HARDWARE INSTALLATION GUIDE

Ruckus ICX 7650 Switch Hardware Installation Guide

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Contents

Preface

Document conventions

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

TABLE 1 Text conventions

Convention	Description	Example
`monospace`	Identifies command syntax examples.	`device(config)# interface ethernet 1/1/6`
bold	User interface (UI) components such as screen or page names, keyboard keys, software buttons, and field names	On the Start menu, click All Programs.
italics	Publication titles	Refer to the *Ruckus Small Cell Release Notes* for more information

Notes, cautions, and warnings

Notes, cautions, and warning statements may be used in this document. They are listed in the order of increasing severity of potential hazards.

NOTE
A Note provides a tip, guidance, or advice, emphasizes important information, or provides a reference to related information.

CAUTION
A Caution statement alerts you to situations that can be potentially hazardous to you or cause damage to hardware, firmware, software, or data.

DANGER
A Danger statement indicates conditions or situations that can be potentially lethal or extremely hazardous to you. Safety labels are also attached directly to products to warn of these conditions or situations.

Command syntax conventions

Bold and italic text identify command syntax components. Delimiters and operators define groupings of parameters and their logical relationships.

Convention	Description
Boldface text	Identifies command names, keywords, and command options.
Italics text	Identifies a variable.
value	In Fibre Channel products, a fixed value provided as input to a command option is printed in plain text, for example, **--show** WWN.
[ ]	Syntax components displayed within square brackets are optional. Default responses to system prompts are enclosed in square brackets.
{ **x** | **y** | **z** }	A choice of required parameters is enclosed in curly brackets separated by vertical bars. You must select one of the options. In Fibre Channel products, square brackets may be used instead for this purpose.
x | **y**	A vertical bar separates mutually exclusive elements.
< >	Nonprinting characters, for example, passwords, are enclosed in angle brackets.
...	Repeat the previous element, for example, member[member...].
\	Indicates a "soft" line break in command examples. If a backslash separates two lines of a command input, enter the entire command at the prompt without the backslash.

Document feedback

Ruckus is interested in improving its documentation and welcomes your comments and suggestions.

You can email your comments to Ruckus at: docs@ruckuswireless.com

When contacting us, please include the following information:

- Document title and release number
- Document part number (on the cover page)
- Page number (if appropriate)
- For example:
  - Ruckus Small Cell Alarms Guide SC Release 1.3
  - Part number: 800-71306-001
  - Page 88

Ruckus product documentation resources

Visit the Ruckus website to locate related documentation for your product and additional Ruckus resources.

Release Notes and other user documentation are available at https://support.ruckuswireless.com/documents. You can locate documentation by product or perform a text search. Access to Release Notes requires an active support contract and Ruckus Support Portal user account. Other technical documentation content is available without logging into the Ruckus Support Portal.

White papers, data sheets, and other product documentation are available at https://www.ruckuswireless.com.

Online training resources

To access a variety of online Ruckus training modules, including free introductory courses to wireless networking essentials, site surveys, and Ruckus products, visit the Ruckus Training Portal at https://training.ruckuswireless.com.

Contacting Ruckus Customer Services and Support

The Customer Services and Support (CSS) organization is available to provide assistance to customers with active warranties on their Ruckus Networks products, and customers and partners with active support contracts.

For product support information and details on contacting the Support Team, go directly to the Support Portal using https://support.ruckuswireless.com, or go to https://www.ruckuswireless.com and select **Support**.

What support do I need?

Technical issues are usually described in terms of priority (or severity). To determine if you need to call and open a case or access the self-service resources use the following criteria:

- Priority 1 (P1)—Critical. Network or service is down and business is impacted. No known workaround. Go to the **Open a Case** section.
- Priority 2 (P2)—High. Network or service is impacted, but not down. Business impact may be high. Workaround may be available. Go to the **Open a Case** section.
- Priority 3 (P3)—Medium. Network or service is moderately impacted, but most business remains functional. Go to the **Self-Service Resources** section.
- Priority 4 (P4)—Low. Request for information, product documentation, or product enhancements. Go to the **Self-Service Resources** section.

Open a case

When your entire network is down (P1), or severely impacted (P2), call the appropriate telephone number listed below to get help:

- Continental United States: 1-855-782-5871
- Canada: 1-855-782-5871
- Europe, Middle East, Africa, and Asia Pacific, toll-free numbers are available at https://support.ruckuswireless.com/contact-us and Live Chat is also available.

Self-service resources

The Support Portal at https://support.ruckuswireless.com/contact-us offers a number of tools to help you to research and resolve problems with your Ruckus products, including:

- Technical Documentation—https://support.ruckuswireless.com/documents
- Community Forums—https://forums.ruckuswireless.com/ruckuswireless/categories
- Knowledge Base Articles—https://support.ruckuswireless.com/answers
- Software Downloads and Release Notes—https://support.ruckuswireless.com/software
- Security Bulletins—https://support.ruckuswireless.com/security

Using these resources will help you to resolve some issues, and will provide TAC with additional data from your troubleshooting analysis if you still require assistance through a support case or RMA. If you still require help, open and manage your case at https://support.ruckuswireless.com/case_management

About This Document

Supported hardware and software

This document is applicable for the various Ruckus ICX 7650 switch models. The following tables list the device models, media expansion modules, power supplies, fan assemblies and rack mount kits supported.

TABLE 2 Switch models

Part number	Description	Introduced (OS)	Currently supported (OS)	Notes
ICX 7650-48ZP	24×1/10/1000 Mbps RJ-45 PoE+ ports and 24× 100/1000 Mbps 2.5/5/10 Gbps RJ-45 PoE+/PoH/UPoE ports	08.0.70	Yes	
ICX 7650-48P	48× 10/100/1000 Mbps RJ-45 ports with 40 supporting PoE+ and 8 supporting PoE+, UPoE and PoH	08.0.70	Yes	
ICX 7650-48F	24× 100/1000 Mbps SFP ports and 24× 1000 Mbps / 10 Gbps SFP+ ports	08.0.70	Yes	

TABLE 3 Media expansion modules

Part number	Description	Introduced (OS)	Currently supported (OS)
ICX7650-1X100GQ	1-port 100 GbE QSFP28 module	08.0.70	Yes
ICX7650-2X40GQ	2-port 40 GbE QSFP+ module	08.0.70	Yes
ICX7650-4X10GF	4-port 1/10 GbE SFP+ module	08.0.70	Yes

TABLE 4 Power supplies

Part number	Description	Introduced (OS)	Currently supported (OS)
RPS15-E	250W AC power supply with nonport-side exhaust airflow	08.0.70	Yes
RPS15-I	250W AC power supply with nonport-side intake airflow	08.0.70	Yes
RPS16-E	1000W AC power supply with nonport-side intake airflow	08.0.70	Yes
RPS16-I	1000W AC power supply with nonport-side intake airflow	08.0.70	Yes
DC RPS16DC-E	510W DC power supply with nonport-side intake airflow	08.0.70	Yes
DC RPS16DC-I	510W DC power supply with nonport-side intake airflow	08.0.70	Yes

TABLE 5 Fan assemblies

Part number	Description	Introduced (OS)	Currently supported (OS)
ICX-FAN12-E	Fan with nonport-side exhaust airflow	08.0.70	Yes
ICX-FAN12-I	Fan with nonport-side intake airflow	08.0.70	Yes

TABLE 6 Rack mount kits

Part number	Description
XBR-R000295	1U, 1.5U, and 2U Universal Kit for Four-Post Racks

Device Overview

Hardware features

The Ruckus ICX 7650 is a high-density aggregation switch that offers 10/100 Mbps Ethernet, 1/10 Gigabit Ethernet (GbE), and 10/40/100 GbE line rates, low latency cut-through switching, and up to 464 Gbps throughput for campus LAN and classic Ethernet data center environments.

The Ruckus ICX 7650 switch features:

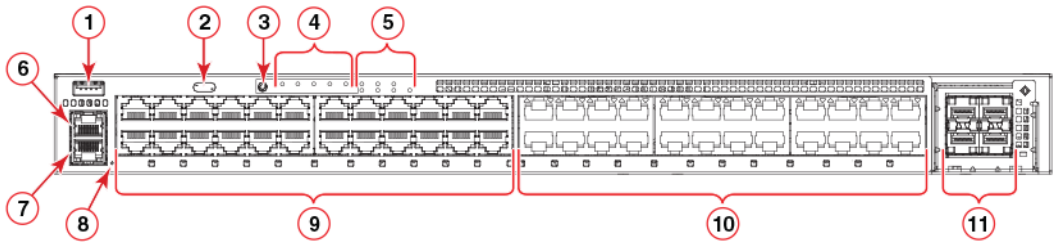
- Comprehensive support for a range of 1 GbE, 10 GbE, 40 GbE, and 100 GbE optics (refer to the latest Ruckus Optics Family Data Sheet)
- Dual redundant, hot-swappable power supplies available with intake or exhaust airflow (250 W AC or 510 W DC for non-PoE switches, and 1000 W AC or 510 W DC for PoE switches)
- Copper ports supporting PoE, PoE+, High PoE, and PoH (ICX 7650-48P and ICX 7650-48ZP)
- SFP ports supporting 1 GbE transceivers and SFP+ ports supporting 10 GbE transceivers (ICX 7650-48F)
- 10 GbE SFP+ expansion module with four 1/10 GbE SFP+ ports
- 40 GbE QSFP+ expansion module with two 40 GbE QSFP+ ports
- 100 GbE QSFP28 expansion module with one 100 GbE QSFP28 port
- Two 40 GbE QSFP+ and two 40/100 GbE QSFP28 stacking ports (supporting stacking for up to twelve switches)
- Dual redundant, hot-swappable fan trays available with intake or exhaust airflow
- One Gigabit Ethernet port (RJ-45) for out-of-band management
- RJ-45 and USB Type-C serial management ports to configure and manage the switch through the CLI
- One USB port for the transfer of software and configuration files from an external disk drive

Port-side views of the Ruckus ICX 7650 switch

Figure 1 shows the front view of the Ruckus ICX 7650-48ZP switch.

NOTE
PoE/PoE+ power is available to ports 1-24. High PoE/PoH is limited to ports 25-48.

FIGURE 1 Front view of the Ruckus ICX 7650-48ZP

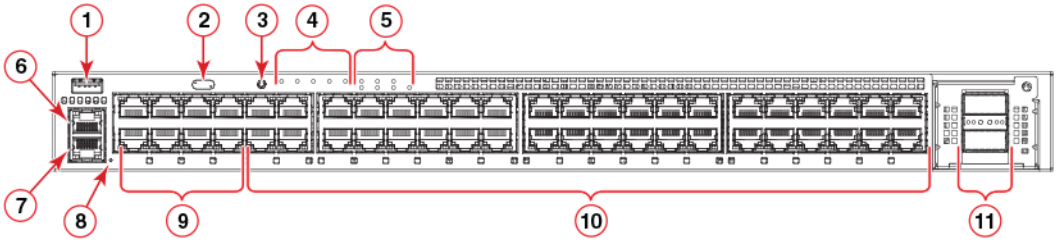


1	USB port (for flash drive)	7	Management port (RJ-45)
2	USB Type-C console port	8	Reset button
3	Status mode button	9	10/100/1000Base-T RJ-45 ports 1-24 supporting PoE/PoE+
4	Status mode LEDs	10	100M/1G/2.5G/5G/10GBase-T RJ-45 ports 25-48 supporting High PoE/PoH
5	System LEDs	11	Module 2 — expansion module ports
6	RJ-45 console port		

Figure 2 shows the front view of the Ruckus ICX 7650-48P switch.

NOTE
High PoE/PoH is limited to ports 1-8. PoE/PoE+ power is available to ports 9-48.

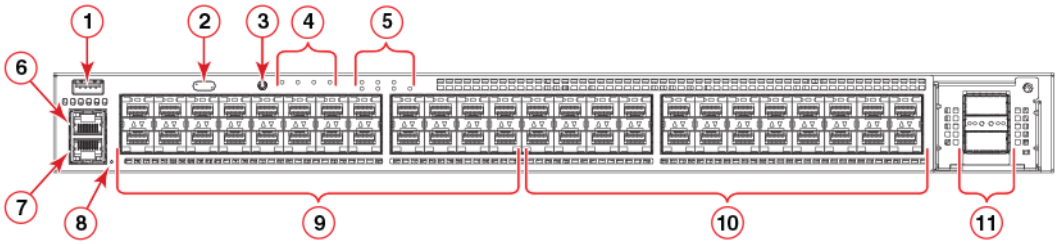
FIGURE 2 Front view of the Ruckus ICX 7650-48P



1	USB port (for flash drive)	7	Management port (RJ-45)
2	USB Type-C console port	8	Reset button
3	Status mode button	9	10/100/1000Base-T RJ-45 ports 1-8 supporting High PoE/PoH
4	Status mode LEDs	10	10/100/1000Base-T RJ-45 ports 9-48 supporting PoE/PoE+
5	System LEDs	11	Module 2 — expansion module ports
6	RJ-45 console port		

Figure 3 shows the front view of the Ruckus ICX 7650-48F switch.

FIGURE 3 Front view of the Ruckus ICX 7650-48F

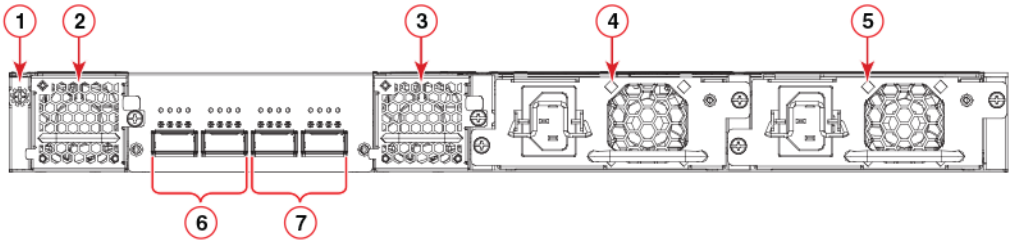


1 USB port (for flash drive)
2 USB Type-C console port
3 Status mode button
4 Status mode LEDs
5 System LEDs
6 RJ-45 console port
7 Management port (RJ-45)
8 Reset button
9 SFP ports 1-24
10 SFP+ ports 25-48
11 Module 2 — expansion module ports

Nonport-side view of the Ruckus ICX 7650 switch

Figure 4 shows the rear view of the Ruckus ICX 7650 switch.

FIGURE 4 Rear view of the Ruckus ICX 7650



1 Grounding terminal
2 Fan tray 2
3 Fan tray 1
4 Power supply unit 2
5 Power supply unit 1
6 Module 3 — 40 GbE QSFP+ stacking/uplink ports
7 Module 3 — 40/100 GbE QSFP28 stacking/uplink ports

Device management options

You can use the management functions built into the switch to monitor the port status, physical status, and other information to help you analyze device performance and system debugging. The switch automatically performs power-on self-test (POST) each time it is turned on.

You can manage the switch using any of the management options listed in the following table.

TABLE 7 Management options for the switch

Management tool	Out-of-band support	In-band support	Reference documents
Command line interface (CLI)	Ethernet or serial connection	N/A	*Ruckus FastIron Command Reference*
REST or NETCONF/YANG APIs.	Ethernet connection	Yes	*Ruckus FastIron Management Configuration Guide*
Standard SNMP applications	Ethernet or serial connection	N/A	*Ruckus FastIron Management Configuration Guide*

Preparing for Installation

Safety precautions

When using this product, observe all danger, caution, and attention notices in this manual. The safety notices are accompanied by symbols that represent the severity of the safety condition.

Refer to "Cautions and Danger Notices" on page 87 for translations of safety notices for this product.

General precautions

DANGER
The procedures in this manual are for qualified service personnel.

DANGER
Before beginning the installation, see the precautions in "Power precautions."

DANGER
Be careful not to accidently insert your fingers into the fan tray while removing it from the chassis. The fan may still be spinning at a high speed.

CAUTION
Changes or modifications made to this device that are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

CAUTION
Disassembling any part of the power supply and fan assembly voids the warranty and regulatory certifications. There are no user-serviceable parts inside the power supply and fan assembly.

CAUTION
Make sure the airflow around the front, sides, and back of the device is not restricted.

CAUTION
Ensure that the airflow direction of the power supply unit matches that of the installed fan tray. The power supplies and fan trays are clearly labeled with either a green arrow with an "E", or an orange arrow with an "I."

CAUTION
To protect the serial port from damage, keep the cover on the port when not in use.

CAUTION
Never leave tools inside the chassis.

CAUTION
If you do not install a module or a power supply in a slot, you must keep the slot filler panel in place. If you run the chassis with an uncovered slot, the system will overheat.

CAUTION
Use the screws specified in the procedure. Using longer screws can damage the device.

CAUTION
Do not install the device in an environment where the operating ambient temperature might exceed 50°C (122°F).

CAUTION
Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the manufacturer's instructions.

ESD precautions

DANGER
For safety reasons, the ESD wrist strap should contain a series 1 megohm resistor.

CAUTION
Static electricity can damage the chassis and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

CAUTION
Before plugging a cable into any port, be sure to discharge any static charge stored on the cable by touching the electrical contacts to ground surface.

Power precautions

DANGER
If the installation requires a different power cord than the one supplied with the device, make sure you use a power cord displaying the mark of the safety agency that defines the regulations for power cords in your country. The mark is your assurance that the power cord can be used safely with the device.

DANGER
Disconnect the power cord from all power sources to completely remove power from the device.

DANGER
This device might have more than one power cord. To reduce the risk of electric shock, disconnect all power cords before servicing.

CAUTION
To avoid high voltage shock, do not open the device while the power is on.

CAUTION
Use a separate branch circuit for each power cord, which provides redundancy in case one of the circuits fails.

CAUTION
Ensure that the device does not overload the power circuits, wiring, and over-current protection. To determine the possibility of overloading the supply circuits, add the ampere (amp) ratings of all devices installed on the same circuit as the device. Compare this total with the rating limit for the circuit. The maximum ampere ratings are usually printed on the devices near the input power connectors.

Lifting precautions

DANGER
Use safe lifting practices when moving the product.

DANGER
Mount the devices you install in a rack as low as possible. Place the heaviest device at the bottom and progressively place lighter devices above.

CAUTION
Make sure the rack housing the device is adequately secured to prevent it from becoming unstable or falling over.

CAUTION
To prevent damage to the chassis and components, never attempt to lift the chassis using the fan or power supply handles. These handles were not designed to support the weight of the chassis.

Laser precautions

DANGER
All fiber-optic interfaces use Class 1 lasers.

DANGER
Laser radiation. Do not view directly with optical instruments. Class 1M laser products.

DANGER
Use only optical transceivers that are qualified by Ruckus and comply with the FDA Class 1 radiation performance requirements defined in 21 CFR Subchapter I, and with IEC 825 and EN60825. Optical products that do not comply with these standards might emit light that is hazardous to the eyes.

Facility requirements

To install and operate the device successfully, ensure compliance with the following electrical, environmental, location, and cable management requirements.

Electrical considerations

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

- The primary outlet is correctly wired, protected by a circuit breaker, and grounded in accordance with local electrical codes.
- The supply circuit, line fusing, and wire size are adequate, as specified by the electrical rating on the device nameplate.
- The power supply standards are met.

Environmental considerations

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

- Because the Ruckus ICX 7650 switch can be ordered with fans that move air either front to back or back to front, be sure to orient your switch with the airflow pattern of any other devices in the rack. All equipment in the rack should force air in the same direction to avoid intake of exhaust air.
- Some combinations of intake and exhaust airflows may not be compatible with your environment. Consult your fan assembly and power supply module FRU kits to determine the correct configuration.
- The ambient air temperature does not exceed 45°C (113°F).

Location considerations

Before installing the device, plan its location and orientation relative to other devices and equipment. Devices can be mounted in a standard 19-inch equipment rack or on a flat horizontal surface.

The site should meet the following requirements:

- Maintain the operating environment as specified in "Environmental considerations" on page 10.
- Allow a minimum of 7.62 cm (3 in.) of space between the front and the back of the device and walls or other obstructions for proper airflow.
- Allow at least 7.62 cm (3 in.) of space at the front and back of the device for the twisted-pair, fiber-optic, and power cabling.
- Allow access space for installing, cabling, and maintaining the devices.
- Ensure the status LEDs are clearly visible.

- Allow for twisted-pair cables to be routed away from power lines, fluorescent lighting fixtures, and other sources of electrical interference, such as radios and transmitters.
- Allow for the unit to be connected to a separate grounded power outlet that provides 100 to 240 VAC, 50 to 60 Hz, is within 2 m (6.6 ft) of each device, and is powered from an independent circuit breaker. As with any equipment, a filter or surge suppressor is recommended.

Rack considerations

For successful installation and operation of the device in a rack, ensure the following rack requirements are met:

- The rack must be a standard EIA rack.
- The equipment in the rack is grounded through a reliable branch circuit connection and maintains ground at all times. Do not rely on a secondary connection to a branch circuit, such as a power strip.
- Airflow and temperature requirements are met on an continual basis, particularly if the device is installed in a closed or multirack assembly.
- The additional weight of the device does not exceed the rack's weight limits or unbalance the rack in any way.
- The rack is secured to ensure stability in case of unexpected movement, such as an earthquake.

Recommendations for cable management

Cables can be organized and managed in a variety of ways; for example, use cable channels on the sides of the rack or patch panels to reduce the potential for tangling the cables. The following list provides some recommendations for cable management:

CAUTION
Before plugging a cable to any port, be sure to discharge any static charge stored on the cable by touching the electrical contacts to ground surface.

NOTE
You should not use tie wraps with fiber-optic cables because they are easily overtightened and can damage the optical fibers. Velcro-like wraps are recommended.

- Plan for the rack space required for cable management before installing the device.
- Leave at least 1 m (3.28 ft) of slack for each port cable. This provides room to remove and replace the device, allows for inadvertent movement of the rack, and helps prevent the cables from being bent to less than the minimum bend radius.
- For easier maintenance, label the cables and record the devices to which they are connected.
- Keep LEDs visible by routing port cables and other cables away from the LEDs.

Quick installation checklist

This checklist provides a high-level overview of the basic installation process from the planning stage to the point where the device comes online and is ready to be deployed. Completing all the tasks in the suggested order ensures successful installation. Ruckus recommends that you print this checklist and take it to the installation site.

Follow the steps listed in Table 8 to install your device. Details for each of these steps are provided on the pages indicated.

TABLE 8 Installation tasks

Task number	Task	Where to find more information	Completed
1	Ensure that the physical environment that will host the device has the proper cabling and ventilation.	"Facility requirements" on page 10	
2	If customizing a Ruckus ICX 7650 switch baseline chassis: 1. Install at least one power supply unit. 2. Install at least one fan. 3. Install an expansion module.	"Inserting a new AC power supply" on page 59 "Inserting a new fan assembly" on page 65 "Installing or replacing an expansion module" on page 69	
3	Mount the device on a desktop or in a rack.	"Installing the device on a desktop" on page 16 "Installing the 1U, 1.5U, and 2U Universal Kit for Four-Post Racks (XBR-R000295)" on page 19	
4	Connect devices in a stack	"Connecting devices in a stack" on page 30	
5	Plug the device into a nearby power source that adheres to the regulatory requirements outlined in this manual.	"Providing power to the device" on page 35	
6	Attach a terminal or PC to the device. This will enable you to configure the device through the command line interface (CLI).	"Establishing a first-time serial connection" on page 35	
7	Assign a password for additional access security. No default password is assigned to the CLI.	*Ruckus FastIron Command Reference*	
8	Before attaching equipment to the device, you must configure an interface IP address to the subnet on which the device will be located. Initial IP address configuration is performed using the CLI with a direct serial connection.	*Ruckus FastIron Command Reference*	
9	Connect network equipment to the system.	"Connecting network devices" on page 40	
10	Test IP connectivity to other devices by pinging them and tracing routes.	*Ruckus FastIron Command Reference*	
11	Continue configuring the device using the CLI.	*Ruckus FastIron Command Reference*	
12	Secure access to the device.	*Ruckus FastIron Management Configuration Guide*	

Shipping carton contents

Ruckus ICX 7650 devices ship with all of the following items included in the shipping carton. When unpacking the device, verify that the contents of the shipping carton is complete, if any items are missing, contact the place of purchase.

- The Ruckus ICX 7650 device
- An accessory kit containing the following items:
  - Rack mounting kit containing two L-shaped mounting brackets and two sets of eight sink-head screws
  - Two-post rack kit containing four rack-mounting screws and four cage nuts
  - Four rubber feet
  - One grounding kit, containing one grounding lug and one grounding screw

- One US AC power cord, shielded (included only with devices with pre-installed power supplies. -E2 devices have two power cords)
- One console cable (RJ45 to RJ45 cross-over)
- One RJ45-to-DB9 adapter
- Installed filler panels for the PSU slot, expansion module slot, or fan tray slot where such modules are not supplied for the switch
- China ROHS sheet
- Read Me First document

Mounting the Device

Mounting options

You can install the Ruckus ICX 7650 in the following ways:

- As a standalone unit on a flat surface.
- In an EIA rack using a fixed-rail rack mount kit. The optional 4-post universal rack mount kit can be ordered from your switch retailer to support up to a 30-inch deep rack. The 4-post rack mount kit includes mid-mount and rear-mount brackets.
- In a two-post Telco rack using a flush-mount rack kit. The 2-post rack mount ears are included with the switch and support various mounting positions (refer to Figure 6).

Precautions specific to mounting

The following precautions specifically apply to mounting the device.

DANGER
Use safe lifting practices when moving the product.

CAUTION
Make sure the rack housing the device is adequately secured to prevent it from becoming unstable or falling over.

CAUTION
Make sure the airflow around the front and sides of the device is not restricted.

CAUTION
Never leave tools inside the device.

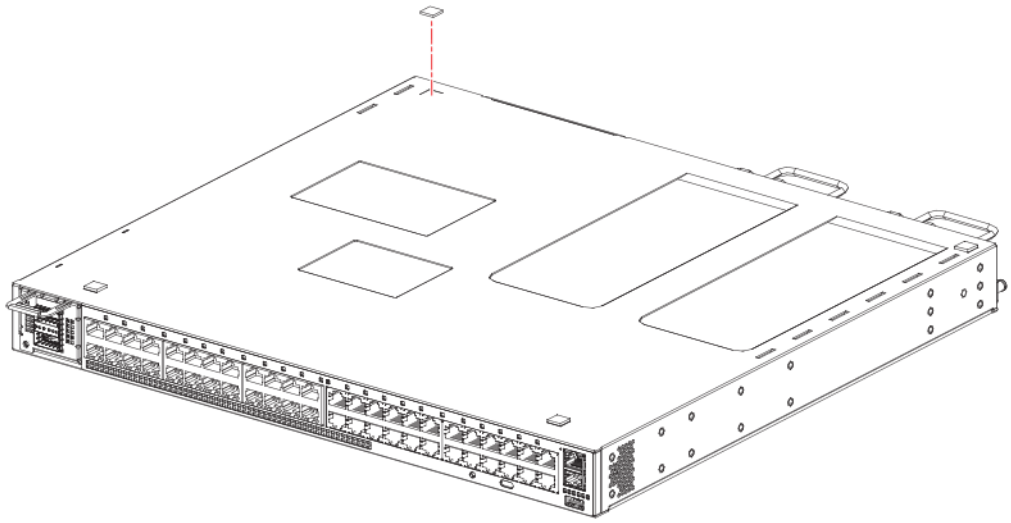
CAUTION
Use the screws specified in the procedure. Using longer screws can damage the device.

CAUTION
Do not install the device in an environment where the operating ambient temperature might exceed 50°C (122°F).

Installing the device on a desktop

Complete the following steps to install the Ruckus ICX 7650 on a desktop or other flat surface.

FIGURE 5 Attaching the adhesive feet



1. Attach the four adhesive feet to the bottom of the device.
2. Set the device on a flat desktop, table, or shelf near an AC power source. Make sure that adequate ventilation is provided for the system. A 7.62 cm (3-inch) clearance is recommended on each side.
3. If installing a single device only, go to "Providing power to the device".
4. If installing multiple devices, attach the adhesive feet to each device. Place each device squarely on top of the one below.

Installing the device in a rack

CAUTION
Make sure the rack housing the device is adequately secured to prevent it from becoming unstable or falling over.

NOTE
You need a #2 Phillips screwdriver for installation.

Before mounting the switch in a rack, pay particular attention to the following factors:

- Temperature: Because the temperature within a rack assembly may be higher than the ambient room temperature, check that the rack-environment temperature is within the specified operating temperature range. (Refer to "Environmental considerations" on page 10.)

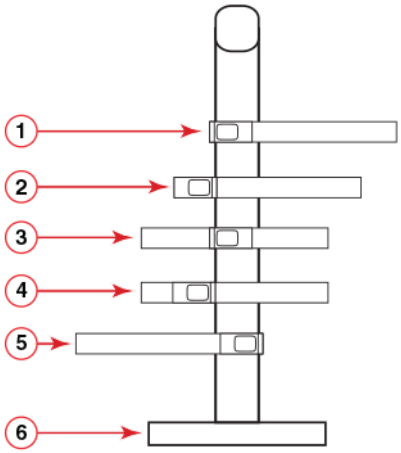
- Mechanical loading: Do not place any equipment on top of a rack-mounted unit.
- Circuit overloading: Be sure that the supply circuit to the rack assembly is not overloaded.
- Grounding: Rack-mounted equipment should be properly grounded. Particular attention should be given to supply connections other than direct connections to the mains electricity supply.

To mount the product into a four-post rack, you can order a four-post rack kit with the part number XBR-R000295. For the procedures to install this kit, refer to "Installing the 1U, 1.5U, and 2U Universal Kit for Four-Post Racks (XBR-R000295)" on page 19.

Two-post rack mount installation

The Ruckus ICX 7650 can be installed in a two-post rack in various mounting positions, as shown in Figure 6.

FIGURE 6 Two-post rack mounting positions



1	Front flush mount	4	Reverse mid-mount
2	Reverse-front mount	5	Rear mount
3	Front mid-mount	6	Two-post rack, side view

NOTE
Use the following procedure when installing the Ruckus ICX 7650 in a two-post rack. For four-post racks, follow the procedures in "Installing the 1U, 1.5U, and 2U Universal Kit for Four-Post Racks (XBR-R000295)" on page 19.

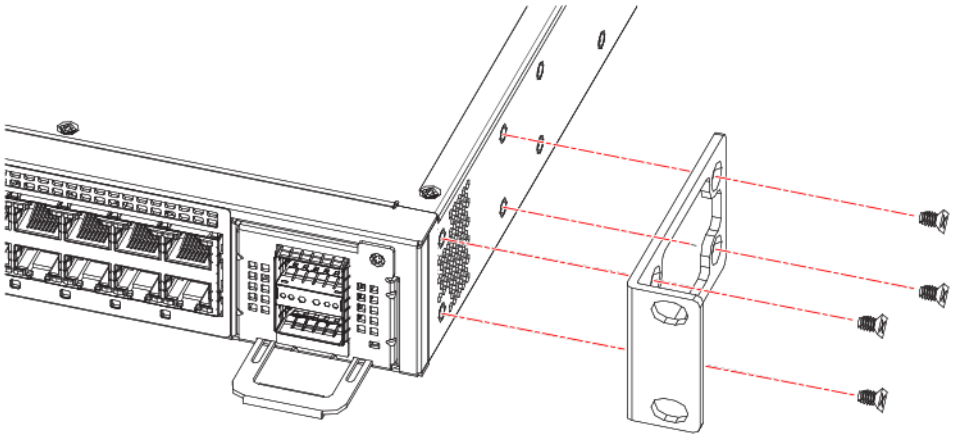
Use the following steps to mount the Ruckus ICX 7650 in a two-post rack.

1. Remove the rack mount kit from the shipping carton. The kit contains the following items:
   - Two L-shaped mounting brackets
   - Eight 8-32 x 5/16-in. panhead Phillips screws
2. Attach the mounting brackets to the sides of the device as illustrated in Figure 7 using the 8-32 x 5/16-in. screws.

NOTE
Be sure to use only the screws included in the Ruckus ICX 7650 kit.

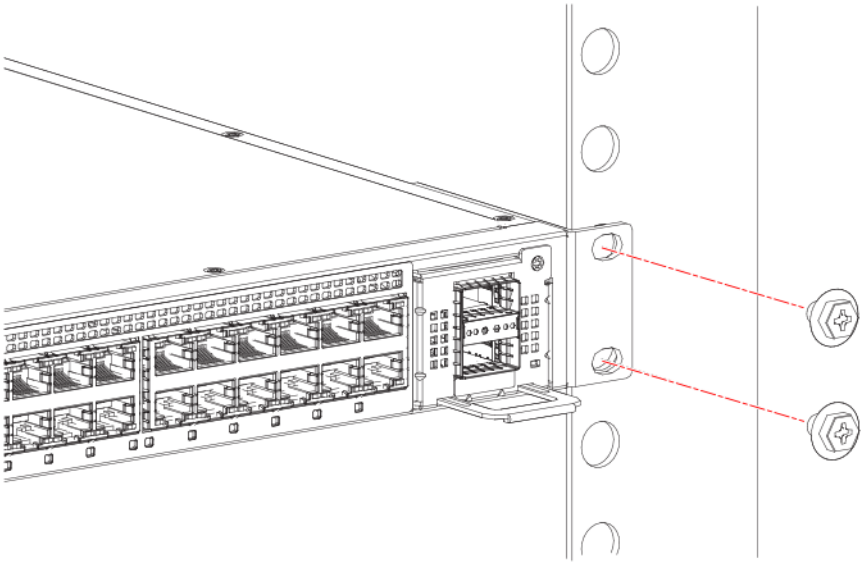
NOTE
Hardware devices illustrated in these procedures are only for reference and may not depict the device you are installing into the rack.

FIGURE 7 Attaching the mounting brackets for a Ruckus ICX 7650



3. Position the device in the rack, providing temporary support under the switch until the rail kit is secured to the rack.
4. Attach the front right bracket to the rail rack using two 10-32 x 5/8-in. screws and the appropriate round-hole or square-hole retainer nuts.
5. Repeat step 4 to attach the left front bracket to the left front rack rail and tighten all 10-32 x 5/8-in. screws to a torque of 25 in-lb (29 cm-kg). Refer to Figure 8.

FIGURE 8 Installing the Ruckus ICX 7650 in a two-post rack



Proceed to "Establishing a first-time serial connection" on page 35.

Installing the 1U, 1.5U, and 2U Universal Kit for Four-Post Racks (XBR-R000295)

Use the following instructions to install a Ruckus ICX 7650 switch in a 19-in. (48.3 cm) EIA rack using the 1U, 1.5U, and 2U Universal Kit for Four-Post Racks (XBR-R000295).

The device can be installed so that the port side is either flush with the front posts or recessed with the non-port side flush with the rear posts. A recessed position allows a more gradual bend in the fiber-optic cables connected to the device and less interference in the aisle at the front of the rack.

> NOTE
> Hardware devices illustrated in these procedures are only for reference and may not depict the device you are installing into the rack.

Installation requirements

Review the installation and facility requirements for your product before mounting the device. Refer to "Facility requirements" on page 10 for more information.

Use Electronic Industries Association (EIA) standard racks. Provide space in a 19-in. (48.3 cm) EIA rack, as required for the device type, with a minimum distance of 24 in. (609.60 mm) and a maximum distance of 32 in. (812.80 mm) between the front and back posts.

Time and items required

Allow 15 to 30 minutes to complete this procedure.

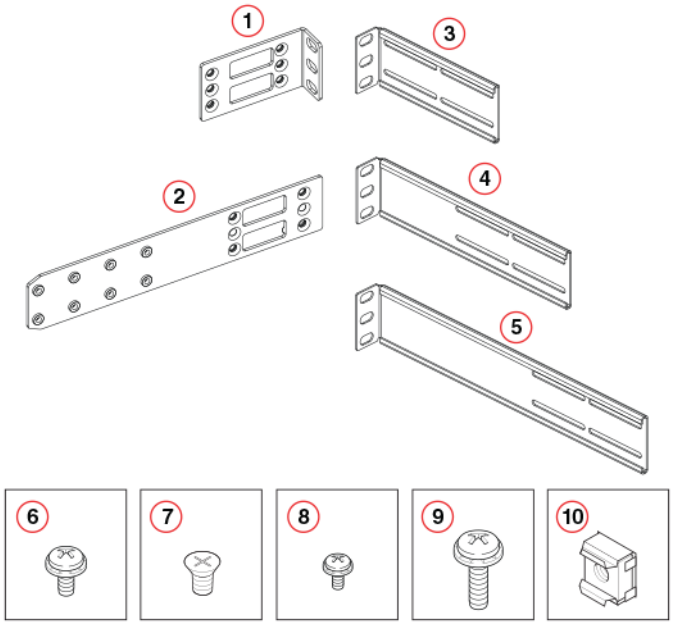
The following items are required to install the device using the 1U, 1.5U, and 2U Universal Kit for Four-Post Racks (XBR-R000295):

- Clamps or other means of temporarily supporting the device in the rack
- #2 Phillips torque screwdriver
- 1/4-inch slotted-blade torque screwdriver

Parts list

The following parts are provided with the 1U, 1.5U, and 2U Universal Kit for Four-Post Racks (XBR-R000295) installation.

FIGURE 9 Rack kit parts



1	Front brackets (2)	6	Screw, 8-32 x 5/16-in., panhead Phillips (8)
2	Bracket extensions (2)	7	Screw, 8-32 x 5/16-in., flathead Phillips (16)
3	Rear brackets, short (2)	8	Screw, 6-32 x 1/4-in., panhead Phillips (8)
4	Rear brackets, medium (2)	9	Screw, 10-32 x 5/8-in., panhead Phillips (8)
5	Rear brackets, long (2)	10	Retainer nut, 10-32 (8)

Flush-front mounting the device in the rack

CAUTION
The device must be turned off and disconnected from the fabric during this procedure.

NOTE
The illustrations in the rack installation procedures are for reference only and may not show the actual device.

Complete the following tasks to install the device in a four-post rack.

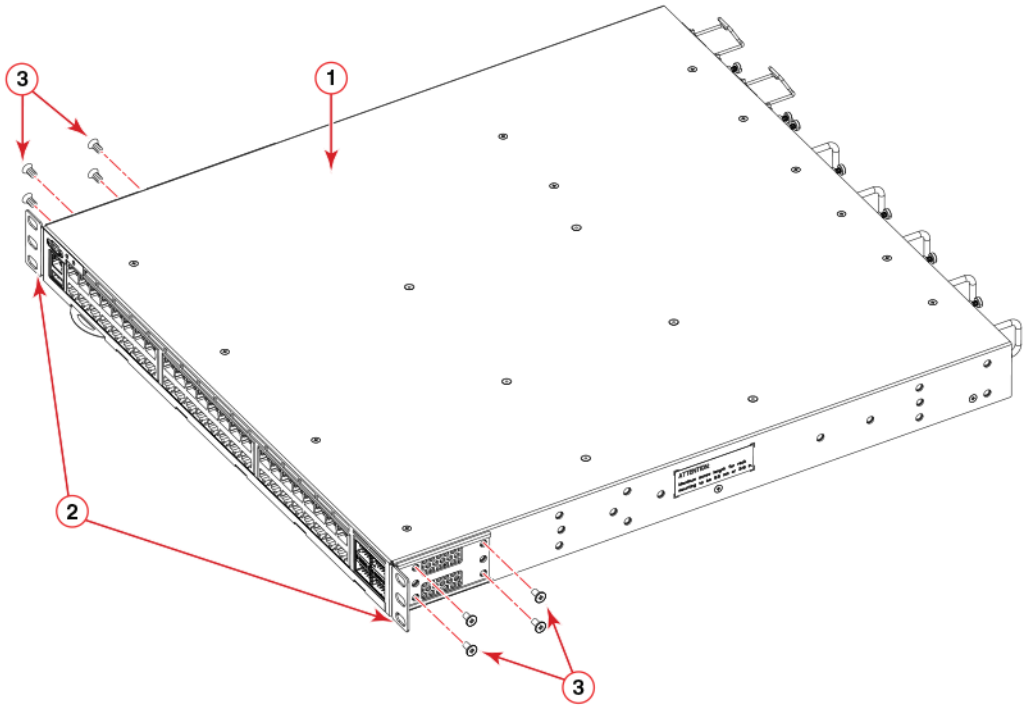
1. "Attaching the front brackets" on page 20
2. "Attaching the extension brackets to the device" on page 21
3. "Installing the device in the rack" on page 22
4. "Attaching the rear brackets to the extensions" on page 23
5. "Attaching the rear brackets to the rack posts" on page 24

Attaching the front brackets

Complete the following steps to attach the front brackets to the device.

1. Position the right front bracket with the flat side against the right side of the device at the front of the device, as shown in Figure 10.
2. Insert four 8-32 x 5/16-in. flathead screws through the vertically aligned holes in the bracket and then into the holes on the side of the device. Use the upper and lower screw holes, leaving the center holes empty.
3. Repeat Step 1 and Step 2 to attach the left front bracket to the left side of the device.
4. Tighten all the 8-32 x 5/16-in. screws to a torque of 15 in-lb (17 cm-kg).

FIGURE 10 Attaching the front brackets



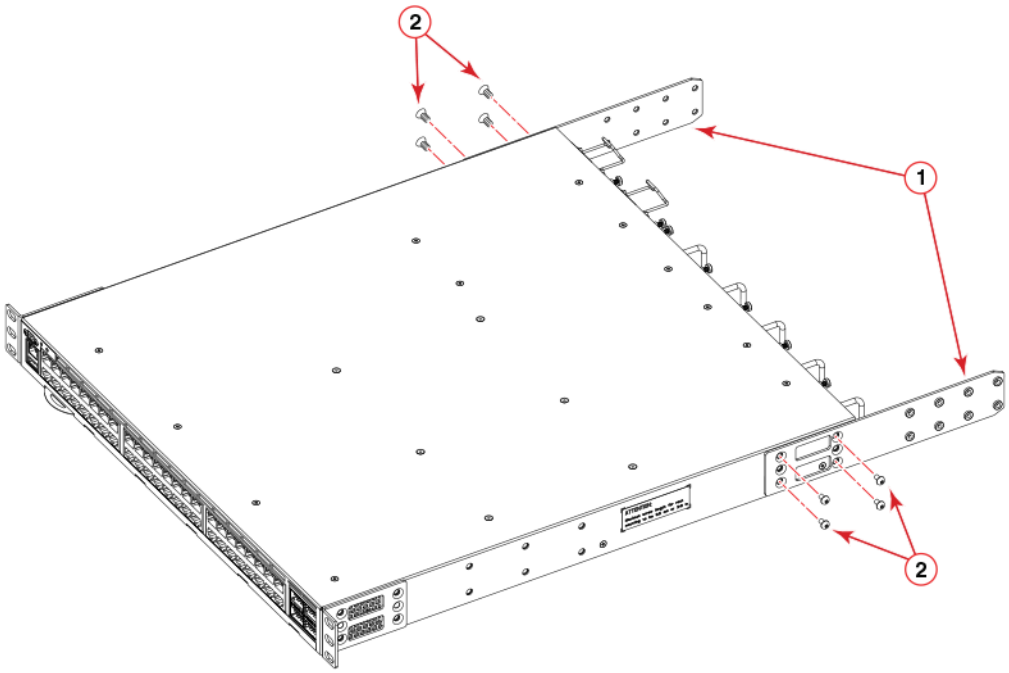
1 Device
2 Front brackets
3 Screws, 8-32 x 5/16-in., flathead Phillips

Attaching the extension brackets to the device

Complete the following steps to attach the extension brackets to the device. There are medium and long extension brackets that you can use for this step. Choose the correct extension bracket for the depth of your rack.

1. Select the proper length extension bracket for your rack depth.
2. Position the right extension bracket along the side of the device as shown in Figure 11.
3. Insert four 8-32 x 5/16-in. flathead screws through the vertically aligned holes in the extension bracket and then into the holes on the side of the device. Use the upper and lower screw holes, leaving the center holes empty.
4. Repeat Step 1 and Step 2 to attach the left extension bracket to the left side of the device.
5. Tighten all the 8-32 x 5/16-in. screws to a torque of 15 in-lb (17 cm-kg).

FIGURE 11 Attaching the extension brackets to the device



1 Bracket extensions

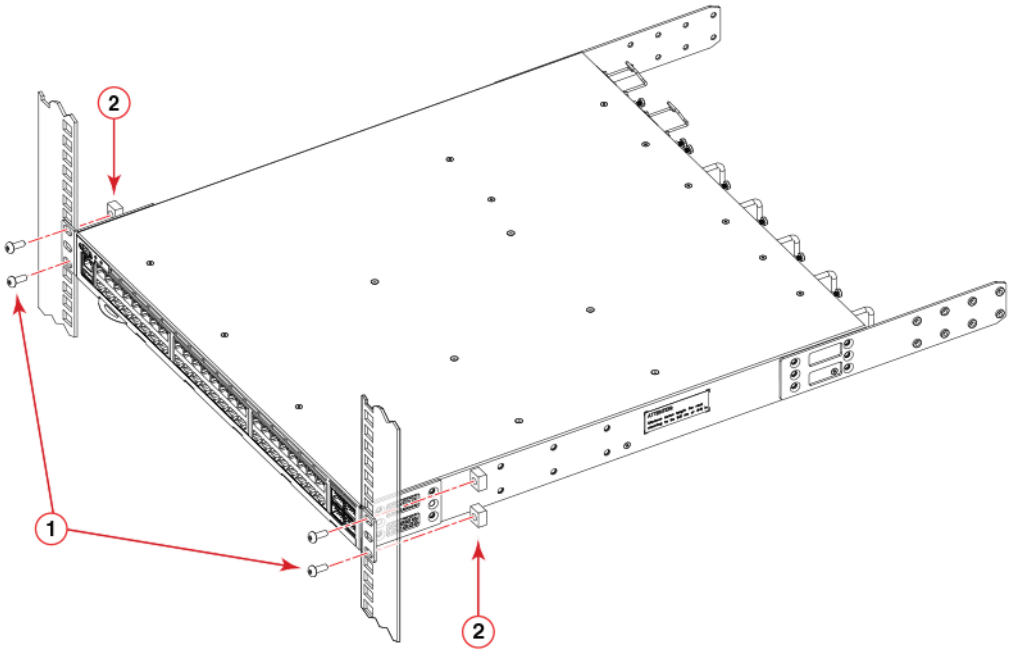
2 Screws, 8-32 x 5/16-in., flathead Phillips

Installing the device in the rack

Complete the following steps to install the device in the rack.

1. Position the device in the rack, as shown in Figure 12, providing temporary support under the device until the rail kit is secured to the rack.
2. Attach the right front bracket to the right front rack post using two 10-32 x 5/8-in. panhead screws and two retainer nuts. Use the upper and lower holes in the bracket.
3. Attach the left front bracket to the left front rack post using two 10-32 x 5/8-in. panhead screws and two retainer nuts. Use the upper and lower holes in the bracket.
4. Tighten all the 10-32 x 5/8-in. screws to a torque of 25 in-lb (29 cm-kg).

FIGURE 12 Positioning the device in the rack



1 Screws, 10-32 x 5/8-in., panhead Phillips 2 Retainer nuts, 10-32

Attaching the rear brackets to the extensions

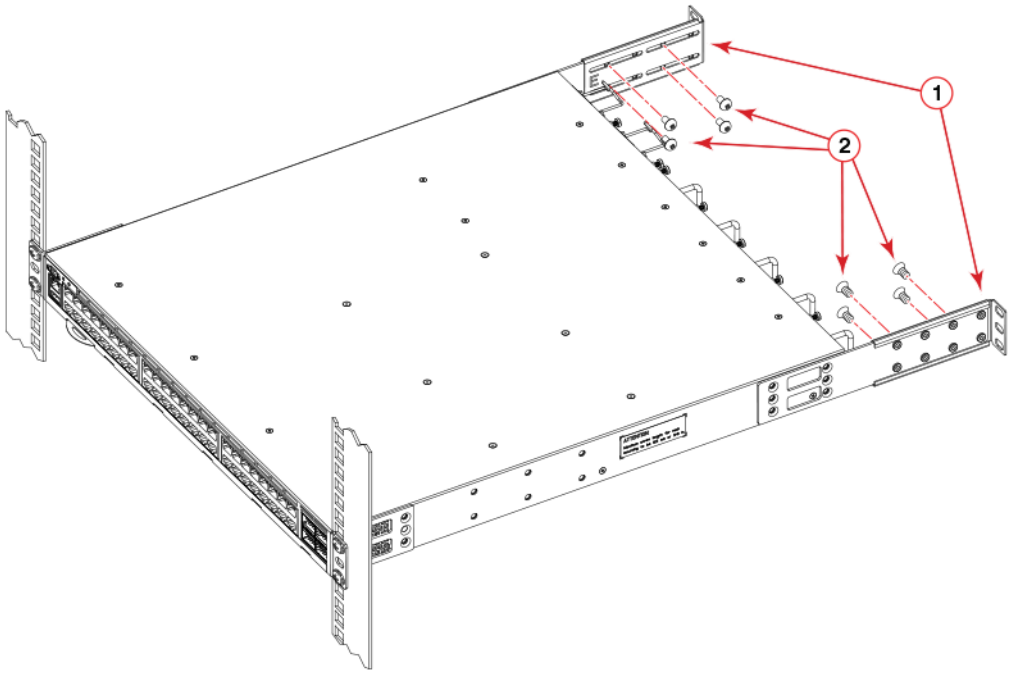
Complete the following steps to attach the rear brackets to the extensions. There are short and long rear brackets that you can use for this step. Choose the correct bracket for the depth of your rack.

1. Select the proper length rear bracket for your rack depth.
2. Slide the right rear bracket onto the right extension, as shown in Figure 13.

   The short rear brackets are shown. Use the first and third vertical pairs of holes for the screws.

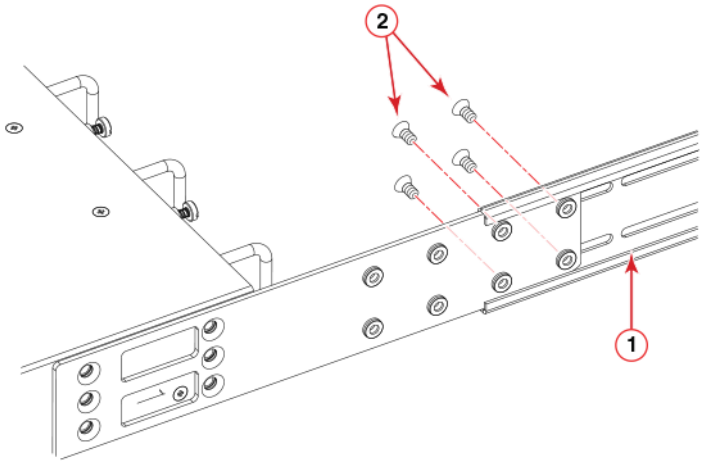
   Refer to Figure 14 for the positioning of the medium or long brackets and screws.
3. Attach the brackets using four 6-32 x 1/4-in. panhead screws.
4. Repeat step 2 and step 3 to attach the left rear bracket to the left extension.
5. Adjust the brackets to the rack depth and tighten all the 6-32 x 1/4-in. screws to a torque of 9 in-lb (10 cm-kg).

FIGURE 13 Attaching the rear brackets to the extensions



1	Rear brackets	2	Screws, 6-32 x 1/4-in., panhead Phillips

FIGURE 14 Attaching the medium or long rear brackets to the extensions



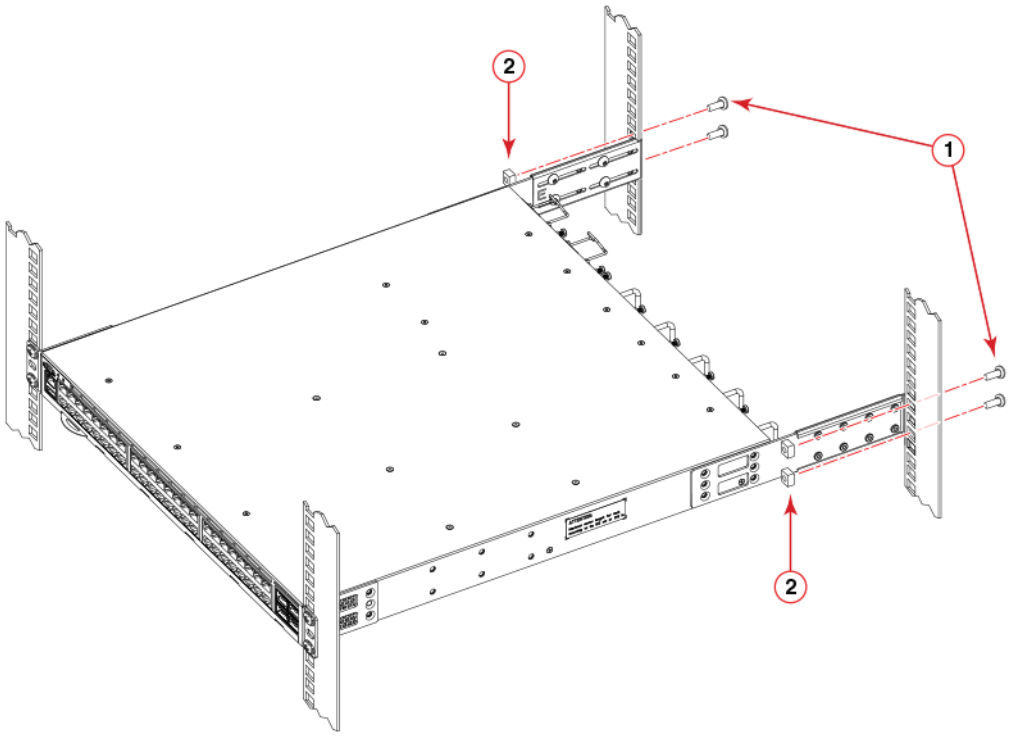
1	Rear bracket, medium or long	2	Screws, 6-32 x 1/4-in., panhead Phillips

Attaching the rear brackets to the rack posts

Complete the following steps to attach the rear brackets to the rack posts.

1. Attach the right rear bracket to the right rear rack post using two 10-32 x 5/8-in. panhead screws and two retainer nuts, as shown in Figure 15. Use the upper and lower holes in the bracket.
2. Attach the left rear bracket to the left rear rack post using two 10-32 x 5/8-in. panhead screws and two retainer nuts. Use the upper and lower holes in the bracket.
3. Tighten all the 10-32 x 5/8-in. screws to a torque of 25 in-lb (29 cm-kg).

FIGURE 15 Attaching the rear brackets to the rack posts



1 Screws, 10-32 x 5/8-in., panhead Phillips 2 Retainer nuts, 10-32

Flush-rear (recessed) mounting the device in the rack

The flush-rear (recessed) mounting is similar to the flush-front mounting except that the brackets are reversed on the device.

CAUTION
The device must be turned off and disconnected from the fabric during this procedure.

NOTE
The illustrations in the rack installation procedures show a 1U device, but the instructions are the same for a 1.5U or 2U device. The illustrations in the rack installation procedures are for reference only and may not show the actual device.

Complete the following tasks to install the device in a four-post rack:

1. "Attaching the front brackets to the rear of the device" on page 26
2. "Attaching the extensions to the front of the device" on page 26
3. "Installing the device in the rack" on page 27
4. "Attaching the rear brackets to the extensions at the front of the device" on page 28
5. "Attaching the rear brackets to the front rack posts" on page 29

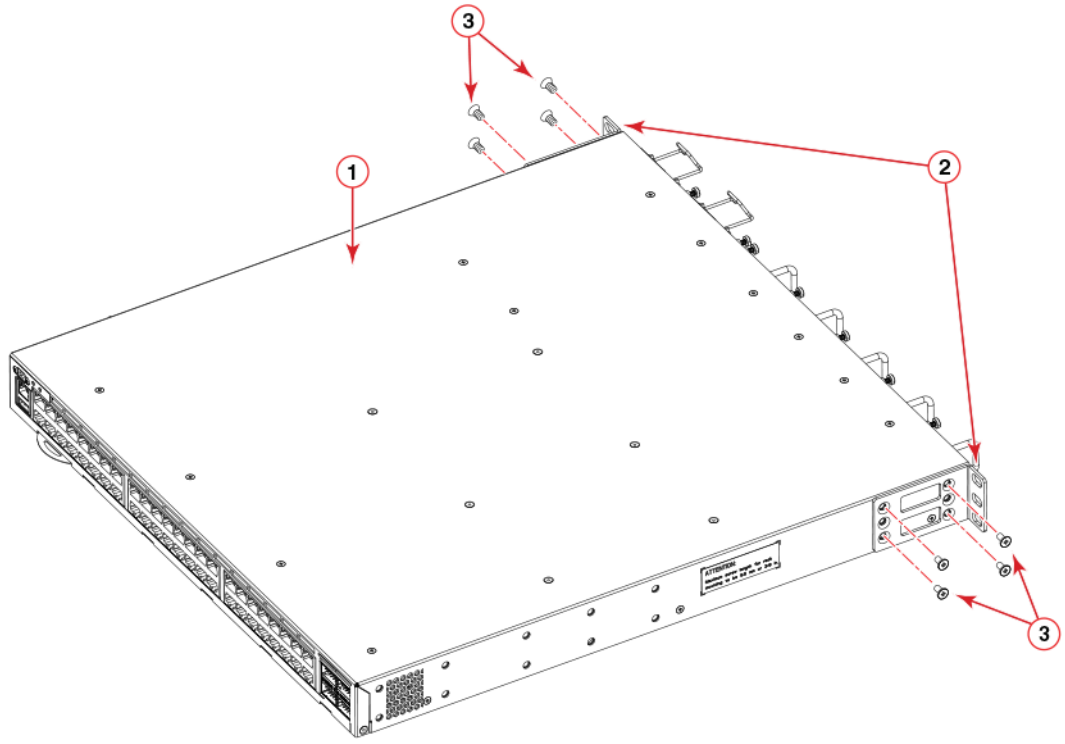
Attaching the front brackets to the rear of the device

> NOTE
> In this installation, the brackets are named as listed in the parts list even though the installation of the brackets is reversed from the flush-front installation.

Complete the following steps to attach the front brackets to the rear of the device.

1. Position the right front bracket with the flat side against the right rear side of the device, as shown in Figure 16.
2. Insert four 8-32 x 5/16-in. flathead screws through the vertically aligned holes in the bracket and then into the holes on the side of the device. Use the upper and lower screw holes, leaving the center holes empty.
3. Repeat Step 1 and Step 2 to attach the left rear bracket to the left side of the device.
4. Tighten all the 8-32 x 5/16-in. screws to a torque of 15 in-lb (17 cm-kg).

FIGURE 16 Attaching the front brackets to the rear of the device



1 Device
2 Front brackets
3 Screws, 8-32 x 5/16-in., flathead Phillips

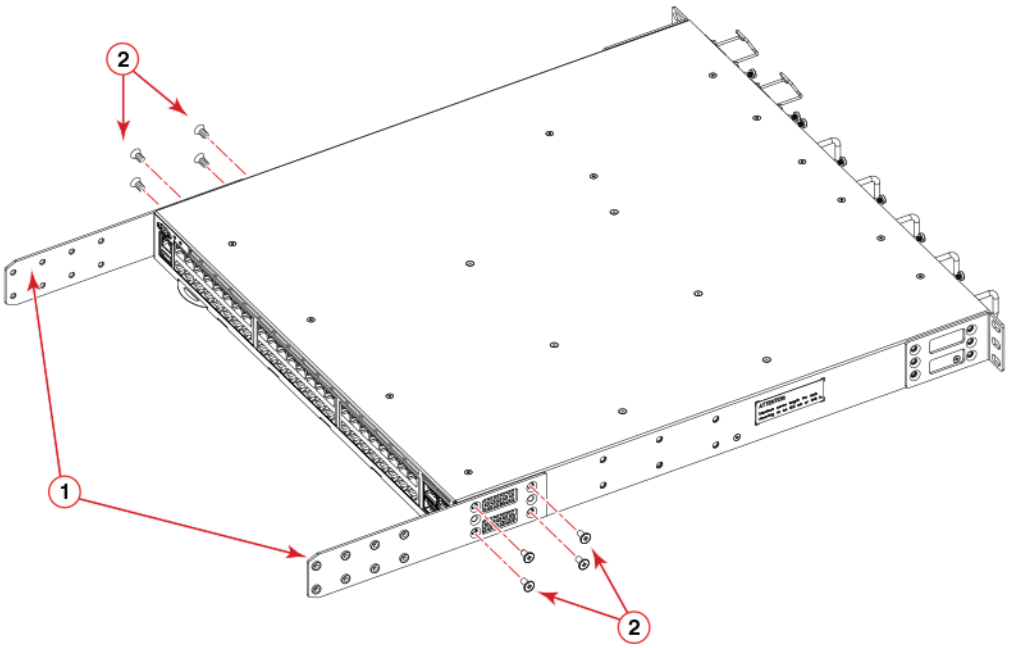
Attaching the extensions to the front of the device

Complete the following steps to attach the extension brackets to the front of the device. There are medium and long extension brackets that you can use for this step. Choose the correct extension for the depth of your rack.

1. Select the proper length extension bracket for your rack depth.
2. Position the right extension along the side of the device as shown in Figure 17.
3. Attach the bracket using four 8-32 x 5/16-in. flathead screws.

4. Repeat Step 1 and Step 2 to attach the left front extension to the left side of the device.
5. Tighten all the 8-32 x 5/16-in. screws to a torque of 15 in-lb (17 cm-kg).

FIGURE 17 Attaching the bracket extensions to the device



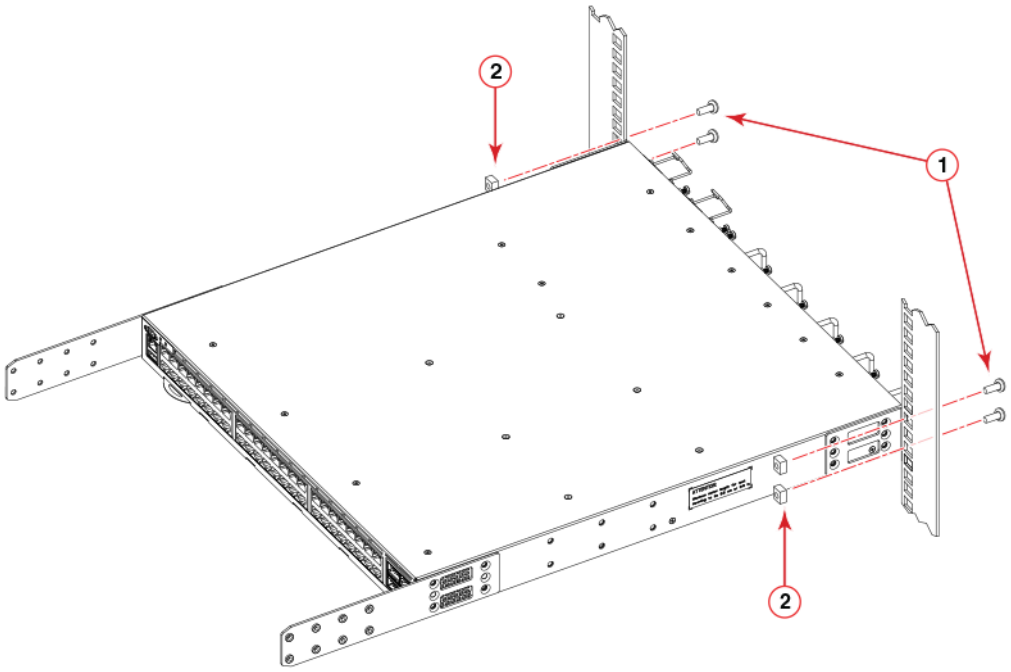
1 Extension brackets
2 Screws, 8-32 x 5/16-in., flathead Phillips

Installing the device in the rack

Complete the following steps to install the device in the rack.

1. Position the device in the rack, as shown in Figure 18, providing temporary support under the device until the rail kit is secured to the rack.
2. Attach the right front bracket to the right rear rack post using two 10-32 x 5/8-in. panhead screws and two retainer nuts. Use the upper and lower holes in the bracket.
3. Attach the left front bracket to the left rear rack post using two 10-32 x 5/8-in. panhead screws and two retainer nuts. Use the upper and lower holes in the bracket.
4. Tighten all the 10-32 x 5/8-in. screws to a torque of 25 in-lb (29 cm-kg).

FIGURE 18 Positioning the device in the rack



1 Screws, 10-32 x 5/8-in., panhead Phillips 2 Retainer nuts, 10-32

Attaching the rear brackets to the extensions at the front of the device

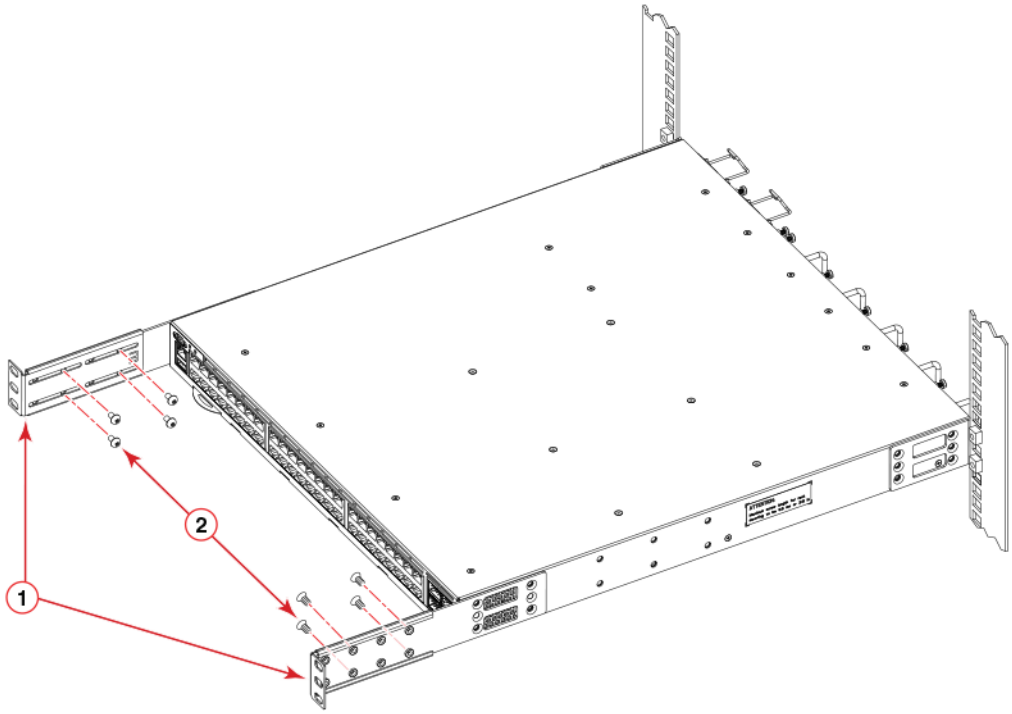
Complete the following steps to attach the rear brackets to the extensions. There are short and long front brackets that you can use for this step. Choose the correct bracket for the depth of your rack.

1. Select the proper length rear bracket for your rack depth.
2. Slide the right rear bracket onto the right extension, as shown in Figure 19.

   The short rear brackets are shown. Use the first and third vertical pairs of holes for the screws.

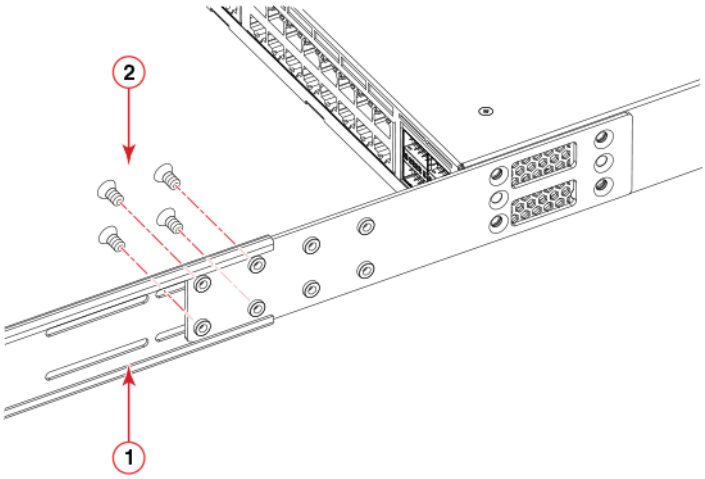
   Refer to Figure 20 for the positioning of the medium or long brackets and screws.
3. Attach the brackets using four 6-32 x 1/4-in. screws.
4. Repeat Step 2 and Step 3 to attach the left rear bracket to the left extension.
5. Adjust the brackets to the rack depth and tighten all the 6-32 x 1/4-in. screws to a torque of 9 in-lb (10 cm-kg).

FIGURE 19 Attaching the rear brackets to the extensions at the front of the device



1 Rear brackets, short 2 Screws, 6-32 x 1/4-in., panhead Phillips

FIGURE 20 Attaching the medium or long rear brackets to the extensions



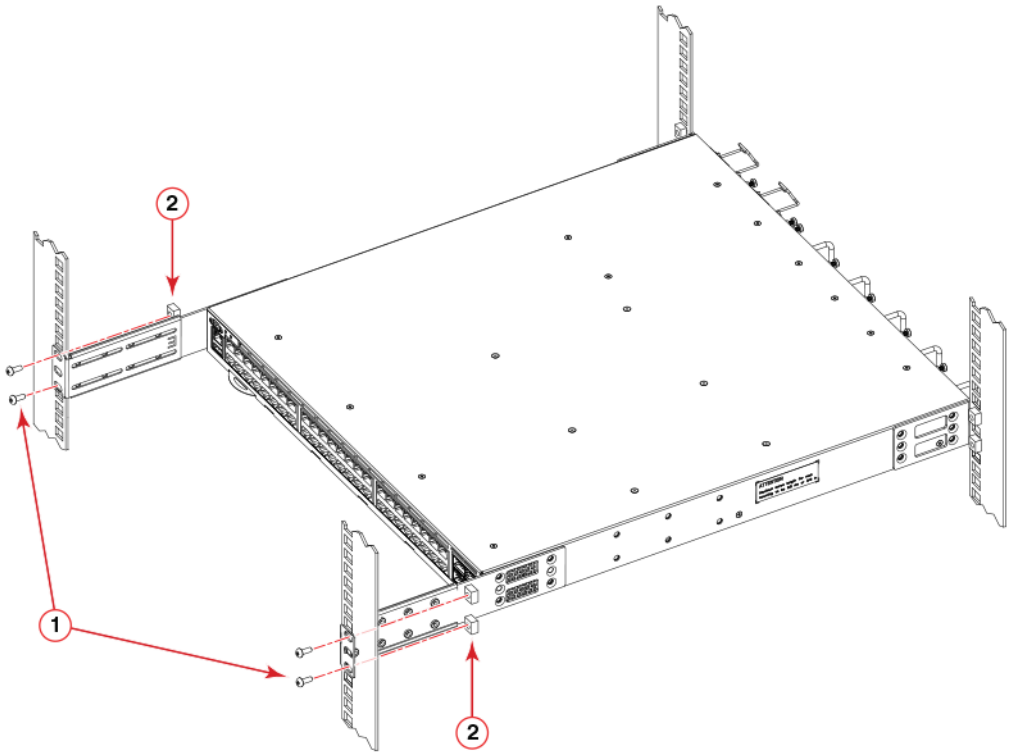
1 Rear bracket, medium or long 2 Screws, 6-32 x 1/4-in., panhead Phillips

Attaching the rear brackets to the front rack posts

Complete the following steps to attach the rear brackets to the front rack posts.

1. Attach the right rear bracket to the right front rack post using two 10-32 x 5/8-in. screws and two retainer nuts, as shown in Figure 21. Use the upper and lower holes in the bracket.
2. Attach the left rear bracket to the left front rack post using two 10-32 x 5/8-in. screws and two retainer nuts. Use the upper and lower holes in the bracket.
3. Tighten all the 10-32 x 5/8-in. screws to a torque of 25 in-lb (29 cm-kg).

FIGURE 21 Attaching the rear brackets to the front rack posts



1 Screws, 10-32 x 5/8-in., panhead Phillips 2 Retainer nuts, 10-32

Connecting devices in a stack

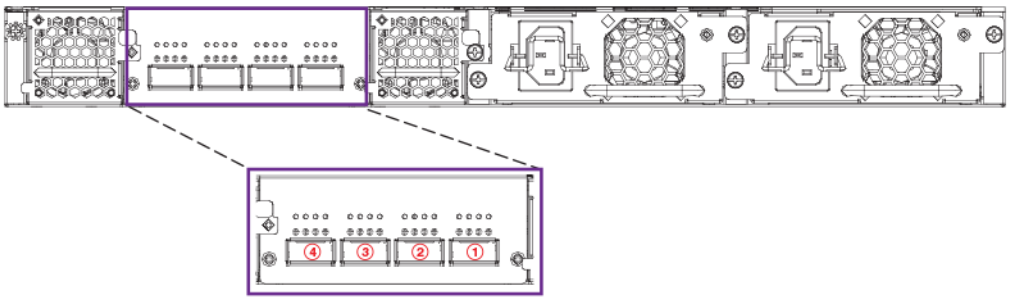
The Ruckus ICX 7650 can operate as a standalone device or as a member of a stack. A stack is a group of devices—Ruckus stackable units and their connected stacking links—that are connected so that the stack is managed as a single entity.

You can mix any Ruckus ICX 7650 models together in a stack. A stack cannot contain other device types.

Stacking ports

There are two QSFP+ ports and two QSFP28 ports on the rear-panel module (Module 3) that can be used as stacking ports. The following figure shows these ports 1/3/1 to 1/3/4 (right to left).

FIGURE 22 Stacking ports (rear panel)



1	40/100 GbE QSFP28 stacking port 1/3/1	3	40 GbE QSFP+ stacking port 1/3/3
2	40/100 GbE QSFP28 stacking port 1/3/2	4	40 GbE QSFP+ stacking port 1/3/4

The 100 GbE ports 1/3/1 and 1/3/2 are default stacking ports. Default stacking ports have the capability to accept special stacking packets during a CLI-initiated command sequence of the Secure Setup utility.

The ports on the front-panel module (Module 2) cannot be used as stacking ports. The Module 2 ports operate in uplink mode when the rear-panel Module 3 ports are operating in stacking mode. When the Module 3 ports operate in uplink mode, the Module 2 ports are disabled.

Stacking configuration requirements

Before configuring the stack using the CLI, physically connect the devices using stacking cables. For information about configuring a stack, refer to the *Ruckus FastIron Stacking Configuration Guide*.

Stacking cables

Use QSFP+/QSFP28 direct attached copper stacking cables or QSFP+/QSFP28 optics with fiber cables to connect the Ruckus ICX 7650 devices in a stack. The copper cable lengths for 40 GbE ports are 0.5 meter, 1 meter, 3 meters, or 5 meters.

> NOTE
> Stacking cables are not included in the shipping carton and must be ordered separately.

Stack size

A traditional stack can contain a maximum of twelve Ruckus ICX 7650 devices. A stack cannot contain other device types.

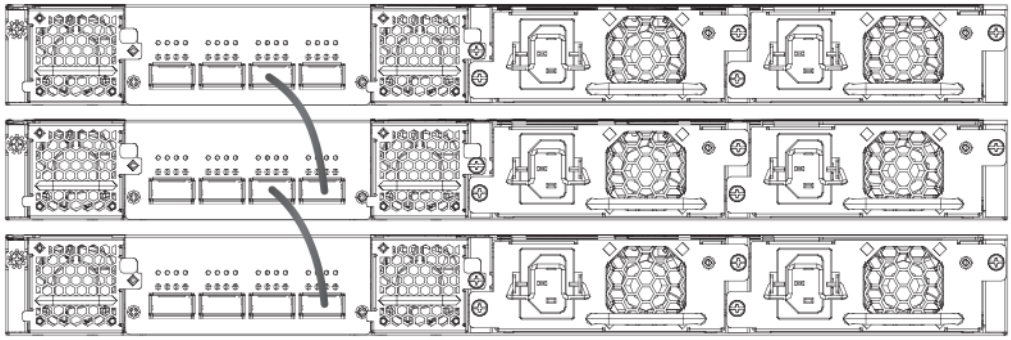
Stacking topologies

Both linear and ring topologies are supported in a stack. In a linear stack topology, there is a connection between each switch that carries two-way communications across the stack.

For example, in a four-unit stack using a linear topology, unit 1 connects to unit 2, unit 2 to unit 3, and unit 3 to unit 4.

Figure 23 shows a supported linear stacking topology using the 100 GbE stacking ports.

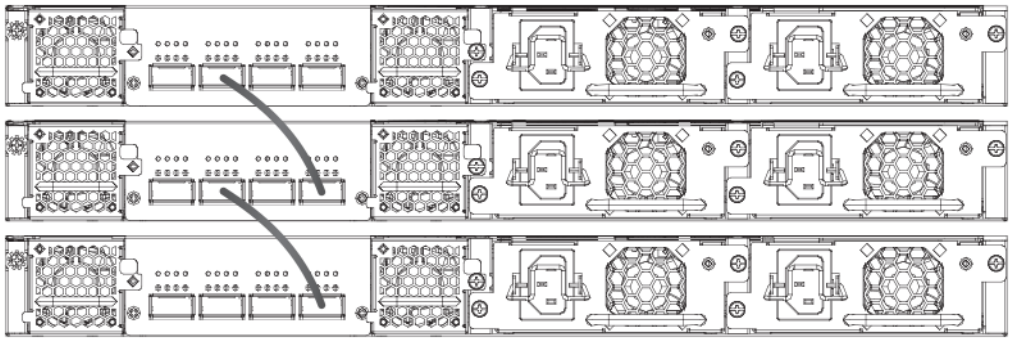
FIGURE 23 100 GbE linear stacking topology



NOTE
The secure-setup utility starts discovery in both upstream and downstream directions. The discovery process produces a list of upstream and downstream devices that are available to join the stack. Assuming the top unit is the Active Controller, the cabling depicted is recommended so that units are discovered and numbered sequentially, starting from the Active Controller at the top. Refer to the *Ruckus FastIron Stacking Configuration Guide* for more information on secure-setup discovery.

Figure 24 shows a supported 40 GbE linear stacking topology using 40 GbE and 40/100 GbE stacking ports.

FIGURE 24 40 GbE linear stacking topology



In a ring stack topology, there is an extra connection between the logical first and last devices, forming a "ring" or "closed-loop." The closed-loop connection provides a redundant path for the stack link, so if one link fails, stack communications can be maintained.

For example, in a three-unit stack using a ring topology, unit 1 connects to unit 2, unit 2 connects to unit 3, and unit 3 connects to unit 1.

Figure 25 shows a supported ring stacking topology using the 100 GbE stacking ports.

FIGURE 25 100 GbE ring stacking topology

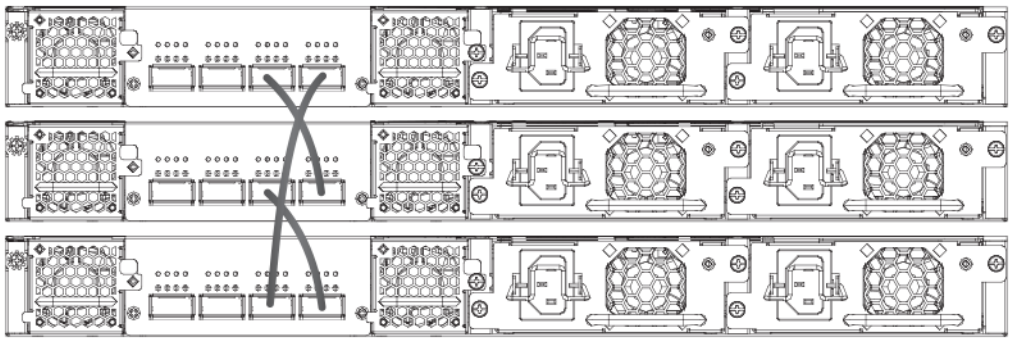
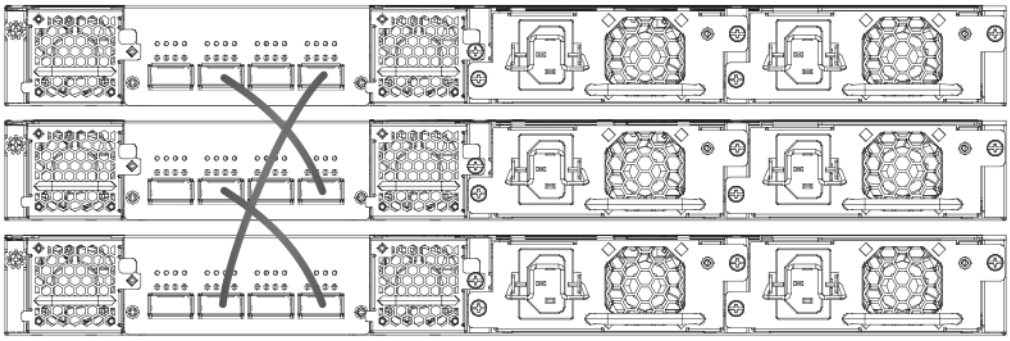


Figure 26 shows a supported 40 GbE ring stacking topology using 40 GbE and 40/100 GbE stacking ports.

FIGURE 26 40 GbE ring stacking topology



NOTE
For more information about stacking, refer to the *Ruckus FastIron Stacking Configuration Guide*.

Initial Setup and Verification

Providing power to the device

After you complete the physical installation, you can power on the system.

1. Install alternating-current (AC) power supplies in the switch. Refer to "Power Supplies" on page 55.
2. Connect AC power cables to the power supply connectors on the rear panel.

   NOTE
   The equipment should be installed near a power source and in an easily accessible location.

3. Connect the power cables to the 100-240 VAC power source. The power sources should be on separate circuits to protect against power failure. Ensure that the power cords have a minimum service loop of 6 inches available and are routed to avoid stress.

   NOTE
   Power is supplied to the device as soon as the first power supply is connected.

4. After the device has booted, verify that the power and status LEDs are green.

   The power supply LEDs display amber until power-on self-test (POST) is complete, and then change to green. The switch usually requires several minutes to boot and complete POST.

   NOTE
   To turn the system off, simply unplug the power cables.

For more information about how to interpret LEDs and run diagnostics tests, refer to "Diagnostic tests and monitoring" on page 52.

Establishing a first-time serial connection

To assign an IP address, you must have access to the command line interface (CLI). The CLI is a text-based interface that can be accessed through a direct serial connection to the device and through Telnet connections. The CLI is described in detail in the *Ruckus FastIron Management Configuration Guide*.

Access the CLI by connecting to the RJ-45 or USB Type-C console port. After you assign an IP address, you can access the system through Telnet, or Ruckus Network Advisor.

Perform the following steps to access the device through a serial connection.

1. Connect the serial cable to the RJ-45 or USB Type-C console port on the front of the Ruckus ICX 7650 switch and to an RS-232 serial port on the workstation using the included RJ-45-to-RS-232 adapter or the USB Type-C serial console port cable.

   For port pinout information for the console ports, refer to "Serial port specifications (pinout - USB Type-C)" on page 77 and "Serial port specifications (pinout RJ-45)" on page 78.

2. Disable any serial communication programs running on the workstation such as synchronization programs.
3. Open a terminal emulator application such as HyperTerminal on a Windows PC, or TERM, TIP, or Kermit in a UNIX environment, and configure the application as follows:
   - In a Windows environment
     - Baud: 9600 bps
     - Data bits: 8
     - Parity: None
     - Stop bits: 1
     - Flow control: None
   - In a UNIX environment using TIP, enter the following string at the prompt:

     ```
     tip /dev/ttyb -9600
     ```

     If ttyb is already in use, use ttya instead and enter the following string at the prompt:

     ```
     tip /dev/ttya -9600
     ```

Establishing an Ethernet connection

The Gigabit Ethernet management port (RJ-45) on the Ruckus ICX 7650 front panel provides an out-of-band network connection to the device. After you assign an IP address, you can access the Ruckus ICX 7650 from anywhere in the attached network using Telnet, a web browser, or other network management tools, such as Ruckus Network Advisor. To prevent unauthorized access, Ruckus recommends that the management port only be connected to a secure private network.

To manage the Ruckus ICX 7650 switch through its management port, connect the port to the Ethernet network using Category 5 or better cable. Management of the Ruckus ICX 7650 is described in detail in the *Ruckus FastIron Management Configuration Guide*.

Installing Transceivers and Cables

Precautions specific to transceivers and cables

DANGER
All fiber-optic interfaces use Class 1 lasers.

DANGER
Laser radiation. Do not view directly with optical instruments. Class 1M laser products.

DANGER
Use only optical transceivers that are qualified by Ruckus and comply with the FDA Class 1 radiation performance requirements defined in 21 CFR Subchapter I, and with IEC 825 and EN60825. Optical products that do not comply with these standards might emit light that is hazardous to the eyes.

DANGER
For safety reasons, the ESD wrist strap should contain a series 1 megohm resistor.

CAUTION
Before plugging a cable to any port, be sure to discharge any static charge stored on the cable by touching the electrical contacts to ground surface.

Cleaning the fiber-optic connectors

To avoid problems with the connection between the fiber-optic transceiver (SFP/SFP+/SFP28 or QSFP+/QSFP28) and the fiber cable connectors, Ruckus strongly recommends cleaning both connectors each time you disconnect and reconnect them. Dust can accumulate in the connectors and cause problems such as reducing the optic launch power.

To clean the fiber cable connectors, Ruckus recommends using a fiber-optic reel-type cleaner. When not using a fiber-optic transceiver connector, make sure to keep the protective covering in place.

Managing cables

Cables can be organized and managed in a variety of ways, for example, using cable channels on the sides of the rack or patch panels to minimize cable management. Follow these recommendations:

NOTE
You should not use tie wraps with optical cables because they are easily overtightened and can damage the optic fibers.

CAUTION
Before plugging a cable to any port, be sure to discharge any static charge stored on the cable by touching the electrical contacts to ground surface.

- Plan for rack space required for cable management before installing the switch.
- Leave at least 1 m (3.28 ft) of slack for each port cable. This provides room to remove and replace the switch, allows for inadvertent movement of the rack, and helps prevent the cables from being bent to less than the minimum bend radius.
- For easier maintenance, label the fiber-optic cables and record the devices to which they are connected.
- Keep LEDs visible by routing port cables and other cables away from the LEDs.
- Use hook and loop style straps to secure and organize fiber-optic cables.
- The minimum bend radius for a 50 micron cable is 2 inches under full tensile load and 1.2 inches with no tensile load.

Installing a fiber-optic transceiver

To monitor the transceivers, the **show media** command output shows the transceiver information for all interfaces on the device. Ruckus provides support for third-party transceivers, but may require a Ruckus transceiver be used for troubleshooting.

Support will not be provided if there is an issue with a third-party transceiver.

NOTE
Ruckus-branded removable media devices are recommended for proper operation of the device.

You can install a new transceiver in a slot while the device is powered on and running. By default, a port automatically detects the transceiver media and its speed, and then configures the port accordingly. For ports not configured in breakout mode, a fixed speed can also be set using the CLI (refer to the *Ruckus FastIron Management Configuration Guide*). Port speed changes are dynamic and do not require a system reboot. Any mismatch between a transceiver and port speed in “fixed speed” mode causes the port to be disabled. Note that the autonegotiation of link speed with a link partner is not supported on any port..

Installed transceivers are validated against a predefined list and categorized as Qualified, Unquallified, or Unsupported. Qualified transceivers operate normally. Unqualified transceivers are allowed to operate, but a log message is generated to inform the user. Unsupported transceivers are rejected and a port fault log message is generated.

Before installing a fiber-optic transceiver, have an ESD wrist strap available with a plug for connection to the ESD connector on the device.

DANGER
For safety reasons, the ESD wrist strap should contain a series 1 megohm resistor.

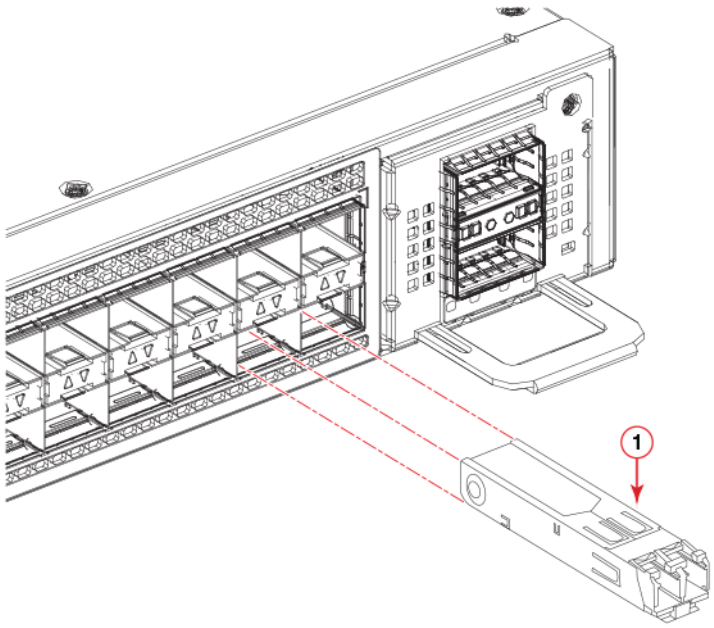
DANGER
Laser radiation. Do not view directly with optical instruments. Class 1M laser products.

Use the following steps to install a transceiver.

1. Put on the ESD wrist strap and ground yourself by attaching the clip end to a metal surface (such as an equipment rack) to act as ground.
2. Remove the new transceiver from the protective packaging.
3. Remove any protector plugs from the transceivers and the ports.
4. Making sure that the bail (wire handle) is in the unlocked position, place the transceiver in the correctly oriented position on the port, as shown in Figure 27.
5. Slide the transceiver into the port until you feel it click into place; then close the bail. Transceivers are keyed to prevent incorrect insertion.

   NOTE
   Each fiber-optic transceiver has a 10-pad gold-plated edge connector on the bottom. The correct position to insert a fiber-optic transceiver in the upper row of ports is with the gold-plated edge down. The correct position to insert a fiber-optic transceiver in the lower row of ports is with the gold-plated edge up.

FIGURE 27 Installing an SFP+ transceiver in a port slot



1 SFP+ transceiver

Replacing a fiber-optic transceiver

You can remove a fiber-optic transceiver from a slot and replace it with a new one while the Ruckus ICX 7650 switch is powered on and running.

Removing a fiber-optic transceiver

While removing a fiber-optic transceiver, be sure to wear an ESD wrist strap that is connected to ground.

DANGER
For safety reasons, the ESD wrist strap should contain a series 1 megohm resistor.

Use the following steps to remove a fiber-optic transceiver from a slot.

1. Put on the ESD wrist strap and ground yourself by attaching the clip end to a metal surface (such as an equipment rack).
2. Disconnect the fiber cable connector from the port connector.
3. Unlock the fiber-optic transceiver by pulling the bail latch forward, away from the front of the slot.

   NOTE
   The QSFP+/QSFP28 transceivers do not have bails, but pull tabs. Always use the pull tab to insert or remove the QSFP+/QSFP28 transceivers, as the transceiver may be hot..

   NOTE
   The bail latch or pull tab may be attached to either the top or the bottom of the fiber-optic transceiver.
4. Grasp the bail latch and pull the fiber-optic transceiver out of the slot.
5. Store the fiber-optic transceiver in a safe, static-free place or in an anti-static bag.
6. Install a new fiber-optic transceiver in the slot.

Connecting network devices

Ruckus devices support connections to other vendors' routers, switches, and hubs, as well other Ruckus devices.

Connecting a network device to a copper port

For copper connections to another Ruckus device or any other devices, use straight-through or crossover UTP cabling.

NOTE
Multi-gigabit (100M/1G/2.5G/5G/10GBase-T) ports can only connect to 1 Gbps and 100 Mbps copper ports when the remote device has auto-negotiation or Energy-Efficient Ethernet (EEE) enabled.

Automatic MDI or MDIX detection

All 10/100/1000 Mbps Ethernet copper ports on the devices support automatic Media Dependent Interface (MDI) and Media Dependent Interface Crossover (MDIX) detection. Automatic MDI or MDIX detection is enabled on all copper ports by default. For each port, you can disable automatic MDI or MDIX, designate the port as an MDI port, or designate the port as an MDIX port.

For more information about automatic MDI or MDIX detection and configuration details, refer to the *Ruckus FastIron Management Configuration Guide*.

Connecting a network device to a fiber port

For direct attachment from the device to a network interface card, switch, or router, using a fiber-optic transceiver, you will need fiber cabling with an LC connector.

For information about transceivers supported on the Ruckus ICX 7650 switch, refer to the Ruckus Optics Family Data Sheet.

To connect the device to another network device using a fiber port, you must complete the following tasks:

- Install a fiber-optic transceiver (SFP/SFP+ or QSFP+/QSFP28). Refer to "Installing a fiber-optic transceiver" on page 38.
- Cable the fiber-optic transceiver.

Cabling a fiber-optic transceiver

Use the following steps to cable a fiber-optic transceiver.

1. Remove the protective covering from the fiber-optic port connectors and store the covering for future use.
2. Before cabling a fiber-optic transceiver, Ruckus strongly recommends cleaning the cable connectors and the port connectors. For more information, refer to "Cleaning the fiber-optic connectors" on page 37.
3. Gently insert the cable connector (a tab on each connector should face upward) into the transceiver connector until the tab locks into place.
4. Observe the link and activity LEDs to determine if the network connections are functioning properly. For more information about the LED indicators, refer to "LED activity interpretation" on page 43.

   NOTE
   To verify that a Ruckus ICX 7650 switch can reach another device through the network, use the **ping** command at any level of the CLI. For more information, refer to the *Ruckus FastIron Management Configuration Guide*.

Monitoring the Device

LED activity interpretation

System activity and status can be determined through the activity of the LEDs on the switch.

There are three possible LED states: off (no light), a steady light, and a flashing light. Flashing lights may be slow, fast, or flickering. The LED colors are either green or amber.

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

Ruckus ICX 7650 port-side LEDs

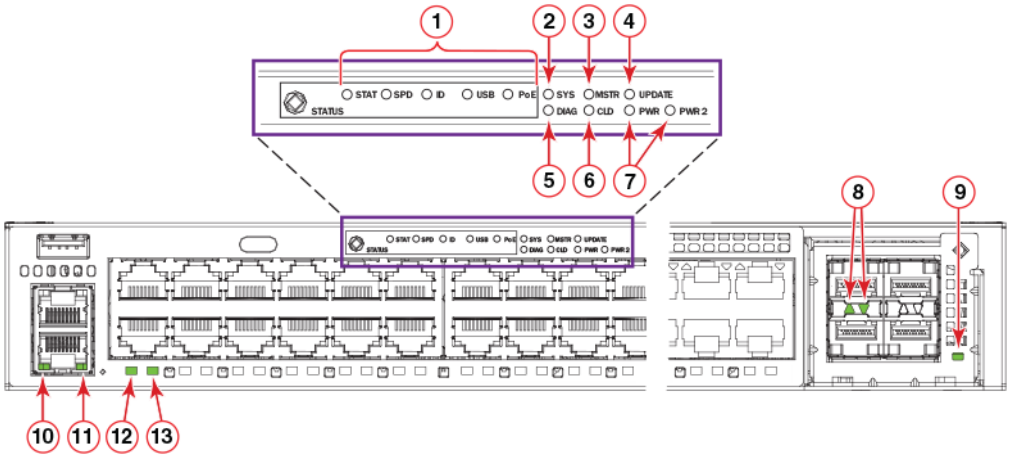
The Ruckus ICX 7650-48ZP has the following LEDs on the front panel:

- Two management port status LEDs (green) for speed and link/activity
- Two power supply unit (PSU) bicolor status LEDs (green and amber) labeled PWR and PWR2
- One SYS (system) bicolor status LED (green and amber)
- One DIAG (diagnostic) bicolor status LED (green and amber)
- One MSTR (stacking configuration) bicolor status LED (green and amber)
- One CLD (cloud management) bicolor status LED (green and amber)
- One UPDATE (software update) bicolor status LED (green and amber)
- Five status mode LEDs (green) selected by pressing the status mode button:
  - STAT — port LEDs indicate link and traffic activity.
  - SPD — port LEDs indicate the link speed.
  - ID — port LEDs indicate the stack unit ID when the switch is in stacking mode, or the PE ID when in SPX mode.
  - USB — indicates files are being copied to a USB drive connected to the USB port.
  - PoE — port LEDs indicate the PoE status.
- 48 bicolor (green and amber) status LEDs for ports 1-48. The LED indication is dependent on the mode set by the status mode button.
- 4x10 GbE module LEDs:
  - Four 1/10 GbE SFP+ port bicolor status LEDs (green for 10 GbE and amber for 1 GbE) which indicate 1 GbE or 10 GbE mode of operation.

- 2x40 GbE module LEDs:
  - Four 40 GbE QSFP+ port bicolor status LEDs (green for 1x40 GbE and amber for 4x10 GbE) which indicate 1x40 GbE or 4x10 GbE mode of operation.
- 1x100 GbE module LEDs:
  - Four 100 GbE QSFP28 port bicolor status LEDs (green for 1x100 GbE and amber for 1x40 GbE) which indicate 1x100 GbE or 1x40 GbE mode of operation.

Figure 28 shows the LEDs on the Ruckus ICX 7650-48ZP front panel. The up-arrow port status LEDs for the 1 GbE and 2.5/5/10 GbE ports correspond to the upper, odd-numbered ports; the down-arrow port status LEDs correspond to the lower, even-numbered ports.

FIGURE 28 Ruckus ICX 7650-48ZP front-panel LEDs



1	Mode status LEDs: STAT, SPD, ID, USB, PoE	8	4x10 GbE module speed and link/activity LEDs
2	SYS (system status) LED	9	Expansion module power LED
3	MSTR (stacking configuration) status LED	10	Management port link/activity LED
4	UPDATE (software update) LED	11	Management port speed LED
5	DIAG (diagnostic) status LED	12	Upper (odd-numbered) RJ-45 port status LEDs
6	CLD (cloud management) LED	13	Lower (even-numbered) RJ-45 port status LEDs
7	PSU1 and PSU2 status LEDs		

NOTE
PoE/PoE+ power is available to ports 1-24. High PoE/PoH is limited to ports 25-48.

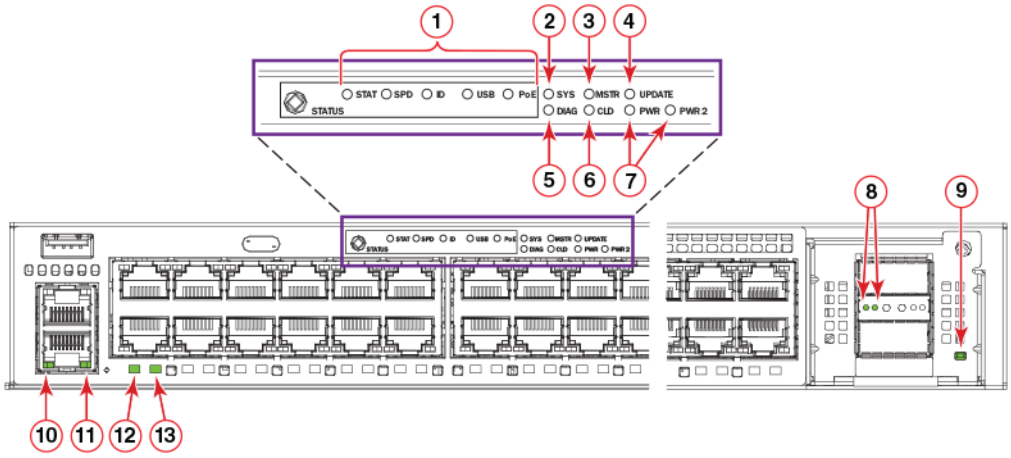
The Ruckus ICX 7650-48P has the following LEDs on the front panel:

- Two management port status LEDs (green) for speed and link/activity
- Two power supply unit (PSU) bicolor status LEDs (green and amber) labeled PSU1 and PSU2
- One SYS (system) bicolor status LED (green and amber)
- One DIAG (diagnostic) bicolor status LED (green and amber)
- One MSTR (stacking configuration) bicolor status LED (green and amber)
- One CLD (cloud management) bicolor status LED (green and amber)
- One UPDATE (software update) bicolor status LED (green and amber)

- Five status mode LEDs (green) selected by pressing the status mode button:
  - STAT — port LEDs indicate link and traffic activity.
  - SPD — port LEDs indicate the link speed.
  - ID — port LEDs indicate the stack unit ID when the switch is in stacking mode, or the PE ID when in SPX mode.
  - USB — indicates files are being copied to a USB drive connected to the USB port.
  - PoE — port LEDs indicate the PoE status.
- 48 bicolor (green and amber) status LEDs for ports 1-48. The LED indication is dependent on the mode set by the status mode button.
- 4x10 GbE module LEDs:
  - Four 1/10 GbE SFP+ port bicolor status LEDs (green for 10 GbE and amber for 1 GbE) which indicate 1 GbE or 10 GbE mode of operation.
- 2x40 GbE module LEDs:
  - Four 40 GbE QSFP+ port bicolor status LEDs (green for 1x40 GbE and amber for 4x10 GbE) which indicate 1x40 GbE or 4x10 GbE mode of operation.
- 1x100 GbE module LEDs:
  - Four 100 GbE QSFP28 port bicolor status LEDs (green for 1x100 GbE and amber for 1x40 GbE) which indicate 1x100 GbE or 1x40 GbE mode of operation.

Figure 29 shows the LEDs on the Ruckus ICX 7650-48P front panel. The up-arrow port status LEDs for the 1 GbE ports correspond to the upper, odd-numbered ports; the down-arrow port status LEDs correspond to the lower, even-numbered ports.

FIGURE 29 Ruckus ICX 7650-48P front-panel LEDs



1 Status LEDs: STAT, SPD, ID, USB, PoE
2 SYS (system status) LED
3 MSTR (stacking configuration) status LED
4 UPDATE (software update) LED
5 DIAG (diagnostic) status LED
6 CLD (cloud management) LED
7 PSU1 and PSU2 status LEDs
8 2x40 GbE module speed and link/activity LEDs
9 Expansion module power LED
10 Management port link/activity LED
11 Management port speed LED
12 Upper (odd-numbered) RJ-45 port status LEDs
13 Lower (even-numbered) RJ-45 port status LEDs

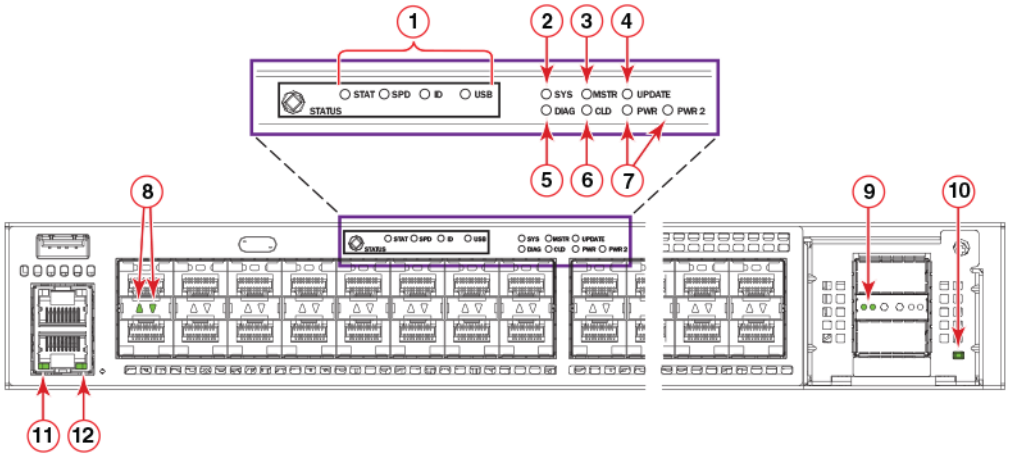
NOTE
PoE/PoE+ power is available to ports 9-48. High PoE/PoH is limited to ports 1-8.

The Ruckus ICX 7650-48F has the following LEDs on the front panel:

- Two management port monocolor status LEDs (green) for speed and link/activity.
- Two power supply unit (PSU) bicolor status LEDs (green and amber) labeled PSU1 and PSU2.
- One SYS (system) bicolor status LED (green and amber)
- One DIAG (diagnostic) bicolor status LED (green and amber)
- One MSTR (stacking configuration) bicolor status LED (green and amber)
- One CLD (cloud management) bicolor status LED (green and amber)
- One UPDATE (software update) bicolor status LED (green and amber)
- Four status mode LEDs (green) selected by pressing the status mode button:
  - STAT — port LEDs indicate link and traffic activity.
  - SPD — port LEDs indicate the link speed.
  - ID — port LEDs indicate the stack unit ID when the switch is in stacking mode, or the PE ID when in SPX mode.
  - USB — indicates files are being copied to a USB drive connected to the USB port.
- 48 bicolor (green and amber) status LEDs for ports 1-48. The LED indication is dependent on the mode set by the status mode button.
- 4x10 GbE module LEDs:
  - Four 1/10 GbE SFP+ port bicolor status LEDs (green for 10 GbE and amber for 1 GbE) which indicate 1 GbE or 10 GbE mode of operation.
- 2x40 GbE module LEDs:
  - Four 40 GbE QSFP+ port bicolor status LEDs (green for 1x40 GbE and amber for 4x10 GbE) which indicate 1x40 GbE or 4x10 GbE mode of operation.
- 1x100 GbE module LEDs:
  - Four 100 GbE QSFP28 port bicolor status LEDs (green for 1x100 GbE and amber for 1x40 GbE) which indicate 1x100 GbE or 1x40 GbE mode of operation.

Figure 30 shows the LEDs on the Ruckus ICX 7650-48F front panel. The up-arrow port status LEDs for the 1/10 GbE ports correspond to the upper, odd-numbered ports; the down-arrow port status LEDs correspond to the lower, even-numbered ports.

FIGURE 30 Ruckus ICX 7650-48F front-panel LEDs



1	Status LEDs: STAT, SPD, ID, USB	7	PSU1 and PSU2 status LEDs
2	SYS (system status) LED	8	Ports 1-48 status LEDs
3	MSTR (stacking configuration) status LED	9	2x40 GbE module speed and link/activity LEDs
4	UPDATE (software update) LED	10	Expansion module power LED
5	DIAG (diagnostic) status LED	11	Management port link/activity LED
6	CLD (cloud management) LED	12	Management port speed LED

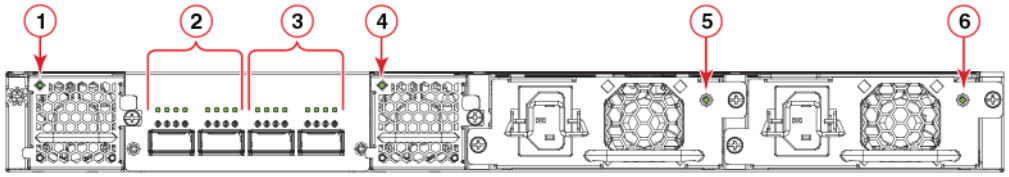
Ruckus ICX 7650 nonport-side LEDs

The Ruckus ICX 7650 has the following LEDs on the rear panel:

- Four single-color status LEDs (green) for each of the two 40 GbE rear-module stacking ports that indicate the status of the ports in 1x40 GbE or 4x10 GbE mode.
- Four single-color status LEDs (green) for each of the two 40/100 GbE rear-module stacking ports that indicate the status of the ports in 1x100 GbE or 1x40 GbE mode.
- Power supply LEDs: One bicolor status LED (green and amber) on each installed power supply
- Fan tray LEDs: One bicolor status LED (green and amber) on each installed fan tray

Figure 31 shows the LEDs on the rear panel of the Ruckus ICX 7650.

FIGURE 31 Ruckus ICX 7650 rear-panel LEDs



1	FAN2 fan tray LED	4	FAN1 fan tray LED
2	40 GbE link/activity LEDs for stacking	5	PSU2 status LED
3	40/100 GbE link/activity LEDs for stacking	6	PSU1 status LED

Status mode button and LEDs

Press the status mode button to select the the corresponding status indicated by the port status LEDs. Pressing the button once selects the next mode in the following sequence.

1. STAT — port LEDs indicate link and traffic activity (the default mode).
2. SPD — port LEDs indicate the link speed.
3. ID — port LEDs indicate the stack unit ID when the switch is in stacking mode, or the PE ID when in SPX mode.
4. USB — indicates files are being copied to a USB drive connected to the USB port.
5. PoE — port LEDs indicate the PoE status.

When in USB mode, a long press for 5 seconds will copy files, such as FastIron image/manifest, config file, and Show Tech (support save) from the switch to the USB. This feature must first be enabled by the **reverse-manifest enable** command in the CLI.

The switch system will also automatically copy files from an inserted USB drive to the system flash after a system reload. The USB drive must have the files preloaded. Note that the status mode automatically selects USB mode when a USB auto copy starts.

The following table describes the USB status mode LED for a file copy to or from a USB drive.

TABLE 9 USB mode LED (file copy to or from USB)

LED state	Status of hardware	Recommended action
Blinking green	A 5 second button press has been detected and the USB copy has started. Or, a system flash upgrade has started from a USB drive.	No action required.
Steady green	A USB drive is plugged in, or a copy operation has completed.	No action required.
Steady amber	No USB device detected.	No action required.
Blinking amber	A USB copy operation has failed, there has been an application error, or the USB is present but there is a mount failure/access failure.	Contact Technical Support.

LED patterns

The following tables describe the Ruckus ICX 7650 LED patterns.

TABLE 10 Management port right (10/100/1000 Mbps) status LED

LED state	Status of hardware	Recommended action
Off (no light)	Not cabled or 10/100 Mbps link is up.	No action required.
Steady green	A 1000 Mbps link is up.	No action required.

TABLE 11 Management port left (activity) status LED

LED state	Status of hardware	Recommended action
Off (no light)	Not cabled or no packets are being transmitted or received.	No action required.
Blinking green	There is traffic and packets are being transmitted or received at 1000 Mbps.	No action required.

TABLE 12 SYS LED

LED state	Status of hardware	Recommended action
Off (no light)	System is off or there is no power.	No action required.
Blinking green	Device is initializing.	No action required.
Steady green	The application software is up and running on the switch.	No action required.
Steady amber	The system is in boot mode.	No action required.
Blinking amber	The system has crashed and the watchdog timer has timed out. Or, the system has failed to boot a valid software image.	Contact Technical Support.

TABLE 13 DIAG LED

LED state	Status of hardware	Recommended action
Off (no light)	Diagnostic is off.	No action required.
Blinking green	System self-diagnostic test is in progress.	No action required.
Steady green	System self-diagnostic test has successfully completed.	No action required.
Steady amber	System self-diagnostic test has detected a fault.	Contact Technical Support.

TABLE 14 MSTR LED

LED state	Status of hardware	Recommended action
Off (no light)	Stacking mode is enabled and the switch is a stack member operating in slave mode, or the switch is operating in standalone mode.	No action required.
Blinking green	Device is initializing.	No action required.
Steady green	Stacking mode is enabled and the switch is the stack master.	No action required.
Steady amber	Stacking mode is enabled and the switch is the standby controller.	No action required.
Blinking amber	Stacking mode is initializing and the switch is in stacking master arbitration/selection state.	No action required.

TABLE 15 UPDATE LED

LED state	Status of hardware	Recommended action
Off (no light)	System is running a previous software image.	No action required.
Blinking green	The switch software is being updated through DHCP, USB/TFTP, ISSU, or from another unit in a stack.	No action required.
Steady green	The switch software has been successfully updated through DHCP, USB/TFTP, ISSU, or from another unit in a stack.	No action required.
Blinking amber	An error has occured during a software update. Or, the system booted after image upgrade from a different partition/image as instructed by the user.	No action required.

TABLE 16 CLD LED

LED state	Status of hardware	Recommended action
Off (no light)	The cloud management feature is disabled on the switch.	No action required.
Blinking green	The switch is trying to connect to a cloud management platform.	No action required.
Steady green	The switch is successfully connected to a cloud management platform.	No action required.

TABLE 16 CLD LED (Continued)

LED state	Status of hardware	Recommended action
Steady amber	The switch has temporarily lost its connection to a cloud management platform.	No action required.
Blinking amber	The switch has encountered an error trying to connect to a cloud management platform.	Contact Technical Support.

TABLE 17 PWR and PWR2 LEDs

LED state	Status of hardware	Recommended action
Off (no light)	System is off or there is no power.	Verify the system is on and has completed booting.
Steady green	PSU is on and functioning properly.	No action required.
Steady amber	PSU is missing power or in a faulty state (such as PSU fan failure).	Verify that the PSU power cord is connected to a functioning power source. Replace power supply.

TABLE 18 100 GbE, 40 GbE, 10 GbE, 1 GbE, and 1/2.5/5/10 GbE port status LEDs

Status mode	LED state	Status of hardware	Recommended action
STAT	Off (no light)	Not cabled.	No action required.
	Steady green	Link is up with no traffic.	No action required.
	Blinking green	Link is up and packets are being transmitted or received.	No action required.
	Steady amber	Packet errors have been detected on the port.	No action required.
	Blinking amber	Port is disabled by UDLD, LACP, or other error.	No action required.
SPD	Off (no light)	No valid link on the port.	No action required.
	Steady green	Port is operating at its highest speed. • 40/100 GbE ports: 100 Gbps • 40 GbE ports: 40 Gbps • 10 GbE ports: 10 Gbps • 1 GbE ports: 1 Gbps • Multi GbE ports: 10 Gbps	No action required.
	Blinking green	Port is operating at its 2nd highest speed. • 40/100 GbE ports: 40 Gbps • 10 GbE ports: 1 Gbps • 1 GbE ports: 100 Mbps • Multi GbE ports: 5 Gbps	No action required.
	Steady amber	Port is operating at its 3rd highest speed. • 10 GbE ports: 100 Mbps (copper) • 1 GbE ports: 10 Mbps • Multi GbE ports: 2.5 Gbps	No action required.
	Blinking amber	Port is operating at its 4th highest speed. • Multi GbE ports: 1 Gbps	No action required.
	Alternating amber/green	Port is operating at its 5th highest speed. • Multi GbE ports: 100 Mbps	No action required.

TABLE 18 100 GbE, 40 GbE, 10 GbE, 1 GbE, and 1/2.5/5/10 GbE port status LEDs (Continued)

Status mode	LED state	Status of hardware	Recommended action
ID	Steady green	The port number is same as the stack ID. Or, the port number is the first digit of the PE ID.	No action required.
	Steady amber	The port number is the second digit of the PE ID. If the port number is 10, then the second digit or PE ID is 0.	No action required.
	Alternating amber/green	The port number indicates that the first and second digit of the PE ID are the same.	No action required.
PoE	Off (no light)	PoE is disabled. The port is not providing PoE power.	No action required.
	Steady green	The port is providing PoE, PoE+, or PoH power.	No action required.
	Steady amber	The PoE power is off due to a fault or not enough PoE power budget set for the port.	No action required.

TABLE 19 1/10 GbE SFP+ module port LEDs

LED state	Status of hardware	Recommended action
Off (no light)	Not cabled.	No action required.
Steady green	Link is up in 10 GbE mode.	No action required.
Blinking green	There is 10 GbE traffic and packets are being transmitted or received.	No action required.
Steady amber	Link is up in 1 GbE mode.	No action required.
Blinking amber	There is 1 GbE traffic and packets are being transmitted or received.	No action required.

TABLE 20 2x40 GbE module port LEDs (left-side LED)

LED state	Status of hardware	Recommended action
Off (no light)	Not cabled.	No action required.
Steady green	Link is up in 40 GbE mode.	No action required.
Blinking green	There is 40 GbE traffic and packets are being transmitted or received.	No action required.

TABLE 21 1x100 GbE mode 100 GbE module port LEDs

LED state	Status of hardware	Recommended action
Off (no light)	Not cabled.	No action required.
Steady amber	Port link is up in 100 GbE mode.	No action required.
Blinking amber	There is 100 GbE traffic and packets are being transmitted or received.	No action required.

TABLE 22 4x10 GbE mode 100 GbE module port LEDs

LED state	Status of hardware	Recommended action
Off (no light)	Not cabled.	No action required.
Steady amber	Port lane link is up in 10 GbE mode.	No action required.
Blinking amber	There is 10 GbE traffic and packets are being transmitted or received.	No action required.

TABLE 23 Module power LED (all media modules)

LED state	Status of hardware	Recommended action
Off (no light)	Module is not receiving power.	Replace module.
Steady green	Module is on and functioning properly.	No action required.
Steady amber	Module is on and booting up.	No action required.

TABLE 24 Fan tray LED

LED state	Status of hardware	Recommended action
Off (no light)	Fan tray is not powered on.	No action required.
Steady green	Fan tray is on and functioning properly.	No action required.
Steady amber	Fan tray has nonfunctioning fans.	Replace fan tray.

Diagnostic tests and monitoring

Ruckus FastIron software includes diagnostic tests to help you troubleshoot the hardware. System diagnostic software is designed to fulfill the purpose of offline diagnostics. In offline diagnostics, you must turn the diagnostic flags on or off to execute diagnostic tests during the next bootup.

The CLI commands for system diagnostic tests are **dm diag** and **dm alt-diag**. These diagnostic tests verify all available hardware components including:

- I2C devices
- EEPROM
- CPU packet
- Line rate

During system diagnostic testing, the system is completely under the control of the diagnostic software. All hardware components are verified, and results are displayed on the console. In cases where a failure is detected, results and corrective actions will be displayed. After the system diagnostic testing is complete, the system exits from the diagnostic mode and reloads the system for normal operation.

System diagnostic testing runs at link speeds of 1 Gbps, 10 Gbps, 40 Gbps, or 100 Gbps depending on the speed of the link being tested and the type of port.

The Ruckus device is engineered for reliability and requires no routine operational steps or maintenance. You can monitor the device by paying attention to the following information:

- The LEDs showing the status of system components
- A description of the operations that the device performs when you power it on

The following commands can be especially helpful in monitoring the health status of various device components. For details about these commands, refer to the *Ruckus FastIron Management Configuration Guide*.

- **show chassis**
- **show system**
- **show environment fan**
- **show environment power**
- **show environment sensor**

- show environment temp

Power Supplies

Power supply overview

The Ruckus ICX 7650 switch supports alternating-current (AC) and direct-current (DC) power supplies. The Ruckus ICX 7650 switch is capable of running on one power supply and one fan. The second power supply and second fan provide redundancy.

If the second power supply and second fan slot are unused, you must cover them with filler panels.

NOTE
Ruckus recommends that the Ruckus ICX 7650 switch operates with two power supplies and two fan trays installed. If a power supply or fan tray fails, it must be replaced as soon as possible.

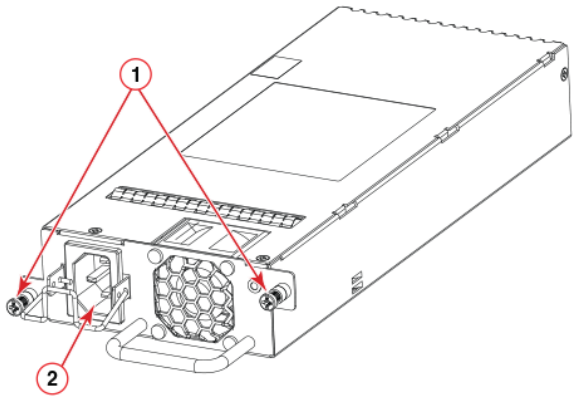
The power supplies in the Ruckus ICX 7650 switch chassis can be removed and replaced without special tools. The device can continue operating during the replacement.

The device supports the following types of power supplies:

- AC power supply with nonport-side air exhaust: This unit moves the air from the port-side to the nonport-side of the device.
- AC power supply with nonport-side air intake: This unit moves the air from the nonport-side to the port-side of the device.
- DC power supply with nonport-side air exhaust: This unit moves the air from the port-side to the nonport-side of the device.
- DC power supply with nonport-side air intake: This unit moves the air from the nonport-side to the port-side of the device.

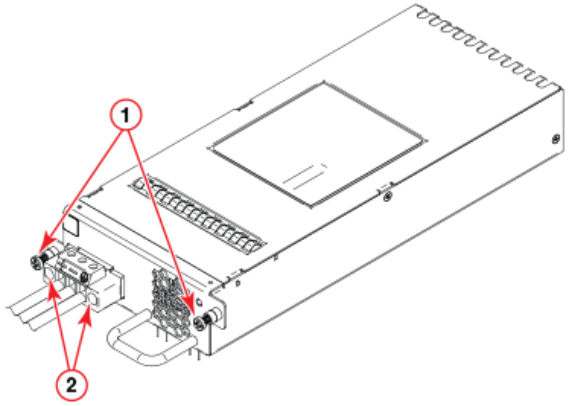
NOTE
Only the Ruckus ICX 7650-48F switch supports DC power supplies.

FIGURE 32 AC power supply



1 Chassis attachment screws 2 AC power cord socket

FIGURE 33 DC power supply



1 Chassis attachment screws 2 Assembly screws

Power supply usage

The Ruckus ICX 7650-48ZP and ICX 7650-48P switches support specific AC power supply inputs and numbers of POE, POE+, High PoE, and PoH ports.

TABLE 25 AC power supply and PoE usage

Model	Maximum PoE output power draw (Watts)	Maximum number of PoE ports supported (15.4 W)	Maximum number of PoE+ ports supported (30 W)	Maximum number of High PoE ports supported (60 W)	Maximum number of PoH ports supported (95 W)
ICX 7650-48ZP	748 Watts	48	24	8	7
ICX 7650-48P	748 Watts	48	24	8	7

Using a second power supply

In the event of an AC power loss or power supply failure, a redundant power supply (second power supply) can be installed as a backup power source to a switch. Each power supply provides a load-sharing and redundant power source (up to 250 W AC or 510 W DC for non-PoE switches, and 1000 W AC for PoE switches).

Ruckus recommends that you pay attention to the PoE, PoE+, High PoE, and PoH port configuration (referred to as PoE in this section) of the switch when using a redundant power supply. When using a single power supply, a PoE switch has a maximum number of supported PoE ports. Ruckus recommends that when a redundant power source is used for a PoE switch, that the maximum number of PoE ports supported by the switch must not exceed that which can be supported by a single power supply.

For example, a Ruckus ICX 7650-48P has two power supplies installed. If you increase the maximum number of PoE ports that can be supported, and if the primary power supply fails, the redundant power supply cannot guarantee the device is protected by backup power. The redundant power supply will not have enough power to sustain the failed primary power supply. In this case, the device can go down even with the redundant power supply connected.

Precautions specific to power supplies

DANGER
Make sure that the power source circuits are properly grounded, then use the power cord supplied with the device to connect it to the power source.

DANGER
If the installation requires a different power cord than the one supplied with the device, make sure you use a power cord displaying the mark of the safety agency that defines the regulations for power cords in your country. The mark is your assurance that the power cord can be used safely with the device.

CAUTION
Disassembling any part of the power supply and fan assembly voids the warranty and regulatory certifications. There are no user-serviceable parts inside the power supply and fan assembly.

CAUTION
Ensure that the airflow direction of the power supply unit matches that of the installed fan tray. The power supplies and fan trays are clearly labeled with either a green arrow with an "E", or an orange arrow with an "I."

CAUTION
If you do not install a module or a power supply in a slot, you must keep the slot filler panel in place. If you run the chassis with an uncovered slot, the system will overheat.

CAUTION
Use a UL-listed or CSA-Certified DC power source to connect to a DC PSU.

Identifying the airflow direction

The power supply and fan assemblies are identified by the following airflow directions:

- **Intake power supply and fan assembly with an orange "I" label or without any label**: Pulls air from the nonport-side of the switch and exhausts it out the port side.

  - Nonport-side air intake
  - Port-side air exhaust
  - Back-to-front (nonport-side to port-side) airflow
  - Part numbers ending with **-R**

- **Exhaust power supply and fan assembly with a green "E" label**: Pulls air from the port side of the switch and exhausts it out the nonport-side.

  - Nonport-side air exhaust
  - Port-side air intake
  - Front-to-back (port-side to nonport-side) airflow
  - Part numbers ending with **-F**

Time and items required

Installing or removing and replacing a power supply should require less than five minutes to complete.

The following items are required to replace a power supply:

- A new power supply (must have the same airflow direction as the power supply being replaced)
- #1 Phillips screwdriver

Replacing a power supply

When installing or replacing a power supply unit, keep in mind the following:

- Power supplies can be swapped in or out while the device is running. The remaining power supply provides enough power for the device.
- The airflow direction of the power supply must match that of the installed fan assemblies. All must be either exhaust or intake.

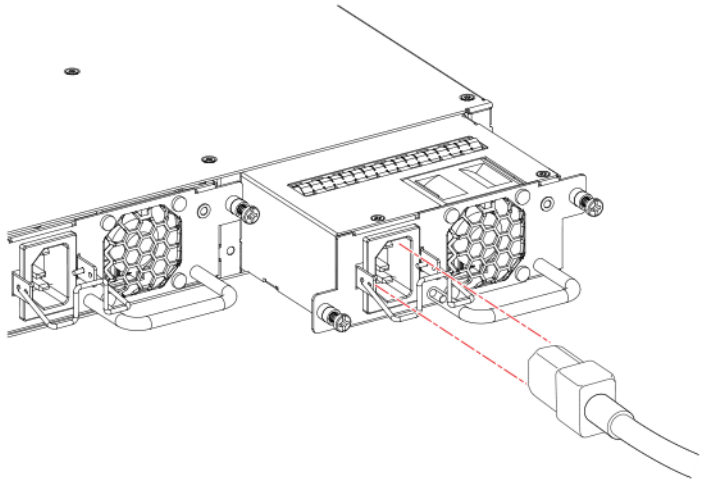
CAUTION
Power supplies are hot-swappable. However, they should be inserted or removed without a power cord being connected to a power source to avoid damage.

CAUTION
Ensure that the airflow direction of the power supply unit matches that of the installed fan tray. The power supplies and fan trays are clearly labeled with either a green arrow with an "E", or an orange arrow with an "I."

Inserting a new AC power supply

Use the following steps to install an AC power supply in the Ruckus ICX 7650 switch.

FIGURE 34 Installing an AC power supply unit



1. If replacing a power supply, remove the previously installed power supply from the appropriate slot by pressing the release lever and pulling the power supply handle.
2. If installing a new power supply into a slot covered with a filler panel:
   a. Press the release lever on the filler panel.
   b. Remove the filler panel.
3. Before opening the package that contains the power supply, touch the bag to the switch casing to discharge any potential static electricity. Ruckus recommends using an ESD wrist strap during installation.
4. Remove the power supply from the anti-static shielded bag.
5. Holding the power supply level, guide it into the carrier rails on each side and gently push it all the way into the slot, ensuring that it firmly engages with the connector and the release lever clicks into its locked position.

When the Ruckus ICX 7650 switch is powered on, the LEDs on the power supply rear panel should light up green to confirm that the power supply is correctly installed and supplying power.

CAUTION
If you do not install a power supply in a slot, you must keep the slot filler panel in place. If you run the device with an uncovered slot, the system will overheat.

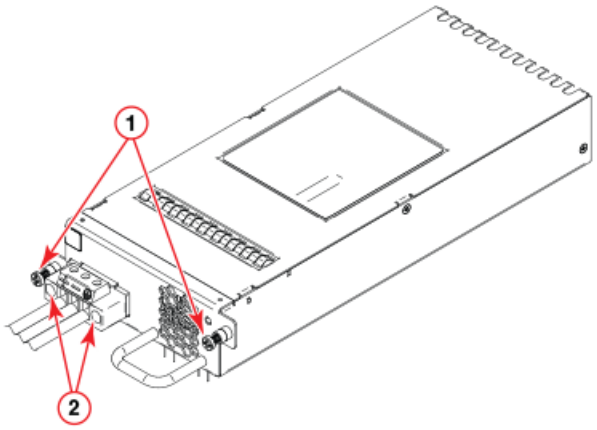
Inserting a new DC power supply

Use the following steps to install a DC power supply in the Ruckus ICX 7650-48F switch.

CAUTION
Use a UL-listed or CSA-Certified DC power source to connect to a DC PSU.

1. If replacing a power supply, remove the previously installed power supply from the appropriate slot by removing the chassis attachment screws located in the upper right and lower left of the power supply unit using a flat-head screwdriver. Refer to item 1 in Figure 35.

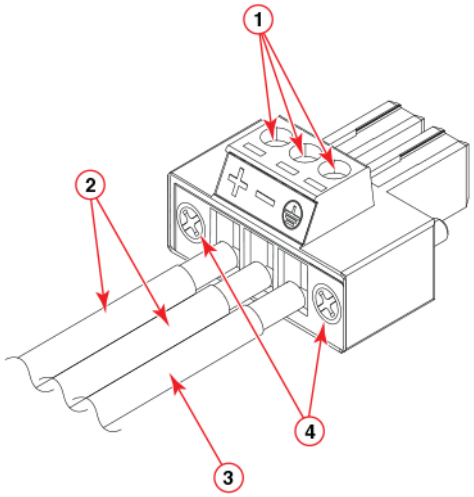
FIGURE 35 DC power supply screws



1 Chassis attachment screws 2 Assembly screws

2. If installing a new power supply into a slot covered with a filler panel:
   a. Press the release lever on the filler panel.
   b. Remove the filler panel.
3. Before opening the package that contains the DC power supply, touch the bag of the switch casing to discharge any potential static electricity. Ruckus recommends using an ESD wrist strap during installation.
4. Remove the DC power supply from the anti-static shielded bag.
5. Insert the DC power supply source wires into the DC wiring assembly, matching the terminals. Refer to Figure 36.

FIGURE 36 DC power supply wiring assembly



1	Wire-tightening screws	3	Earth ground wire
2	DC power source wires	4	Assembly screws

6. Use the wire-tightening screws to secure the wires.
7. Insert the earth ground wire into the ground terminal on the DC wiring assembly. Refer to Figure 36.

   NOTE
   This equipment installation must meet NEC/CEC Code requirements. Consult local authorities for regulations.

8. Insert the DC power supply wiring assembly with the wires connected into the power supply and tighten the assembly screws. Refer to Figure 36.
9. Using the handle on the power supply, hold the power supply level and guide it into the carrier rails on each side of the power supply slot. Gently push the power supply all the way into the slot, ensuring that it firmly engages with the connector.
10. When you are sure the power supply has properly engaged the connector, tighten the chassis attachment screws to secure the power supply in the slot.

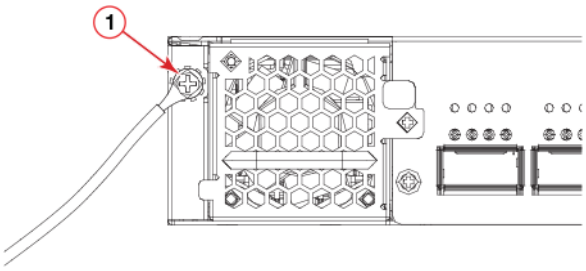
When the Ruckus ICX 7650 switch is powered on, the LEDs on the power supply rear panel should light up green to confirm that the power supply is correctly installed and supplying power.

CAUTION
If you do not install a power supply in a slot, you must keep the slot filler panel in place. If you run the device with an uncovered slot, the system will overheat.

Grounding the Ruckus ICX 7650 switch

The rear panel of the Ruckus ICX 7650 switch includes a dual-screw grounding terminal for chassis grounding. The surface area around this terminal is not painted to provide a good electrical connection. Before connecting power to the device, connect the grounding lug to ground the chassis if required by your local building code or regulatory compliance..

FIGURE 37 Connecting the grounding terminal



1 Grounding terminal

CAUTION
For the installation of a Ruckus device with AC systems, use a ground wire of at least 6 AWG. The ground wire should have an agency-approved crimped connector (provided with the device) attached to one end, with the other end attached to building ground. The connector must be crimped with the proper tool, allowing it to be connected to both ground screws on the enclosure. Before crimping the ground wire into the provided ground lug, ensure that the bare copper wire has been cleaned and antioxidant is applied to the bare wire. In addition, anti-rotation devices or lock washers must be used with all screw connections for the grounding wire.

NOTE
Use the grounding lug, screws, flat washers, and lock washers included in the Ruckus ICX 7650 switch grounding kit.

Perform the following steps to connect to the grounding terminal.

1. Ensure that the rack in which the Ruckus ICX 7650 switch is mounted is properly grounded and in compliance with local regulations.
2. Ensure that there is a good electrical connection to the grounding point on the rack (no paint or isolating surface treatment).
3. Crimp the included grounding lug to a grounding wire of at least 6 American Wire Gauge (AWG). The 6 AWG wire and grounding lug should be crimped together using a proper tool.
4. Attach the 6 AWG stranded copper wire to the grounding terminal on the Ruckus ICX 7650 switch using the screws, flat washers, and lock washers included in the grounding kit.
5. Attach the grounding wire to a grounding point.

NOTE
The terminal for the connection of a grounding conductor is not to be used with an aluminum conductor.

NOTE
To ensure adequate bonding when attaching the ground lug, a minimum of 20 in-lb (2.76 Nm) of torque is required to be applied to the mounting hardware used to attach the ground lug.

Fan Assemblies

Fan assembly overview

The Ruckus ICX 7650 switch includes two redundant, hot-swappable fan assemblies. However, the switch is capable of running on one power supply and one fan. The second power supply and second fan provide redundancy.

If the second power supply and second fan slots are unused, you must cover them with filler panels.

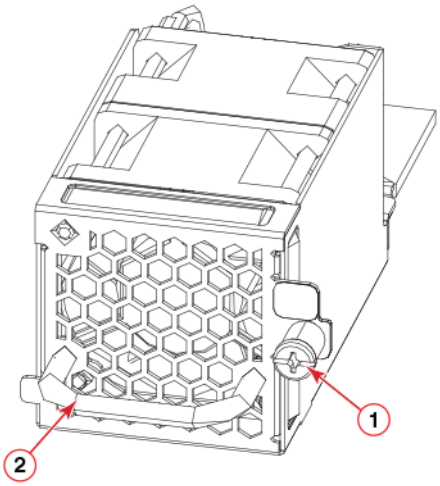
> NOTE
> Ruckus recommends that the Ruckus ICX 7650 switch operates with two power supplies and one fan assembly installed. If a power supply or fan assembly fails, it must be replaced as soon as possible.

The fan assemblies in the Ruckus ICX 7650 switch chassis can be removed and replaced without special tools. The device can continue operating during the replacement.

The device supports the following types of fan assemblies:

- Fan assembly with nonport-side air exhaust: This unit moves the air from the port-side to the nonport-side of the device.
- Fan assembly supply with nonport-side air intake: This unit moves the air from the nonport-side to the port-side of the device.

FIGURE 38 Fan assembly



1 Captive screw 2 Fan assembly handle

Precautions specific to fan assemblies

DANGER
Be careful not to accidently insert your fingers into the fan assembly while removing it from the chassis. The fan may still be spinning at a high speed.

CAUTION
Disassembling any part of the power supply and fan assembly voids the warranty and regulatory certifications. There are no user-serviceable parts inside the power supply and fan assembly.

CAUTION
Ensure that the airflow direction of the power supply unit matches that of the installed fan assembly. The power supplies and fan assemblies are clearly labeled with either a green arrow with an "E", or an orange arrow with an "I."

CAUTION
If you do not install a module or a power supply in a slot, you must keep the slot filler panel in place. If you run the chassis with an uncovered slot, the system will overheat.

Identifying the airflow direction

The power supply and fan assemblies are identified by the following airflow directions:

- **Intake power supply and fan assembly with an orange "I" label or without any label**: Pulls air from the nonport-side of the switch and exhausts it out the port side.

  - Nonport-side air intake
  - Port-side air exhaust
  - Back-to-front (nonport-side to port-side) airflow
  - Part numbers ending with **-R**

- **Exhaust power supply and fan assembly with a green "E" label**: Pulls air from the port side of the switch and exhausts it out the nonport-side.

  - Nonport-side air exhaust
  - Port-side air intake
  - Front-to-back (port-side to nonport-side) airflow
  - Part numbers ending with **-F**

Time and items required

Installing or removing and replacing a fan assembly should require less than five minutes to complete.

The following items are required to replace a fan assembly:

- New fan assembly (must have the same airflow direction as the fan assembly being replaced)
- #1 Phillips screwdriver

Replacing a fan assembly

When installing or replacing a fan assembly unit, keep in mind the following:

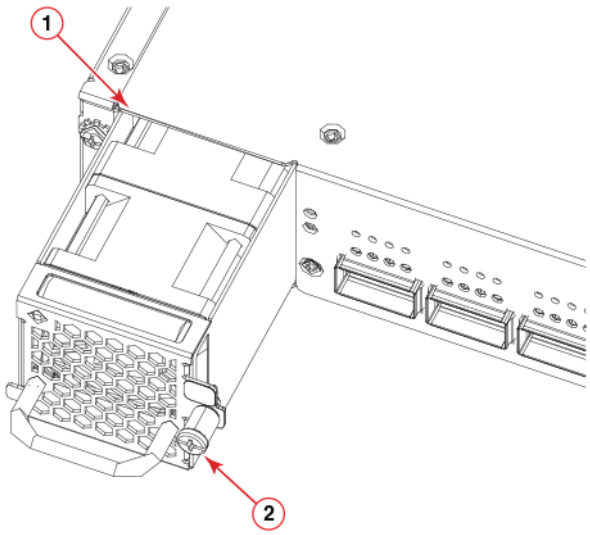
- Fan assemblies can be swapped in or out while the device is running. The remaining fan assemblies provide enough airflow for the device.
- The airflow direction of the fan assembly must match that of the installed fan assemblies. All must be either exhaust or intake.

CAUTION
Ensure that the airflow direction of the power supply unit matches that of the installed fan assemblies. The power supplies and fan assemblies are clearly labeled with either a green arrow with an “E”, or an orange arrow with an "I."

Inserting a new fan assembly

Use the following steps to install a fan assembly in the Ruckus ICX 7650 switch.

FIGURE 39 Installing a fan assembly



1 Fan assembly slot 2 Captive screw

1. If replacing a fan assembly:
   a. Using a Phillips screwdriver, unscrew the captive screw on the fan assembly.
   b. Remove the fan assembly from the chassis by pulling the handle on the fan assembly out and away from the chassis.
   c. Ensure that the replacement fan assembly has the same part number and airflow label as the fan assembly being replaced.

2. If installing a new fan assembly into a slot covered with a filler panel:
   a. Using a Phillips screwdriver, unscrew the captive screw on the filler panel.
   b. Remove the filler panel.
3. Before opening the package that contains the new fan assembly, touch the bag to the switch casing to discharge any potential static electricity. It is recommended that you wear an ESD wrist strap during installation.
4. Remove the fan assembly from the anti-static shielded bag.

   NOTE
   Do not force the installation. If the fan assembly does not slide in easily, ensure that it is correctly oriented before continuing.
5. Holding the fan assembly level, guide it into the carrier rails on each side and gently push it all the way into the slot, ensuring that it firmly engages with the connector.
6. When you are sure the fan assembly has properly engaged the connector, tighten the captive screw to secure the fan assembly in the slot.

   NOTE
   The fans are controlled automatically by the device.

When a fan assembly is installed in a slot, the power LED on the fan assembly should light up green to confirm that the fan assembly is correctly installed and running. Refer to "LED patterns" on page 48.

CAUTION
If you do not install a module or a power supply in a slot, you must keep the slot filler panel in place. If you run the chassis with an uncovered slot, the system will overheat.

Expansion Modules

Expansion module overview

The Ruckus ICX 7650 switch includes one port-side slot for media expansion modules, including a 4-port SFP+ 10 GbE module, a 2-port QSFP+ 40 GbE module, and a 1-port QSFP28 100 GbE module. If not installed, the empty expansion module slot must be covered using a filler panel.

The following media expansion modules are supported:

- ICX7650-4X10GF: A 4-port 1/10 GbE SFP+ expansion module. The expansion module supports 1 GbE and 10 GbE optics (refer to the Ruckus Optics Family Data Sheet).
- ICX7650-2X40GQ: A 2-port 40 GbE QSFP+ expansion module. The expansion module supports 40 GbE optics (refer to the Ruckus Optics Family Data Sheet).
- ICX7650-1X100GQ: A 1-port 100 GbE QSFP28 expansion module. The expansion module supports 40 GbE and 100 GbE optics (refer to the Ruckus Optics Family Data Sheet).

The modules can be used for data uplink, as shown in Table 26.

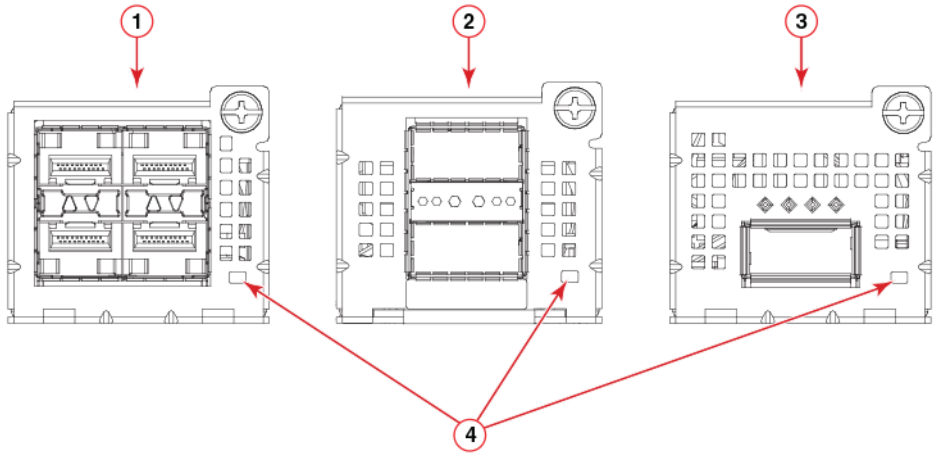
NOTE
When the rear-panel (Module 3) stacking ports operate in uplink mode, Module 2 is disabled. No configurations are allowed for the Module 2 ports.

TABLE 26 Ruckus ICX 7650 supported media modules

Switch	ICX7650-4X10GF module	ICX7650-2X40GQ module	ICX7650-1X100GQ module
Ruckus ICX 7650-48ZP	Uplink supported	Uplink supported	Uplink supported
Ruckus ICX 7650-48P	Uplink supported	Uplink supported	Not supported
Ruckus ICX 7650-48F	Uplink supported	Uplink supported	Uplink supported

Instructions for installing or replacing an expansion module are described in "Installing or replacing an expansion module" on page 69.

FIGURE 40 Ruckus ICX 7650 media expansion modules



1	ICX7650-4X10GF module	3	ICX7650-1X100GQ module
2	ICX7650-2X40GQ module	4	Expansion module power LED

Precautions specific to expansion modules

CAUTION
Disassembling any part of the expansion module voids the warranty and regulatory certifications. There are no user-serviceable parts inside the expansion module assembly.

CAUTION
The expansion modules are not hot-swappable.

CAUTION
Do not force the installation. If the expansion module does not slide in easily, ensure that it is correctly oriented before continuing.

CAUTION
If you do not install a module or a power supply in a slot, you must keep the slot filler panel in place. If you run the chassis with an uncovered slot, the system will overheat.

Time and items required

Replacing an expansion module in the Ruckus ICX 7650 should take less than two minutes to complete.

You need the following items to replace an expansion module in the Ruckus ICX 7650:

- A new expansion module
- A #1 Phillips screwdriver

Installing or replacing an expansion module

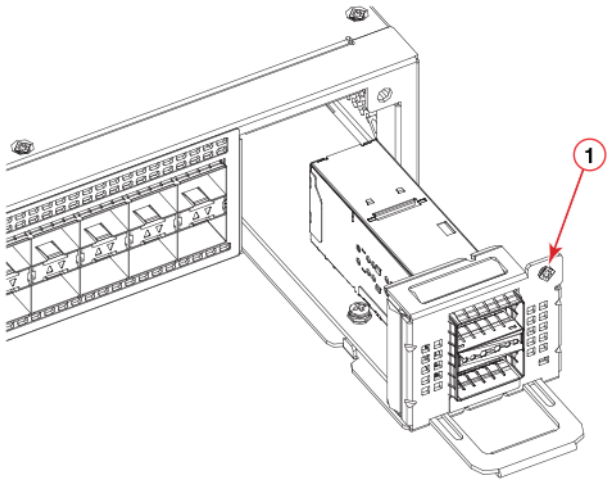
Complete the following steps to install or replace an expansion module in the Ruckus ICX 7650.

1. Power off the switch.
2. If replacing an expansion module:
   a. Using a Phillips screwdriver, unscrew the captive screw on the expansion module.
   b. Remove the expansion module from the chassis by pulling the handle on the expansion module out and away from the chassis.
3. If installing a new expansion module into a slot covered with a filler panel:
   a. Using a Phillips screwdriver, unscrew the captive screw on the filler panel.
   b. Remove the filler panel.
4. Before opening the package that contains the new expansion module, touch the bag to the switch casing to discharge any potential static electricity. It is recommended that you wear an ESD wrist strap during installation.
5. Remove the expansion module from the anti-static shielded bag.

CAUTION
Do not force the installation. If the expansion module does not slide in easily, ensure that it is correctly oriented before continuing.

6. Holding the expansion module level, guide it into the carrier rails on each side and gently push it all the way into the slot, ensuring that it firmly engages with the connector.

FIGURE 41 Installing an expansion module



1 Captive screw

7. When you are sure the expansion module has properly engaged the connector, tighten the captive screw to secure the expansion module in the slot.
8. Power on the switch.
9. Verify correct installation by running the **show module** command.

CAUTION
If you do not install a module or a power supply in a slot, you must keep the slot filler panel in place. If you run the chassis with an uncovered slot, the system will overheat.

Resolving Module 2 mismatches

When an expansion module is replaced, it can result in a mismatch with the switch configuration for the previous module. For example, if a 4x10 GbE module is replaced with a 1x100 GbE module there may be an exisiting configuration for port x/2/4 that no longer applies to the new module. When these configuration mismatches occur, action must be taken to resolve the mismatch.

The procedures to resolve a Module 2 mismatch in a standalone Ruckus ICX 7650 switch and a mismatch in a Ruckus ICX 7650 stack are different.

Resolving Module 2 mismatches in a standalone Ruckus ICX 7650 switch

Use the following procedure to resolve a Module 2 configuration mismatch for a Ruckus ICX 7650 switch in standalone mode.

1. Power down the switch, replace the installed module, and then reboot the switch.
2. Use the **no module** command to remove the current Module 2 configuration.

```
ICX7650-48ZP Router(config)# stack un 1
ICX7650-48ZP Router(config-unit-1)# no module 2
ICX7650-48ZP Router# show module
       Module                                    Status Ports Starting MAC
U1:M1  ICX7650-48ZP POE 48-port Management Module     OK     48   00c1.e2b5.bdf1
U1:M3  ICX7650-2X100G 2-port 200G Module              OK     2    00c1.e2b5.be26
```

3. Configure Module 2 for the installed module.

```
ICX7650-48ZP Router# configure terminal
ICX7650-48ZP Router(config)# stack un 1
ICX7650-48ZP Router(config-unit-1)# module
  module                       Configure stack module type
ICX7650-48ZP Router(config-unit-1)# module 2
  icx7600-100g-1port-100g-module
  icx7600-qsfp-2port-80g-module
  icx7600-xgf-4port-40g-module
ICX7650-48ZP Router(config-unit-1)# module 2 icx7600-qsfp-2port-80g-module
ICX7650-48ZP Router(config-unit-1)# end
```

4. Use the **write memory** command and then check the configuration with the **show config** command.

```
ICX7650-48ZP Router# write memory
Flash Memory Write (8192 bytes per dot)
Write startup-config done.
Copy Done.
ICX7650-48ZP Router# show config
!
Startup-config data location is flash memory
!
Startup configuration:
!
ver 08.0.70b1T228
!
stack unit 1
  module 1 icx7650-48zp-port-management-module
  module 2 icx7600-qsfp-2port-80g-module
```

```
  module 3 icx7650-100g-2port-200g-module
!
```

Resolving Module 2 mismatches in a Ruckus ICX 7650 stack

When a Ruckus ICX 7650 stack unit rejoins a stack with a different module type installed as Module 2, a configuration mismatch occurs, and the active controller places the stack unit in non-operational mode.

Follow these steps to correct a module configuration mismatch in a Ruckus ICX 7650 stack.

1. Enter the **show stack** command to confirm that a unit has become non-operational due to a configuration mismatch.

```
ICX7650-48P Router# show stack
T=1d4h22m36.1: alone: standalone, D: dynamic cfg, S: static
ID  Type         Role    Mac Address    Pri State  Comment
1 S ICX7650-48P  active  609c.9f52.6353 128 local  Ready
2 S ICX7650-48P  standby 609c.9f52.5a9b   0 remote Ready
3 S ICX7650-48ZP member  609c.9f52.32e3   0 remote NON-OP: config mismatch
4 S ICX7650-48ZP member  609c.9f52.2743   0 remote Ready
    active                               standby
    +---+        +---+        +---+        +---+
-3/1| 1 |3/2--3/2| 4 |3/1--3/1| 3 |3/2--3/2| 2 |3/1-
|   +---+        +---+        +---+        +---+   |
|                                                   |
|---------------------------------------------------|
Standby u2 - protocols ready, can failover
Current stack management MAC is 609c.9f52.6353
```

   The example shows a configuration mismatch on stack unit 3.

2. Use one of the following options to resolve an identified configuration mismatch:

   - Option 1: Remove the unit from the stack and allow it to rejoin.
   - Option 2: Remove the incorrect module configuration and allow the correct module information to be learned.

   a. Option 1: In global configuration mode, enter the **no stack unit** command followed by the stack number of the offending device.

```
ICX7650-48P Router# configure terminal
ICX7650-48P Router(config)# no stack unit 3
T=1d4h28m30.3: Election, was active, no change, ID=1, pri=128, 4U(1-4),
A=u1, nbr#=3 3, reason: u2: unit-removal, ,
Detect stack member 3 POE capable
All entries are cleared on unit 1 for unit 3
T:1d4h27m36.1: Done hot swap: active controller u1 sets u3 to Ready.
```

      The example removes stack unit 3 from the stack and shows the unit rejoining the stack with the correct configuration.

   b. Option 2: In stack unit configuration mode for the non-operational unit, enter the **no module 2** command.

```
ICX7650-48P Router# configure terminal
ICX7650-48P Router(config)# stack unit 3
ICX7650-48P Router(config-unit-3)# no module 2
```

3. (Optional) Enter the **show module** command to verify that the new configuration for Module 2 has been learned.

```
ICX7650-48P Router(config-unit-3)# show module
      Module                                  Status Ports  Starting MAC
U1:M1 ICX7650-48P POE 48-port Management Module   OK     48   609c.9f52.6353
U1:M2 ICX7600-2X40GQ 2-port 80G Module            OK      2   609c.9f52.6384
U1:M3 ICX7650-2X100G 2-port 200G Module           OK      2   609c.9f52.6388
U2:M1 ICX7650-48P POE 48-port Management Module   OK     48   609c.9f52.5a9b
```

```
U2:M2 ICX7600-2X40GQ 2-port 80G Module            OK      2   609c.9f52.5acc
U2:M3 ICX7650-2X100G 2-port 200G Module           OK      2   609c.9f52.5ad0
U3:M1 ICX7650-48ZP POE 48-port Management Module  OK     48   609c.9f52.32e3
U3:M2 ICX7600-2X40GQ 2-port 80G Module            OK      2   609c.9f52.3314
U3:M3 ICX7650-2X100G 2-port 200G Module           OK      2   609c.9f52.3318
U4:M1 ICX7650-48ZP POE 48-port Management Module  OK     48   609c.9f52.2743
U4:M2 ICX7600-2X40GQ 2-port 80G Module            OK      2   609c.9f52.2774
U4:M3 ICX7650-2X100G 2-port 200G Module           OK      2   609c.9f52.2778
```

The example displays the updated configuration of Module 2 in stack unit 3 as a 2-port 80-Gbps module.

4. (Optional) Enter the **show stack** command to confirm that the stack unit has returned to operation.

```
ICX7650-48P Router(config-unit-3)# show stack
T=1d4h54m37.4: alone: standalone, D: dynamic cfg, S: static
ID  Type         Role    Mac Address    Pri State  Comment
1 S ICX7650-48P  active  609c.9f52.6353 128 local  Ready
2 S ICX7650-48P  standby 609c.9f52.5a9b   0 remote Ready
3 S ICX7650-48ZP member  609c.9f52.32e3   0 remote Ready
4 S ICX7650-48ZP member  609c.9f52.2743   0 remote Ready
    active                                standby
    +---+        +---+        +---+        +---+
-3/1| 1 |3/2--3/2| 4 |3/1--3/1| 3 |3/2--3/2| 2 |3/1-
|   +---+        +---+        +---+        +---+   |
|                                                   |
|---------------------------------------------------|
Will assign standby in 49 sec due to all ready
Standby u2 - protocols ready, can failover
```

Ruckus ICX 7650 Specifications

System specifications

System component	Description
Enclosure	Stackable up to 12 switches per stack, chassis-mountable (1U) in a standard 2 or 4-post rack
Power supplies	Dual redundant, hot-swappable power supplies supported with 250 W AC intake or exhaust airflow for non-PoE switches, 1000 W AC with intake or exhaust airflow for PoE switches, and 510 W DC intake or exhaust airflow for non-PoE switches.
Fans	Dual redundant, hot-swappable fan units with intake or exhaust airflow
Cooling	Forced-air cooling front-to-back or back-to-front
System architecture	Non-blocking shared-memory switch
System processors	BCM58712D with quad-core ARM Cortex-A57 processor running at 1.6 GHz

Ethernet

These are standard modules for shipping bundles. For Ruckus ICX 7650 non-bundled switches, expansion modules need to be ordered separately.

System component	Description	Maximum ports supported
100 GbE QSFP28 ports	40/100 GbE QSFP28 stacking or uplink port	2 (Module 3)
40 GbE QSFP+ ports	40 GbE QSFP+ stacking or uplink port	2 (Module 3)
10 GbE SFP+ ports	10 GbE SFP+ port	24 (ICX 7650-48F)

System component	Description	Maximum ports supported
1 GbE SFP ports	1 GbE SFP port	24 (ICX 7650-48F)
10 GbE RJ-45 ports	100M/1/2.5/5/10 GbE RJ-45 port	24 (ICX 7650-48ZP)
1 GbE RJ-45 ports	10/100/1000 Mbps RJ-45 port	24 (ICX 7650-48ZP) 48 (ICX 7650-48P)
Ethernet management port	10/100/1000 Mbps RJ-45 port	1

LEDs

System component	Description
Switch status and management	Seven LED types indicate switch status: PWR and PWR2 (power supply units) DIAG (diagnostics) SYS (system status) MSTR (stacking configuration) CLD (cloud management) UPDATE (software update) STAT, SPD, ID, USB, PoE status mode
Ports	LEDs indicate port status or switch ID based on the status mode selection

Other

System component	Description
Serial cable	1 (RJ-45 to RJ-45)
RJ-45 to DB9 adapter	1
AC power cord	IEC 320-C14

Weight and physical dimensions

Model	Height	Width	Depth	Weight (with basic modules)
ICX 7650-48ZP	4.37 cm 1.72 inches	44.00 cm 17.32 inches	40.64 cm 16 inches	8.01 kg 17.82 lb
ICX 7650-48P	4.37 cm 1.72 inches	44.00 cm 17.32 inches	40.64 cm 16 inches	7.50 kg 16.5 lb
ICX 7650-48F	4.37 cm 1.72 inches	44.00 cm 17.32 inches	40.64 cm 16 inches	7.10 kg 15.62 lb

Environmental requirements

Condition	Operational	Non-operational
Ambient Temperature	0°C to 45°C (32°F to 113°F) at sea level	-40°C to 70°C (-40°F to 158°F)
Relative Humidity (non-condensing)	10% to 90% at 50°C (122°F)	10% to 90% at 70°C (158°F)
Altitude (above sea level)	0 to 3,048 m (10,000 ft)	0 to 12,000 m (39,370 ft)
Shock	20 G, 11 ms, half-sine wave	33 G, 11 ms, half-sine wave
Vibration	1 G sine, 0.4 grms random, 5-500 Hz	2.4 G sine, 1.1 grms random, 5-500 Hz
Airflow	Nominal: 10-25 cfm, Maximum: 54-57 cfm.	N/A
Heat dissipation (+/- 5%)	**NOTE:** Refer to "Power consumption (typical configuration)" on page 75 and "Power consumption (maximum configuration)" on page 76 for detailed information on heat dissipation.	N/A
Operating noise	ICX 7650-48ZP: 56.4 dBA ICX 7650-48P: 46.7 dBA ICX 7650-48F: 48.3 dBA	N/A

Power supply specifications (per PSU)

Power supply model	Maximum output power rating (DC)	Input voltage	Input line frequency	Maximum input current	Input line protection	Maximum inrush current
RPS15-E	250 W	100-240 V~	50-60 Hz	4.0 A	Fuses	35 A
RPS15-I	250 W	100-240 V~	50-60 Hz	4.0 A	Fuses	35 A
RPS16-E	1000 W	100-240 V~	50-60 Hz	11.8 A	Fuses	35 A
RPS16-I	1000 W	100-240 V~	50-60 Hz	11.8 A	Fuses	35 A
DC RPS16DC-E	510 W	40-60 V	-	15.5A	Fuses	40A
DC RPS16DC-I	510 W	40-60 V	-	15.5A	Fuses	40A

Power consumption (typical configuration)

All 1-GbE and two 10-GbE ports are linked up (no other port links), loading with 10 percent traffic rate and no PoE load. Two fan FRUs, 4x10GF uplink. Fans at nominal speed.

ICX7650-48ZP: 24 1-GbE + 24 2.5-GbE and Slot 2: Empty, Slot 3: 2x40GQ ports are linked up, loading with 10 percent traffic rate. Two fans at nominal speed.

Model name (Input power ±5%)	@100 VAC input	@200 VAC input	Minimum number of power supplies	Notes
ICX 7650-48ZP	120.46 W 411.14 BTU/hr	118.59 W 404.76 BTU/hr	1 x 1000 W AC	1 PSU, no PoE load.
	130.57 W 445.65 BTU/hr	128.32 W 437.97 BTU/hr	2 x 1000 W AC	2 PSUs, no PoE load

Model name (Input power ±5%)	@100 VAC input	@200 VAC input	Minimum number of power supplies	Notes
ICX 7650-48P	129.7 W 443 BTU/hr	143 W 488 BTU/hr	1 x 1000 W AC	1 PSU, no PoE load.
	128.2 W 438 BTU/hr	141.1 W 482 BTU/hr	1 x 1000 W AC	2 PSUs, no PoE load
ICX 7650-48F	141.4 W 420 BTU/hr	139.6 W 477 BTU/hr	1 x 250 W AC	1 PSU
	152.8 W 522 BTU/hr	151.6 W 518 BTU/hr	1 x 250 W AC	2 PSUs

Power consumption (maximum configuration)

All 1-GbE and two 10-GbE ports are linked up (no other port links), loading with 100 percent traffic rate and 100 percent PoE load. Two PSUs, two fan FRUs, 4x10GF uplink, fans at high speed.

ICX7650-48ZP: 24 1-GbE + 24 10-GbE and Slot 2: 4x10GF, Slot 3: 2x100GQ are linked up, 100 percent traffic and PoE load.

Model name (Input power ±5%)	@100 VAC input	@200 VAC input	Minimum number of power supplies	Notes
ICX 7650-48ZP	167.1 W 570.33 BTU/hr	164.06 W 559.95 BTU/hr	2 x 1000 W AC	1 PSU
	11853.08 W 6324.71 BTU/hr	1763.55 W 6019.14 BTU/hr	2 x 1000 W AC	2 PSUs required for PoE loading
ICX 7650-48P	998 W 3406 BTU/hr	958 W 3270 BTU/hr	1 x 1000 W AC	1 PSU
	1809 W 6174 BTU/hr	1769 W 6038 BTU/hr	1 x 1000 W AC	2 PSUs required for PoE loading
ICX 7650-48F	178.3 W 609 BTU/hr	175.7 W 606 BTU/hr	1 x 250 W AC	1 PSU
	196.4 W 670 BTU/hr	194.1 W 663 BTU/hr	1 x 250 W AC	2 PSUs

Power consumption (modules)

Name	Description	Power consumption
ICX7650-4X10GF	4-port 1/10 GbE SFP+ expansion module	Typical = 12.96 W Maximum = 15.72 W
ICX7650-2X40GQ	2-port 40 GbE QSFP+ data uplink / stacking module	Typical = 5.64 W Maximum = 7.38 W
ICX7650-1X100GQ	1-port 100 GbE QSFP28 data uplink / stacking module	Typical = 5.64 W Maximum = 7.38 W

Name	Description	Power consumption
ICX-FAN12-E	Power-supply exhaust airflow fan (two fans required if two power supplies are used)	Typical = 4.68 W Maximum = 16.68 W
ICX-FAN12-I	Power-supply intake airflow fan (two fans required if two power supplies are used)	Typical = 4.68 W Maximum = 16.68 W

Data port specifications (Ethernet)

Model name	Port type	Number (in module)	Description
ICX 7650-48ZP	100 GbE	2 (slot 3)	QSFP28 stacking ports, 40/100 Gbps, compatible with optical transceivers, or direct attached copper cable.
	40 GbE	2 (slot 3)	QSFP+ stacking ports, 40 Gbps, compatible with optical transceivers, or direct attached copper cable.
	10 GbE	24 (slot 1)	100M/1/2.5/5/10 GbE RJ-45 ports with PoE support
	1 GbE	24 (slot 1)	10/100M/1 GbE RJ-45 ports with PoE support
ICX 7650-48P	100 GbE	2 (slot 3)	QSFP28 stacking ports, 40/100 Gbps, compatible with optical transceivers, or direct attached copper cable.
	40 GbE	2 (slot 3)	QSFP+ stacking ports, 40 Gbps, compatible with optical transceivers, or direct attached copper cable.
	1 GbE	48 (slot 1)	10/100M/1 GbE RJ-45 ports with PoE support
ICX 7650-48F	100 GbE	2 (slot 3)	QSFP28 stacking ports, 40/100 Gbps, compatible with optical transceivers, or direct attached copper cable.
	40 GbE	2 (slot 3)	QSFP+ stacking ports, 40 Gbps, compatible with optical transceivers, or direct attached copper cable.
	10 GbE	24 (slot 1)	SFP+ ports, compatible with ER, LR, LRM, SR, ZR, or USR optical transceivers
	1 GbE	24 (slot 1)	SFP ports, compatible with 100Base-FX IR or LR SFP optic for SMF, 100Base-FX SFP optic MMF, 1000Base-BXD SFP optic SMF, 1000Base-BXU SFP optic SMF, 1000Base-LHA SFP optic SMF, 1000Base-LX SFP optic SMF, 1000Base-SX SFP optic MMF, 1000BASE-TX SFP Copper
ICX7650-1X100GQ	100 GbE	1 (slot 2)	Pluggable module with QSFP28 uplink port, compatible with optical transceivers, or direct attached copper cable
ICX7650-2X40GQ	40 GbE	2 (slot 2)	Pluggable module with QSFP+ uplink ports, compatible with optical transceivers, or direct attached copper cable
ICX7650-4X10GF	10 GbE	4 (slot 2)	Pluggable module with SFP+ uplink ports, compatible with ER, LR, LRM, SR, ZR. or USR optical transceivers

Serial port specifications (pinout - USB Type-C)

Pin	Signal	Description
A1	USB-C_GND	Ground
A2	Reserved	Not used
A3	Reserved	Not used
A4	USB_TYPE_C_5V_IN	5 V bus power

Pin	Signal	Description
A5	USB-C_CC1	Configuration channel
A6	USB-C_AD1+	Data A positive
A7	USB-C_AD1-	Data A negative
A8	Reserved	Not used
A9	USB_TYPE_C_5V_IN	5 V bus power
A10	Reserved	Not used
A11	Reserved	Not used
A12	USB-C_GND	Ground
B1	USB-C_GND	Ground
B2	Reserved	Not used
B3	Reserved	Not used
B4	USB_TYPE_C_5V_IN	5 V bus power
B5	Reserved	Not used
B6	USB-C_BD2+	Data B positive
B7	USB-C_BD2-	Data B negative
B8	Reserved	Not used
B9	USB_TYPE_C_5V_IN	5 V bus power
B10	Reserved	Not used
B11	Reserved	Not used
B12	USB-C_GND	Ground

Serial port specifications (pinout RJ-45)

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

Serial port specifications (protocol)

Parameter	Value
Baud	9600
Data bits	8

Parameter	Value
Parity	None
Stop bits	1
Flow control	None

Memory specifications

Memory	Type	Size
Main memory	DDR4 2133 SO-DIMM	4 GB
Boot Flash	SPI Flash	16 MB
M.2 Flash Module	NAND flash	16 GB

Regulatory compliance (EMC)

- FCC Part 15, Subpart B (Class A)
- EN 55032 (CE mark) (Class A)
- EN 55024 (CE mark) (Immunity) for Information Technology Equipment
- ICES-003 (Canada) (Class A)
- AS/NZ 55032 (Australia/New Zealand) (Class A)
- VCCI (Japan) (Class A)
- EN 300 386
- CNS 13438 (BSMI) (Taiwan) (Class A)
- KN 32 (South Korea) (Class A)
- KN 35 (South Korea) (Class A)
- TCVN 7189 / TCVN 7317 (Vietnam) (Class A)
- EN 61000-3-2
- EN 61000-3-3

Regulatory compliance (safety)

- CAN/CSA-C22.2 No. 60950/UL 60950 - Safety of Information Technology Equipment
- EN 60825 Safety of Laser Products - Part 1: Equipment Classification, Requirements and User's Guide
- EN 60950/IEC 60950 Safety of Information Technology Equipment

Regulatory compliance (environmental)

- 2014/35/EU and 2014/30/EU
- 2011/65/EU – Restriction of the use of certain hazardous substance in electrical and electronic equipment (EU RoHS)
- 2012/19/EU – Waste electrical and electronic equipment (EU WEEE)

- 94/62/EC – packaging and packaging waste (EU)
- 2006/66/EC – batteries and accumulators and waste batteries and accumulators (EU battery directive)
- 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (EU REACH)
- Section 1502 of the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 – U.S. Conflict Minerals
- 30/2011/TT-BCT – Vietnam circular
- SJ/T 11363-2006 Requirements for Concentration Limits for Certain Hazardous Substances in EIPs (China)
- SJ/T 11364-2006 Marking for the Control of Pollution Caused by EIPs (China)

Regulatory Statements

USA (FCC CFR 47 Part 15 Warning)

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

NOTE
Changes or modifications made to this device which are not expressly approved by Ruckus could void the user's authority to operate the equipment.

Industry Canada statement

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

English translation of above statement

This Class A digital apparatus complies with Canadian ICES-003.

Europe and Australia (CISPR 32 Class A Warning)

This equipment is compliant with Class A of CISPR 32. In a residential environment, this equipment may cause radio interference.

Germany (Noise Warning)

Maschinenlärminformations-Verordnung - 3. GPSGV, der höchste Schalldruckpegel beträgt 52 dB(A) gemäss EN ISO 7779.

English translation of above statement

Machine noise information regulation - 3. GPSGV, the highest sound pressure level value is 52 dB(A) in accordance with EN ISO 7779.

Japan (VCCI)

この装置は、クラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。 VCCI－A

English translation of above statement

This is Class A product based on the standard of the Voluntary Control Council For Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

Korea

A 급 기기 (업무용 방송통신기기): 이 기기는 업무용 (A 급) 으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며 , 가정외의 지역에서 사용하는 것을 목적으로 합니다 .

English translation of above statement

Class A device (Broadcasting Communication Device for Office Use): This device obtained EMC registration for office use (Class A), and may be used in places other than home. Sellers and/or users need to take note of this.

China

China-CCC Warning statements

在维修的时候一定要断开所有电源 (English translation"disconnect all power sources before service")

For non tropical use:

安全说明和标记	汉文	"仅适用于非热带气候条件下安全使用。"
	藏文	《[illegible]》
	蒙古文	"[illegible]"
	壮文	Dan hab yungh youq gij dienheiq diuzgen mbouj dwg diegndat haenx ancienz sawjyungh.
	维文	غەيرى ئىسسىق بەلباغ ھاۋا كىلىماتى شارائىتىدىلا بىخەتەر ئىشلەتكىلى بولىدۇ

For altitude 2000 meter and below:

安全说明和标记	汉文	仅适用于海拔2000m以下地区安全使用。
	藏文	《2000m [illegible]》
	蒙古文	"[illegible]"
	壮文	Dan hab yungh youq gij digih haijbaz 2000m doxroengz haenx ancienz sawjyungh.
	维文	دېڭىز يۈزىدىن 2000 مېتر تۆۋەن رايونلاردىلا بىخەتەر ئىشلەتكىلى بولىدۇ

Warning for Class A:

声 明

此为 A 级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，可能需要用户对其干扰采取切实可行的措施。

English translation of above statement

This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

BSMI statement (Taiwan)

警告使用者：
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，
在這種情況下，使用者會被要求採取某些適當的對策。

English translation of above statement

Warning: This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

限用物質含有情況標示聲明書

Declaration of the Presence Condition of the Restricted Substances Marking

設備名稱：乙太網交換機 Equipment name　　型號（型式）：ICX7650-48F, ICX7650-48P, ICX7650-48ZP Type designation (Type)

單元Unit	限用物質及其化學符號 Restricted substances and its chemical symbols					
	鉛Lead (Pb)	汞Mercury (Hg)	鎘Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr^{+6})	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
電路板組件 PCBA	-	○	○	○	○	○
風扇 FAN	-	○	○	○	○	○
散熱器 Heatsink	○	○	○	○	○	○
機殼 Chassis	-	○	○	○	○	○
組合線 Cable ass'y	○	○	○	○	○	○
電源供應器 Power Supply	-	○	○	○	○	○

備考1.〝超出0.1 wt %〞及〝超出0.01 wt %〞係指限用物質之百分比含量超出百分比含量基準值。
Note 1：“Exceeding 0.1 wt %” and “exceeding 0.01 wt %” indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition.

備考2.〝○〞係指該項限用物質之百分比含量未超出百分比含量基準值。
Note 2：“○” indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.

備考3.〝-〞係指該項限用物質為排除項目。
Note 3：The “–” indicates that the restricted substance corresponds to the exemption.

型號: ICX7650-48F

系列型號: ICX7650-48F-E, ICX7650-48F-E2, ICX7650-48F-E-RMT3

型號: ICX7650-48P

系列型號: ICX7650-48P-E, ICX7650-48P-E2, ICX7650-48P-E-RMT3

型號: ICX7650-48ZP

系列型號: ICX7650-48ZP-E, ICX7650-48ZP-E2, ICX7650-48ZP-E-RMT3

Cautions and Danger Notices

Cautions

A caution calls your attention to a possible hazard that can damage equipment.

“Vorsicht” weist auf die Gefahr einer möglichen Beschädigung des Gerätes hin.

Une mise en garde attire votre attention sur un risque possible d’endommagement de l’équipement. Ci-dessous, vous trouverez les mises en garde utilisées dans ce manuel.

Un mensaje de precaución le advierte sobre un posible peligro que pueda dañar el equipo. Las siguientes son precauciones utilizadas en este manual.

CAUTION
Changes or modifications made to this device that are not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

VORSICHT	Falls dieses Gerät verändert oder modifiziert wird, ohne die ausdrückliche Genehmigung der für die Einhaltung der Anforderungen verantwortlichen Partei einzuholen, kann dem Benutzer der weitere Betrieb des Gerätes untersagt werden.
MISE EN GARDE	Les éventuelles modifications apportées à cet équipement sans avoir été expressément approuvées par la partie responsable d’en évaluer la conformité sont susceptibles d’annuler le droit de l’utilisateur à utiliser cet équipement.
PRECAUCIÓN	Si se realizan cambios o modificaciones en este dispositivo sin la autorización expresa de la parte responsable del cumplimiento de las normas, la licencia del usuario para operar este equipo puede quedar anulada.

CAUTION
Disassembling any part of the power supply and fan assembly voids the warranty and regulatory certifications. There are no user-serviceable parts inside the power supply and fan assembly.

VORSICHT	Das Zerlegen von Netzteilen oder Lüftereinheiten macht die Garantie und die gesetzlichen Zertifizierungen ungültig. Die Netzteile und Lüftereinheiten enthalten keine Teile, die vom Benutzer gewartet werden können.
MISE EN GARDE	Le démontage d’une pièce du bloc d’alimentation ou du ventilateur annule la garantie et les certificats de conformité. Aucune pièce du bloc de l’alimentation ou du ventilateur ne peut être réparée par l’utilisateur.
PRECAUCIÓN	Si se desmonta cualquier pieza del módulo de fuente de alimentación y ventiladores, la garantía y las certificaciones normativas quedan anuladas. En el interior del módulo de fuente de alimentación y ventiladores no hay piezas que pueda reparar el usuario.

CAUTION
Make sure the airflow around the front, sides, and back of the device is not restricted.

VORSICHT	Stellen Sie sicher, dass an der Vorderseite, den Seiten und an der Rückseite der Luftstrom nicht behindert wird.
MISE EN GARDE	Vérifiez que rien ne restreint la circulation d'air devant, derrière et sur les côtés du dispositif et qu'elle peut se faire librement.
PRECAUCIÓN	Asegúrese de que el flujo de aire en las inmediaciones de las partes anterior, laterales y posterior del instrumento no esté restringido.

CAUTION
Ensure that the airflow direction of the power supply unit matches that of the installed fan tray. The power supplies and fan trays are clearly labeled with either a green arrow with an "E", or an orange arrow with an "I."

VORSICHT	Vergewissern Sie sich, dass die Luftstromrichtung des Netzteils der eingebauten Lüftereinheit entspricht. Die Netzteile und Lüftereinheiten sind eindeutig mit einem grünen Pfeil und dem Buchstaben "E" oder einem orangefarbenen Pfeil mit dem Buchstaben "I" gekennzeichnet.
MISE EN GARDE	Veillez à ce que le sens de circulation de l'air du bloc d'alimentation corresponde à celui du tiroir de ventilation installé. Les blocs d'alimentation et les tiroirs de ventilation sont étiquetés d'une flèche verte avec un "E " ou d'une flèche orange avec un " I ".
PRECAUCIÓN	Asegúrese de que la dirección del flujo de aire de la unidad de alimentación se corresponda con la de la bandeja del ventilador instalada. Los dispositivos de alimentación y las bandejas del ventilador están etiquetadas claramente con una flecha verde y una "E" o con una flecha naranja y una "I".

CAUTION
To protect the serial port from damage, keep the cover on the port when not in use.

VORSICHT	Um den seriellen Anschluss vor Beschädigungen zu schützen, sollten Sie die Abdeckung am Anschluss belassen, wenn er nicht verwendet wird.
MISE EN GARDE	Mettre le bouchon de protection sur le port série lorsqu'il ne sert pas pour éviter de l'endommager.
PRECAUCIÓN	Para evitar que se dañe el puerto serie, mantenga la cubierta colocada sobre el puerto cuando no lo utilice.

CAUTION
Never leave tools inside the chassis.

VORSICHT	Lassen Sie keine Werkzeuge im Chassis zurück.
MISE EN GARDE	Ne laissez jamais d'outils à l'intérieur du châssis.
PRECAUCIÓN	No deje nunca herramientas en el interior del chasis.

CAUTION
If you do not install a module or a power supply in a slot, you must keep the slot filler panel in place. If you run the chassis with an uncovered slot, the system will overheat.

VORSICHT	Falls kein Modul oder Netzteil im Steckplatz installiert wird, muss die Steckplatztafel angebracht werden. Wenn ein Steckplatz nicht abgedeckt wird, läuft das System heiß.
MISE EN GARDE	Si vous n'installez pas de module ou de bloc d'alimentation dans un slot, vous devez laisser le panneau du slot en place. Si vous faites fonctionner le châssis avec un slot découvert, le système surchauffera.
PRECAUCIÓN	Si no instala un módulo o un fuente de alimentación en la ranura, deberá mantener el panel de ranuras en su lugar. Si pone en funcionamiento el chasis con una ranura descubierta, el sistema sufrirá sobrecalentamiento.

CAUTION
Use the screws specified in the procedure. Using longer screws can damage the device.

VORSICHT	Verwenden Sie die in der Anleitung aufgeführten Schrauben. Mit längeren Schrauben wird das Gerät möglicherweise beschädigt.
MISE EN GARDE	Utilisez les vis mentionnées dans les instructions. L'utilisation de vis plus longues peut endommager l'appareil.
PRECAUCIÓN	Utilice los tornillos especificados en el procedimiento. Si utiliza tornillos de mayor longitud, podría dañar el dispositivo.

CAUTION
Do not install the device in an environment where the operating ambient temperature might exceed 50°C (122°F).

VORSICHT	Das Gerät darf nicht in einer Umgebung mit einer Umgebungsbetriebstemperatur von über 50° C (122° F) installiert werden.
MISE EN GARDE	N'installez pas le dispositif dans un environnement où la température d'exploitation ambiante risque de dépasser 50° C (122° F).
PRECAUCIÓN	No instale el instrumento en un entorno en el que la temperatura ambiente de operación pueda exceder los 50° C (122° F).

CAUTION
Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the manufacturer's instructions.

VORSICHT	Es besteht Explosionsgefahr, wenn ein unzulässiger Batterietyp eingesetzt wird. Verbrauchte Batterien sind entsprechend den geltenden Vorschriften zu entsorgen.
MISE EN GARDE	Risque d'explosion en cas de remplacement de la pile par un modèle incorrect. Débarrassezvous des piles usagées conformément aux instructions.
PRECAUCIÓN	Riesgo de explosión si se sustituye la batería por una de tipo incorrecto. Deshágase de las baterías usadas de acuerdo con las instrucciones.

CAUTION
The device must be turned off and disconnected from the fabric during this procedure.

VORSICHT	Bei diesem Verfahren muss das Gerät ausgeschaltet und von der Fabric getrennt sein.
MISE EN GARDE	Au cours de cette procédure, l'appareil doit être éteint et déconnecté du réseau.
PRECAUCIÓN	El dispositivo debe estar apagado y desconectado del fabric durante este procedimiento.

CAUTION
Power supplies are hot-swappable. However, they should be inserted or removed without a power cord being connected to a power source to avoid damage.

VORSICHT	Netzteile sind hot-swap-fähig. Sie sollten jedoch eingesetzt oder entfernt werden, ohne dass ein Stromkabel mit einer Stromquelle verbunden ist, um Beschädigungen zu vermeiden.
MISE EN GARDE	Les unités d'alimentation sont permutables à chaud. Cependant, et pour éviter tout dommage, elles doivent être insérées ou retirées sans cordon d'alimentation relié à une source d'alimentation.
PRECAUCIÓN	Los proveedores de energía son deslizables por calor. Sin embargo deben insertarse o extraerse sin ningún cable de alimentación conectado a la fuente de alimentación para evitar daños.

CAUTION
Static electricity can damage the chassis and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

VORSICHT	Statische Elektrizität kann das System und andere elektronische Geräte beschädigen. Um Schäden zu vermeiden, entnehmen Sie elektrostatisch empfindliche Geräte erst aus deren antistatischer Schutzhülle, wenn Sie bereit für den Einbau sind.
MISE EN GARDE	L'électricité statique peut endommager le châssis et les autres appareils électroniques. Pour éviter tout dommage, conservez les appareils sensibles à l'électricité statique dans leur emballage protecteur tant qu'ils n'ont pas été installés.
PRECAUCIÓN	La electricidad estática puede dañar el chasis y otros dispositivos electrónicos. A fin de impedir que se produzcan daños, conserve los dispositivos susceptibles de dañarse con la electricidad estática dentro de los paquetes protectores hasta que esté listo para instalarlos.

CAUTION
Use a separate branch circuit for each power cord, which provides redundancy in case one of the circuits fails.

VORSICHT	Es empfiehlt sich die Installation eines separaten Stromkreiszweiges für jede Elektroschnur als Redundanz im Fall des Ausfalls eines Stromkreises.
MISE EN GARDE	Utilisez un circuit de dérivation différent pour chaque cordon d'alimentation ainsi, il y aura un circuit redondant en cas de panne d'un des circuits.
PRECAUCIÓN	Use un circuito derivado separado para cada cordón de alimentación, con lo que se proporcionará redundancia en caso de que uno de los circuitos falle.

CAUTION
To avoid high voltage shock, do not open the device while the power is on.

VORSICHT	Das eingeschaltete Gerät darf nicht geöffnet werden, da andernfalls das Risiko eines Stromschlags mit Hochspannung besteht.
MISE EN GARDE	Afin d'éviter tout choc électrique, n'ouvrez pas l'appareil lorsqu'il est sous tension.
PRECAUCIÓN	Para evitar una descarga de alto voltaje, no abra el dispositivo mientras esté encendido.

CAUTION
Ensure that the device does not overload the power circuits, wiring, and over-current protection. To determine the possibility of overloading the supply circuits, add the ampere (amp) ratings of all devices installed on the same circuit as the device. Compare this total with the rating limit for the circuit. The maximum ampere ratings are usually printed on the devices near the input power connectors.

VORSICHT	Stromkreise, Verdrahtung und Überlastschutz dürfen nicht durch das Gerät überbelastet werden. Addieren Sie die Nennstromleistung (in Ampere) aller Geräte, die am selben Stromkreis wie das Gerät installiert sind. Somit können Sie feststellen, ob die Gefahr einer Überbelastung der Versorgungsstromkreise vorliegt. Vergleichen Sie diese Summe mit der Nennstromgrenze des Stromkreises. Die Höchstnennströme (in Ampere) stehen normalerweise auf der Geräterückseite neben den Eingangsstromanschlüssen.
MISE EN GARDE	Assurez-vous que le dispositif ne risque pas de surcharger les circuits d'alimentation, le câblage et la protection de surintensité. Pour déterminer le risque de surcharge des circuits d'alimentation, additionnez l'intensité nominale (ampères) de tous les dispositifs installés sur le même circuit que le dispositif en question. Comparez alors ce total avec la limite de charge du circuit. L'intensité nominale maximum en ampères est généralement imprimée sur chaque dispositif près des connecteurs d'entrée d'alimentation.
PRECAUCIÓN	Verifique que el instrumento no sobrecargue los circuitos de corriente, el cableado y la protección para sobrecargas. Para determinar la posibilidad de sobrecarga en los circuitos de suministros, añada las capacidades nominales de corriente (amp) de todos los instrumentos instalados en el mismo circuito que el instrumento. Compare esta suma con el límite nominal para el circuito. Las capacidades nominales de corriente máximas están generalmente impresas en los instrumentos, cerca de los conectores de corriente de entrada.

CAUTION
Before plugging a cable to any port, be sure to discharge any static charge stored on the cable by touching the electrical contacts to ground surface.

VORSICHT	Bevor Sie ein Kabel in einen Anschluss einstecken, entladen Sie jegliche im Kabel vorhandene elektrische Spannung, indem Sie mit den elektrischen Kontakten eine geerdete Oberfläche berühren.
MISE EN GARDE	Avant de brancher un câble à un port, assurez-vous de décharger la tension du câble en reliant les contacts électriques à la terre.
PRECAUCIÓN	Antes de conectar un cable en cualquier puerto, asegúrese de descargar la tensión acumulada en el cable tocando la superficie de conexión a tierra con los contactos eléctricos.

CAUTION
For the NEBS-compliant installation of a Ruckus device with AC or DC systems, use a ground wire of at least 6 AWG. The ground wire should have an agency-approved crimped connector (provided with the device) attached to one end, with the other end attached to building ground. The connector must be crimped with the proper tool, allowing it to be connected to both ground screws on the enclosure. Before crimping the ground wire into the provided ground lug, ensure that the bare copper wire has been cleaned and antioxidant is applied to the bare wire. In addition, anti-rotation devices or lock washers must be used with all screw connections for the grounding wire.

VORSICHT	Zur NEBS-konformen Installation eines Ruckus Geräts mit Gleich- oder Wechselstrom betriebenen muss zur Erdung ein Kabel der Stärke von mindestens 6 AWG verwendet werden. Das Erdungskabel muss an einem Ende mit einem zugelassenen Crimp-Anschluss (im Lieferumfang des Geräts) versehen sein und mit dem anderen Ende an die Gebäude-Erde angeschlossen werden. Der Anschluss muss mit einem geeigneten Werkzeug gecrimpt werden, damit er mit den beiden Erdungsschrauben auf dem Gehäuse verbunden werden kann. Bevor das Erdungskabel an die Erdungsöse angeschlossen wird, muss der blanke Kupferdraht gereinigt und mit einem Antioxidationsmittel behandelt werden. Außerdem müssen bei allen Schraubverbindungen des Erdungskabels Drehsicherungen oder Sicherungsscheiben verwendet werden.
MISE EN GARDE	Pour garantir la conformité de l'installation d'un dispositif Ruckus avec système alimentation CC ou CA à la norme NEBS, utilisez un câble de mise à la terre d'au moins 6 AWG. Le câble de mise à la terre doit être muni d'une cosse sertie homologuée (fournie avec l'appareil) à une extrémité, l'autre extrémité étant reliée à la terre. La cosse doit être sertie avec l'outil adéquat, ce qui permet de la relier aux deux vis de mise à la terre du boîtier. Avant de sertir le câble de mise à la terre dans la cosse fournie, assurez-vous que le fil de cuivre dénudé a été nettoyé et qu'un antioxydant a été appliqué. De plus, des dispositifs antirotation ou des rondelles de frein doivent être utilisés avec tous les raccords vissés au câble de mise à la terre.

PRECAUCIÓN	Para que la instalación de un dispositivo con sistemas de CA o CC sea conforme a la certificación NEBS, utilice un cable de conexión a tierra de calibre AWG 6 como mínimo. El cable de conexión a tierra debe disponer de un conector engarzado homologado (suministrado con el dispositivo) unido a un extremo de modo que el otro extremo se conecte a la toma de tierra. El conector se debe engarzar con la herramienta adecuada de forma que se pueda conectar a los dos tornillos de conexión a tierra del compartimento. Antes de engarzar el cable de conexión a tierra a la patilla de conexión a tierra proporcionada, asegúrese de limpiar y aplicar antioxidante al alambre pelado de cobre. Además, deben emplearse los seguros contra giro o las arandelas de sujeción en todas las uniones atornilladas del cable de toma de tierra.

CAUTION
Make sure the rack housing the device is adequately secured to prevent it from becoming unstable or falling over.

VORSICHT	Stellen Sie sicher, dass das Gestell oder der Schrank für die Unterbringung des Geräts auf angemessene Weise gesichert ist, so dass das Gestell oder der Schrank nicht wackeln oder umfallen kann.
MISE EN GARDE	Vérifiez que le bâti ou le support abritant le dispositif est bien fixé afin qu'il ne devienne pas instable ou qu'il ne risque pas de tomber.
PRECAUCIÓN	Verifique que el bastidor o armario que alberga el instrumento está asegurado correctamente para evitar que pueda hacerse inestable o que caiga.

CAUTION
To prevent damage to the chassis and components, never attempt to lift the chassis using the fan or power supply handles. These handles were not designed to support the weight of the chassis.

VORSICHT	Alle Geräte mit Wechselstromquellen sind nur zur Installation in Sperrbereichen bestimmt. Ein Sperrbereich ist ein Ort, zu dem nur Wartungspersonal mit einem Spezialwerkzeug, Schloss und Schlüssel oder einer anderen Schutzvorrichtung Zugang hat.
MISE EN GARDE	Pour éviter d'endommager le châssis et les composants, ne jamais tenter de soulever le châssis par les poignées du ventilateur ou de l'alimentation. Ces poignées n'ont pas été conçues pour supporter le poids du châssis.
PRECAUCIÓN	Para prevenir daños al chasis y a los componentes, nunca intente levantar el chasis usando las asas de la fuente de alimentación o del ventilador. Tales asas no han sido diseñadas para soportar el peso del chasis.

Danger notices

A danger notification calls your attention to a possible hazard that can cause injury or death. The following are the warnings used in this manual.

“Gefahr” weist auf eine mögliche Gefährdung hin, die zu Verletzungen oder Tod führen können. Sie finden die folgenden Warnhinweise in diesem Handbuch.

Un danger attire votre attention sur un risque possible de blessure ou de décès. Ci-dessous, vous trouverez les avertissements utilisés dans ce manuel.

Una señal de peligro le llama la atención sobre cualquier posible peligro que pueda ocasionar daños personales o la muerte. A continuación se dan las advertencias utilizadas en este manual.

DANGER
The procedures in this manual are for qualified service personnel.

GEFAHR	Die Verfahren in diesem Handbuch sind nur für qualifiziertes Wartungspersonal gedacht.
DANGER	Les procédures décrites dans ce manuel doivent être effectuées par le personnel de service qualifié uniquement.
PELIGRO	Los procedimientos de este manual se han hecho para personal de servicio cualificado.

DANGER
Make sure that the power source circuits are properly grounded, then use the power cord supplied with the device to connect it to the power source.

GEFAHR	Stellen Sie sicher, dass die Stromkreise ordnungsgemäß geerdet sind. Benutzen Sie dann das mit dem Gerät gelieferte Stromkabel, um es an die Srromquelle anzuschließen.
DANGER	Vérifiez que les circuits de sources d’alimentation sont bien mis à la terre, puis utilisez lecordon d’alimentation fourni avec le dispositif pour le connecter à la source d’alimentation.
PELIGRO	Verifique que circuitos de la fuente de corriente están conectados a tierra correctamente; luego use el cordón de potencia suministrado con el instrumento para conectarlo a la fuente de corriente.

DANGER
Before beginning the installation, see the precautions in “Power precautions.”

GEFAHR	Vor der Installation siehe Vorsichtsmaßnahmen unter “Power Precautions” (Vorsichtsmaßnahmen in Bezug auf elektrische Ablagen).
DANGER	Avant de commencer l’installation, consultez les précautions décrites dans “Power Precautions” (Précautions quant à l’alimentation).
PELIGRO	Antes de comenzar la instalación, consulte las precauciones en la sección “Power Precautions” (Precauciones sobre corriente).

DANGER
Be careful not to accidently insert your fingers into the fan tray while removing it from the chassis. The fan may still be spinning at a high speed.

GEFAHR	Die Finger dürfen nicht versehentlich in das Ventilatorblech gesteckt werden, wenn dieses vom Gehäuse abgenommen wird. Der Ventilator kann sich unter Umständen noch mit hoher Geschwindigkeit drehen.
DANGER	Faites attention de ne pas accidentellement insérer vos doigts dans le boîtier du ventilateur lorsque vous l'enlevez du châssis. Il est possible que le ventilateur tourne encore à grande vitesse.
PELIGRO	Procure no insertar los dedos accidentalmente en la bandeja del ventilador cuando esté desmontando el chasis. El ventilador podría estar girando a gran velocidad.

DANGER
For safety reasons, the ESD wrist strap should contain a series 1 megohm resistor.

GEFAHR	Aus Sicherheitsgründen sollte ein EGB-Armband zum Schutz von elektronischen gefährdeten Bauelementen mit einem 1 Megaohm-Reihenwiderstand ausgestattet sein.
DANGER	Pour des raisons de sécurité, la dragonne ESD doit contenir une résistance de série 1 méga ohm.
PELIGRO	Por razones de seguridad, la correa de muñeca ESD deberá contener un resistor en serie de 1 mega ohmio.

DANGER
If the installation requires a different power cord than the one supplied with the device, make sure you use a power cord displaying the mark of the safety agency that defines the regulations for power cords in your country. The mark is your assurance that the power cord can be used safely with the device.

GEFAHR	Falls für die Installation ein anderes Stromkabel erforderlich ist (wenn das mit dem Gerät gelieferte Kabel nicht passt), müssen Sie sicherstellen, dass Sie ein Stromkabel mit dem Siegel einer Sicherheitsbehörde verwenden, die für die Zertifizierung von Stromkabeln in Ihrem Land zuständig ist. Das Siegel ist Ihre Garantie, dass das Stromkabel sicher mit Ihrem Gerät verwendet werden kann.
DANGER	Si l'installation nécessite un cordon d'alimentation autre que celui fourni avec le dispositif, assurez-vous d'utiliser un cordon d'alimentation portant la marque de l'organisation responsable de la sécurité qui définit les normes et régulations pour les cordons d'alimentation dans votre pays. Cette marque vous assure que vous pouvez utiliser le cordon d'alimentation avec le dispositif en toute sécurité.
PELIGRO	Si la instalación requiere un cordón de corriente distinto al que se ha suministrado con el instrumento, verifique que usa un cordón de corriente que venga con la marca de la agencia de seguridad que defina las regulaciones para cordones de corriente en su país. Esta marca será su garantía de que el cordón de corriente puede ser utilizado con seguridad con el instrumento.

DANGER
Disconnect the power cord from all power sources to completely remove power from the device.

GEFAHR	Ziehen Sie das Stromkabel aus allen Stromquellen, um sicherzustellen, dass dem Gerät kein Strom zugeführt wird.
DANGER	Débranchez le cordon d'alimentation de toutes les sources d'alimentation pour couper complètement l'alimentation du dispositif.
PELIGRO	Para desconectar completamente la corriente del instrumento, desconecte el cordón de corriente de todas las fuentes de corriente.

DANGER
This device might have more than one power cord. To reduce the risk of electric shock, disconnect all power cords before servicing.

GEFAHR	Dieses System ist möglicherweise mit mehr als einem Netzkabel ausgestattet. Trennen Sie stets die Verbindung aller Netzkabel, bevor Sie Wartungsarbeiten durchführen, um dieGefahr eines Stromschlags auszuschließen.
DANGER	Ce commutateur peut comporter plusieurs cordons d'alimentation. Pour réduire les risques de choc électrique, déconnectez tous les cordons d'alimentation avant d'effectuerl'entretien de l'appareil.
PELIGRO	Este conmutador podría tener más de un cable de alimentación. Para reducir el riesgo de sufrir una descarga eléctrica, desconecte todos los cables de alimentación antes de proceder con la reparación.

DANGER
Use safe lifting practices when moving the product.

GEFAHR	Beim Bewegen des Produktes ist auf eine sichere Hubtechnik zu achten.
DANGER	Utiliser des techniques de levage sûres pour déplacer le produit.
PELIGRO	Tenga mucho cuidado al levantar el producto para moverlo

DANGER
Mount the devices you install in a rack as low as possible. Place the heaviest device at the bottom and progressively place lighter devices above.

GEFAHR	Montieren Sie die Geräte im Gestell so tief wie möglich. Platzieren Sie das schwerste Gerät ganz unten, während leichtere Geräte je nach Gewicht (je schwerer desto tiefer) darüber untergebracht werden.
DANGER	Montez les dispositifs que vous installez dans un bâti aussi bas que possible. Placez le dispositif le plus lourd en bas et le plus léger en haut, en plaçant tous les dispositifs progressivement de bas en haut du plus lourd au plus léger.
PELIGRO	Monte los instrumentos que instale en un bastidor lo más bajos posible. Ponga el instrumento más pesado en la parte inferior y los instrumentos progresivamente más livianos más arriba.

DANGER
All fiber-optic interfaces use Class 1 lasers.

GEFAHR	Alle Glasfaser-Schnittstellen verwenden Laser der Klasse 1.
DANGER	Toutes les interfaces en fibres optiques utilisent des lasers de classe 1.
PELIGRO	Todas las interfaces de fibra óptica utilizan láser de clase 1.

DANGER
Laser radiation. Do not view directly with optical instruments. Class 1M laser products.

GEFAHR	Laserstrahlung! Schauen Sie nicht direkt mit optischen Instrumenten in den Laserstrahl herein. Klasse 1M Laserprodukte.
DANGER	Rayonnement de laser. Ne regardez pas directement avec les instruments optiques. Produits de laser de la classe 1M.
PELIGRO	Radiacion de Laser. No vea directamente con Instrumentos Opticos. Clase 1M de Productos de Laser.
危險	雷射輻射，勿以光學儀器直視等級 1 M雷射產品。
警告	レーザ放射 光学器具で直接ビームを見ないこと クラス 1 M レーザ製品

DANGER

Use only optical transceivers that are qualified by Ruckus and comply with the FDA Class 1 radiation performance requirements defined in 21 CFR Subchapter I, and with IEC 825 and EN60825. Optical products that do not comply with these standards might emit light that is hazardous to the eyes.

GEFAHR	Verwenden Sie nur optische Transceiver, die von Ruckus zugelassen sind und die die Anforderungen gemäß FDA Class 1 Radiation Performance Standards in 21 CFR, Unterkapitel I, sowie IEC 825 und EN60825 erfüllen. Optische Produkte, die diese Normen nicht erfüllen, können Strahlen aussenden, die für das menschliche Auge gefährlich sind.
DANGER	Utilisez uniquement des émetteurs-récepteurs optiques certifiés par Ruckus et conformes aux exigences sur la puissance de rayonnement de catégorie 1 de la FDA définies au sous-chapitre 21 CFR I et à les normes IEC 825 et EN60825. Les produits optiques non-conformes à ces normes sont susceptibles d'émettre une lumière dangereuse pour les yeux.
PELIGRO	Utilice sólo transceptores ópticos aprobados por Ruckus y que cumplan con las normas IEC 825 y EN60825, y con los estándares de rendimiento Clase 1 de FDA definidos en el subcapítulo I de 21 CFR. Los productos ópticos que no cumplan con estos estándares pueden emitir luz dañina para los ojos.