and Acoustic Noise

Table 241: Fan and Acoustic Noise

Switch Model	Bystander Sound Pressure (at 25°C)	Declared Sound Power (at 25°C)
X695-48Y-8C-F (FB airflow)	52.2 db(A)	6.8 bels
X695-48Y-8C-R (BF airflow)	50.5 db(A)	6.7 bels

Fan Tray and Speed Variation

Fan speeds are adjusted based on calculations of the temperatures on all sensors. Due to one fan being located behind the other, air pushed from one fan may cause the

other fan in the module to run at a higher speed. One fan can run at medium speed while the other can spin at high speed if one is close to the temperature boundary.

Table 242: Fan Tray Speed Variation

Description	Operation Status	Operation Speed	Airflow Direction
Tray 1 Fan 1	up	high speed	unknown*
Tray 1 Fan 2	up	medium speed	unknown*
Tray 2 Fan 1	up	high speed	unknown*
Tray 2 Fan 2	up	medium speed	unknown*
Tray 3 Fan 1	up	high speed	unknown*
Tray 3 Fan 2	up	medium speed	unknown*
Tray 4 Fan 1	up	high speed	unknown*
Tray 4 Fan 2	up	medium speed	unknown*
Tray 5 Fan 1	up	high speed	unknown*
Tray 5 Fan 2	up	medium speed	unknown*
Tray 6 Fan 1	up	high speed	unknown*
Tray 6 Fan 2	up	medium speed	unknown*

*The color of the tab on the fan tray indicates the airflow direction:

- Red = Front-to-Back
- Blue = Back-to-Front

Power Options

Supported power supply configurations include two AC power supplies, two DC power supplies, or one AC and one DC power supply.

Table 243: X695 Power Options

X695-48Y-8C	750 W AC power supply: Part # XN-ACPWR-750W-F (front-to-back) Part # XN-ACPWR-750W-R (back-to-front) AC Input: 100-120/200-240 VAC, 50/60 Hz 3.5/1.8 A max. for each PSU PSU Input Socket: IEC 320 C14 Power cord input plug: IEC 320 C13
	750 W DC power supply: Part # XN-DCPWR-750W-F (front-to-back) Part # XN-DCPWR-750W-R (back-to-front) DC Input: -48 to -60 VDC, 7.5 A max. for each PSU

Power Consumption

Table 244: X695 Power Consumption

Switch Model	Minimum Heat Dissipation (BTU/hr)	Minimum Power Consumption (W)	Maximum Heat Dissipation (BTU/hr)	Maximum Power Consumption (W)
X695-48Y-8C	553	167	1600	469

Mean Time Between Failures (MTBF)

Table 245: X695-48Y-8C MTBF

Switch	Mean Time Between Failures
X695-48Y-8C-AC-F	389719 hrs @ 25°C
X695-48Y-8C-AC-R	450269 hrs @ 25°C

CPU, Memory

Table 246: CPU, Memory

2.2 GHz 64-bit CPU
16 Gb memory, 128 Gb SSD
4GB eMMC Flash Memory
32 MB buffer, per chip

Standards

Table 247: Safety Standards

North American Safety of ITE	UL 62368-1 2nd Ed., 2014-12-01, Listed Device (US) UL 60950-1 2nd Ed., 2014-10-14, Listed Device (US) CAN/CSA 22.2 #62368-1-14 2nd Ed., Canada CAN/CSA 22.2 #60950-1-07 2nd Ed., Canada 2014-10 Complies with FCC 21 CFR Chapter 1, Sub-chapter J in accordance with FDA & CDRH requirements (US Laser Safety) CDRH Letter of Approval (US FDA Approval)
European Safety of ITE	EN 62368-1 EN 60950 2014/35/EU Low Voltage Directive
International Safety of ITE	CNS 14336-1 AS/NZX 60950-1 (Australia /New Zealand) GB4943.1 IEC/EN 60825, IEC/EN 60825-2 (Lasers Safety) IEC 62368-1 IEC 60950-1

Table 248: EMI/EMC Standards

North America EMC for ITE	FCC 47 CFR part 15 subpart B Class A (USA) ICES-003 (Canada)
European EMC standards	EN 300 386 V2.1.1(2016-07) Class A EN 55032:2015/AC:2016-07 Class A EN 55024:2010/A1:2015 EN 55011:2009+A1:2010 (Group 1, Class A) EN 61000-6-2:2005+AC:2005 EN 61000-6-4:2007+A1:2011 EN 61000-3-2:2014 Class A EN 61000-3-3:2013 EN 61000-4-2:2009 EN 61000-4-3:2006+A1:2008+A2:2010 EN 61000-4-4:2012 EN 61000-4-5:2014 EN 61000-4-6:2014/AC:2015 EN 61000-4-8:2010 EN 61000-4-11:2004/A1:2017

Table 248: EMI/EMC Standards (continued)

International EMC certifications	IEC 61000-6-2:2016 ED 3.0 IEC 61000-6-4:2018 ED 3.0 IEC 61000-4-2:2008 ED 2.0 IEC 61000-4-3:2006+AMD1:2007+AMD2:2010 ED 3.2 IEC 61000-4-4:2012 ED 3.0 IEC 61000-4-5:2014+AMD1:2017+ ED 3.1 IEC 61000-4-6:2013+ ED 4.0 IEC 61000-4-8:2009+ ED 2.0 IEC 61000-4-11:2004+AMD1:2017+ ED 2.1 CISPER 32:2015 ED 2.0 Class A CISPER 24:2010+AMD1:2015 Class A CISPER 11:2009 ED 5.0 Group 1, Class A AS/NZS CISPER 32:2015 Class A GB/T9254-2008 Class A ANSI C63.4:2014
Country-specific	RCM (Australia) VCCI Class A (Japan) MSIP KCC (Korea) BSMI (Taiwan) ANATEL (Brazil) CCC mark (China) SABS & NRCS (South Africa) UL, FCC (North America) EAC mark (Custom Union)

Table 249: Telecom Standards

EN/ETSI 300 386:2008 (EMC Telecommunications) EN/ETSI 300 019 (Environmental for Telecommunications) MEF9 and MEF14 certified for EPL, EVPL, and ELAN

Table 250: IEEE 802.3 Media Access Standards

IEEE 802.3ab 1000BASE-T IEEE 802.3z 1000BASE-X IEEE 802.3ae 10GBASE-X IEEE 802.3ba 40GBASE-X

Environmental Data

Table 251: Environmental Data

Environmental standards	EN/ETSI 300 019-2-1 v2.1.2 (2000 - 2009) - Class 1.2 Storage EN/ETSI 300 019-2-2 v2.1.2 (1999 - 09) - Class 2.3 Transportation EN/ETSI 300 019-2-3 v2.1.2 (2003 - 04) - Class 3.1e Operational EN/ETSI 300 753 (1997-10) - Acoustic Noise ASTM D3580 Random Vibration Unpackaged 1.5G
Temperature range	• Front-to-back airflow: 0°C to 50°C (32°F to 122°F) up to 1800m (6000 ft) • Front-to-back airflow: 0°C to 45°C (32°F to 113°F) above 1800m (6000 ft) • Back-to-front airflow: 0°C to 45°C (32°F to 113°F) up to 1800m (6000 ft) • Back-to-front airflow: 0°C to 40°C (32°F to 104°F) above 1800m (6000 ft)
Other operating conditions	Humidity: 5% to 95% relative humidity, non-condensing Altitude: 0 to 3,000 meters (9,850 feet) Operational shock (half sine): 30 m/s^2 (3 G), 11 ms, 60 shocks Operational random vibration: 3 to 500 Hz at 1.5 G rms
Storage & transportation conditions (packaged)	Transportation temperature: -40°C to 70°C (-40°F to 158°F) Humidity: 5% to 95% relative humidity, non-condensing Packaged shock (half sine): 180 m/s^2 (18 G), 6 ms, 600 shocks Packaged sine vibration: 5 to 62 Hz at velocity 5 mm/s, 62 to 500 Hz at 0.2 G Packaged random vibration: 5 to 20 Hz at 1.0 ASD w/–3 dB/ oct. from 20 to 200 Hz 14 drops minimum on sides and corners at 42 in (<15 kg box)

ExtremeSwitching X870 Series Switches Technical Specifications

The ExtremeSwitching X870 series includes the following switches:

- X870-32c

- X870-96x-8c

Table 252: X870 Unpackaged Dimensions

X870-32c X870-96x-8c	Height: 1.75 inches (4.5 cm) Width: 17.00 inches (43.2 cm) Length: 19.00 inches (48.3 cm)

Table 253: X870 Unpackaged Weight

X870-32c X870-96x-8c	15.21 lb (6.9 kg)

Table 254: X870 Packaged Dimensions

X870-32c X870-96x-8c	Height: 6.69 inches (17.0 cm) Width: 22.05 inches (56.0 cm) Length: 23.43 inches (59.5 cm)

Table 255: X870 Packaged Weight

X870-32c X870-96x-8c	20.33 lb (9.2 kg)

Fan and Acoustic Noise

Table 256: Fan and Acoustic Noise

Switch Model	Bystander Sound Pressure	Declared Sound Power
X870-32c X870-96x-8c (front-back airflow)	54.8 db(A) up to 25°C 57.5 db(A) up to 30°C 76.5 db(A) at 45°C (max)	7.0 bels up to 25°C 7.2 bels up to 30°C 9.2 bels at 45°C (max)
X870-32c X870-96x-8c (back-front airflow)	54.9 db(A) up to 25°C 62.8 db(A) up to 30°C 76.4 db(A) at 45°C (max)	7.4 bels up to 25°C 7.8 bels up to 30°C 9.1 bels at 45°C (max)

Power Options

Table 257: X870 Power Options

X870-32c (part # 17800) X870-96x-8c (part # 17810)	770 W AC power supply: Part # 10960 770 W AC PS FB (front-back) Part # 10961 770 W AC PS FB (back-front) AC Input: 100-240 VAC, 50/60 Hz PSU Input Socket: IEC 320 C14 Power cord input plug: IEC 320 C13
	1100 W DC power supply: Part # 10962 1100 W DC PS FB (front-back) Part # 10963 1100 W DC PS FB (back-front) DC Input: -48 VDC

Table 258: Power Specifications

Switch Model	
X870-32c X870-96x-8c	AC Input: 100-127 VAC, 5.3 A max. per PSU, 50/60 Hz AC Input: 200-240 VAC, 2.7 A max. per PSU, 50/60 Hz DC Input: -48 VDC, 11 A max. per PSU

CPU, Memory

CPU/Memory
1 GHz 64-bit CPU
2 GB DDR3 ECC SDRA memory
4 GB eMMC Flash Memory
12 MB buffer, per chip

Standards and Environmental Data

Table 259: Safety Standards

North American Safety of ITE	UL 60950-1 1st Ed., Listed Device (US) CSA 22.2 #60950-1-07 2nd Ed.(Canada) Complies with FCC 21CFR 1040.10 (US Laser Safety) CDRH Letter of Approval (US FDA Approval)
European Safety of ITE	EN 60950-1:2006 2nd Ed. TUV-R GS EN 60825-1:2007 (Lasers Safety) 2006/95/EC Low Voltage Directive
International Safety of ITE	CB Report & Certificate per IEC 60950-1:2005 2nd Ed., + National Differences AS/NZX 60950-1 (Australia /New Zealand)

Table 260: EMI/EMC Standards

North America EMC for ITE	FCC 47 CFR part 15 subpart B Class A (USA) ICES-003 (Canada)
European EMC standards	EN 55022:2006+A1:2007 Class A EN 55024:1998+A1:2001+A2:2003 Class A includes IEC 61000-4-2, 3, 4, 5, 6, 11 EN 61000-3-2: 2006+A2:2009 (Harmonics) EN 61000-3-3:2008 (Flicker) 2014/30/EU EMC Directive ETSI EN 300 386: v1.4.1 (2008-04) (EMC Telecommunications) ETSI EN 50121-1 (Railroad) EN 55011 (ISM) EN 61000-6-2 (Industrial Immunity

Table 260: EMI/EMC Standards (continued)

International EMC certifications	CISPR 22: 2008 (Ed 6.0), Class A (International Emissions) EN 55024:1998+A1:2001+A2:2003 Class A (International Immunity) IEC/EN 61000-4-2:2008 Electrostatic Discharge, 8kV Contact, 15 kV Air, Criteria A IEC/EN 61000-4-3:2008 Radiated Immunity 10V/m, Criteria IEC/EN 61000-4-4:2004 Transient Burst, 1 kV, Criteria A IEC/EN 61000-4-5:2005 Surge, 2 kV L-L, 2 kV L-G, Level 3, Criteria A IEC/EN 61000-4-6:2008 Conducted Immunity, 0.15-80 MHz, 10V/m unmod. RMS, Criteria A IEC/EN 61000-4-11:2004 Power Dips & Interruptions, >30%, 25 periods, Criteria C
Country-specific	RCM (Australia) VCCI Class A (Japan Emissions) KCC mark, EMC Approval (Korea) BSMI (Taiwan Emissions) ANATEL (Brazil) CCC mark (China)

Table 261: Telecom Standards

EN/ETSI 300 386:2008 (EMC Telecommunications)
EN/ETSI 300 019 (Environmental for Telecommunications)
MEF9 and MEF14 certified for EPL, EVPL, and ELAN

Table 262: IEEE 802.3 Media Access Standards

IEEE 802.3ab 1000BASE-T
IEEE 802.3z 1000BASE-X
IEEE 802.3ae 10GBASE-X
IEEE 802.3ba 40GBASE-X

Table 263: Environmental Data

Environmental standards	EN/ETSI 300 019-2-1 v2.1.2 (2000 - 2009) - Class 1.2 Storage EN/ETSI 300 019-2-2 v2.1.2 (1999 - 09) - Class 2.3 Transportation EN/ETSI 300 019-2-3 v2.1.2 (2003 - 04) - Class 3.1e Operational EN/ETSI 300 753 (1997-10) - Acoustic Noise ASTM D3580 Random Vibration Unpackaged 1.5G
Operating conditions	Temperature range: 0°C to 45°C (32°F to 113°F) Humidity: 10% to 95% relative humidity, non-condensing Altitude: 0 to 3,000 meters (9,850 feet)

Table 263: Environmental Data (continued)

	Operational shock (half sine): 30 m/s^2 (3 G), 11 ms, 60 shocks Operational random vibration: 3 to 500 Hz at 1.5 G rms
Storage & transportation conditions (packaged)	Transportation temperature: -40°C to 70°C (-40°F to 158°F) Storage and transportation humidity: 10% to 95% relative humidity, non-condensing Packaged shock (half sine): 180 m/s^2 (18 G), 6 ms, 600 shocks Packaged sine vibration: 5 to 62 Hz at velocity 5 mm/s, 62 to 500 Hz at 0.2 G Packaged random vibration: 5 to 20 Hz at 1.0 ASD w/–3 dB/ oct. from 20 to 200 Hz 14 drops minimum on sides and corners at 42 inches (<15 kg box)

V300 Virtual Port Extender Specifications

The following V300 Virtual Port Extender models are available:

- V300-8P-2X
- V300-8T-2X
- V300-8P-2T-W

- V300HT-8P-2X
- V300HT-8T-2X

Table 264: V300 Unpackaged Dimensions

V300-8P-2X V300-8T-2X V300HT-8P-2X V300HT-8T-2X	Height:1.73 in (4.4 cm) Width: 7.76 in (19.71 cm) Length: 212 in (538.48 cm)
V300-8P-2T-W	Height: 1.73 in (4.4 cm) Width: 8.26 in (21 cm) Length: 7.48 in (19 cm)

Table 265: V300 Unpackaged Weight

V300-8P-2X V300-8T-2X V300HT-8P-2X V300HT-8T-2X	3.31 lb (1.5 kg)
V300-8P-2T-W	3.22 lb (1.46 kg)

Table 266: V300 Packaged Dimensions

V300-8P-2X	Height: 3.07 in (7.79 cm) Width: 11.52 in (29.26 cm) Length: 19.98 in (50.74 cm)
V300-8T-2X	Height: 3.07 in (7.79 cm) Width: 10.15 in (25.78 cm) Length: 17.61 in (44.72 cm)
V300-8P-2T-W	Height: 3.08 in (7.82 cm) Width: 10.85 in (27.56 cm) Length: 11.52 in (29.26 cm)
V300HT-8P-2X V300HT-8T-2X	Height: 3.07 in (7.79 cm) Width: 10.15 in (25.78 cm) Length: 14.46 in (36.72 cm)

Table 267: V300 Packaged Weight

V300-8P-2X with 280W PSU	7.94 (3.6 kg)
V300-8T-2X with 40W PSU	5.73 lb (2.6 kg)
V300-8P-2T-W	4.1 lb (1.86 kg)
V300HT-8P-2X V300HT-8T-2X	3.97 (1.8kg)

Power Specifications

Note
When you use a redundant power supply (RPS), only redundant power – not additive power – is supported. Thus, the PoE ports load does not increase when an RPS is added.

Table 268: V300 Power Options

V300-8P-2X	DC Input: 54VDC, 4.5A max
V300-8T-2X	DC Input: 12VDC, 1.5A max
V300-8P-2T-W	The PoE PSE Budget is dynamically determined by the 802.3bt Type 4 PD input power applied to its uplinks as follows: • 2 x 90W = PoE ports load to 105W • 1 x 90W = PoE ports load to 50W • 2 x 60W = PoE ports load to 75W • 1 x 60W = PoE ports load to 30W • 2 x 30W = PoE ports load to 30W • 1 x 30W = PoE ports load to 0W
V300HT-8P-2X	DC Input: 54VDC, 4.5A max
V300HT-8T-2X	DC Input: 12VDC, 1.5A max

Table 269: Power Specifications

	Minimum Heat Dissipation (BTU/hr)	Minimum Power Consumption (Watts)	Maximum Heat Dissipation (BTU/hr)	Maximum Power Consumption (Watts)
V300-8P-2X	25.9	7.6W	118.2	214.6W
V300-8T-2X	11.6	3.3W	23.8	7.0W
V300-8P-2T-W	24.57	7.2W	82.1	129.1W
V300HT-8P-2X	25.8	7.6W	113.7	213.3W
V300HT-8T-2X	16.6	4.9W	7.4	25.2W

Minimum is defined as idle, with no ports linked. Maximum is defined as fans high, all ports 100% traffic.

Standards and Environmental Data

Table 270: Safety Standards

North American Safety of ITE	UL 60950-1 2nd Ed., A2:2014, Listed Device (US) CSA 22.2 #60950-1-07 2nd Ed., 2014-10 Canada) Complies with FCC 21CFR 1040.10 (US Laser Safety) CDRH Letter of Approval (US FDA Approval)
European Safety of ITE	EN 60950-1:2006 +A11+A1+A12+A2 EN 60825-1:2007 (Lasers Safety) IEC 60950-1:2005 2nd+A1:2009+A2:2013 2014/35/EU Low Voltage Directive
International Safety of ITE	CB Report & Certificate per IEC 60950-1:2005 2nd Ed. + National Differences AS/NZX 60950-1 (Australia /New Zealand)

Table 271: Environmental Data

Operating conditions	Temperature: 0°C to 60°C (32°F to 140°F) for V300 8P-2T-W and V300-8P/8T-2X models Temperature: -40°C to 70°C (-40°F to 158°F) for V300HT-8P/8T-2X models Storage and transportation temperature: -40°C to 70°C (-40°F to 158°F) Humidity: 5% to 95% relative humidity, non-condensing Altitude: 0 to 3,000 meters (9,850 feet)

V400 Virtual Port Extender Technical Specifications

The following V400 Virtual Port Extender models are available:

- V400-24t-10GE2 (part no. 18101)
- V400-24p-10GE2 (part no. 18102)
- V400-48t-10GE4 (part no. 18103)
- V400-48p-10GE4 (part no. 18104)

Table 272: V400 Unpackaged Dimensions

V400-24t-10GE2	Height: 1.70 in (4.32 cm) Width: 9.97 in (25.3 cm) Length: 17.34 in (44.0 cm)
V400-24p-10GE2	Height: 1.70 in (4.32 cm) Width: 9.97 in (25.3 cm) Length: 17.34 in (44.0 cm)

Table 272: V400 Unpackaged Dimensions (continued)

V400-48t-10GE4	Height: 1.70 in (4.32 cm) Width: 9.97 in (25.3 cm) Length: 17.34 in (44.0 cm)
V400-48p-10GE4	Height: 1.70 in (4.32 cm) Width: 15.25 in (38.7 cm) Length: 17.34 in (44.0 cm)

Table 273: V400 Unpackaged Weight

V400-24t-10GE2	6.62 lb (3.00 kg)
V400-24p-10GE2	9.08 lb (4.12 kg)
V400-48t-10GE4	7.14 lb (3.26 kg)
V400-48p-10GE4	14.06 lb (6.38 kg)

Table 274: V400 Packaged Dimensions

V400-24t-10GE2	Height: 4.49 in (11.4 cm) Width: 14.66 in (37.2 cm) Length: 22.02 in (55.9 cm)
V400-24p-10GE2	Height: 4.49 in (11.4 cm) Width: 14.66 in (37.2 cm) Length: 22.02 in (55.9 cm)
V400-48t-10GE4	Height: 4.49 in (11.4 cm) Width: 14.66 in (37.2 cm) Length: 22.02 in (55.9 cm)
V400-48p-10GE4	Height: 4.49 in (11.4 cm) Width: 19.86 in (50.4 cm) Length: 22.02 in (55.9 cm)

Table 275: V400 Packaged Weight

V400-24t-10GE2	9.00 lb (4.08 kg)
V400-24p-10GE2	11.44 lb (5.19 kg)
V400-48t-10GE4	9.69 lb (4.39 kg)
V400-48p-10GE4	16.56 lb (7.50 kg)

Power Specifications

Note
When you use a redundant power supply (RPS), only redundant power – not additive power – is supported. Thus, the PoE ports load does not increase when an RPS is added.

Table 276: V400 Power Options

V400-24t-10GE2	AC Input: 100-240 VAC, 50/60 Hz, 0.6 A max
V400-24p-10GE2	AC Input: 100-240 VAC, 50/60 Hz, 2.2 A max DC RPS input: 54 VDC, 18.52 A max • PoE ports load to 382 W for AC input only. • PoE ports load to 720 W for DC input only. • PoE ports load to 720 W for AC+DC input.
V400-48t-10GE4	AC Input: 100-240 VAC, 50/60 Hz, 1.0 A max
V400-48p-10GE4	AC Input: 100-240 VAC, 50/60 Hz, 12.0 - 6.0 A max DC RPS input: 54 VDC, 18.52 A max • PoE ports load to 740 W for AC input only. • PoE ports load to 900 W for DC input only. • PoE ports load to 1440 W for AC+DC input.

Table 277: Power Specifications

	Minimum[20] Heat Dissipation (BTU/hr)	Minimum[20] Power Consumption (Watts)	Maximum[20] Heat Dissipation (BTU/hr)	Maximum[20] Power Consumption (Watts)
V400-24t-10GE2	36.1	10.6	75.2	22.1
V400-24p-10GE2	109.8	32.2	336.8	478.7
V400-48t-10GE4	66.0	19.3	134.8	39.5
V400-48p-10GE4	168.9	49.5	583.2	910.9
VX-RPS-1000	141.3	41.4	3152.8	924

[20] Minimum is defined as idle, with no ports linked. Maximum is defined as fans high, all ports 100% traffic.

Fan and Acoustic Sound

Table 278: Fan and Acoustic Sound

	Bystander Sound Pressure[21] in dB(A)	Declared Sound Power (L_{WAd})[21] in bels
V400-24t-10GE2	41.6 (Duty 30%) / 59.4 (max.)	4.4 (Duty 30%) / 6.2 (max.)
V400-24p-10GE2	47.5 (Duty 30%) / 64.0 (max.)	5.0 (Duty 30%) / 6.7 (max.)
V400-48t-10GE4	43.4 (Duty 30%) / 61.1 (max.)	4.6 (Duty 30%) / 6.4 (max.)
V400-48p-10GE4	48.5 (Duty 30%) / 65.5 (max.)	5.1 (Duty 30%) / 6.8 (max.)

Standards and Environmental Data

Table 279: Safety Standards

North American Safety of ITE	UL 60950-1 2nd Ed., A2:2014, Listed Device (US) CSA 22.2 #60950-1-07 2nd Ed., 2014-10 Canada) Complies with FCC 21CFR 1040.10 (US Laser Safety) CDRH Letter of Approval (US FDA Approval)
European Safety of ITE	EN 60950-1:2006 +A11+A1+A12+A2 EN 60825-1:2007 (Lasers Safety) IEC 60950-1:2005 2nd+A1:2009+A2:2013 2014/35/EU Low Voltage Directive
International Safety of ITE	CB Report & Certificate per IEC 60950-1:2005 2nd Ed. + National Differences AS/NZX 60950-1 (Australia /New Zealand)

Table 280: V400 Environmental Data

Operating conditions	Temperature: 0°C to 50°C (32°F to 122°F) for non-PoE models Temperature: 0°C to 45°C (32°F to 113°F) for PoE models Storage and transportation temperature: -40°C to 70°C (-40°F to 158°F) Humidity: 5% to 95% relative humidity, non-condensing Altitude: 0 to 3,000 meters (9,850 feet)

[21] At 25°C and 50% PoE load where applicable

LRM/MACsec Adapter Technical Specifications

The LRM/MACsec Adapter (part no. 10965) can be attached to switch ports that are not LRM or MACsec capable, using a cable that is specifically designed for this purpose.

Table 281: LRM/MACsec Adapter Packaged Dimensions

Height	3.00 cm (1.18 in)
Width	7.60 cm (2.99 in)
Length	12.35 cm (4.86 in)
Weight	300 g (0.66 lb)

Table 282: LRM/MACsec Adapter Power Specifications

LRM/MACsec Adapter Environmental Data and Standards

Table 283: Environmental Data

Operating temperature	0°C to 40°C (32°F to 104°F) when used with the following optics modules: • Tunable DWDM SFP+ (part no. 10325) • ER SFP+ (part no. 10309) • ZR SFP+ (part no. 10310) • Bidirectional 120 km SFP (part nos. MGBIC-BX120-U and MGBIC-BX120-D) 0°C to 45°C (32°F to 113°F) when used with all other supported optics modules
Storage and transportation temperature	-40°C to 70°C (-40°F to 158°F)
Humidity	10% to 95% relative humidity, non-condensing
Altitude	0 to 3,000 meters (9,850 feet)

Table 284: Safety Standards

North American Safety of ITE	UL 62368-1:2014, Listed Device (US) UL 60950-1 2nd Ed., A2:2014, Listed Device (US) CAN/CSA 22.2 #62368-1-14:2014 Canada)
European Safety of ITE	EN 62368-1:2014 EN 60950-1:2006+A11+A1+A12+A2 IEC 62368-1:2014 IEC 60950-1:2005 2nd+A1:2009+A2:2013 2014/35/EU Low Voltage Directive

Five-Slot Bracket

Table 285: Five-Slot Bracket for LRM/MACsec Adapter: Specifications

Part no.	10966
Height	4.32 cm (1.70 in)
Width	48.26 cm (19.00 in)
Length	5.00 cm (1.97 in)
Weight	487 g (1.07 lb)

Half-Duplex to Full-Duplex Converter Technical Specifications

The Half-Duplex to Full-Duplex Converter can be attached to switch ports to enable communication over half-duplex connections with older Ethernet devices.

Order the converter using one of the following part numbers:

- 10958: HDX to FDX Converter, Rest of World
- 10959: HDX to FDX Converter: North America

Other specifications:

- 8.8 Gbps switching capacity
- 4 priority queues
- 192Kb packet buffer

Table 286: Half-Duplex to Full-Duplex Converter Packaged Dimensions

Height	2.69 cm (1.06 in)
Width	12.9 cm (5.08 in)
Depth	6.91 cm (2.72 in)
Weight	200 g (0.44 lb)

Half-Duplex to Full-Duplex Converter Power Specifications

Table 287: Rest of the World External Power Pack (10958-CEE 7/1)

Voltage input range	200-240 VAC
Line frequency range	50 to 60 Hz
Operating temperature	0°C to 40°C (32°F to 104°F) normal operation

Table 288: North American External Power Pack (10959-NEMA 1-15P)

Voltage input range	100-120 VAC
Line frequency range	50 to 60 Hz
Operating temperature	0°C to 40°C (32°F to 104°F) normal operation

Half-Duplex to Full-Duplex Converter Environmental Data and Standards

Table 289: Environmental Data

Environmental conditions	Operating temperature: 0°C to 40°C (32°F to 104°F) Storage temperature: -40°C to 70°C (-40°F to 158°F) Humidity: 10% to 95% relative humidity, non-condensing Altitude: 0 to 2,000 meters (6,562 feet) Packaged shock (half sine): 180 m/s2 (18 G), 6 ms, 600 shocks Packaged vibration: 5 to 62 Hz at velocity 5 mm/s, 62 to 500 Hz at 0.2 G Packaged random vibration: 5 to 20 Hz at 1.0 ASD w/–3 dB/ oct. from 20 to 200 Hz Packaged drop height: 14 drops minimum on sides and corners at 42 inches (<15 kg box)

Table 290: Safety Standards

North American ITE	UL 60950-1 2nd Ed., Listed Device (U.S.) CSA 22.2 #60950-1-03 2nd Ed. (Canada) Complies with FCC 21CFR 1040.10 (U.S. Laser Safety)
European/International ITE	EN 60950-1:2007 2nd Ed. CB Report & Certificate per IEC 60950-1 2nd Ed. + National Differences AS/NZS 60950-1 (Australia /New Zealand)
EMI/EMC Standards	FCC CFR 47 part 15 Class A (USA) ICES-003 Class A (Canada) EN 55022: Class A EN 55024:A2 Class A includes IEC 61000-4-2, 3, 4, 5, 6, 11 EN 61000-3-2,8 (Harmonics) EN 61000-3-3 (Flicker) 2014/30/EU EMC Directive
International EMC Certifications	CISPR 22: Ed 5.2, Class A (International Emissions) CISPR 24:A2: Class A (International Immunity) IEC 61000-4-2: EN 61000-4-2:2009 Electrostatic Discharge, 8kV Contact, 15 kV Air, Criteria A IEC 61000-4-3: EN 61000-4-3:2006+A1:2008 Radiated Immunity 10V/m, Criteria A IEC 61000-4-4: am1 ed.2./EN 61000-4-4:2004/A1:2010 Transient Burst, 1 kV, Criteria A IEC 61000-4-5: EN 61000-4-5:2006 Surge, 2 kV L-L, 2 kV L-G, Level 3, Criteria A IEC 61000-4-6: EN 61000-4-6:2009 Conducted Immunity, 0.15-80 MHz, 10V/m unmod. RMS, Criteria A IEC/EN 61000-4-11: Power Dips & Interruptions, >30%, 25 periods, Criteria C

Table 290: Safety Standards (continued)

IEEE 802.3 Media Access Standards	IEEE 802.3ab 1000BASE-T IEEE 802.3az EEE
Environmental specifications	EN/ETSI 300 019-2-1 v2.1.2 - Class 1.2 Storage EN/ETSI 300 019-2-2 v2.1.2 - Class 2.3 Transportation EN/ETSI 300 019-2-3 v2.1.2 - Class 3.1e Operational ASTM D3580 Random Vibration Unpackaged 1.5 G

Summit 300 W Power Supplies Technical Specifications

The following Summit 300 W power supplies are available for use:

- Summit 300 W AC power supply Front-to-Back airflow Model 10930A
- Summit 300 W AC power supply Back-to-Front airflow Model 10943
- Summit 300 W DC power supply Front-to-Back airflow Model 10933
- Summit 300 W DC power supply Back-to-Front airflow Model 10944

These power supplies are for use with the X460-G2 series switches (non-PoE models).

Summit 300 W AC Power Supply (Model 10930A and 10943)

Table 291: Physical Specifications

Dimensions	Height: 1.57 inches (4.0 cm) Width: 3.15 inches (8.0 cm) Depth: 9.5 Inches (24.1 cm)
Weight	2.25 lb (1 kg)

Table 292: Power Specifications

Voltage input range	85 to 264 V~
Nominal input ratings	100 to 240 V~, 50 to 60 Hz, 5 A
Nominal input current at full loads	4.2 A @ 90 V~ (low-line) 1.7 A @ 230 V~ (high-line)
Line frequency range	47 to 63 Hz
Maximum inrush current	30 A
Output	12 V⎓, 25 A max, 300 Watts 3.3 V⎓, 3.03 A max, 10 Watts
Power supply input socket	IEC 320 C14
Power cord input plug	IEC 320 C13

Table 292: Power Specifications (continued)

Power cord wall plug	Refer to Power Cord Requirements for AC-Powered Switches and AC Power Supplies on page 504.
Power supply cord gauge	18 AWG (0.75 mm^2) up to 6 feet or 2 meters or 16 AWG (1.0 mm^2) over 6 feet
Efficiency	Low Line: 85% at 50% load and 88% at 100% load High Line: 86% at 50% load and 89% at 100% load

Table 293: Environmental Specifications

Operating temperature	0°C to 50°C (normal operation)
Storage temperature	-40°C to 70°C
Operating humidity	20% to 90% relative humidity, non-condensing
Operational shock	30 m/s^2 (3 G)

Summit 300 W DC Power Supply (Model 10933 and 10944)

Table 294: Physical Specifications

Dimensions	Height: 1.57 inches (4.0 cm) Width: 3.15 inches (8.0 cm) Depth: 9.5 Inches (24.1 cm)
Weight	1.83 lb (0.83 kg)

Table 295: Power Specifications

Nominal Input	–40 to –72 V, 9 A
DC Voltage Input Range	18V to -72V⎓
Maximum Input Amperages	9 A @ 40 V⎓ 7.5 A @ 48 V⎓ 5 A @ 72 V⎓
Inrush Current	82 A at 72 V⎓ peak
Minimum wire size	14 AWG (1.5 mm^2) copper stranded

Table 295: Power Specifications (continued)

DC Output	12 V⎓, 25 A/3.3 V⎓, 3.0 A
DC Output Power (W)	300 W

Table 296: Environmental Specifications

Operating temperature	0°C to 50°C (normal operation)
Storage temperature	-40°C to 70°C
Operating humidity	20% to 90% relative humidity, non-condensing
Operational shock	30 m/s^2 (3 G)

Summit 350 W Power Supplies Technical Specifications

The following Summit 350 W power supplies are available for use in X460-G2 series PoE switches:

- Summit 350 W AC power supply: front-to-back airflow (part nos. XN-ACPWR-350W-FB and 10953)
- Summit 350 W AC power supply: back-to-front airflow (part no. 10954)

Models XN-ACPWR-350W-FB and 10953 (front-to-back airflow) are also compatible with the ExtremeSwitching X465-24S, X465-24XE, and X465-48T switch models.

Summit 350 W AC Power Supply (XN-ACPWR-350W-FB, 10953, 10954)

Table 297: Physical Specifications

Dimensions	Height: 1.57 inches (4.0 cm) Width: 3.25 inches (8.3 cm) Length: 10.22 inches (26.0 cm)
Weight	2.55 lb (1.12 kg)

Table 298: Power Specifications

Voltage input range	100-127/200-240~ 47 to 63Hz
Nominal input ratings	12.5 A max at 115VAC and 6A max at 230VAC at Full 350 W load
Maximum inrush current	45A at Max 264 VAC at 25C with cold start
Output	54 V, 13.2 A max, 350 W
Power supply input socket and cord	IEC/EN 60320-1/C16 AC input receptacles

Table 298: Power Specifications (continued)

Power cord wall plug	Refer to Power Cord Requirements for AC-Powered Switches and AC Power Supplies on page 504
Efficiency	Minimum efficiency: 88% at maximum power output

Table 299: Environmental Specifications

Operating temperature	-10°C to 50°C (normal operation)
Storage temperature	-40°C to 70°C
Operating humidity	93% relative humidity, non-condensing at 30C
Operational shock	30 m/s^2 (3 G)

Summit 550 W Power Supplies Technical Specifications

The following power supplies are available for use in X670-G2 series switches:

- 550 W AC PSU-FB (Model 10925)—AC power supply with front-to-back ventilation airflow
- 550 W AC PSU-BF (Model 10927)—AC power supply with back-to-front ventilation airflow
- 550 W DC PSU-FB (Model 10926)—DC power supply with front-to-back ventilation airflow
- 550 W DC PSU-BF (Model 10928)—DC power supply with back-to-front ventilation airflow

Table 300: Physical Specifications

Dimensions	Height: 1.57 inches (4.0 cm) Width: 3.07 inches (7.8 cm) Depth: 13.31 inches (33.8 cm)
Weight	3.64 lb (1.65 kg)

Table 301: AC Power Specifications (Models 10925 and 10927)

Voltage input range	90 to 264 V ~
Nominal input ratings	100 to 240 V ~, 50 to 60 Hz, 8 A
Nominal input current at full loads	8 A @ 90 V ~ (low-line), 4 A @ 230 V ~ (high-line)
Line frequency range	47 to 63 Hz
Maximum inrush current	15 A at 25°C (77°F)
Output	12 V ⎓, 45 A max, 540 Watts, 3 V ⎓, 3 A max, 10 Watts Maximum continuous DC output shall not exceed 550 Watts.
Power supply input socket	IEC 320 C14

Table 301: AC Power Specifications (Models 10925 and 10927) (continued)

Power cord input plug	IEC 320 C13
Power cord wall plug	Refer to Power Cord Requirements for AC-Powered Switches and AC Power Supplies on page 504.
Power supply cord gauge	18 AWG (0.75 mm^2) up to 6 feet or 2 meters or 16 AWG (1.0 mm^2) over 6 feet
Efficiency	87% at 110 V ~ with full load 88% at 220 V ~ with full load

Table 302: DC Power Specifications (Models 10926 and 10928)

Nominal Input	–40 V to –60 V, 18 A
DC Voltage Input Range	–36 to –75 V ⎓
Maximum Input Amperages	18 A @ 36 V ⎓, 13.5 A @ 48 V ⎓ 8.5 A @ 75 V ⎓
Inrush Current	25 A peak
Inrush Energy	0.625 A^2S
Minimum wire size	14 AWG (1.5 mm^2) copper stranded
DC Output	12 V ⎓, 45 A/3.3 V ⎓, 3.0 A
DC Output Power (W)	550 W

Table 303: Environmental Specifications

Operating temperature	0°C to 45°C (normal operation)
Storage temperature	-40°C to 70°C
Operating humidity	20% to 90% relative humidity, non-condensing
Operating altitude	Up to 10,000 feet
Operational shock	
Frequency Range	5 to 350 Hz, 200 to 2000 Hz PSD: 0.0001g2/Hz 350 to 500 Hz -6dB/Octave, 500 Hz 0.000052 Hz
Acceleration	0.21.0 gRMS (Typical Level) Duration: 20 min per axis

Summit 715 W Power Supplies Technical Specifications

The following Summit 715 W power supplies are available for use in Summit X460-G2 series switches.

- Summit 715 W AC power supply: front-to-back airflow (part nos. XN-ACPWR-715W-FB and 10951)
- Summit 715 W AC power supply: back-to-front airflow (part no. 10952)

Models XN-ACPWR-715W-FB and 10951 (front-to-back airflow) are also compatible with the Summit X450-G2 and ExtremeSwitching X465-24W/48P/48W/24MU/24MU-24W and X465i-48W PoE switch models.

Table 304: Physical Specifications

Dimensions	Height: 1.57 inches (4.0 cm) Width: 3.25 inches (8.3 cm) Length: 10.22 inches (26.0 cm)
Weight	2.55 lb (1.12 kg)

Table 305: Power Specifications

Voltage input range	100-127/200-240~ 47 to 63Hz
Nominal input ratings	12.5 A max at 115VAC and 6A max at 230VAC at Full 715 W load
Maximum inrush current	45A at Max 264 VAC at 25C with cold start
Output	54 V, 13.2 A max, 715 W
Power supply input socket and cord	IEC/EN 60320-1/C16 AC input receptacles
Power cord wall plug	Refer to Power Cord Requirements for AC-Powered Switches and AC Power Supplies on page 504
Efficiency	Minimum efficiency: 88% at maximum power output

Table 306: Environmental Specifications

Operating temperature	-10°C to 50°C (normal operation)
Storage temperature	-40°C to 70°C
Operating humidity	93% relative humidity, non-condensing at 30C
Operational shock	30 m/s^2 (3 G)

750 W Power Supplies Technical Specifications

The Summit 750 W AC power supply (part no. 10931) is available for use with ExtremeSwitching X620-16p switches. It is compatible with the EPS-C2 power supply.

The Summit 750 W AC power supply is used in the EPS-C2 external power system.

Table 307: Physical Specifications

Dimensions	Height: 1.57 inches (4.0 cm) Width: 3.15 inches (8.0 cm) Depth: 9.5 inches (24.1 cm)
Weight	2.25 lb (1 kg)

Table 308: Power Specifications

Voltage input range	85 to 264 V ~
Nominal input ratings	100 to 240 V ~ , 50 to 60 Hz, 10 A
Nominal input current at full loads	10 A at 90 V ~ (low-line) 3.7 A at 230 V ~ (high-line)
Line frequency range	47 to 63 Hz
Maximum inrush current	35 A
Output	12 V ⎓, 25 A max, 300 Watts 55 V ⎓, 8.18 A max, 450 Watts 3.3 V ⎓, 3.03 A max, 10 Watts
Power supply input socket	IEC 320 C14
Power cord input plug	IEC 320 C13
Power cord wall plug	Refer to Power Cord Requirements for AC-Powered Switches and AC Power Supplies on page 504.
Power supply cord gauge	18 AWG (0.75 mm^2) up to 6 feet or 2 meters or 16 AWG (1.0 mm^2) over 6 feet
Efficiency	Low Line: 88% at 50% load and 86% at 100% load High Line: 90% at 50% and 100% loads

Table 309: Environmental Specifications

Operating temperature	0°C to 45°C (normal operation)
Storage temperature	-40°C to 70°C
Operating humidity	20% to 90% relative humidity, non-condensing
Operational shock	30 m/s^2 (3 G)

750 W Power Supplies Technical Specifications

Four 750 W power supply units are available for use with ExtremeSwitching X695 switches:

- 750W AC power supply - front-to-back airflow (part no. XN-ACPWR-750W-F)
- 750W AC power supply - back-to-front airflow (part no. XN-ACPWR-750W-R)
- 750W DC power supply - front-to-back airflow (part no. XN-DCPWR-750W-F)
- 750W DC power supply - back-to-front airflow (part no. XN-DCPWR-750W-R)

Table 310: 750 W Power Supplies: Unpackaged Dimensions

750 W power supply – AC front-to-back or back-to-front airflow	Height: 4.00 cm (1.57 in) Width: 8.00 cm (3.15 in) Depth: 20.60 cm (8.11 in)
750 W power supply – DC front-to-back or back-to-front airflow	Height: 4.00 cm (1.57 in) Width: 8.00 cm (3.15 in) Depth: 20.60 cm (8.11 in)

Table 311: 750 W Power Supplies: Unpackaged Weight

750 W power supply – AC front-to-back or back-to-front airflow	0.81 kg (1.79 lb)
750 W power supply – DC front-to-back or back-to-front airflow	0.85 kg (1.86 lb)

Table 312: 750 W Power Supplies: Packaged Dimensions

750 W power supply – AC front-to-back or back-to-front airflow	Height: 44.5 cm (17.52 in) Width: 27.5 cm (10.83 in) Depth: 42.5 cm (16.73 in)
750 W power supply – DC front-to-back or back-to-front airflow	Height: 44.5 cm (17.52 in) Width: 27.5 cm (10.83 in) Depth: 42.5 cm (16.73 in)

Table 313: 750 W Power Supplies: Packaged Weight

750 W power supply – AC front-to-back or back-to-front airflow	10.22 kg (22.53 lb)
750 W power supply – DC front-to-back or back-to-front airflow	10.50 kg (23.15 lb)

Table 314: Power Specifications (AC Power Supplies)

Voltage input range	85 to 264 V ~
Nominal input ratings	100-140/200-240V ~ , 10/5.36A max., 50/60Hz
Nominal input current at full loads	10 A at 90 V ~ (low-line) 3.7 A at 230 V ~ (high-line)
Line frequency range	47 to 63 Hz
Maximum inrush current	35 A
Output	+12 V, 61.5 A +12 Vsb, 3 A Total output power not to exceed 750W
Power supply input socket	IEC 320 C14
Power cord input plug	IEC 320 C13
Power cord wall plug	Refer to Power Cord Requirements for AC-Powered Switches and AC Power Supplies on page 504.
Power supply cord gauge	18 AWG (0.75 mm^2) up to 6 feet or 2 meters or 16 AWG (1.0 mm^2) over 6 feet
Efficiency	Low Line: 88% at 50% load and 86% at 100% load High Line: 90% at 50% and 100% loads

Table 315: Power Specifications (DC Power Supplies)

Nominal input	-48 to -60 VDC, 20.4 A
DC Voltage input range	-35 to -75 V
Inrush Current	21 A peak
Maximum wire size	14 AWG (1.5 mm2 copper stranded).
DC Output	+12.2VDC, 61.5A; +12Vaux, 2.5A
Power (W)	750 W

Table 316: Environmental Specifications (All Power Supply Units)

Operating temperature	0°C to 55°C (normal operation)
Storage temperature	-40°C to 70°C
Operating humidity	20% to 90% relative humidity, non-condensing
Operational shock	30 m/s^2 (3 G)

Summit 770 W Power Supplies Technical Specifications

The following Summit 770 W power supplies are available for use in ExtremeSwitching X690 and X870 series switches.

- Summit 770 W AC power supply: front-to-back airflow (part no. 10960)
- Summit 770 W AC power supply: back-to-front airflow (part no. 10961)

Table 317: Physical Specifications

Dimensions	Height: 1.57 inches (4.0 cm) Width: 3.25 inches (8.3 cm) Length: 10.22 inches (26.0 cm)
Weight	2.55 lb (1.12 kg)

Table 318: Power Specifications

Voltage input range	100-127/200-240~ 47 to 63Hz
Nominal input ratings	12.5 A max at 115VAC and 6A max at 230VAC at Full 770 W load
Maximum inrush current	45A at Max 264 VAC at 25C with cold start
Output	54 V, 13.2 A max, 770 W
Power supply input socket and cord	IEC/EN 60320-1/C16 AC input receptacles
Power cord wall plug	Refer to Power Cord Requirements for AC-Powered Switches and AC Power Supplies on page 504.
Efficiency	Minimum efficiency: 88% at maximum power output.

Table 319: Environmental Specifications

Operating temperature	-10°C to 50°C (normal operation)
Storage temperature	-40°C to 70°C
Operating humidity	93% relative humidity, non-condensing at 30C
Operational shock	30 m/s^2 (3 G)

Summit 1100 W Power Supplies Technical Specifications

AC Power Supplies

The following Summit 1100 W AC power supplies are available for use in Summit X460-G2 series switches.

- Summit 1100 W AC power supply: front-to-back airflow (part nos. XN-ACPWR-1100W-FB and 10941)
- Summit 1100 W AC power supply: back-to-front airflow (part no. 10942)

Models XN-ACPWR-1100W-FB and 10941 (front-to-back airflow) are also compatible with the X450-G2 and ExtremeSwitching X465-24W/48P/48W/24MU/24MU-24W and X465i-48W PoE switch models.

See Summit 1100 W AC Power Supplies (XN-ACPWR-1100W-FB, 10941, 10942) on page 491 for details.

DC Power Supplies

The following Summit 1100 W DC power supplies are available for use in ExtremeSwitching X690 and X870 series switches.

- Summit 1100 W DC power supply: front-to-back airflow (part no. 10962)
- Summit 1100 W DC power supply: back-to-front airflow (part no. 10963)

See Summit 1100 W DC Power Supplies (10962, 10963) on page 492 for details.

Summit 1100 W AC Power Supplies (XN-ACPWR-1100W-FB, 10941, 10942)

Table 320: Physical Specifications

Dimensions	Height: 1.57 inches (4.0 cm) Width: 3.25 inches (8.3 cm) Length: 10.22 inches (26.0 cm)
Weight	2.55 lb (1.12 kg)

Table 321: Power Specifications

Voltage input range	100-127/200-240~ 47 to 63Hz
Nominal input ratings	12.5 A max at 115VAC and 6 A max at 230VAC at full 1100 W load
Maximum inrush current	45A at Max 264 VAC at 25C with cold start
Output	54 V, 20 A max, 1100 W
Power supply input socket and cord	IEC/EN 60320-1/C16 AC input receptacles
Power cord wall plug	Refer to Power Cord Requirements for AC-Powered Switches and AC Power Supplies on page 504.
Efficiency	Minimum efficiency: 88% at maximum power output.

Table 322: Environmental Specifications

Operating temperature	-10°C to 50°C (normal operation)
Storage temperature	-40°C to 70°C
Operating humidity	93% relative humidity, non-condensing at 30C
Operational shock	30 m/s^2 (3 G)

Summit 1100 W DC Power Supplies (10962, 10963)

Table 323: Physical Specifications

Dimensions	Height: 1.57 inches (4.0 cm) Width: 3.25 inches (8.3 cm) Length: 10.22 inches (26.0 cm)
Weight	2.55 lb (1.12 kg)

Table 324: Power Specifications

Nominal input	-48 to -60 VDC, 24 A
DC Voltage input range	-35 to -75 V
Inrush Current	21 A peak
Maximum wire size	14 AWG (1.5 mm2 copper stranded).
DC Output	12 V, 45 A/3.3V, 3A
DC Output Power (W)	1100 W

Table 325: Environmental Specifications

Operating temperature	-10°C to 50°C (normal operation)
Storage temperature	-40°C to 70°C
Operating humidity	93% relative humidity, non-condensing at 30C
Operational shock	30 m/s^2 (3 G)

ExtremeSwitching 2000 W Power Supply Technical Specifications

The ExtremeSwitching 2000 W AC power supply with front-to-back airflow (part nos. XN-ACPWR-2000W-FB and XN-ACPWR-2000W-F) are available for use in X465-24W/48P/48W/24MU/24MU-24W and X465i-48W PoE switch models:

Table 326: Physical Specifications

Dimensions (with handle)	Height: 1.57 inches (4 cm) Width: 3.25 inches (8.25 cm) Length: 11.51 inches (29.25 cm)
Dimensions (without handle)	Height: 1.57 inches (4 cm) Width: 3.25 inches (8.25 cm) Length: 10.25 inches (26.05 cm)
Weight	2.95 lb (1.34 kg)

Table 327: Power Specifications

Voltage input range	100-200~ 50 to 60Hz
Nominal input ratings	12.5 A max at 115VAC and 6A max at 230VAC at Full 770 W load
Maximum inrush current	45A at Max 264 VAC at 25C with cold start
Output	54 V, 13.2 A max, 2000 W
Power supply input socket and cord	IEC/EN 60320-1/C16 AC input receptacles
Power cord wall plug	Refer to Power Cord Requirements for AC-Powered Switches and AC Power Supplies on page 504
Efficiency	Minimum efficiency: 88% at maximum power output

Table 328: Environmental Specifications

Operating temperature	0°C to 50°C (normal operation)
Storage temperature	-40°C to 70°C
Operating humidity	93% relative humidity, non-condensing at 30C
Operational shock	

EPS-C2 Redundant Power Supply Technical Specifications

The following tables list the specifications for the EPS-C2 redundant power supply unit (model 10936).

Table 329: Physical Specifications

Dimensions	4.4 cm H x 44.1 cm W x 38.4 cm D 1.73 in H x 17.4 in W x 15.1 in D
Weight (unit only)	1.03 kg (2.27 lb)

Table 330: Other Specifications

Allowable PSU	Summit 750W PoE AC PSU
Power cord input plug/socket	IEC 320 C13/C14
Power cord gauge	Min 18AWG

RPS-90 Redundant Power Supply Technical Specifications

The following tables list the specifications for the RPS-90 redundant power supply unit (model RPS-90).

Table 331: Power Specifications

AC input frequency range	47-63 Hz
AC input voltage range	90-264 VAC
AC input current	1.5 A maximum at 100 VAC 0.8 A maximum at 240 VAC
Output voltage	19 VDC
Maximum output power	90 W

Table 332: Environmental Specifications

Operating temperature	0°C to 40°C (32°F to 104°F)
Storage temperature	-20°C to 85°C (-4°F to 185°F)
Operating relative humidity	10% to 90%
Storage relative humidity	5% to 95%

RPS-150XT Redundant Power Supply Technical Specifications

The following tables list the specifications for the 150 W RPS-150XT Redundant Power Supply unit (model 10932).

Table 333: Physical Specifications

Dimensions	4.1 H x 15.4 W x 30.0 D (cm) 1.61 H x 6.1 W x 11.8 D (in)
Weight (unit only)	1.5 kg (3.3 lb)
Weight (unit and packaging)	approximately 3 kg (6.6 lb)

Table 334: Power Specifications

AC input frequency	50/60 Hz (range 47-63 Hz)
AC input voltage	100-240 V~ (range 90-264 V~)
AC input current	2 A maximum (range 2 A at 100 V, 1 A at 200 V)
DC output	+12.0 V⎓, 13 A maximum
Maximum output power	156 W

Table 335: Environmental Specifications

Operating temperature	0°C to 60°C (32°F to 140°F)
Storage temperature	-45°C to 85°C (-49°F to 185°F)
Operating relative humidity	10% to 90% operating/95% non-condensing

RPS-150XT Connector

See Figure 317 and Table 336 on page 496 for pin locations and function.

Note
The following information is for troubleshooting purposes only. For proper operation, use only the RPS cable supplied with the RPS-150XT. This cable is specially designed for this application and meets all necessary regulatory and safety standards.

Caution
The use of non-approved cables will void your warranty.

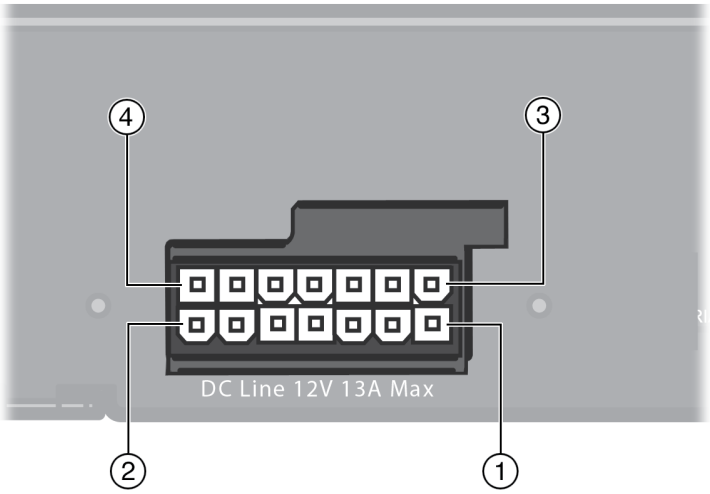


Figure 317: RPS-150XT Connector Pin Locations

1 = Pin 1	3 = Pin 8
2 = Pin 7	4 = Pin 14

Table 336: RPS-150XT Connector Pin Functions

Pin	Function	Pin	Function
1	Ground	8	Spare pin
2	Spare pin	9	Spare pin
3	12 V power	10	Power present
4	12 V power	11	Start 1
5	12 V power	12	Start 2
6	12 V power	13	Power good
7	Ground	14	Ground

RPS-500p Redundant Power Supply Technical Specifications

External Power Supplies for PoE Switches

The following tables list the specifications for the 500 W DC RPS-500p (model 10923).

Table 337: Physical Specifications

Dimensions	4.45 H x 44.5 W x 16.5 D (cm) 1.75 H x 17.5 W x 6.5 D (in)
Weigh (unit only)	3.47 kg (7.63 lb)
Weigh (unit and packaging)	4.95 kg (10.89 lb)

Table 338: Power Specifications

AC input frequency	50/60 Hz (range 47-63 Hz)
AC input voltage	100-240 V~ (range 90-264 V~)
AC input current	8 A maximum
DC output	-54 V⎓, 7.8 A maximum
	+12.0 V⎓, 14 A maximum
Maximum DC output power	500 W

Table 339: Environmental Specifications

Operating temperature	0°C to 50°C (normal operation) (32°F to 122°F)
Storage temperature	-40°C to 70°C (-40°F to 158°F)
Operating humidity	5% to 95% relative humidity, non-condensing

RPS-500p Connector

See Figure 318 and Table 340 on page 498 for pin locations and function.

Note
The following information is for troubleshooting purposes only. For proper operation, use only the 1 meter RPS cable supplied with the RPS-500p. This cable is specially designed for this application and meets all necessary regulatory and safety standards. The use of non-approved cables will void your warranty.

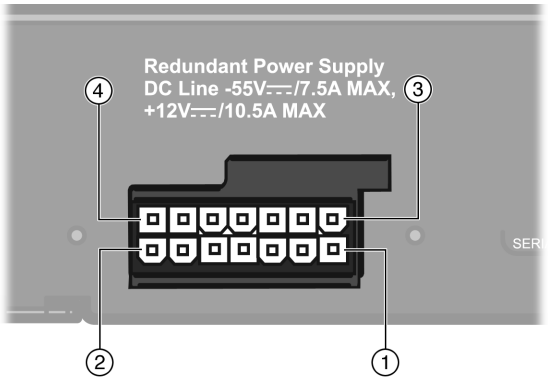


Figure 318: RPS-500p Connector Pin Locations

Table 340: RPS-500p Connector Pins

Pin	Function	Pin	Function
1	- 55 V return	8	Ground
2	- 55 VDC	9	No connection
3	12 VDC output	10	RPS present
4	12 VDC output	11	Status 1 Status
5	12 VDC output	12	Status 2
6	12 VDC output	13	Power good
7	Ground	14	Ground

STK-RPS-150PS and RPS Shelves Technical Specifications

The Extreme Networks STK-RPS-150PS is a 150 watt DC power redundant power supply for use with an Extreme Networks stackable or standalone fixed switch model that does not support PoE.

Caution
The STK-RPS-150PS does not support pliant fixed switch models. Do not connect the power cable from an STK-RPS-150PS to a PoE-compliant fixed switch. Otherwise, damage to the switch may result.

The STK-RPS-150PS can be installed as a standalone unit or with the following rack-mounted shelves:

- STK-RPS-150CH2, a two-slot shelf
- STK-RPS-150CH8, an eight-slot shelf

STK-RPS-150PS Specifications

Table 341: Physical Specifications

Dimensions	7.7 H x 2.04 W x 10.1 D (in.) 19.6 H x 5.2 W x 25.7 D (cm)
Unpackaged Weight	3.85 lb (1.75 kg)

Table 342: Power Specifications

AC input frequency range	50 to 60 Hz
AC input voltage range	100-240 VAC
Output Voltage	12VDC
Output Current	1.0 A min., 8.5 A or 13.0 A max.

Table 343: Environmental Specifications

Operating temperature	0°C to 50°C (32°F to 122°F)
Storage temperature	-40°C to 70°C (32°F to 122°F)
Operating humidity	5% to 95% (non-condensing)

STK-RPS-150CH2 Specifications

Table 344: Physical Specifications

Dimensions without mounting brackets	5.5 H x 44.0 W x 18.0 D (cm) 2.2 H x 17.3 W x 7.0 D (in.)
Unpackaged Weight	2.09 lb (0.95 kg)

STK-RPS-150CH8 Specifications

Table 345: Physical Specifications

Dimensions without mounting brackets	22.26 H x 44.0 W x 26.4 D (cm) 8.77 H x 17.3 W x 10.4 D (in.)
Unpackaged Weight	11.6 lb (5.27 kg)

STK-RPS-150PS Connector Pin Locations

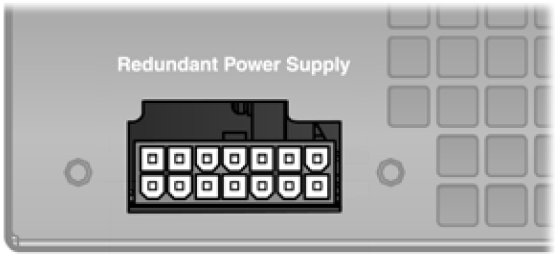


Figure 319: STK-RPS-150PS Connector Pin Locations

Table 346: STK-RPS-150PS Connector Pin Functions

Pin	Function	Pin	Function
1	- 50 V return	8	Ground
2	- 50 VDC	9	No connection
3	12 VDC output	10	RPS present
4	12 VDC output	11	Status 1
5	12 VDC output	12	Status 2
6	12 VDC output	13	Power good
7	Ground	14	Ground

STK-RPS-1005PS Redundant Power Supply Technical Specifications

The following tables list the specifications for the 1005 W PoE+ Redundant Power supply unit (model STK-RPS-1005PS) .

Table 347: Physical Specifications

Dimensions	4.3 H x 15.4 W x 34.0 D (cm) 1.7 H x 6.1 W x 13.4 D (in.)
Weight (unit only)	2.1 kg (4.6 lb)
Weight (unit and packaging)	3.5 kg (7.8 lb)

Table 348: Power Specifications

AC input frequency range	50/60 Hz
AC input voltage range	115-230 VAC
AC input current	12 A maximum at 115 VAC, 60 Hz 6.0 A maximum at 230 VAC, 50 Hz

Table 348: Power Specifications (continued)

DC output	-55 VDC, 15 A maximum +12.0 VDC, 0.1 A minimum, 15 A maximum
Maximum output power	1005 W

Table 349: Environmental Specifications

Operating temperature	0°C to 50°C (32°F to 122°F)
Storage temperature	-40°C to 70°C (-40°F to 158°F)
Operating relative humidity	10% to 90% non-condensing

STK-RPS-1005PS Connector

For pin location and function, refer to Figure 320 and Table 350 on page 502, respectively.

Note
The following information is for troubleshooting purposes only. For proper operation, use only the RPS cable supplied with the STK-RPS-1005PS. This cable is specially designed for this application and meets all necessary regulatory and safety standards.

Caution
The use of non-approved cables will void your warranty.

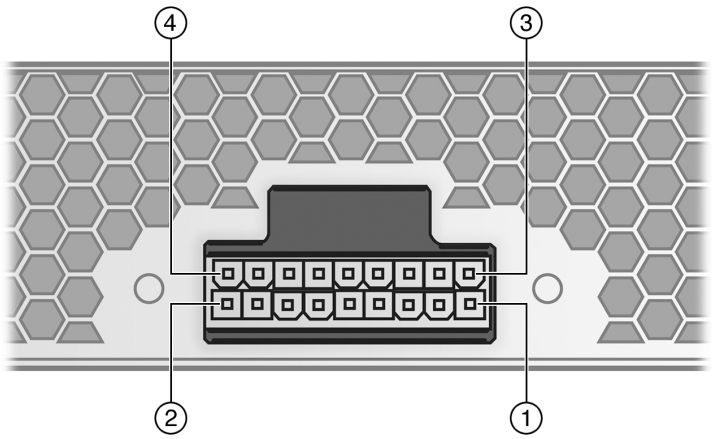


Figure 320: STK-RPS-1005PS Connector Pin Locations

1 = Pin 1	3 = Pin 10

2 = Pin 9	4 = Pin 18

Table 350: STK-RPS-1005PS Connector Pin Functions

Pin	Function	Pin	Function
1	12 V power	10	Power good of RPS
2	12 V power	11	Power supply present
3	12 V power	12	12 V current sharing
4	Ground	13	Ground
5	Ground	14	Spare pin
6	Spare pin	15	-55 V current sharing
7	-55 V power	16	-55 V power
8	-55 V power	17	-55 V power return
9	-55 V power return	18	-55 V power return

VX-RPS-1000 Redundant Power Supply Technical Specifications

The following tables list the specifications for the model VX-RPS-1000 Redundant Power Supply.

Table 351: VX-RPS-1000 Unpackaged Dimensions

Height: 1.64 inches (4.17 cm) Width: 5.27 inches (13.4 cm) Length: 15.21 inches (38.6 cm) Weight: 11.51 lb (5.22 kg)

Table 352: VX-RPS-1000 Packaged Dimensions

Height: 5.04 inches (12.8 cm) Width: 12.57 inches (31.9 cm) Length: 21.91 inches (55.6 cm) Weight: 13.00 lb (5.89 kg)

Table 353: VX-RPS-1000 Power Specifications

AC input frequency range	50/60 Hz
AC input voltage range	100-120 VAC or 200-240 VAC
AC input current	12 A maximum at 120 VAC, 60 Hz 6.0 A maximum at 240 VAC, 50 Hz

Table 353: VX-RPS-1000 Power Specifications (continued)

DC output	+54.0 VDC, 18.52 A maximum
Maximum output power	1000 W

Table 354: VX-RPS-1000 Environmental Specifications

Operating temperature	0°C to 45°C (32°F to 113°F)
Storage temperature	-40°C to 70°C (-40°F to 158°F)
Operating relative humidity	5% to 90% non-condensing

Table 355: VX-RPS-1000 Connector Pin Functions

Pin	Function	Pin	Function
1	12 V power	9	Power good of RPS
2	12 V power	10	Power supply present
3	12 V power	11	12 V current sharing
4	Ground	12	Ground
5	Ground	13	Spare pin
6	Spare pin	14	-55 V current sharing
7	-55 V power	15	-55 V power return
8	-55 V power	16	-55 V power return

3-Slot Modular Shelves: Technical Specifications

Model STK-RPS-1005CH3-E

The following table lists the specifications for the 3-slot modular shelf (model STK-RPS-1005CH3-E). The shelf is designed for use with the following equipment:

- STK-RPS-1005PS Redundant Power Supply on page 133 (model STK-RPS-1005PS)
- RPS-150XT Redundant Power Supply on page 130 (model 10932)
- Half-Duplex to Full-Duplex Converter (models 10958 and 10959)

Table 356: Physical Specifications

Length	48.20 cm (18.99 in.)
Depth	35.16 cm (13.85 in.)
Height	5.00 cm (1.97 in.)
Weight	2.39 kg (5.27 lb)

Model VX-RPS-CH3

The following table lists the specifications for the 3-slot modular shelf (model VX-RPS-CH3). The shelf is designed for use with the following equipment:

- VX-RPS-1000 Redundant Power Supply on page 135 (model 18202)

Table 357: Physical Specifications

Length	44.0 cm (17.34 in.)
Depth	38.7 cm (15.25 in.)
Height	4.4 cm (1.73 in.)
Weight	2.89 kg (6.37 lb)

Power Cord Requirements for AC-Powered Switches and AC Power Supplies

An AC power cord is not included with the AC power supply.

Power cords used with AC-powered switches or AC power supplies must meet the following requirements:

- The power cord must be agency-certified for the country of use.
- The power cord must have an IEC320-C15 connector for connection to the switch or power supply.
- The power cord must have an appropriately rated and approved wall plug applicable to the country of installation.
- For cords up to 14.76 feet (4.5 m) long, the wire size must be 15 AWG (2 mm^2) minimum wire length up to 4.9 feet (1.5 m).

For details about obtaining AC power cords for use in your country, refer to http://www.extremenetworks.com/product/powercords/.

Console Connector Pinouts

Table 358 describes the pinouts for a DB-9 console plug connector.

Table 358: Pinouts for the DB-9 Console Connector

Function	Pin Number	Direction
DCD (data carrier detect)	1	In
RXD (receive data)	2	In
TXD (transmit data)	3	Out
DTR (data terminal ready)	4	Out
GND (ground)	5	-
DSR (data set ready)	6	In

Table 358: Pinouts for the DB-9 Console Connector (continued)

Function	Pin Number	Direction
RTS (request to send)	7	Out
CTS (clear to send)	8	In

Figure 321 shows the pinouts for a 9-pin to 25-pin (RS-232) null-modem cable.

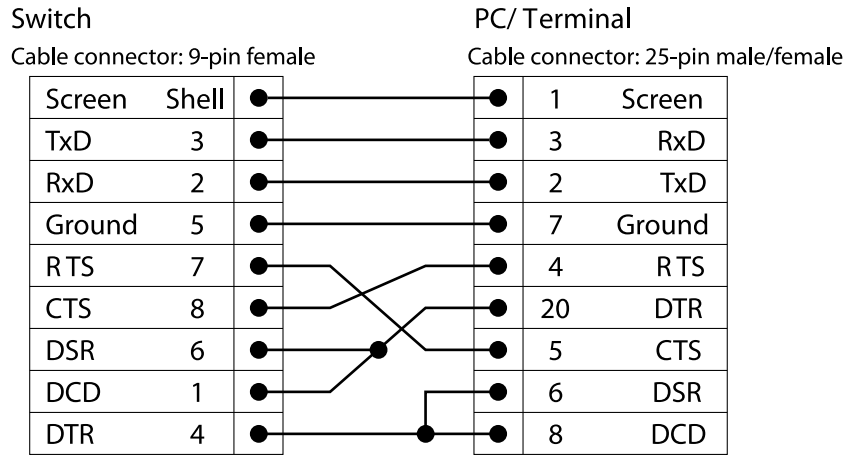


Figure 321: Null-Modem Cable Pinouts

Figure 322 shows the pinouts for a 9-pin to 9-pin (PC-AT) null-modem serial cable.

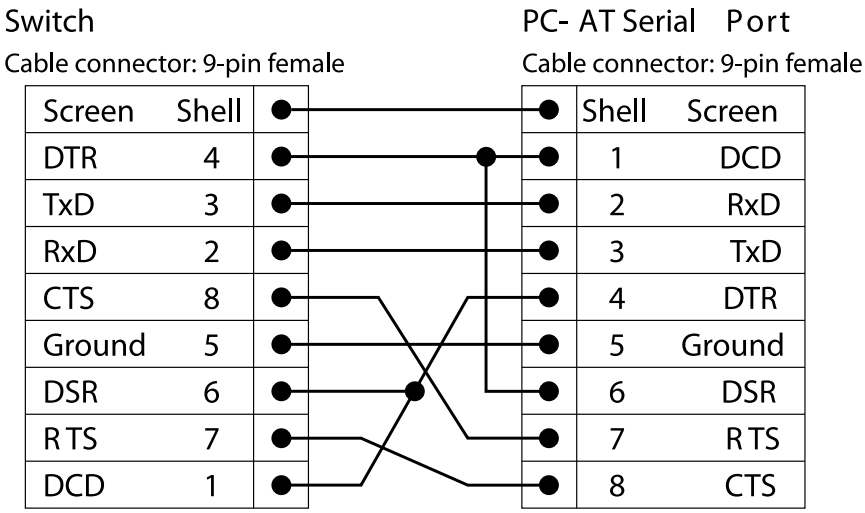


Figure 322: PC-AT Serial Null-modem Cable Pinouts

Table 359 shows the pinouts for the RJ45 console port on the ExtremeSwitching switches.

Table 359: RJ45 Console Port on Switch

Function	Pin Number	Direction
CTS (clear to send)	1	In
DTR (data carrier detect)	2	Out
TXD (transmit data)	3	Out
GND (ground)	4	—
GND (ground)	5	—
RXD (receive data)	6	In
DSR (data set ready)	7	In
RTS (request to send)	8	Out

Table 360 shows the pinouts for an RJ45-to-DB-9 adapter.

Table 360: Pinouts for an RJ45 to DB-9 Adapter

Signal	RJ45 Pin	DB-9 Pin
CTS (clear to send)	1	8
DTR (data carrier detect)	2	6
TXD (transmit data)	3	2
GND (ground)	4	5
GND (ground)	5	5
RXD (receive data)	6	3
DSR (data set ready)	7	4
RTS (request to send)	8	7

Safety and Regulatory Information

Warning
Read the following safety information thoroughly before installing Extreme Networks products. Failure to follow this safety information can lead to personal injury or damage to the equipment.

Only trained and qualified service personnel (as defined in IEC 60950-1 and AS/NZS 3260) should install, replace, or perform service to Extreme Networks switches and their components. Qualified personnel have read all related installation manuals, have the technical training and experience necessary to be aware of the hazards to which they are exposed in performing a task, and are aware of measures to minimize the danger to themselves or other persons.

If you are located in the United States, install the system in accordance with the U.S. National Electrical Code (NEC).

Considerations Before Installing

Consider the following items before you install equipment.

- For equipment designed to operate in a typical Telco environment that is environmentally controlled, choose a site that has the following characteristics:
  - Temperature-controlled and humidity-controlled, such that the maximum ambient room temperature shall not exceed 50°C (122°F).
  - Clean and free from airborne materials that can conduct electricity.
  - Well ventilated and away from sources of heat including direct sunlight.
  - Away from sources of vibration or physical shock.
  - Isolated from strong electromagnetic fields produced by electrical devices.
- For equipment designed to be installed in environments that are not environmentally controlled, such as outdoor enclosures, see the product data sheet or for environmental conditions, temperature, and humidity.
- Establish at least 3 inches clearance on all sides for effective ventilation. Do not obstruct the air intake vent on the front, side, or rear ventilation grills. Locate the system away from heat sources.
- Make sure that your equipment is placed in an area that accommodates the power consumption and component heat dissipation specifications.
- Make sure that your power supplies meet the site DC power or AC power requirements of all the network equipment.
- Racks for Extreme Networks equipment must be permanently attached to the floor. Failure to stabilize the rack can cause the rack to tip over when the equipment is removed for servicing.
- Do not operate the system unless all modules, faceplates, front covers, and rear covers are in place. Blank faceplates and cover panels are required for the following functions:
  - Preventing exposure to hazardous voltages and currents inside the equipment
  - Containing electromagnetic interference (EMI) that might disrupt other equipment
  - Directing the flow of cooling air through the equipment
- Ultimate disposal of this product should be handled according to all national laws and regulations.

General Safety Precautions

Follow these guidelines:

- Do not try to lift objects that you think are too heavy for you.
- When you install equipment in a rack, load heavier devices in the lower half of the rack first to avoid making the rack top-heavy.
- Use only tools and equipment that are in perfect condition. Do not use equipment with visible damage.
- Route cables in a manner that prevents possible damage to the cables and avoids causing accidents, such as tripping.

- Do not place a monitor or other objects on top of the equipment. The chassis cover is not designed to support weight.
- To reduce the risk of fire, use only #26 AWG or larger telecommunications line cord. Use only copper conductors.
- Do not work on the system or connect or disconnect cables during periods of lightning activity.
- This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor.

Maintenance Safety

When you perform maintenance procedures on Extreme Networks equipment, follow these recommendations:

- Use only authorized accessories or components approved for use with this system. Failure to follow these instructions may damage the equipment or violate required safety and regulations.
- This system contains no customer serviceable components. Do not attempt to repair a chassis, power supply, module, or other component. In the event of failure, return the defective unit to Extreme Networks for repair or replacement, unless otherwise instructed by an Extreme Networks representative.
- To remove power from the system, you must unplug all power cords from wall outlets. The power cord is the disconnect device to the main power source.
- Disconnect all power cords before working near power supplies, unless otherwise instructed by a product-specific maintenance procedure.
- Replace a power cord immediately if it shows any signs of damage.
- When you work with optical devices, power supplies, or other modular accessories, put on an ESD-preventive wrist strap to reduce the risk of electronic damage to the equipment. Connect the other end of the strap to an appropriate grounding point on the equipment rack or to an ESD jack on the chassis if one is provided. Leave the ESD-preventive wrist strap permanently attached to the equipment rack or chassis so that it is always available when you need to handle components that are sensitive to ESD.
- Install all cables in a manner that avoids strain. Use tie wraps or other strain relief devices.

Fiber Optic Ports and Optical Safety

The following safety warnings apply to all optical devices used in Extreme Networks equipment that are removable or directly installed in an I/O module or chassis system.

Such devices include but are not limited to gigabit interface converters (GBICs), small form factor pluggable (SFP) modules (or mini-GBICs), QSFP+ modules, XENPAK transceivers, and XFP laser optic modules.

Warning

Laser optic modules become very hot after prolonged use. Take care when removing a laser optic module from the module or option card. If the laser optic module is too hot to touch, disengage the laser optic module and allow it to cool before removing it completely.

When working with laser optic modules, always take the precautions listed below to avoid exposure to hazardous radiation.

- Never look at the transmit LED/laser through a magnifying device while the transmit LED is powered on.
- Never look directly at a fiber port on the switch or at the ends of a fiber cable when they are powered on.
- Invisible laser radiation can occur when the connectors are open. Avoid direct eye exposure to the beam when optical connections are unplugged.
- Never alter, modify, or change an optical device in any way other than suggested in this document.

GBIC, SFP (Mini-GBIC), QSFP+, XENPAK, and XFP Regulatory Compliance

Extreme Networks pluggable optical modules and direct-attach cables meet the following regulatory requirements:

- Class 1 or Class 1M Laser Product
- EN60825-1:2007 2nd Ed. or later, European standard
- FCC 21 CFR Chapter 1, Subchapter J in accordance with FDA & CDRH requirements
- Application of CE Mark in accordance with 2014/30/EU EMC Directive and the 2014/35/EU Low Voltage Directives
- UL and/or CSA registered component for North America
- 47 CFR Part 15, Class A when installed into Extreme products

Cable Routing for LAN Systems

Extreme Networks equipment meets the requirements for LAN system equipment.

LAN systems are designed for intra-building installations; that is, cable runs between devices must be in the same building as the connected units, except under the conditions listed in the next paragraph.

As allowed in the USA by the National Electrical Code (NEC), this equipment can be connected between buildings if any one of the following conditions is true:

- Cable runs between buildings are less than 140 feet long.
- Cable runs between buildings are directly buried.

- Cable runs between buildings are in an underground conduit, where a continuous metallic cable shield or a continuous metallic conduit containing the cable is bonded to each building grounding electrode system.

Caution
Failure to follow these requirements for cable routing conditions may expose the user to electrical shock and expose the unit to damage that can cause errors.

Warning
The Ethernet ports of the equipment and its sub-assemblies are suitable only for intra-building connections (within the same building) or for connections to unexposed wiring or cabling. (See the conditions listed above.) The Ethernet ports of this equipment or its sub-assemblies must not be metallically connected to interfaces that connect to the outside plant (OSP) or its wiring. Ethernet interfaces are designed for use only as intra-building interfaces (described as Type 2 or Type 4 ports in GR-1089-CORE, Issue 6) and require isolation from the exposed OSP wiring. The addition of Primary Protectors is not sufficient protection to connect these interfaces metallically to OSP wiring.

This warning does not apply to T1/E1 ports because T1/E1 ports have built-in isolation and surge protection that allows them to be connected to OSP wiring.

Installing Power Supply Units and Connecting Power

For the ratings and power input requirements of each power supply unit, see #unique_419 or the data sheet for the power supply at www.extremenetworks.com.

Warning
Be sure to satisfy the requirements listed in this section when you install Extreme Networks power supplies or connect power.

When you install any power supply:

- Do not use excessive force when you insert a power supply into the bay.
- Do not attempt to open the power supply enclosure for any reason; the power supply does not contain user-serviceable parts. In the event of failure, return the defective power supply to Extreme Networks for repair or replacement.
- Do not put your hand into an open power supply bay when a power supply is not present.
- Before you work on equipment that is connected to power lines, remove all jewelry, including watches. Metal objects heat up when they are connected to power and ground and can cause serious burns or weld the metal object to the terminals.
- An electrical arc can occur when you connect or disconnect the power with power applied. This could cause an explosion in hazardous area installations. Be sure that power is removed from the device.
- When you install or replace equipment, always make the ground connection first and disconnect the ground connection last.

When you install AC power supplies:

- For switches with field-replaceable power supplies, do not connect the power supply to an electrical source when the power supply is not installed in the switch; doing so would expose a hazardous energy and poses a potential shock and fire hazard.
- Plug power supplies only into properly grounded electrical outlets to help prevent electrical shock and to comply with international safety standards.
- Use only power cords that are certified for use within the country of use. Do not attempt to modify AC power cords.
- Make sure that the voltage and frequency of your power outlet match the system electrical ratings for the equipment. The building and/or power source must provide overload protection.
- Use a surge suppressor, line conditioner, or uninterruptible power supply to protect the system from momentary increases or decreases in electrical power.
- When multiple power supplies are used with a system, connect each power supply to a different, independent overcurrent protection device, such as a circuit breaker. If a single power source fails, it will affect only that power supply to which it is connected. See the data sheet of the power supply for proper sizing of the circuit breaker.
- Extreme Networks AC power supplies do not have switches for turning the unit on and off. Remove all wall plugs from the electrical outlets to disconnect the power. Make sure that these connections are easily accessible.

When you install DC power supplies or connect DC power:

- Making the connection to your facility DC source voltage must be performed by a qualified, licensed electrician.
- Extreme Networks DC power supplies do not have switches for turning the unit on and off. Make sure that the DC circuit is de-energized before connecting or disconnecting the DC power cord at the DC input power socket.
- Do not connect a DC power supply to the DC source power when the power supply is not installed in the chassis; doing so would expose a hazardous energy and poses a potential shock and fire hazard.
- Connect the system or power supply only to a DC power source that complies with the safety extra-low voltage (SELV) requirements in IEC 60950-based safety standards.
- DC-powered equipment must be installed in a restricted-access area to ensure that only trained and qualified service personnel have access to the equipment. A

restricted-access area can be entered only through the use of a special tool, lock and key, or other means of security.

Note
Because building codes vary worldwide, consult an electrical contractor to ensure proper equipment grounding and power distribution for your specific installation and country.

Warning
Extreme Networks power supplies do not have switches for turning the unit on and off. Disconnect all power cords to remove power from the device. Make sure that these connections are easily accessible.

Extreme Networks alimentations n'ont pas de contact pour mettre l'appareil sous et hors tension. Débranchez tous les cordons d'alimentation pour couper l'alimentation de l'appareil. Assurez-vous que ces connexions sont facilement accessibles.

Selecting Power Supply Cords

You can purchase a power cord for your product and for your specific country from your local Extreme Networks Channel Account Manager or Sales Manager, or you can purchase a cord from your local supplier. Requirements for the power cord are listed in the Technical Specifications for your product.

To locate a Sales Manager or Partner in your region, visit www.extremenetworks.com/partners/where-to-buy.

Note
This equipment is not intended to be directly powered by power distribution systems where phase-phase voltages exceed 240 VAC (2P+PE), such as those used in Norway, France, and other countries. For these applications, use a transformer to step down the voltage to < 240 VAC from phase-phase, or make a connection to a (P+N+PE) power distribution where voltages do not exceed 240 VAC.

All installations should confirm that the product is reliably grounded according to the country's local electrical codes.

Battery Notice

Warning: This product contains a battery used to maintain product information. If the battery should need replacement it must be replaced by Service Personnel. Please contact Technical Support for assistance.

Risk of explosion if battery is replaced by an incorrect type. Dispose of expended battery in accordance with local disposal regulations.

Attention: Ce produit renferme une pile servant à conserver les renseignements sur le produit. Le cas échéant, faites remplacer la pile par le personnel du service de réparation. Veuillez communiquer avec l'assistance technique pour du soutien.

Il y a risque d'explosion si la pile est remplacée par un type de pile incorrect. Éliminez les piles usées en conformité aux règlements locaux d'élimination des piles.

Battery Warning - Taiwan

警告

如果更換不正確之電池型式會有爆炸的風險,

請依製造商說明書處理用過之電池。

EMC Warnings

Taiwan BSMI Warning

警告使用者:

此為甲類資訊技術設備，於居住環境中使用時，可能會造成射頻擾動，在此種情況下，使用者會被要求採取某些適當的對策。

China CQC Warning

警告使用者:

此为A级产品，在生活环境中，该产品可能会造成无线电干扰。

在这种情况下，可能需要用户对干扰采取切实可行的措施。

Japan (VCCI Class A)

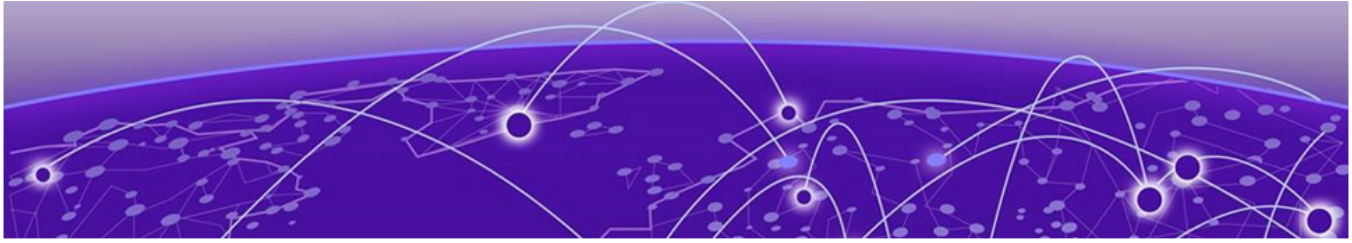
Warning
This is a Class A product based on the standard of the VCCI Council. If this equipment is used in a domestic environment, radio interference may occur, in which case the user may be required to take corrective actions.

この装置は、クラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

VCCI-A

Korea EMC Statement

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.



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