

ExtremeSwitching and Summit Switches: Hardware Installation Guide

for Switches Using ExtremeXOS 21 or Later

121137-04

Published August 2017

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Preface

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

- ExtremeSwitching X440-G2 Series Switches on page 11
- Summit X450-G2 Series Switches on page 27
- ExtremeSwitching and Summit X460-G2 Series Switches on page 38
- ExtremeSwitching X620 Series Switches on page 54
- Summit X670-G2 Series Switches on page 61
- ExtremeSwitching X690 Series Switches on page 65
- Summit X770 Series Switches on page 72
- ExtremeSwitching X870 Series Switches on page 76

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
- *SNMP (Simple Network Management Protocol)*
- Basic equipment installation procedures

See the *ExtremeXOS 22.3 User Guide* and the *ExtremeXOS 22.3 Command Reference Guide* for information about configuring ExtremeSwitching and Summit 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

The following tables list text conventions that are used throughout this guide.

Table 1: Notice Icons

Icon	Notice Type	Alerts you to...
	General Notice	Helpful tips and notices for using the product.
	Note	Important features or instructions.
	Caution	Risk of personal injury, system damage, or loss of data.
	Warning	Risk of severe personal injury.
	New	This command or section is new for this release.

Table 2: Text Conventions

Convention	Description
`Screen displays`	This typeface indicates command syntax, or represents information as it appears 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 with brackets, such as **[Return]** 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]**
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.

Terminology

When features, functionality, or operation is specific to a switch family, such as ExtremeSwitching™ or Summit®, 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 to Us

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 especially want to know about:

- Content errors or confusing or conflicting information.
- Ideas for improvements to our documentation so you can find the information you need faster.
- Broken links or usability issues.

If you would like to provide feedback to the Extreme Networks Information Development team about this document, please contact us using our short online feedback form. You can also email us directly at internalinfodev@extremenetworks.com.

Getting Help

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- GTAC (Global Technical Assistance Center) for Immediate Support
  - **Phone:** 1-800-998-2408 (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
  - **Email:** support@extremenetworks.com. To expedite your message, enter the product name or model number in the subject line.
- GTAC Knowledge — Get on-demand and tested resolutions from the GTAC Knowledgebase, or create a help case if you need more guidance.
- The Hub — A forum for Extreme customers to connect with one another, get questions answered, share ideas and feedback, and get problems solved. This community is monitored by Extreme Networks employees, but is not intended to replace specific guidance from GTAC.
- Support Portal — Manage cases, downloads, service contracts, product licensing, and training and certifications.

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

- Your Extreme Networks service contract number and/or serial numbers for all involved Extreme Networks products
- A description of the failure
- A description of any action(s) 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

Related Publications

ExtremeSwitching X8, ExtremeSwitching, and E4G Hardware Documentation

- *Extreme Hardware/Software Compatibility and Recommendation Matrices*
- *Extreme Networks Pluggable Transceivers Installation Guide*
- *ExtremeXOS 22.3 User Guide*
- *ExtremeXOS 22.3 Command Reference Guide*
- *ExtremeSwitching and Summit Switches: Hardware Installation Guide for Switches Using ExtremeXOS 16 or Earlier*
- *Environmental Guidelines for ExtremeSwitching Products*

1 ExtremeSwitching and Summit Switches

Overview of the Switches
ExtremeSwitching X440-G2 Series Switches
Summit X450-G2 Series Switches
ExtremeSwitching and Summit X460-G2 Series Switches
ExtremeSwitching X620 Series Switches
Summit X670-G2 Series Switches
ExtremeSwitching X690 Series Switches
Summit X770 Series Switches
ExtremeSwitching X870 Series Switches
Pluggable Interfaces for ExtremeSwitching and Summit Switches

The ExtremeSwitching and Summit switches are compact enclosures 1.75 inches high (1 U). Each switch model provides between 8 and 72 high-density copper or fiber optic ports operating at speeds up to 40 Gbps. Many models also provide combination copper/fiber uplink ports. *PoE (Power over Ethernet)* connections and options for adding 10-Gbps or 40-Gbps uplink connections are available on some models.

Many ExtremeSwitching and Summit switches include high-speed stacking interfaces that allow you to connect up to eight switches into a single SummitStack management entity. Models are available for AC or DC power connection; all switches make provision for redundant power supplies. Most models have connections for optional external redundant power supplies: the X450-G2 (PoE models), X460-G2, X620 (16-port models), X670-G2, and X770 switches provide two bays for pluggable power supplies.

This document describes switches that are supported on ExtremeXOS version 21.1 or later versions. For information about other Summit switches, refer to the *ExtremeSwitching and Summit Switches: Hardware Installation Guide for Switches Using ExtremeXOS 16 or Earlier*.

The following sections contain general information about the switches:

- ExtremeSwitching X440-G2 Series Switches on page 11
- Summit X450-G2 Series Switches on page 27
- ExtremeSwitching and Summit X460-G2 Series Switches on page 38
- ExtremeSwitching X620 Series Switches on page 54
- Summit X670-G2 Series Switches on page 61
- ExtremeSwitching X690 Series Switches on page 65
- Summit X770 Series Switches on page 72
- ExtremeSwitching X870 Series Switches on page 76

Overview of the Switches

The following sections describe the ExtremeSwitching and Summit 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 22.3 User Guide* and the *ExtremeXOS 22.3 Command Reference Guide* for feature-specific information about the Summit switches and for information regarding switch configuration.

Combination Ports and Failover

ExtremeSwitching and Summit 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 and Summit 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 and Summit 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 port*s, see the *ExtremeXOS 22.3 User Guide*.

Port Partitioning

On some ExtremeSwitching and Summit 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 3: QSFP28 and QSFP+ Port Partitioning

Switch Model	Port Bandwidth	Each Physical Port Can Operate as....
X670-G2-48x-4q QSFP+	40 Gb	One 40 Gb port or Four 10 Gb ports
X770 (all models) QSFP+	40 Gb	One 40 Gb port or Four 10 Gb ports
X690 (all models) QSFP28 and QSFP+	100 Gb	One 100 Gb port or Two 50 Gb ports or Four 25 Gb ports
	40 Gb	One 40 Gb port or Four 10 Gb ports
X870 (all models) QSFP28 and QSFP+	100 Gb	One 100 Gb port or Two 50 Gb ports or 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 22.3 Command Reference Guide*.

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 ExtremeSwitching X440-G2 Stacking on page 134.

On X440-G2 switches, SummitStack-V is compatible with X450-G2 and X460-G2 switches with 10 Gb uplinks and with X620, X670-G2, and X770 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 26 on page 83.

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 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 (coaxial barrel connector).

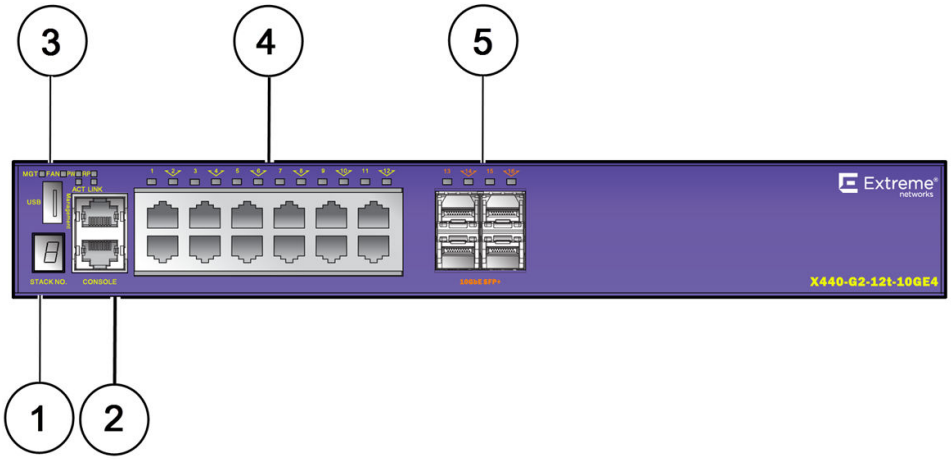


Figure 1: ExtremeSwitching X440-G2-12t-10GE4 Front Panel

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)	

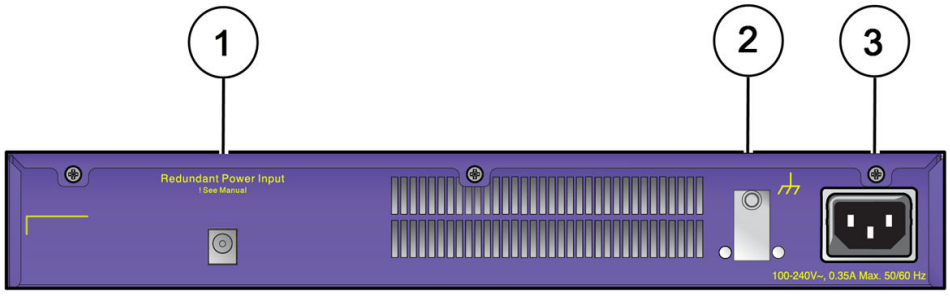


Figure 2: ExtremeSwitching X440-G2-12t-10GE4 Rear Panel

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 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.

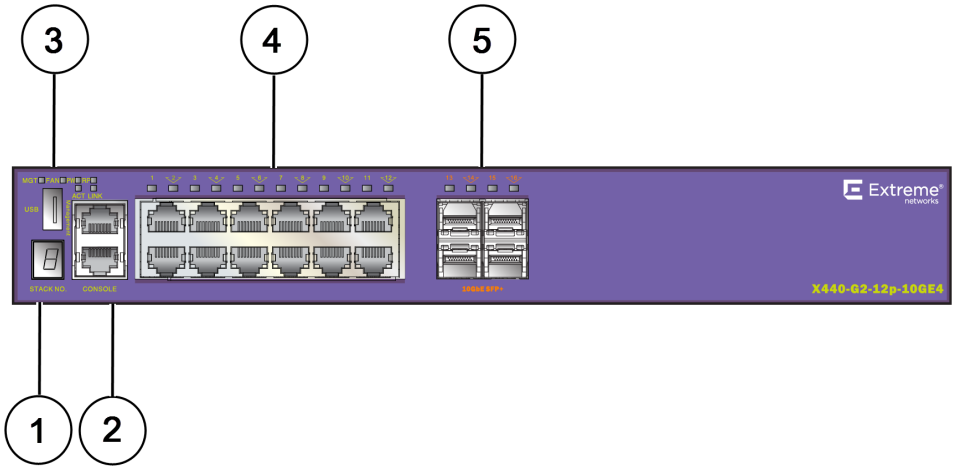


Figure 3: ExtremeSwitching X440-G2-12p-10GE4 Front Panel

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)	

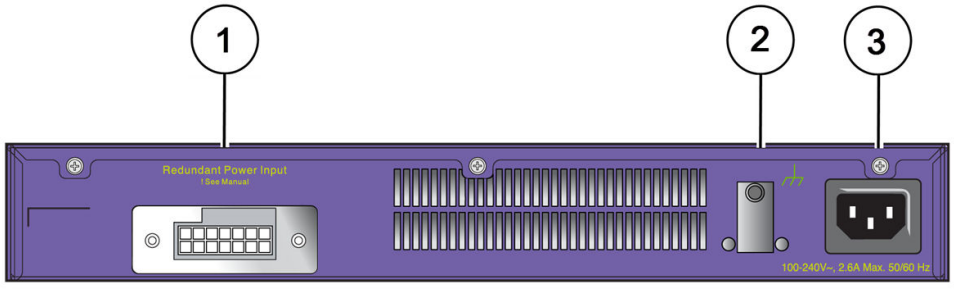


Figure 4: ExtremeSwitching X440-G2-12p-10GE4 Rear Panel

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 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.

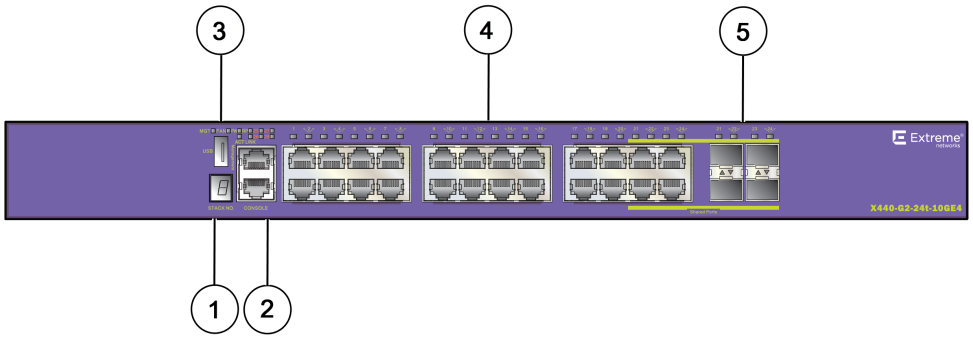


Figure 5: ExtremeSwitching X440-G2-24t-10GE4 Front Panel

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)	

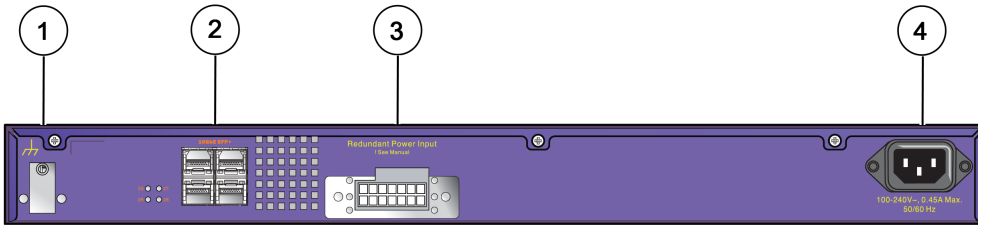


Figure 6: ExtremeSwitching X440-G2-24t-10GE4 Rear Panel

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 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.

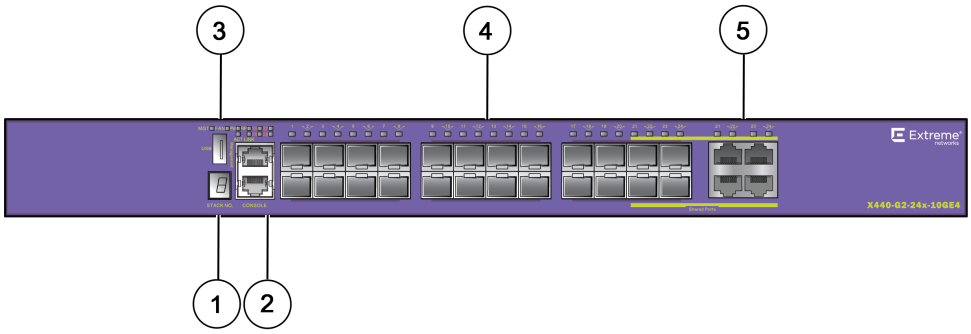


Figure 7: ExtremeSwitching X440-G2-24x-10GE4 Front Panel

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)	

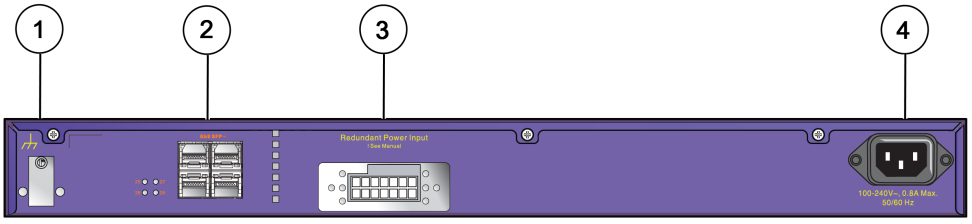


Figure 8: ExtremeSwitching X440-G2-24x-10GE4 Rear Panel

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 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.

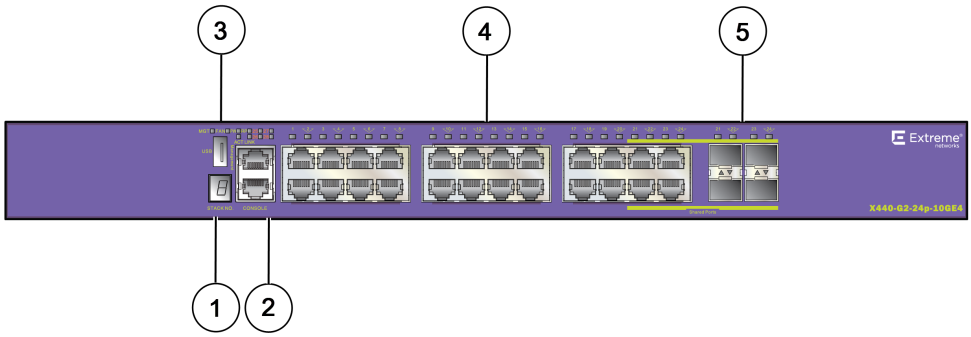


Figure 9: ExtremeSwitching X440-G2-24p-10GE4 Front Panel

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)	

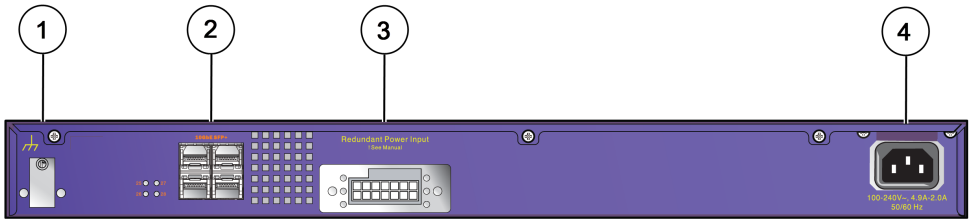


Figure 10: ExtremeSwitching X440-G2-24p-10GE4 Rear Panel

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 upgraded to 10Gb Ethernet.
- 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.

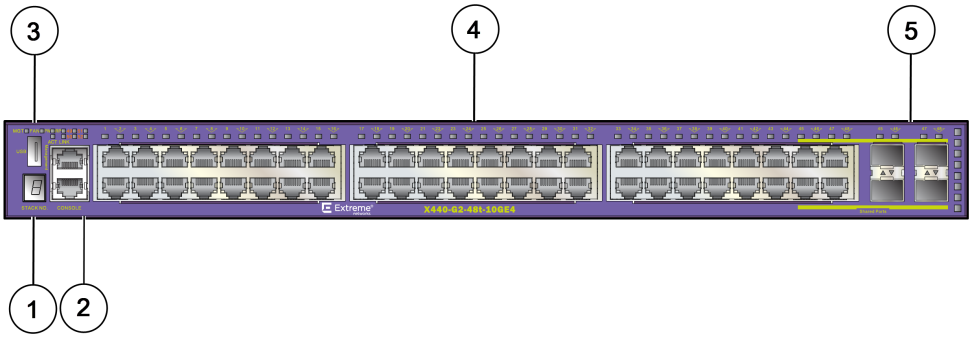


Figure 11: ExtremeSwitching X440-G2-48t-10GE4 Front Panel

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)	

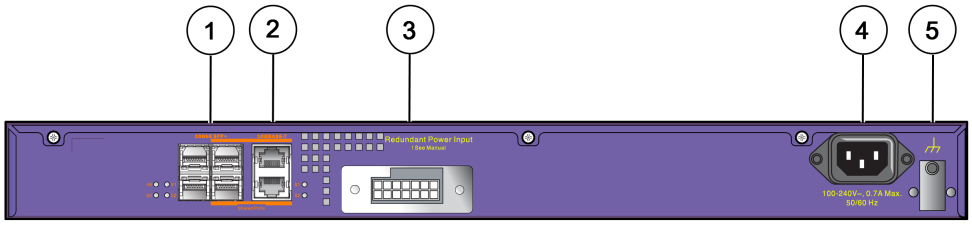


Figure 12: ExtremeSwitching X440-G2-48t-10GE4 Rear Panel

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 upgraded to 10Gb Ethernet.
- 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.

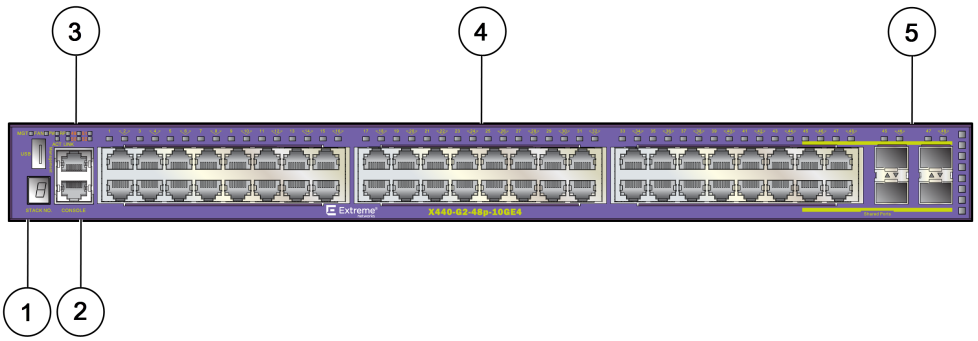


Figure 13: ExtremeSwitching X440-G2-48p-10GE4 Front Panel

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)	

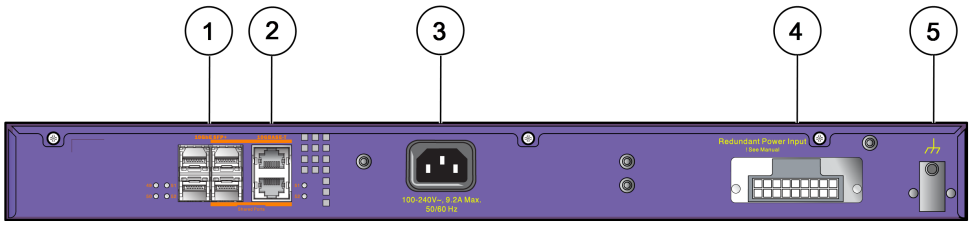


Figure 14: ExtremeSwitching X440-G2-48p-10GE4 Rear Panel

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 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.

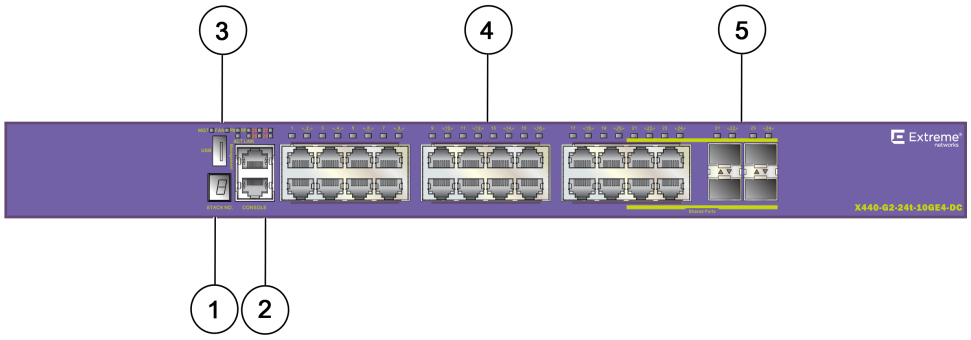


Figure 15: ExtremeSwitching X440-G2-24t-10GE4-DC Front Panel

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)	

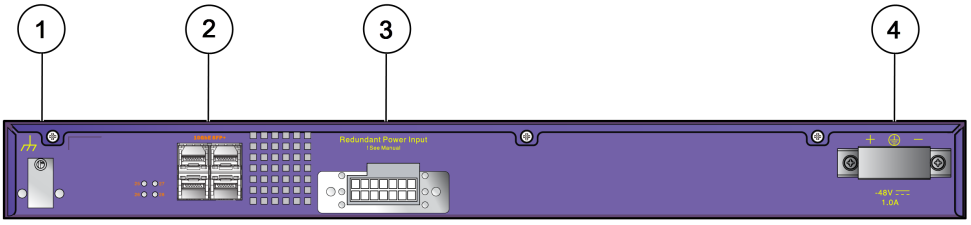


Figure 16: ExtremeSwitching X440-G2-24t-10GE4-DC Rear Panel

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 upgraded to 10Gb Ethernet.
- 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.

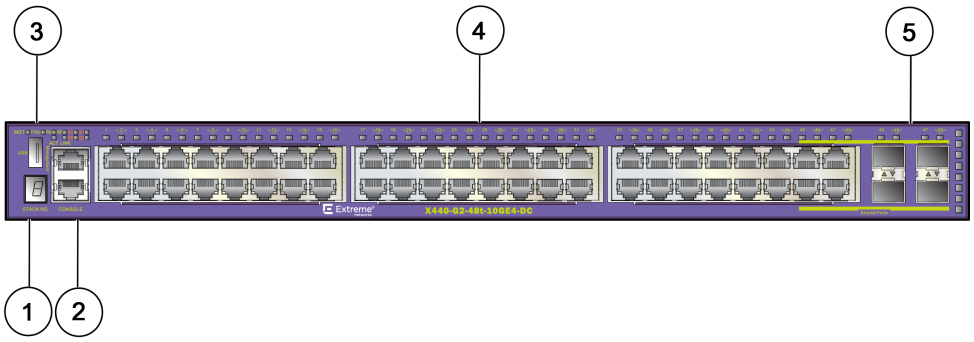


Figure 17: ExtremeSwitching X440-G2-48t-10GE4-DC Front Panel

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)	

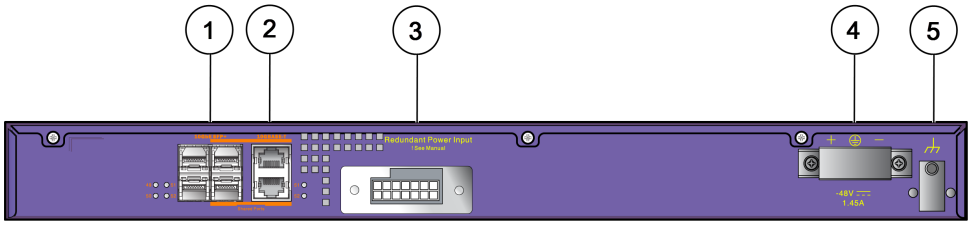


Figure 18: ExtremeSwitching X440-G2-48t-10GE4-DC Rear Panel

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.

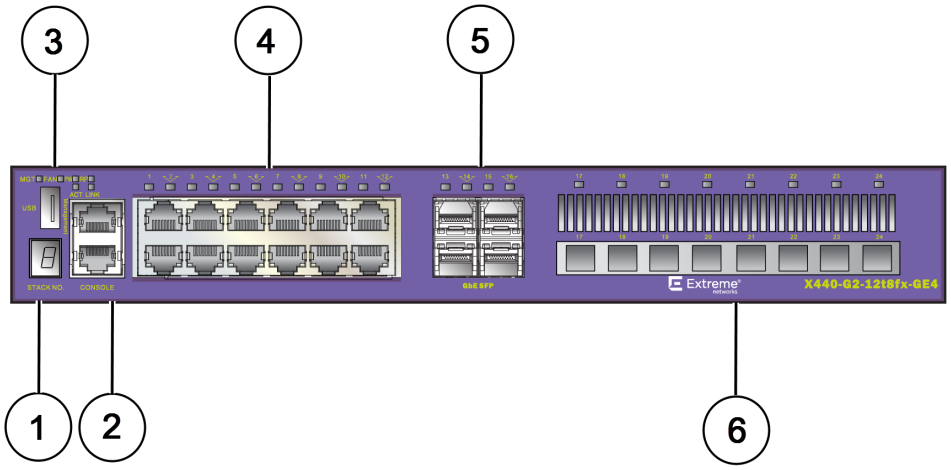


Figure 19: ExtremeSwitching X440-G2-12t8fx-GE4 Front Panel

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

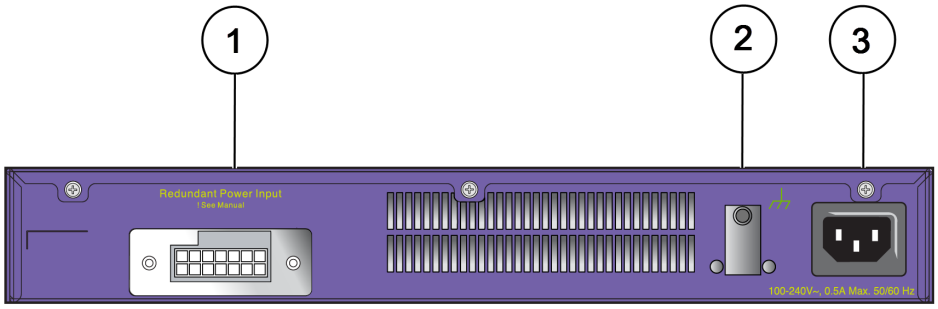


Figure 20: ExtremeSwitching X440-G2-12t8fx-GE4 Rear Panel

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.

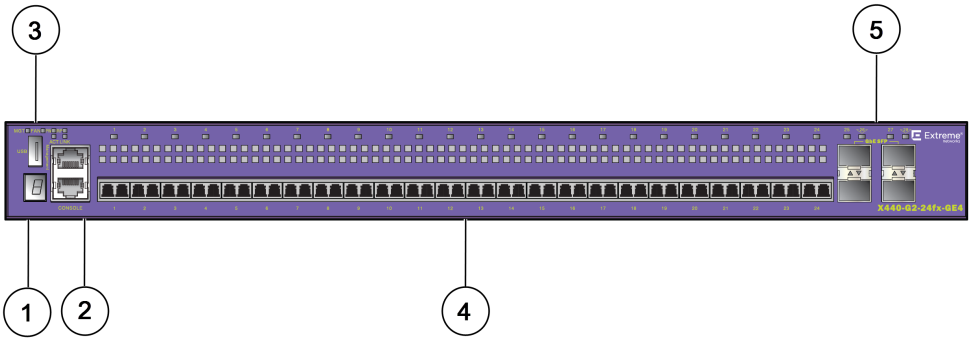


Figure 21: ExtremeSwitching X440-G2-24fx-GE4 Front Panel

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)	

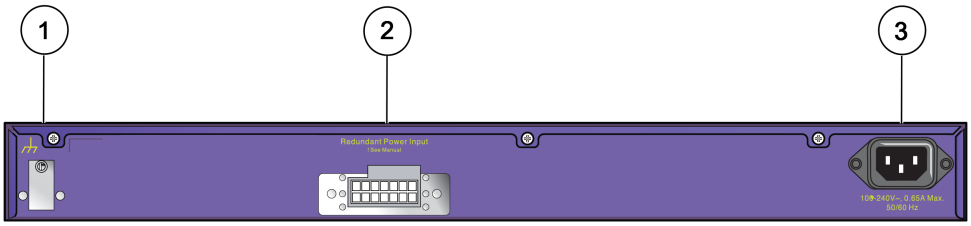


Figure 22: ExtremeSwitching X440-G2-24fx-GE4 Rear Panel

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.

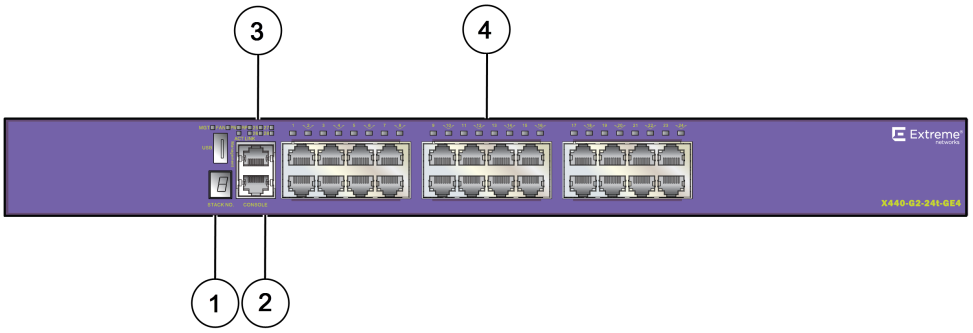


Figure 23: ExtremeSwitching X440-G2-24t-GE4 Front Panel

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

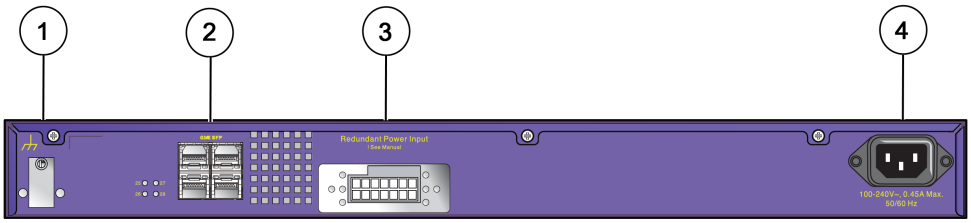


Figure 24: ExtremeSwitching X440-G2-24t-GE4 Rear Panel

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 4: 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
Other ports	Steady green	Link OK
	Blinking green	Activity on the indicated port
	Off	No link, or port disabled

Table 5: 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 6: 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

Summit X450-G2 Series Switches

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

- Summit X450-G2-24t-GE4 switch
- Summit X450-G2-24t-10GE4 switch
- Summit X450-G2-48t-GE4 switch
- Summit X450-G2-48t-10GE4 switch
- Summit X450-G2-24p-GE4 switch
- Summit X450-G2-24p-10GE4 switch
- Summit X450-G2-48p-GE4 switch
- Summit X450-G2-48p-10GE4 switch

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 Summit 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 Summit X450-G2 switches, see Replaceable Internal Power Supplies on page 93.



Note
Summit 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.

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

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

The Summit 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.

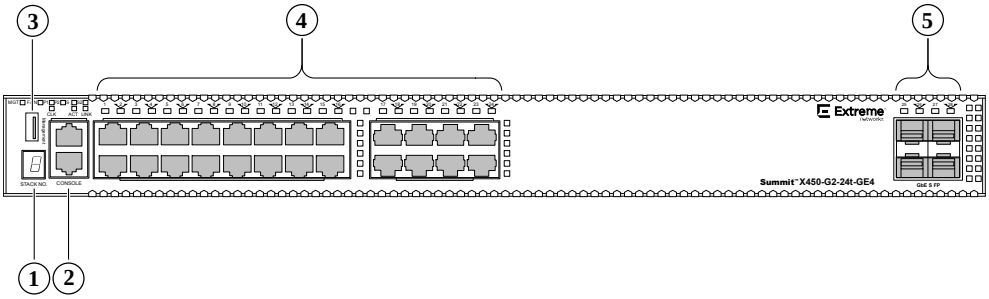


Figure 25: Summit X450-G2-24t-GE4 Front Panel

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

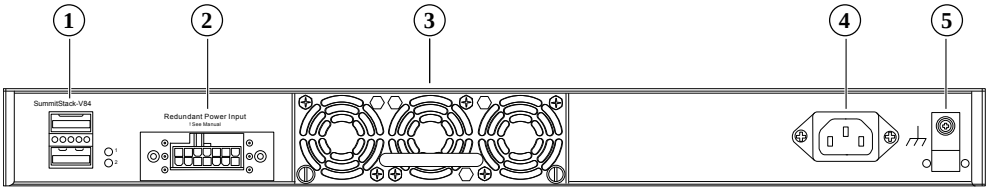


Figure 26: Summit X450-G2-24t-GE4 Rear Panel

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	

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

The Summit 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.

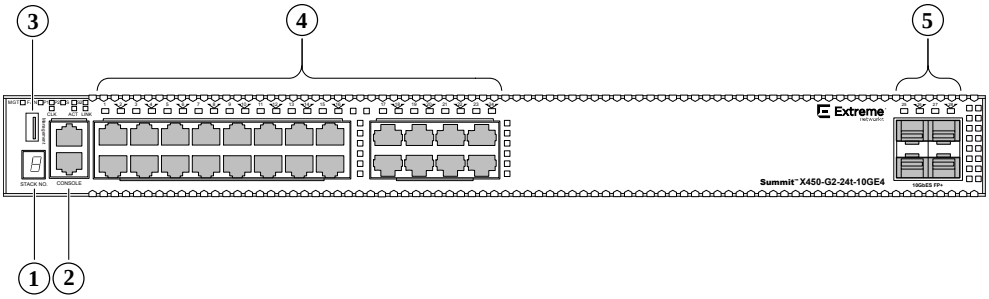


Figure 27: Summit X450-G2-24t-10GE4 Front Panel

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

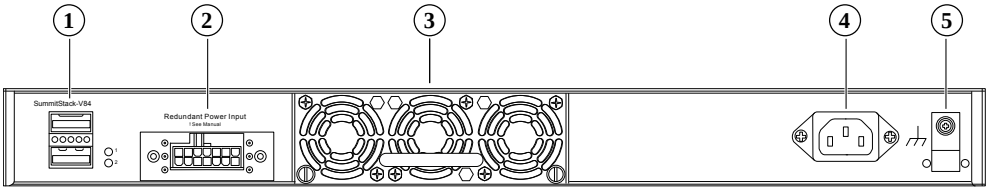


Figure 28: Summit X450-G2-24t-10GE4 Rear Panel

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	

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

The Summit 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.

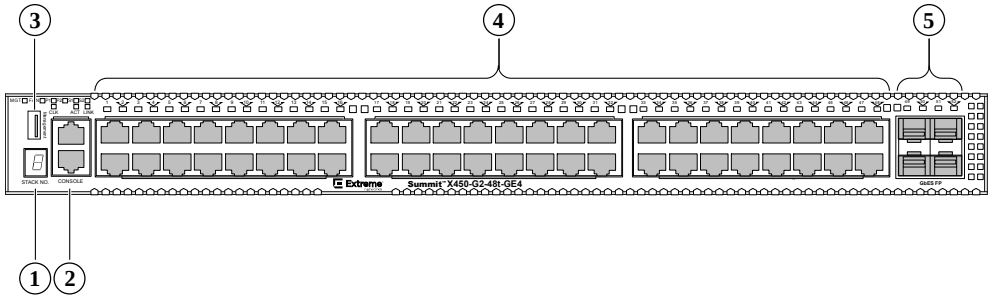


Figure 29: Summit X450-G2-48t-GE4 Front Panel

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

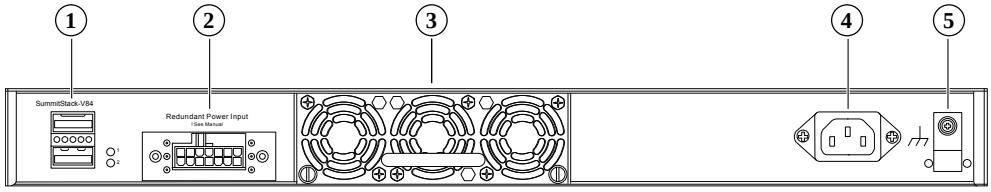


Figure 30: Summit X450-G2-48t-GE4 Rear Panel

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	

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

The Summit 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.

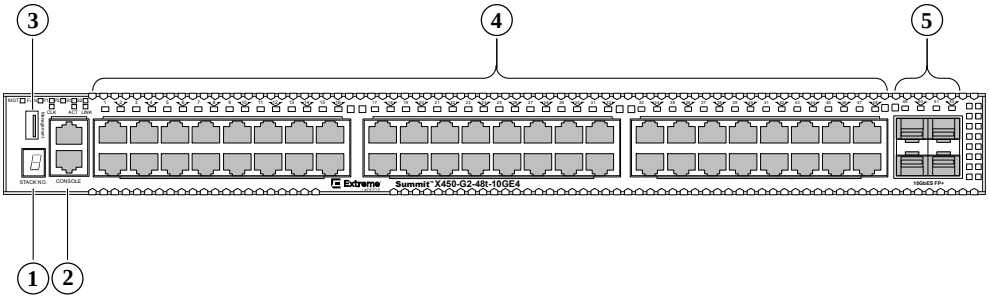


Figure 31: Summit X450-G2-48t-10GE4 Front Panel

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

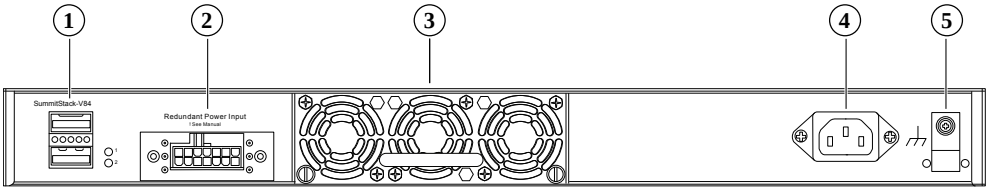


Figure 32: Summit X450-G2-48t-10GE4 Rear Panel

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	

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

The Summit 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.

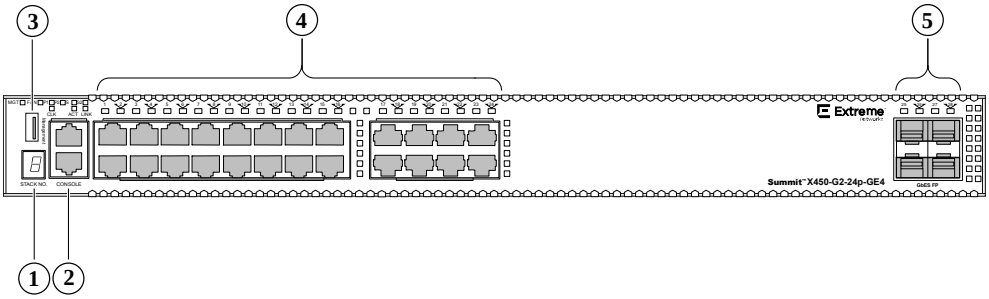


Figure 33: Summit X450-G2-24p-GE4 Front Panel

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

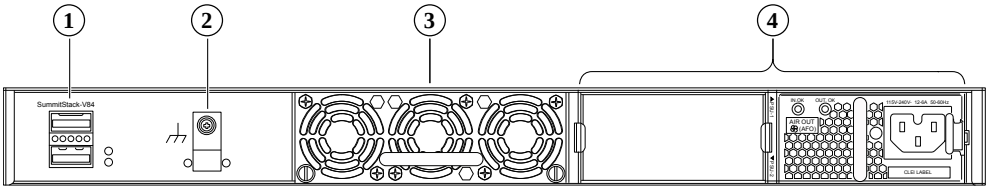


Figure 34: Summit X450-G2-24p-GE4 Rear Panel

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

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

The Summit 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.

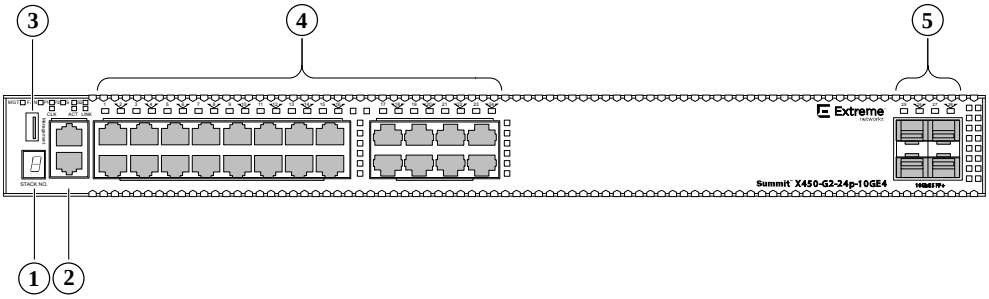


Figure 35: Summit X450-G2-24p-10GE4 Front Panel

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	

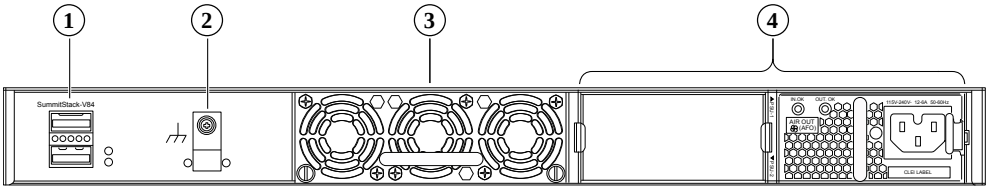


Figure 36: Summit X450-G2-24p-10GE4 Rear Panel

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

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

The Summit 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.

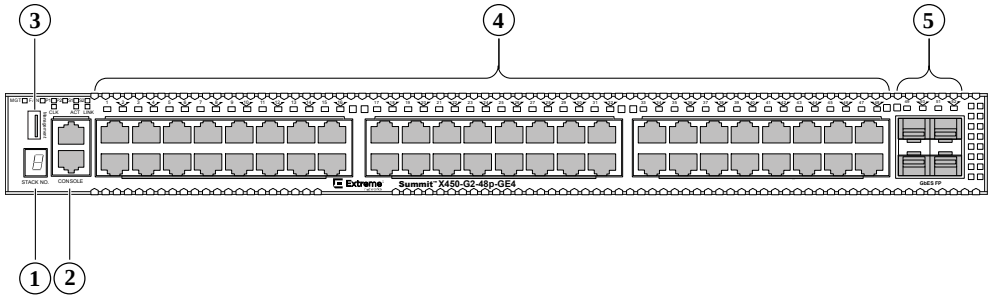


Figure 37: Summit X450-G2-48p-GE4 Front Panel

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	

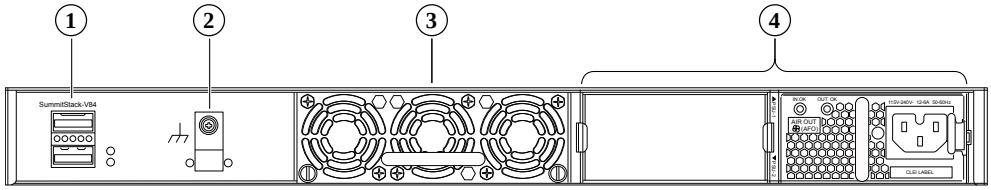


Figure 38: Summit X450-G2-48p-GE4 Rear Panel

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

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

The Summit 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.

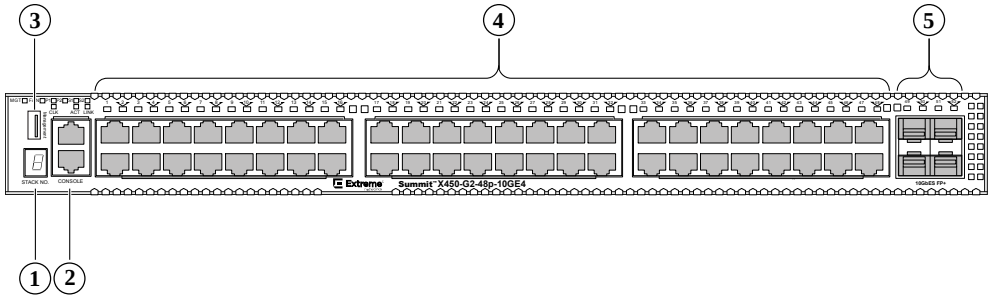


Figure 39: Summit X450-G2-48p-10GE4 Front Panel

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	

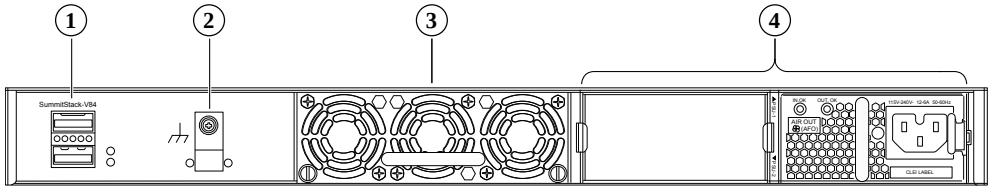


Figure 40: Summit X450-G2-48p-10GE4 Rear Panel

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

Summit X450-G2 Series Switch LEDs

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

Table 7: 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 7: 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 8: Additional Port LED Meanings for PoE Switches: Summit 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 9: Summit X450-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 and Summit X460-G2 Series Switches

The ExtremeSwitching and Summit 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:

- Summit X460-G2-24t-GE4 switch
- Summit X460-G2-24t-10GE4 switch
- Summit X460-G2-24x-10GE4 switch
- Summit X460-G2-24p-GE4 switch
- Summit X460-G2-24p-10GE4 switch
- Summit X460-G2-48t-GE4 switch
- Summit X460-G2-48t-10GE4 switch
- ExtremeSwitching X460-G2-24t-24ht-10GE4 switch
- Summit X460-G2-48x-10GE4 switch
- Summit X460-G2-48p-GE4 switch
- Summit X460-G2-48p-10GE4 switch
- ExtremeSwitching X460-G2-24p-24hp-10GE4 switch
- ExtremeSwitching X460-G2-16mp-32p-10GE4 switch

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 Summit 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 Summit X460-G2 switches, see Replaceable Internal Power Supplies on page 93.

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.

Other X460-G2 switch models require 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 Summit X460-G2 Stacking on page 137.



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 the X460-G2 Series Switches on page 99.

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

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

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

The Summit 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.

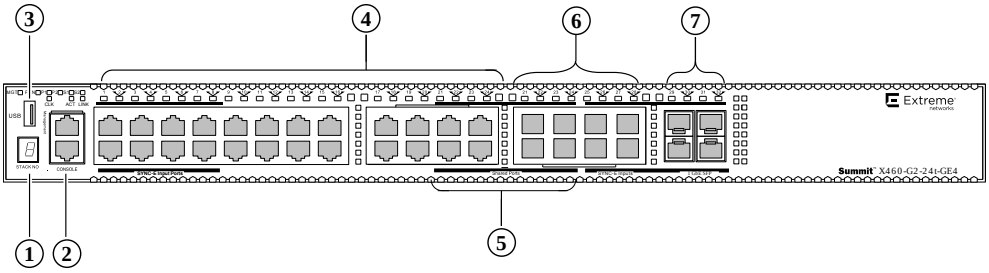


Figure 41: Summit X460-G2-24t-GE4 Front Panel

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	

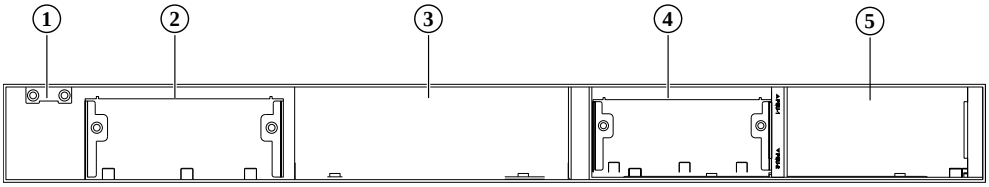


Figure 42: Summit X460-G2-24t-GE4 Rear Panel

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

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

The Summit 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.

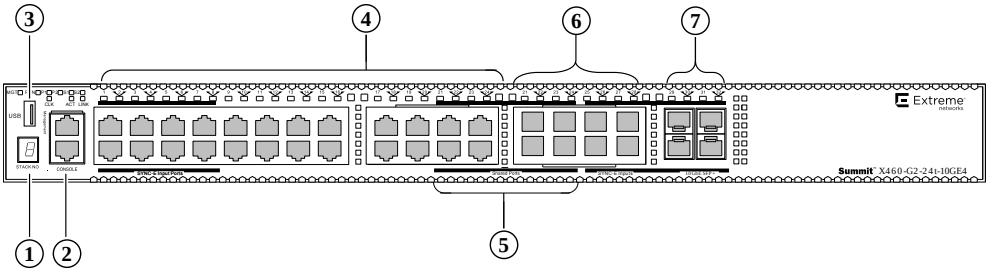


Figure 43: Summit X460-G2-24t-10GE4 Front Panel

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	

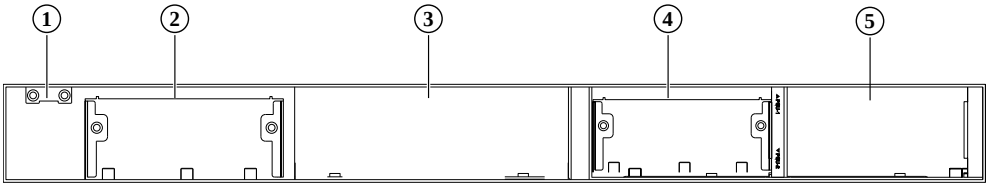


Figure 44: Summit X460-G2-24t-10GE4 Rear Panel

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

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

The Summit 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.

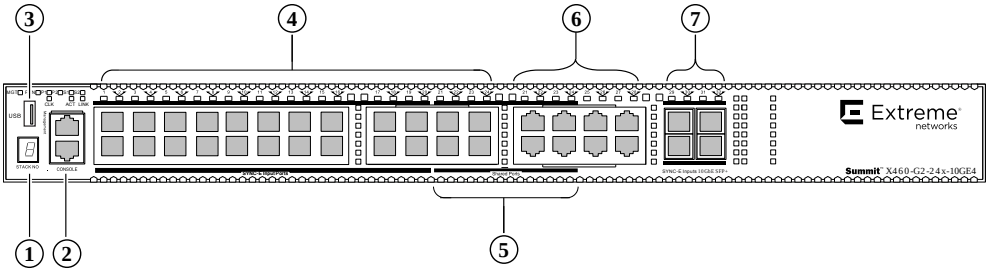


Figure 45: Summit X460-G2-24x-10GE4 Front Panel

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	

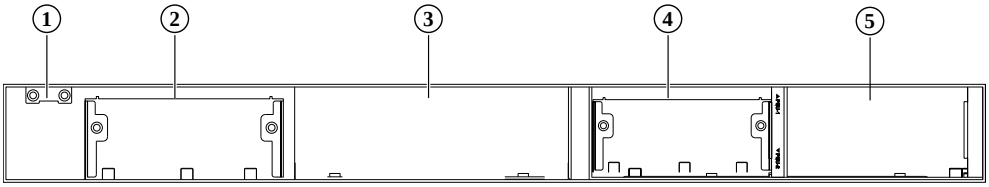


Figure 46: Summit X460-G2-24x-10GE4 Rear Panel

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

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

The Summit 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.

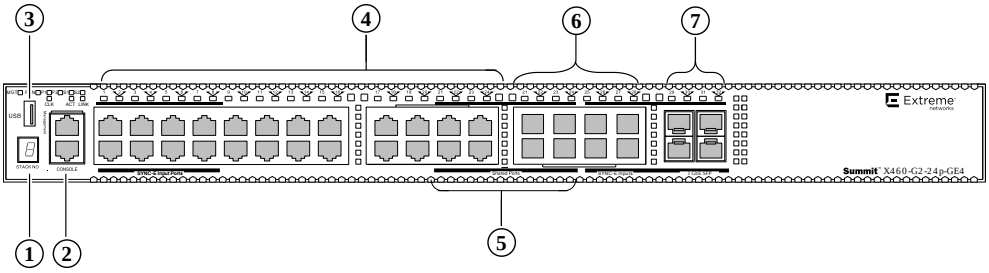


Figure 47: Summit X460-G2-24p-GE4 Front Panel

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	

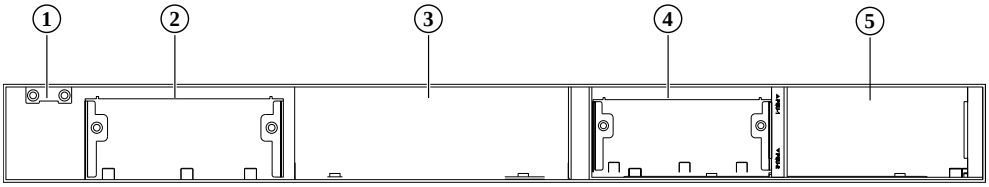


Figure 48: Summit X460-G2-24p-GE4 Rear Panel

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

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

The Summit 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.

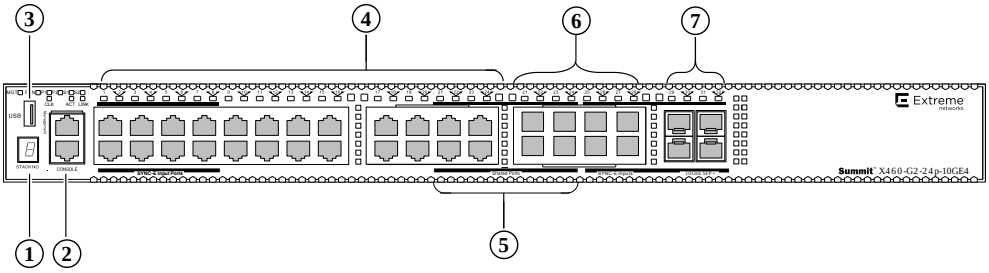


Figure 49: Summit X460-G2-24p-10GE4 Front Panel

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	

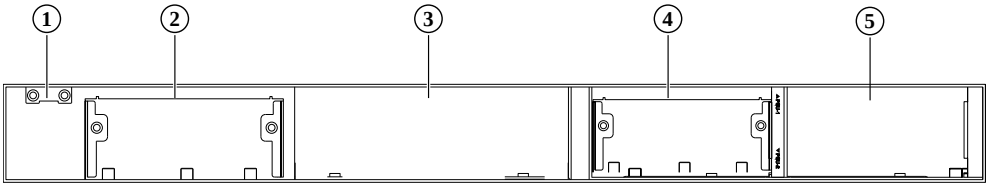


Figure 50: Summit X460-G2-24p-10GE4 Rear Panel

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

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

The Summit 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.

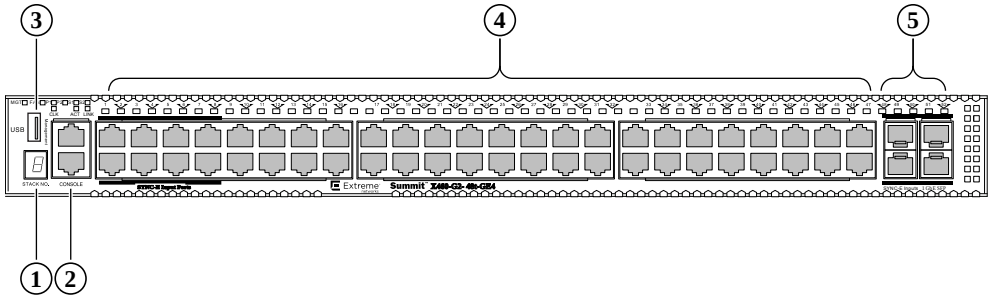


Figure 51: Summit X460-G2-48t-GE4 Front Panel

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

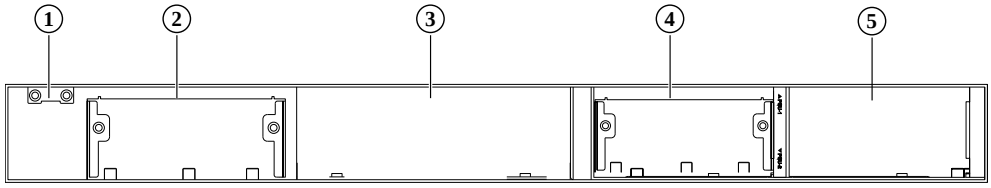


Figure 52: Summit X460-G2-48t-GE4 Rear Panel

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

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

The Summit 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.

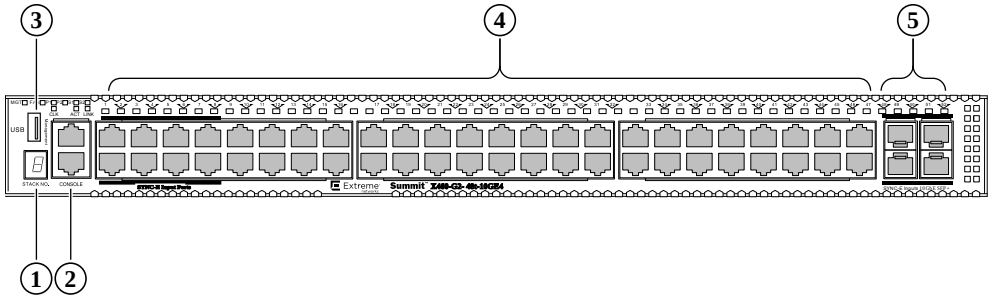


Figure 53: Summit X460-G2-48t-10GE4 Front Panel

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

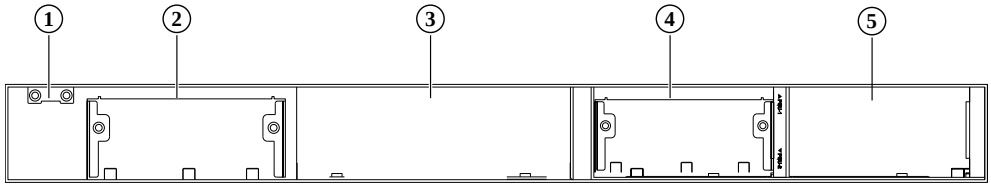


Figure 54: Summit X460-G2-48t-10GE4 Rear Panel

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

The ExtremeSwitching 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.

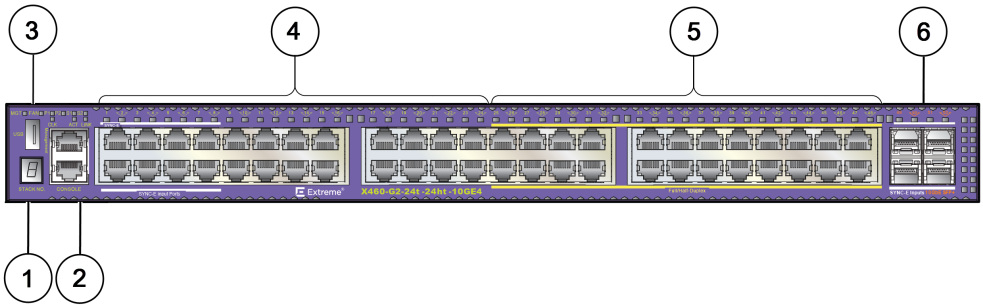


Figure 55: ExtremeSwitching X460-G2-24t-24ht-10GE4 Front Panel

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

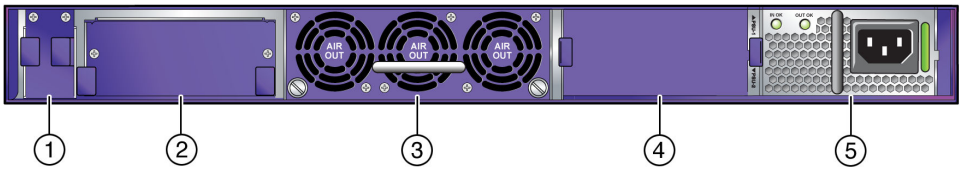


Figure 56: ExtremeSwitching X460-G2-24t-24ht-10GE4 Rear Panel

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.

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

The Summit 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.

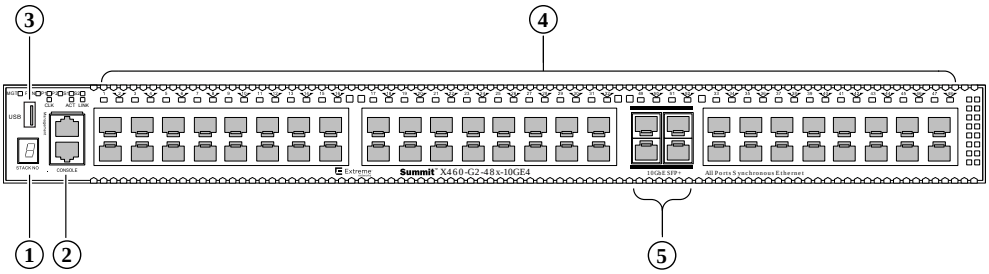


Figure 57: Summit X460-G2-48x-10GE4 Front Panel

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

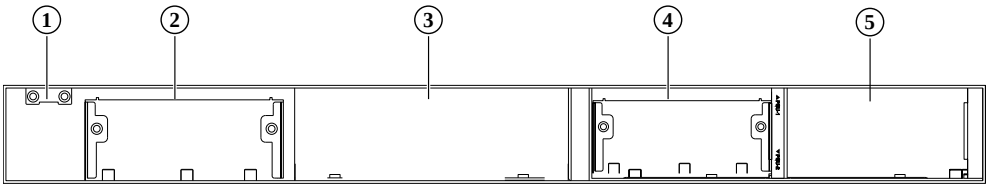


Figure 58: Summit X460-G2-48x-10GE4 Rear Panel

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.

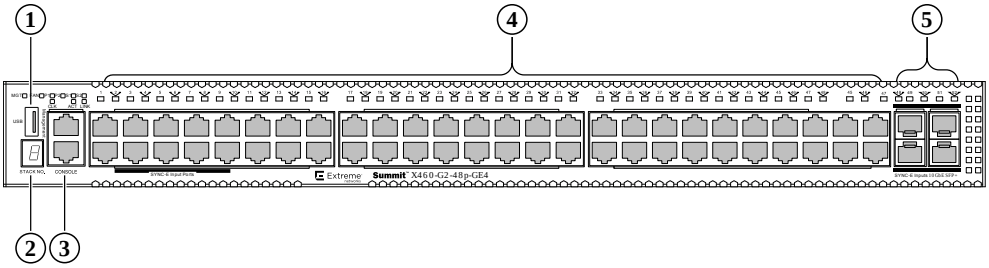


Figure 59: Summit X460-G2-48p-GE4 Front Panel

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	

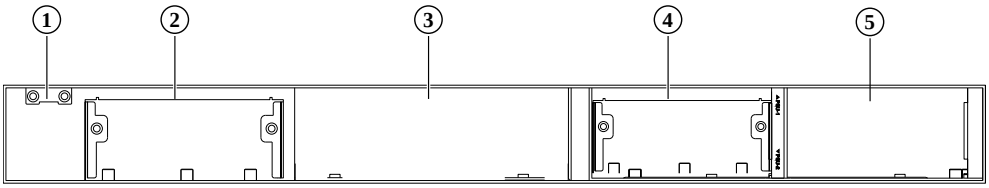


Figure 60: Summit X460-G2-48p-GE4 Rear Panel

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

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

The Summit 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.

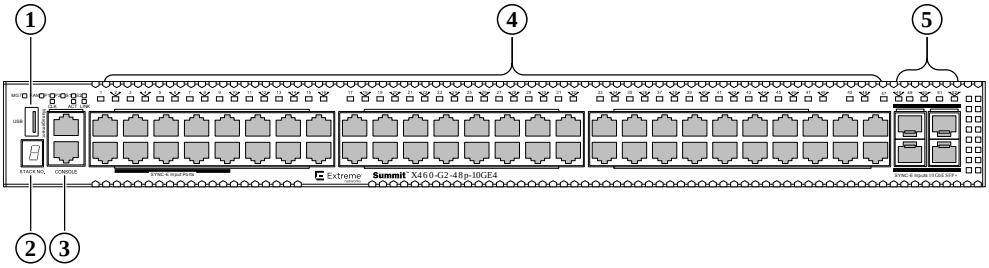


Figure 61: Summit X460-G2-48p-10GE4 Front Panel

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	

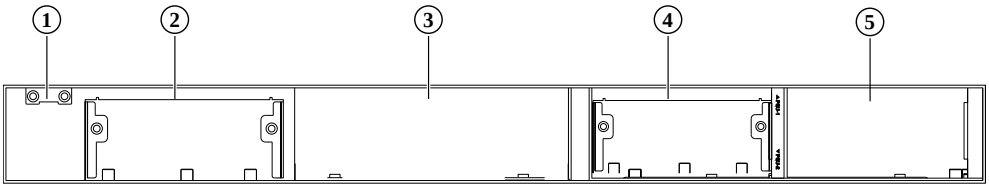


Figure 62: Summit X460-G2-48p-10GE4 Rear Panel

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

The ExtremeSwitching 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.

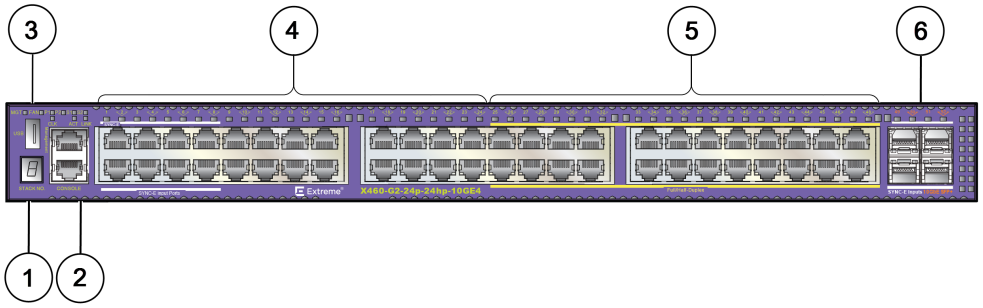


Figure 63: ExtremeSwitching X460-G2-24p-24hp-10GE4 Front Panel

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

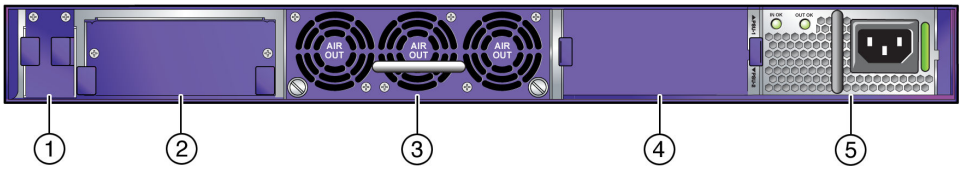


Figure 64: ExtremeSwitching X460-G2-24p-24hp-10GE4 Rear Panel

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

The ExtremeSwitching 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

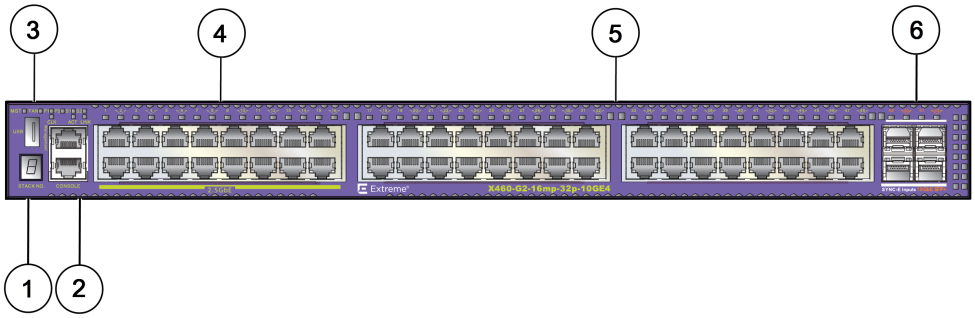


Figure 65: ExtremeSwitching X460-G2-16mp-32p-10GE4 Front Panel

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

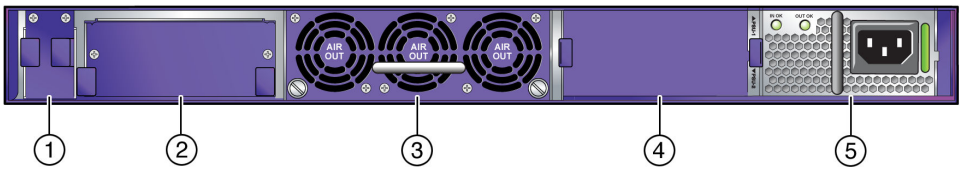


Figure 66: ExtremeSwitching X460-G2-16mp-32p-10GE4 Rear Panel

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

ExtremeSwitching and Summit X460-G2 Series Switch LEDs

Table 10 describes the meanings of the front-panel LEDs on all Summit X460-G2 series switches.

Table 10: 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

Table 10: X460-G2 Front Panel LEDs (continued)

Label or Type	Color/State	Meaning
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 11 on page 53 describes the meanings of additional port LEDs on the following Summit 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 11: 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 12 describes the meanings of the two-digit stack number indicator on all Summit X460-G2 series switches.

Table 12: Summit 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 X620 Series Switches

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

ExtremeSwitching 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 ExtremeSwitching 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 ExtremeSwitching 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, X670-G2, and X770 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 13: ExtremeSwitching 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
X620-16p		16	4 (see note)
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.

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.

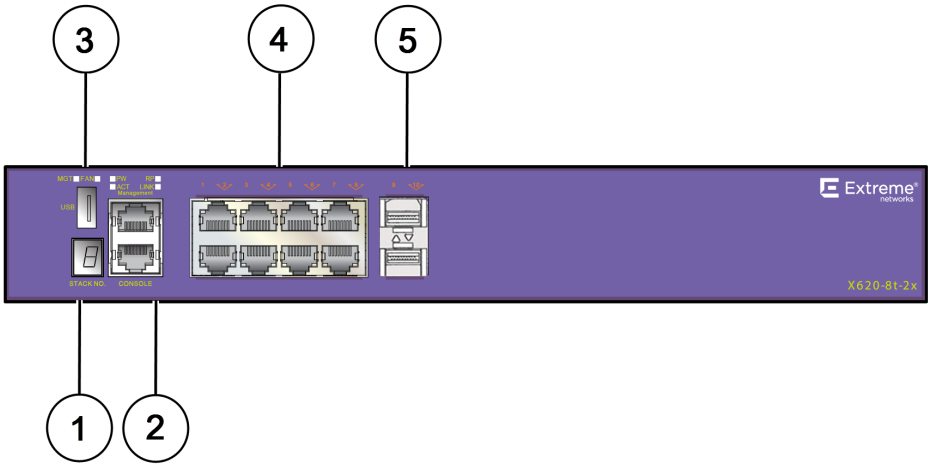


Figure 67: ExtremeSwitching X620-8t-2x Front Panel

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)	

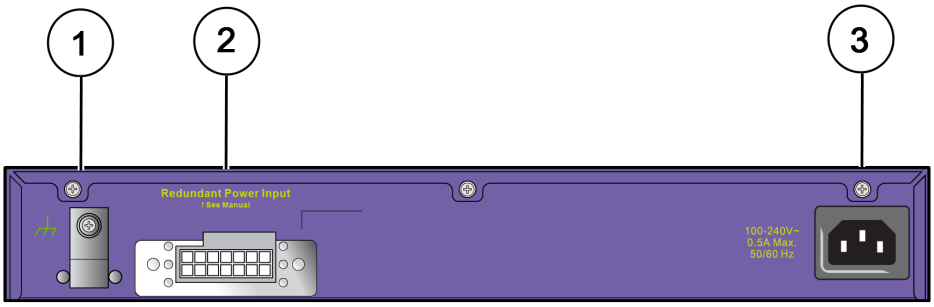


Figure 68: ExtremeSwitching X620-8t-2x Rear Panel

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.

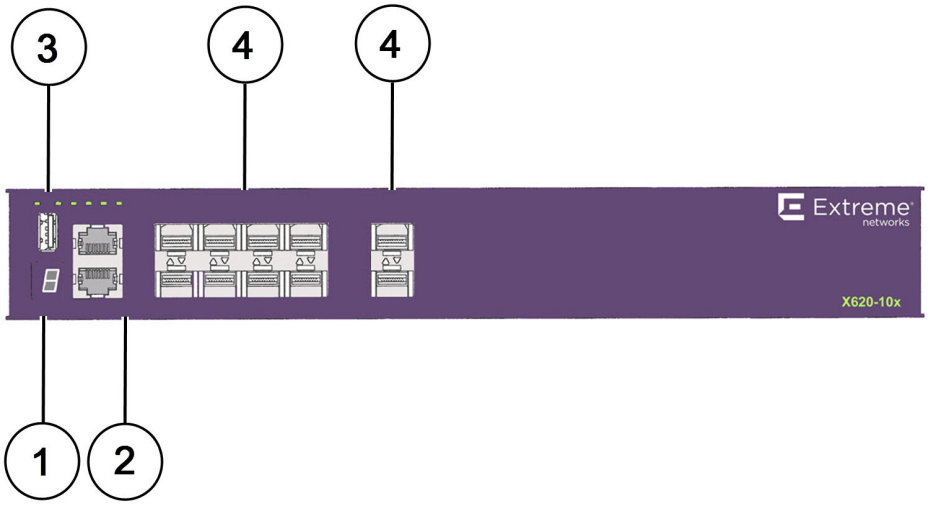


Figure 69: ExtremeSwitching X620-10x Front Panel

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

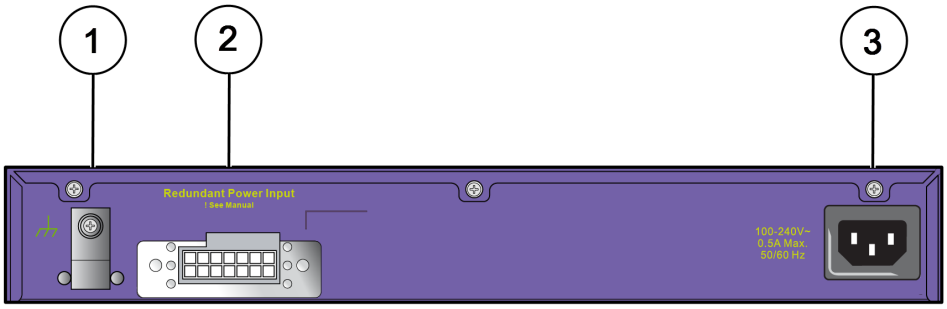


Figure 70: ExtremeSwitching X620-10x Rear Panel

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.

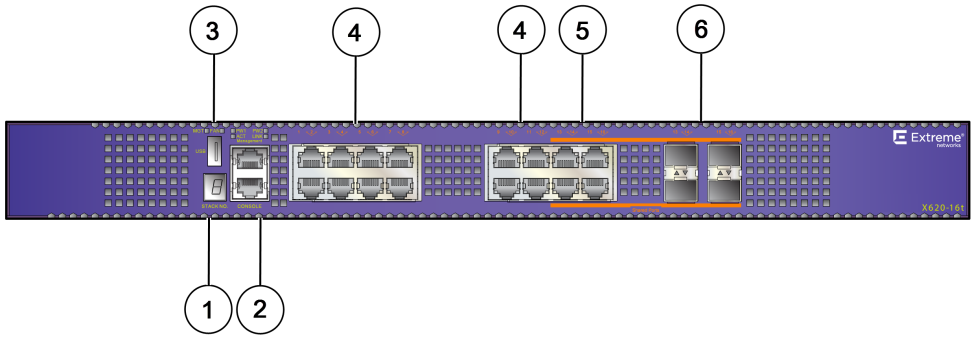


Figure 71: ExtremeSwitching X620-16t Front Panel

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

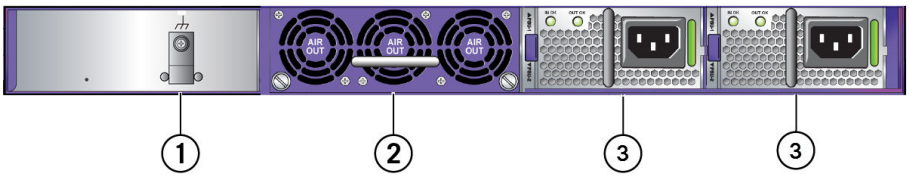


Figure 72: ExtremeSwitching X620-16t Rear Panel

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.

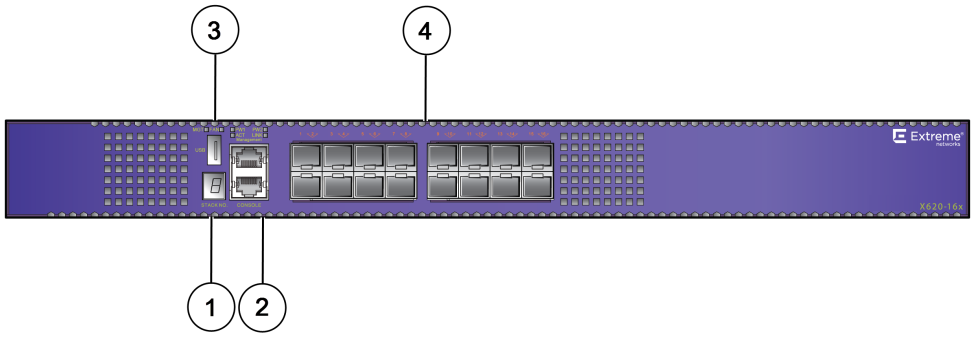


Figure 73: ExtremeSwitching X620-16x Front Panel

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

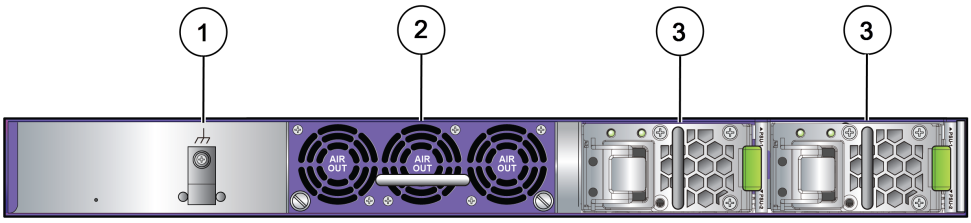


Figure 74: ExtremeSwitching X620-16x Rear Panel

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.

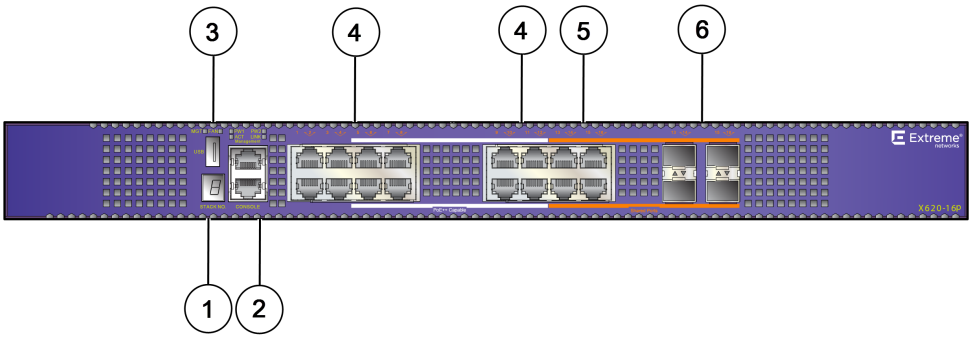


Figure 75: ExtremeSwitching X620-16p Front Panel

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

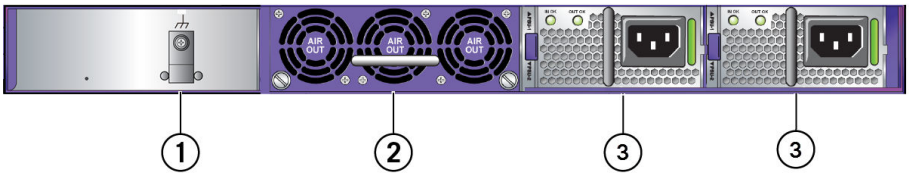


Figure 76: ExtremeSwitching X620-16p Rear Panel

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 14: 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

Table 14: X620 Front Panel LEDs (continued)

Label or Type	Color/State	Meaning
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
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 15: 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

Summit X670-G2 Series Switches

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

- Summit X670-G2-48x-4q switch

- Summit X670-G2-72x switch

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 Summit 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 Summit 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.

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

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

The Summit 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 40G mode or ports 49 to 64 in 10G mode) that provide 40 Gbps of fiber connectivity. Two (stacking V160 or V80) or four (stacking V320) of these four ports are configurable to be 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

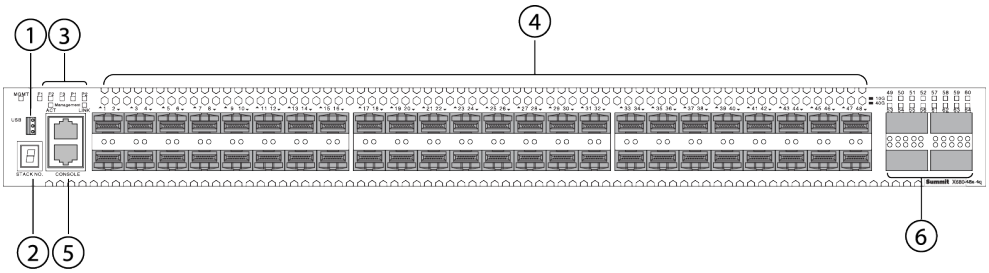


Figure 77: Summit X670-G2-48x-4q Front Panel

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

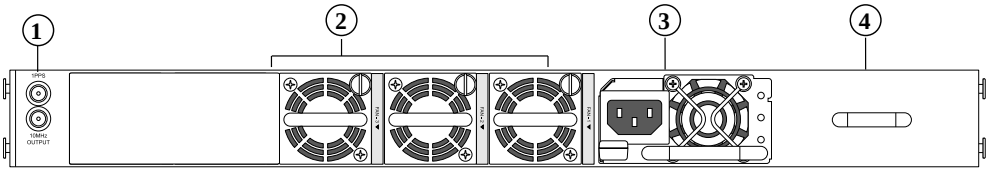


Figure 78: Summit X670-G2-48x-4q Rear Panel

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

Summit X670-G2-72x Switch Ports and Slots

The Summit 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

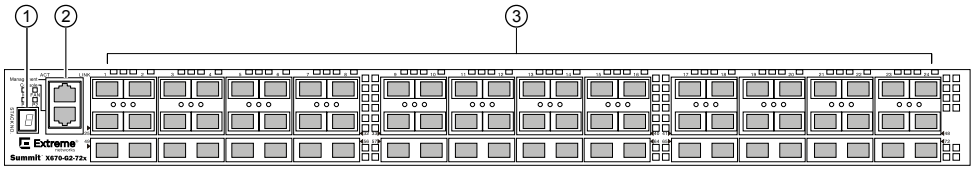


Figure 79: Summit X670-G2-72x Front Panel

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

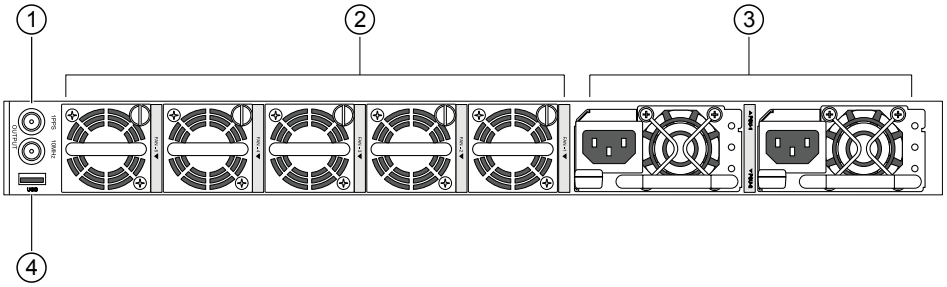


Figure 80: Summit X670-G2-72x Rear Panel

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

Summit X670-G2 Series Switch LEDs

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

Table 16: 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.

Table 16: X670-G2 Front Panel LEDs (continued)

Label or Type	Color/State	Meaning
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 17: Summit 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 ExtremeSwitching 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 ExtremeSwitching X870 series.

The ExtremeSwitching 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 66.

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 ExtremeSwitching 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.

ExtremeSwitching X690 series switches require ExtremeXOS version 22.3 or later.

Partitioning X690 Switch Ports into Data Lanes

Front-panel ports on ExtremeSwitching 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.

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

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

Port numbers are assigned depending on whether the physical ports are partitioned into data lanes. To illustrate, Figure 81 shows the physical ports on the X690 front panel that can be partitioned. Table 18 on page 67 and Table 19 on page 68 detail how port numbers are assigned for each of the physical ports.

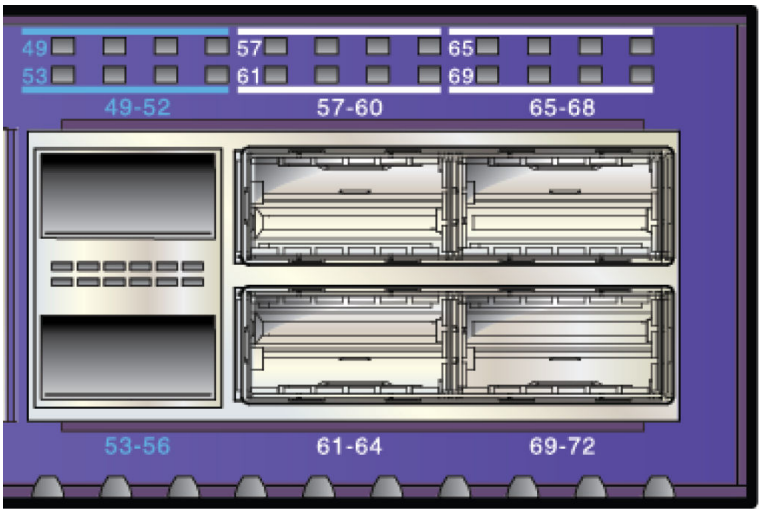


Figure 81: X690 Ports that Can Be Partitioned into Data Lanes

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.

Table 18: 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
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 19: 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



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 of these ports are configurable as stacking ports.
- 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.

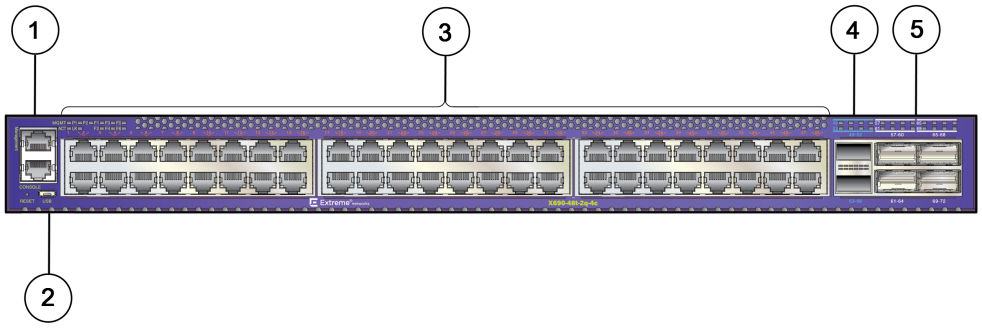


Figure 82: ExtremeSwitching X690-48t-2q-4c Front Panel

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

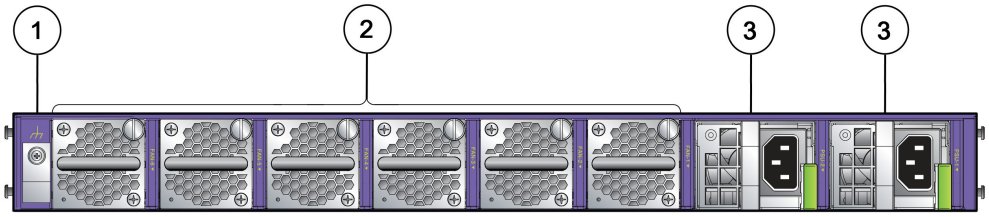


Figure 83: ExtremeSwitching X690-48t-2q-4c Rear Panel

1 = Grounding lug	3 = DC power input connector supply
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 1Gb/10GBASE-X SFP+ ports (ports 1-48) that provide 10 Gbps high-density fiber connectivity. Two of these ports are configurable as stacking ports.
- 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.

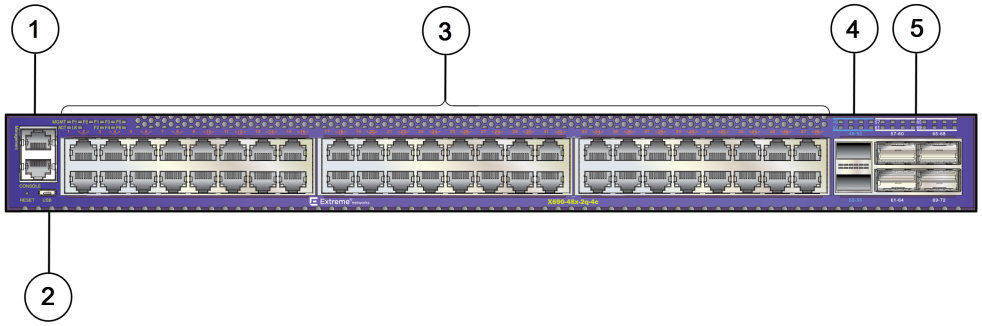


Figure 84: ExtremeSwitching X690-48x-2q-4c Front Panel

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

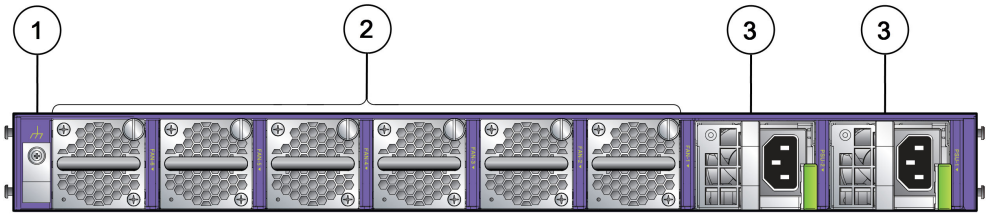


Figure 85: ExtremeSwitching X690-48x-2q-4c Rear Panel

1 = Grounding lug	3 = DC power input connector supply
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 20: 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 21: 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
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

Table 21: X690 Front Panel Port LEDs (continued)

Location	Speed	Color/State	Meaning
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

Summit X770 Series Switches

The Summit X770 series switches have 32 front-panel Ethernet ports that can provide 40-gigabit Ethernet connectivity using installable QSFP+ optical modules. The ports can operate in 40-gigabit mode, or with appropriate optical modules can be partitioned into 10-gigabit data lanes. Both native stacking and alternate stacking are supported using the front panel-ports.

For details on port data capacity and numbering, see Summit X770-32q Switch Ports and Slots on page 73.

The Summit X770 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.

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 Summit X770-32q 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 port.

The X770 also supports Boundary Clock (BC), Transparent Clock (TC), and Ordinary Clock (OC) protocols for synchronizing phase and frequency, and allowing the network and the connected devices to be synchronized down to microseconds of accuracy over Ethernet connections.

Switch cooling is provided by five 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 five 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.

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

Summit X770 series switches require ExtremeXOS version 15.4.1.3 or later, or version 21.1.1 or later.

Summit X770-32q Switch Ports and Slots

The front panel of the Summit X770-32q switch includes:

- 32 40-gigabit Ethernet ports capable of supporting passive copper QSFP+ and active fiber QSFP+.

  With quad fan-out SFP+ cables, the QSFP+ ports can be partitioned into 10-gigabit data lanes: 24 of the ports can be partitioned into four 10-gigabit data lanes, and the remaining eight ports can be used as single 10-gigabit data lanes. This yields a total of 104 10-gigabit ports as shown in Figure 86:

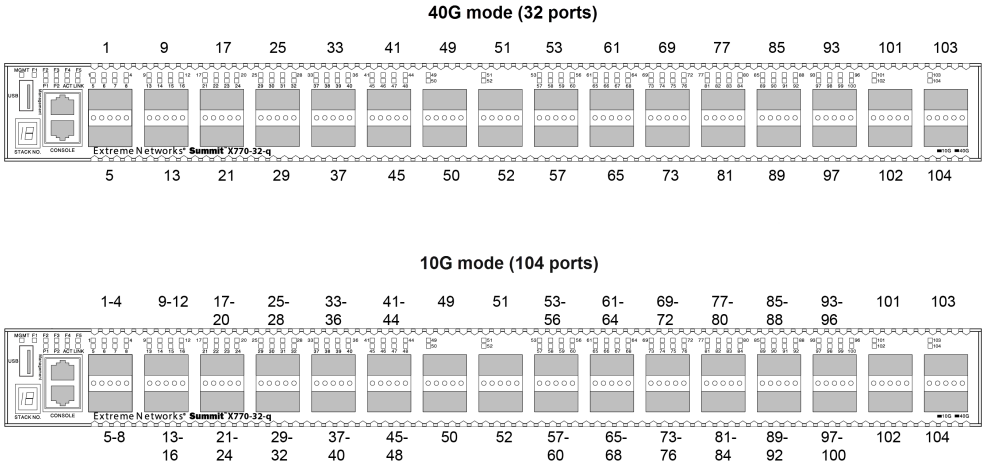


Figure 86: X770 Port Numbers for 10G mode and 40G Mode

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

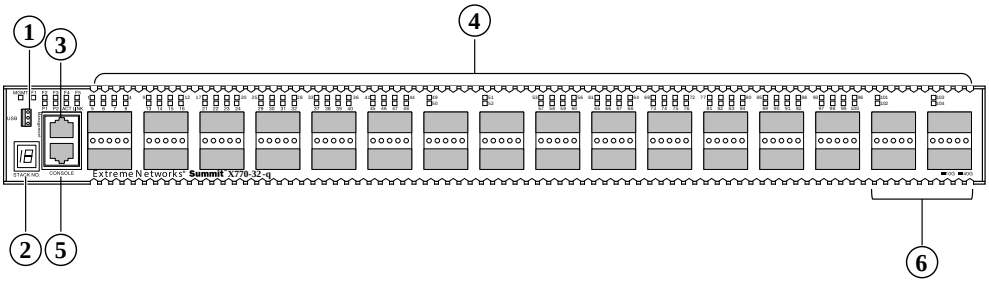
- Groups of two or four ports configurable to be stacking ports as shown in the following table:

Table 22: X770 Stacking Method and Ports

Stacking Method	Ports
SummitStack-V	103 and 104
SummitStack-V160	103 and 104
SummitStack-V-320	101 and 103, 102 and 104

When ports are used for stacking they are not available for normal Ethernet connectivity. For more information about stacking, see Building Stacks on page 120.

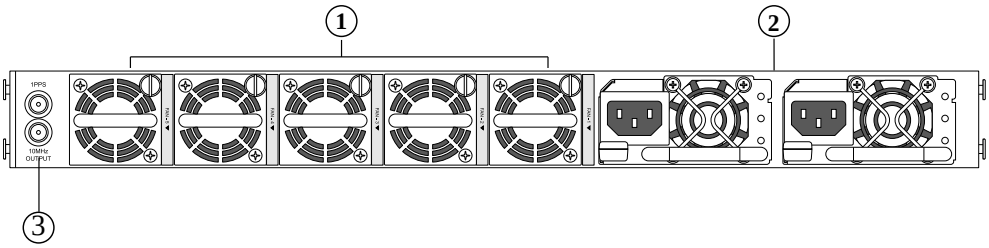
- Management port (10/100/1000-Mbps).
- Front panel USB port for access to external storage.
- RJ45 RS-232c serial console port used to connect a terminal and perform local management.
- LEDs to indicate port status and switch operating conditions. For a description of the LEDs and their operation, see Summit X770 Series Switch LEDs on page 74.
- Stack number indicator.



1 = USB port	4 = 40G/10G QSFP+ Ethernet ports
2 = Stack number indicator	5 = Console port
3 = Management port	6 = Stacking ports

The rear panel of the Summit X770-32q switch includes:

- Five replaceable fan modules
- Two power supply bays for either AC or DC power supplies (see Summit 550 W AC and DC Power Supplies on page 95).
- Two mini-BNC connectors labeled OUT for connecting a Building Integrated Timing Supply (BITS) or GPS timing source:
  - 1 PPS frame output
  - 10 MHz output



1 = Fan modules	3 = mini-BNC connectors
2 = Power supply	

Summit X770 Series Switch LEDs

The following sections describe the meanings of the LEDs on the Summit X770 series switches.

Table 23: X770 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 Ports 40G mode 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, 41, 45, 49, 50 51, 52, 53, 57, 61, 65, 69, 73, 77, 81, 85, 89, 93, 97, 101, 102, 103, 104	Steady blue	Link OK.
	Blinking blue	Activity on the indicated port.
	Off	No link or port disabled.
Ethernet Ports 10G mode 1-104	Steady green	Link OK
	Blinking green	Activity on the indicated port
	Off	No 10G link or port disabled.

Table 24: 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.
Stacking Ports 40G mode (V160 and V320 stacking) ports 101, 102, 103, and 104	Steady blue	Link OK
	Blinking blue	Activity
	Off	No link or port disabled.
Stacking Ports 10G mode (Alternate stacking) ports 103 and 104	Steady green	Link OK
	Blinking green	Activity
	Off	No link or port disabled

ExtremeSwitching X870 Series Switches

The ExtremeSwitching 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 76 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 ExtremeSwitching X870 series includes the following base models:

- ExtremeSwitching X870-32c Switch Ports and Slots on page 78
- ExtremeSwitching X870-96x-8c Switch Ports and Slots on page 79

ExtremeSwitching X870 series switches require ExtremeXOS version 22.2.1 or later.

Partitioning X870 Switch Ports into Data Lanes

Front-panel ports on ExtremeSwitching 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.

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

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

Port numbers are assigned depending on whether the physical ports are partitioned into data lanes. To illustrate, Figure 87 shows a portion of the switch's front panel along with the port-number assignments for physical ports P1 through P8.

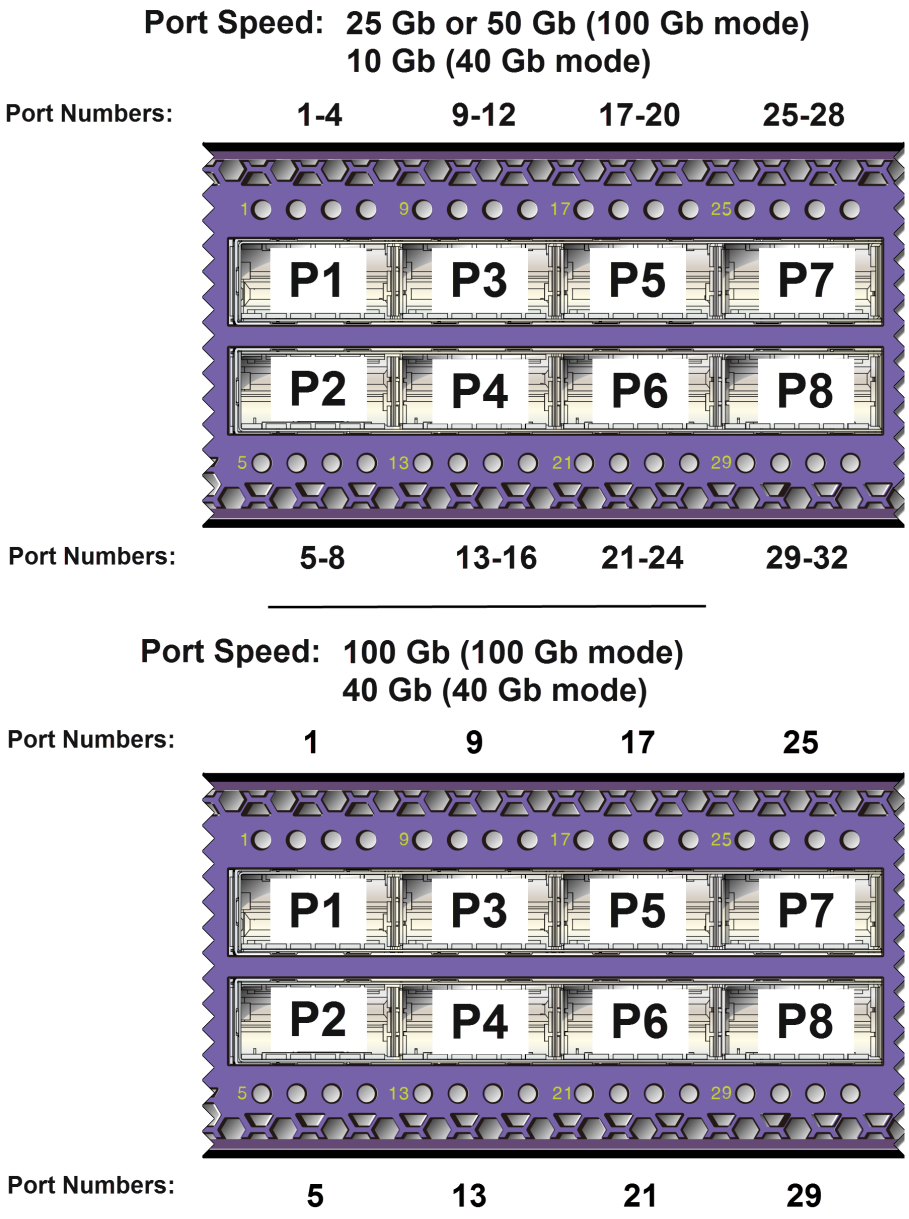


Figure 87: X870 Port Numbers for 100G Mode and 40G Modes when Ports are Partitioned into Data Lanes

Management

A serial console port on the front panel of the ExtremeSwitching 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.

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 80.

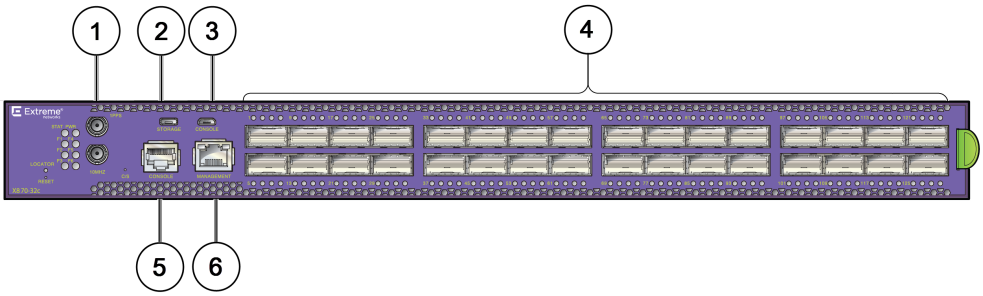


Figure 88: ExtremeSwitching X870-32c Front Panel

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.

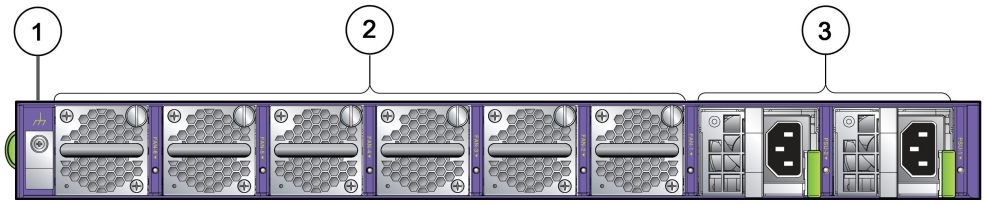


Figure 89: ExtremeSwitching X870-32c Rear Panel

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 80.

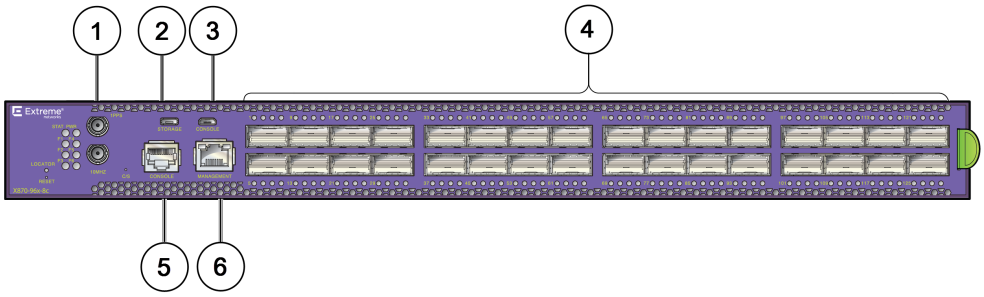


Figure 90: ExtremeSwitching X870-96x-8c Front Panel

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.

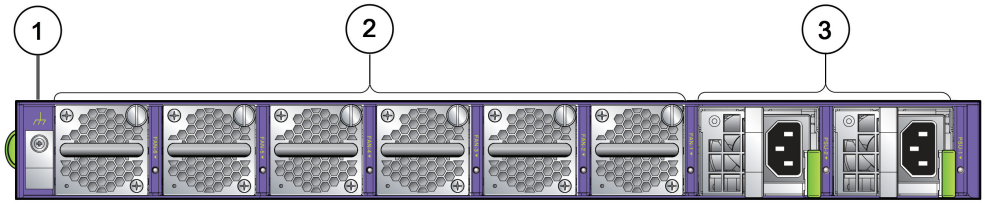


Figure 91: ExtremeSwitching X870-96x-8c Rear Panel

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 25: 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 76)	Steady green	Link up, no activity
	Blinking green	Packet transmitting or receiving
	Off	Link not up or port disabled

Pluggable Interfaces for ExtremeSwitching and Summit Switches

Many ExtremeSwitching and Summit switches include ports that are compatible with a variety of optical modules, including SFP, SFP+, and QSFP+, modules. 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*.

2 Power supplies

External Power Supplies
Replaceable Internal Power Supplies

Many ExtremeSwitching and Summit 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 93.)

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 (Power over Ethernet)* operation on applicable switches.

The following ExtremeSwitching and Summit switches use external power supplies for redundancy:

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

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

- Summit X450-G2 (PoE models)
- Summit X460-G2
- ExtremeSwitching X620 (16-port models)
- Summit X670-G2
- Summit X770

External Power Supplies

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

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

Table 26: 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	750W AC PSU: 10931 EPS-C2: 10936

Table 26: External Power Supplies for X440-G2 Series Switches (continued)

Switch Model	Compatible External Power Supply	Model: Part Number
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	750W 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	750W 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	750W AC PSU: 10931 EPS-C2: 10936
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	750W 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	750W 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	750W 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	750W AC PSU: 10931 EPS-C2: 10936

Table 26: External Power Supplies for X440-G2 Series Switches (continued)

Switch Model	Compatible External Power Supply	Model: Part Number
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	750W AC PSU: 10931 EPS-C2: 10936
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	750W AC PSU: 10931 EPS-C2: 10936

Table 27: 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	750W 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	750W 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	750W 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	750W AC PSU: 10931 EPS-C2: 10936

Table 28: 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	750W AC PSU: 10931 EPS-C2: 10936

Table 28: 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	750W AC PSU: 10931 EPS-C2: 10936

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 Summit 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 Summit 750 W AC power supplies (Model 10931). For more information about the 750 W AC power supply including LED meanings, see Summit 750 W AC Power Supply on page 96.

The EPS-C2 system is compatible with the following switch models:

- ExtremeSwitching X440-G2-12p-10GE4 switch
- ExtremeSwitching X440-G2-24t-10GE4 switch
- ExtremeSwitching X440-G2-24p-10GE4 switch
- ExtremeSwitching X440-G2-24x-10GE4 switch
- ExtremeSwitching X440-G2-48t-10GE4 switch
- ExtremeSwitching X440-G2-24t-10GE4-DC switch
- ExtremeSwitching X440-G2-48t-10GE4-DC switch
- ExtremeSwitching X440-G2-12t8fx-GE4 switch
- ExtremeSwitching X440-G2-24x-GE4 switch
- ExtremeSwitching X440-G2-24t-GE4 switch
- Summit X450-G2 series switches (all models)
- ExtremeSwitching X620-8t-2x switch
- ExtremeSwitching X620-10x switch

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. Five 2x7 connectors are used to deliver power to the switches.

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.

One redundant 2x7 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.

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 333.

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 197.

Each EPS-C2 power supply is shipped with a special redundant power supply cord.

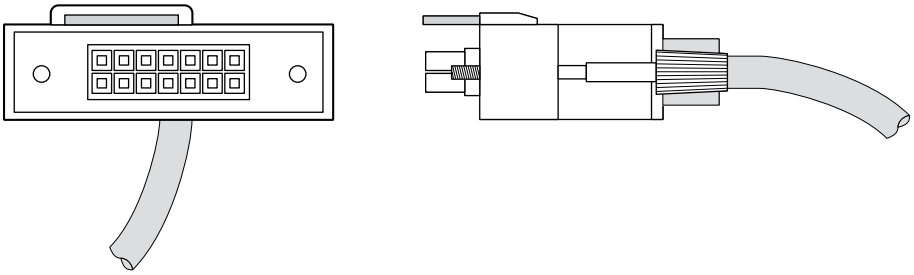


Figure 92: EPS-C2 2x7 Pin Redundant Power Cable

RPS-90 Redundant Power Supply

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 333.

STK-RPS-150PS Redundant Power Supply

The STK-RPS-150PS is a hot-swappable 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:

- ExtremeSwitching X440-G2-24t-10GE4 switch
- ExtremeSwitching X440-G2-24x-10GE4 switch
- ExtremeSwitching X440-G2-48t-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
- Summit X450-G2-24t-GE4 switch
- Summit X450-G2-24t-10GE4 switch
- Summit X450-G2-48t-GE4 switch
- Summit X450-G2-48t-10GE4 switch
- ExtremeSwitching X620-8t-2x switch
- ExtremeSwitching X620-10x switch

Table 29: 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 334.

RPS-150XT Redundant Power Supply

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)

The RPS-150XT is compatible with the following Extreme Networks switches:

- ExtremeSwitching X440-G2-24t-10GE4 switch
- ExtremeSwitching X440-G2-24x-10GE4 switch
- ExtremeSwitching X440-G2-48t-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
- ExtremeSwitching X620-8t-2x switch
- ExtremeSwitching X620-10x switch

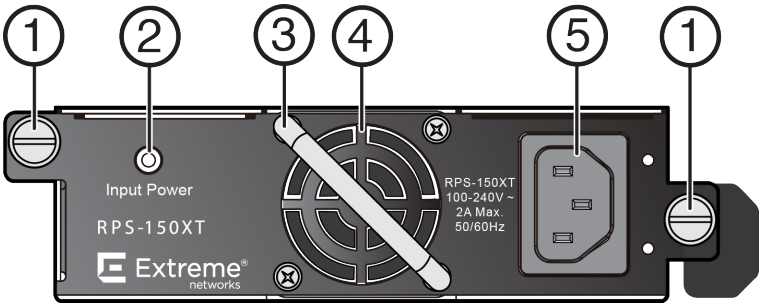


Figure 93: RPS-150XT Front Panel

1 = Captive screws	4 = Fan
2 = Status LEDs	5 = AC power input connector
3 = Handle	

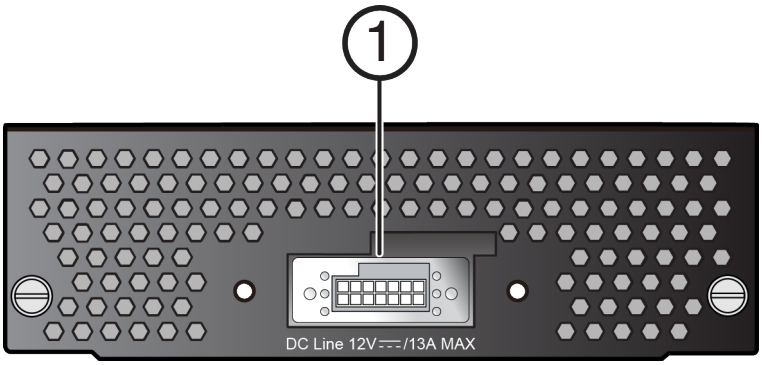


Figure 94: RPS-150XT Rear Panel

1 = 14-pin Redundant Power Supply connector

See RPS-150XT Connector on page 336 for pin locations and function.

Table 30: 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 335.

RPS-500p Redundant Power Supply

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:

- AC power cord
- RPS cable (1 meter long)
- Four rubber feet (for flat surface installation)
- Two rack mount brackets
- Eight flathead screws (M3x6mm)

The RPS-500p is compatible with the following Extreme Networks switches:

- ExtremeSwitching X440-G2 switches (most models)
- Summit X450-G2 switches (non-PoE models)

The RPS-500p is compatible with both PoE and non-PoE switches.

Table 31: 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 337.

STK-RPS-1005PS Redundant Power Supply

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:

- AC power cable
- RPS cable
- Four rubber feet (for flat surface installation)

The STK-RPS-1005PS is compatible with the ExtremeSwitching X440-G2-48p-10GE4 switch.

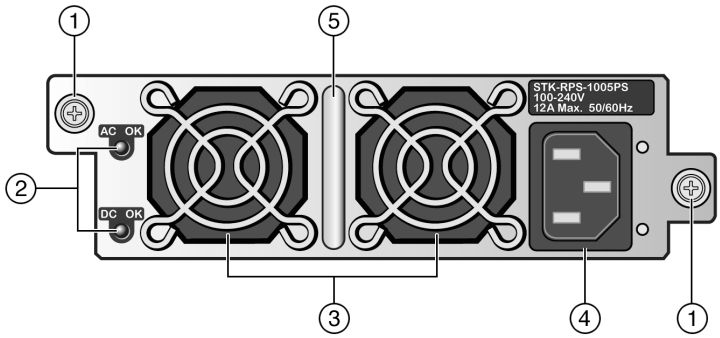


Figure 95: STK-RPS-1005PS Front Panel

1 = Captive screws	4 = AC power input connector
2 = Status LEDs	5 = Handle
3 = Fans	

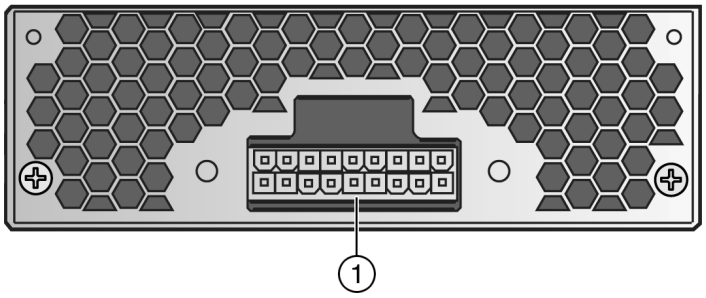


Figure 96: STK-RPS-1005PS Rear Panel

1 = 18-pin Redundant Power Supply connector

Table 32: 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 339.

Replaceable Internal Power Supplies

Several ExtremeSwitching and Summit 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 33: 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	
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
X620-16p switch	750 W AC: 10931	
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
X770-32q switch	550 W AC-FB: 10925 550 W AC-BF: 10927	550 W DC-FB: 10926 550 W DC-BF: 10928
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 a Summit 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 340.

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:

- Summit X460-G2 switches (non-*PoE* models)
- ExtremeSwitching 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 34: 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.
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 (Model 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

These power supplies are compatible with Summit X460-G2 *PoE* switch models that have the same airflow direction as the power supply.

These power supplies have a keyed power inlet (C16) that requires a notched (C15) power cord.

The Summit 350 W AC power supplies have the status LEDs listed in Table 35.

Table 35: Summit 350 W AC Power Supply LED Status Indications

IN_OK (Green)	OUT_OK (Green/RED)	Description
Off	Off	No AC input power connection or low AC voltage
On	Off	AC input good; output disabled

Table 35: Summit 350 W AC Power Supply LED Status Indications (continued)

IN_OK (Green)	OUT_OK (Green/RED)	Description
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:

- Summit X670-G2 switches (all models)
- Summit X770-32q switch

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 36.

Table 36: 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 (Model 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

Both power supplies are compatible with Summit X460-G2 *PoE* switch models that have the same airflow direction as the power supply.

The Summit 715 W AC PSU-FB power supply (Model 10951) is compatible with the Summit X450-G2 PoE 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 37.

Table 37: Summit 715 W AC Power Supply LED Status Indications

IN_OK (Green)	OUT_OK (Green/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 (Model 10931) is available for PoE models of the Summit X460 and ExtremeSwitching X620 series switches.

The Summit 750 W AC power supply is also used in the EPS-C2 external power system (see EPS-C2 Redundant Power System on page 86). 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 38: 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.

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 ExtremeSwitching X690 and X870 switches that have the same airflow direction as the power supply.

The Summit 770 W AC power supplies have the status LEDs listed in Table 39.

Table 39: Summit 770 W AC Power Supply LED Status Indications

IN_OK (Green)	OUT_OK (Green/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 1100 W AC Power Supplies

Summit 1100 W AC power supplies are available in the following models:

- 1100 W AC PSU-FB (Model 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 Summit X460-G2 *PoE* switch models that have the same airflow direction as the power supply.

The Summit 1100 W AC PSU-FB power supply (Model 10941) is compatible with the Summit X450-G2 PoE 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 40.

Table 40: Summit 1100 W AC Power Supply LED Status Indications

IN_OK (Green)	OUT_OK (Green/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 ExtremeSwitching 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 41.

Table 41: Summit 1100 W DC Power Supply LED Status Indications

IN_OK (Green)	OUT_OK (Green/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

3 Option Cards and Versatile Interface Modules

Optional Ports for the X460-G2 Series Switches

Port option cards, versatile interface modules (VIMs), or stacking modules are installed in dedicated slots at the back of the switch to provide optional I/O ports or stacking ports. If no card or module is installed, the option slot is covered by a blank panel.

These optional items add 10-Gbps copper or fiber I/O ports or high-performance stacking ports to the back panel of compatible switches.

For information about option cards, VIMs, and stacking modules that work with other Summit switches, refer to *ExtremeSwitching and Summit Switches: Hardware Installation Guide for Switches Using ExtremeXOS 16 or Earlier*.

The following table lists the types of port option cards, VIMs, and stacking modules and their compatible Summit switch series.

Table 42: Summit Card, VIM, and Module Compatibility

Card or Module Type	Name	No. of Ports	Type of Ports	Compatible Switch Series
VIM2	VIM-2q	2	40 gigabit QSFP+ optical ports	Summit X460-G2
	VIM-2ss	2	high-performance SummitStack ports	Summit X460-G2
	VIM-2t	2	10-gigabit copper BASE-T ports	Summit X460-G2
	VIM-2x	2	10-gigabit SFP+ optical ports	Summit X460-G2
Clock	TM-CLK Clock Module	NA	Reference frequency for SyncE and 1588v2 precision time features	Summit X460-G2

Optional Ports for the X460-G2 Series 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 Summit 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 a Summit 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 and Summit switches, see Building Stacks on page 120.

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.

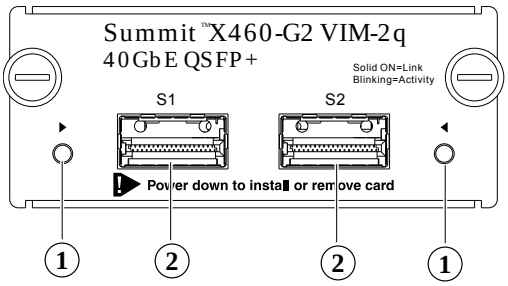


Figure 97: VIM-2q Port Option Card

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

Summit 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 a Summit 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 98, 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.

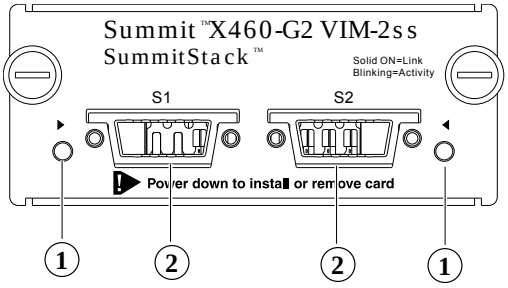


Figure 98: VIM-2ss SummitStack Module

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 a Summit 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.

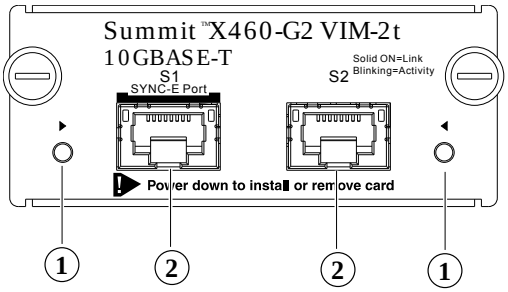


Figure 99: VIM-2t Ethernet Module Option

1 = LEDs	2 = 10G BASE-T ports

VIM-2x Ethernet Module Port Option Card

The VIM-2x Ethernet Module option card, shown in Figure 100, allows you to add up to two 10-gigabit SFP+ optical ports to the VIM slot on the rear panel of the Summit 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.

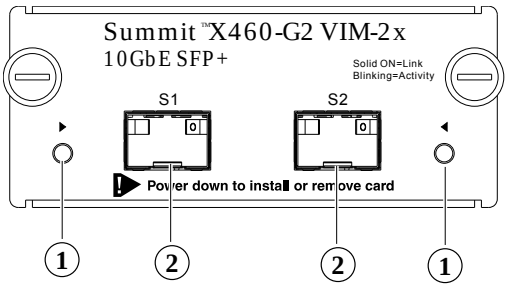


Figure 100: VIM-2x Ethernet Module Option

1 = LEDs	2 = SFP+ Ports

TM-CLK Clock Module

The TM-CLK Clock Module provides an Oven-controlled Crystal Oscillator (OCXO), stable to better than one part per million for use as a reference frequency for SyncE and 1588v2 precision time features. 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.

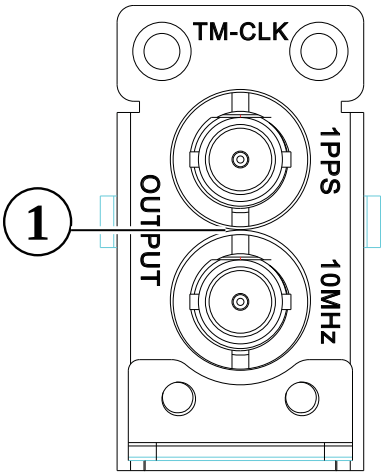


Figure 101: TM-CLK Module Option

1 = Timing signal mini-BNC outputs

4 Site Preparation

Planning Your Site
Operating Environment Requirements
Rack Specifications and Recommendations
Evaluating and Meeting Cable Requirements
Meeting Power Requirements
Following Applicable Industry Standards

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 on page 282.

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 282.

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.

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
www.sbcci.org

The organizations listed in Table 43 are authorities on electrical codes.

Table 43: 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, Massachusetts 02169 USA	www.nfpa.org
Underwriters' Laboratory (UL) (USA only) 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, Illinois 60062-2096 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, Virginia 22209 USA	www.nema.org

Table 43: Authorities on Electrical Codes (continued)

Organization	Address	Web Site URL
Electronics Industries Alliance (EIA) Trade association that develops technical standards, disseminates marketing data, and maintains contact with government agencies in matters relating to the electronics industry.	EIA 2500 Wilson Boulevard Arlington, Virginia 22201 USA	www.eia.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, D.C. 20554 USA	www.fcc.gov

Wiring Closet Considerations

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 108 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

We recommend that you consult an electrical contractor for commercial building and wiring specifications.

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 44 on page 107 summarizes the behavior of ExtremeSwitching and Summit switches when they experience high operating temperatures.

Table 45 on page 107 lists the ambient temperature range for ExtremeSwitching and Summit 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 (78°F).

Safeguards are built into all Extreme Networks switches and power supply units to minimize the risk of fire.

Table 44: 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 45: Ambient Temperature Range for ExtremeSwitching and Summit 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)
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)
X770	0°C (32°F) to 45°C (113°F)
X870	0°C (32°F) to 45°C (113°F)

Humidity

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.

Spacing Requirements and Airflow

Be sure that cables and other equipment do not block the switch's air intake or outflow.

It is best to have at least 3 inches (8 cm) of clear space in front of the air intake and outflow vents on the sides of the switch; airflow moves from side to side. For proper airflow through a switch, leave clear space on the left and right sides of the switch.

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.

ESD (Electrostatic Discharge)

Your system must be protected from static electricity or *ESD (electrostatic discharge)*. 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 600 pounds (272 kilograms).

Protective Grounding for the Rack

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 Summit DC-powered switch, use a minimum 14 AWG stranded copper wire for grounding.

  AC-powered Summit 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, Extreme Networks strongly recommends that you consult an electrical contractor to ensure proper equipment grounding for your specific installation.

Space Requirements 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.



Warning

The DC-powered switches include the following models:

- ExtremeSwitching 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.

Securing the Rack

The rack should be attached to the wiring closet floor with 3/8-inch (9.5 mm) lag screws or equivalent hardware.

The floor under the rack should be level within 3/16-inch (5 mm). Use a floor-leveling cement compound if necessary or bolt the racks to the floor as shown.

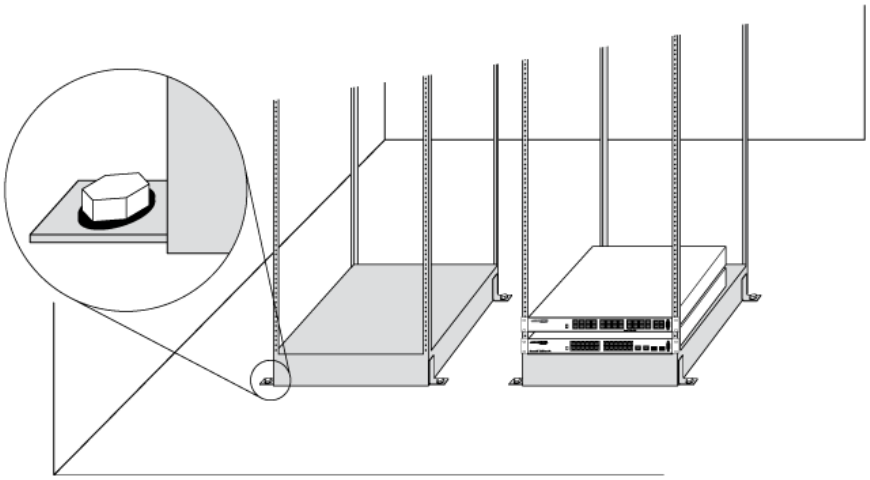


Figure 102: Properly Secured Rack

Brace open equipment racks if the channel thickness is less than 1/4 inch (6.4 mm).

Evaluating and Meeting Cable Requirements

Use professional consultants for site planning and cabling.

Extreme Networks recommends using the Building Industry Consulting Service International (BICSI) Registered Communications Distribution Designer (RCDD), which is globally recognized as a standard in site planning and cabling.

For information, visit www.bicsi.org.

Cable Labeling and Record Keeping

A reliable cable labeling system is essential when planning and installing a network.

Maintaining 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.

Installing 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 2 to 3 inches (5.08 to 7.62 cm), to provide proper strain relief as shown in Figure 103 on page 112.
- 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 1 inch (2.54 cm) 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 *ESD* 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.

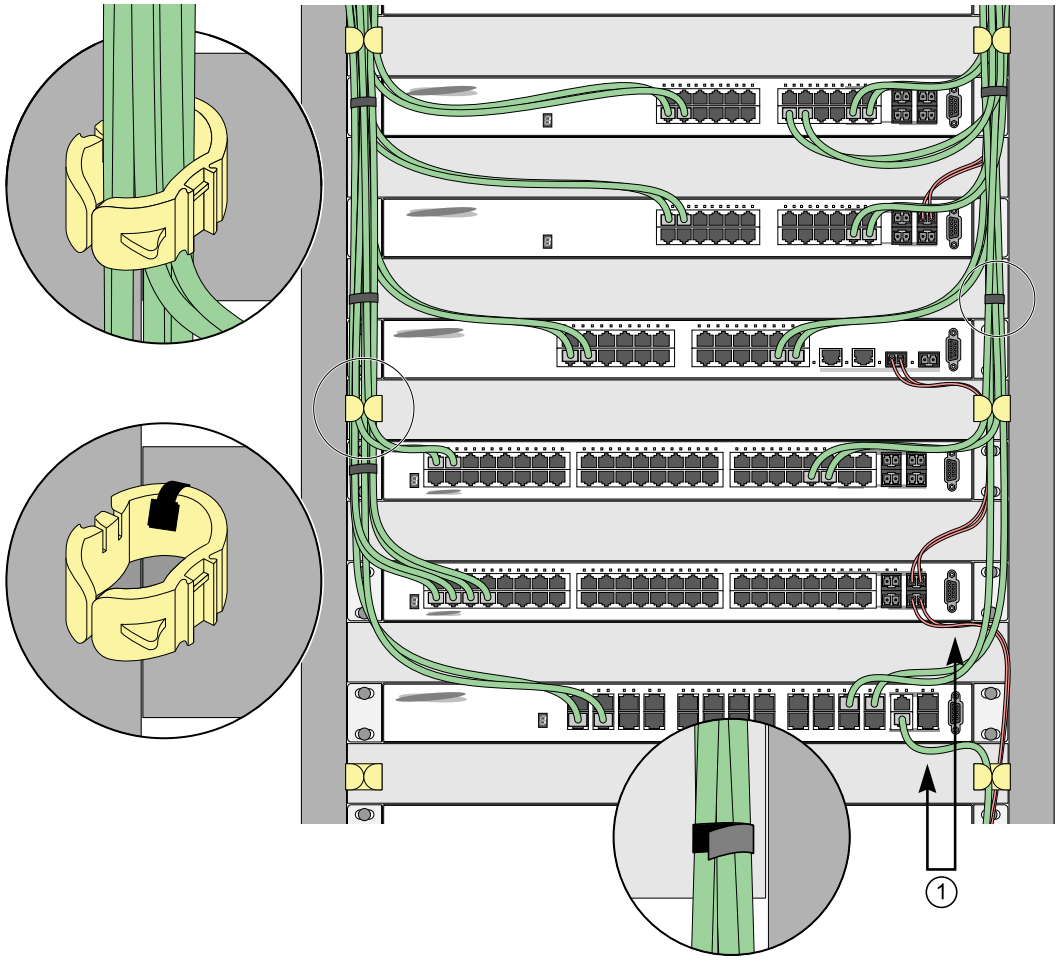


Figure 103: Properly Installed and Bundled Cable

1 = Adequate slack and bend radius

Handling fiber Optic Cable

Fiber optic cable must be handled carefully during installation.

Every cable has a minimum bend radius, example, and fibers will be damaged if the cables are bent too sharply. It is also important not to stretch the cable during installation. Extreme Networks recommends

that the bend radius for fiber optic cable equal at least 2 inches (5 cm) for each 90-degree turn as shown in Figure 104.

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.

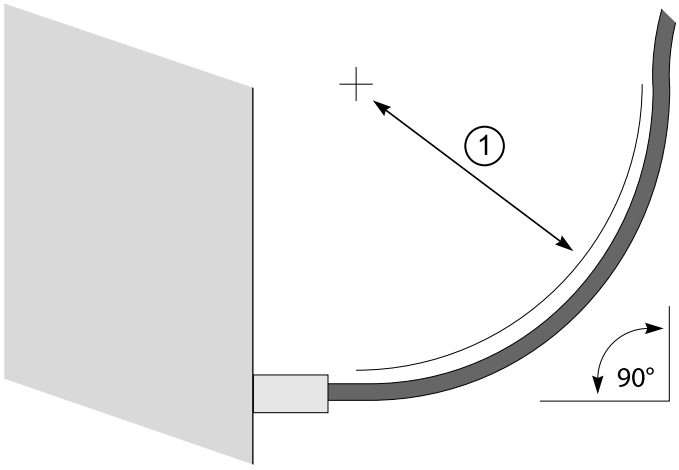


Figure 104: Bend Radius for Fiber Optic Cable

1 = Minimum 2-inch (5.08 cm) radius in 90° bend

Cable Distances and Types

Table 46 shows cable media types and maximum distances that support reliable transmission in accordance with international standards (except where noted).

Table 46: 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
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[1]	–	10,000

Table 46: Cable Distances and Types (continued)

Standard	Media Type	MHz•km Rating	Maximum Distance (Meters)
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-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
10GBASE-LRM SFP+ (1310nm optical window)	62.5/125 µm multimode fiber	–	220
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 47 lists the direct-attach cables available from Extreme Networks.

[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 47: Extreme Networks Direct-Attach Cables

Cable Type	Model Number	Length
SFP+ passive copper cable	10304	1 meter
	10305	3 meters
	10306	5 meters
	10307	10 meters
QSFP+ passive copper cable	10311	0.5 meter
	10312	1 meter
	10313	3 meters
	10313A	3 meters (26 AWG)
	10323	5 meters
QSFP+ active optical cable	10315	10 meters
	10316	20 meters
	10318	100 meters
QSFP+-to-SFP+ fan-out passive copper cable	10202	1 meter (26 AWG)
	10203	2 meter (26 AWG)
	10321	3 meters
	10322	5 meters

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 105 shows examples of recommended and non-recommended connector jacket types.

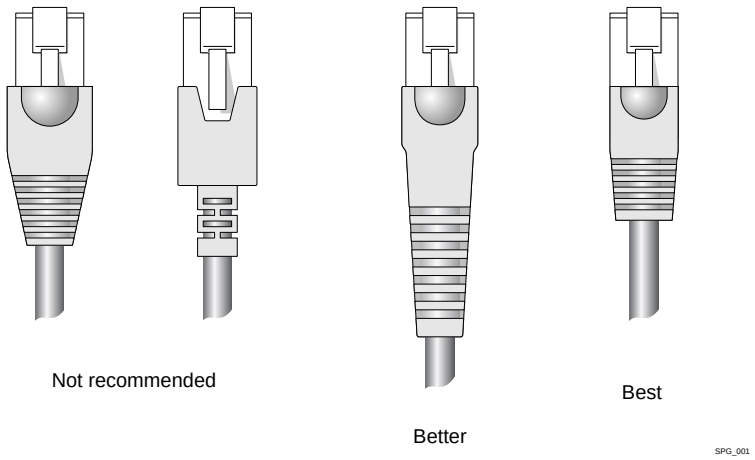


Figure 105: RJ45 Connector Jacket Types

Preventing 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.

PoE Devices

When connecting *PoE (Power over Ethernet)* 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 ExtremeSwitching and Summit switches:

- 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, we recommend that you plug your system into a surge suppressor.

For power specifications for ExtremeSwitching and Summit switches, see Technical Specifications on page 282.

Selecting and Purchasing Power Cords

Extreme Networks equipment does 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. Specifications for power cords in each country are provided so that you can purchase cords locally.

The power cord must meet the requirements listed in Power Cord Requirements for AC-Powered Switches and AC Power Supplies on page 340.

Uninterruptible Power Supply (UPS) Requirements

An uninterruptible power supply (UPS) 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.

Selecting 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 UPS Transition Time on page 118.)



Note
We recommend that you use a UPS that provides online protection.

Calculating 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, we recommend that you add 30% to the total.

UPS Transition Time

UPS transition time is the time required for the UPS to switch from providing AC power derived from the utility (or mains) supply to providing AC power derived from the battery backup. (It 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, we recommend a UPS transition time of 20 milliseconds or less to ensure optimum performance and minimize service interruptions.

For high-availability and fault-tolerant installations in which the switches use redundant power supply units (PSUs), we recommend that each PSU in a switch be connected to a different UPS and that each UPS be 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.

Following 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.

5 Building Stacks

Introduction to Stacking
Planning to Create Your Stack
Setting up the Physical Stack

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 22.3 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 106 shows four nodes in a stack, connected to each other by SummitStack cables.

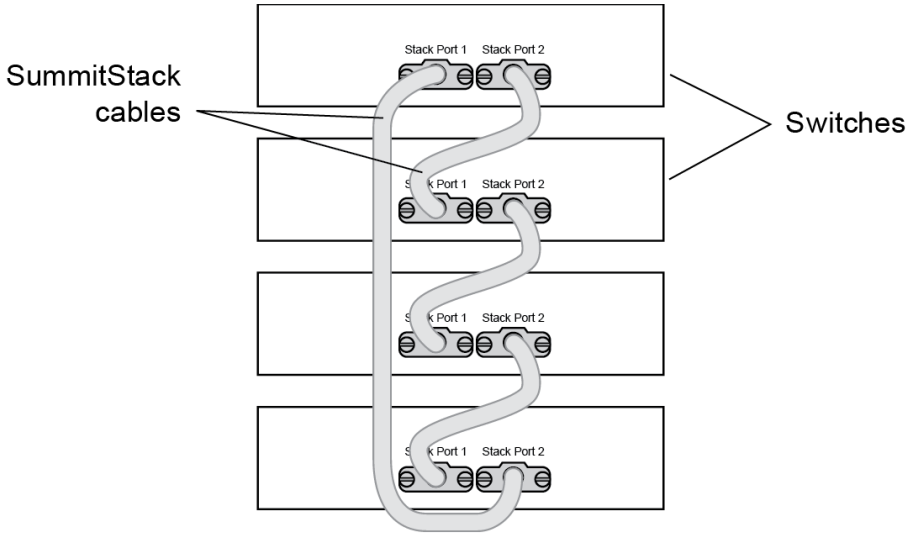


Figure 106: Switches Connected to Form a Stack

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 146 for information about which switch series can be combined to form a stack.

Slot Numbers

A 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 150 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 107.) 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.

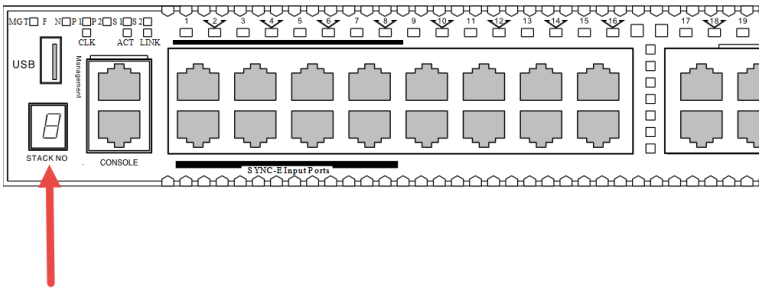


Figure 107: Position of the Stack Number Indicator (X460-G2 Switch Shown)

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 Summit X670-G2
2 Summit X460-G2
3 Summit X770

4 Summit X450-G2
5 ExtremeSwitching X440-G2 and X620

For example, in a stack that combines Summit 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 X690 and X870 switches can be stacked with each other, but they cannot be stacked with other switch models.

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 108 presents a graphical representation of a stack and some of the terms that describe stack conditions.

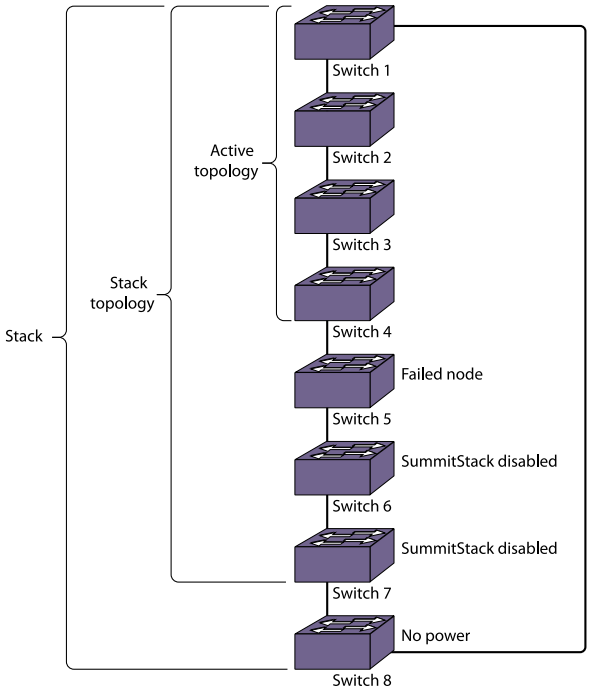


Figure 108: Example of a Stack, Showing the Active Topology and the Stack Topology

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 Planning to Create Your Stack on page 132.

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 129.

Ring Topology

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 109 represents a maximal ring topology of eight active nodes.

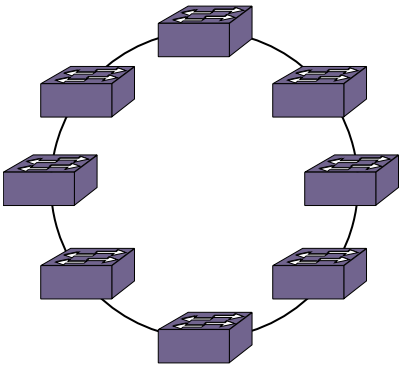


Figure 109: Graphical Representation of a Ring Topology

Figure 110 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.

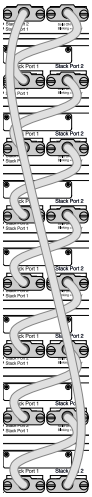


Figure 110: Switches Connected to Each Other in a Ring Topology

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

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.

We strongly recommend that your stack nodes be connected in a ring topology, not a daisy-chain topology, for normal operation.

In Figure 111, 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.

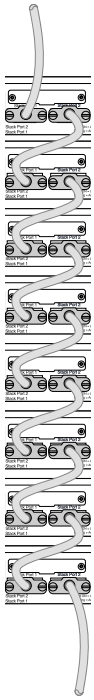


Figure 111: Daisy-Chain Topology

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 master condition increases. Before you create a daisy chain topology, read the *ExtremeXOS 22.3 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 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 48 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 48 – operate as stacking ports.

Table 48: 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
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-2t or VIM-2x
X460-G2-48t-GE4 X460-G2-48p-GE4	VIM-2ss or VIM-2q	53,54	VIM-2t or VIM-2x

Table 48: Native and Alternate Stacking Ports (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
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
X770-32q	Ports 101,102,103,104	103,104	Front panel
X870-32c	Ports 121,125	None	Not applicable
X870-96x-8c	Ports 121,125	None	Not applicable

Available Stacking Methods

Each ExtremeSwitching and Summit switch model can use various methods of stacking.

Table 49 shows the switch models that can participate in each stacking method.

Table 49: Summit Stacking by Stacking Method

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	Summit X460-G2
SummitStack-V	10 Gbps	0.5 m - 40 km SFP+, XENPAK (with SR, LR, and ER)	ExtremeSwitching X440-G2 Summit X450-G2 (10G models) Summit X460-G2 (1G models with VIM-2x, VIM-2t) Summit X460-G2 (10G models) ExtremeSwitching X620 Summit X670-G2 Summit X770 (ports 103,104)
SummitStack-V80	20 Gbps	0.5 m - 100 m QSFP+ only	Summit X670-G2-48x-4q (ports 57, 61)

Table 49: Summit Stacking by Stacking Method (continued)

Stacking Method	Speed per Link (HDX)	Cable Type and Lengths	Switch Models
SummitStack-V84	21 Gbps	0.5 m - 5 m QSFP+ passive copper	Summit X450-G2 (rear panel 21G stacking ports)
SummitStack-V160	40 Gbps	0.5 m - 100 m QSFP+ only	X460-G2 (VIM-2q) Summit X670-G2-48x-4q (ports 57, 61) Summit X770 (ports 103 and 104)
SummitStack-V320	80 Gbps[2]	0.5 m - 100 m QSFP+ only	Summit X670-G2-48x-4q (ports 49, 53, 57, 61) Summit X770-32q (ports 101 and 103, and 102 and 104)
SummitStack-V400	100 Gbps	0.5 m - 20 m QSFP28 only	ExtremeSwitching X690 (ports 61, 69) ExtremeSwitching 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 134.



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 50 describes the terms used for the SummitStack feature. These terms are listed in the recommended reading sequence.

Table 50: List of Stacking Terms

Term	Description
Stackable switch	An ExtremeSwitching or Summit family 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.

[2] Combined over paired ports

Table 50: List of Stacking Terms (continued)

Term	Description
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.
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.

Table 50: List of Stacking Terms (continued)

Term	Description
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.
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 (Virtual LAN)* 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 bee 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.
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.

Table 50: List of Stacking Terms (continued)

Term	Description
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.

Planning 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 134 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 on page 124). 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 133 to configure the software for your stack.

The recommended procedures for installing and interconnecting a stack are found in Setting up the Physical Stack on page 150.

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 *ExtremeXOS 22.3 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 22.3 User Guide* for more information about managing licenses.
- If the stack supports any feature pack license (such as *MPLS (Multiprotocol Label Switching)* 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 22.3 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 132 for physically situating your equipment.

Stacking Considerations for Each Switch Model on page 134 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 and Summit switch models.

- ExtremeSwitching X440-G2 Stacking on page 134
- Summit X450-G2 Stacking on page 135
- Summit X460-G2 Stacking on page 137
- ExtremeSwitching X620 Stacking on page 140
- Summit X670-G2 Stacking on page 141
- ExtremeSwitching X690 Stacking on page 142
- Summit X770 Stacking on page 143
- ExtremeSwitching X870 Stacking on page 144

ExtremeSwitching 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 132.

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 145.

Table 51: 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), even when the 10G ports are operating at 1G speed. 10G upgrade licensing is not required to enable stacking on the designated stack ports. Table 52 summarizes alternate stacking support for the various X440-G2 switch models.

Table 52: 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

Summit 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 132.

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 145.

Table 53: 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 Summit 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 112. 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 Summit switch that supports SummitStack-V84.

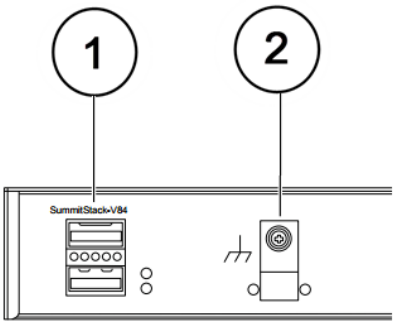


Figure 112: X450-G2 Switch: Native Stacking Ports

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 54. Use the front-panel 10G ports for alternate stacking.

Table 54: 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 Summit 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 Summit 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, X670-G2, and X770 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 Summit switches. For information on which cables to use with each type of Summit family switch, see Stacking Cables on page 147.

Summit 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 132.

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 145.

Table 55: 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 137.	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 137.	40 Gbps	QSFP+
SummitStack-V (front panel 10G models) See Alternate Stacking for X460-G2 Switches on page 138.	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.

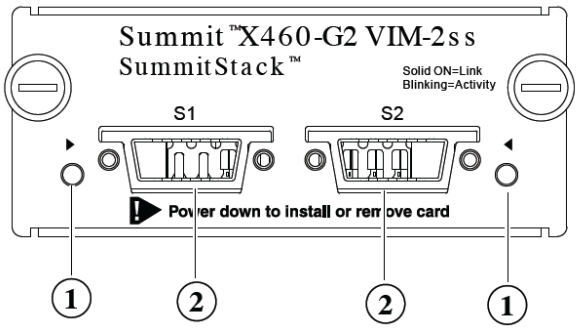


Figure 113: VIM-2ss SummitStack Module

1 = LEDs	2= Stacking ports

The VIM-2q module connects to QSFP+ cables to form stacks using the SummitStack-V160 protocol.

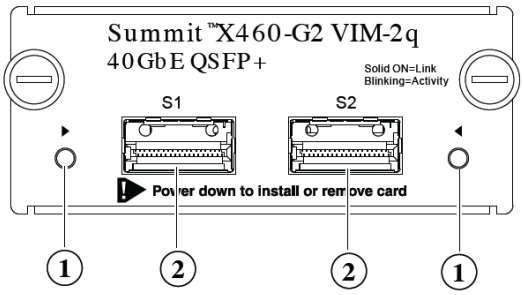


Figure 114: VIM-2q Port Option Card

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 139 for additional considerations.

X460-G2 1-gigabit switch models (GE4) support alternate stacking through an attached VIM-2t or VIM-2x module. See Summit X460-G2 (1G Models Using VIM Ports) Stack Configuration Guidelines on page 140 for additional considerations.

Note
40G ports on the VIM-2q cannot be partitioned into four 10G ports.

Table 56 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 56 – operate using the stacking protocol for the logical stacking ports.

Table 56: 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-2t or VIM-2x
X460-G2-48t-GE4 X460-G2-48p-GE4	VIM-2ss or VIM-2q	53,54	VIM-2t or VIM-2x

Table 56: 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 139.
- See also Summit X460-G2 (1G Models Using VIM Ports) Stack Configuration Guidelines on page 140.

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*.
- 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, X670-G2, and X770 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 Stacking Cables on page 147.
- 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 and VIM-2x 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: Summit X440-G2, X450-G2, X620, X460-G2, X670-G2, and X770.

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-2t, VIM-2x, VIM-2q, or VIM-2ss.
- UTP cables must be used when VIM-2t ports are used as stacking ports.
- We recommend against mixing X450-G2, X460-G2, X670-G2, and X770 switches in a stack if the desired routing table exceeds the supported limit.
- Support is available on ExtremeXOS version 16.1 or later.

ExtremeSwitching X620 Stacking

See X620 Stacking on page 54 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 132.

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 145.

Table 57: 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 58 summarizes alternate stacking support for X620 switches.

Table 58: 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.

Summit 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 132.

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 145.

Table 59: 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 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[3]	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*.

X670-G2-48x-4q switches support native stacking using SummitStack-V80, V160, and V320.

- For SummitStack-V80 stacking, use ports 57 and 61.
- For SummitStack-V160 stacking, use ports 57 and 61.
- For SummitStack-V320 stacking, use ports 49, 53, 57, and 61.

[3] Combined over paired ports

X670-G2-72x switches support do not support native stacking.

Alternate Stacking for X670-G2 Switches

Table 60 summarizes alternate stacking support for X670-G2 switches.

Table 60: 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 45 and 46 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 Summit 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, X670-G2, and X770 switches in a stack.
  - The X670-G2-48x-4q switch supports the LR4 Parallel Single Mode (PSM) optical transceiver on 40G optical QSFP+ ports.



ExtremeSwitching X690 Stacking

ExtremeSwitching X690 series switches can be stacked with other X690 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.

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 132.

Table 61 summarizes stacking support for X690 switches.

Table 61: Stacking Methods for X690 Switches

Stacking Method	Speed per Link (HDX)	Cable Type and Lengths
SummitStack-V400 (Front panel ports 61,69)	100 Gbps	0.5 m – 20 m QSFP28

Summit X770 Stacking

The stacking-support option is enabled by default for X770 switches. For more information, see Enabling and Disabling the Stacking-Support Option on page 132.

The stacking port selection option, which allows you to choose between native and alternate ports, is enabled by default for X770 switches. For more information, see Selecting Native and Alternate Stacking Ports on page 145.

Table 62: Stacking Methods for X770 Switches

Stacking Method	Speed per Link (HDX)	Cable Type and Lengths
SummitStack-V (ports 103 and 104)	10 Gbps	1m and 2m QSFP+ 4xSFP+ fan-out cable
SummitStack-V160 (ports 103 and 104)	40 Gbps	0.5m, 1m, and 3m (26 AWG) QSFP+
SummitStack-V320 (ports 101 and 103, and 102 and 104)	80 Gbps (combined over paired ports)	0.5m, 1m, and 3m (26 AWG) QSFP+

Native Stacking for X770 Switches

The X770 supports SummitStack-V80, V160, and V320 stacking. Use any Extreme Networks certified 40G QSFP+ cable or optical transceiver to make the connections among the switches to be stacked.

For X770 native stacking, use the fixed 40G QSFP+ ports numbered 101, 102, 103, and 104 (shown in Figure 115).

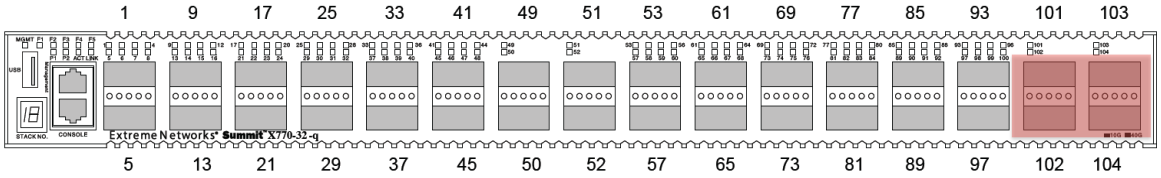


Figure 115: Location of Stacking Ports (101 through 104) on an X770 Switch

For a complete listing of compatible cables and optical transceivers, see the *Extreme Hardware/Software Compatibility and Recommendation Matrices*.

Alternate Stacking for X770 Switches

Table 63 summarizes alternate stacking support for X770 switches.

Table 63: Alternate Stacking Ports for X770 Switches

Switch Model	Type or location of Native Stacking Ports	Alternate Stacking Ports	Location of Alternate Stacking Ports
X770-32q	Ports 101,102,103,104	103,104	Front panel

Note
Ports 103 and 104 are not available as data ports when the alternate stacking ports are used. Ports 101 and 102 remain available to use as data ports.

Additional Stacking Considerations for X770 Switches

Before deploying a new stack with Summit X770 switches, consider the following guidelines:

- To use the failover feature in the stack, a second Summit X770 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:
  - Enhanced stacking must be configured on each switch in the stack. (In ExtremeXOS version 22.2 and later, enhanced stacking is configured automatically.)
  - We recommend against mixing X450-G2, X460-G2, X670-G2, and X770 switches in a stack if the desired routing table exceeds the supported limit. For the X770 switch, the limit is 98K IPv4 LPM routes.
- X770 switches support multiple types of QSFP+ stacking cables for connection between ports 101-104 and other Summit switches. For information on which cables to use with each type of switch, see Stacking Cables on page 147.

ExtremeSwitching X870 Stacking

ExtremeSwitching X870 series switches support native stacking using front-panel data ports 121 and 125. They can be stacked with other X870 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 132.

Table 64 summarizes stacking support for X870 switches.

Table 64: Stacking Methods for X870 Switches

Stacking Method	Speed per Link (HDX)	Cable Type and Lengths
SummitStack-V400 (Front panel ports 121,125)	100 Gbps	0.5 m – 20 m 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 134), 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** {**V80** | **V160** |**V320** | **V400**} | **alternate**]

  Note
  Not all options are available for all switches. Refer to Stacking Considerations for Each Switch Model on page 134 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 and Summit switches can be stacked in the combinations listed in Table 65 on page 146. 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 65: Matrix of Switches and Stacking Methods

Stack with	X440-G2[1]	X450-G2[2]	X460-G2[1]	X620	X670-G2[3]	X690	X770	X870
X440-G2[1]	V	V	V	V	V		V	
X450-G2[2]	V	V V84	V	V	V		V	
X460-G2[1]	V	V	40G SS V V160	V	V V160		V V160	
X620	V	V	V	V	V		V	
X670-G2[3]	V	V	V V160	V	V V80 V160 V320		V V160 V320	
X690						V400		V400

Table 65: Matrix of Switches and Stacking Methods (continued)

Stack with	X440-G2[1]	X450-G2[2]	X460-G2[1]	X620	X670-G2[3]	X690	X770	X870
X770	V	V	V V160	V	V V160 V320		V V160 V320	
X870						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 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 122.

Stack configuration, easy setup, and redundancy are fully described in the *ExtremeXOS 22.3 User Guide*.

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 66 lists the cable types that have been verified by Extreme Networks for use as stack connection hardware, along with the Summit switches or modules with which each type is compatible.

Caution

Use of non-recommended cables or optics could cause stack instability.

Table 66: Available Stacking Cables for Summit Switches

Part Number	Cable Type, Length	Compatible Ports and Devices
16105	SummitStack, 5 meter	20-Gbps stacking ports on VIM-2ss on X460-G2 series switches
16106	SummitStack, 0.5 meter	
16107	SummitStack, 1.5 meter	
16108	SummitStack, 3 meter	
10202	QSFP+ to 4x SFP+ fan-out copper cable, 26 AWG, 1 meter	X770 alternate stacking

Table 66: Available Stacking Cables for Summit Switches (continued)

Part Number	Cable Type, Length	Compatible Ports and Devices
10203	QSFP+ to 4x SFP+ fan-out copper cable, 26 AWG, 2 meters	
10304	10GBASE-CR SFP+ pre-terminated twin-ax copper cable, 1 meter	10G stacking ports on ExtremeSwitching X440-G2, Summit X450-G2 10G, and ExtremeSwitching 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 ExtremeSwitching X440-G2 (48-port switches only) and Summit X450-G2 10G switches
10311	QSFP+ direct-attach passive copper cable, 0.5 meter	21-Gbps stacking ports on Summit X450-G2 switches, 40-Gbps stacking ports on SummitStack-V80 modules in Summit X460-G2 series switches with VIM-2q modules, QSFP+ ports on X670-G2-48x-4q switches, and QSFP+ ports on X770 series switches
10312	QSFP+ direct-attach passive copper cable, 1 meter	
10313	QSFP+ direct-attach passive copper cable, 3 meters	
10313A	QSFP+ direct-attach passive copper cable, 3 meters, 26 AWG (for X770 to X770 stacking)	
10315	QSFP+ direct-attach active optical cable, 10 meters	QSFP+ ports on X670-G2-48x-4q switches
10317	QSFP+ direct-attach active optical cable, 50 meters	
10318	QSFP+ direct-attach active optical cable, 100 meters	
10323	QSFP+ direct-attach passive copper cable, 5 meters	21-Gbps stacking ports on Summit X450-G2 switches
10336	QSFP+ active optical cable, 3 meters	40-Gbps ports on Summit X670-G2 and X770 switches; 40-Gbps VIM ports on Summit X460-G2 switches
10337	QSFP+ active optical cable, 5 meters	
10410	QSFP28 passive copper cable, 0.5 meters	100-Gbps ports on ExtremeSwitching 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	
10435	QSFP28 active optical cable, 7 meters	100-Gbps ports on ExtremeSwitching X690 and X870 switches

Table 66: Available Stacking Cables for Summit Switches (continued)

Part Number	Cable Type, Length	Compatible Ports and Devices
10436	QSFP28 active optical cable, 10 meters	
10437	QSFP28 active optical 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*.

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 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) 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 Figure 116. In this example, stacking ports are represented by S1 and S2 on the right side.



Figure 116: X670-G2 Switch 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.
- 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 67: Colors in the Stacking Tool Display

Color	Meaning
Green	Compatible and preferred
Blue	Compatible
Yellow	Incompatible with the selected master node
Red	Incompatible

Setting up the Physical Stack

After you have installed the individual switches (see Installing ExtremeSwitching and Summit Switches on page 159), 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 150.

2 Connect stacking cables to the switches.

See Connecting Stacking Cables on page 156.

3 Connect the switches to your management network.

See Connecting Your Stack to the Management Network on page 158.

After setting up and connecting the switches, perform software configuration for the stack. See "Configuring a New Stack" in the *ExtremeXOS 22.3 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.

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 Connecting Stacking Cables on page 156.

Combining Different Types of Stacking Ports

Figure 117 shows an example stack configuration using the following switches: X440-G2, X450-G2, X460-G2, and X620.

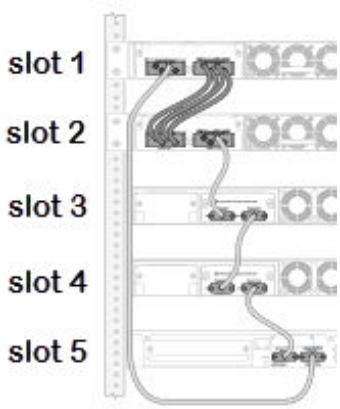


Figure 117: Combining Stacking Port Types: Example

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 68 lists the recommended order for connecting the stacking ports in this example.

Table 68: 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

Using SummitStack-V160 Stacking

A stacking rate of 160 Gbps can be achieved using certain configurations of Summit 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. V-160 stacking is also supported on the X770 switch using the QSFP+ ports.

For SummitStack V-160 on the Summit X770, ports 103 and 104 are the stacking ports.

Using SummitStack-V320 Stacking

A stacking rate of 320 Gbps can be achieved across a stack of X670-G2-48x-4q and X770 switches using the QSFP+ connection and cables. These switches can use 80-Gbps stacking connections that provide 320 Gbps *full-duplex* bandwidth.

Table 69 lists the port pairings for SummitStack V-320 using the front panel ports on the Summit X770 switch.

Table 69: Physical Port Pairings for Front Panel Ports

Summit X770-32q	
Paired physical ports	Stacking port
101 and 103	S1
102 and 104	S2

Examples of Valid Stacking Configurations

The Summit 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 118 shows cable connections for a 4-node stack using SummitStack 40G cables to connect switches with integrated SummitStack ports.

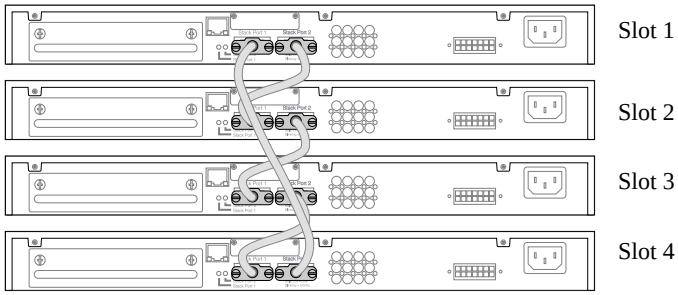


Figure 118: SummitStack Cable Connections Using Eight Switches with Integrated SummitStack Ports

Table 70 lists the recommended order for connecting the stacking ports in this example.

Table 70: 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 119 shows cable connections for an 8-node stack using SummitStack 40G cables to connect switches with integrated SummitStack ports.



Figure 119: SummitStack Cable Connections Using Eight Summit Switches with Integrated SummitStack Ports

Table 71 lists the recommended order for connecting the stacking ports in this example.

Table 71: 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 120 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 153.

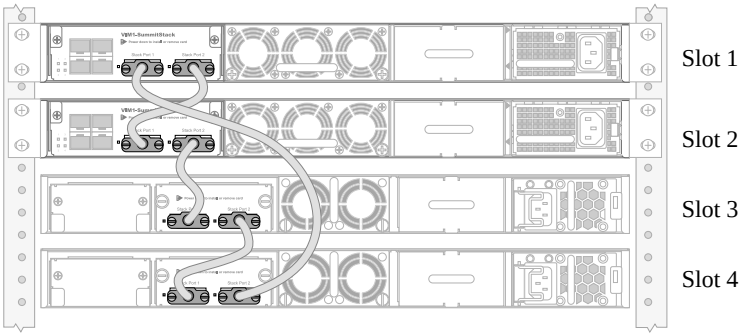


Figure 120: SummitStack Configuration Using Different Switch Models and SummitStack 40G Cables

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 master and backup nodes (slot 1 and slot 2, respectively).

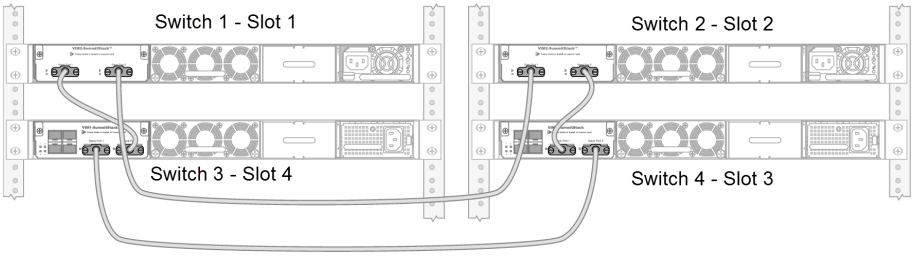


Figure 121: SummitStack Connections Using Four Summit Switches with SummitStack Ports on VIMs

Table 72 lists the recommended order for connecting the stacking ports in this example.

Table 72: 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 122 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.

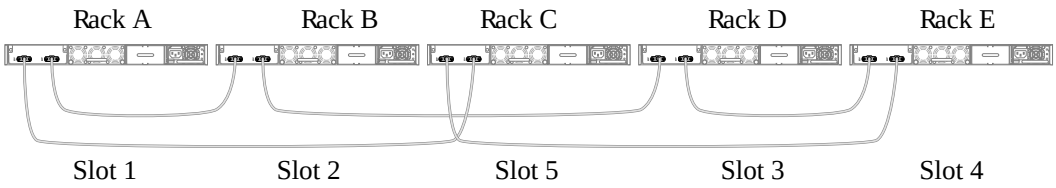


Figure 122: Top-of-Rack Stack Installation

Table 73 lists the recommended order for connecting the stacking ports in this example.

Table 73: 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

Connecting Stacking Cables

To connect Summit switches in a SummitStack configuration, use the appropriate stacking cables for the specific stacking ports on the switches.

Connecting 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 123).
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.

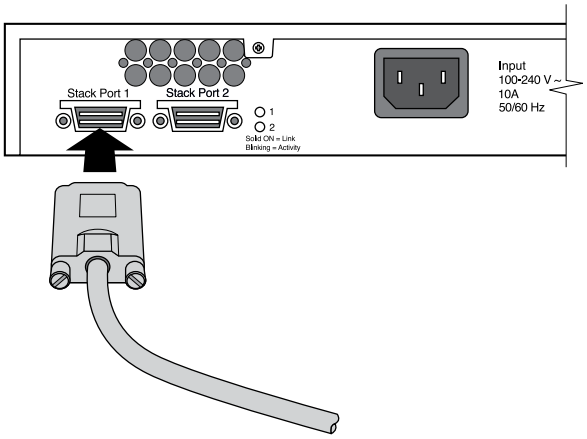


Figure 123: Connecting a SummitStack Cable

Caution
Avoid making sharp bends in the cable. Sharp bends can stress the cable and cause damage.

Connecting 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
- X770 switch, which supports SummitStack-V160 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.

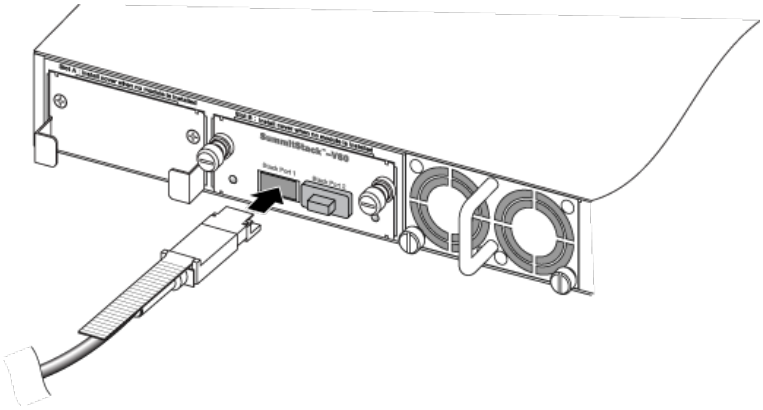


Figure 124: Connecting a QSFP+ Passive Copper Direct-Attach Cable to a SummitStack-V80 Module

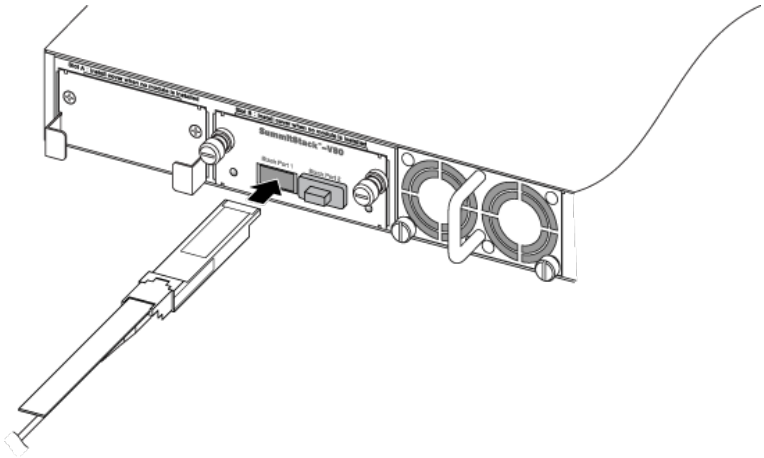


Figure 125: Connecting a QSFP+ Active Optical Direct-Attach Cable to a SummitStack-V80 Module

2 Push the connector into the port until you hear it click into place.

Connecting 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 master node. If you plan to configure redundancy, we recommend connecting to the console ports of all switches in the stack that will be master-capable.

If you followed the cabling examples in Connecting the Switches to Form the Stack Ring on page 150, and if you use the Easy Setup configuration procedure, only slots 1 and 2 will be allowed to become the master node. However, you may 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 22.3 User Guide* for instructions to perform the software configuration for your stack.

6 Installing ExtremeSwitching and Summit Switches

Safety Considerations for Installing Switches
Pre-installation Requirements
Attaching the Switch to a Rack or Cabinet
Installing Optional Components
Installing Internal Power Supplies
Connecting Power to the Switch
Connecting Network Interface Cables
Performing Initial Management Tasks

Before you attempt to install or remove an Extreme Networks switch, read the precautions in Safety Considerations for Installing Switches on page 160.

If you are installing switches for use in a SummitStack configuration, read Building Stacks on page 120 before you install the switches.



Note

This document describes the installation process for switches that are supported on ExtremeXOS version 21.1. For information about installing other Summit series switches, refer to *ExtremeSwitching and Summit Switches: Hardware Installation Guide for Switches Using ExtremeXOS 16 or Earlier*.

ExtremeSwitching and Summit switches fit into standard 19-inch equipment racks.

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 160.
2. Install the switch in the rack.

   See Attaching the Switch to a Rack or Cabinet on page 161.
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 165.

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 165.



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 191.

6 For a stacked configuration, connect stacking cables.

See Connecting the Switches to Form the Stack Ring on page 150.

7 Connect network interface cables.

See Connecting Network Interface Cables on page 191.

8 Perform initial network connection and configuration.

See Performing Initial Management Tasks on page 192.

Safety Considerations for Installing Switches

Read the information in this chapter thoroughly before you attempt to install or remove an Extreme Networks switch.



Caution
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 Information on page 267 for additional safety information.
See Technical Specifications on page 282 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 and Summit 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 and Summit 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 and Summit 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 (Power over Ethernet)* 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
- X670-G2
- X690
- X770
- 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.
- #1 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 340.
- 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 126 shows a mid-mount configuration using a long mounting bracket.
- Figure 127 shows a front-mount configuration using a short mounting bracket.

Note
For some switch models, only short mounting brackets are provided.

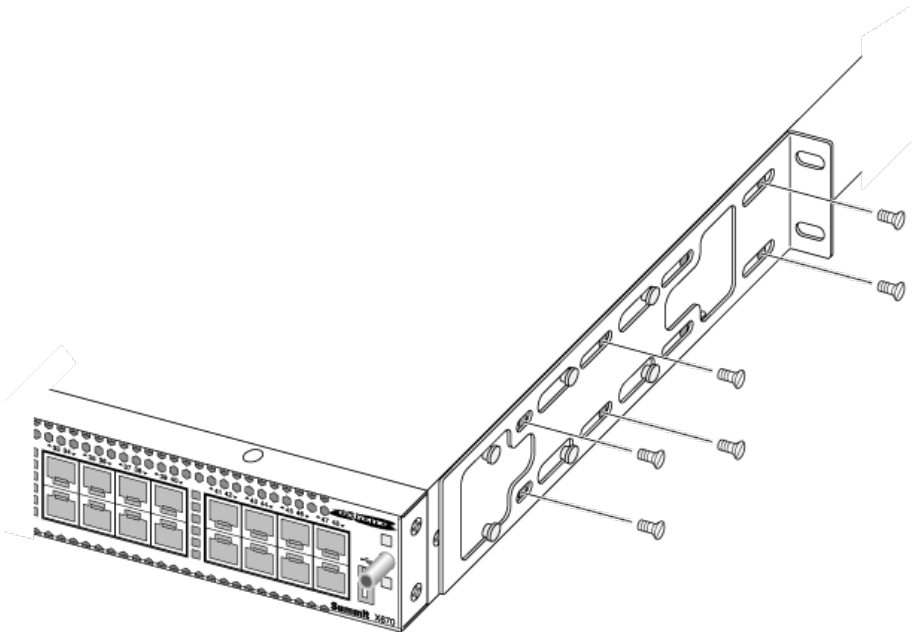


Figure 126: Mid-Mount: Attaching a Long Mounting Bracket

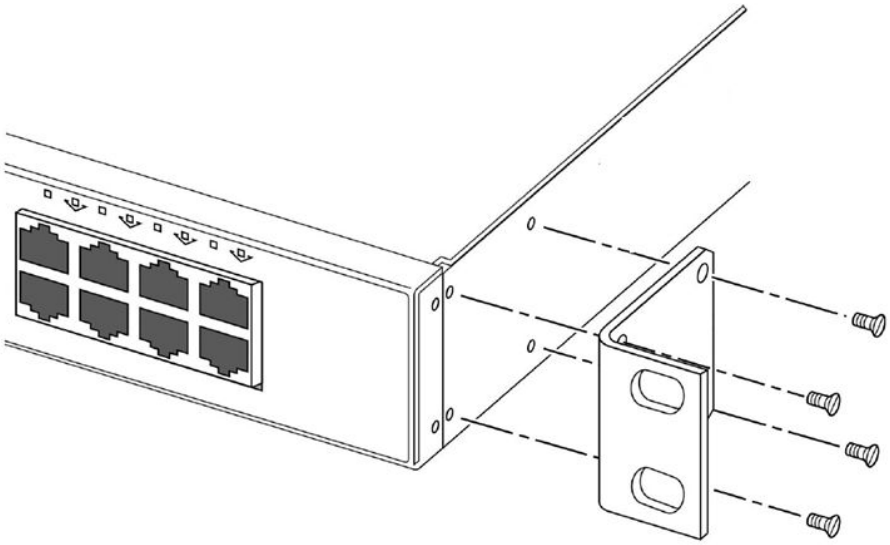


Figure 127: Front Mount: Attaching a Short Mounting Bracket

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 128 shows an example of a mid-mount installation.

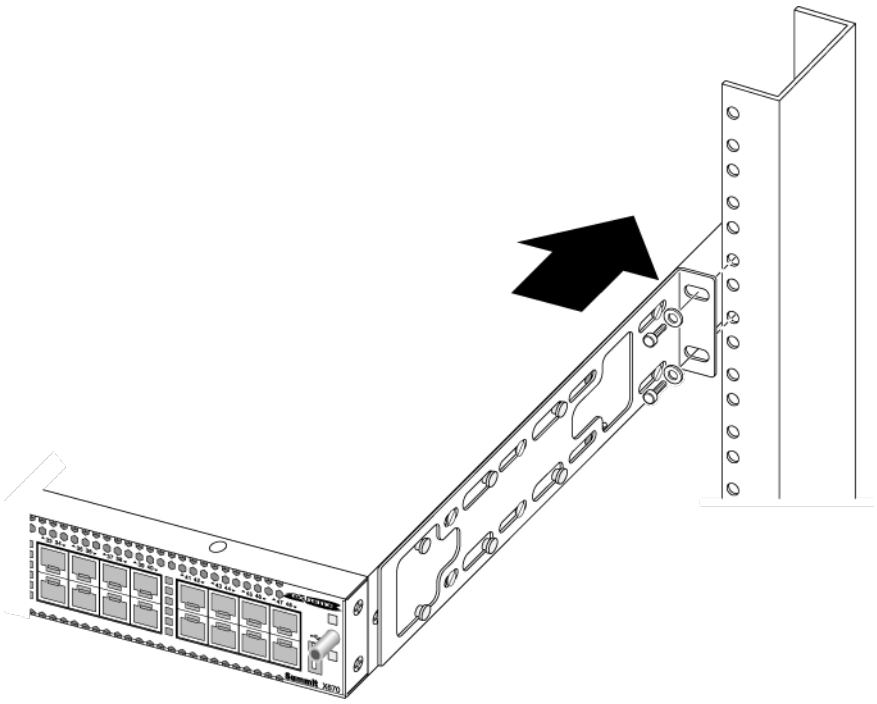


Figure 128: Sliding the Switch into the Rack

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 164.

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.

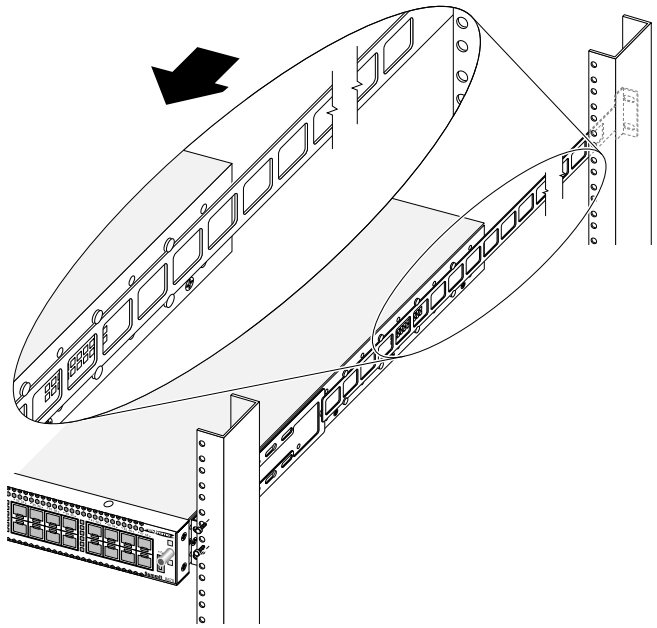


Figure 129: Inserting the Rear Mounting Brackets Between the Pegs on the Side of the Switch

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 165.

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 165.

- For X690 and X870 switches, you can install 770 W AC or 1100 W DC power supplies.
- For X670-G2 and X770 switches, you can install 550 W AC or 550 W DC power supplies.
- For X620 PoE+ switches, you can install 750 W AC power supplies.

- For X450-G2 PoE+ switches, you can install 715 W or 1100 W AC power supplies.
- For X460-G2 PoE+ switches, you can install 300 W, 715 W, or 1100 W AC power supplies.
- For other switches, you can install 300 W DC power supplies.

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 Port Option Cards and VIMs on page 222.

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 191.

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 165.

To see which internal power supplies are compatible with your switch, see Table 33 on page 93.

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 33 on page 93.

Follow the instructions in the following sections to install the appropriate power supply and connect power to the switch.

Installing 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 on page 166.

2 Prepare the power cables and ground cable by attaching the provided connection lugs to the cables.

   See Preparing the Cables on page 166.

3 Insert the power supply into the switch.

   See Installing the 300 W DC Power Supply on page 167.

4 Connect the ground wire.

   See Connecting the Ground Wire on page 168.

5 Connect the power supply to the DC source voltage.

   See Connecting the DC Power Supply to the Source Voltage on page 169.

6 Energize the DC circuit.

Required Tools and Materials

You need the following tools and materials to install or remove a 300 W DC power supply in a Summit series switch.

- Two spade terminals (Tyco part number 328281 or equivalent) for connecting the input power cables (provided)
- One ring terminal (Tyco part number 2-320561-4 or equivalent) and screw with captive lock washer (type 6-32 UNC) 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
- #1 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

A ring terminal and two spade 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 0.25 inch (6.35 mm) 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.

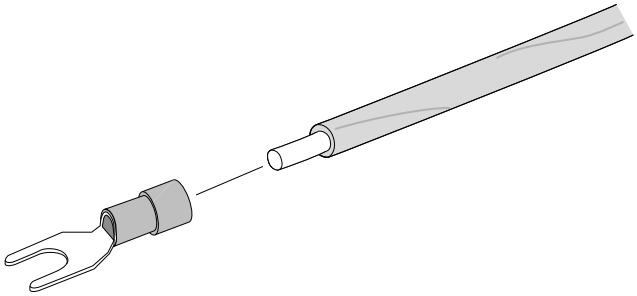


Figure 130: Attaching a Spade Terminal to a Cable

3 Repeat step 2 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.

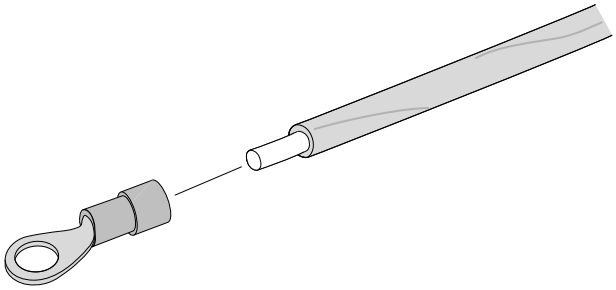


Figure 131: Attaching a Ring Terminal to a Ground Cable

Installing the 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 back of the switch.

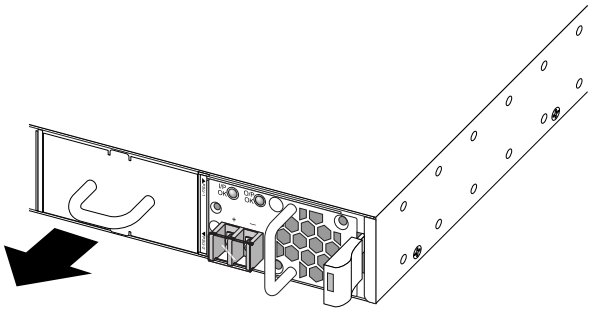


Figure 132: Removing a Blank Panel

3 Verify that the power supply is right side up.

The power supply should be oriented as shown in Figure 133.

4 Carefully slide the power supply all the way into the power supply bay.

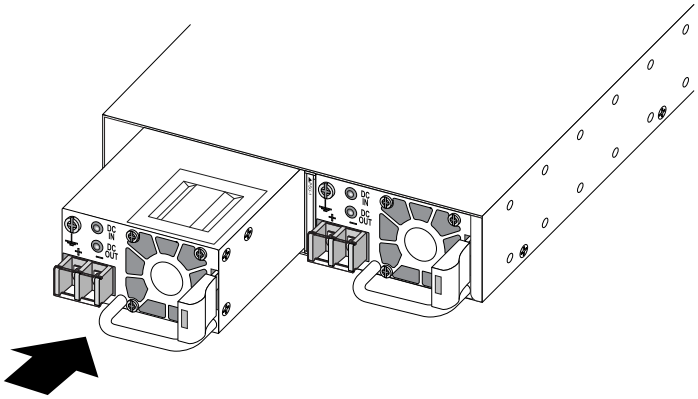


Figure 133: Installing a Summit 300 W DC Power Supply (Back-to-Front Model 10933 Shown)

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 on page 168.

Connecting the Ground Wire

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 134.

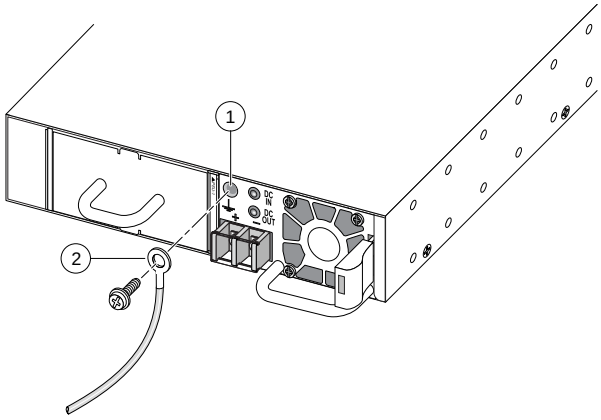


Figure 134: Connecting the Ground Wire (Front-to-Back Model 10933 Shown)

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 the DC Power Supply to the Source Voltage on page 169.

Connecting the 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 170, 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 allow the spade terminal to slide underneath the captive square washer.

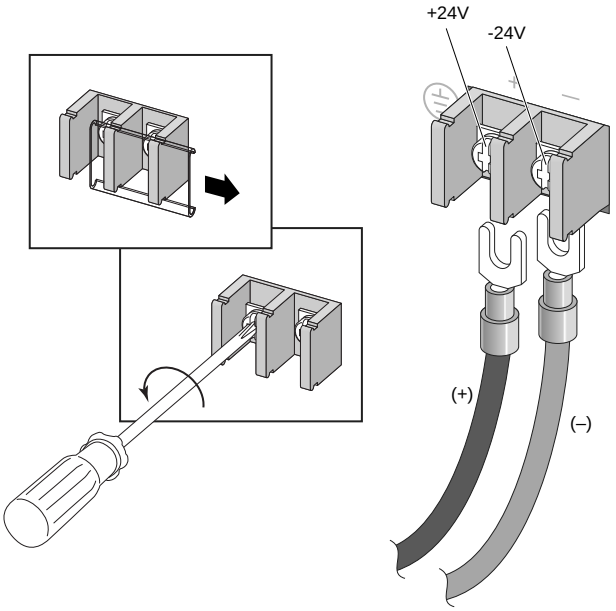


Figure 135: Loosening Terminal Screws (Connecting to a +24 V Source)

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).

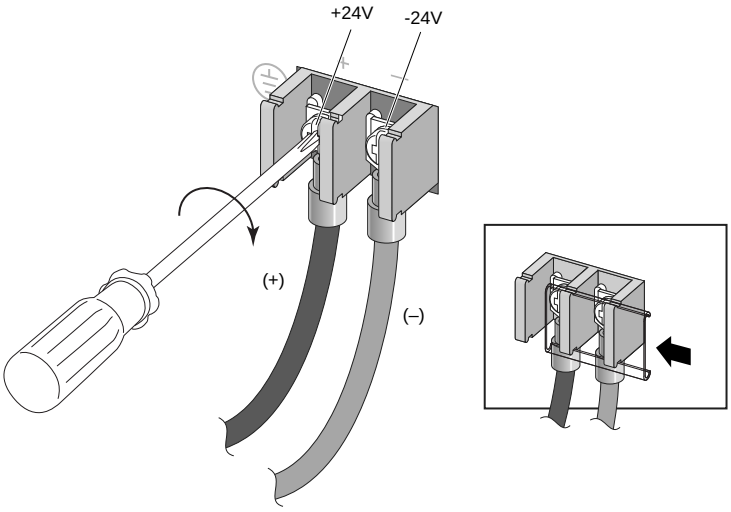


Figure 136: Tightening Terminal Screws (Connecting to a +24 V Source)

When connecting the power supply to a –48 V source:

a On each terminal, loosen the screw enough to allow the spade terminal to slide underneath the captive square washer.

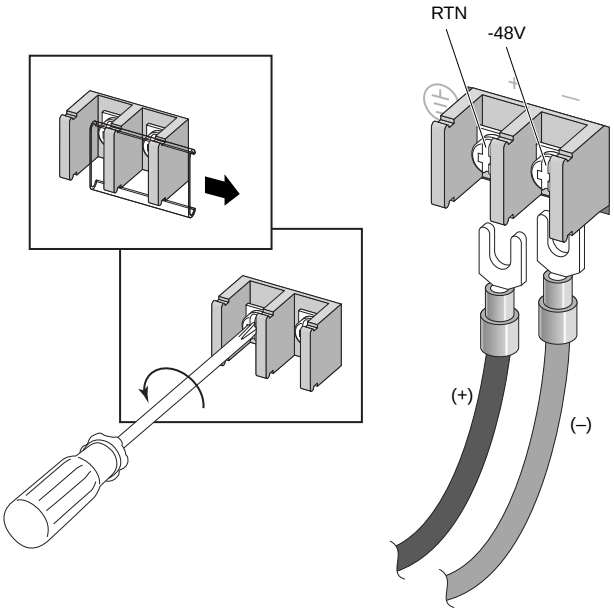


Figure 137: Loosening Terminal Screws (Connecting to a –48 V Source)

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).

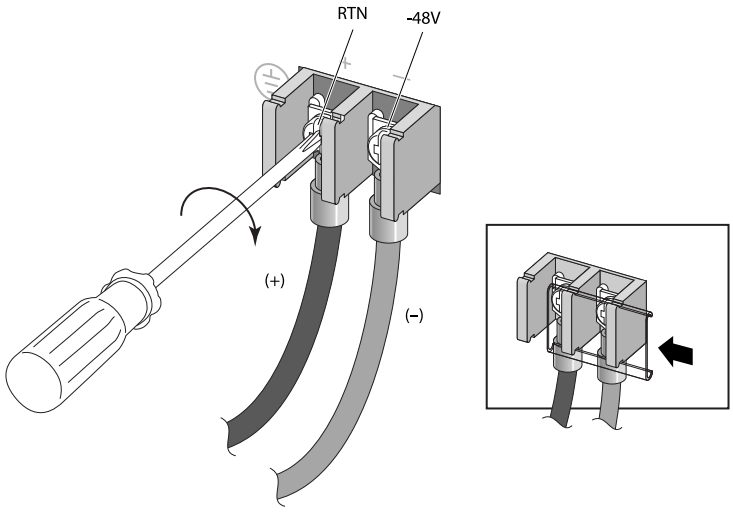


Figure 138: Tightening Terminal Screws (Connecting to a –48 V Source)

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 Connecting Network Interface Cables on page 191.

Installing a 550 W Internal DC Power Supply

The Summit X770 switch accommodates one or two Summit 550 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 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 on page 173.

2 Prepare the power cables and ground cable by attaching the provided connection lugs to the cables.

See Preparing the Cables on page 173.

3 Insert the power supply into the switch.

See Installing the 550 W DC Power Supply on page 174.

4 Connect the ground wire.

See Connecting the Ground Wire on page 175.

5 Connect the power supply to the electrical source and energize the DC circuit.

See Connecting the DC Power Supply to the Source Voltage on page 177.

Required Tools and Materials

You need the following tools and materials to install or remove a 550 W DC power supply in a Summit series switch.

- 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
- #1 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

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 0.25 inch (6.35 mm) 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.

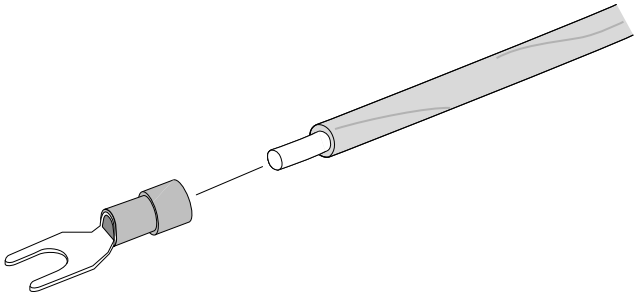


Figure 139: Attaching a Spade Terminal to a Cable

3 Repeat step 2 for the other power cable wire and for the ground wire.

Installing the 550 W DC Power Supply

Before installing a Summit 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 back of the switch.

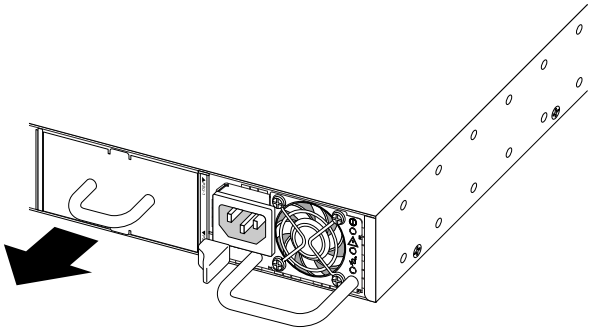


Figure 140: Removing a Blank Panel

3 Verify that the power supply is right side up.

The power supply should be oriented as shown in Figure 141.

4 Carefully slide the power supply all the way into the power supply bay.

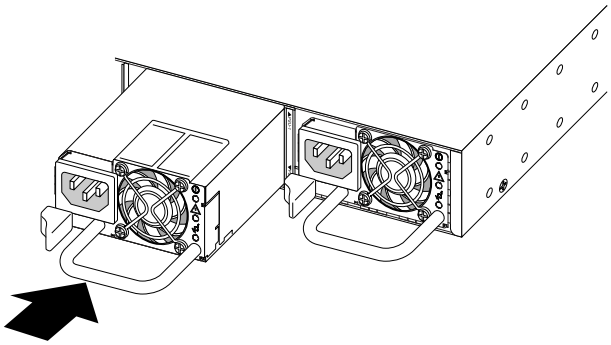


Figure 141: Installing a Power Supply

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 on page 175.

Connecting the Ground Wire

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 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 142.

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.

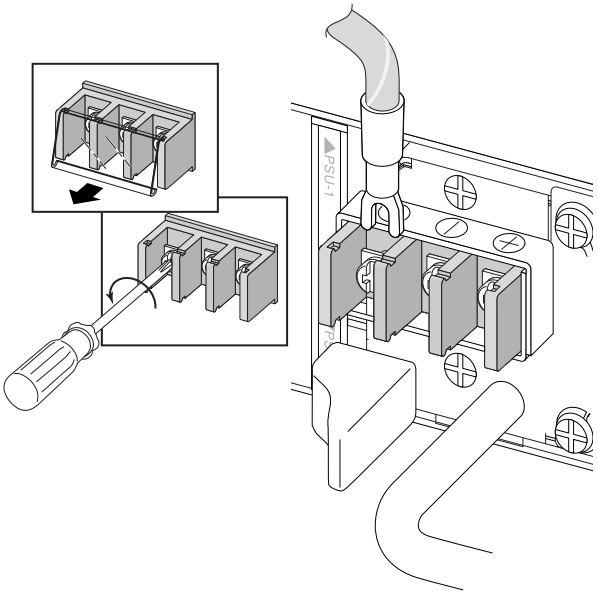


Figure 142: Connecting the Ground Wire

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 143.

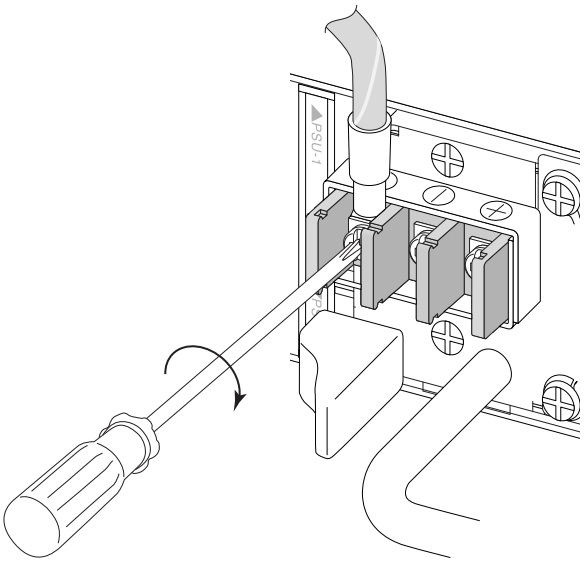


Figure 143: Securing the Ground Wire

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 the DC Power Supply to the Source Voltage on page 177.

Connecting the DC Power Supply to the Source Voltage

Summit 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 allow the spade terminal to 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 **–**).

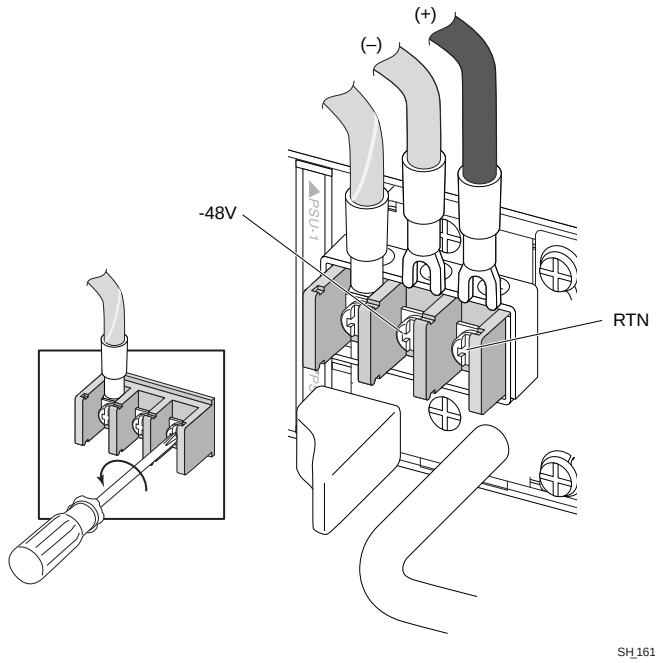


Figure 144: Connecting the Negative Power Wire to a –48V Source (550 W DC Power Source)

b Slide the spade terminal of the positive wire (–48 V RTN) under the captive square washer on the positive terminal (labeled +).

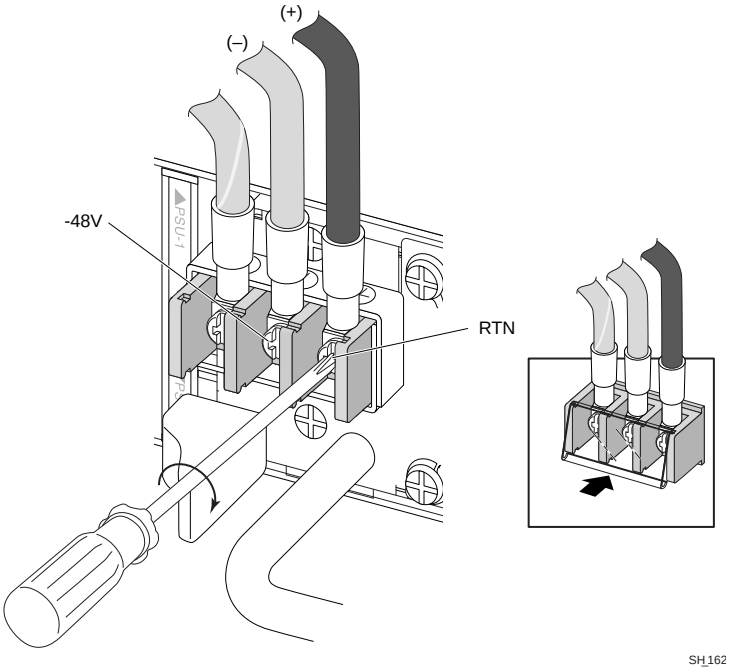


Figure 145: Connecting the Positive Power Wire to a –48V Source (550 W DC Power Source)

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 Connecting Network Interface Cables on page 191.

Installing 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 on page 179.

2 Prepare the power cables and ground cable by attaching the provided connection lugs to the cables.

   See Preparing the Cables on page 179.

3 Insert the power supply into the switch.

   See Installing the 1100 W DC Power Supply on page 180.

4 Connect the ground wire.

   See Connecting the Ground Wire on page 181.

5 Connect the power supply to the electrical source and energize the DC circuit.

   See Connecting the DC Power Supply to the Source Voltage on page 182.

Required Tools and Materials

You need the following tools and materials to install or remove an 1100 W DC power supply in a Summit series switch.

- 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
- Crimping tool for attaching the lug to the ground wire
- #1 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

You need three cable wires: two power input cables and one ground cable. Refer to Required Tools and Materials on page 179 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.

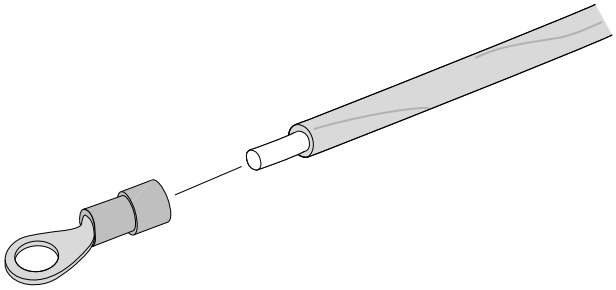


Figure 146: Attaching a Ring Terminal to a Ground Cable

No ring terminal is required to connect the cable wires (non-ground wires) to the 1100 W DC power supply.

Installing the 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 back of the switch.
3 Verify that the power supply is right side up.

The power supply should be oriented as shown in Figure 147 on page 181.

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 147.

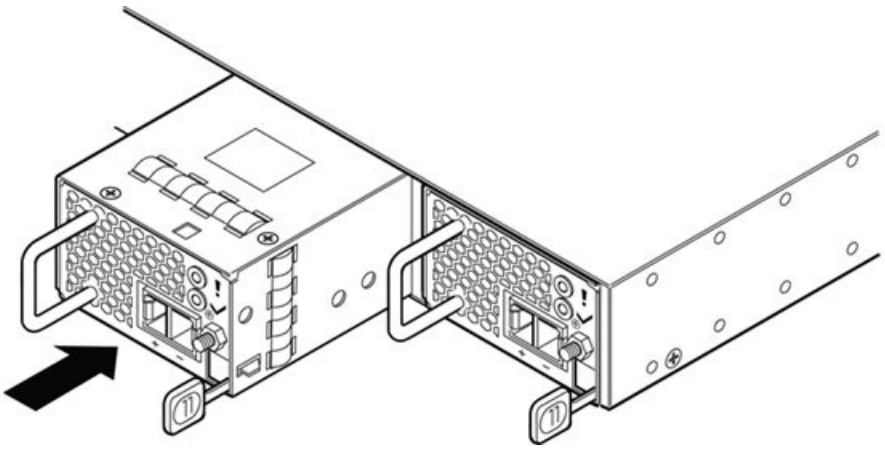


Figure 147: Installing an 1100 W DC Power Supply

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 on page 175.

Connecting the Ground Wire

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 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 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 148).

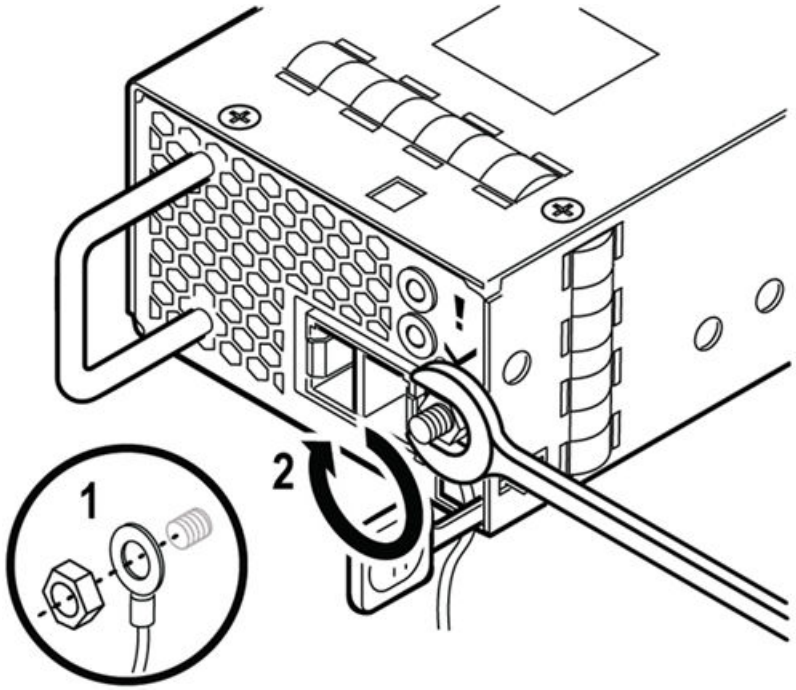


Figure 148: Securing the Ground Wire

   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.

Connect the power supply to the power source, following the instructions in Connecting the DC Power Supply to the Source Voltage on page 182.

Connecting the 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 148 on page 182.

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 149.

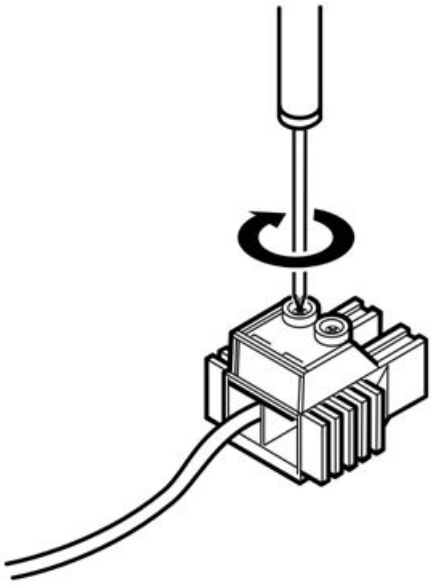


Figure 149: Inserting the DC Power Cables into the Connector

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 150.

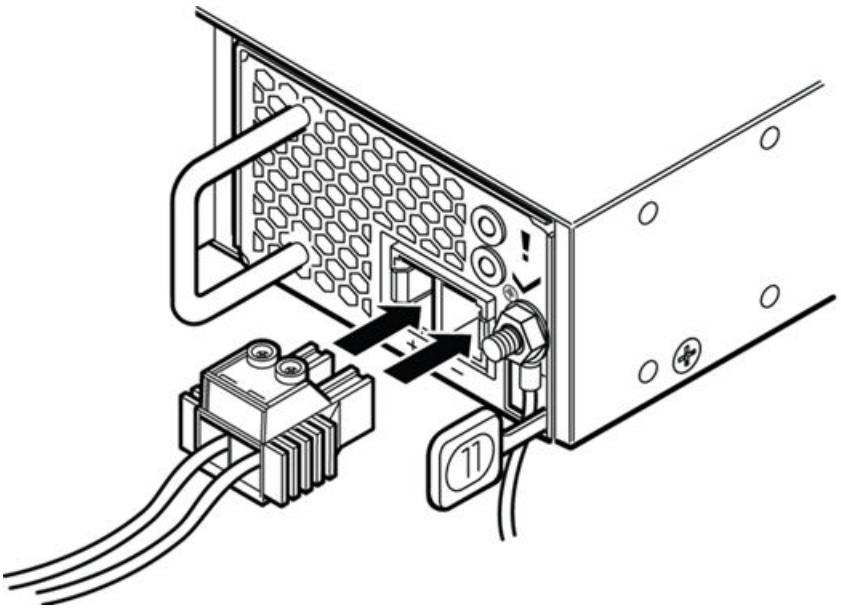


Figure 150: Inserting the Connector into the Power Supply

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 Connecting Network Interface Cables on page 191.

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 Installing a 300 W or 750 W Internal AC Power Supply on page 185.

350 W AC PSU Part numbers 10953 and 10954. Compatible with X460-G2 *PoE* switches. For installation instructions, see Installing a 350 W, 715 W, 770 W, or 1100 W Internal AC Power Supply on page 190.

550 W AC PSU Part numbers 10925 through 10928. Compatible with X670-G2 and X770-32q switches. For installation instructions, see Installing a 550 W Internal AC Power Supply on page 188.

715 W AC PSU Part numbers 10951 and 10952. Compatible with X450-G2 and X460-G2 PoE switches. For installation instructions, see Installing a 350 W, 715 W, 770 W, or 1100 W Internal AC Power Supply on page 190.

750 W AC PSU Part number 10931. For PoE switches. Compatible with the EPS-C2 external power supply. For installation instructions, see Installing a 300 W or 750 W Internal AC Power Supply on page 185.

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, or 1100 W Internal AC Power Supply on page 190.
1100 W AC PSU	Part numbers 10941 and 10942. Compatible with X450-G2 and X460-G2 PoE switches. For installation instructions, see Installing a 350 W, 715 W, 770 W, or 1100 W Internal AC Power Supply on page 190.

AC Power Supply Cords

An AC power cord is not included with a Summit 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 340.

Installing 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).

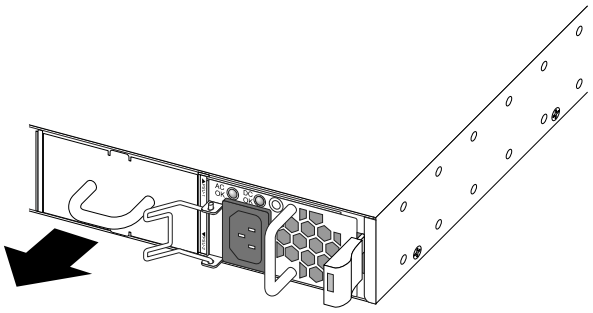


Figure 151: Removing a Blank Panel (300 W Power Supply Unit)

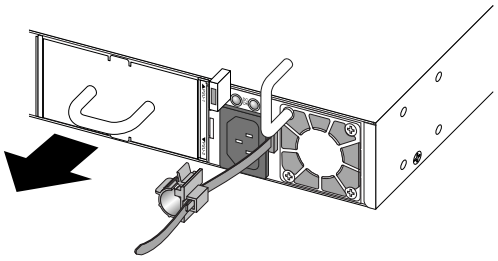


Figure 152: Removing a Blank Panel (750 W Power Supply Unit)

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).

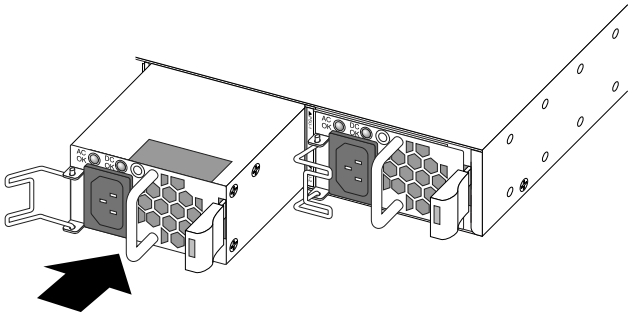


Figure 153: Installing a 300 W AC Power Supply

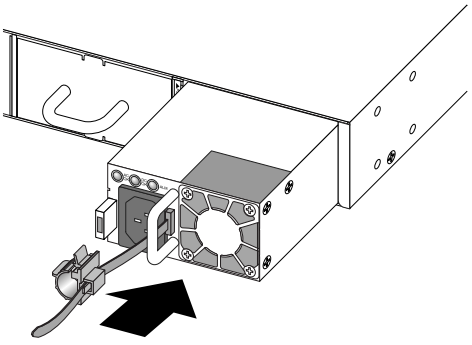


Figure 154: Installing a 750 W AC Power Supply

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 155).

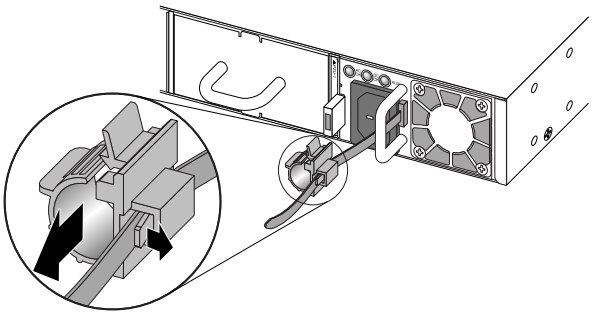


Figure 155: Moving the Power Cord Retainer

b Connect the AC power cord to the input connector (see Figure 156).

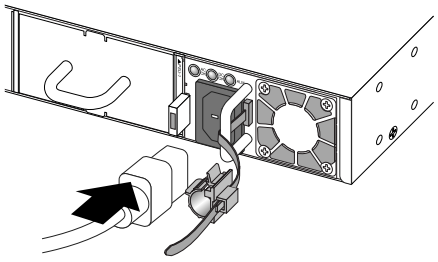


Figure 156: Connecting the Power Cord

c Open the clip and slip it over the barrel of the connector (see Figure 157).

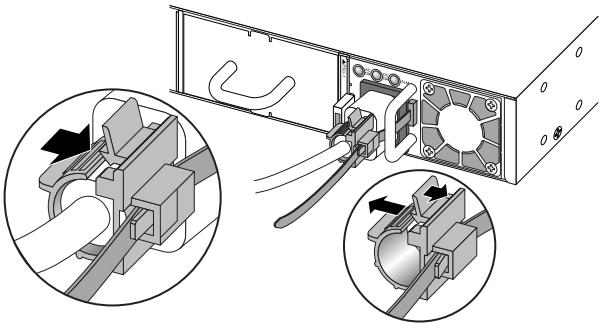


Figure 157: Attaching the Power Cord Retainer

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 185 through step 7.

Installing a 550 W Internal AC Power Supply

Some switches are shipped without installed power supplies. They accommodate one or two Summit 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 Summit 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 340.

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 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 back of the switch.

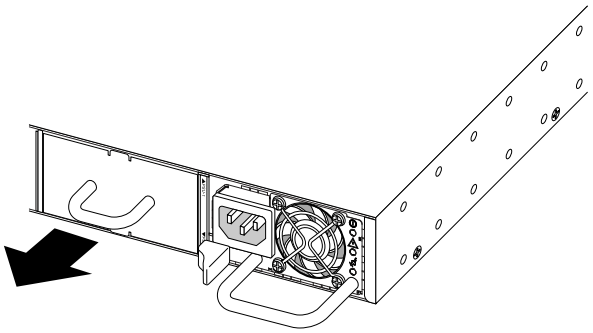


Figure 158: Removing a Blank Panel

3 Verify that the power supply is right side up.

The power supply should be oriented as shown in Figure 159.

4 Carefully slide the power supply all the way into the power supply bay.

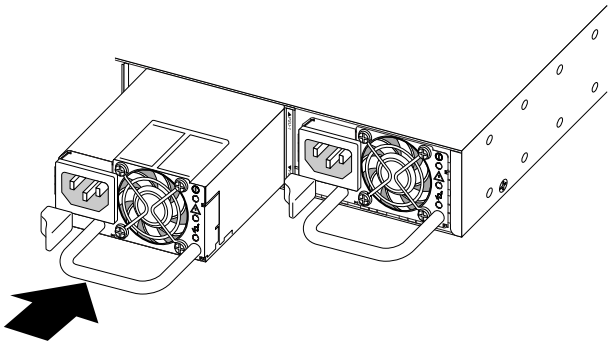


Figure 159: Installing a Power Supply

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 191.

Installing a 350 W, 715 W, 770 W, or 1100 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 Summit 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 340.

To install a 350 W, 715 W, 770 W, or 1100 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 160.

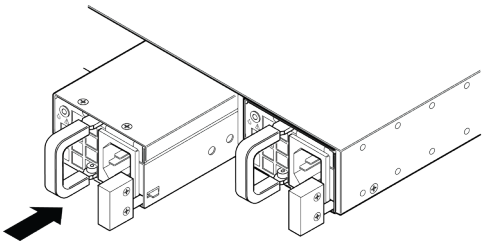


Figure 160: Installing a Summit AC Power Supply (770 W Model Shown)

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 Summit 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 340.

To power up 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 Connecting Network Interface Cables on page 191.

If the PSU and RPS LEDs do not turn green, see the *Switch LEDs* topic for your switch model (in the ExtremeSwitching and Summit Switches on page 9 section) for troubleshooting information.

Connecting 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 step 1 on page 192 through step 4 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.

Set up local management access, and configure the switch's software, by following the instructions in Performing Initial Management Tasks on page 192.

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 192
- Logging In for the First Time on page 193

You can also:

- Configuring the Switch's IP Address for the Management VLAN on page 194
- Configuring ExtremeXOS on the Switch on page 194

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: 9600 (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 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 341.

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 192.

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: 9600 (see note)
- Data bits: 8
- Stop bit: 1



Note
Set the baud rate to 115200 when using the RJ45 Ethernet management port on an 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, **SummitX770#**) 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 22.3 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 (Virtual LAN)*) by following the steps in Configuring the Switch's IP Address for the Management VLAN on page 194.

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 22.3 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 194.

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 194.
3 From the Software Download page, download the ExtremeXOS image file to the management console.
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.

7 Installing Summit External Power Supplies

Safety Considerations for Installing Power Supplies
Pre-installation Requirements
Installing an EPS-C2 Power Supply
Installing an STK-RPS-150PS Redundant Power Supply
Installing an RPS-150XT Redundant Power Supply
Installing an RPS-500p Redundant Power Supply
Installing an STK-RPS-1005PS Redundant Power Supply

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 Summit 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.



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 Information on page 267. 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 on page 282 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 340.



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 271 for information about selecting a power cord.

Installing an EPS-C2 Chassis

Figure 161 shows an EPS-C2 chassis mounted above a switch in a rack.

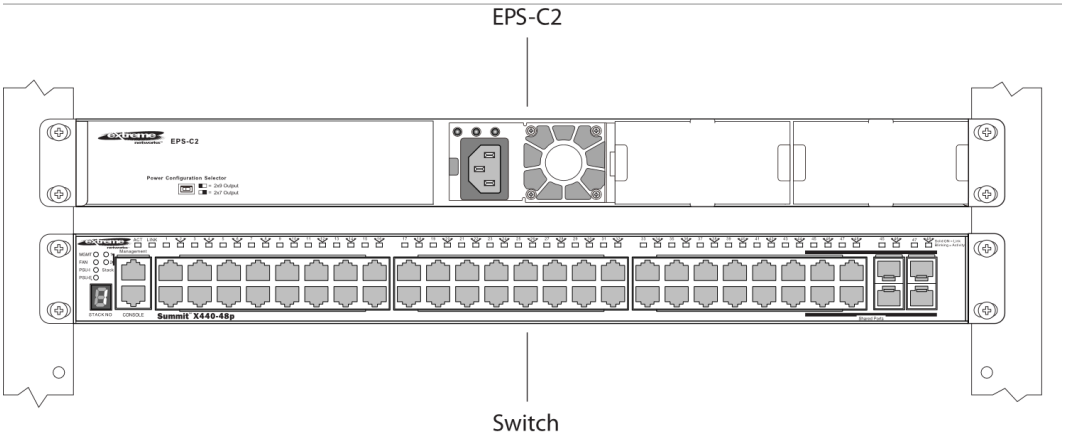


Figure 161: EPS-C2 Power System Chassis and Switch

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 162).
   b Insert the screws and fully tighten them using a screwdriver.

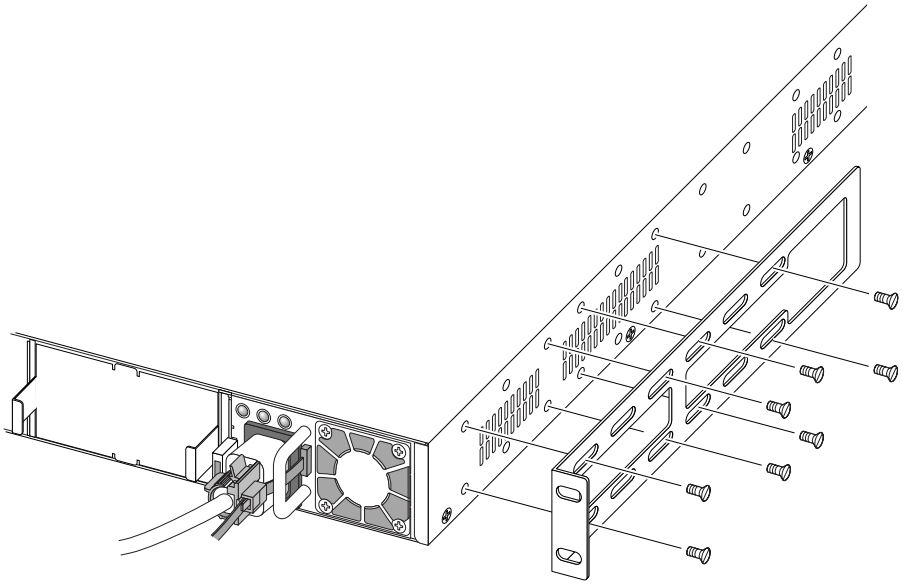


Figure 162: Attaching the Mounting Bracket to the EPS-C2 Chassis

   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 163.

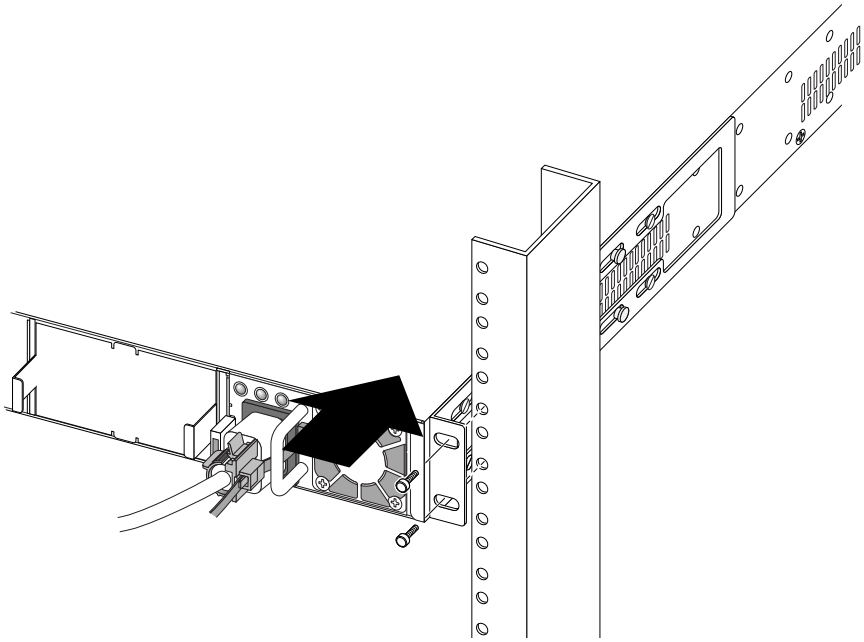


Figure 163: Sliding the EPS-C2 into the Rack and Securing it

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.

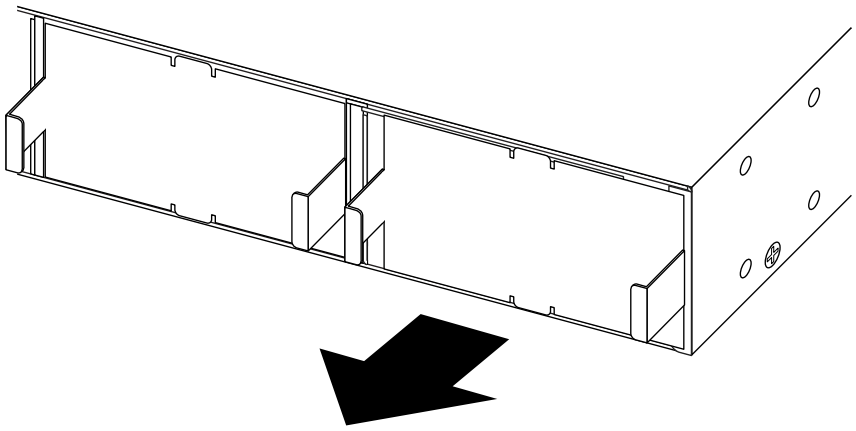


Figure 164: Removing a Blank Panel from the EPS-C2 Chassis

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 165).

4 Push the power supply in until the latch snaps into place.

Caution
Do not slam the power supply into the chassis.

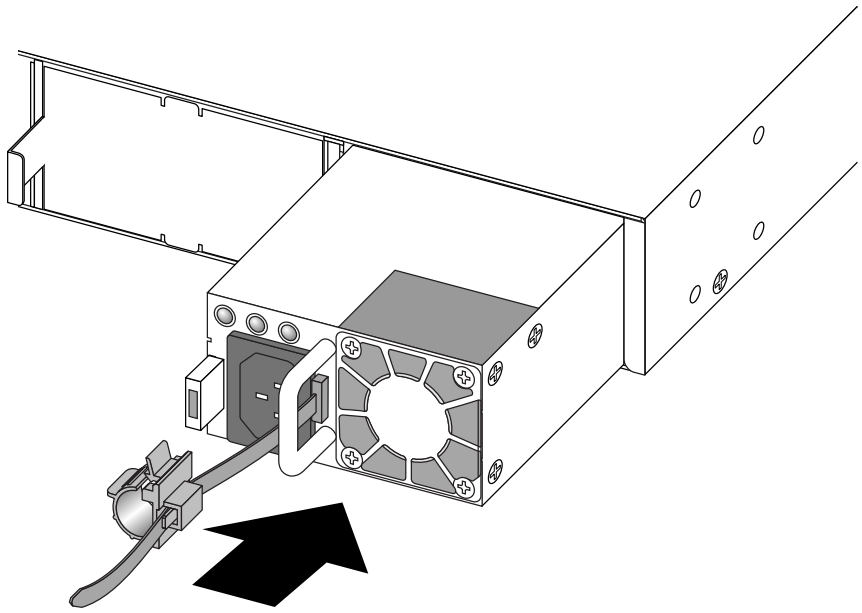


Figure 165: Installing a 750 W AC Power Supply in an EPS-C2 Chassis

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 166, which connect the power supply to ExtremeSwitching X440-G2 and X620 switches.

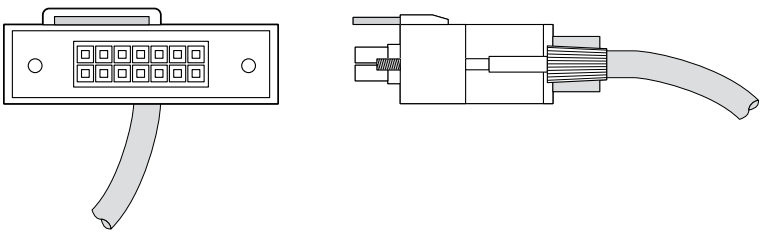


Figure 166: EPS-C2 2x7 Pin Redundant Power Cable with Connector Key Tab

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 167.

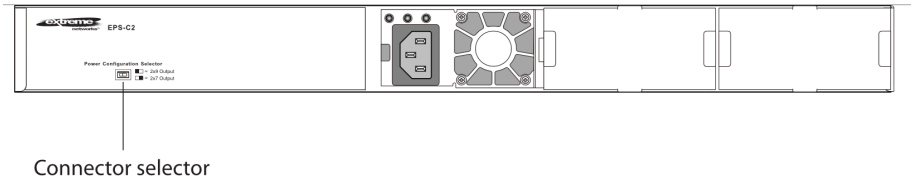


Figure 167: EPS-C2 Connector Selector Switch

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 168.

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 Summit switch.

See Figure 168.

Be sure that the side of the connector marked TOP is facing up.

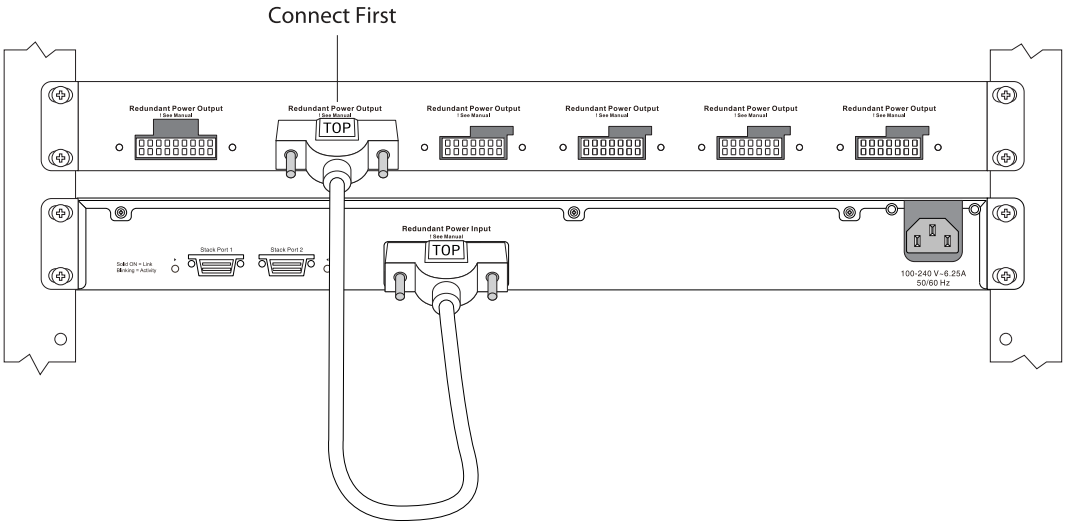


Figure 168: Installing the Redundant Power Cord

Note

The EPS-C2 2x9 connector, shown in the figure to the left of where the cable is connected, is not used with any of the switches that run 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

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 169.

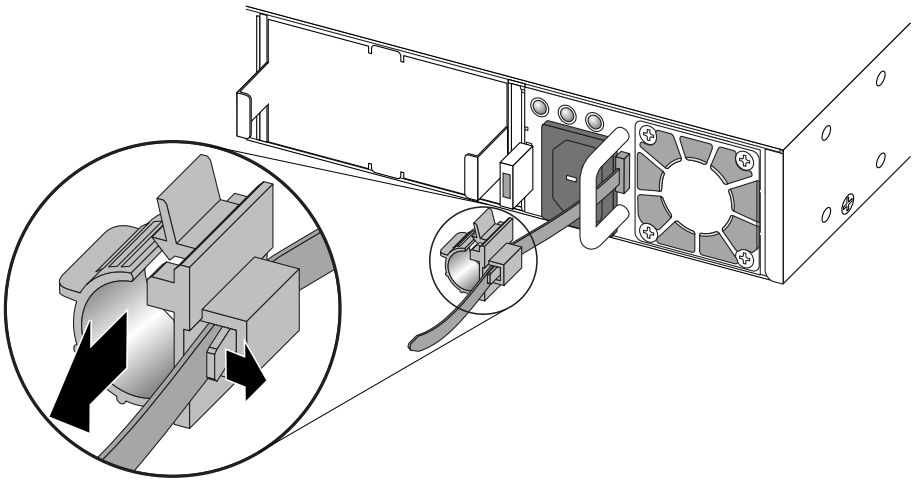


Figure 169: Moving the Power Cord Retainer on the 750 W AC Power Supply

2 Connect the AC power cord to the input connector.

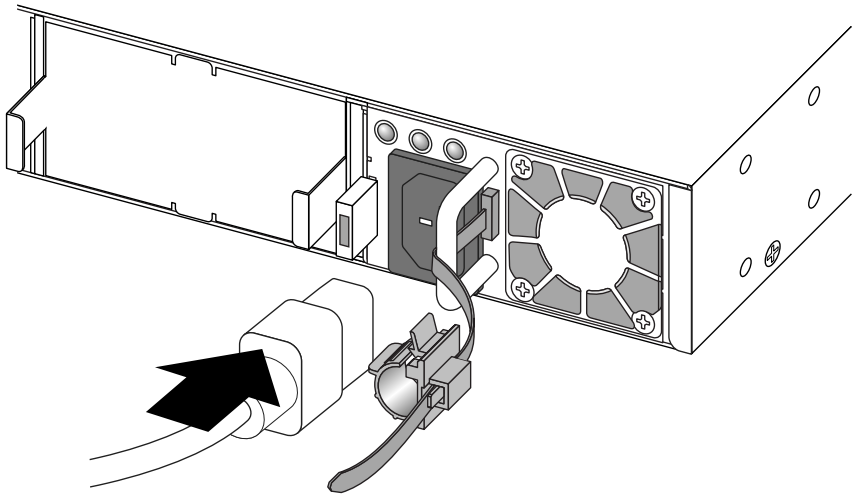


Figure 170: Connecting the Power Cord on the 750 W AC Power Supply

3 Open the clip and slip it over the barrel of the connector.

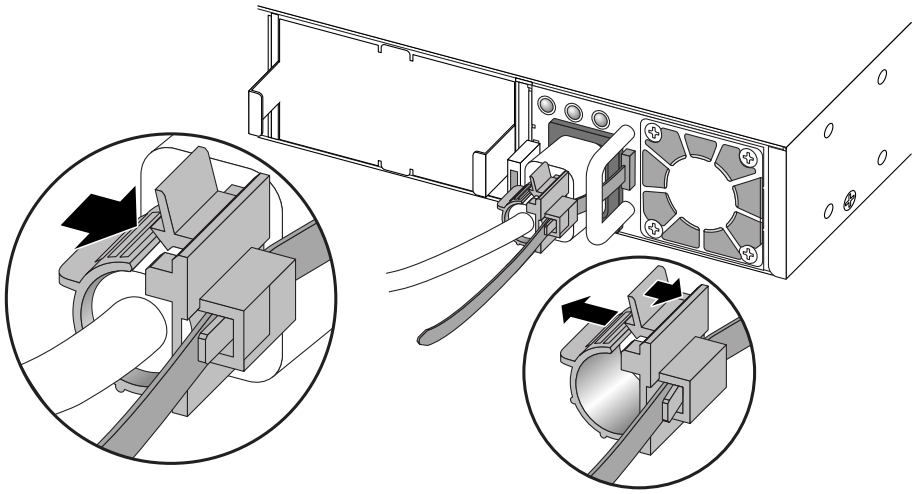


Figure 171: Attaching the Power Cord Retainer on the 750 W AC Power Supply

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 STK-RPS-150PS Redundant Power Supply

You can install an STK-RPS-150PS as a stand alone 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 208.

To install an STK-RPS-150PS in an RPS shelf, see Installing an STK-RPS-150PS in an RPS Shelf on page 205.

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 (electrostatic discharge)* 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.

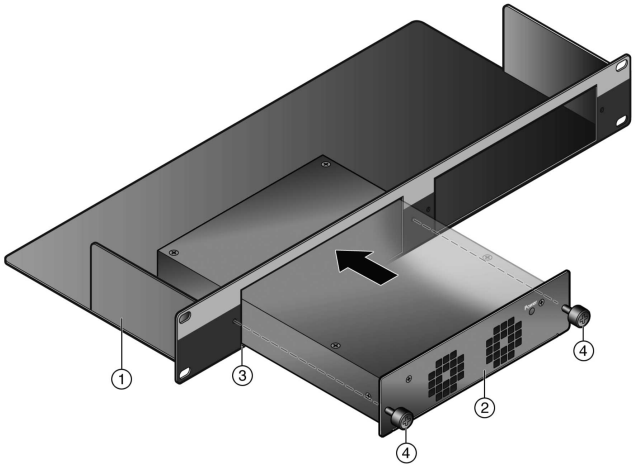


Figure 172: STK-RPS-150PS Installation in an STK-RPS-150CH2 Shelf

1 = STK-RPS-150CH2 shelf	3 = Shelf power supply slot
2 = STK-RPS-150PS power supply	4 = Captive screws (2)

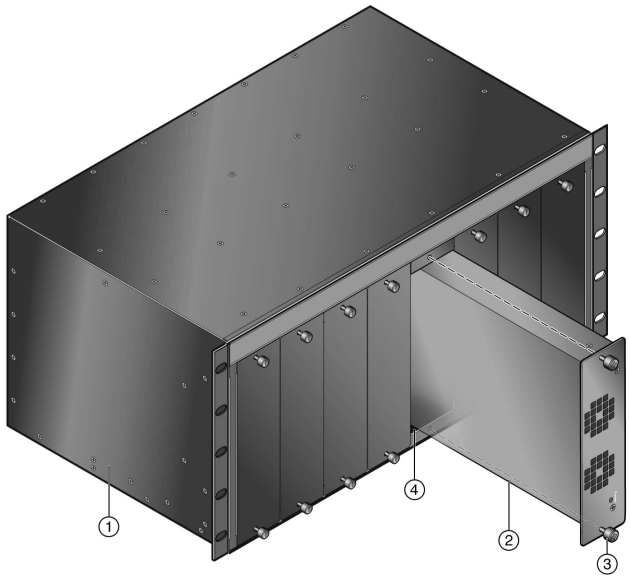


Figure 173: STK-RPS-150PS Installation in an STK-RPS-150CH8 Shelf

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 207.

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 205, 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 207).
3 Connect the RPS cables and AC power cords of the power supplies (Connecting the RPS Cable and AC Power Cord on page 208).

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.
- Up to two three-pronged power receptacles capable of delivering the current and voltage specified in STK-RPS-150PS and RPS Shelves Technical Specifications on page 334. Up to 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).

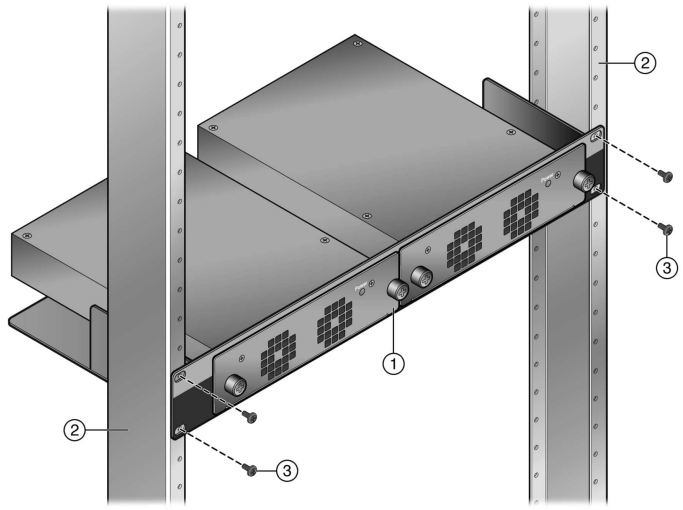


Figure 174: Fastening the STK-RPS-150CH2 to the Rack

1 = STK-RPS-150CH2 shelf	3 = Mounting screws
2 = Rails of rack	

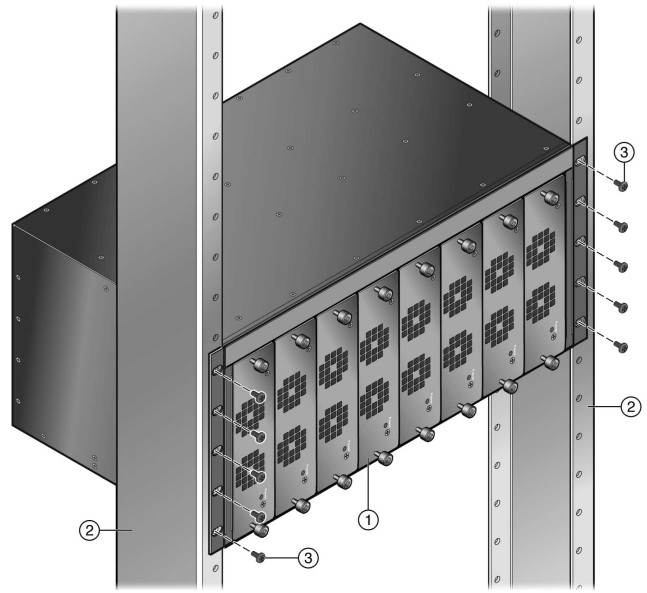


Figure 175: Fastening the STK-RPS-150CH8 to the Rack

1 = STK-RPS-150CH8 shelf	3 = Mounting screws
2 = Rails of rack	

Connecting the RPS Cable and AC Power Cord

The redundant power supply is connected to a Summit 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.

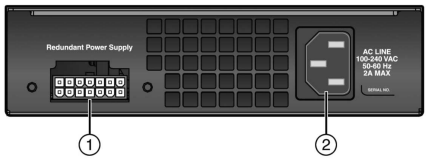


Figure 176: Power Connectors on STK-RPS-150PS (rear view)

1 = Redundant power supply connector	2 = AC power connector

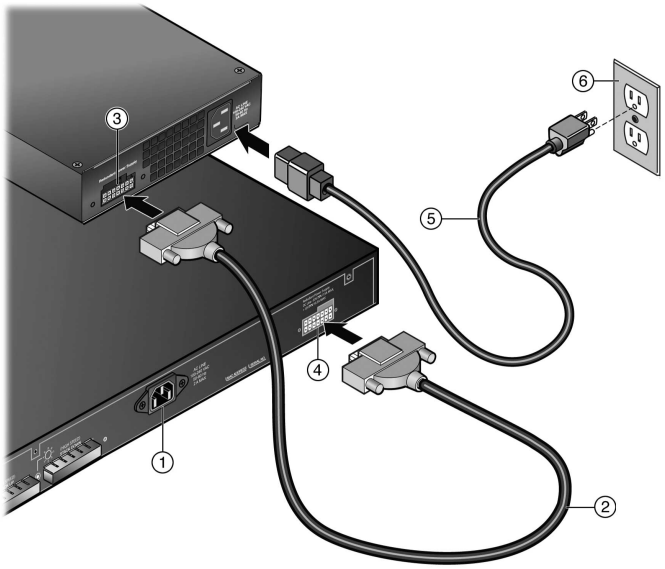


Figure 177: RPS and AC Power Cord Connections

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 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 may 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 178.

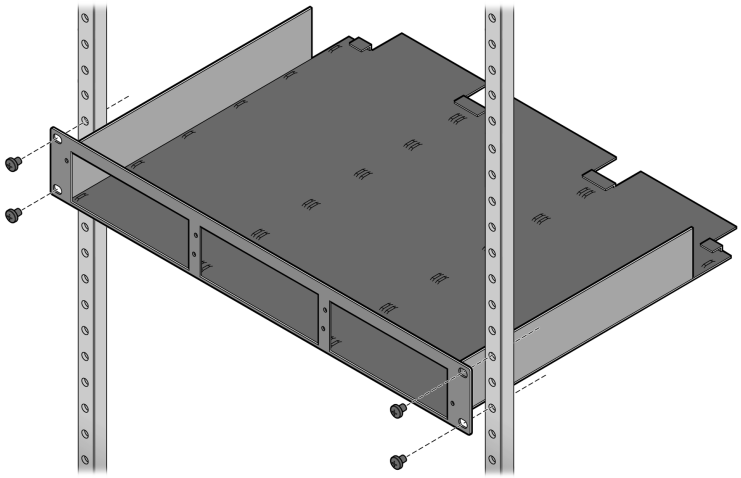


Figure 178: Securing the Three-slot Modular Shelf to a Rack

2 Slide the power supply into an empty bay in the shelf.

See Figure 179.

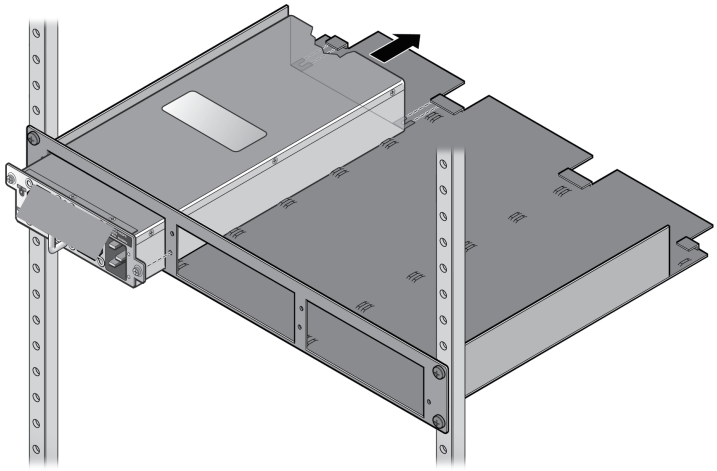


Figure 179: Installing an RPS-150XT Power Supply Unit in a Shelf

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 213.

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 213.

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.

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 180.

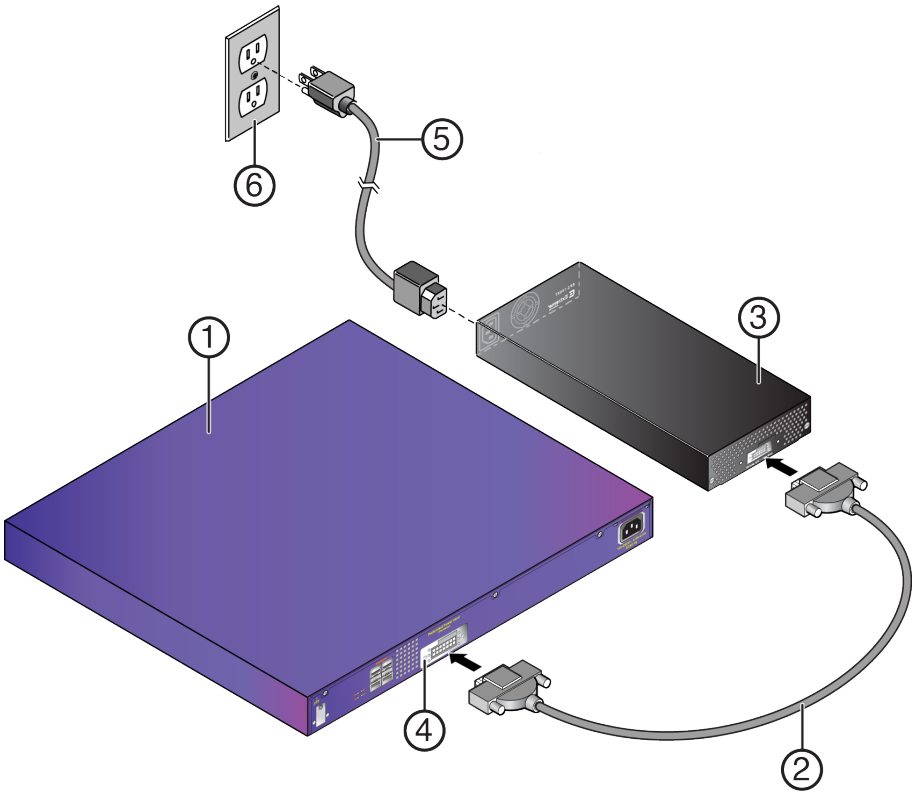


Figure 180: RPS Cable and AC Power Cord Connections for the RPS-150XT

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 may 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 181.

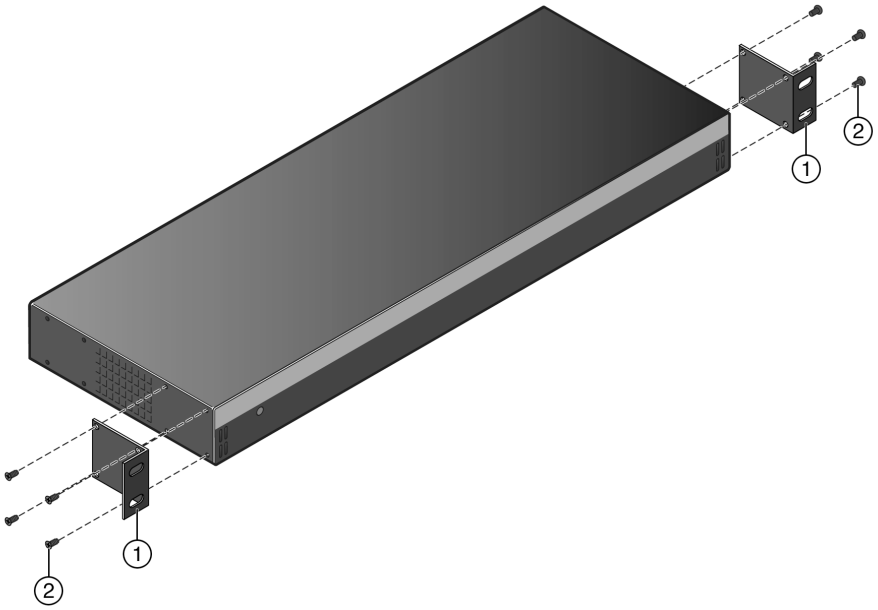


Figure 181: Attaching the Rack-Mounting Brackets

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 182.

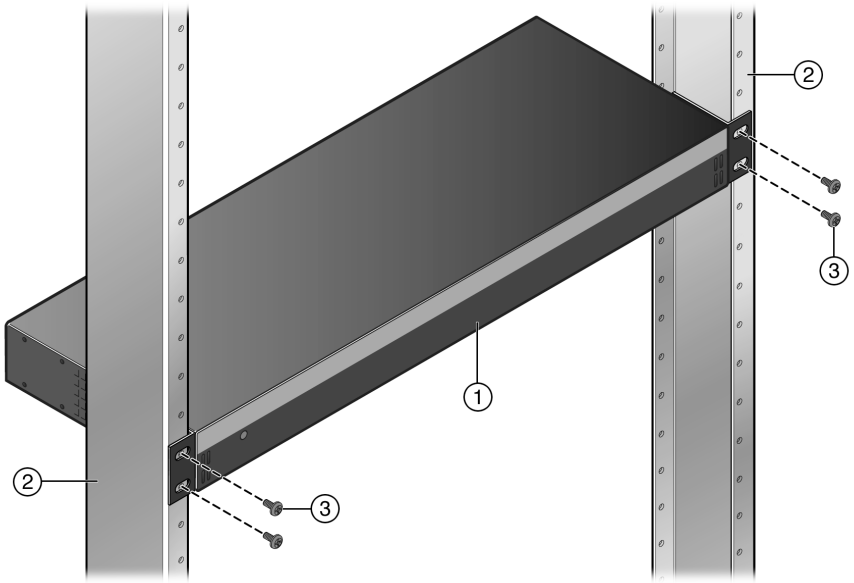


Figure 182: Fastening the RPS-500p to the Rack

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 If you are installing the RPS-500p in a stacked configuration, repeat this procedure for each power supply.
5 Connect the RPS-500p to its power source.

See Connecting the RPS Cable and AC Power Cord to an RPS-500p on page 216.

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 216.

Connecting the RPS Cable and AC Power Cord to an RPS-500p

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 183.

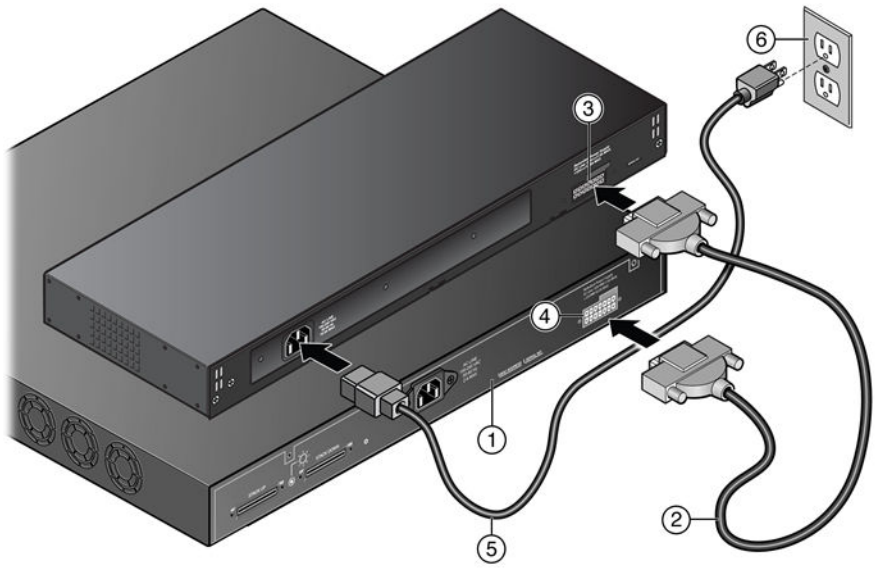


Figure 183: RPS Cable and AC Power Cord Connections for the RPS-500p

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 power LED on the front of the RPS-500p turns green to indicate that the connection was successful and the power supply is operating properly.

If the LED does 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-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 may 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 184.

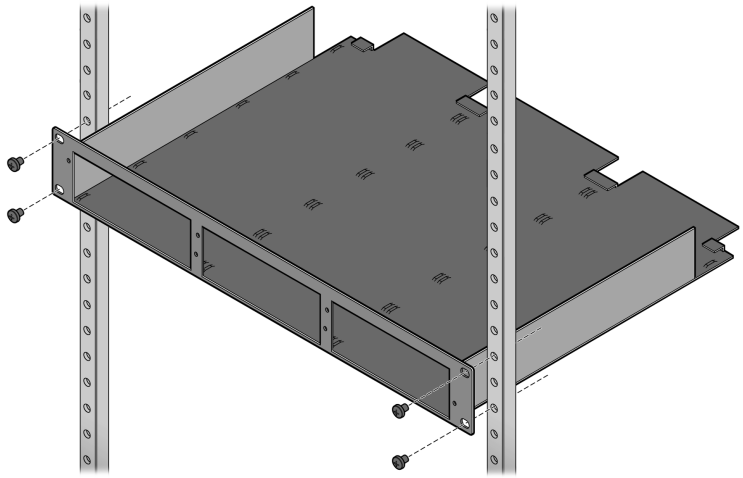


Figure 184: Securing the Three-slot Modular Shelf to a Rack

2 Slide the power supply into an empty bay in the shelf.

See Figure 185.

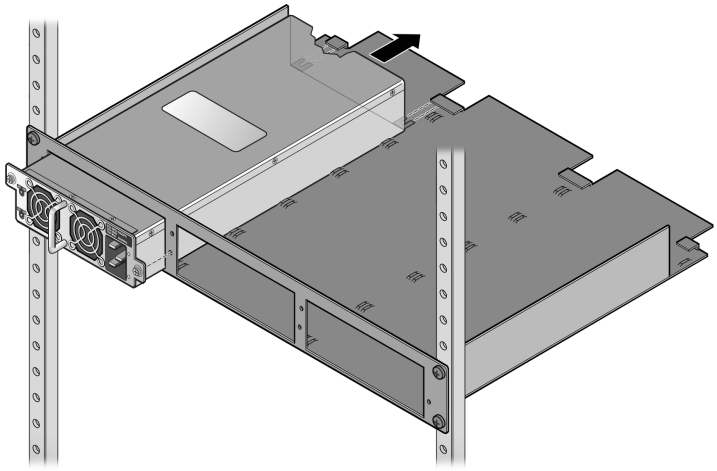


Figure 185: Installing an STK-RPS-1005PS Power Supply Unit in a Shelf

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 220.

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 220.

Connecting the RPS Cable and AC Power Cord to an STK-RPS-1005PS

The STK-RPS-1005PS RPS (redundant power supply) is connected to the switch using the supplied RPS cable. Use Figure 186 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.

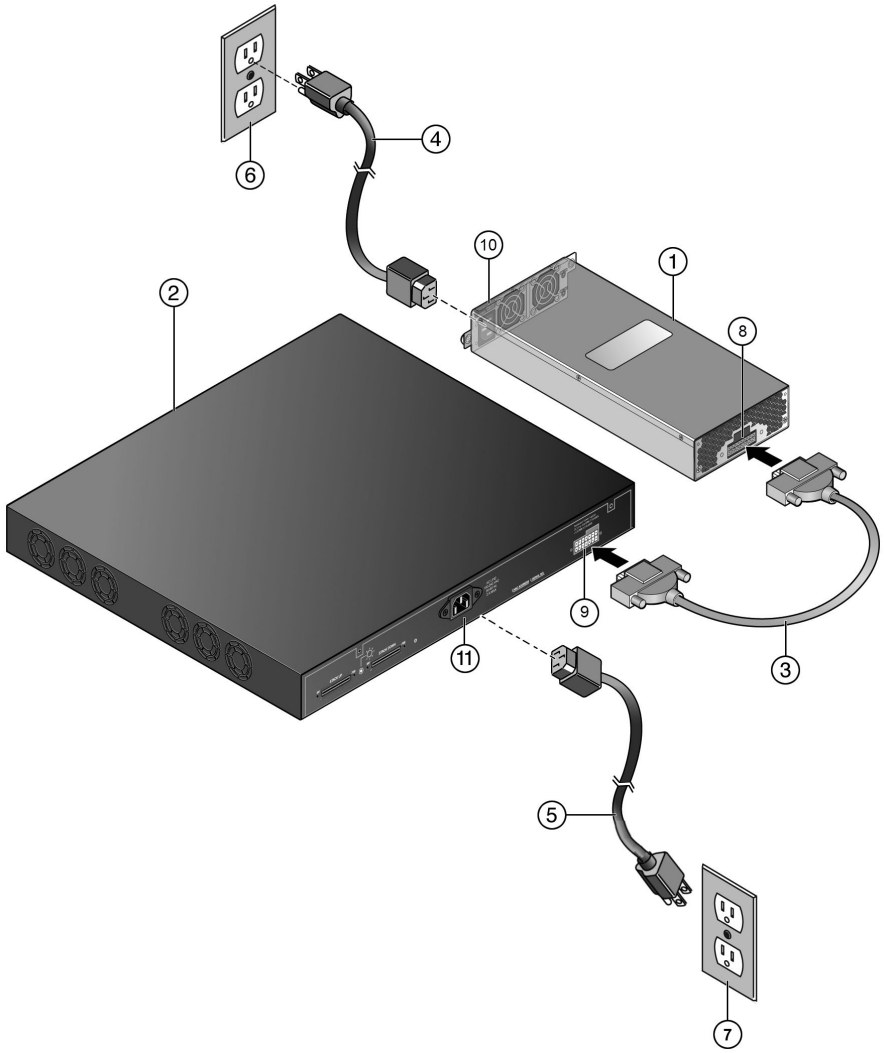


Figure 186: RPS Cable and AC Power Cord Connections for the STK-RPS-1005PS

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 271 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.

8 Installing Port Option Cards and VIMs

This chapter describes how to install Summit port option cards, versatile interface modules (VIMs), and stacking modules.



Note
Read the information in this chapter thoroughly before trying install or remove a Summit option card.

To install port option cards, VIMs, and stacking modules that work with other Summit switches, refer to *ExtremeSwitching and Summit Switches: Hardware Installation Guide for Switches Using ExtremeXOS 16 or Earlier*.

Installing a Versatile Interface Module or Clock Module in a Summit X460-G2 Series Switch

This section describes how to install a versatile interface module (VIM) or a clock module in the rear slot of a Summit 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
Summit 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.

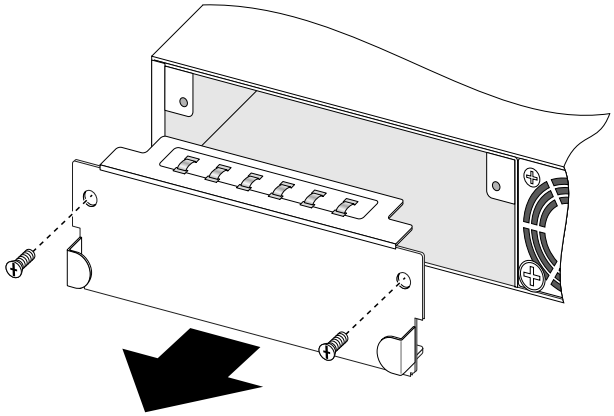


Figure 187: Removing a slot Cover Plate (VIM slot cover shown)

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.

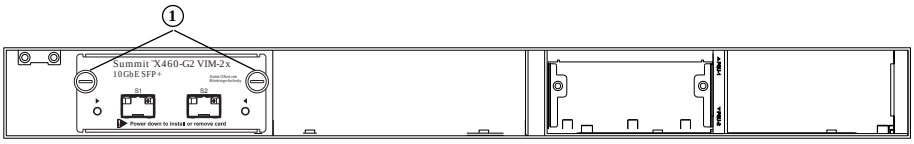


Figure 188: Tighten Screws on the Inserted VIM Module

1 = VIM module retaining screw locations

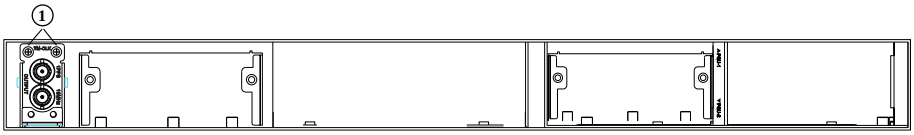


Figure 189: Tighten Screws on the Inserted Clock Module

1 = clock module retaining screw locations

9 Replacing AC Power Supplies

Replacing a Summit 300 W AC Power Supply
Replacing a Summit 350 W or 715 W AC Power Supply
Replacing a Summit 550 W AC Power Supply
Replacing a Summit 750 W AC Power Supply
Replacing a Summit 770 W AC Power Supply
Replacing a Summit 1100 W AC Power Supply
Removing an STK-RPS-150PS Redundant Power Supply
Removing an RPS-150XT Redundant Power Supply
Removing an RPS-500p Redundant Power Supply
Removing an STK-RPS-1005PS Redundant Power Supply

This chapter describes how to replace AC power supplies in a Summit 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 Summit 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 340.

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.

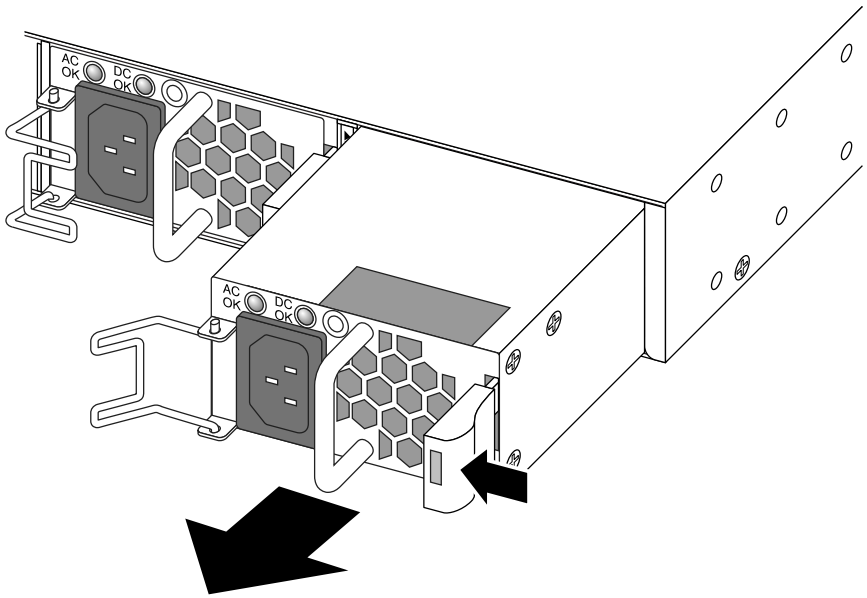


Figure 190: Removing a Summit 300 W AC Power Supply

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 191

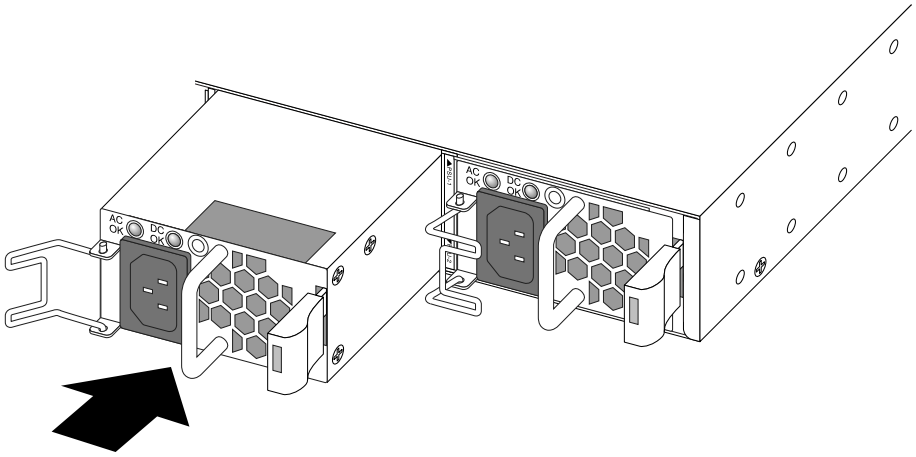


Figure 191: Installing a Summit 300 W AC Power Supply

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 Summit X460-G2 *PoE (Power over Ethernet)* switch models that have the same airflow direction as the power supply.

The Summit 715 W AC power supplies are compatible with the Summit X450-G2 and X460-G2 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 192.

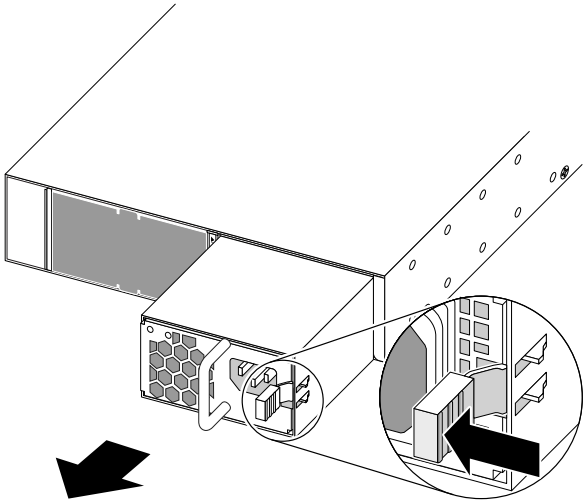


Figure 192: Removing a Summit 350 W or 715 W AC Power Supply

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 193.

7 Push the power supply in until the latch snaps into place.

Caution
Do not slam the power supply into the switch.

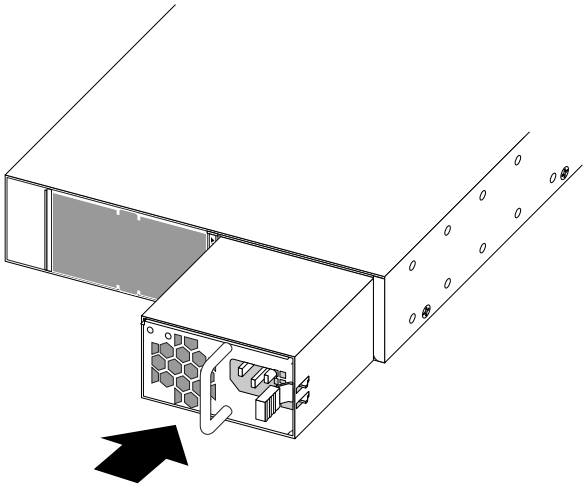


Figure 193: Installing A Summit 350 W or 715 W AC Power Supply

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 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 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 340.

In a switch with a redundant power configuration, you can replace one Summit AC power supply without powering down the switch.

To replace a 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 194.

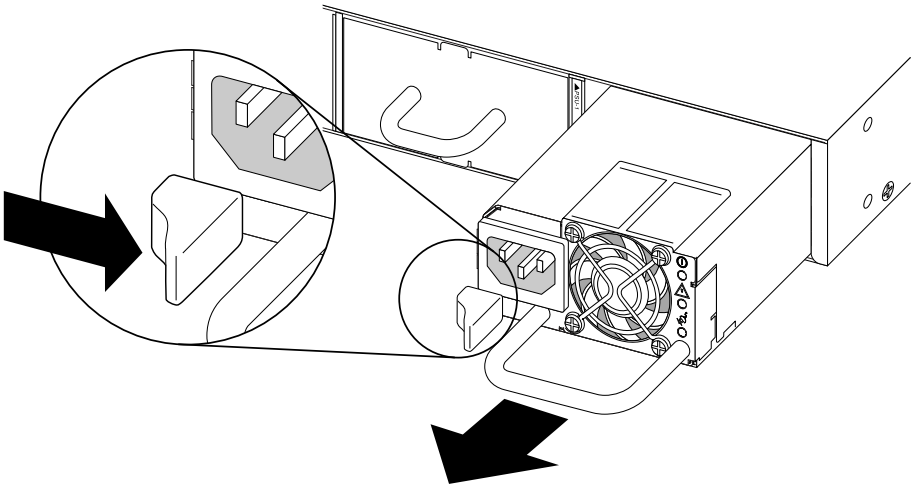


Figure 194: Removing a 550 W AC Power Supply

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 195.

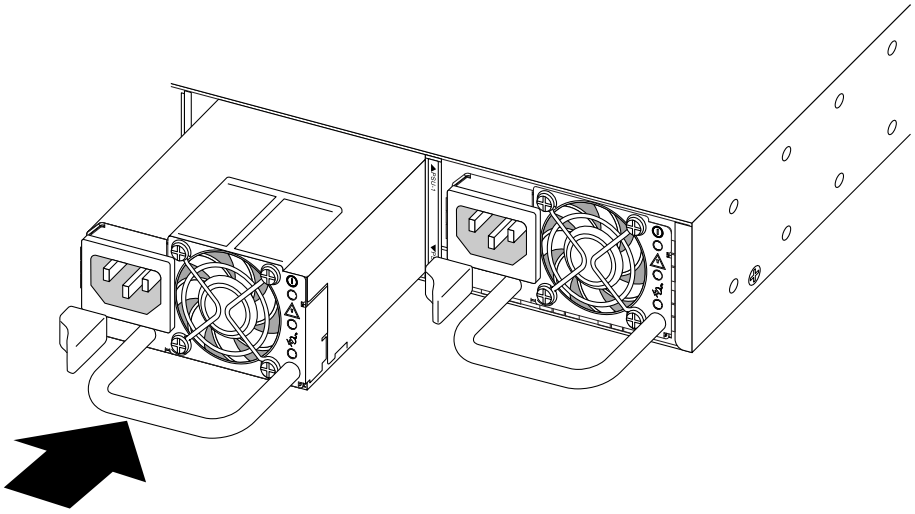


Figure 195: Installing a 550 W AC Power Supply

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 Summit 750 W AC Power Supply

You need the following tools and materials to replace a Summit 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 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 340.

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 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 196.

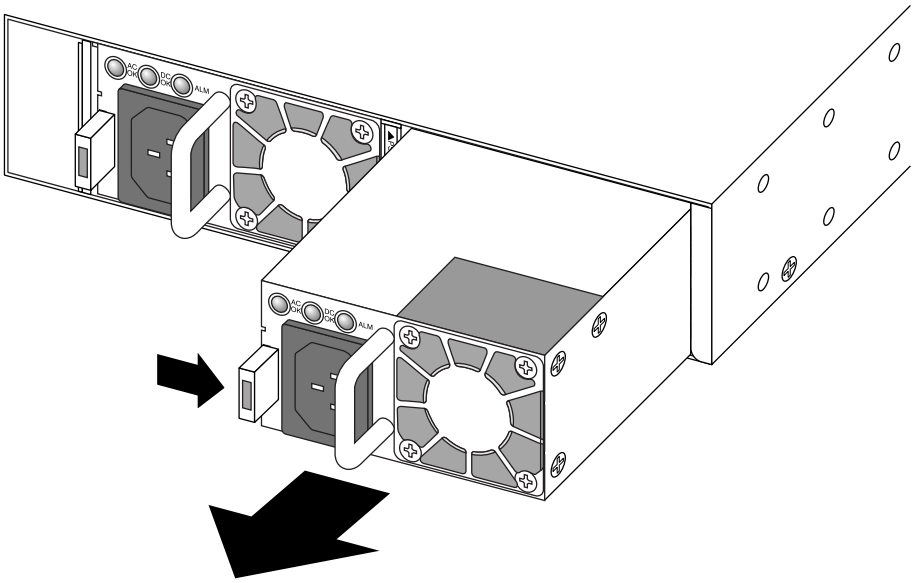


Figure 196: Removing a Summit 750 W AC Power Supply

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 197.

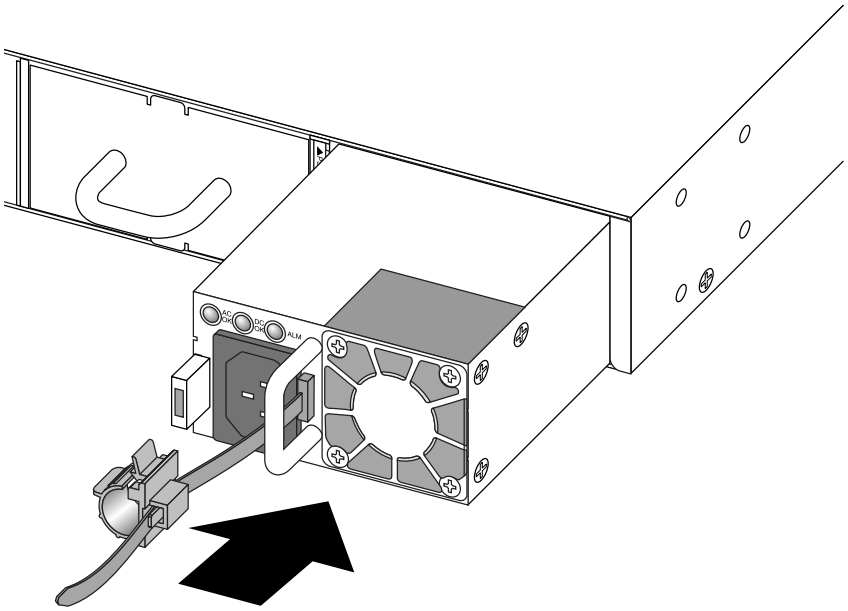


Figure 197: Installing a Summit 750 W AC Power Supply

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 198.

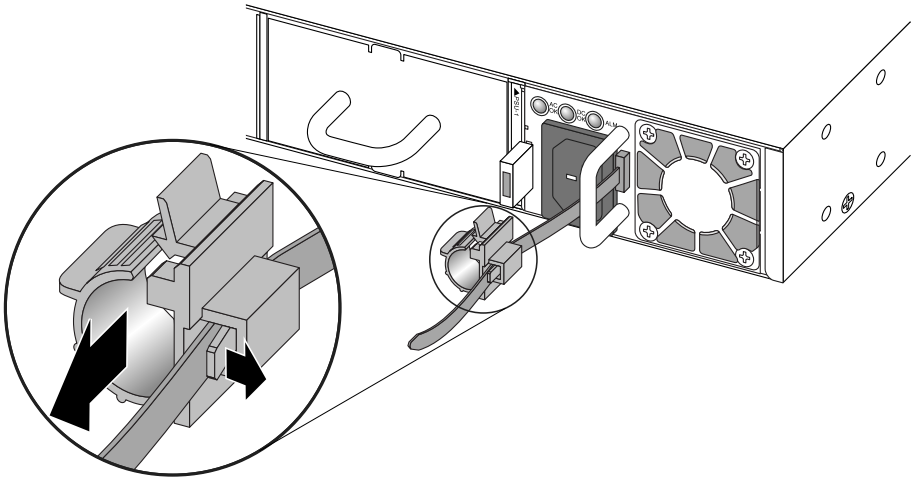


Figure 198: Moving the Power Cord Retainer

9 Connect the AC power cord to the input connector.
See Figure 199.

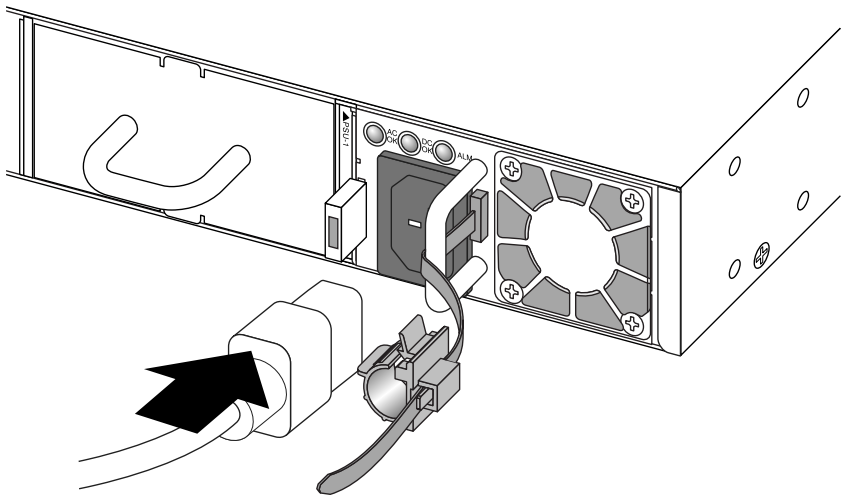


Figure 199: Connecting the Power Cord

10 Open the clip and slip it over the barrel of the connector.
See Figure 200.

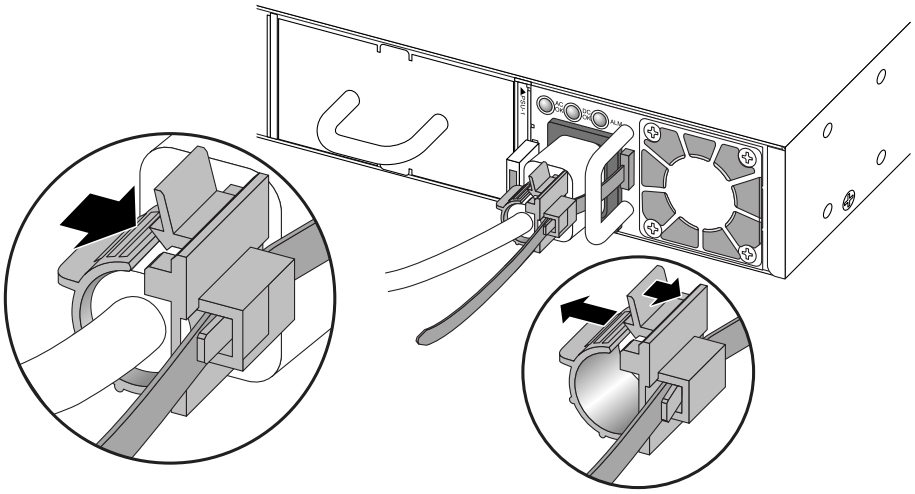


Figure 200: Attaching the Power Cord Retainer

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 253. 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 201.

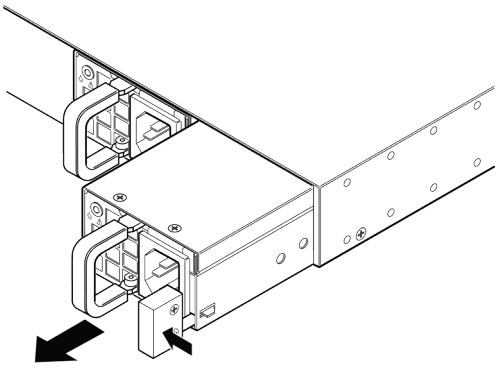


Figure 201: Removing a Summit 770 W AC Power Supply

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 202.

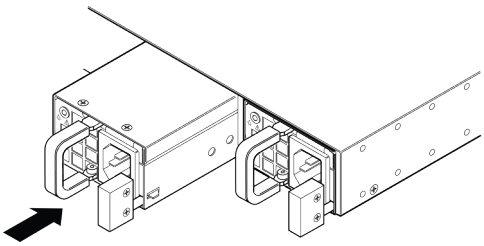


Figure 202: Installing A Summit 770 W AC Power Supply

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 Summit X450-G2 and X460-G2 *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 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 203.

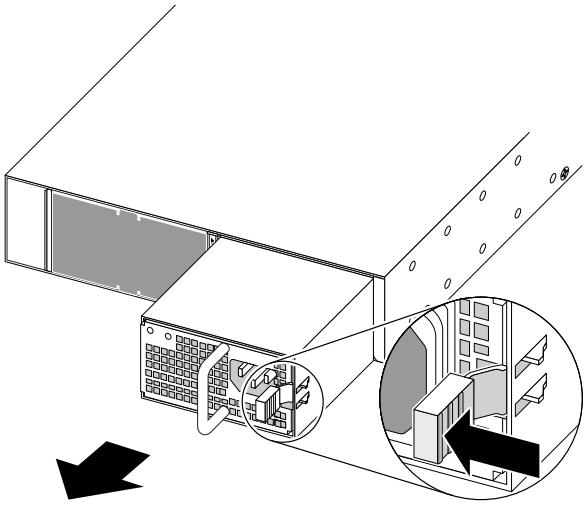


Figure 203: Removing a Summit 1100 W AC Power Supply

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 204.

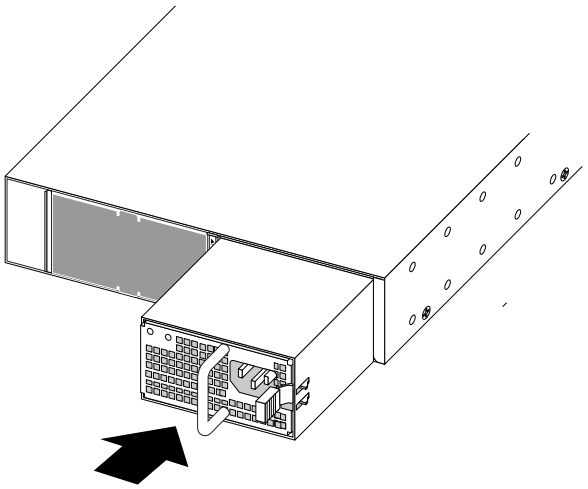


Figure 204: Installing a Summit 1100 W AC Power Supply

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.

Removing an STK-RPS-150PS Redundant Power Supply



Caution
Observe all *ESD (electrostatic discharge)* precautions when handling sensitive electronic equipment.

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 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.

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 210.

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 214.

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.

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 217.

10 Replacing DC Power Supplies

Replacing a Summit 300 W DC Power Supply
Replacing a Summit 550 W DC Power Supply
Replacing a Summit 1100 W DC Power Supply

This chapter describes how to replace internal DC power supplies in a Summit X460-G2, X620, X670-G2, or X770 switch. These switches have two bays for hot-swappable power supplies. In a switch with a redundant power configuration, you can replace one Summit DC power supply without powering down the switch.

See Replaceable Internal Power Supplies on page 93 for a list of which internal DC power supplies are compatible with the switch you are using.

To replace DC power supplies that work inside other Summit switches, refer to *ExtremeSwitching and Summit Switches: Hardware Installation Guide for Switches Using ExtremeXOS 16 or Earlier*.

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:

- #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)



Warning
Be sure to disconnect all power cables before you disconnect the chassis ground wire.

Removing the 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 205.

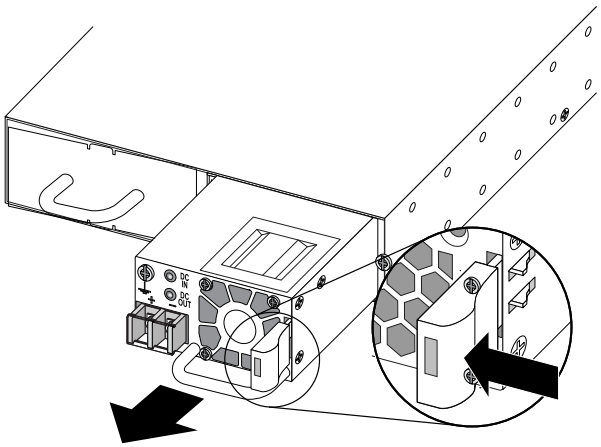


Figure 205: Removing a Summit 300 W DC Power Supply (Front-to-Back Model 10933 Shown)

5 Carefully slide the power supply the rest of the way out of the switch.

Installing the Replacement 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 206.

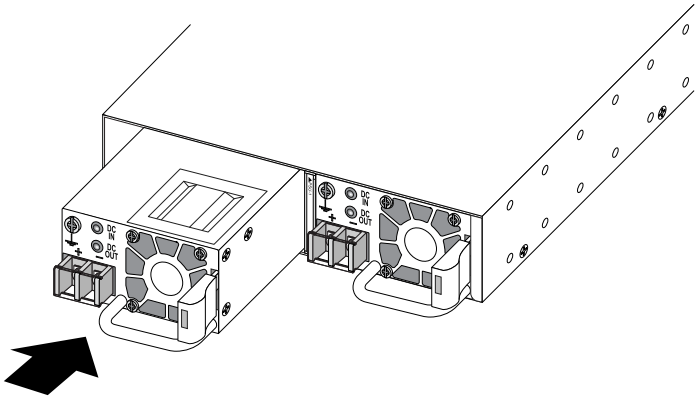


Figure 206: Installing a Summit 300 W DC Power Supply (Front-to-Back Model 10933 Shown)

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 on page 242.

Connecting the Ground Wire

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 207.

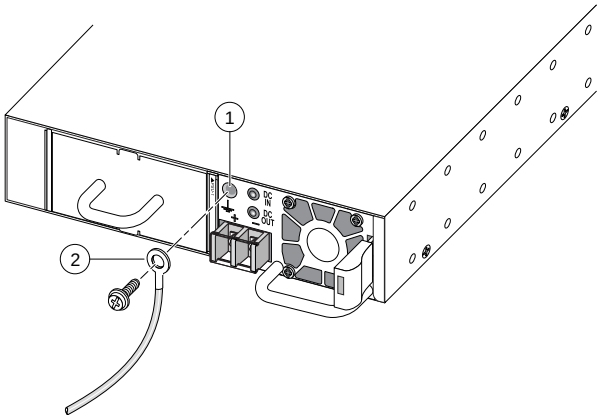


Figure 207: Connecting the Ground Wire (Front-to-Back Model 10933 Shown)

1 = Grounding point	2 = Ground wire

3 Insert an M3.5 screw (provided) through the ring terminal on the ground and into the grounding point on the power supply.
4 Tighten the screw to 12.6 in-lb (1.4 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 the DC Power Cables on page 242.

Connecting the DC Power Cables

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 243
- Connecting the DC Power Cables to a -48 V Source on page 244

Connecting the DC Power Cables to a +24 V Source

To connect the DC power cables to the Model 10933 or 10944 Summit DC power supply 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 on page 242.

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 208.

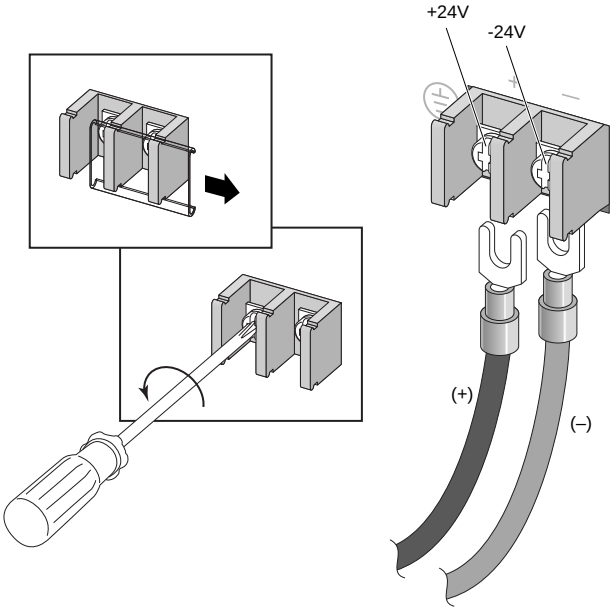


Figure 208: Connecting the DC Power Cables: Part 1

d Tighten both screws on the terminal block to 11 in-lb (1.24 N m) as shown in Figure 209.

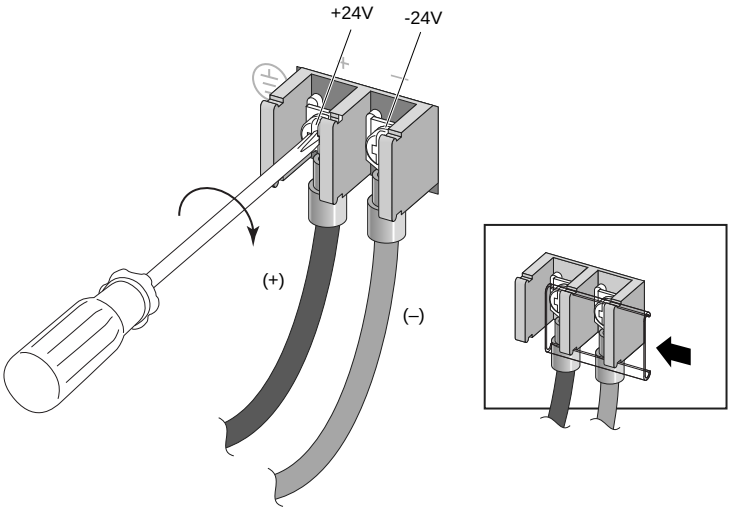


Figure 209: Connecting the DC Power Cables: Part 2

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 to the Model 10933 or 10944 Summit DC power supply 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 on page 242.
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 210.

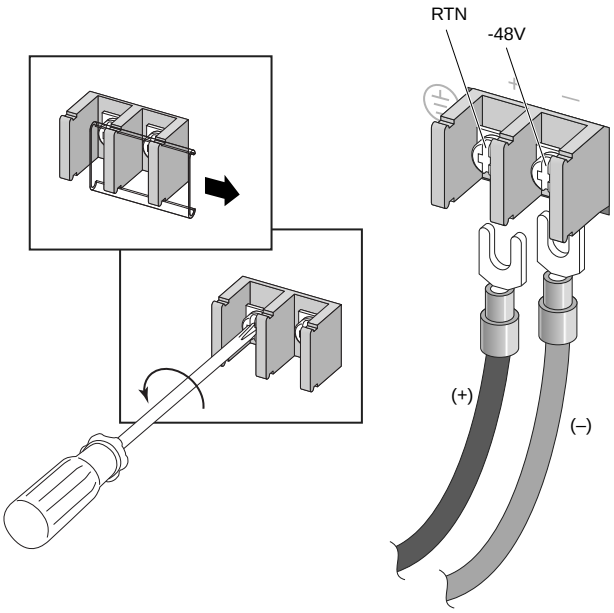


Figure 210: Connecting the DC Power Cables: Part 1

d Tighten both screws on the terminal block to 11 in-lb (1.24 N m) as shown in Figure 211.

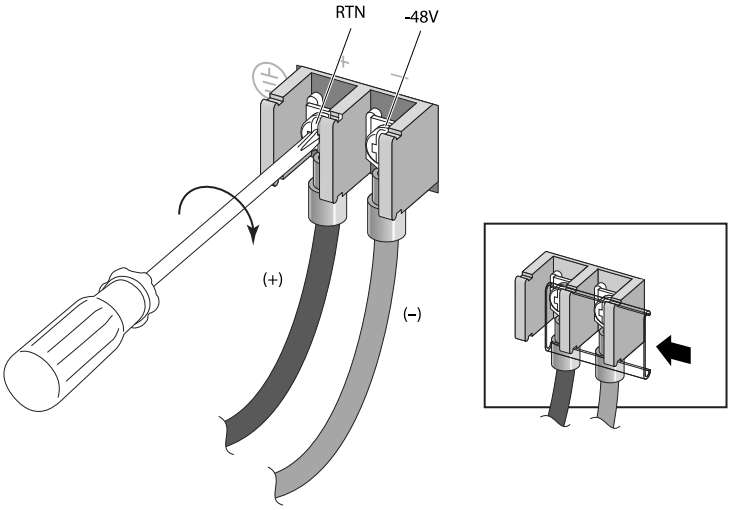


Figure 211: Connecting the DC Power Cables: Part 2

6 Slide the cover into place over the terminal block.

7 Energize the DC circuit.

Replacing a Summit 550 W DC Power Supply

The Summit X670-G2 and X770 switches can accommodate one or two Summit 550 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.

You need the following tools and materials to replace a 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 the Power Supply

To remove an installed 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 212.

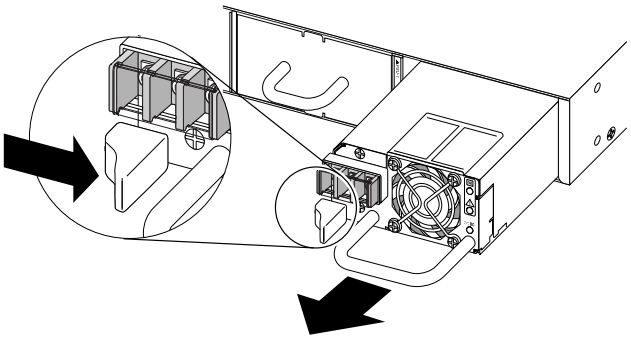


Figure 212: Removing a Summit 550 W Power Supply

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 the Replacement Power Supply

To install a replacement 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 213.

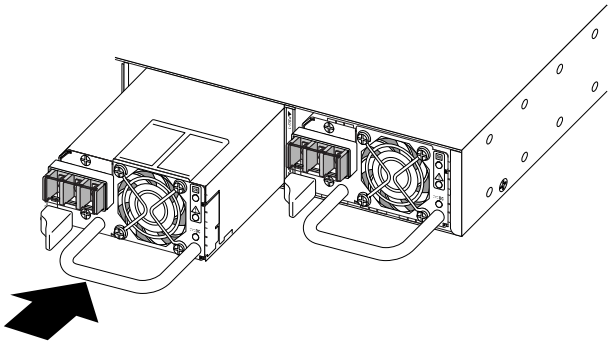


Figure 213: Installing a 550 W DC Power Supply

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 on page 249.

Connecting the Ground Wire

To connect the ground wire to the 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 214.

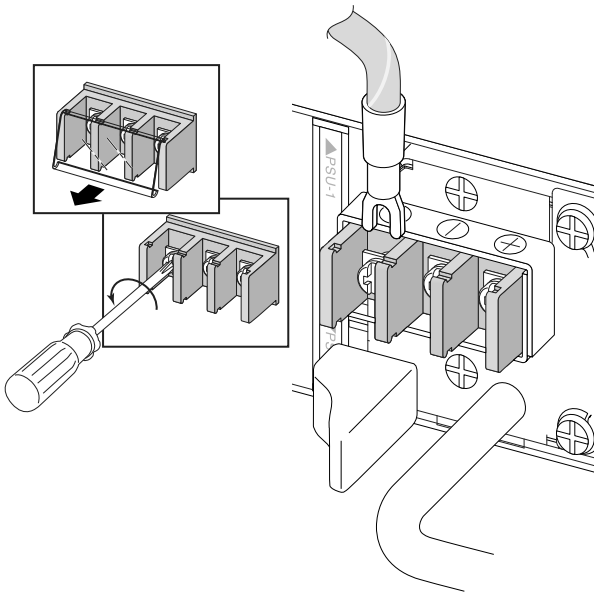


Figure 214: Connecting the Ground Wire

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 215).

   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).

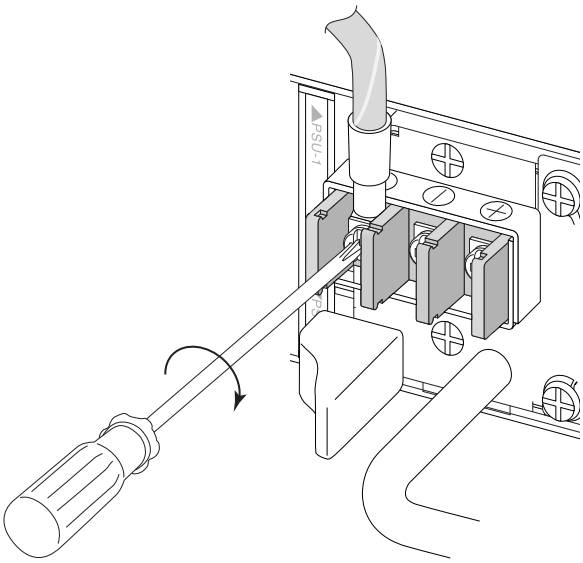


Figure 215: Securing the Ground Wire

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 the DC Power Cables on page 250.

Connecting the DC Power Cables

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 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 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 on page 249.

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 216 on page 252).

   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 +).

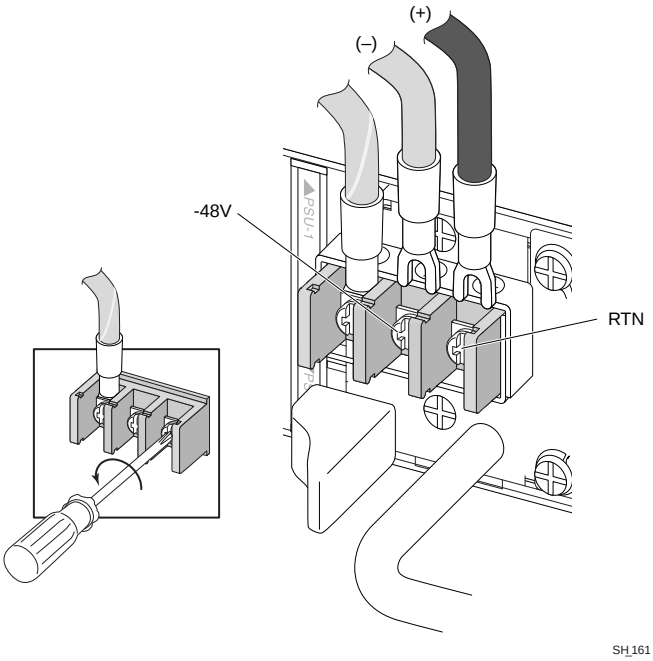


Figure 216: Connecting the DC Power Cables: Part 1

d Tighten both screws on the terminal block to 7 in-lb (0.79 N m), as shown in Figure 217.

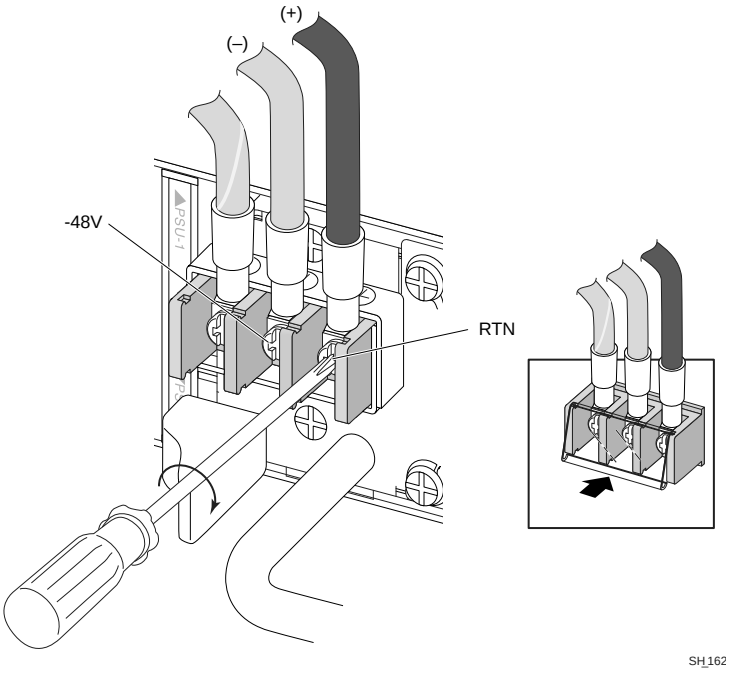


Figure 217: Connecting the DC Power Cables: Part 2

5 Snap the cover into place over the terminal block.

6 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 234. 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 the 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 218.

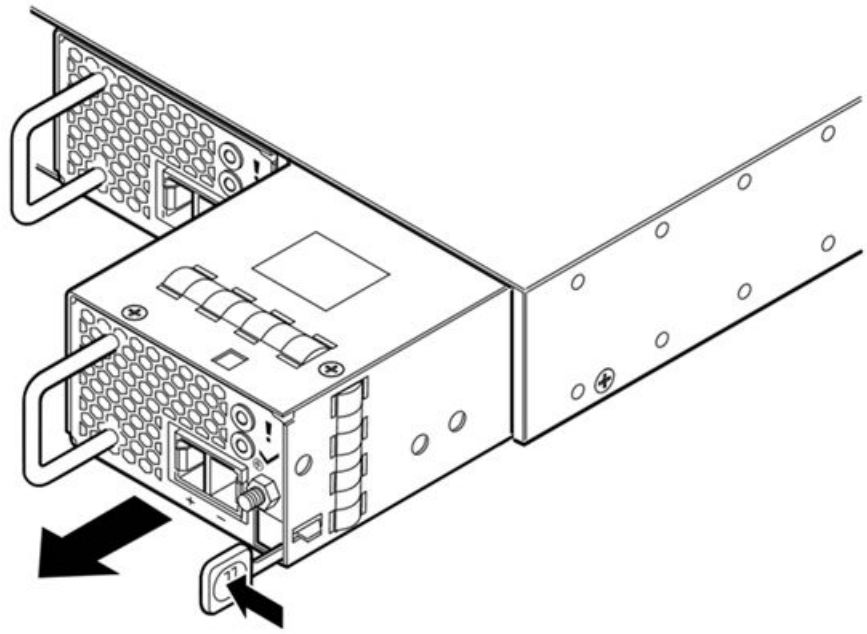


Figure 218: Removing a Summit 1100 W Power Supply

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.

Installing the Replacement 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 219.

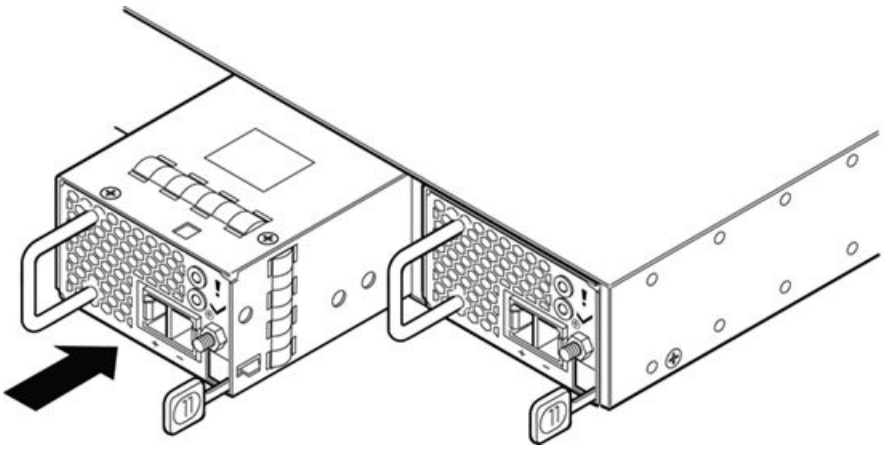


Figure 219: Installing an 1100 W DC Power Supply

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 Connecting the Ground Wire on page 255.

Connecting the Ground Wire

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 220).

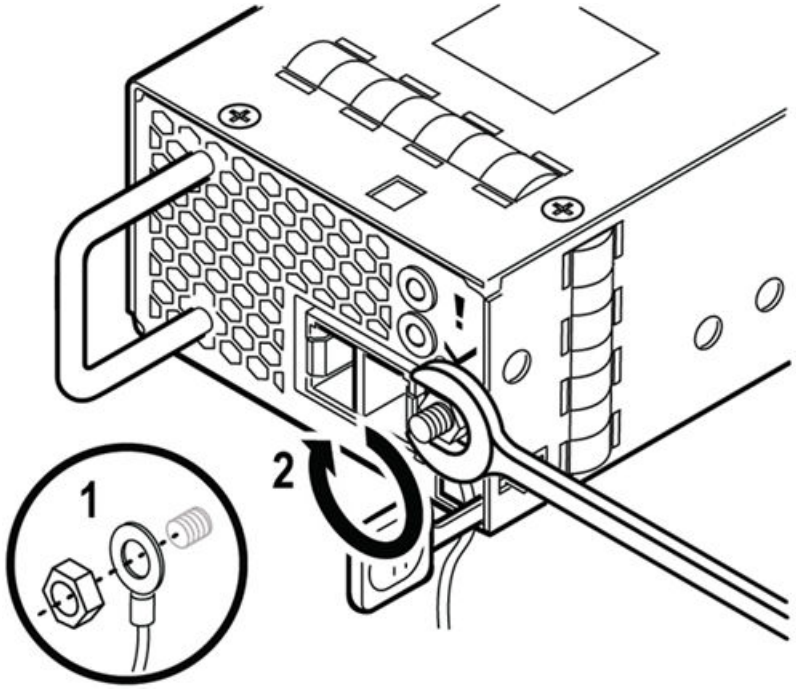


Figure 220: Securing the Ground Wire

   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.
5 Connect the power supply to the DC power source. See the instructions in Connecting the DC Power Cables on page 256.

Connecting the DC Power Cables

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 Connecting the Ground Wire on page 255.

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 221.

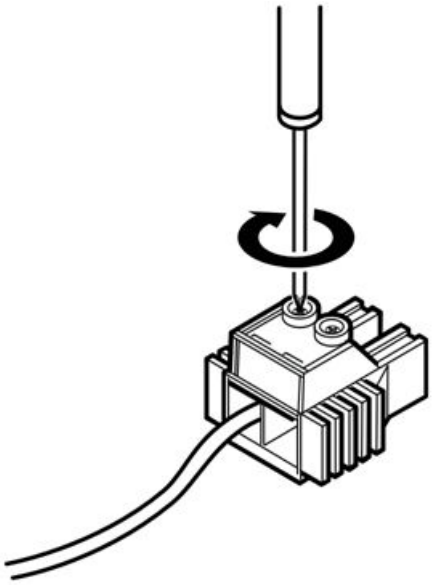


Figure 221: Inserting the DC Power Cables into the Connector

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 222.

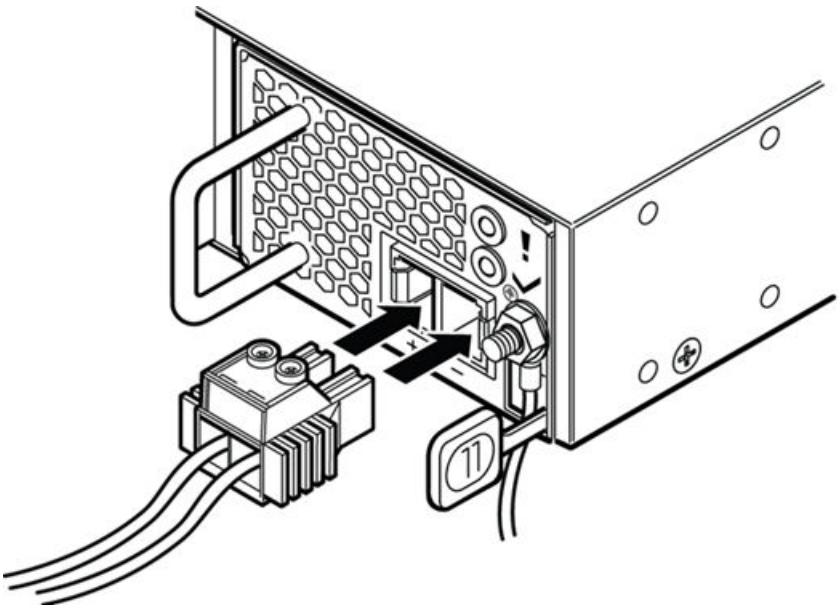


Figure 222: Inserting the Connector into the Power Supply

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.

11 Replacing Fan Modules

Pre-Installation Requirements
Airflow Direction Requirements
Replacing a Fan Module

This chapter describes how to replace fan modules in the following switches: X450-G2, X460-G2, X620 (16-port models), X670-G2, and X770.

Illustrations in this chapter show switches that might not be identical to the ones you are using. However, the procedure for replacing a fan module is the same for all ExtremeSwitching and Summit switches.



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 X450-G2, X460-G2, X620 (16-port models), X670-G2, and X770 switches are available in models with the following ventilation airflow direction:

Summit switches are available in models with the following ventilation airflow direction:

- 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.

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 223.

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.

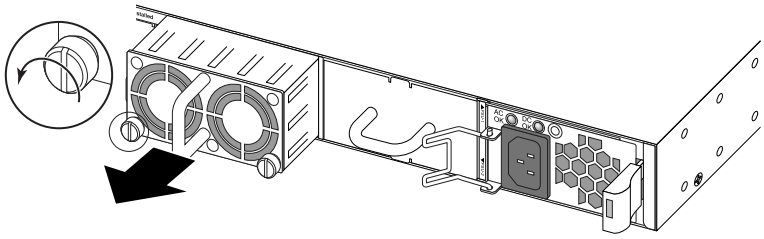


Figure 223: Removing a Fan Module

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.

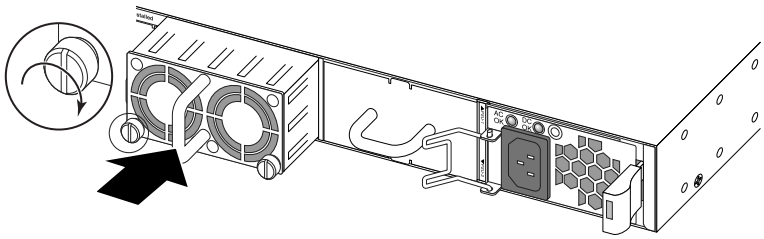


Figure 224: Installing a Fan Module

5 Align and fully tighten the captive retaining screws.

12 Replacing Port Option Cards and VIMs

Replacing a Versatile Interface Module or Clock Module in a Summit X460-G2 Series Switch

This chapter describes how to replace port option cards, versatile interface modules (VIMs), and stacking modules in a Summit series switch.

Replacing a Versatile Interface Module or Clock Module in a Summit X460-G2 Series Switch

This section describes how to replace versatile interface modules (VIMs) or a clock module in the rear slot of a Summit X460-G2 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
- #1 Phillips screwdriver (for clock module) or flat-bladed screwdriver (for all other VIM modules)



Caution
Summit 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 replacement 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 replace a versatile interface module 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 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 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.

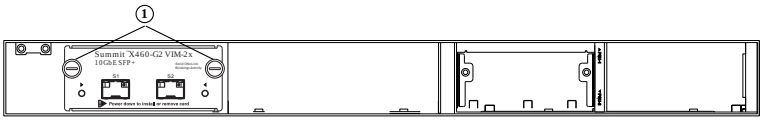


Figure 225: Tighten Screws on the Inserted VIM Module

1 = VIM module retaining screw locations

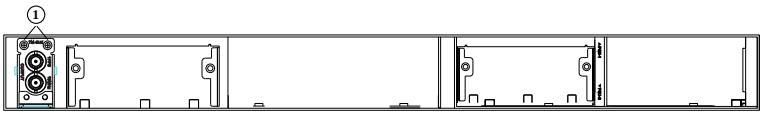


Figure 226: Tighten Screws on the Inserted Clock Module

1= clock module retaining screw locations

13 Removing ExtremeSwitching and Summit Switches

Removing an AC Power Supply
Removing a DC Power Supply
Removing a Switch from a Rack

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 263.
   - Disconnect and remove the switch's removable DC power supply. See Removing a DC Power Supply on page 264.
   - 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 265.



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.

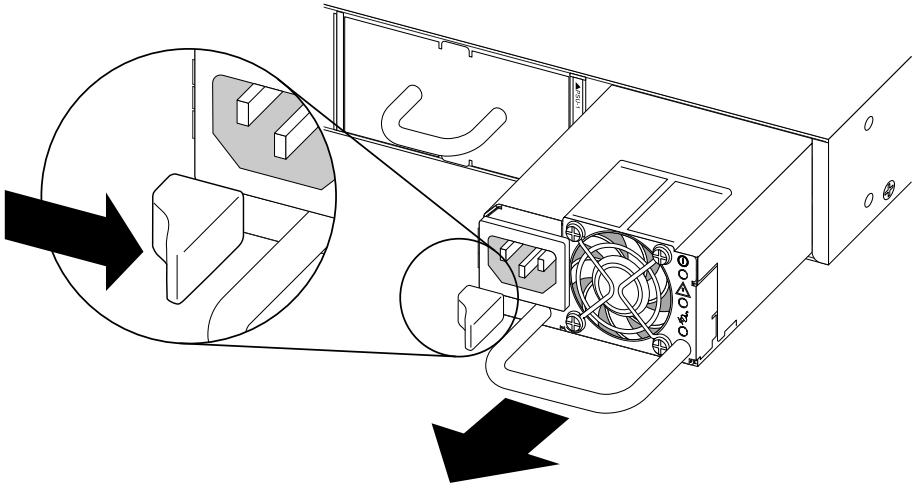


Figure 227: Removing an AC Power Supply

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.

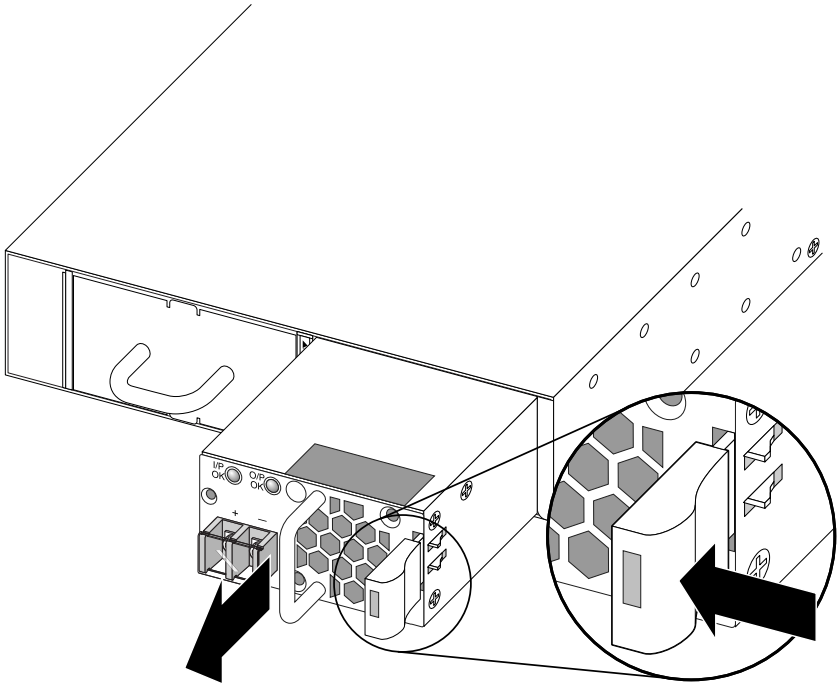


Figure 228: Removing a DC Power Supply

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 263 or Removing a DC Power Supply on page 264.
- 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.

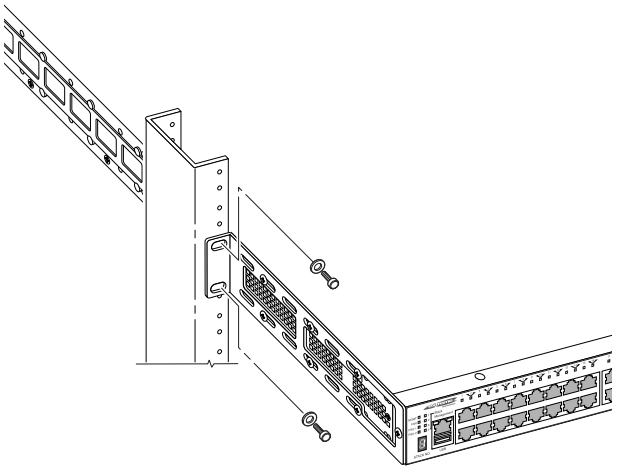


Figure 229: Removing a Front-Mounted Switch from a Two-Post Rack

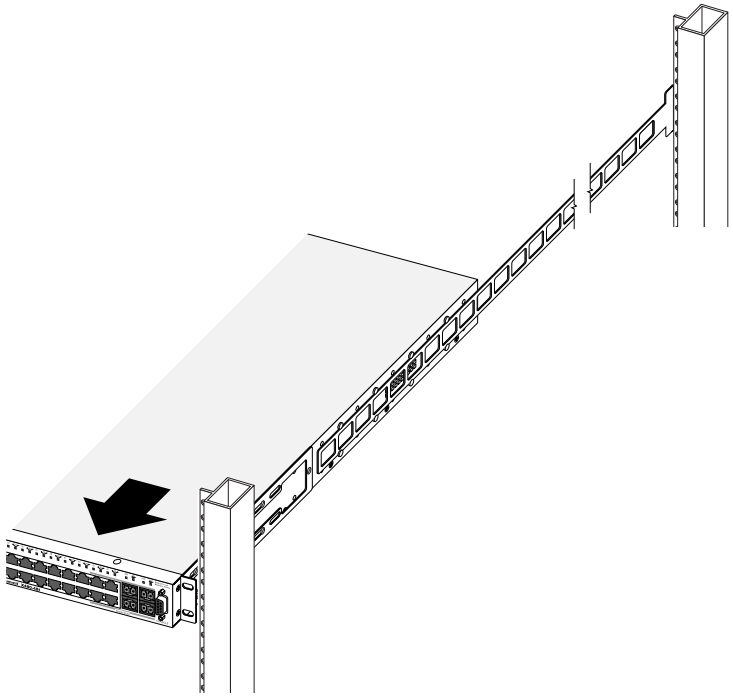


Figure 230: Removing the Switch from a Four-Post Rack

3 Place the switch on a secure, flat surface.
4 Using a #1 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.

A Safety Information

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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 in the USA, 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 (122ºF).
  - 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 *EMC (electromagnetic compatibility)* 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.

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 Technical Specifications on page 282 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, Extreme Networks strongly recommends that you 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

Extreme Networks does not include power input cords in the product box.

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 it is recommended that a transformer be used to step down the voltage to < 240 VAC from phase-phase, or that you 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 Replacement and Disposal

Batteries included with Extreme products are encapsulated and must be replaced only by qualified Extreme Service personnel.

Contact your Extreme Networks Service personnel for product replacement. Do not attempt to replace the battery. If these instructions are disregarded and replacement of these batteries is attempted, the following guidelines must be followed to avoid danger of explosion:

- Replace with the same or equivalent battery type as recommended by the battery manufacturer.
- Dispose of the battery in accordance with the battery manufacturer's recommendation.

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。

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 2004/108/EEC EMC Directive and the 2006/95/EC Low Voltage Directives
- UL and/or CSA registered component for North America
- 47 CFR Part 15, Class A when installed into Extreme products

Sicherheitshinweise

Warning



Lesen Sie die folgenden Sicherheitshinweise aufmerksam durch, ehe Sie Extreme Networks-Produkte installieren. Eine Missachtung dieser Sicherheitshinweise kann zu Verletzungen oder zu einer Beschädigung des/r Geräte/s führen.

Extreme Networks-Geräte und deren Komponenten dürfen nur durch geschulte und qualifizierte Wartungstechniker (wie in IEC 60950-1 und AS/NZS 3260 definiert) installiert, ausgetauscht oder gewartet werden. Dieses qualifizierte Personal muss den Inhalt aller zugehörigen Installationsanleitungen kennen sowie über die technische Ausbildung und Erfahrung verfügen, um die Gefahren, die mit der Ausführung einer Aufgabe assoziiert sind, zu kennen und zu wissen, wie sie diese Gefahren für sich selbst und Dritte minimieren können.

In den USA muss das System gemäß dem US National Electrical Code (NEC) installiert werden.

Überlegungen vor der Installation

Berücksichtigen Sie vor der Installation der Geräte folgende Punkte.

- Wählen Sie für Geräte, die in einer typischen Telekommunikationsumgebung mit kontrollierten Umweltbedingungen eingesetzt werden, einen Ort mit folgenden Merkmalen:
  - Temperatur und Feuchtigkeit werden kontrolliert, und die maximale Raumtemperatur liegt nicht über 40°C.
  - Sauber und frei von in der Luft enthaltenen Stoffen, die Elektrizität übertragen können.
  - Gut belüftet und fern von Wärmequellen inklusive direkter Sonneneinstrahlung.
  - Fern von Quellen für Erschütterungen oder mechanische Einwirkungen.
  - Getrennt von starken elektromagnetischen Feldern, die von elektrischen Geräten erzeugt werden.
- Bei Geräten, die nicht für eine Installation in Umgebungen mit kontrollieren Umweltbedingungen vorgesehen sind, wie z. B. Gehäuse im Freien, beachten Sie bitte das Produktdatenblatt oder Anhang B dieser Anleitung mit den Spezifikationen für Umgebungsbedingungen, Temperatur und Feuchtigkeit.
- Lassen Sie auf allen Seiten mindestens 3 Zoll Platz, um eine ausreichende Luftzirkulation zu gewährleisten. Die Lüftungsschlitze an der Vorder- oder Rückseite und an den Seiten dürfen nicht blockiert werden. Stellen Sie das System nicht in der Nähe von Wärmequellen auf.
- Versichern Sie sich, dass Ihre Geräte in einem Bereich aufgestellt werden, der für den Stromverbrauch und die damit verbundene Wärmestrahlung der Komponenten geeignet ist.
- Versichern Sie sich, dass Ihre Netzteile den Gleichstrom- bzw. Wechselstrombedarf aller Netzwerkgeräte decken können.
- Racks für Extreme Networks-Geräte müssen fest am Boden verankert werden. Bei nicht vorschriftsmäßiger Fixierung des Racks besteht die Gefahr, dass das Rack bei Wartungsarbeiten umkippt.
- Voraussetzung für den Betrieb des Systems ist die vollständige Anbringung aller Module, Blenden, Frontabdeckungen und rückseitigen Abdeckungen. Blenden und Abdeckplatten erfüllen folgende Funktionen:
  - Schutz vor gefährlich hohen Spannungen und Strömen im Inneren des Gerätes
  - Eindämmung von elektromagnetischen Interferenzen (EMI), die andere Geräte stören könnten
  - Vorgabe der Luftströmungsrichtung durch das Gerät
- Bei der Entsorgung des Gerätes sind alle nationalen Gesetze und Vorschriften zu beachten.

Allgemeine Sicherheitshinweise

Befolgen Sie die Richtlinien:

- Heben Sie keine Gegenstände, die zu schwer für Sie sind.
- Bei der Installation von Geräten in einem Rack platzieren Sie die schwereren Geräte in der unteren Hälfte, damit das Rack nicht kopflastig wird.
- Verwenden Sie nur Werkzeuge und Geräte, die sich in einem einwandfreien Zustand befinden. Werkzeuge, die sichtbar beschädigt sind, dürfen nicht benutzt werden.
- Achten Sie bei der Verlegung von Kabeln darauf, mögliche Beschädigungen der Kabel zu vermeiden und Risiken, z. B. Stolpergefahren, auszuschalten.
- Stellen Sie keinen Bildschirm oder anderen Gegenstände auf die Geräte. Die Chassisabdeckung ist keine Abstellfläche.

- Zum Schutz vor Selbstentzündung verwenden Sie nur Datenübertragungskabel der Größe 26 AWG oder größer. Verwenden Sie nur Kupferleiter.
- Arbeiten Sie während eines Gewitters nicht an dem System und stecken Sie keine Kabel an oder ab.
- Das Gerät muss geerdet werden. Der Schutzleiter darf nicht manipuliert oder umgangen werden und das Gerät darf auf keinen Fall ohne einen entsprechend installierten Schutzleiter betrieben werden.

Sicherheit bei Wartungsarbeiten

Befolgen Sie bei allen Wartungsarbeiten an Extreme Networks-Geräten folgende Empfehlungen:

- Verwenden Sie nur zugelassene Zubehörteile oder Komponenten, die für den Einsatz mit diesem System genehmigt sind. Eine Missachtung dieser Hinweise kann zu einer Beschädigung des/r Geräte/s führen und die einschlägigen Sicherheits- und EMV-Vorschriften verletzen.
- Das System enthält keinerlei Teile, die vom Benutzer zu warten sind. Versuchen Sie nicht, Chassis, Netzteil, Modul oder andere Komponenten eigenmächtig zu reparieren. Senden Sie im Falle einer Störung das defekte Teil zur Reparatur oder zum Austausch an Extreme Networks ein, sofern ein Extreme Networks-Vertreter nicht etwas anderes angibt.
- Um das System spannungslos zu machen, müssen Sie alle Netzkabel aus den Netzsteckdosen ziehen. Das Netzkabel ist der "Trennschalter" für die Netzspannungsquelle.
- Trennen Sie vor allen Arbeiten in der unmittelbaren Nähe von Netzteilen alle Netzkabel von der Spannungsquelle, sofern die produktspezifische Wartungsanleitung nicht etwas anderes angibt.
- Legen Sie für alle Arbeiten an optischen Geräten, Netzteilen oder sonstigen modularen Zubehörteilen ein geerdetes Massearmband an, um das Risiko einer Beschädigung des Gerätes durch elektrostatische Aufladung zu reduzieren. Schließen Sie das eine Ende des Armbands an einem geeigneten Erdungspunkt am Rack oder an einer ESD-Buchse am Chassis (sofern vorhanden) an. Lassen Sie das geerdete Massearmband am Rack oder am Chassis angeschlossen, damit Sie es jederzeit parat haben, wenn Sie mit Komponenten umgehen, die empfindlich gegenüber elektrostatischer Aufladung sind.
- Die Kabel sind spannungsfrei zu installieren. Verwenden Sie Kabelbinder oder sonstige Zugentlastungsvorrichtungen.

Kabelverlegung für LAN-Systeme

Extreme Networks-Geräte erfüllen die Anforderungen für Geräte für LAN-Systeme. LAN-Systeme sind für gebäudeinterne Installationen konzipiert, das heißt, die Kabel zwischen den einzelnen Einheiten müssen im gleichen Gebäude verlaufen, in dem auch die Geräte untergebracht. Hiervon ausgenommen sind nur die unten aufgeführten Bedingungen.

Laut dem US-amerikanischen National Electrical Code (NEC) darf diese Ausrüstung zwischen Gebäuden verbunden werden, sofern eine der folgenden Bedingungen erfüllt ist:

- Die Länge der zwischen Gebäuden verlegten Kabel beträgt höchsten 140 Fuß.
- Die Kabel sind zwischen den Gebäuden direkt erdverlegt.

- Die Kabel zwischen den Gebäuden sind in einem unterirdischen Kanal verlegt, wobei ein durchgehender metallischer Kabelschirm oder eine durchgehende Metallleitung, die das Kabel umschließt, an den Erdungselektrodensystemen der einzelnen Gebäude angeschlossen ist.



Caution

Eine Missachtung dieser Bedingungen für die Kabelverlegung kann Nutzer der Gefahr eines elektrischen Stromschlages aussetzen und das Gerät so beschädigen, dass es nicht mehr einwandfrei arbeitet.



Warning

Die Ethernet-Anschlüsse des Gerätes und der zugehörigen Baugruppen sind nur für gebäudeinterne (innerhalb ein und desselben Gebäudes) Verbindungen oder für Anschlüsse an nicht exponierte Verdrahtungen oder Verkabelungen geeignet (siehe die oben aufgeführten Bedingungen). Die Ethernet-Anschlüsse des Gerätes und der zugehörigen Baugruppen dürfen nicht mit Metallkontakt an Schnittstellen angeschlossen werden, die mit einer externen Anlage (Outside Plant, OSP) oder deren Verdrahtung verbunden sind. Ethernet-Schnittstellen sind nur für eine Verwendung als gebäudeinterne Schnittstellen konzipiert (sog. Ports vom Typ 2 oder Typ 4 gemäß GR-1089-CORE, Ausgabe 6) und müssen durch Isolierung von exponierter OSP-Verdrahtung getrennt werden. Primäre Protektoren sind kein ausreichender Schutz für den Anschluss dieser Schnittstellen über einen Metallkontakt mit OSP-Verdrahtung.

Diese Warnung gilt nicht für Ports vom Typ T1/E1, weil diese Ports über eine integrierte Isolierung und einen Schutz vor Spannungsspitzen verfügen, der den Anschluss an OSP-Verdrahtung gestattet.

Installation der Netzteile und Netzanschluss

Die Leistungsdaten und die Anforderung der einzelnen Netzteile an den Leistungseingang entnehmen Sie bitte Anhang B dieser Anleitung oder dem Datenblatt für die Netzversorgung unter www.extremenetworks.com.



Warning

Die in diesem Abschnitt aufgeführten Anforderungen müssen bei der Installation von Extreme Networks-Netzteilen und beim Netzanschluss unbedingt erfüllt werden.

Bei Installation eines Netzteils:

- Schieben Sie das Netzteil nicht mit Gewalt in den Einschub.
- Versuchen Sie nicht, das Gehäuse des Netzteils zu öffnen; das Netzteil enthält keinerlei Teile, die vom Nutzer zu warten sind. Senden Sie im Falle einer Störung das defekte Netzteil zur Reparatur oder zum Austausch an Extreme Networks ein.
- Fassen Sie nicht mit der Hand in einen offenen Netzteileinschub, wenn das Netzteil entfernt wurde.
- Legen Sie vor allen Arbeiten an einem an Leistungskabeln angeschlossenen Gerät sämtlichen Schmuck sowie Ihre Armbanduhr ab. Im Falle eines Kurzschlusses (Kontakt mit Leistung und Erde) erwärmen sich Metallgegenstände, was zu ernsthaften Verbrennungen führen oder den Metallgegenstand mit den Anschlüssen verschweißen kann.
- Legen Sie vor allen Arbeiten an einem an Leistungskabeln angeschlossenen Gerät sämtlichen Schmuck sowie Ihre Armbanduhr ab. Metallgegenstände erwärmen sich, wenn sie an Leistung und

an Erde angeschlossen werden, was zu ernsthaften Verbrennungen führen oder den Metallgegenstand mit den Anschlüssen verschweißen kann.

- Wenn das Netz bei angeschlossener Netzversorgung angeschlossen oder getrennt wird, kann ein elektrischer Lichtbogen entstehen. Dies kann bei Installationen in Gefahrenbereichen zu einer Explosion führen. Achten Sie unbedingt darauf, dass das Gerät nicht mit der Netzversorgung verbunden ist.
- Achten Sie bei der Installation oder beim Austausch von Geräten darauf, dass Sie zuerst den Erdungsanschluss herstellen bzw. den Erdungsanschluss zuletzt trennen.

Bei Installation von AC-Netzteilen:

- Schließen Sie bei Switches mit einem vor Ort austauschbaren Netzteil die Spannungsversorgung nicht an einer elektrischen Spannungsquelle an, wenn das Netzteil nicht im Switch eingebaut ist; andernfalls kann gefährliche Energie freigesetzt werden und es besteht potenzielle Stromschlag- und Brandgefahr.
- Stecken Sie Netzteile nur an vorschriftsmäßig geerdete Netzsteckdosen an, um die Gefahr eines elektrischen Stromschlages zu vermeiden und internationale Sicherheitsstandards zu erfüllen.
- Verwenden Sie nur Netzkabel, die in dem jeweiligen Einsatzland zugelassen sind. Versuchen Sie nicht, modifizierte AC-Netzkabel zu verwenden
- Versichern Sie sich, dass Spannung und Frequenz Ihrer Steckdose mit den elektrischen Daten Ihres Gerätes übereinstimmen. Das Gebäude und/oder die Spannungsquelle muss gegen Überlast geschützt sein.
- Verwenden Sie einen Überspannungsschutz, einen Netzfilter oder eine unterbrechungsfreie Spannungsversorgung, um das System plötzlichen Spannungsschwankungen zu schützen.
- Bei Systemen mit mehreren Netzteilen schließen Sie jedes Netzteil an einer anderen, unabhängigen Überstromschutzvorrichtung an, z. B. an einem Schütz. Bei Ausfall einer Spannungsquelle ist nur das daran angeschlossene Netzteil betroffen. Für die korrekte Auslegung des Schützes siehe das Datenblatt des Netzteils.
- AC-Netzteile von Extreme Networks haben keinen Ein-/Ausschalter. Trennen Sie alle Netzstecker von den elektrischen Steckdosen, um die Spannungsversorgung zu unterbrechen. Achten Sie auf gute Zugänglichkeit der Steckdosen.

Installation von DC-Netzteilen und Anschluss von Gleichspannung:

- Der Anschluss an die Gleichspannungsquelle Ihrer Einrichtung muss von einem qualifizierten, geprüften Elektriker vorgenommen werden.
- DC-Netzteile von Extreme Networks haben keinen Ein-/Ausschalter. Versichern Sie sich, dass der DC-Kreis spannungslos ist, ehe Sie das Gleichstromkabel an einer Gleichstromeingangsbuchse an- oder abstecken.
- Schließen Sie eine Gleichstromversorgung nicht an die DC-Quelle an, wenn das Netzteil nicht im Chassis eingebaut ist; andernfalls kann gefährliche Energie freigesetzt werden und es besteht potenzielle Stromschlag- und Brandgefahr.
- Schließen Sie das System oder das Netzteil nur an eine DC-Spannungsquelle an, die die Bestimmungen für Sicherheitskleinspannung (SELV) in den IEC 60950-basierten Sicherheitsstandards erfüllt.
- DC-Geräte müssen in einem zugangsbeschränkten Bereich installiert werden, damit gewährleistet ist, dass nur geschultes und qualifiziertes Wartungspersonal Zugang zu den Geräten hat. Ein

zugangsbeschränkter Bereich kann beispielsweise nur mithilfe eines Spezialwerkzeugs, Schloss und Schlüssel oder einer anderen Sicherheitsvorrichtung geöffnet werden.



Note
Da die Gebäudevorschriften in aller Welt unterschiedlich sind, empfiehlt Extreme Networks dringend, sich bezüglich der korrekten Erdung und Spannungsverteilung für Ihre Installation in Ihrem Land an einen Elektrofachbetrieb zu wenden.

Auswahl der Netzkabel

Im Lieferumfang von Extreme Networks-Produkten sind keine Netzkabel enthalten.

Ein für Ihr Produkt und Land passendes Netzkabel erhalten Sie entweder von Ihrem zuständigen Extreme Networks Channel Account Manager oder Sales Manager oder im örtlichen Fachhandel. Die Anforderungen an das Netzkabel entnehmen Sie Anhang B zu dieser Anleitung.

Hier finden Sie Ihren zuständigen Sales Manager oder Fachhändler: www.extremenetworks.com/partners/where-to-buy



Note
Dieses Gerät ist nicht für eine direkte Versorgung von einem Spannungsverteilungssystem vorgesehen, wo die Leiter-Leiter-Spannung den Wert von 240 VAC (2 Phasen+Schutzerde), wie zum Beispiel in Norwegen, Frankreich und anderen Ländern. Für derartige Anwendungen wird ein Transformator empfohlen, um die Spannung auf einen Wert unter < 240 VAC (Leiter-Leiter) herunterzutransformieren oder ein Anschluss an eine (P+N+Schutzerde) Spannungsverteilung, wo die Spannung 240 VAC nicht überschreitet.

Alle Installationen müssen eine zuverlässige Erdung gemäß den nationalen Elektrovorschriften vorsehen.

Wechseln und Entsorgen der Batterie

Die Batterien in Extreme Produkten sind gekapselt und dürfen nur durch qualifiziertes Extreme-Wartungspersonal ausgewechselt werden.

Wenden Sie sich für den Austausch eines Produktes an das Wartungspersonal von Extreme Networks. Versuchen Sie nicht, die Batterie selbst auszuwechseln. Bei einer Missachtung dieser Anweisungen und dem Versuch, die Batterien eigenmächtig zu wechseln, müssen folgende Richtlinien eingehalten werden, um eine mögliche Explosion zu vermeiden:

- Tauschen Sie die Batterie nur gegen eine Batterie des gleichen Typs (wie vom Hersteller empfohlen)aus.
- Entsorgen Sie die Batterie gemäß den Empfehlungen des Batterieherstellers.

LWL-Ports und optische Sicherheit

Folgende Sicherheitswarnung gilt für alle optischen Geräte, die in Extreme Networks-Geräten eingesetzt werden und entweder herausnehmbar sind oder direkt in einem E/A-Modul oder im Chassissystem eingebaut sind.

Solche Geräte sind nicht nur Gigabit-Interface-Konverter (GBICs), steckbare Kleinformfaktormodule (SFP) (oder Mini-GBICs), QSFP+ Module, XENPAK Sendeempfänger und laseroptische XFP-Module.

Warning



Laseroptische Module können bei längerem Gebrauch sehr heiß werden. Seien Sie beim Ausbau eines laseroptischen Moduls aus dem Modul oder der Optionskarte äußerst vorsichtig. Wenn das laseroptische Modul zum Anfassen zu heiß ist, trennen Sie das laseroptische Modul und lassen Sie es abkühlen, ehe Sie es komplett ausbauen.

Ergreifen Sie beim Arbeiten mit laseroptischen Modulen die nachfolgenden Vorsichtsmaßnahmen, um eine Aussetzung gegenüber gefährlicher Strahlung zu vermeiden.

- Blicken Sie auf keinen Fall durch ein Vergrößerungsglas in die Sendediode/den Laser, solange die Sendediode aktiv ist.
- Blicken Sie auf keinen Fall in den LWL-Port am Switch oder auf die Stirnflächen eines aktiven LWL-Kabels.
- Bei offenen Anschlüssen kann unsichtbare Laserstrahlung abgegeben werden. Vermeiden Sie eine direkte Aussetzung der Augen gegenüber dem Strahl, wenn die optischen Anschlüsse offen (ohne Stecker) sind.
- Optische Geräte dürfen auf keine andere Weise als in diesem Dokument empfohlen verändert, modifiziert oder umgebaut werden.

Konformität von GBIC, SFP (Mini-GBIC), QSFP+, XENPAK und XFP

Steckbare optische Module von Extreme Networks und direkt angeschlossene Kabel erfüllen folgende gesetzliche Vorschriften:

- Laserprodukt der Klasse 1 oder Klasse 1M
- EN60825-1:2007 2. Ausgabe oder später, Europäische Norm
- FCC 21 CFR Kapitel 1, Paragraph J in Übereinstimmung mit FDA- und CDRH-Bestimmungen
- Anwendung des CE-Zeichens gemäß der EMV-Richtlinie 2004/108/EEC und der Niederspannungsrichtlinie 2006/95/EC
- UL und/oder CSA-geprüfte Komponente für Nordamerika
- 47 CFR Teil 15, Klasse A bei Einbau in Extreme-Produkte

Mögliche Netzanschlussgerät- und Lüftereinsatz-Konfigurationen für X770-32q

Table 74: Mögliche Netzanschlussgerät- und Lüftereinsatz-Konfigurationen für X770-32q

Konfiguration Nr.	Anzahl d. Netzanschlussgeräte	Artikelnummer d. Netzanschlussgeräts	Beschreibung d. Spannungsversorgung	Anzahl d. Lüftereinsätze	Artikelnummer Lüftereinsatz	Beschreibung Lüftereinsatz
1	1	10927z	Netzanschlussgerät Summit 550 W AC Luftstrom von hinten nach vorne (DS550HE-3)	5	17112z	Lüftermodul Summit X670 Luftstrom von hinten nach vorne (JDD0405612UB3A01)
2	1	10925z	Netzanschlussgerät Summit 550 W AC Luftstrom von vorne nach hinten (DS550HE-3)	5	17111z	Lüftermodul X670 Luftstrom von vorne nach hinten (AS04012UB565300)
3	2	10927z	Netzanschlussgerät Summit 550 W AC Luftstrom von hinten nach vorne (DS550HE-3)	5	17112z	Lüftermodul Summit X670 Luftstrom von hinten nach vorne (JDD0405612UB3A01)
4	2	10925z	Netzanschlussgerät Summit 550 W AC Luftstrom von vorne nach hinten (DS550HE-3)	5	17111z	Lüftermodul X670 Luftstrom von vorne nach hinten (AS04012UB565300)
5	1	10928z	Netzanschlussgerät Summit 550 W DC Luftstrom von hinten nach vorne (DS550DC-3-003)	5	17112z	Lüftermodul Summit X670 Luftstrom von hinten nach vorne (JDD0405612UB3A01)
6	1	10926z	Netzanschlussgerät Summit 550 W DC Luftstrom von vorne nach hinten (DS550DC-3)	5	17111z	Lüftermodul X670 Luftstrom von vorne nach hinten (AS04012UB565300)
7	2	10928z	Netzanschlussgerät Summit 550 W DC Luftstrom von hinten nach vorne (DS550DC-3-003)	5	17112z	Lüftermodul Summit X670 Luftstrom von hinten nach vorne (JDD0405612UB3A01)
8	2	10926z	Netzanschlussgerät Summit 550 W DC Luftstrom von vorne nach hinten (DS550DC-3)	5	17111z	Lüftermodul X670 Luftstrom von vorne nach hinten (AS04012UB565300)

Table 74: Mögliche Netzanschlussgerät- und Lüftereinsatz-Konfigurationen für X770-32q (continued)

Konfiguration Nr.	Anzahl d. Netzanschlussgeräte	Artikelnummer d. Netzanschlussgeräts	Beschreibung d. Spannungsversorgung	Anzahl d. Lüftereinsätze	Artikelnummer Lüftereinsatz	Beschreibung Lüftereinsatz
9	1	10927z	Netzanschlussgerät Summit 550 W AC PSU Luftstrom von hinten nach vorne (DS550HE-3)	5	17112z	Lüftermodul Summit X670 Luftstrom von hinten nach vorne (JDD0405612UB3A01)
	1	10928z	Netzanschlussgerät Summit 550 W DC Luftstrom von hinten nach vorne (DS550DC-3-003)			
10	1	10925z	Netzanschlussgerät Summit 550 W AC Luftstrom von vorne nach hinten (DS550HE-3)	5	17111z	Lüftermodul X670 Luftstrom von vorne nach hinten (AS04012UB565300)
	1	10926z	Netzanschlussgerät Summit 550 W DC Luftstrom von vorne nach hinten (DS550DC-3)			

B Technical Specifications

ExtremeSwitching X440-G2 Series Switches Technical Specifications
Summit X450-G2 Series Switches Technical Specifications
ExtremeSwitching and Summit X460-G2 Series Switches Technical Specifications
ExtremeSwitching X620 Series Switches Technical Specifications
Summit X670-G2 Series Switches Technical Specifications
ExtremeSwitching X690 Series Switches Technical Specifications
Summit X770 Series Switches Technical Specifications
ExtremeSwitching X870 Series Switches Technical Specifications
Summit 300 W Power Supplies Technical Specifications
Summit 350 W Power Supplies Technical Specifications
Summit 550 W Power Supplies Technical Specifications
Summit 715 W Power Supplies Technical Specifications
Summit 750 W Power Supplies Technical Specifications
Summit 770 W Power Supplies Technical Specifications
Summit 1100 W Power Supplies Technical Specifications
EPS-C2 Redundant Power Supply Technical Specifications
RPS-90 Redundant Power Supply Technical Specifications
STK-RPS-150PS and RPS Shelves Technical Specifications
RPS-150XT Redundant Power Supply Technical Specifications
RPS-500p Redundant Power Supply Technical Specifications
STK-RPS-1005PS Redundant Power Supply Technical Specifications
Power Cord Requirements for AC-Powered Switches and AC Power Supplies
Console Connector Pinouts
Taiwan Warnings
Japan (VCCI Class A)
Korea EMC Statement



Note
In this section, all references to specific switch model numbers also apply to the equivalent TAA-compliant switch versions.

ExtremeSwitching X440-G2 Series Switches Technical Specifications

The ExtremeSwitching X440-G2 series includes the following switches:

- 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

Physical Dimensions

Table 75: Physical Dimensions

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

Table 76: 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)

Packaged Dimensions (Packaged)

Table 77: 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 78: 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

[4] At 25°C and 50% PoE load where applicable

Table 79: Fan and Acoustic Sound

	Bystander Sound Pressure[4] in dB(A)	Declared Sound Power (L_{WAd})[4] 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 80: Power Specifications

	Minimum[5] Heat Dissipation (BTU/hr)	Minimum[5] Power Consumption (Watts)	Maximum[5] Heat Dissipation (BTU/hr)	Maximum[5] 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 (@ 200W PoE)	264
X440-G2-24p-10GE4	121	35	410 (@ 380W PoE)	500
X440-G2-48p-10GE4	196	57	755 (@ 740W PoE)	961
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

[5] Minimum is defined as idle, with no ports linked. Maximum is defined as fans high, all ports 100% traffic.

Table 80: Power Specifications (continued)

	Minimum[5] Heat Dissipation (BTU/hr)	Minimum[5] Power Consumption (Watts)	Maximum[5] Heat Dissipation (BTU/hr)	Maximum[5] Power Consumption (Watts)
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 81: Power Specifications: Fixed Internal Power Supply

Voltage input range	100-240 VAC[6]
Line frequency range	47 to 63 Hz
Power supply input socket	IEC 320 C14
Power cord input plug	IEC 320 C13
Operating temperature	0° to 60°C (extended temperature switches[7]) 0° to 50°C (all other switches)

PoE + Power Budget

Table 82: 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.

[6] The power supplies will continue to operate at +/- 10% of the rated input to accommodate temporary loss of input voltage regulation.

[7] The extended temperature switches are the X440-G2-24fx-GE4, X440-G2-12t8fx-GE4, and X440-G2-24t-GE4.

CPU, Memory

Table 83: 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 84: 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 85: 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) 2006/95/EC Low Voltage Directive
International ITE	CB Report & Certificate per IEC 60950-1 2nd Ed. + National Differences AS/NZX 60950-1 (Australia /New Zealand)

Table 86: 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) 2004/108/EC 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)

Table 87: Telecom Standards

CE 2.0 Compliant

Table 88: 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

Summit X450-G2 Series Switches Technical Specifications

The Summit X450-G2 series includes the following switches:

- Summit X450-G2-24t-GE4
- Summit X450-G2-24t-10GE4
- Summit X450-G2-48t-GE4
- Summit X450-G2-48t-10GE4
- Summit X450-G2-24p-GE4

- Summit X450-G2-24p-10GE4
- Summit X450-G2-48p-GE4
- Summit X450-G2-48p-10GE4

Table 89: 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 90: 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 91: 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 92: 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)
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 93: Fan and Acoustic Noise

Switch Model	Bystander Sound Pressure[8]	Declared Sound Power[9]
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 (Power over Ethernet)* 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.

Table 94: 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)	

[8] Sound pressure is presented for comparison per ISO 7779
[9] Declared Sound Power is presented in accordance with ISO 7779, ISO 9296 per ETSI/EN 300 753

Power Options

Table 95: 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 96: 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
X450-G2-24p-GE4 X450-G2-24p-10GE4	214.3 BTU/hr	62.8 W	604.7 BTU/hr	127.2 W
X450-G2-48p-GE4 X450-G2-48p-10GE4	238.8 BTU/hr	70.0 W	778 BTU/hr	228 W

Table 97: 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

Table 97: X450-G2 PoE Power Budget (continued)

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-G2-48p-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 98: CPU, Memory

CPU/Memory
1GHz 64-bit CPU
1GB DDR3 ECC DRAM
4GB eMMC Flash Memory
4 MB packet buffer per chip

Standards and Environmental Data

Table 99: 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 100: 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 100: 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 101: 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 102: 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 103: 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 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 and Summit X460-G2 Series Switches Technical Specifications

The ExtremeSwitching and Summit X460-G2 series includes the following switches:

- ExtremeSwitching X460-G2-24t-24ht-10GE4 switch
- ExtremeSwitching X460-G2-24p-24hp-10GE4 switch
- ExtremeSwitching X460-G2-16mp-32p-10GE4 switch
- Summit X460-G2-24t-GE4 switch
- Summit X460-G2-24t-10GE4 switch
- Summit X460-G2-24x-10GE4 switch
- Summit X460-G2-24p-GE4 switch
- Summit X460-G2-24p-10GE4 switch
- Summit X460-G2-48t-GE4 switch
- Summit X460-G2-48t-10GE4 switch
- Summit X460-G2-48x-10GE4 switch
- Summit X460-G2-48p-GE4 switch
- Summit X460-G2-48p-10GE4 switch

Table 104: 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 105: 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 106: 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 X460-G2-24p-10GE4 X460-G2-48p-GE4 X460-G2-48p-10GE4 X460-G2-24p-24hp-10GE4 X460-G2-16mp-32p-10GE4	Height: 6.70 inches (17.0 cm) Width: 22.85 inches (58.0 cm) Length: 24.03 inches (61.0 cm)

Table 107: 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 108: VIM and Clock Module Weights and Dimensions

VIM/Module	Weight	Dimensions
Summit 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)
Summit 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)
Summit 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)
Summit 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)
Summit 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 109: Fan and Acoustic Noise

Switch Model	Bystander Sound Pressure[10]	Declared Sound Power (L_{WAd})[11]
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
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

[10] Bystander Sound pressure is presented for comparison to other products measured using Bystander Sound Pressure.
[11] Declared Sound Power is presented in accordance with ISO 7779:2010(E), ISO 9296:2010 per ETSI/EN 300 753:2012-01.

Table 109: Fan and Acoustic Noise (continued)

Switch Model	Bystander Sound Pressure[10]	Declared Sound Power (L_{WAd})[11]
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.		

Table 110: 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)	

[10] Bystander Sound pressure is presented for comparison to other products measured using Bystander Sound Pressure.
[11] 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 111: Summit 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
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

Table 111: Summit X460-G2 Power Supply Options (continued)

Switch Model	Power Supply
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 112: 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	427 BTU/hr	125 W
X460-G2-24p-GE4	250 BTU/hr	73 W	761 BTU/hr	223 W
X460-G2-24p-10GE4	260 BTU/hr	76 W	761 BTU/hr	223 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	427 BTU/hr	125 W
X460-G2-48p-GE4	284 BTU/hr	83 W	1116 BTU/hr	327 W
X460-G2-48p-10GE4	287 BTU/hr	84 W	1116 BTU/hr	327 W
X460-G2-24p-24hp-10GE4	287 BTU/hr	84 W	1116 BTU/hr	327 W
X460-G2-16mp-32p-10GE4	287 BTU/hr	84 W	1116 BTU/hr	327 W

Table 113: 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
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 114: CPU, Memory

CPU/Memory
1GHz 64-bit CPU
1GB DDR3 ECC SDRA
4GB eMMC Flash Memory
4 MB packet buffer per chip

Standards and Environmental Data

Table 115: 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 116: 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
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 117: 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 118: 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 119: 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 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 X620 Series Switches Technical Specifications

The ExtremeSwitching X620 series includes the following switches:

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

Physical Dimensions

Table 120: 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)
X620-16p	Height: 1.73 inches (4.4 cm) Width: 17.38 inches (44.1 cm) Depth: 16.98 inches (43.1 cm)

Weight

Table 121: 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)
X620-16p	11.90 lb (5.40 kg)

Packaged Dimensions

Table 122: 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 X620-16p	Height: 6.66 inches (16.9 cm) Width: 21.63 inches (54.9 cm) Depth: 22.93 inches (58.2 cm)

Packaged Weight

Table 123: 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)
X620-16p	17.68 lb (8.02 kg)

Fan Speed

Table 124: 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
X620-16p	Continuously variable speed as needed

Acoustic Sound

Table 125: 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)
X620-16p no *PoE* configured (front-back airflow)	47.3 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)
X620-16p PoE configured (front-back airflow)	50.5 db(A) up to 35°C (50% PoE power) 67.1 db(A) at 50°C (100% PoE power)	6.5 bels up to 35°C (50% PoE power) 8.2 bels at 50°C (100% PoE power)

Power Specifications

[12] Minimum is defined as idle, with no ports linked. Maximum is defined as fans high, all ports 100% traffic.

Table 126: Power Specifications

	Minimum [12] Heat Dissipation (BTU/hr)	Minimum [12] Power Consumption (Watts)	Maximum [12] Heat Dissipation (BTU/hr)	Maximum [12] Power Consumption (Watts)
X620-8t-2x	74	22	177	52
X620-10x	60	18	123	36
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
X620-16p no PoE	208	61	328	114
X620-16p 720 W PoE	501	867	684	920

Power Supplies

Table 127: 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	
X620-16p	Modular 750 W PoE AC power supply (up to two PSU)

Table 128: Power Supply Specifications

	Fixed Internal PSU X620-8t-2x/X620-10x	300 W AC PSU 10930A/10943 X620-16t/X620-16x	300 W DC PSU 10933/10944 X620-16t/X620-16x	750 W AC PSU 10931 X620-16p
Dimensions	W: 3.09 in (7.8 cm) D: 10.9 in (27.7 cm) H: 1.06 in (2.7 cm)			W: 3.15 in (8.0 cm) D: 9.5 in (24.1 cm) H: 1.57 in (4.0 cm)
Voltage Input Range	85 to 264 VAC	85 to 264 VAC	-40 to -72 VDC	85 to 264 VAC
Line Frequency Range	47 - 63 Hz	47 - 63 Hz	NA	47 - 63 Hz

Table 128: Power Supply Specifications (continued)

	Fixed Internal PSU X620-8t-2x/X620-10x	300 W AC PSU 10930A/10943 X620-16t/X620-16x	300 W DC PSU 10933/10944 X620-16t/X620-16x	750 W AC PSU 10931 X620-16p
PSU Input Socket	IEC 320 C14	IEC 320 C14	Terminal block	IEC 320 C14
Power Cord Input Plug	IEC 320 C13	IEC 320 C13	NA	IEC 320 C13
Operating Conditions	0°C - 50°C operation			

CPU, Memory

Table 129: CPU, Memory

CPU/Memory
1 GHz CPU
1 GB DDR3 ECC memory
4 GB eMMC Flash memory

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 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 131: 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 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 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 133: Telecom Standards

CE 2.0 compliant

IEEE 802.3 Media Access Standards

Table 134: IEEE 802.3 Media Access Standards

IEEE 802.3ab 1000BASE-T IEEE 802.3z 1000BASE-X IEEE 802.3ae 10GBASE-X IEEE 802.3bz 2.5GBASE-T and 5GBASE-T (for X620-16p) 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 135: 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 136: X670-G2 Unpackaged Weight

X670-G2-48x-4q	14.7 lb (6.7 kg)
X670-G2-72x	15.42 lb (7.0 kg)

Table 137: 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 138: X670-G2 Packaged Weight

X670-G2-48x-4q	20.1 lb (9.1 kg)
X670-G2-72x	20.7 lb (9.4 kg)

Table 139: Fan and Acoustic Noise

Switch Model	Bystander Sound Pressure[13]	Declared Sound Power (L_{WAd})[14]
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

Power Options

Table 140: 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

[13] Bystander Sound pressure is presented for comparison to other products measured using Bystander Sound Pressure.
[14] Declared Sound Power is presented in accordance with ISO 7779:2010(E), ISO 9296:2010 per ETSI/EN 300 753:2012-01.

Table 140: Summit X670-G2 Power Options (continued)

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 141: 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 142: CPU, Memory

CPU/Memory
1GHz 64-bit CPU
2GB DDR3 ECC SDRA memory
4GB eMMC Flash Memory
12 MB buffer, per chip

Standards and Environmental Data

Table 143: 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 144: 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
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 145: 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 146: 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 147: 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) 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 148: 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 149: X690 Unpackaged Weight

X690-48t-2q-4c	15.65 lb (7.1 kg)
X690-48x-2q-4c	14.88 lb (6.8 kg)

Table 150: 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 151: 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 152: 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 153: 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 154: 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

CPU, Memory

CPU/Memory
1GHz 64-bit CPU
2GB DDR3 ECC SDRA memory
4GB eMMC Flash Memory
12 MB buffer, per chip

Standards and Environmental Data

Table 155: 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 156: 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 156: 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 157: 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 158: 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 159: 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) 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)

Summit X770 Series Switches Technical Specifications

The Summit X770 series includes the following switch:

- Summit X770-32q switch

Table 160: Physical Dimensions

Summit X770-32q switch	Height: 1.73 inches (4.4 cm) Width: 17.6 inches (44.8 cm) Depth: 20.4 inches (51.9 cm) including the PSU and installed fan modules.

Table 161: Weight

Summit X770-32q switch[15]	18.0 lb (8.2 kg)
Summit X770 fan module	0.36 lb (0.16 kg)
550 W AC PSU	2.75 lb (1.2 kg)
550 W DC PSU	2.50 lb (1.1 kg)

Table 162: Packaged Dimensions

Summit X770-32q switch	Height: 6.5 inches (16.5 cm)
	Width: 23.4 inches (59.3 cm)
	Depth: 26.2 inches (66.5 cm)

Table 163: Packaged Weight

Summit X770-32q switch	23.2 lb (10.5 kg)
Summit X770 fan module	0.50 lb (0.20 kg)

Table 164: Fan Speed

Minimum speed	4500 RPM
Maximum speed	18000 RPM

Power: Summit X770-32q

Table 165: Summit X770-32q: Power for Each of the Two Installed AC Power Supplies

Nominal input ratings	100 to 240 V~, 50/60 Hz, 2.5 A
Input current	2.25 A @ 100 V~ (low-line) 0.9 A @ 240 V~ (high-line)

[15] Switch weights include installed fan module. They do not include power supplies.

Table 165: Summit X770-32q: Power for Each of the Two Installed AC Power Supplies (continued)

Heat dissipation	225 W, 768 BTU/hr
Power consumption	225 W, 768 BTU/hr

Table 166: Summit X770-32q: Power for Each of the Two Installed DC Power Supplies

Nominal input ratings	48 to 60 V⎓, 5.0 A
Input current	4.25 A @ 48 V⎓ (low-line) 3.35 A @ 60 V⎓ (high-line)
Heat dissipation	210 W, 717 BTU/hr
Power consumption	210 W, 717 BTU/hr

Summit X770 Power Supply Unit (PSU) and Fan Tray Configurations

Table 167: X770-32q PSU and Fan Tray Configurations

Configuration No.	Quantity PSU	PSU Part No.	Power Supply Description	Quantity Fan Tray	Fan Tray Part No.	Fan Tray Description
1	1	10927z	Summit 550 W AC PSU Back to Front airflow (DS550HE-3)	5	17112z	Summit X670 fan module Back to Front airflow (JDD0405612UB3A01)
2	1	10925z	Summit 550 W AC PSU Front to Back airflow (DS550HE-3)	5	17111z	Summit X670 fan module Front to Back airflow (AS04012UB565300)
3	2	10927z	Summit 550 W AC PSU Back to Front airflow (DS550HE-3)	5	17112z	Summit X670 fan module Back to Front airflow (JDD0405612UB3A01)
4	2	10925z	Summit 550 W AC PSU Front to Back airflow (DS550HE-3)	5	17111z	Summit X670 fan module Front to Back airflow (AS04012UB565300)
5	1	10928z	Summit 550 W DC PSU Back to Front airflow (DS550DC-3-003)	5	17112z	Summit X670 fan module Back to Front airflow (JDD0405612UB3A01)
6	1	10926z	Summit 550 W DC PSU Front to Back airflow (DS550DC-3)	5	17111z	Summit X670 fan module Front to Back airflow (AS04012UB565300)
7	2	10928z	Summit 550 W DC PSU Back to Front airflow (DS550DC-3-003)	5	17112z	Summit X670 fan module Back to Front airflow (JDD0405612UB3A01)

Table 167: X770-32q PSU and Fan Tray Configurations (continued)

Configuration No.	Quantity PSU	PSU Part No.	Power Supply Description	Quantity Fan Tray	Fan Tray Part No.	Fan Tray Description
8	2	10926z	Summit 550 W DC PSU Front to Back airflow (DS550DC-3)	5	17111z	Summit X670 fan module Front to Back airflow (AS04012UB565300)
9	1	10927z	Summit 550 W AC PSU Back to Front airflow (DS550HE-3)	5	17112z	Summit X670 fan module Back to Front airflow (JDD0405612UB3A01)
	1	10928z	Summit 550 W DC PSU Back to Front airflow (DS550DC-3-003)			
10	1	10925z	Summit 550 W AC PSU Front to Back airflow (DS550HE-3)	5	17111z	Summit X670 fan module Front to Back airflow (AS04012UB565300)
	1	10926z	Summit 550 W DC PSU Front to Back airflow (DS550DC-3			

CPU, Memory

Table 168: CPU, Memory

1GHz CPU
1GB memory
12 MB packet buffer, per chip

Standards and Environmental Data

Table 169: 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 170: 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
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 171: 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 172: 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 173: 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) 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

Table 173: Environmental Data (continued)

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)
Acoustic noise	Summit X770-32q: 56.6 dB(A) min

ExtremeSwitching X870 Series Switches Technical Specifications

The ExtremeSwitching X870 series includes the following switches:

- X870-32c
- X870-96x-8c

Table 174: 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 175: X870 Unpackaged Weight

X870-32c X870-96x-8c	15.21 lb (6.9 kg)

Table 176: 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 177: X870 Packaged Weight

X870-32c X870-96x-8c	20.33 lb (9.2 kg)

Fan and Acoustic Noise

Table 178: 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 179: 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 180: 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
1GHz 64-bit CPU
2GB DDR3 ECC SDRA memory
4GB eMMC Flash Memory
12 MB buffer, per chip

Standards and Environmental Data

Table 181: 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 182: 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
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 183: 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 184: 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 185: 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) 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)

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 Summit X460-G2 series switches (non-*PoE* models).

Summit 300 W AC Power Supply (Model 10930A and 10943)

Table 186: 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 187: 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
Power cord wall plug	Refer to Power Cord Requirements for AC-Powered Switches and AC Power Supplies on page 340.
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 188: 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 189: 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 190: Power Specifications

Nominal Input	–40 to –72 V, 9 A
DC Voltage Input Range	18V to -72V⎓

Table 190: Power Specifications (continued)

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
DC Output	12 V⎓, 25 A/3.3 V⎓, 3.0 A
DC Output Power (W)	300 W

Table 191: 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 Summit X460-G2 series *PoE* switches:

- Summit 350 W AC power supply: front-to-back airflow (part no. 10953)
- Summit 350 W AC power supply: back-to-front airflow (part no. 10954)

Summit 350 W AC Power Supply (10953, 10954)

Table 192: 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 193: 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 193: Power Specifications (continued)

Power cord wall plug	Refer to Power Cord Requirements for AC-Powered Switches and AC Power Supplies on page 340.
Efficiency	Minimum efficiency: 88% at maximum power output.

Table 194: 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 Summit X670-G2 and X770 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 195: 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 196: 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
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 340.

Table 196: AC Power Specifications (Models 10925 and 10927) (continued)

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 197: 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 198: 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 no. 10951)
- Summit 715 W AC power supply: back-to-front airflow (part no. 10952)

Model 10951 (front-to-back airflow) is also compatible with the Summit X450-G2 *PoE* switch models.

Table 199: 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 200: 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 340.
Efficiency	Minimum efficiency: 88% at maximum power output.

Table 201: 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 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 also used in the EPS-C2 external power system.

Table 202: 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 203: Power Specifications

Voltage input range	85 to 264 V ~
Nominal input ratings	100 to 240 V ~ , 50 to 60 Hz, 10 A

Table 203: Power Specifications (continued)

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 340.
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 204: 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)

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 205: 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 206: 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

Table 206: Power Specifications (continued)

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 340.
Efficiency	Minimum efficiency: 88% at maximum power output.

Table 207: 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 no. 10941)
- Summit 1100 W AC power supply: back-to-front airflow (part no. 10942)

Model 10941 (front-to-back airflow) is also compatible with the Summit X450-G2 *PoE* switch models.

See Summit 1100 W AC Power Supplies (10941, 10942) on page 332 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 332 for details.

Summit 1100 W AC Power Supplies (10941, 10942)

Table 208: 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 209: 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 340.
Efficiency	Minimum efficiency: 88% at maximum power output.

Table 210: 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 211: 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 212: 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).

Table 212: Power Specifications (continued)

DC Output	12 V, 45 A/3.3V, 3A
DC Output Power (W)	1100 W

Table 213: 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)

EPS-C2 Redundant Power Supply Technical Specifications

The following tables list the specifications for the EPS-C2 redundant power supply unit (model 10936).

Table 214: Physical Specifications

Dimensions	4.4 H x 44.1 W x 38.4 D (cm) 17.4 H x 15.1 W x 13.4 D (in.)
Weight (unit only)	1.03 kg (2.27 lb)

Table 215: 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 216: 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 217: 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%

STK-RPS-150PS and RPS Shelves Technical Specifications

The Extreme Networks STK-RPS-150PS is a hot-swappable 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 218: 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 219: 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 220: 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 221: 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 222: 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

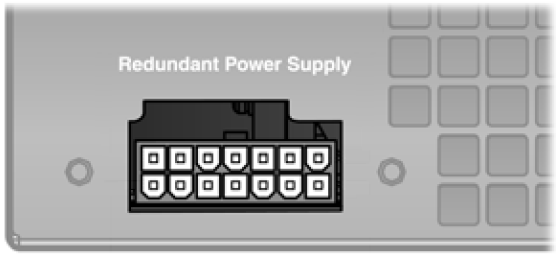


Figure 231: STK-RPS-150PS Connector Pin Locations

Table 223: 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

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 224: 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 225: 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 226: 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 232 and Table 227 on page 337 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.

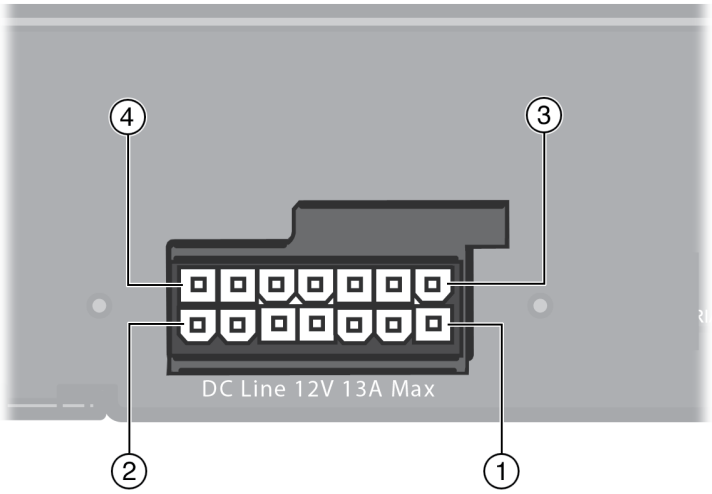


Figure 232: RPS-150XT Connector Pin Locations

1 = Pin 1	3 = Pin 8
2 = Pin 7	4 = Pin 14

Table 227: 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 228: 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 229: 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 230: 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 233 and Table 231 on page 338 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.

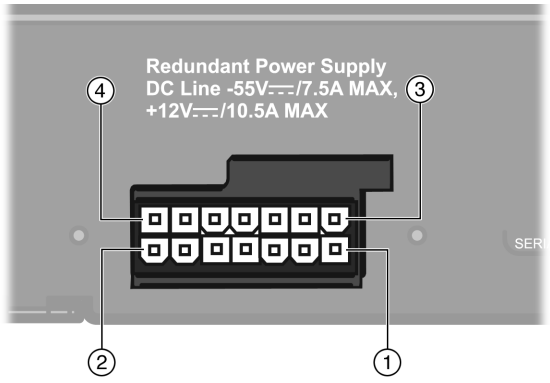


Figure 233: RPS-500p Connector Pin Locations

Table 231: 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

Table 231: RPS-500p Connector Pins (continued)

Pin	Function	Pin	Function
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-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 232: 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 233: 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
DC output	-55 VDC, 15 A maximum +12.0 VDC, 0.1 A minimum, 15 A maximum
Maximum output power	1005 W

Table 234: 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 234 and Table 235 on page 340, 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.

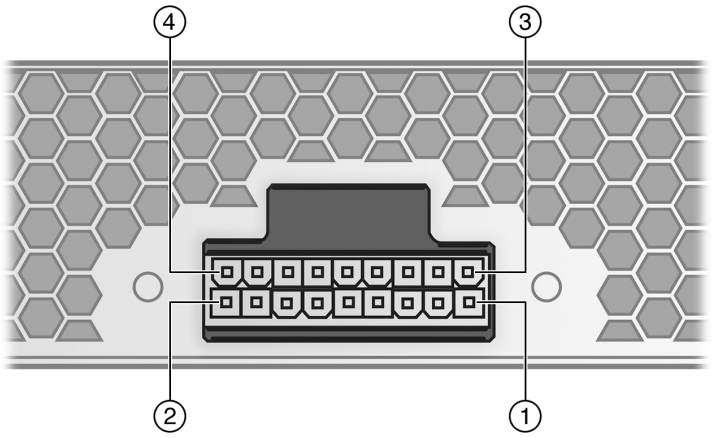


Figure 234: STK-RPS-1005PS Connector Pin Locations

1 = Pin 1	3 = Pin 10
2 = Pin 9	4 = Pin 18

Table 235: 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

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 with Summit 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-C13 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 6 feet (2 m) long, the wire size must be 18 AWG (.75 mm^2) minimum; over 6 feet, the minimum wire size is 16 AWG (1.0 mm^2).

  The power cords for switches that use either the 1100 W or 715 W power supplies are keyed with a "notch" to ensure the proper orientation when plugged in. These cords are of 3x14 AWG.

You can purchase AC power cords for use in the US and Canada from Extreme Networks or from your local supplier.

Console Connector Pinouts

Table 236 describes the pinouts for a DB-9 console plug connector.

Table 236: 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
RTS (request to send)	7	Out
CTS (clear to send)	8	In

Figure 235 shows the pinouts for a 9-pin to 25-pin (RS-232) null-modem cable.

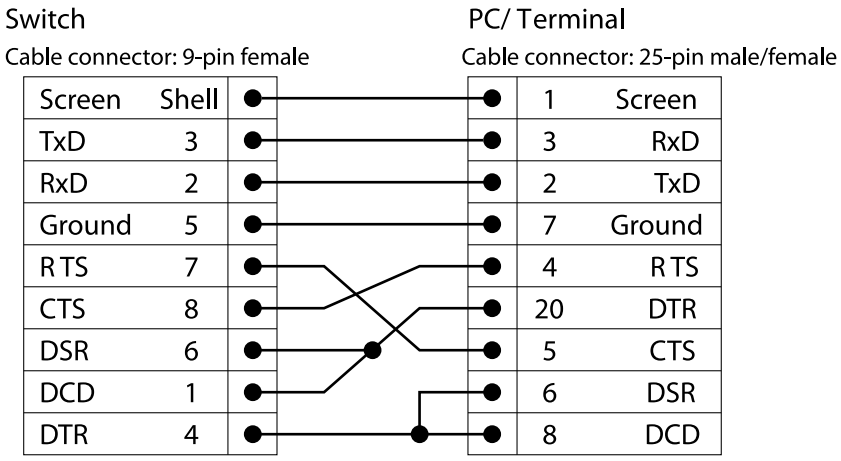


Figure 235: Null-Modem Cable Pinouts

Figure 236 shows the pinouts for a 9-pin to 9-pin (PC-AT) null-modem serial cable.

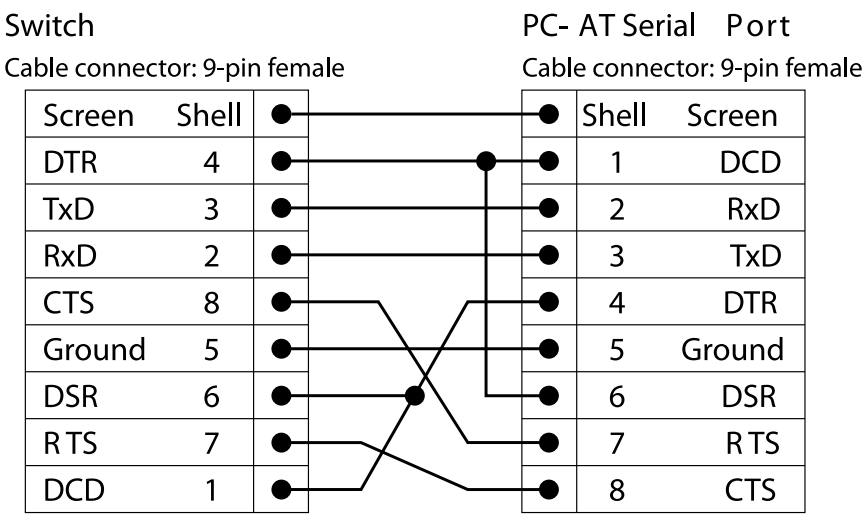


Figure 236: PC-AT Serial Null-modem Cable Pinouts

Table 237 shows the pinouts for the RJ45 console port on the ExtremeSwitching and Summit switches.

Table 237: 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 238 shows the pinouts for an RJ45-to-DB-9 adapter.

Table 238: 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

Table 238: Pinouts for an RJ45 to DB-9 Adapter (continued)

Signal	RJ45 Pin	DB-9 Pin
DSR (data set ready)	7	4
RTS (request to send)	8	7

Taiwan Warnings

Warning

警告使用者:

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Warning

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VCCI-A

Korea EMC Statement

Warning



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Glossary

ACL

An Access Control List is a mechanism for filtering packets at the hardware level. Packets can be classified by characteristics such as the source or destination MAC, IP address, IP type, or *QoS (Quality of Service)* queue. Once classified, the packets can be forwarded, counted, queued, or dropped.

ad hoc mode

An 802.11 networking framework in which devices or stations communicate directly with each other, without the use of an AP.

AP

In wireless technology, Access Points are LAN transceivers or "base stations" that can connect to the regular wired network and forward and receive the radio signals that transmit wireless data.

ARP

Address Resolution Protocol is part of the TCP/IP suite used to dynamically associate a device's physical address (MAC address) with its logical address (IP address). The system broadcasts an ARP request, containing the IP address, and the device with that IP address sends back its MAC address so that traffic can be transmitted.

AS

In *OSPF (Open Shortest Path First)*, an Autonomous System is a connected segment of a network topology that consists of a collection of subnetworks (with hosts attached) interconnected by a set of routes. The subnetworks and the routers are expected to be under the control of a single administration. Within an AS, routers may use one or more interior routing protocols and sometimes several sets of metrics. An AS is expected to present to other autonomous systems an appearance of a coherent interior routing plan and a consistent picture of the destinations reachable through the AS. An AS is identified by a unique 16-bit number.

ATM

Asynchronous Transmission Mode is a start/stop transmission in which each character is preceded by a start signal and followed by one or more stop signals. A variable time interval can exist between characters. ATM is the preferred technology for the transfer of images.

backbone area

In *OSPF (Open Shortest Path First)*, a network that has more than one area must have a backbone area, configured as 0.0.0.0. All areas in an *Autonomous System (AS)* must connect to the backbone area.

BGP

Border Gateway Protocol is a router protocol in the IP suite designed to exchange network reachability information with BGP systems in other autonomous systems. You use a fully meshed configuration with BGP.

BGP provides routing updates that include a network number, a list of ASs that the routing information passed through, and a list of other path attributes. BGP works with cost metrics to choose the best available path; it sends updated router information only when one host has detected a change, and only the affected part of the routing table is sent.

BGP communicates within one AS using Interior BGP (IBGP) because BGP does not work well with IGP. Thus the routers inside the AS maintain two routing tables: one for the IGP and one for IBGP. BGP uses exterior BGP (EBGP) between different autonomous systems.

BPDU

In *STP (Spanning Tree Protocol)*, a Bridge Protocol Data Unit is a packet that initiates communication between devices. BPDU packets contain information on ports, addresses, priorities, and costs and they ensure that the data ends up where it was intended to go. BPDU messages are exchanged across bridges to detect loops in a network topology. The loops are then removed by shutting down selected bridge interfaces and placing redundant switch ports in a backup, or blocked, state.

BSS

Basic Service Set is a wireless topology consisting of one access point connected to a wired network and a set of wireless devices. Also called an infrastructure network. See also *IBSS (Independent Basic Service Set)*.

CA

A Certificate Authority is a trusted third-party that generates and signs certificates. A CA may be a commercial concern, such as GoDaddy or GeoTrust. A CA may also be an in-house server for certificates used within an enterprise.

carrier VLAN

In *STP (Spanning Tree Protocol)*, carrier *VLAN (Virtual LAN)*s define the scope of the *STPD (Spanning Tree Domain)*, including the physical and logical ports that belong to the STPD as well as the 802.1Q tags used to transport EMISTP- or PVST+-encapsulated BPDUs. Only one carrier VLAN can exist in any given STPD.

CCM

In CFM, Connectivity Check Messages are frames transmitted periodically by a MEP to ensure connectivity across the maintenance entities to which the transmitting MEP belongs. The CCMs contain a unique ID for the specified domain. Because a failure to receive a CCM indicates a connectivity fault in the network, CCMs proactively check for network connectivity.

CFM

Connectivity Fault Management allows an ISP to proactively detect faults in the network for each customer service instance individually and separately. CFM comprises capabilities for detecting, verifying, and isolating connectivity failures in virtual bridged LANs.

CHAP

Challenge-Handshake Authentication Protocol is one of the two main authentication protocols used to verify a user's name and password for PPP Internet connections. CHAP is more secure because it performs a three-way handshake during the initial link establishment between the home and remote machines. It can also repeat the authentication anytime after the link has been established.

CIST

In an *MSTP (Multiple Spanning Tree Protocol)* environment, Common and Internal Spanning Tree is a single spanning tree domain that connects MSTP regions. The CIST is responsible for creating a loop-free topology by exchanging and propagating *BPDU (Bridge Protocol Data Unit)*s across MSTP regions. You can configure only one CIST on each switch.

CIST regional root bridge

Within an *MSTP (Multiple Spanning Tree Protocol)* region, the bridge with the lowest path cost to the *CIST (Common and Internal Spanning Tree)* root bridge is the CIST regional root bridge If the CIST root bridge is inside an MSTP region, that same bridge is the CIST regional root for that region because it has the lowest path cost to the CIST root. If the CIST root bridge is outside an MSTP region, all regions connect to the CIST root through their respective CIST regional roots.

CIST root bridge

In an *MSTP (Multiple Spanning Tree Protocol)* environment, the bridge with the lowest bridge ID becomes the *CIST (Common and Internal Spanning Tree)* root bridge. The bridge ID includes the bridge priority and the MAC address. The CIST root bridge can be either inside or outside an MSTP region. The CIST root bridge is unique for all regions and non-MSTP bridges, regardless of its location.

CNP

Customer Network Port.

combination port

Also known as a *combo port*. A physical port, available on several Extreme Networks switch models, that pairs a copper port using RJ45 connectors with an optical (fiber) port. The copper port operates as an autonegotiating 10/100/1000BASE-T port. The optical port allows Gigabit Ethernet uplink connections through small form factor pluggable (SFP) interface modules.

CRC

Cyclic Redundancy Check is a simple checksum is designed to detect transmission errors. A decoder calculates the CRC for the received data and compares it to the CRC that the encoder calculated, which is appended to the data. A mismatch indicates that the data was corrupted in transit.

CVID

CVLAN ID. The CVID represents the CVLAN tag for tagged *VLAN (Virtual LAN)* traffic.

CVLAN

Customer *VLAN (Virtual LAN)*.

DCB

Data Center Bridging is a set of IEEE 802.1Q extensions to standard Ethernet, that provide an operational framework for unifying Local Area Networks (LAN), Storage Area Networks (SAN) and Inter-Process Communication (IPC) traffic between switches and endpoints onto a single transport layer.

DHCP

Dynamic Host Configuration Protocol allows network administrators to centrally manage and automate the assignment of IP addresses on the corporate network. DHCP sends a new IP address when a computer is plugged into a different place in the network. The protocol supports static or dynamic IP addresses and can dynamically reconfigure networks in which there are more computers than there are available IP addresses.

DoS attack

Denial of Service attacks occur when a critical network or computing resource is overwhelmed so that legitimate requests for service cannot succeed. In its simplest form, a DoS attack is indistinguishable

from normal heavy traffic. ExtremeXOS software has configurable parameters that allow you to defeat DoS attacks.

DSSS

Direct-Sequence Spread Spectrum is a transmission technology used in Local Area Wireless Network (LAWN) transmissions where a data signal at the sending station is combined with a higher data rate bit sequence, or chipping code, that divides the user data according to a spreading ratio. The chipping code is a redundant bit pattern for each bit that is transmitted, which increases the signal's resistance to interference. If one or more bits in the pattern are damaged during transmission, the original data can be recovered due to the redundancy of the transmission. (Compare with *FHSS (Frequency-Hopping Spread Spectrum)*.)

EAP-TLS/EAP-TTLS

EAP-TLS Extensible Authentication Protocol - Transport Layer Security. A general protocol for authentication that also supports multiple authentication methods, such as token cards, Kerberos, one-time passwords, certificates, public key authentication and smart cards.

IEEE 802.1x specifies how EAP should be encapsulated in LAN frames.
In wireless communications using EAP, a user requests connection to a *WLAN (Wireless Local Area Network)* through an access point, which then requests the identity of the user and transmits that identity to an authentication server such as *RADIUS (Remote Authentication Dial In User Service)* The server asks the access point for proof of identity, which the access point gets from the user and then sends back to the server to complete the authentication.

EAP-TLS provides for certificate-based and mutual authentication of the client and the network. It relies on client-side and server-side certificates to perform authentication and can be used to dynamically generate user-based and session-based *WEP (Wired Equivalent Privacy)* keys.

EAP-TTLS (Tunneled Transport Layer Security) is an extension of EAP-TLS to provide certificate-based, mutual authentication of the client and network through an encrypted tunnel, as well as to generate dynamic, per-user, per-session WEP keys. Unlike EAP-TLS, EAP-TTLS requires only server-side certificates.
(See also *PEAP (Protected Extensible Authentication Protocol)*.)

EAPS

Extreme Automatic Protection Switching is an Extreme Networks-proprietary version of the Ethernet Automatic Protection Switching protocol that prevents looping Layer 2 of the network. This feature is discussed in RFC 3619.

ECMP

Equal Cost Multi Paths is a routing algorithm that distributes network traffic across multiple high-bandwidth *OSPF (Open Shortest Path First)*, *BGP (Border Gateway Protocol)*, IS-IS, and static routes to increase performance. The Extreme Networks implementation supports multiple equal cost paths between points and divides traffic evenly among the available paths.

EGP

Exterior Gateway Protocol is an Internet routing protocol for exchanging reachability information between routers in different autonomous systems. *BGP (Border Gateway Protocol)* is a more recent protocol that accomplishes this task.

ELRP

Extreme Loop Recovery Protocol is an Extreme Networks-proprietary protocol that allows you to detect Layer 2 loops.

EMC

Abbreviation for electromagnetic compatibility: the branch of electrical engineering that seeks to prevent EMI (electromagnetic interference) and physical damage caused by electromagnetic energy.

EMISTP

Extreme Multiple Instance Spanning Tree Protocol. This Extreme Networks-proprietary protocol uses a unique encapsulation method for *STP (Spanning Tree Protocol)* messages that allows a physical port to belong to multiple *STPD (Spanning Tree Domain)*s.

EPS

Ethernet Protection Switching is defined in ITU/T G.8031.

ESD

Static electricity. To prevent personal injury and damage to equipment, ESD protection – in the form of special gloves or wrist straps – is necessary when handling certain electronic equipment.

ESRP

Extreme Standby Router Protocol is an Extreme Networks-proprietary protocol that provides redundant Layer 2 and routing services to users.

ESS

Several *BSS (Basic Service Set)*s can be joined together to form one logical *WLAN (Wireless Local Area Network)* segment, referred to as an extended service set (ESS). The *SSID* is used to identify the ESS.

FHSS

Frequency-Hopping Spread Spectrum is a transmission technology used in Local Area Wireless Network (LAWN) transmissions where the data signal is modulated with a narrowband carrier signal that 'hops' in a random but predictable sequence from frequency to frequency as a function of time over a wide band of frequencies. This technique reduces interference. If synchronized properly, a single logical channel is maintained. (Compare with *DSSS (Direct-Sequence Spread Spectrum)*.)

full-duplex

The communication mode in which a device simultaneously sends and receives over the same link, doubling the bandwidth. Thus, a full-duplex 100 Mbps connection has a bandwidth of 200 Mbps, and so forth. A device either automatically adjusts its duplex mode to match that of a connecting device or you can configure the duplex mode; all devices at 1 Gbps or higher run only in full-duplex mode.

GARP

Generic Attribute Registration Protocol registers an attribute with other participants. It is specified in IEEE 802.1D-2004, clause 12.

half-duplex

The communication mode in which a device can either send or receive data, but not simultaneously. (Devices at 1 Gbps or higher do not run in half-duplex mode; they run only in full-duplex mode.)

IBSS

An IBSS is the 802.11 term for an ad hoc network. See *ad hoc mode*.

ICMP

Internet Control Message Protocol is the part of the TCP/IP protocol that allows generation of error messages, test packets, and operating messages. For example, the ping command allows you to send ICMP echo messages to a remote IP device to test for connectivity. ICMP also supports traceroute, which identifies intermediate hops between a given source and destination.

ICV

Integrity Check Value is a 4-byte code appended in standard *WEP (Wired Equivalent Privacy)* to the 802.11 message. Enhanced *WPA* inserts an 8-byte MIC just before the ICV. (See *MIC (Message Integrity Check or Code)*.)

IETF

The Internet Engineering Task Force is a large, open, international community of network designers, operators, vendors, and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet. The technical work of the IETF is done in working groups, which are organized by topic.

IGMP

Hosts use Internet Group Management Protocol to inform local routers of their membership in multicast groups. Multicasting allows one computer on the Internet to send content to multiple other computers that have identified themselves as interested in receiving the originating computer's content. When all hosts leave a group, the router no longer forwards packets that arrive for the multicast group.

IMAP

Internet Message Access Protocol is used by email clients to retrieve messages from a mail server. IMAP is the protocol that IMAP clients use to communicate with the servers, and *SMTP (Simple Mail Transfer Protocol)* is the protocol used to transport mail to an IMAP server.

The current version is IMAP4. It is similar to POP3 (Post Office Protocol version 3), but offers additional features. For example, the IMAP4 protocol leaves your email messages on the server rather than downloading them to your computer. If you wish to remove your messages from the server, you must use your mail client to generate local folders, copy messages to your local hard drive, and then delete and expunge the messages from the server.

IP MultiCast

IPMC supports IPv4 and IPv6 multicasting. IPMCv4 denotes multicast for IPv4. IPMCv6 denotes multicast for IPv6.

IPTV

Internal Protocol Television uses a digital signal sent via broadband through a switched telephone or cable system. An accompanying set top box (that sits on top of the TV) decodes the video and converts it to standard television signals.

IVL

In Independent VLAN Learning, every VLAN uses its own logical source address table, as opposed to *SVL (Shared VLAN Learning)*, where two or more VLANs share the same part of the MAC address table.

LACP

Link Aggregation Control Protocol is part of the IEEE 802.3ad and automatically configures multiple aggregated links between switches.

LAG

A Link Aggregation Group is the logical high-bandwidth link that results from grouping multiple network links in link aggregation (or load sharing). You can configure static LAGs or dynamic LAGs (using the *LACP (Link Aggregation Control Protocol)*).

LLC

The IEEE 802.2 Logical Link Control protocol provides a link mechanism for upper layer protocols. It is the upper sub-layer of the Data Link Layer and provides multiplexing mechanisms that make it possible for several network protocols (IP, IPX) to coexist within a multipoint network. The LLC header consists of a 1 byte Destination Service Access Point (DSAP), 1 byte Source Service Access Point (SSAP), and a 1 or 2 byte Control field, followed by LLC information.

LLDP

Link Layer Discovery Protocol conforms to IEEE 802.1ab and is a neighbor discovery protocol. Each LLDP-enabled device transmits information to its neighbors, including chassis and port identification, system name and description, *VLAN (Virtual LAN)* names, and other selected networking information. The protocol also specifies timing intervals in order to ensure current information is being transmitted and received.

load sharing

Load sharing, also known as trunking or link aggregation, conforms to IEEE 802.3ad. This feature is the grouping of multiple network links into one logical high-bandwidth link. For example, by grouping four 100 Mbps of full-duplex bandwidth into one logical link, you can create up to 800 Mbps of bandwidth. Thus, you increase bandwidth and availability by using a group of ports to carry traffic in parallel between switches.

LSA

A Link State Advertisement is a broadcast packet used by link state protocols, such as *OSPF (Open Shortest Path First)*. The LSA contains information about neighbors and path costs and is used by the receiving router to maintain a routing table.

MAC

Media Access Control layer. One of two sublayers that make up the Data Link Layer of the OSI model. The MAC layer is responsible for moving data packets to and from one NIC to another across a shared channel.

MEP

In MEP, a Maintenance End Point is an end point for a single domain, or maintenance association. The MEP may be either an UP MEP or a DOWN MEP.

MIB

Management Information Bases make up a database of information (for example, traffic statistics and port settings) that the switch makes available to network management systems. MIB names identify objects that can be managed in a network and contain information about the objects. MIBs provide a

means to configure a network device and obtain network statistics gathered by the device. Standard, minimal MIBs have been defined, and vendors often have private enterprise MIBs.

MIC

Message Integrity Check (or Code), also called 'Michael', is part of *WPA* and *TKIP (Temporal Key Integrity Protocol)*. The MIC is an additional 8-byte code inserted before the standard 4-byte *ICV (Integrity Check Value)* appended in by standard *WEP (Wired Equivalent Privacy)* to the 802.11 message. This greatly increases the difficulty in carrying out forgery attacks.
Both integrity check mechanisms are calculated by the receiver and compared against the values sent by the sender in the frame. If the values match, there is assurance that the message has not been tampered with.

MLD

Multicast Listener Discovery is used by IPv6 routers to discover multicast listeners on a directly attached link, much as *IGMP (Internet Group Management Protocol)* is used in IPv4. The protocol is embedded in ICMPv6 instead of using a separate protocol.

MPLS

Multiprotocol Label Switching speeds up network traffic. When forwarding packets, the Layer 2 (Switching) label is used to avoid complex destination lookups in the routing table. MPLS uses Label Switched Paths (LSPs) to establish the network path. The packet will be labeled so that service providers can decide the best way to keep traffic flowing. The Multiprotocol Label Switching Transport Profile (MPLS-TP) extensions to MPLS are designed to meet service provider requirements and are used as a network layer technology in transport networks. MPLS-TP gives service providers a reliable packet-based technology that is based on circuit-based transport networking. MPLS-TP is expected to be a low cost level 2 technology (if the limited profile is implemented in isolation) that will provide *QoS (Quality of Service)*, end-to-end *OAM (Operation Administration & Maintenance)* and protection switching.

MSM

This Extreme Networks-proprietary name refers to the module that holds both the control plane and the switch fabric for switches that run the ExtremeXOS software on modular switches. One MSM is required for switch operation; adding an additional MSM increases reliability and throughput. Each MSM has two CPUs. The MSM has LEDs as well as a console port, management port, modem port, and compact flash; it may have data ports as well. The MSM is responsible for upper-layer protocol processing and system management functions. When you save the switch configuration, it is saved to all MSMs.

MSTI

Multiple Spanning Tree Instances control the topology inside an *MSTP (Multiple Spanning Tree Protocol)* region. An MSTI is a spanning tree domain that operates within a region and is bounded by that region; and MSTI does not exchange *BPDU (Bridge Protocol Data Unit)*s or send notifications to other regions. You can map multiple *VLAN (Virtual LAN)*s to an MSTI; however, each VLAN can belong to only one MSTI. You can configure up to 64 MSTIs in an MSTP region.

MSTP

Multiple Spanning Tree Protocol, based on IEEE 802.1Q-2003 (formerly known as IEEE 892.1s), allows you to bundle multiple VLANs into one *STP (Spanning Tree Protocol)* topology, which also provides enhanced loop protection and better scaling. MSTP uses *RSTP (Rapid Spanning Tree Protocol)* as the converging algorithm and is compatible with legacy STP protocols.

MTU

A Maximum Transmission Unit is a configurable parameter that determines the largest packet than can be transmitted by an IP interface (without the packet needing to be broken down into smaller units).



Note

Packets that are larger than the configured MTU size are dropped at the ingress port. Or, if configured to do so, the system can fragment the IPv4 packets and reassemble them at the receiving end.

NAT

The Network Address Translation (or Translator) is a network capability that enables a group of computers to dynamically share a single incoming IP address. NAT takes the single incoming IP address and creates a new IP address for each client computer on the network.

netmask

A netmask is a string of 0s and 1s that mask, or screen out, the network part of an IP address, so that only the host computer part of the address remains. A frequently-used netmask is 255.255.255.0, used for a Class C subnet (one with up to 255 host computers). The ".0" in the netmask allows the specific host computer address to be visible.

NTP

Network Time Protocol is an Internet standard protocol (built on top of TCP/IP) that assures accurate synchronization to the millisecond of computer clock times in a network of computers. Based on UTC, NTP synchronizes client workstation clocks to the U.S. Naval Observatory Master Clocks in Washington, DC and Colorado Springs, CO. Running as a continuous background client program on a computer, NTP sends periodic time requests to servers, obtaining server time stamps and using them to adjust the client's clock. (RFC 1305)

OAM

Operation Administration & Maintenance is a protocol described in ITU-T Y.1731. It is used to implement carrier ethernet functionality.

OSPF

An interior gateway routing protocol for TCP/IP networks, Open Shortest Path First uses a link state routing algorithm that calculates routes for packets based on a number of factors, including least hops, speed of transmission lines, and congestion delays. You can also configure certain cost metrics for the algorithm. This protocol is more efficient and scalable than vector-distance routing protocols. OSPF features include least-cost routing, *ECMP (Equal Cost Multi Paths)* routing, and load balancing. Although OSPF requires CPU power and memory space, it results in smaller, less frequent router table updates throughout the network. This protocol is more efficient and scalable than vector-distance routing protocols.

PCP

The Priority Code Point is a 3-bit field that stores the priority-level for the 802.1Q frame. It is also known as User Priority.

PDU

A Protocol Data Unit is a message of a given protocol comprising payload and protocol-specific control information, typically contained in a header.

PEAP

Protected Extensible Authentication Protocol is an *IETF (Internet Engineering Task Force)* draft standard to authenticate wireless LAN clients without requiring them to have certificates. In PEAP authentication, first the user authenticates the authentication server, then the authentication server authenticates the user. If the first phase is successful, the user is then authenticated over the SSL tunnel created in phase one using EAP-Generic Token Card (EAP-GTC) or Microsoft Challenged Handshake Protocol Version 2 (MSCHAP V2). (See also *EAP-TLS/EAP-TTLS*.)

PoE

The Power over Ethernet standard (IEEE 802.3af) defines how power can be provided to network devices over existing Ethernet connections, eliminating the need for additional external power supplies.

PVST+

Per VLAN Spanning Tree +. This implementation of *STP (Spanning Tree Protocol)* has a 1:1 relationship with VLANs. The Extreme Networks implementation of PVST+ allows you to interoperate with third-party devices running this version of STP. PVST is a earlier version of this protocol and is compatible with PVST+.

QL

QL In SyncE this is the Quality Level of a given clock source. This is received on a port in a SSM indicating the quality of the clock received in the port.

QoS

Quality of Service is a technique that is used to manage network resources and guarantee a bandwidth relationship between individual applications or protocols. A communications network transports a multitude of applications and data, including high-quality video and delay-sensitive data such as real-time voice. Networks must provide secure, predictable, measurable, and sometimes guaranteed services. Achieving the required QoS becomes the secret to a successful end-to-end business solution.

RADIUS

RADIUS is a client/server protocol and software that enables remote access servers to communicate with a central server to authenticate dial-in users and authorize their access to the requested system or service. RADIUS allows a company to maintain user profiles in a central database that all remote servers can share. It provides better security, allowing a company to set up a policy that can be applied at a single administered network point. With RADIUS, you can track usage for billing and for keeping network statistics.

RF

Radio Frequency is a frequency in the electromagnetic spectrum associated with radio wave propagation. When an RF current is supplied to an antenna, an electromagnetic field is created that can propagate through space. These frequencies in the electromagnetic spectrum range from Ultra-low frequency (ULF):0-3 Hz to Extremely high frequency (EHF): 30 GHz–300 GHz. The middle ranges are: Low frequency (LF): 30 kHz–300 kHz; Medium frequency (MF): 300 kHz–3 MHz; High frequency (HF): 3 MHz–30 MHz; Very high frequency (VHF): 30 MHz–300 MHz; and Ultra-high frequency (UHF): 300 MHz–3 GHz.

RIP

This IGP vector-distance routing protocol is part of the *TCP/IP* suite and maintains tables of all known destinations and the number of hops required to reach each. Using Routing Information Protocol, routers periodically exchange entire routing tables. RIP is suitable for use only as an IGP.

RMON

Remote monitoring is a standardized method to make switch and router information available to remote monitoring applications. It is an *SNMP (Simple Network Management Protocol)* network management protocol that allows network information to be gathered remotely. RMON collects statistics and enables a management station to monitor network devices from a central location. It provides multivendor interoperability between monitoring devices and management stations. RMON is described in more detail in IETF RFC 1757 and RFC 2201.

RSN

Robust Security Network is a new standard within IEEE 802.11 to provide security and privacy mechanisms. The RSN (and related *TSN*) both specify IEEE 802.1x authentication with Extensible Authentication Protocol (EAP).

RSTP

Rapid Spanning Tree Protocol, described in IEEE 802.1w, is an enhanced version of *STP (Spanning Tree Protocol)* that provides faster convergence. The Extreme Networks implementation of RSTP allows seamless interoperability with legacy STP.

SMTP

Simple Mail Transfer Protocol uses the *TCP (Transmission Control Protocol)* to provide a mail service modeled on the FTP file transfer service. SMTP transfers mail between systems.

SNMP

Simple Network Management Protocol is a standard that uses a common software agent to remotely monitor and set network configuration and runtime parameters. SNMP operates in a multivendor environment, and the agent uses *MIB (Management Information Base)*s, which define what information is available from any manageable network device. You can also set traps using SNMP, which send notifications of network events to the system log.

SSH

Secure Shell, sometimes known as Secure Socket Shell, is a UNIX-based command interface and protocol of securely gaining access to a remote computer. With SSH commands, both ends of the client/server connection are authenticated using a digital certificate, and passwords are protected by being encrypted. At Extreme Networks, the SSH is a separate software module, which must be downloaded separately. (SSH is bundled with SSL in the software module.)

SSID

The Service Set Identifier is a 32-character unique identifier attached to the header of packets sent over a Wireless LAN that acts as a password when a wireless device tries to connect to the *BSS (Basic Service Set)*. Several BSSs can be joined together to form one logical *WLAN (Wireless Local Area Network)* segment, referred to as an (*ESS (Extended Service Set)*). The SSID is used to identify the ESS.

In 802.11 networks, each *AP (Access Point)* advertises its presence several times per second by broadcasting beacon frames that carry the ESS name (SSID). Stations discover APs by listening for beacons, or by sending probe frames to search for an AP with a desired SSID. When the station locates an appropriately-named access point, it sends an associate request frame containing the desired SSID.

The AP replies with an associate response frame, also containing the SSID.
Some APs can be configured to send a zero-length broadcast SSID in beacon frames instead of sending their actual SSID. The AP must return its actual SSID in the probe response.

SSL

Secure Socket Layer is a protocol for transmitting private documents using the Internet. SSL works by using a public key to encrypt data that is transferred over the SSL connection. SSL uses the public-and-private key encryption system, which includes the use of a digital certificate. SSL is used for other applications than *SSH (Secure Shell)*, for example, OpenFlow.

STP

Spanning Tree Protocol, defined in IEEE 802.1d, used to eliminate redundant data paths and to increase network efficiency. STP allows a network to have a topology that contains physical loops; it operates in bridges and switches. STP opens certain paths to create a tree topology, thereby preventing packets from looping endlessly on the network. To establish path redundancy, STP creates a tree that spans all of the switches in an extended network, forcing redundant paths into a standby, or blocked, state.

STP allows only one active path at a time between any two network devices (this prevents the loops) but establishes the redundant links as a backup if the initial link should fail. If STP costs change, or if one network segment in the STP becomes unreachable, the spanning tree algorithm reconfigures the STP topology and re-establishes the link by activating the standby path.

STPD

Spanning Tree Domain is an *STP (Spanning Tree Protocol)* instance that contains one or more *VLAN (Virtual LAN)*s. The switch can run multiple STPDs, and each STPD has its own root bridge and active path. In the Extreme Networks implementation of STPD, each domain has a carrier VLAN (for carrying STP information) and one or more protected VLANs (for carrying the data).

stub area

In *OSPF (Open Shortest Path First)*, a stub area is connected to only one other area (which can be the backbone area). External route information is not distributed to stub areas.

SVL

In Shared VLAN Learning, two or more VLANs are grouped to share common source address information in the MAC table. The common entry in the MAC table is identified by a Filter ID (FID). SVL is useful for configuration of more complex, asymmetrical cross-VLAN traffic patterns, like E-TREE (Rooted-Multipoint) and Multi-netted Server. The alternative VLAN learning mode is *IVL (Independent VLAN Learning)*. The default VLAN learning mode is IVL. Not all switches support SVL.

syslog

A protocol used for the transmission of event notification messages across networks, originally developed on the University of California Berkeley Software Distribution (BSD) TCP/IP system implementations, and now embedded in many other operating systems and networked devices. A device generates a messages, a relay receives and forwards the messages, and a collector (a syslog server) receives the messages without relaying them.
syslog uses the *UDP (User Datagram Protocol)* as its underlying transport layer mechanism. The UDP port that has been assigned to syslog is 514. (RFC 3164)

TCP

Transmission Control Protocol uses the Internet Protocol (IP) to exchange messages between computers. It is known as a connection-oriented protocol, which means that a connection is established and maintained until messages have been exchanged. TCP divides messages into packets for transfer via IP and reassembles the packets into complete messages for delivery to the receiving computer. Common network applications that use TCP include the worldwide web, email, and FTP.

TCP/IP

Transmission Control Protocol/Internet Protocol is one of the core protocols underlying the Internet. The two protocols are usually referred to as a group, by the term TCP/IP. TCP provides a reliable connection, which means that each end of the session is guaranteed to receive all of the data transmitted by the other end of the connection, in the same order that it was originally transmitted without receiving duplicates.

TKIP

Temporal Key Integrity Protocol is an enhancement to *WEP (Wired Equivalent Privacy)* encryption. It uses a set of algorithms to rotate session keys. The protocol's enhanced encryption includes a per-packet key mixing function, a *MIC (Message Integrity Check or Code)*, an extended initialization vector (IV) with sequencing rules, and a re-keying mechanism. The encryption keys are changed (re-keyed) automatically and authenticated between devices after the re-key interval (either a specified period of time, or after a specified number of packets has been transmitted).

TLV

An *LLDP (Link Layer Discovery Protocol)* frame that can contain multiple pieces of information. Each piece is known as a Type Length Value.

TSN

Transition Security Network is a subset of *RSN (Robust Security Network)*, which provides an enhanced security solution for legacy hardware. The Wi-Fi Alliance has adopted a solution called *WPA*, based on TSN. RSN and TSN both specify IEEE 802.1x authentication with Extensible Authentication Protocol (EAP).

UDP

User Datagram Protocol is an efficient but unreliable, connectionless protocol that is layered over IP (as is *TCP (Transmission Control Protocol)*). Application programs must supplement the protocol to provide error processing and retransmitting data. UDP is an OSI Layer 4 protocol.

virtual router

In the Extreme Networks implementations, virtual routers allow a single physical switch to be split into multiple virtual routers. Each virtual router has its own IP address and maintains a separate logical forwarding table. Each virtual router also serves as a configuration domain. The identity of the virtual router you are working in currently displays in the prompt line of the CLI. The virtual routers discussed in relation to Extreme Networks switches themselves are not the same as the virtual router in VRRP.

In VRRP, the virtual router is identified by a virtual router (VRID) and an IP address. A router running VRRP can participate in one or more virtual routers. The VRRP virtual router spans more than one physical router, which allows multiple routers to provide redundant services to users.

VLAN

The term VLAN is used to refer to a collection of devices that communicate as if they are on the same physical LAN. Any set of ports (including all ports on the switch) is considered a VLAN. LAN segments

are not restricted by the hardware that physically connects them. The segments are defined by flexible user groups you create with the CLI.

VM

A virtual machine is a logical machine that runs on a VM server, which can host multiple VMs.

VMAN

In ExtremeXOS software, Virtual MANs are a bi-directional virtual data connection that creates a private path through the public network. One VMAN is completely isolated from other VMANs; the encapsulation allows the VMAN traffic to be switched over Layer 2 infrastructure. You implement VMAN using an additional 892.1Q tag and a configurable EtherType; this feature is also known as Q-in-Q switching.

VRRP

The Virtual Router Redundancy Protocol specifies an election protocol that dynamically assigns responsibility for a virtual router to one of the VRRP routers on a LAN. The VRRP router controlling the IP address(es) associated with a virtual router is called the master router, and forwards packets sent to these IP addresses. The election process provides dynamic failover in the forwarding responsibility should the master router become unavailable. In case the master router fails, the virtual IP address is mapped to a backup router's IP address; this backup becomes the master router. This allows any of the virtual router IP addresses on the LAN to be used as the default first-hop router by end-hosts. The advantage gained from using VRRP is a higher availability default path without requiring configuration of dynamic routing or router discovery protocols on every host. VRRP is defined in RFC 2338.

WEP

Wired Equivalent Privacy is a security protocol for *WLAN (Wireless Local Area Network)*s defined in the 802.11b standard. WEP aims to provide security by encrypting data over radio waves so that it is protected as it is transmitted from one end point to another.

WLAN

Wireless Local Area Network.

WPA

Wireless Protected Access is a security solution adopted by the Wi-Fi Alliance that adds authentication to *WEP (Wired Equivalent Privacy)*'s basic encryption. For authentication, WPA specifies IEEE 802.1x authentication with Extensible Authentication Protocol (EAP). For encryption, WPA uses the *TKIP (Temporal Key Integrity Protocol)* mechanism, which shares a starting key between devices, and then changes their encryption key for every packet. *CA (Certificate Authority)* can also be used. Also part of the encryption mechanism are 802.1x for dynamic key distribution and *MIC (Message Integrity Check or Code)*.

WPA requires that all computers and devices have WPA software.

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