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# LN2600 Rugged Security Router

## Hardware Guide



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*LN2600 Rugged Security Router Hardware Guide*

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#### Revision History

January 2015—Minor updates.

November 2013—Initial release.

The information in this document is current as of the date on the title page.

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- Documentation and Release Notes on page xi
- Objectives on page xi
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- Documentation Feedback on page xiii
- Requesting Technical Support on page xiv

## Documentation and Release Notes

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To obtain the most current version of all Juniper Networks® technical documentation, see the product documentation page on the Juniper Networks website at <http://www.juniper.net/techpubs/>.

If the information in the latest release notes differs from the information in the documentation, follow the product Release Notes.

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## Objectives

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This documentation describes hardware components, installation, basic configuration, and basic troubleshooting procedures for the Juniper Networks LN2600 Rugged Security Router. It explains how to prepare your site for router installation, unpack and install the hardware, power on the router, perform initial software configuration, and perform routine maintenance. After completing the installation and basic configuration procedures covered in this documentation, see the Junos OS configuration guides for information about further Junos OS configuration.



**NOTE:** For additional information about Juniper Networks routers and the Physical Interface Cards (PICs) they support—either corrections to or information that might have been omitted from this guide—see the hardware release notes at <http://www.juniper.net/>.

## Documentation Conventions

Table 1 on page xii defines notice icons used in this guide.

Table 1: Notice Icons







Icon	Meaning	Description
	Informational note	Indicates important features or instructions.
	Caution	Indicates a situation that might result in loss of data or hardware damage.
	Warning	Alerts you to the risk of personal injury or death.
	Laser warning	Alerts you to the risk of personal injury from a laser.
	Tip	Indicates helpful information.
	Best practice	Alerts you to a recommended use or implementation.

Table 2 on page xii defines the text and syntax conventions used in this guide.

Table 2: Text and Syntax Conventions

Convention	Description	Examples
<b>Bold text like this</b>	Represents text that you type.	To enter configuration mode, type the <b>configure</b> command:  user@host> <b>configure</b>
Fixed-width text like this	Represents output that appears on the terminal screen.	user@host> <b>show chassis alarms</b> No alarms currently active
<i>Italic text like this</i>	<ul style="list-style-type: none"> <li>Introduces or emphasizes important new terms.</li> <li>Identifies guide names.</li> <li>Identifies RFC and Internet draft titles.</li> </ul>	<ul style="list-style-type: none"> <li>A policy <i>term</i> is a named structure that defines match conditions and actions.</li> <li><i>Junos OS CLI User Guide</i></li> <li>RFC 1997, <i>BGP Communities Attribute</i></li> </ul>

Table 2: Text and Syntax Conventions (*continued*)

Convention	Description	Examples
<i>Italic text like this</i>	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name:  [edit] root@# <b>set system domain-name</b> <i>domain-name</i>
<b>Text like this</b>	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	<ul style="list-style-type: none"> <li>To configure a stub area, include the <b>stub</b> statement at the [edit protocols ospf area area-id] hierarchy level.</li> <li>The console port is labeled <b>CONSOLE</b>.</li> </ul>
< > (angle brackets)	Encloses optional keywords or variables.	<b>stub</b> <default-metric <i>metric</i> >;
(pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	<b>broadcast   multicast</b>  <i>(string1   string2   string3)</i>
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	<b>rsvp { # Required for dynamic MPLS only</b>
[ ] (square brackets)	Encloses a variable for which you can substitute one or more values.	<b>community name members [</b> <i>community-ids</i> <b>]</b>
Indentation and braces ( { } )	Identifies a level in the configuration hierarchy.	[edit] routing-options { static { route default { nexthop <i>address</i> ; retain; } } }
;(semicolon)	Identifies a leaf statement at a configuration hierarchy level.	
<b>GUI Conventions</b>		
<b>Bold text like this</b>	Represents graphical user interface (GUI) items you click or select.	<ul style="list-style-type: none"> <li>In the Logical Interfaces box, select <b>All Interfaces</b>.</li> <li>To cancel the configuration, click <b>Cancel</b>.</li> </ul>
> (bold right angle bracket)	Separates levels in a hierarchy of menu selections.	In the configuration editor hierarchy, select <b>Protocols&gt;Ospf</b> .

## Documentation Feedback

We encourage you to provide feedback, comments, and suggestions so that we can improve the documentation. You can provide feedback by using either of the following methods:

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- E-mail—Send your comments to [techpubs-comments@juniper.net](mailto:techpubs-comments@juniper.net). Include the document or topic name, URL or page number, and software version (if applicable).

## Requesting Technical Support

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Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active J-Care or JNASC support contract, or are covered under warranty, and need post-sales technical support, you can access our tools and resources online or open a case with JTAC.

- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the *JTAC User Guide* located at <http://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf>.
- Product warranties—For product warranty information, visit <http://www.juniper.net/support/warranty/>.
- JTAC hours of operation—The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

## Self-Help Online Tools and Resources

For quick and easy problem resolution, Juniper Networks has designed an online self-service portal called the Customer Support Center (CSC) that provides you with the following features:

- Find CSC offerings: <http://www.juniper.net/customers/support/>
- Search for known bugs: <http://www2.juniper.net/kb/>
- Find product documentation: <http://www.juniper.net/techpubs/>
- Find solutions and answer questions using our Knowledge Base: <http://kb.juniper.net/>
- Download the latest versions of software and review release notes: <http://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications: <http://kb.juniper.net/InfoCenter/>
- Join and participate in the Juniper Networks Community Forum: <http://www.juniper.net/company/communities/>
- Open a case online in the CSC Case Management tool: <http://www.juniper.net/cm/>

To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool: <https://tools.juniper.net/SerialNumberEntitlementSearch/>

## Opening a Case with JTAC

You can open a case with JTAC on the Web or by telephone.

- Use the Case Management tool in the CSC at <http://www.juniper.net/cm/>.
- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

For international or direct-dial options in countries without toll-free numbers, see <http://www.juniper.net/support/requesting-support.html>.



## PART 1

# Overview of the LN2600 Rugged Security Router

- [LN2600 Rugged Security Router Overview on page 3](#)



## CHAPTER 1

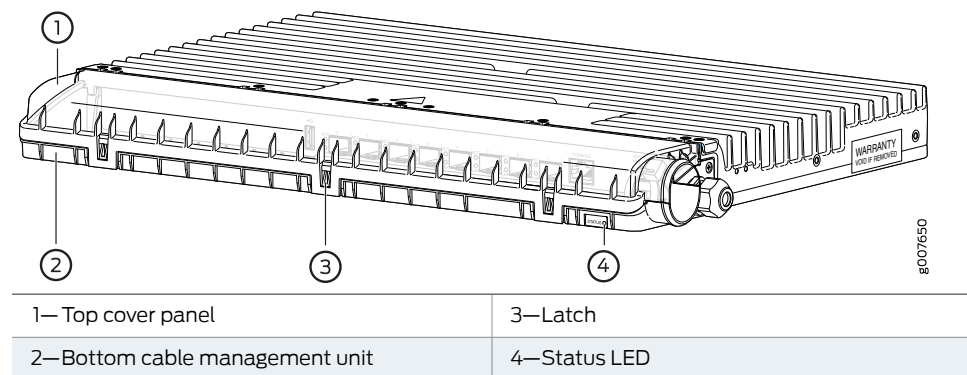
# LN2600 Rugged Security Router Overview

- [LN2600 Rugged Security Router Description on page 3](#)
- [LN2600 Rugged Security Router Features on page 4](#)
- [LN2600 Router Front Panel Overview on page 6](#)

## LN2600 Rugged Security Router Description

The Juniper Networks LN2600 Rugged Security Router is an embedded security router that operates in both wire-line and wireless environments with communication nodes that are either mobile or stationary. The LN2600 router provides reliable and secure data, voice, and video services. The LN2600 router is a high-performance router with security features that includes firewall, encryption, and intrusion prevention system in a fanless, ventless, and water-resistant system capable of effortlessly performing in extreme temperatures and harsh environments. The LN2600 router can be installed as a rack-mountable or wall-mountable chassis.

**Figure 1: LN2600 Rugged Security Router**



The LN2600 router can be used effectively in the following environments:

- Energy and utility companies, such as Smart Grid
- Mission critical infrastructure companies, such as electricity, oil, gas and water infrastructures
- Public sector safety organizations, such as first responders

- Military and defense establishments that require secure and reliable routing solutions on the go
- Transportation including rail and subways
- Industrial and manufacturing facilities

- Related Documentation**
- [LN2600 Rugged Security Router Features on page 4](#)
  - [Installing the LN2600 Router Overview on page 14](#)

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## LN2600 Rugged Security Router Features

- [Rugged Chassis on page 4](#)
- [Ethernet Ports on page 4](#)
- [RJ-45 Console Port on page 4](#)
- [USB Port on page 5](#)
- [Tamper-Evident Seals on page 5](#)
- [Tamper-Proof Lock on page 5](#)
- [Enhanced Memory on page 6](#)

### Rugged Chassis

The LN2600 router is a fanless and ventless router. These features make the LN2600 router very sturdy. All interfaces and cabling are on one side of the chassis, and are well protected by a sealed plexiglass cover. The LN2600 router meets the International Protection profile (IP-64) for dust proof and water splash proof environments.

### Ethernet Ports

The LN2600 router supports eight ports of Gigabit Ethernet small form-factor pluggable transceiver (SFP) traffic with up to 1024 logical interfaces (see [Figure 4 on page 6](#)). The router supports most Layer 2 and Layer 3 protocols, route redistribution, tunneling, multicast, routine quality of service (QoS), and security.

The eight gigabit Ethernet ports on the LN2600 router are 1000Base-X interfaces (SX, LX, and T options) with autonegotiation on by default. All the eight SFP transceivers on the LN2600 router must be industrial-hardened versions (maximum 80° C).

### RJ-45 Console Port

The LN2600 router supports one RJ-45 console port receptacle that accepts an RJ-45 cable (see [Figure 4 on page 6](#)) to connect the router to an auxiliary or console management device. You can use the console port on the device to connect to the device through an RJ-45 serial cable. From the console port, you can use the CLI to configure the device. By default, the console port is enabled.

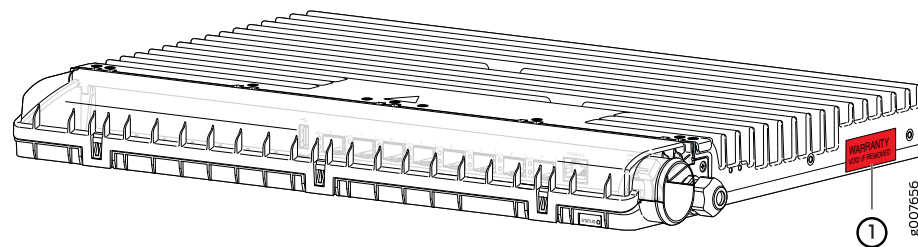
## USB Port

The LN2600 router supports one removable media interface through which you can install the Junos OS.

## Tamper-Evident Seals

Two tamper-evident seals are affixed to the sides of the router to show evidence of tampering with the router's internal components. Two red color seals are placed on each sides of the LN2600 router chassis.

**Figure 2: Tamper-Evident Seal**



1— Tamper-evident seal

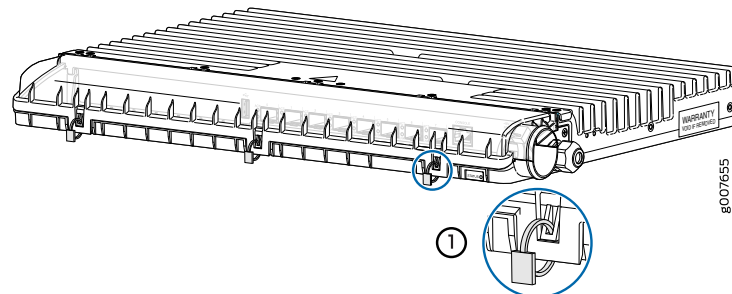


**WARNING:** If any of these seals are removed or peeled off the router, there may have been an attempt to break open the router, compromising the integrity of the router, which voids the router's warranty.

## Tamper-Proof Lock

The LN2600 router comes with a front protective cover that can be secured with a lock. The front protective cover closed and secured with locks ensures unwanted tampering of the input and power chords. You can lock the LN2600 router at three different places for enhanced security.

**Figure 3: Tamper-Proof Lock**



1— Protective lock

## Enhanced Memory

The LN2600 router comes with 2 GB of RAM and 4 GB of flash memory for faster processing.

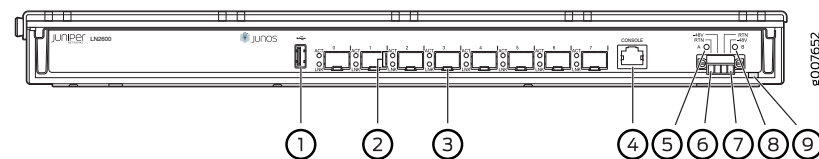
### Related Documentation

- [LN2600 Rugged Security Router Description on page 3](#)
- [LN2600 Router Status LED on page 39](#)
- [LN2600 Router Front Panel Overview on page 6](#)

## LN2600 Router Front Panel Overview

The LN2600 router is designed so that it can be accessed only from the front of the router chassis. All the interface ports including the power inputs are located in the front of the LN2600 router. All the cables are arranged in the cable management system, which protects them from extreme weather conditions.

Figure 4: LN2600 Router Front Panel



1—USB port	6—DC power input <b>A</b>
2—ACT and Link LEDs	7—DC power input <b>B</b>
3—Gigabit Ethernet SFP ports	8—Power LED - DC power input <b>B</b>
4—RJ-45 console port	9—Status LED port
5—Power LED - DC power input <b>A</b>	

The front panel of an LN2600 router consists of the following components:

- Eight Gigabit Ethernet SFP ports
- One console port
- One USB port for upgrading Junos OS
- Two DC power input ports, labeled **A** and **B**
- LEDs

### Related Documentation

- [LN2600 Rugged Security Router Features on page 4](#)
- [LN2600 Router Status LED on page 39](#)

## PART 2

# Setting Up the LN2600 Router

- [Unpacking and Inspecting the LN2600 Rugged Security Router Hardware on page 9](#)
- [Installing the LN2600 Rugged Security Router on page 13](#)



## CHAPTER 2

# Unpacking and Inspecting the LN2600 Rugged Security Router Hardware

- [Unpacking the LN2600 Router on page 9](#)
- [Inspecting the Hardware on page 9](#)
- [Parts Inventory \(Packing List\) for the LN2600 Router on page 10](#)
- [If You Detect or Suspect Damage on page 11](#)

## Unpacking the LN2600 Router

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The router is shipped in a cardboard carton, secured with packing material.

Before you begin unpacking the router, be sure you have a utility knife to open the box.

To unpack the LN2600 router:

1. Open the box from the top to access the router in its protective package.
2. Remove the router and its protective package from the box.
3. Remove the protective packaging from the router.

### Related Documentation

- [Inspecting the Hardware on page 9](#)
- [Packing Instructions for Returning an LN2600 Router on page 44](#)
- [If You Detect or Suspect Damage on page 11](#)

## Inspecting the Hardware

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After you remove the equipment from the shipping container:

- Confirm the contents of the container.
- Inspect all external surfaces and external connectors for visible signs of damage.
- Inspect all accessories shipped with each unit.
- Document any damage noted during your inspection.

- Related Documentation**
- [If You Detect or Suspect Damage on page 11](#)
  - [Unpacking the LN2600 Router on page 9](#)

## Parts Inventory (Packing List) for the LN2600 Router

The LN2600 routers are shipped in a cardboard carton, secured with foam packing material. The carton also contains an accessory box.

The router shipment includes a packing list. Check the parts you receive in the router shipping carton against the items on the packing list. The packing list specifies the part number and description of each part in your order. The SFP optics, rack-mounting kit, and the wall-mounting kits are sold separately. They do not come with the LN2600 router.

If any part on the packing list is missing, contact your customer service representative. For international-dial or direct-dial options in countries without toll-free numbers, see <http://www.juniper.net/support/requesting-support.html>.

Table 3 on page 10 through Table 5 on page 11 list the parts and their quantities in the packing list.

**Table 3: Parts List for the LN2600 Router**

Component	Component
LN2600 router	End User License Agreement
Juniper Networks Product Warranty	LN2600 router quick start guide

**Table 4: Parts List for the Rack-Mounting Kit**

Component	Component
Rack-mounting unit	Rack mount brackets
Juniper Networks Product Warranty	Cable sealing foam
End User License Agreement	Hose bag
Cage nuts	Cable tie
Heat sink screws	Thumb screws
Shoulder screws	Grounding cable lug
Bracket screws	



**NOTE:** If needed, you must provide additional mounting screws that are appropriate for your rack to mount the chassis on a rack.

**Table 5: Parts List for the Wall-Mounting Kit**

Component	Component
Wall-mounting unit	Wall-mount brackets
Juniper Networks Product Warranty	Wall-mount screws
End User License Agreement	Cable sealing foam
Cage nuts	Hose bag
Grounding cable lug	Cable tie
Thumb screws	Screws
Wall mounting drill template	

**Related Documentation**

- [Inspecting the Hardware on page 9](#)
- [If You Detect or Suspect Damage on page 11](#)
- [LN2600 Rugged Security Router Description on page 3](#)

## If You Detect or Suspect Damage

If you detect or suspect damage to any equipment:

- Contact the shipper responsible for delivery, and formally report the damage.
- Contact your Juniper Networks sales representative or reseller.

**Related Documentation**

- [Packing Instructions for Returning an LN2600 Router on page 44](#)
- [Information You Might Need to Supply to JTAC on page 43](#)
- [LN2600 Rugged Security Router Description on page 3](#)



## CHAPTER 3

# Installing the LN2600 Rugged Security Router

- [Before You Install the LN2600 Router on page 13](#)
- [Installing the LN2600 Router Overview on page 14](#)
- [Mounting the LN2600 Router on the Rack on page 14](#)
- [Mounting the LN2600 Router on the Wall on page 18](#)
- [Removing the LN2600 Router on page 21](#)
- [Powering on the LN2600 Router on page 22](#)
- [Installing the SFP Transceiver in the LN2600 Router on page 27](#)
- [Removing the SFP Transceiver from the LN2600 Router on page 29](#)
- [Weatherproofing the LN2600 Router on page 30](#)
- [Configuring and Operating the Router on page 35](#)

### Before You Install the LN2600 Router

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Before installing the LN2600 router, be sure you have:

- A 3/32 Allen wrench with a torque of 5 lb-in (0.56 Nm).
- Phillips (+) screwdriver with a minimum shaft length of 6 inches (150 mm)
- 2.5-mm slotted screwdriver
- T10 Torx and 7 mm nut driver
- 3/8-in ratchet driver
- Copper or fiber-optic Ethernet cables (up to eight for each router)
- SFP and the RJ-45 Console cables
- An electrostatic discharge (ESD) grounding strap
- Power supply of -48 VDC
- Rack-mounting and the wall-mounting kits (optional)

- Related Documentation**
- [LN2600 Rugged Security Router Description on page 3](#)
  - [Installing the LN2600 Router Overview on page 14](#)

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## Installing the LN2600 Router Overview

The LN2600 router comes with an option of mounting the router on a rack or on a wall. Based on your need, you can install the LN2600 router in one of the following ways:

- [“Mounting the LN2600 Router on the Rack” on page 14](#) — You can mount the LN2600 router on a standard 19 in. rack with help of a rack-mounting kit. The rack-mounting kit is sold separately. It does not come with the LN2600 router.
- [“Mounting the LN2600 Router on the Wall” on page 18](#) — You can mount the LN2600 router on a suitable wall with the help of a wall-mounting kit. The wall-mounting kit is sold separately. It does not come with the LN2600 router.

- Related Documentation**
- [Mounting the LN2600 Router on the Rack on page 14](#)
  - [Mounting the LN2600 Router on the Wall on page 18](#)
  - [Before You Install the LN2600 Router on page 13](#)

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## Mounting the LN2600 Router on the Rack

You can mount the LN2600 router on four posts of a standard 19 in. rack. The rack-mounting kit comes with heat sink unit that provides enhanced cooling to the LN2600 router.

A 19 in. rack is defined in *Cabinets, Racks, Panels, and Associated Equipment* (document number EIA-310-D) published by the Electronics Industry Association (<http://www.eia.org>).

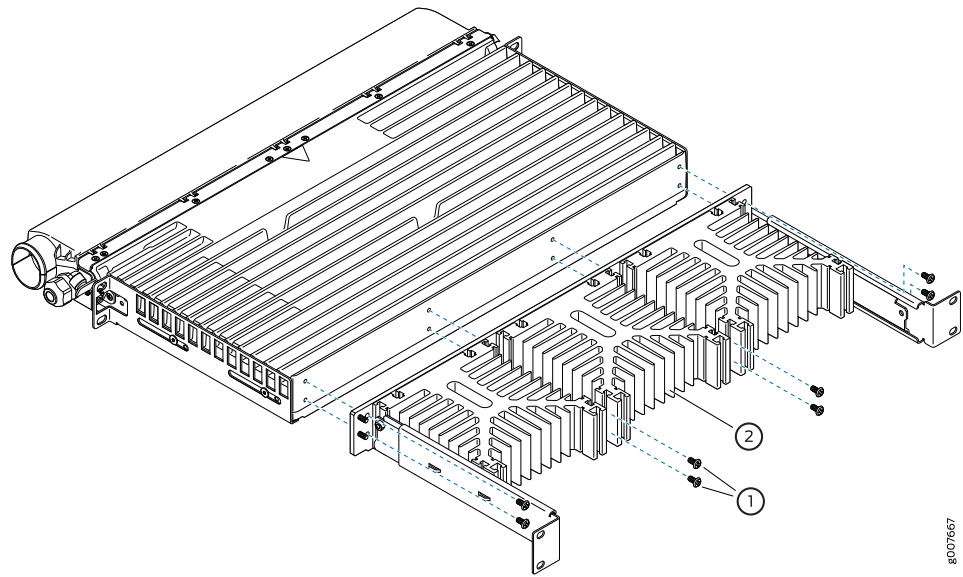
Ensure that you have the following parts and tools available:

- Phillips (+) screwdriver with a minimum shaft length of 6 inches (150 mm)
- T10 Torx and 7-mm nut driver
- An electrostatic discharge (ESD) grounding strap
- Mounting brackets, mounting screws, heat sink unit, and matching screws provided with the rack-mounting kit
- Ground label and ground lug provided with the rack-mounting kit

To mount the LN2600 router on the 19 in. rack:

1. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to one of the ESD points on the chassis.
2. Keep the LN2600 router on a horizontal surface near the rack.
3. Attach the heat sink unit provided with the rack-mounting kit to the rear side of the LN2600 router, and secure it with eight heat sink screws.

Figure 5: LN2600 Router with Heat Sink Unit



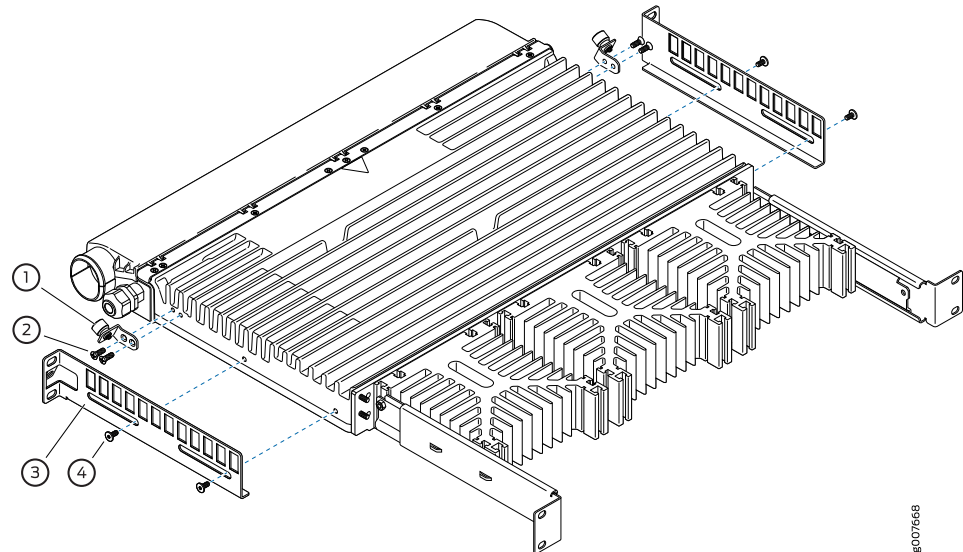
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1—Heat sink screws

2—Heat sink unit

4. Attach the rack-mount brackets to the sides of the LN2600 router using one shoulder screw on each side.

Figure 6: LN2600 Router with Brackets



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1—Thumb screw

3—Rack-mount bracket

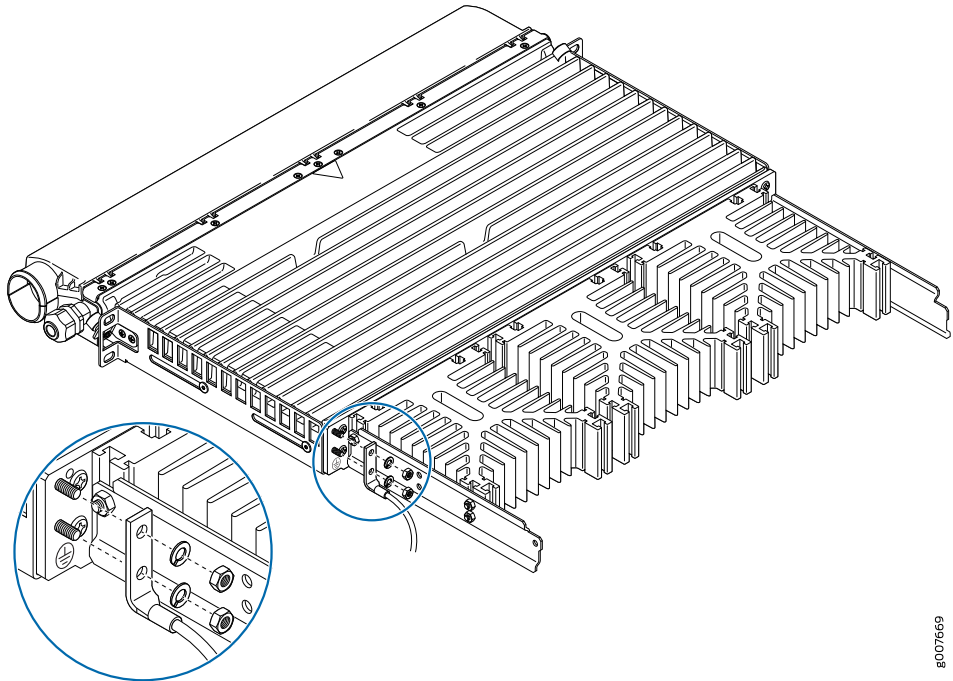
2—Screw

4—Shoulder screw

5. Attach the two thumb screws to the sides of the LN2600 router and secure it with two screws.

6. On the rear side of the LN2600 router, place the grounding cable lug over the grounding points, and secure the grounding cable lug to the grounding points, first with the washers, then with the screws.

**Figure 7: LN2600 Router with Grounding Lug**



8007669

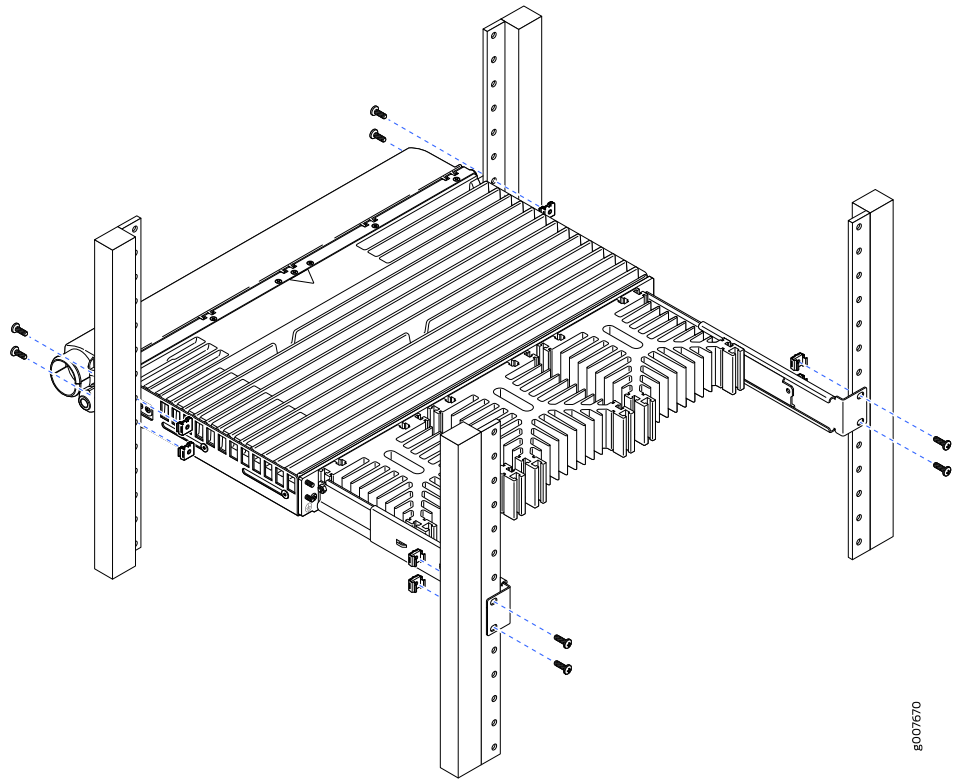
7. On the front side of the two rack rails, insert four cage nuts in the holes specified for mounting the router. Install the cage nuts from the front of the front rail.

The rack-mounting kit comes with cage nuts to support mounting the LN2600 router into the racks with square hole mounting flanges.



**NOTE:** For effective cooling in the rack-mount configuration, ensure that you have a minimum of 2 U (3.5 in) space above the router.

Figure 8: LN2600 Router in the Rack



g007670

8. Slide the LN2600 router from the front side of the rack rails until it touches the rear side of the rack rails. Ensure that the router sits properly on the rack.
9. Secure the LN2600 router from the front side with the rack screws.
10. On the rear side of the two rack rails, insert four cage nuts in the holes specified for mounting the router. Install the cage nuts from the front of the back rail.



**NOTE:** Make sure that the two front cage nuts and the two back cage nuts are at the same level.

11. Slide rear support brackets onto rear left and right side flanges of the LN2600 router, and secure it to the rear side of the rack mounting rails with bracket screws.
12. Secure the rear support brackets to the four rear cage nuts with screws.

The LN2600 router is now ready for use. Connect the power supply and cabling as required.

#### Related Documentation

- [LN2600 Router Physical Specifications on page 81](#)
- [LN2600 Router Power Requirements on page 83](#)
- [Powering on the LN2600 Router on page 22](#)
- [Installing the SFP Transceiver in the LN2600 Router on page 27](#)

- [Diagnostic Tests on page 40](#)

## Mounting the LN2600 Router on the Wall

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You can mount the LN2600 router on the wall with the help of a wall-mounting kit. The wall-mounting kit comes with heat sink unit that provides enhanced cooling to the LN2600 router.



**NOTE:** The wall on which you want to install the LN2600 router along with the wall-mounting unit must have the following:

- The thickness of the wall must be a minimum of 1 meter to allow easy access to the connectors.

If you are installing the LN2600 router wall-mounting unit on a plywood wall, the thickness of the plywood wall must be a minimum of 3/4 inch.

- The concrete wall must be a minimum of 800 PSI (5.5 MPA) strength.

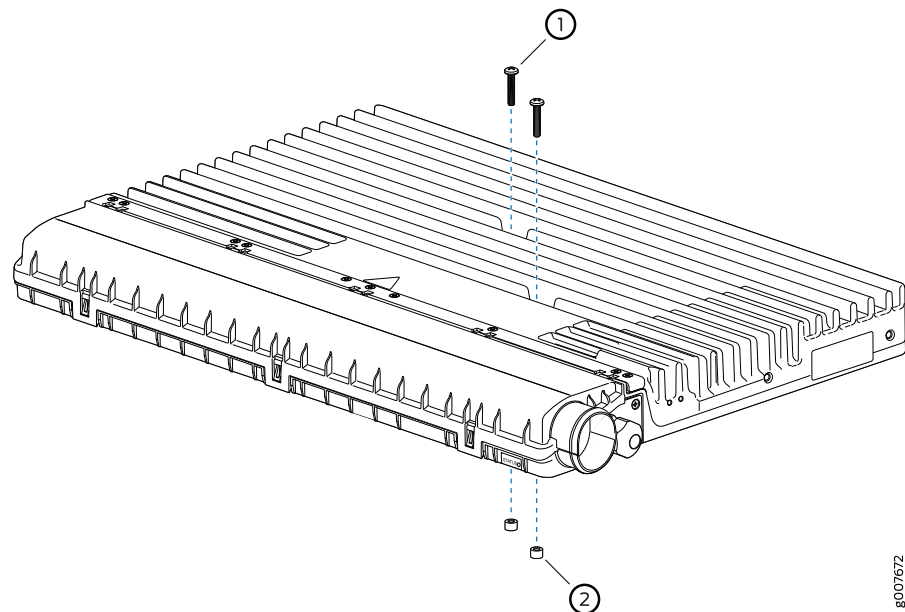
Ensure that you have the following parts and tools available:

- Phillips (+) screwdriver with a minimum shaft length of 6 inches (150 mm)
- 3/8 inches ratchet driver set
- An electrostatic discharge (ESD) grounding strap
- Wall-mounting unit along with the mounting screws and chassis mounting screws provided with the wall-mounting kit
- Ground label and ground lug provided with the wall-mounting kit
- Marker pen
- Drilling machine

To mount the LN2600 router on the wall:

1. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to one of the ESD points on the chassis.
2. Prepare the LN2600 router for wall-mounting by removing the two screws and the respective nuts located on the top and bottom center of the LN2600 router, and keep the two screws for using it later. You may discard the two nuts. They are not required for wall-mounting the LN2600 router.

Figure 9: LN2600 Router Screw Removal



8007672

1—Router screws

2—Router nuts

3. Place the wall-mounting drill hole template on the wall (concrete or plywood wall as required) and drill four holes on the exact pre-drill locations marked on the template. Ensure that the drill hole template is leveled properly.

The wall-mounting drill hole template is a paper template that comes with the wall-mounting unit. The template has exact mount hole locations marked.



**NOTE:** Ensure that you have a minimum of 355 mm (14 in) space to the left and that of 250 mm (10 in) to the right of the wall-mounting drill hole template.

For installing the LN2600 router on a wall:

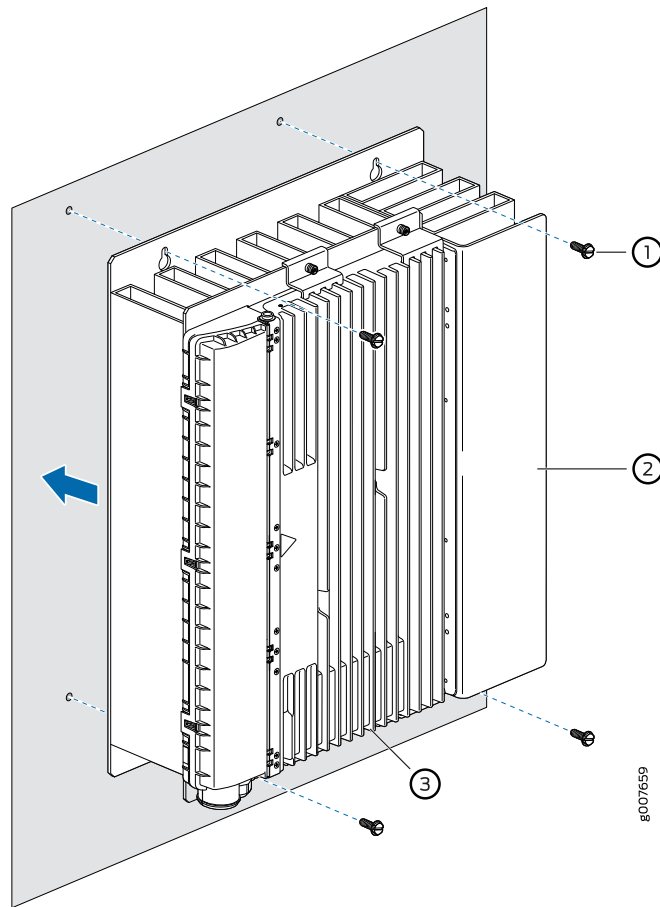
- If you are using Tapcon<sup>®</sup> concrete screws, drill the screw holes of 3/16 inch to a depth of 2.25 inch.
- If you are using Hilty<sup>®</sup> anchors, drill the anchor holes of 1/4 inch to a depth of 1.5 inch.

For installing the LN2600 router on a plywood surface, drill the pilot screw holes of 1/8 inch.

4. Install the respective screws (or anchors as required) to the drill holes till you have 1/4 inch of the screw left.
5. Place the wall-mount unit on top of the screws (or anchors) through the key holes present on the wall-mount unit, and tighten the screws to secure the wall-mount unit in place..

6. Place the LN2600 router on top of the wall-mount unit aligning the center mounting posts with the rear screw holes present on the bottom of the LN2600 router.
7. Secure the LN2600 router using the two screws removed in step 2.

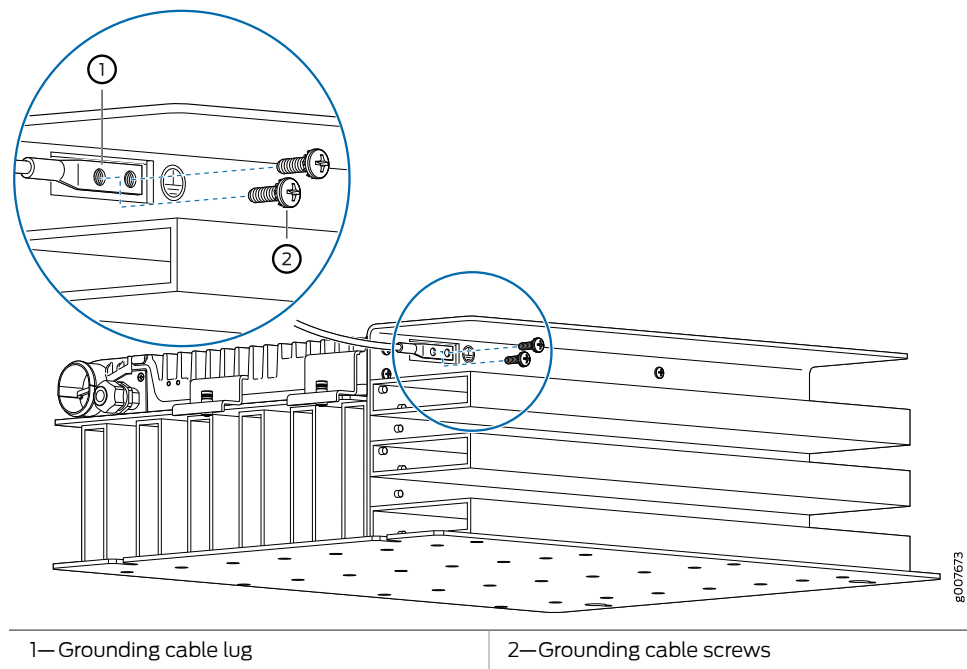
**Figure 10: LN2600 Router on the Wall-Mounting Unit**



1— Wall-mount screws	3—LN2600 router
2— Wall-mounting unit	

8. Secure the LN2600 router with the wall-mounting unit by attaching two wall-mount clamps each to the top and bottom of the wall-mounting unit. Secure the clamps with screws.
9. On the right side of the wall-mount unit, secure the LN2600 router with eight heat sink screws.
10. Install the grounding cable lug over the grounding points on the right of the wall-mounting unit, and secure them with grounding screws and washers.

Figure 11: Grounding Points on the LN2600 Router



The LN2600 router is now ready for use. Connect the power supply and cabling as required.

#### Related Documentation

- [LN2600 Router Physical Specifications on page 81](#)
- [LN2600 Router Power Requirements on page 83](#)
- [Powering on the LN2600 Router on page 22](#)
- [Installing the SFP Transceiver in the LN2600 Router on page 27](#)
- [Diagnostic Tests on page 40](#)

## Removing the LN2600 Router

The interface cables on the LN2600 router are hot-swappable; power can be left on while you remove or replace a cable without damaging the router.

Ensure that you have the following parts and tools available:

- A 3/32 in Allen wrench with a torque of 5 lb-in (0.56 Nm).
- Phillips (+) screwdriver
- An electrostatic discharge (ESD) grounding strap



**CAUTION:** The LN2600 router has more than one power source. Ensure proper care while disconnecting the DC power supply to the router.

To remove the router from the 19 in. rack:

1. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to one of the ESD points on the chassis.
2. Using the screwdriver, loosen the four cage nuts from the front and from the rear of the rack that hold the LN2600 router.

Ensure that you hold the router from the bottom for support before loosening the nuts.

3. Hold the LN2600 router from the bottom to support it, and pull it completely out of the rack.

To remove the router from the wall-mounting unit:

1. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to one of the ESD points on the chassis.
2. Using the screwdriver, loosen the four clamps from the top and bottom of the wall-mounting unit that holds the LN2600 router to the wall-mounting unit.
3. Using the screwdriver, remove the eight nuts from the side of the heat sink unit.
4. Using the screwdriver, remove the two screws from the top center of the LN2600 router.
5. Hold the LN2600 router from the bottom for support, and pull it completely out of the wall-mounting unit.

**Related  
Documentation**

- [Mounting the LN2600 Router on the Wall on page 18](#)
- [Mounting the LN2600 Router on the Rack on page 14](#)

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## Powering on the LN2600 Router

The LN2600 router derives its power from a single -48 VDC power supply with dual power inputs.



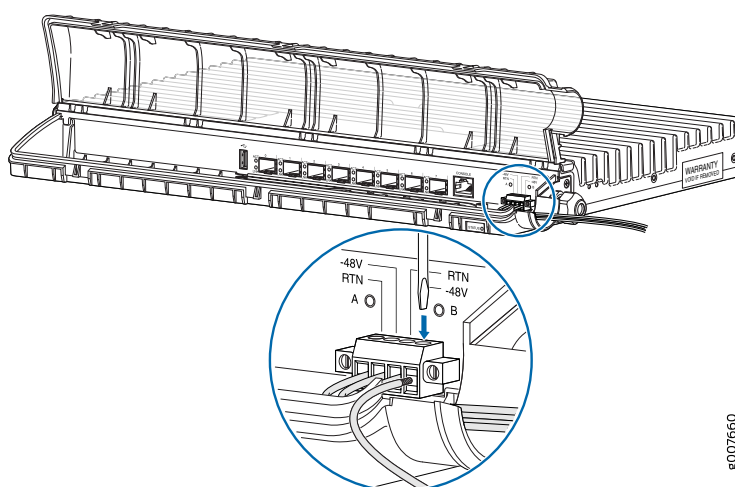
**CAUTION:** The LN2600 router has more than one power source. Ensure proper care while connecting the DC power supply to the router.

You connect DC power to the router by attaching power cables from the external DC power sources to the terminal on the power supply ports. The power cables are not provided with the router.

To connect the DC source power cables to the router for each power supply:

1. Power off the dedicated customer site circuit breakers. Ensure that the voltage across the DC power source cable leads is 0 V and that there is no chance that the cable leads might become active during installation.
2. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to one of the ESD points on the chassis.
3. Verify that the DC power cables are correctly labeled before making connections to the power supply. In a typical power distribution scheme where the return is connected to chassis ground at the battery plant, you can use a multimeter to verify the resistance of the **48V** and **RTN** cables to chassis ground:
  - The cable with very large resistance (indicating an open circuit) to chassis ground is **–48V**.
  - The cable with very low resistance (indicating a closed circuit) to chassis ground is **RTN**.
4. Loosen the screws from the power terminals using a 2.5 mm slotted screw driver.

Figure 12: Dual DC Power Source



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**CAUTION:** You must ensure that power connections maintain the proper polarity. The power source cables might be labeled (+) and (–) to indicate their polarity. There is no standard color coding for DC power cables. The color coding used by the external DC power source at your site determines the color coding for the leads on the power cables that attach to the terminal studs on each power supply.

5. Insert the power cables as specified to the respective power terminals, and secure the cables with the screws.
  - Secure the positive (+) DC source power cable to the **RTN** (return) terminal.
  - Secure the negative (–) DC source power cable to the **–48V** (input) terminal.



**CAUTION:** Ensure that each power cable seats flush against the surface of the terminal block as you are tightening the screws. Ensure that each screw is properly threaded into the terminal. Applying installation torque to the screw when improperly threaded may result in damage to the terminal.

6. Repeat Step 4 through Step 5 for the remaining power supply.
7. Arrange the other end of the power cables in a single bundle, and pass them through the power cable entrance (see [Figure 16 on page 31](#)).
8. Power on the dedicated customer site circuit breakers.
9. Monitor router startup on the console and the LED on the front panel of the LN2600 router to verify that the router is booting properly. For information on the LN2600 router status LED, see [“LN2600 Router Status LED” on page 39](#).

As a standard part of the boot process, the router runs startup power-on self test (SPOST) and then power-on self test (POST) diagnostics.

A successful startup looks similar to the following example:

```
CPU Memory (Data32: 00000000-0007ffff) test completed, 1 pass, 0 errors
CPU Memory (Data32: 0f000000-0fffffff) test completed, 1 pass, 0 errors
CPU Memory (Addr32: 00000000-0007ffff) test completed, 1 pass, 0 errors
CPU Memory (Addr32: 0f000000-0fffffff) test completed, 1 pass, 0 errors
```

```
Boot Flash: 16 MB in 131 Sectors (portwidth: 16bit chipwidth: 16bit)
OCTEON CN56XX pass 2.1, Core clock: 600 MHz, DDR clock: 266 MHz
```

```
Initializing USB
```

```
Device 1:
```

```
Product      DOTG Root Hub
```

```
Initializing IDE
```

```
Initializing FPGA
```

```
Programming /cf/usr/share/pfe/firmware/563-029572.bit: 2067591 bytes
```

```
Programmed successfully (time: 883966125 ticks)
```

```
PCIe: Waiting for port 0 link
```

```
PCIe: Port 0 link active, 1 lanes
```

```
0:00:00.0 0x003b1304
```

```
HWA FPGA Version 0x0011081200000055
```

```
PCIe: Waiting for port 1 link
```

```
PCIe: Port 1 link active, 4 lanes
```

```
1:00:00.0 0x0009184e
```

```
IDP Revision Date-Time: 05/28/08-18:00:00
```

```
Juniper LN2600 revision 1.3, Serial# 1R263360016*
```

```
Juniper Part # 650-046793
```

```

Bootstrap:   #1.6

Loader:      #2.3  12.1X45-D10 2013-07-04 05:03:05 UTC

              builder@briath.juniper.net

IPMC:        1.0.19

IPMC_RB:     1.0.19


SDRAM:       2048 MB
Boot flash:  16 MB @ 0x1fc00000
IDE flash:   3.7 GB (7946064 x 512)
USB:         not available
current_dev: ide
coremask:    0xfff (12 cores)
reset:       Hard
NVMRO:       Write-enabled
watchdog:    Armed
FPGA:        Enabled


Firmware Image Status:
Primary Bootstrap: UP TO DATE
Secondary Loader0: UP TO DATE
Secondary Loader1: UP TO DATE
IPMC Firmware: UP TO DATE
IPMC_RB Firmware: UP TO DATE


Hit any key to stop autoboot:  0

Checking firmware for updates...


IPMC test
IPMC test completed, 1 pass, 0 errors, 0 warnings


*****
POST
*****


CPU BIST test
CPU BIST test completed, 1 pass, 0 errors, 0 warnings


CPU Core (Offe) test
CPU Core (Offe) test completed, 1 pass, 0 errors, 0 warnings


CPU GPIO test

*** Warning during CPU GPIO test, pass 1,
NVMRO not asserted, verify error at location 0x8001070000000880, expected 0x0002,
actual 0x0000, Slot 0 (Signal ref. des. NVMRO[A4])


CPU GPIO test completed, 1 pass, 0 errors, 1 warning


CPU Memory (Post: 00080000-0effffff) test
CPU Memory (Post: 00080000-0effffff) test completed, 1 pass, 0 errors, 0 warnings


CPU Memory (Post: 20000000-7fffffff) test
CPU Memory (Post: 20000000-7fffffff) test completed, 1 pass, 0 errors, 0 warnings

```

CPU Memory (Post: c0000000-cfffffff) test  
CPU Memory (Post: c0000000-cfffffff) test completed, 1 pass, 0 errors, 0 warnings

Juniper ID EEPROM test  
Juniper ID EEPROM test completed, 1 pass, 0 errors, 0 warnings

SysFlash test  
SysFlash test completed, 1 pass, 0 errors, 0 warnings

I2C Bus test  
I2C Bus test completed, 1 pass, 0 errors, 0 warnings

PCIe Interface test  
PCIe Interface test completed, 1 pass, 0 errors, 0 warnings

IDP Interface test  
IDP Interface test completed, 1 pass, 0 errors, 0 warnings

HWA Memory (Short MemWalk: 00000000-04000000) test  
HWA Memory (Short MemWalk: 00000000-04000000) test completed, 1 pass, 0 errors, 0 warnings

HWA Memory (Short MemAddr: 00000000-04000000) test  
HWA Memory (Short MemAddr: 00000000-04000000) test completed, 1 pass, 0 errors, 0 warnings

HWA Packet test  
HWA Packet test completed, 1 pass, 0 errors, 0 warnings

Sensor test  
Sensor test completed, 1 pass, 0 errors, 0 warnings

Temp near FPGA	29 degrees C	OK
Temp near NPU	25 degrees C	OK
Temp near SFP3	23 degrees C	OK
Temp near SFP0	25 degrees C	OK
FPGA +3.3V	3294 millivolts	OK
VDD +3.3V	3294 millivolts	OK
0.9V OK	0	Asserted
1.8V OK	0	Asserted
1.2V OK	0	Asserted
1.1V OK	0	Asserted
1.0V OK	0	Asserted
NPU Tj	disabled	NS

NPU Tj: / 34C

IPMC test  
IPMC test completed, 1 pass, 0 errors, 0 warnings

Booting...  
Booting /kernel ...

For normal operation, allow the autoboot to proceed. Do not press any key when you get the **Hit any key to stop autoboot:** message.

Full POST diagnostics then run, and the system starts Junos OS normally. If detailed diagnostics must be run, or if alternate media (for example, a USB storage device) must be booted, press any key before or during the 1-second countdown. The following bootstrap prompt is displayed:

BOOT>

If POST diagnostics or the bootstrap sequence fails, the bootstrap prompt is displayed again, and the front panel LED lights turn red.

**Related Documentation**

- [LN2600 Router Power Requirements on page 83](#)
- [LN2600 Router Status LED on page 39](#)
- [Diagnostic Tests on page 40](#)

## Installing the SFP Transceiver in the LN2600 Router

You can install up to eight SFP transceivers in the LN2600 router. The SFP transceivers are hot-removable and hot-insertable. You can remove and replace them without powering off the LN2600 router or disrupting the router functions.



**WARNING:** Do not look directly into transceivers or into the ends of fiber-optic cables connected to a transceiver. Fiber-optic transceivers emit laser light that can damage your eyes.

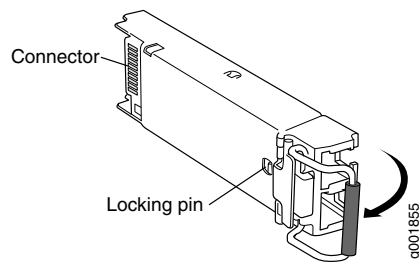


**CAUTION:**

When handling fiber-optic transceivers and fiber-optic cable, observe the following precautions:

- Do not leave a fiber-optic transceiver uncovered except when inserting or removing cable. The safety cap keeps the port clean and prevents accidental exposure to laser light.
- Do not bend fiber-optic cable beyond its minimum bend radius. An arc smaller than a few inches in diameter can damage the cable and cause problems that are difficult to diagnose.
- Do not let fiber-optic cable hang free from the connector. Do not allow fastened loops of cable to dangle, which stresses the cable at the fastening point.

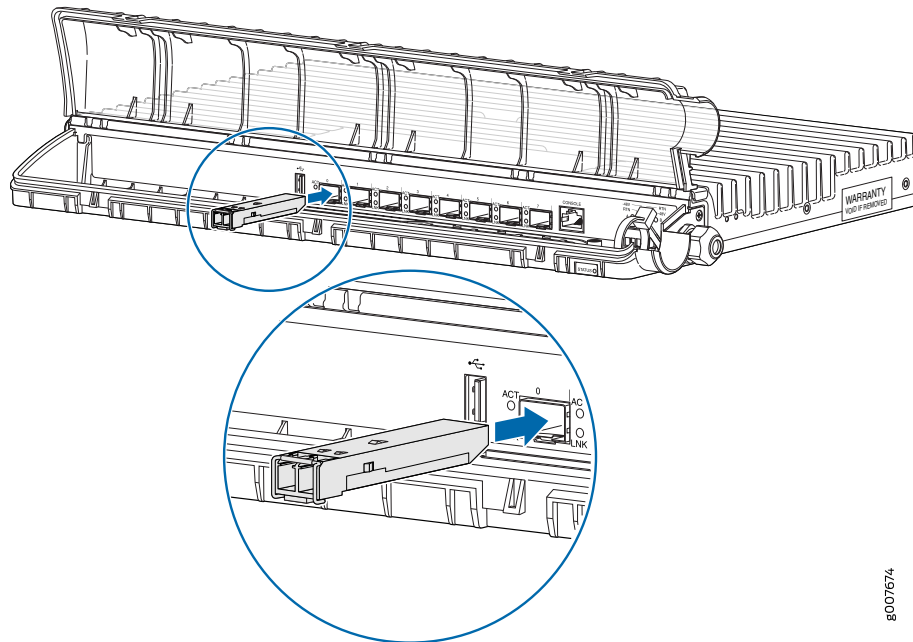
Figure 13: Small Form-Factor Pluggable (SFP)



To install an SFP transceiver:

1. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to one of the ESD points on the chassis.
2. Verify that a rubber safety cap covers the SFP transceiver, installing one if necessary.
3. Orient the SFP over the port in the router so that the connector end will enter the slot first and the SFP connector faces the appropriate direction.

Figure 14: Installing the SFP Transceiver



4. Slide the SFP into the slot.
5. Remove the rubber safety cap from the transceiver and the end of the cable, and insert the cable into the transceiver.
6. Verify that the SFP is installed by entering the CLI **show chassis hardware detail** command.

The output will be displayed similar to this:

```
root@ln2600> show chassis hardware detail
Hardware inventory:
```

Item	Version	Part number	Serial number	Description
Chassis				LN2600
Routing Engine	REV 01	xxx-yyyyyy	ABCDXXXX	RE-LN2600
ad0	3879 MB	4GB NANDrive	00000000001R18C8B7fI	FPC
FPC 0				8x GE Base PIC
PIC 0				SFP-T
Xcvr 0	REV 01	740-013111	8142777	SFP-SX
Xcvr 1	REV 01	740-031851	PLT17N5	SFP-SX
Xcvr 2	REV 01	740-031851	AM1229SY78D	SFP-SX
Xcvr 3	REV 02	740-011613	PHE2JA7	SFP-SX
Xcvr 4	REV 01	740-031851	AM1229SY6WR	SFP-SX
Xcvr 5	REV 01	740-031851	PM3082M	SFP-T
Xcvr 6	REV 01	740-013111	8156347	SFP-T
Xcvr 7	REV 01	740-013111	8154982	SFP-T
Power Supply 0				

- Related Documentation**
- [Safety Guidelines for the LN2600 Router on page 49](#)
  - [Safety Warnings for the LN2600 Router on page 50](#)

## Removing the SFP Transceiver from the LN2600 Router



**WARNING:** Do not look directly into transceivers or into the ends of fiber-optic cables connected to a transceiver. Fiber-optic transceivers emit laser light that can damage your eyes.

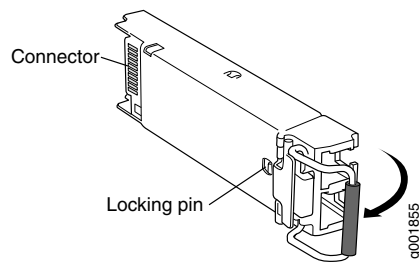


### CAUTION:

When handling fiber-optic transceivers and fiber-optic cable, observe the following precautions:

- Do not leave a fiber-optic transceiver uncovered except when inserting or removing cable. The safety cap keeps the port clean and prevents accidental exposure to laser light.
- Do not bend fiber-optic cable beyond its minimum bend radius. An arc smaller than a few inches in diameter can damage the cable and cause problems that are difficult to diagnose.
- Do not let fiber-optic cable hang free from the connector. Do not allow fastened loops of cable to dangle, which stresses the cable at the fastening point.

Figure 15: Small Form-Factor Pluggable (SFP)



To remove an SFP:

1. Place an electrostatic bag or antistatic mat on a flat, stable surface to receive the SFP. Have ready a rubber safety cap for the SFP transceiver and the cable.
2. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to one of the ESD points on the chassis.
3. Label the cable connected to the SFP so that you can later reconnect it to the correct SFP.
4. Disconnect the cable from the SFP. Immediately cover the transceiver and the end of the cable with a rubber safety cap.
5. Arrange the cable to prevent it from dislodging or developing stress points. Secure the cable so that it is not supporting its own weight as it hangs to the floor. Place excess cable out of the way in a neatly coiled loop. Placing fasteners on the loop helps to maintain its shape.
6. Pull the ejector handle away from the SFP faceplate to unseat the SFP from the router. Pull the SFP out of the router, and place it on the antistatic mat or in the electrostatic bag.



**CAUTION:** After removing a transceiver from the chassis, wait at least 30 seconds before reinserting it or inserting a transceiver into a different slot. Issue the CLI `show chassis hardware detail` command to verify the installed transceivers.

**Related Documentation**

- [Safety Guidelines for the LN2600 Router on page 49](#)
- [Safety Warnings for the LN2600 Router on page 50](#)

## Weatherproofing the LN2600 Router

The LN2600 router is built to withstand water, dust, and unwanted interferences. There are two parts to securing and weatherproofing the LN2600 router cables—securing the front interface cables and the power cables, and securing the external cables.

The cable management system, along with the protective top and bottom cover panels, protects the front interface cables and power cables connected to the LN2600 router.

The top cover panel has protective rubber gasket attached to it. This makes the cable management system water and dust resistant when closed.

The external exposed cables coming out of the LN2600 router need to be protected with the hose bag and cable ties. If left exposed to direct sun and rain, over time the cables may slowly get damaged.

To arrange and secure the cables:

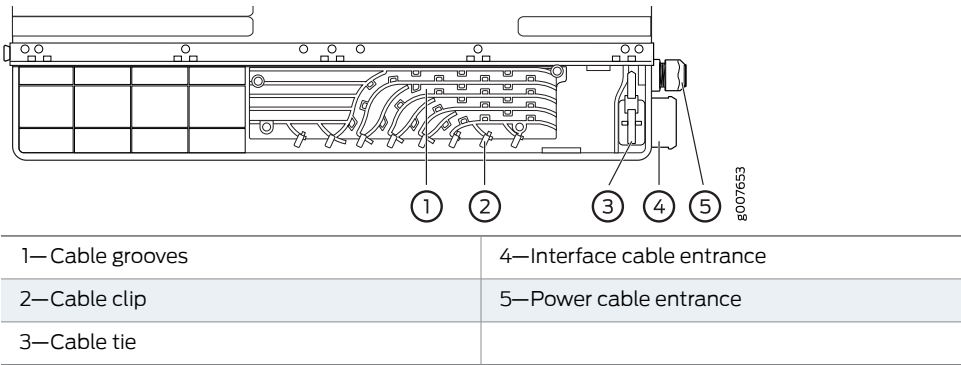
1. Pass the power cables through the power cable entrance.
2. Plug the interface cables and the power cables in their respective ports on the LN2600 router.
3. Place the cables in the grooves present on the cable management system, and secure them with the respective cable clips.



**NOTE:** When using copper cables for SFPs, do not lay the cables in the grooves present on the cable management system. Instead, just hold all the cables together neatly at one place and secure it with a cable tie.

Figure 16 on page 31 shows the cable management system without the interface and power cables plugged in to the router.

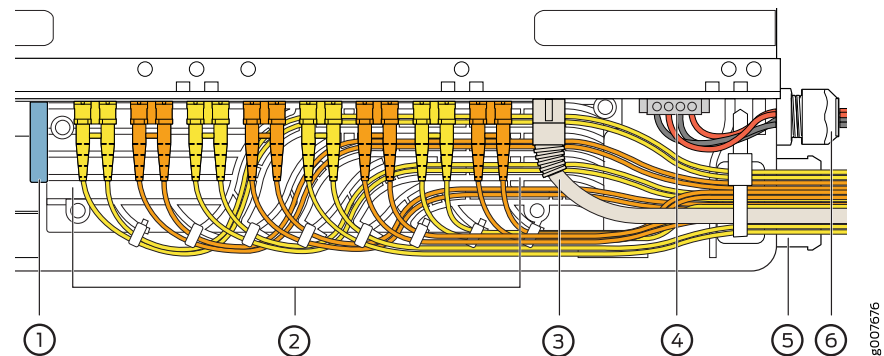
Figure 16: LN2600 Router Cable Management System



Each interface port on the front of the LN2600 router has a corresponding cable groove on the cable management system. Insert and secure the SFPs to the cable management tray starting from the port labeled 0, and gradually proceeding toward the last port labeled 7.

Figure 17 on page 32 shows the final placement of the interface cables in the cable management system. Colors used in Figure 17 on page 32 are just for clarity.

**Figure 17: LN2600 Router Cable Management System with Interface and Power Cables**



1—USB	4—DC power cables
2—Gigabit Ethernet SFPs	5—Interface cable entrance
3—RJ-45 console cable	6—Power cable entrance

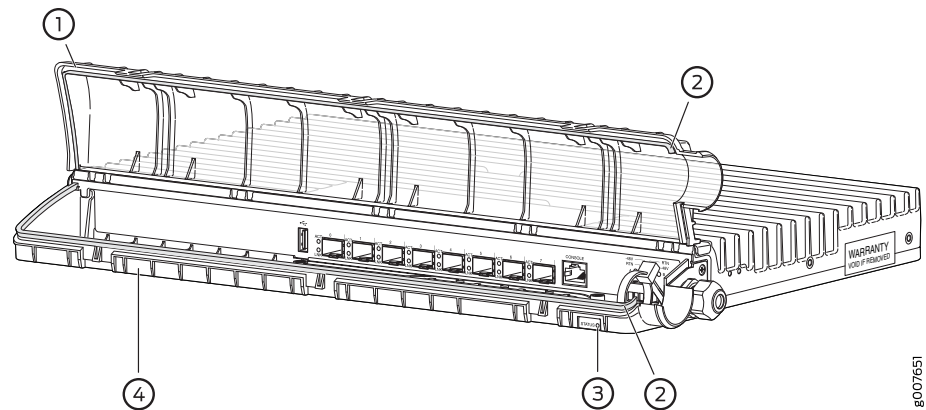
4. At the exit point, hold all the interface cables at one place with a cable tie.
5. Pass the interface cable bundle through the interface cable entrance.
6. At the power cable entrance, tighten the power cord screw to seal the power cord.
7. Close the top cover panel, and secure it with three latches (see [Figure 3 on page 5](#)).

For enhanced security you may secure the latches with locks. This precaution ensures that the router is accessible only to authorized personnel.



**NOTE:** When closing the top cover, make sure that the rubber gasket present on the top of the cable cover unit is properly placed on the grooves. This rubber gasket prevents water and dust from entering the LN2600 router unit.

Figure 18: LN2600 Router with Top Cover Panel Open



1— Top cover panel	3— Status LED
2— Protective rubber gasket	4— Bottom cable management unit

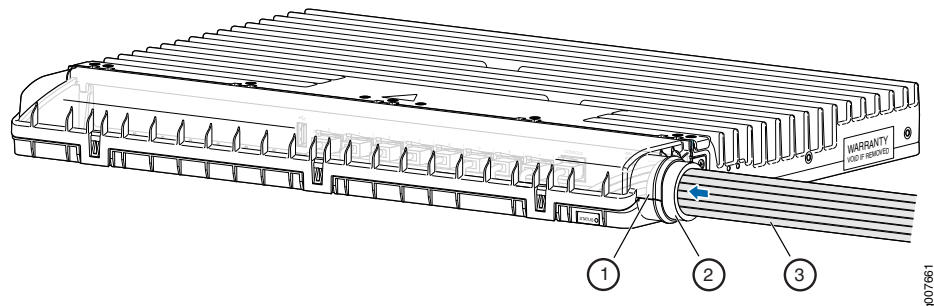
8. Pass the interface cables that are coming out of the interface cable entrance through the grooves present in the cable seal unit.

The cable seal is a small circular-shaped foam structure with grooves for the cables to pass through. The cable seal sits tightly on the interface cable entrance and prevents water and dust particles from entering the cable management system.



**NOTE:** Ensure that each groove on the foam cable seal unit accommodates only one cable through it.

Figure 19: LN2600 Router with Interface Cables



1— Interface cable entrance	3— Interface cables
2— Cable seal	

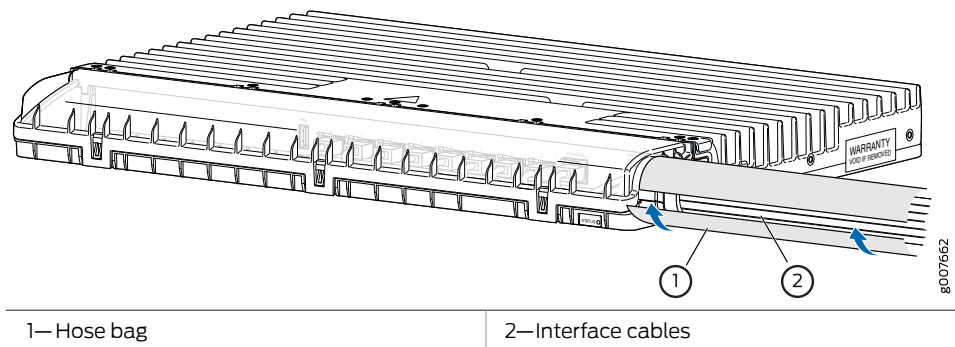
9. Squeeze and slide the cable seal along with the interface cables into the interface cable entrance until one fourth of the cable seal foam is left.
10. Wrap the interface cables that are coming out from the other end of the cable seal with the hose bag, and secure it tightly with the Velcro that is attached to the hose bag.

The hose bag is a rectangular synthetic material wrapper that prevents the cables from damage due to extreme environmental conditions. The hose bag has Velcro attached to it.



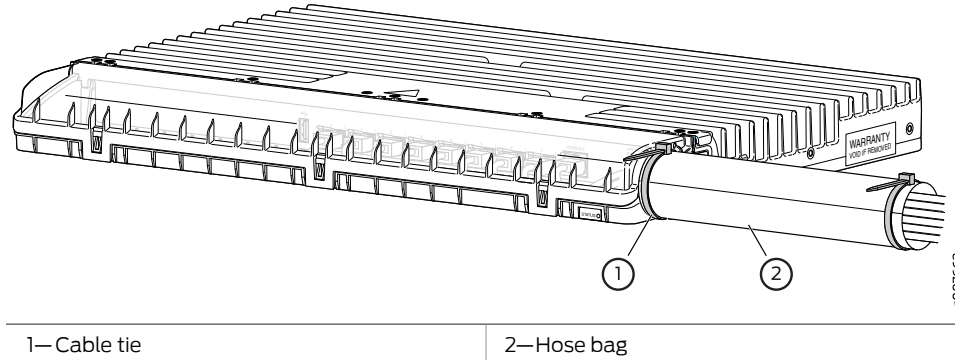
**NOTE:** Make sure that the sewn hem of the hose bag is wrapped on to the interface cable exit.

**Figure 20: LN2600 Router Interface Cables Wrapped in Hose Bag**



11. Secure both the ends of the hose bag with the cable ties.

**Figure 21: LN2600 Router Interface Cables Protected with Hose Bag**



12. Apply a pull of 16 lb to the cable ties to ensure that the cables sit tightly inside the hose bag.

The LN2600 router cables are now secure from an extreme environment.

#### Related Documentation

- [Safety Guidelines for the LN2600 Router on page 49](#)
- [LN2600 Rugged Security Router Features on page 4](#)
- [Mounting the LN2600 Router on the Rack on page 14](#)
- [Mounting the LN2600 Router on the Wall on page 18](#)

## Configuring and Operating the Router

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You are now ready to configure routing on your system. For specific routing configuration options available for the router, see the *LN1000 Mobile Secure Router User Guide*.



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**NOTE:** The routing configuration options for the LN1000 Mobile Secure Router and the LN2600 Rugged Security Router are same.

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## PART 3

# Hardware Maintenance, Troubleshooting, and Replacement Procedures

- [Troubleshooting Router Boot-Up and Operation on page 39](#)
- [Contacting Customer Support and Returning Hardware on page 43](#)



# Troubleshooting Router Boot-Up and Operation

- LN2600 Router Status LED on page 39
- Diagnostic Tests on page 40

## LN2600 Router Status LED

The LN2600 router includes LEDs on the front panel to provide status information.

Figure 22: LN2600 Router Front Panel

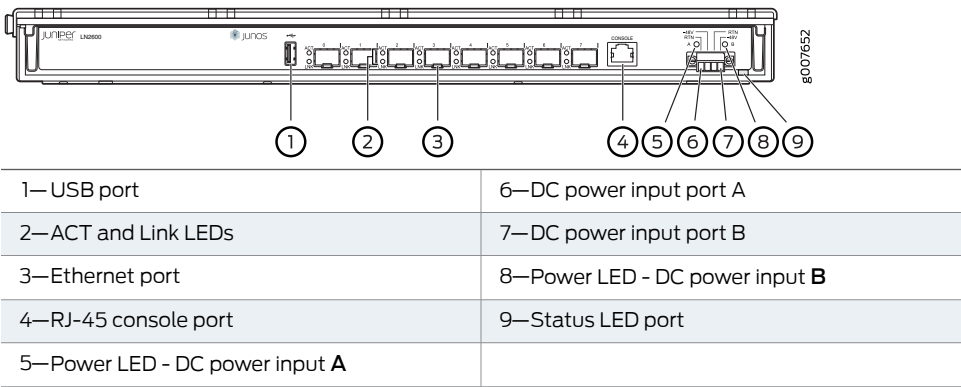


Table 6 on page 39 provides information on the LEDs present on the faceplate of the LN2600 router.

Table 6: LN2600 Router Faceplate LEDs Status

LED	Color	Meaning
A	Off; No color	Power is off.
B	Steady green	Ready for operation.  The router is powered on and has a proper power supply.
LINK	Off; No color	No link on associated port.
	Steady green	On; link established.

Table 6: LN2600 Router Faceplate LEDs Status (*continued*)

LED	Color	Meaning
ACT	Off; No color	No activity.
	Blinking green	Traffic activity.

On initial power-on, the components of the router run boot code, go through a series of self-diagnostic tests, and synchronize with each other. When the tests are complete, use the status LED on the router front panel to determine the status of the router.

[Table 7 on page 40](#) provides information about the status LED located on the top cable cover of the LN2600 router. [Figure 1 on page 3](#) shows the position of the status LED on the LN2600 router.

Table 7: LN2600 Router Status LED

Status LED Color	Meaning
Off; No color	Power is off.
Steady red	Error condition.
Steady green	Ready for operation. The router is powered on and has successfully booted and run SPOST and POST diagnostics.
Blinking green	Powering on and then running SPOST and POST diagnostics, or running individual diagnostics, or performing an upgrade.



**NOTE:** The status LED on Initial power-on may briefly flash red color while running the diagnostic tests.

#### Related Documentation

- [Diagnostic Tests on page 40](#)
- [LN2600 Router Front Panel Overview on page 6](#)

## Diagnostic Tests

Startup power-on self-test (SPOST) and power-on self-test (POST) diagnostic tests run automatically on the LN2600 router as part of the boot-up process at every power-on, reset, or warm reboot. SPOST diagnostics consist of a limited suite of quick diagnostics that ensure that system components required for Boot Loader and diagnostics relocation and execution from RAM are working without error. POST diagnostics consist of a suite of quick diagnostics that ensure that components of the system are working without error before trying to load and execute Junos OS. PASS/FAIL test results for the SPOST and POST diagnostics are reported by means of the front panel LED and console port.

In the event that SPOST, POST, or the bootstrap sequence reports a failure and the front panel LED lights red, extended diagnostic tests are available.

In the event of failure of any hardware component, run the diagnostic tests from the BOOT prompt.

For information about running extended diagnostic tests and other hardware issues, contact Juniper Networks.

**Related  
Documentation**

- [LN2600 Router Status LED on page 39](#)
- [If You Detect or Suspect Damage on page 11](#)



## CHAPTER 5

# Contacting Customer Support and Returning Hardware

- [Information You Might Need to Supply to JTAC on page 43](#)
- [Packing Instructions for Returning an LN2600 Router on page 44](#)

### Information You Might Need to Supply to JTAC

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When requesting technical support from the JTAC by phone, be prepared to provide the following information:

- Priority level
- Indication of what activity was being performed on the router when the problem occurred
- Problem detail and configuration data, obtained by these commands:
  - **show version**
  - **show chassis hardware**
  - **show chassis environment**
  - **show configuration**

When a new request for technical support is submitted, the JTAC engineer:

- Opens a case and assigns a number
- Begins troubleshooting, diagnostics, and problem replication (if appropriate)
- Provides you with periodic updates on problem status and escalates the problem as appropriate according to escalation management guidelines
- Closes the case when you agree that the problem has been resolved

#### Related Documentation

- [Packing Instructions for Returning an LN2600 Router on page 44](#)

## Packing Instructions for Returning an LN2600 Router

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If possible, use the original shipping containers and packing materials in which the LN2600 hardware was originally shipped. If these materials are unavailable, use comparable shipping materials, or contact your Juniper Networks representative for information on approved packaging material.

To pack the LN2600 hardware for shipment:

1. Issue the proper shutdown commands to halt your system.
2. Switch all power switches to the OFF position.
3. Remove the router from the rack-mounting or the wall-mounting unit.
4. Place the router in its protective container, and then put the router in a box, placing packing foam around the router.

### **Related Documentation**

- [Parts Inventory \(Packing List\) for the LN2600 Router on page 10](#)
- [Information You Might Need to Supply to JTAC on page 43](#)
- [Inspecting the Hardware on page 9](#)

## PART 4

# Appendixes

- [Safety and Regulatory Compliance Information for the LN2600 Router on page 47](#)
- [LN2600 Router Environmental Specifications on page 79](#)
- [LN2600 Router Physical Specifications on page 81](#)
- [LN2600 Router Power Requirements on page 83](#)



## APPENDIX A

# Safety and Regulatory Compliance Information for the LN2600 Router

- Safety Information for the LN2600 Router on page 47
- Agency Approvals and Compliance Statements for the LN2600 Router on page 75

## Safety Information for the LN2600 Router

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- Definition of Safety Warning Levels on page 47
- Safety Guidelines for the LN2600 Router on page 49
- Safety Warnings for the LN2600 Router on page 50
- General Safety Warnings for Juniper Networks Hardware Equipment on page 51
- Preventing Electrostatic Discharge Damage to an LN2600 Router on page 54
- Fire Safety Requirements for Juniper Networks Hardware Equipment on page 54
- Installation Safety Warnings for Juniper Networks Hardware Equipment on page 55
- General Laser Safety Guidelines for LN2600 Router on page 60
- Laser Safety Warnings for LN2600 Router on page 61
- Maintenance and Operational Safety Warnings for Juniper Networks Hardware Equipment on page 63
- Electrical Safety Guidelines and Warnings for the LN2600 Router on page 67

## Definition of Safety Warning Levels

The documentation uses the following levels of safety warnings:



.....

**NOTE:** You might find this information helpful in a particular situation, or might otherwise overlook it.

.....



.....

**CAUTION:** You must observe the specified guidelines to avoid minor injury or discomfort to you, or severe damage to the hardware device.

.....



**WARNING:** This symbol alerts you to the risk of personal injury from a laser.



**WARNING:** This symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents.

**Waarschuwing** Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen.

**Varoitus** Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista.

**Attention** Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents.

**Warnung** Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt.

**Avvertenza** Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti.

**Advarsel** Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du være oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker.

**Aviso** Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes.

**¡Atención!** Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos

que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes.

**Varning!** Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador.

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**Related  
Documentation**

- [General Safety Warnings for Juniper Networks Hardware Equipment on page 51](#)
- [Installation Safety Warnings for Juniper Networks Hardware Equipment on page 55](#)
- [Maintenance and Operational Safety Warnings for Juniper Networks Hardware Equipment on page 63](#)
- [Electrical Safety Guidelines and Warnings for the LN2600 Router on page 67](#)

## Safety Guidelines for the LN2600 Router

The router is designed to protect against the risk of electrical shock and other hazards during installation, operation, and maintenance, and under likely fault conditions, including human error. It complies with grounding requirements of NFPA 70-93, article 250. As a precautionary measure to avoid harm to yourself as you install and maintain the router module, follow the guidelines for working near and with electrical equipment, as well as the safety procedures for working with Internet routers.

The following guidelines help ensure your safety and protect the hardware equipment from damage. The list of guidelines might not address all potentially hazardous situations in your working environment, so be alert and exercise good judgment at all times.

- Perform only the procedures explicitly described in this documentation. Make sure that only authorized service personnel perform other system services.
- Keep the area around the chassis clear and free from dust before, during, and after installation.
- Keep tools away from areas where people could trip over them while walking.
- Do not wear loose clothing or jewelry, such as rings, bracelets, or chains, which could become caught in the chassis.
- Wear safety glasses if you are working under any conditions that could be hazardous to your eyes.
- Do not perform any actions that create a potential hazard to people or make the equipment unsafe.
- Never attempt to lift an object that is too heavy for one person to handle.
- Never install or manipulate wiring during electrical storms.
- Never install electrical jacks in wet locations unless the jacks are specifically designed for wet environments.

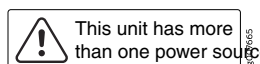
- Operate the hardware equipment only when the chassis is properly grounded.
- Do not open or remove chassis covers or sheet metal parts unless instructions are provided in this documentation. Such an action could cause severe electrical shock.
- Do not push or force any object through any opening in the chassis frame. Such an action could result in electrical shock or fire.
- Avoid spilling liquid onto the chassis or onto any hardware component. Such an action could cause electrical shock or damage the hardware equipment.
- Avoid touching uninsulated electrical wires or terminals that have not been disconnected from their power source. Such an action could cause electrical shock.

**Related  
Documentation**

- [Safety Warnings for the LN2600 Router on page 50](#)
- *Definition of Safety Warning Levels*

## Safety Warnings for the LN2600 Router

- The hardware equipment is intended for installation in restricted access areas. A restricted access area is one to which access can be gained only by service personnel through the use of a special tool, lock and key, or other means of security, and which is controlled by the authority responsible for the location.
- The DC-powered router is equipped with a DC power connector that is rated for the power requirements of a maximally configured router. To supply sufficient power, terminate the DC input wiring on a facility DC source capable of supplying at least 2 A @ –48 VDC per input for each power supply.
- The DC power input port is Type 8 as described in GR-1089-CORE, Issue 6.
- Incorporate an easily accessible disconnect device into the facility wiring. We recommend that the 48 VDC facility DC source be equipped with a circuit breaker rated between 6.25 A to 10 A @ 48 VDC, or as required by local code. In the United States and Canada, the 48 VDC facility should be equipped with a circuit breaker rated a minimum of 125% of the power provisioned for the input in accordance with the National Electrical Code in the US and the Canadian Electrical Code in Canada. A readily accessible disconnect device should be incorporated external to the device.
- Primary overcurrent protection is provided by the building circuit breaker. This breaker should protect against excess currents, short circuits, and earth faults in accordance with NEC ANSI/NFPA70.
- The LN2600 router has more than one power source. Ensure proper care while connecting the DC power supply to the router. The following label provides the warning of the dual power source:



- Some parts of the LN2600 router might become hot. The following label provides the warning of the hot surfaces on the router:



- The SFP interface might not turn off the laser when the interface is disabled.
- The Ethernet cables permanently connected to the router must be shielded CAT6A type cables.
- The intrabuilding port(s) of the router is suitable for connection to intrabuilding or unexposed wiring or cabling only. The intrabuilding port(s) of the router **MUST NOT** be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intrabuilding interfaces only (Type 2 ports as described in GR-1089-CORE, Issue 6) and require isolation from the exposed cabling. The addition of primary protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.
- The intrabuilding port(s) of the equipment must use intrabuilding cabling or wiring that is grounded at both ends.
- The battery return connection is to be treated as an isolated DC return (that is DC-I), as defined in GR-1089-CORE.
- The equipment is suitable for installation as part of the Common Bonding Network (CBN).
- The equipment is suitable for installation in telecommunication network facilities and locations where the National Electrical Code (NEC) applies.

#### Related Documentation

- [Safety Guidelines for the LN2600 Router on page 49](#)
- [Definition of Safety Warning Levels on page 47](#)
- [General Safety Warnings for Juniper Networks Hardware Equipment on page 51](#)
- [General Laser Safety Guidelines for LN2600 Router on page 60](#)
- [Laser Safety Warnings for LN2600 Router on page 61](#)
- [Electrical Safety Guidelines and Warnings for the LN2600 Router on page 67](#)

## General Safety Warnings for Juniper Networks Hardware Equipment

- [Qualified Personnel Warning on page 51](#)
- [Restricted Access Area Warning on page 52](#)

### Qualified Personnel Warning



**WARNING:** Only trained and qualified personnel should install or replace the hardware equipment.

**Waarschuwing** Installatie en reparaties mogen uitsluitend door getraind en bevoegd personeel uitgevoerd worden.

**Varoitus** Ainoastaan koulutettu ja pätevä henkilökunta saa asentaa tai vaihtaa tämän laitteen.

**Attention** Tout installation ou remplacement de l'appareil doit être réalisé par du personnel qualifié et compétent.

**Warnung** Gerät nur von geschultem, qualifiziertem Personal installieren oder auswechseln lassen.

**Avvertenza** Solo personale addestrato e qualificato deve essere autorizzato ad installare o sostituire questo apparecchio.

**Advarsel** Kun kvalifisert personell med riktig opplæring bør montere eller bytte ut dette utstyret.

**Aviso** Este equipamento deverá ser instalado ou substituído apenas por pessoal devidamente treinado e qualificado.

**¡Atención!** Estos equipos deben ser instalados y reemplazados exclusivamente por personal técnico adecuadamente preparado y capacitado.

**Varning!** Denna utrustning ska endast installeras och bytas ut av utbildad och kvalificerad personal.

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### Restricted Access Area Warning

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**WARNING:** The hardware equipment is intended for installation in restricted access areas. A restricted access area is an area to which access can be gained only by service personnel through the use of a special tool, lock and key, or other means of security, and which is controlled by the authority responsible for the location.

**Waarschuwing** Dit toestel is bedoeld voor installatie op plaatsen met beperkte toegang. Een plaats met beperkte toegang is een plaats waar toegang slechts door servicepersoneel verkregen kan worden door middel van een speciaal instrument, een slot en sleutel, of een ander veiligheidsmiddel, en welke beheerd wordt door de overheidsinstantie die verantwoordelijk is voor de locatie.

**Varoitus** Tämä laite on tarkoitettu asennettavaksi paikkaan, johon pääsy on rajoitettua. Paikka, johon pääsy on rajoitettua, tarkoittaa paikkaa, johon vain huoltohenkilöstö pääsee jonkin erikoistyökalun, lukkoon sopivan avaimen tai jonkin muun turvalaitteen avulla ja joka on paikasta vastuussa olevien toimivaltaisten henkilöiden valvoma.

**Attention** Cet appareil est à installer dans des zones d'accès réservé. Ces dernières sont des zones auxquelles seul le personnel de service peut accéder en utilisant un outil spécial, un mécanisme de verrouillage et une clé, ou tout

autre moyen de sécurité. L'accès aux zones de sécurité est sous le contrôle de l'autorité responsable de l'emplacement.

**Warnung** Diese Einheit ist zur Installation in Bereichen mit beschränktem Zutritt vorgesehen. Ein Bereich mit beschränktem Zutritt ist ein Bereich, zu dem nur Wartungspersonal mit einem Spezialwerkzeugs, Schloß und Schlüssel oder anderer Sicherheitsvorkehrungen Zugang hat, und der von dem für die Anlage zuständigen Gremium kontrolliert wird.

**Avvertenza** Questa unità deve essere installata in un'area ad accesso limitato. Un'area ad accesso limitato è un'area accessibile solo a personale di assistenza tramite un'attrezzo speciale, lucchetto, o altri dispositivi di sicurezza, ed è controllata dall'autorità responsabile della zona.

**Advarsel** Denne enheten er laget for installasjon i områder med begrenset adgang. Et område med begrenset adgang gir kun adgang til servicepersonale som bruker et spesielt verktøy, lås og nøkkel, eller en annen sikkerhetsanordning, og det kontrolleres av den autoriteten som er ansvarlig for området.

**Aviso** Esta unidade foi concebida para instalação em áreas de acesso restrito. Uma área de acesso restrito é uma área à qual apenas tem acesso o pessoal de serviço autorizado, que possua uma ferramenta, chave e fechadura especial, ou qualquer outra forma de segurança. Esta área é controlada pela autoridade responsável pelo local.

**¡Atención!** Esta unidad ha sido diseñada para instalarse en áreas de acceso restringido. Área de acceso restringido significa un área a la que solamente tiene acceso el personal de servicio mediante la utilización de una herramienta especial, cerradura con llave, o algún otro medio de seguridad, y que está bajo el control de la autoridad responsable del local.

**Varning!** Denna enhet är avsedd för installation i områden med begränsat tillträde. Ett område med begränsat tillträde får endast tillträdas av servicepersonal med ett speciellt verktyg, lås och nyckel, eller annan säkerhetsanordning, och kontrolleras av den auktoritet som ansvarar för området.

- 
- Related Documentation**
- [Maintenance and Operational Safety Warnings for Juniper Networks Hardware Equipment on page 63](#)
  - [Electrical Safety Guidelines and Warnings for the LN2600 Router on page 67](#)

## Preventing Electrostatic Discharge Damage to an LN2600 Router

Many router hardware components are sensitive to damage from static electricity. Some components can be impaired by voltages as low as 30 V. You can easily generate potentially damaging static voltages whenever you handle plastic or foam packing material or if you move components across plastic or carpets. Observe the following guidelines to minimize the potential for electrostatic discharge (ESD) damage, which can cause intermittent or complete component failures:

- Always use an ESD wrist strap or ankle strap, and make sure that it is in direct contact with your skin.
- When handling any component that is removed from the chassis, make sure the equipment end of your ESD strap is attached to one of the electrostatic discharge points on the chassis.
- Avoid contact between the component and your clothing. ESD voltages emitted from clothing can still damage components.



**CAUTION:** For safety, periodically check the resistance value of the ESD strap. The measurement should be in the range of 1 to 10 Mohms.

### Related Documentation

- [Electrical Safety Guidelines and Warnings for the LN2600 Router on page 67](#)

## Fire Safety Requirements for Juniper Networks Hardware Equipment

- [General Fire Safety Requirements on page 54](#)
- [Fire Suppression on page 54](#)
- [Fire Suppression Equipment on page 55](#)

### General Fire Safety Requirements

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In the event of a fire emergency involving routers and other network equipment, the safety of people is the primary concern. Establish procedures for protecting people in the event of a fire emergency, provide safety training, and properly provision fire-control equipment and fire extinguishers.

In addition, establish procedures to protect your equipment in the event of a fire emergency. Juniper Networks products should be installed in an environment suitable for electronic equipment. We recommend that fire suppression equipment be available in the event of a fire in the vicinity of the equipment, and that all local fire, safety, and electrical codes and ordinances be observed when installing and operating your equipment.

### Fire Suppression

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In the event of an electrical hazard or an electrical fire, first turn power off to the equipment at the source. Then use a Type C fire extinguisher, which uses noncorrosive fire retardants, to extinguish the fire.

## Fire Suppression Equipment

Type C fire extinguishers, which use noncorrosive fire retardants such as carbon dioxide (CO<sub>2</sub>) and Halotron, are most effective for suppressing electrical fires. Type C fire extinguishers displace the oxygen from the point of combustion to eliminate the fire. For extinguishing fire on or around equipment that draws air from the environment for cooling, use this type of inert oxygen displacement extinguisher instead of an extinguisher that leave residues on equipment.

Do not use multipurpose Type ABC chemical fire extinguishers (dry chemical fire extinguishers) near Juniper Networks equipment. The primary ingredient in these fire extinguishers is monoammonium phosphate, which is very sticky and difficult to clean. In addition, in minute amounts of moisture, monoammonium phosphate can become highly corrosive and corrodes most metals.

Any equipment in a room in which a chemical fire extinguisher has been discharged is subject to premature failure and unreliable operation. The equipment is considered to be irreparably damaged.



**NOTE:** To keep warranties effective, do not use a dry chemical fire extinguisher to control a fire at or near a Juniper Networks hardware equipment. If a dry chemical fire extinguisher is used, the unit is no longer eligible for coverage under a service agreement.

We recommend that you dispose of any irreparably damaged equipment in an environmentally responsible manner.

### Related Documentation

- [Definition of Safety Warning Levels on page 47](#)
- [General Safety Warnings for Juniper Networks Hardware Equipment on page 51](#)

## Installation Safety Warnings for Juniper Networks Hardware Equipment

Observe the following warnings before and during hardware equipment installation:

- [Installation Instructions Warning on page 55](#)
- [Rack-Mounting Requirements and Warnings on page 56](#)
- [Ramp Warning on page 59](#)

### Installation Instructions Warning



**WARNING:** Read the installation instructions before you connect the hardware equipment to a power source.

**Waarschuwing** Raadpleeg de installatie-aanwijzingen voordat u het systeem met de voeding verbindt.

**Varoitus** Lue asennusohjeet ennen järjestelmän yhdistämistä virtalähteeseen.

**Attention** Avant de brancher le système sur la source d'alimentation, consulter les directives d'installation.

**Warnung** Lesen Sie die Installationsanweisungen, bevor Sie das System an die Stromquelle anschließen.

**Avvertenza** Consultare le istruzioni di installazione prima di collegare il sistema all'alimentatore.

**Advarsel** Les installasjonsinstruksjonene før systemet kobles til strømkilden.

**Aviso** Leia as instruções de instalação antes de ligar o sistema à sua fonte de energia.

**¡Atención!** Ver las instrucciones de instalación antes de conectar el sistema a la red de alimentación.

**Varning!** Läs installationsanvisningarna innan du kopplar systemet till dess strömförsörjningsenhet.

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### Rack-Mounting Requirements and Warnings

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Ensure that the equipment rack into which the chassis is installed is evenly and securely supported, to avoid the hazardous condition that could result from uneven mechanical loading.

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**WARNING:** To prevent bodily injury when mounting or servicing the chassis in a rack, take the following precautions to ensure that the system remains stable. The following directives help maintain your safety:

- The chassis must be installed into a rack that is secured to the building structure.
- The chassis should be mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting the chassis in a partially filled rack, load the rack from the bottom to the top, with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting the chassis in the rack or servicing the hardware equipment.

**Waarschuwing** Om lichamelijk letsel te voorkomen wanneer u dit toestel in een rek monteert of het daar een servicebeurt geeft, moet u speciale voorzorgsmaatregelen nemen om ervoor te zorgen dat het toestel stabiel blijft. De onderstaande richtlijnen worden verstrekt om uw veiligheid te verzekeren:

- De router moet in een stellage worden geïnstalleerd die aan een bouwswel is verankerd.
- Dit toestel dient onderaan in het rek gemonteerd te worden als het toestel het enige in het rek is.
- Wanneer u dit toestel in een gedeeltelijk gevuld rek monteert, dient u het rek van onderen naar boven te laden met het zwaarste onderdeel onderaan in het rek.
- Als het rek voorzien is van stabiliseringshulpmiddelen, dient u de stabilisatoren te monteren voordat u het toestel in het rek monteert of het daar een servicebeurt geeft.

**Varoitus** Kun laite asetetaan telineeseen tai huolletaan sen ollessa telineessä, on noudatettava erityisiä varotoimia järjestelmän vakavuuden säilyttämiseksi, jotta vältetään loukkaantumisia. Noudata seuraavia turvallisuusohjeita:

- Router on asennettava telineeseen, joka on kiinnitetty rakennukseen.
- Jos telineessä ei ole muita laitteita, aseta laite telineen alaosaan.
- Jos laite asetetaan osaksi täytettyyn telineeseen, aloita kuormittaminen sen alaosaan kaikkein raskaimmalla esineellä ja siirry sitten sen yläosaan.
- Jos telinettä varten on vakaimet, asenna ne ennen laitteen asettamista telineeseen tai sen huoltamista siinä.

**Attention** Pour éviter toute blessure corporelle pendant les opérations de montage ou de réparation de cette unité en casier, il convient de prendre des précautions spéciales afin de maintenir la stabilité du système. Les directives ci-dessous sont destinées à assurer la protection du personnel:

- Le rack sur lequel est monté le router doit être fixé à la structure du bâtiment.
- Si cette unité constitue la seule unité montée en casier, elle doit être placée dans le bas.
- Si cette unité est montée dans un casier partiellement rempli, charger le casier de bas en haut en plaçant l'élément le plus lourd dans le bas.
- Si le casier est équipé de dispositifs stabilisateurs, installer les stabilisateurs avant de monter ou de réparer l'unité en casier.

**Warnung** Zur Vermeidung von Körperverletzung beim Anbringen oder Warten dieser Einheit in einem Gestell müssen Sie besondere Vorkehrungen treffen, um sicherzustellen, daß das System stabil bleibt. Die folgenden Richtlinien sollen zur Gewährleistung Ihrer Sicherheit dienen:

- Der router muß in einem Gestell installiert werden, das in der Gebäudestruktur verankert ist.
- Wenn diese Einheit die einzige im Gestell ist, sollte sie unten im Gestell angebracht werden.
- Bei Anbringung dieser Einheit in einem zum Teil gefüllten Gestell ist das Gestell von unten nach oben zu laden, wobei das schwerste Bauteil unten im Gestell anzubringen ist.
- Wird das Gestell mit Stabilisierungszubehör geliefert, sind zuerst die Stabilisatoren zu installieren, bevor Sie die Einheit im Gestell anbringen oder sie warten.

**Avvertenza** Per evitare infortuni fisici durante il montaggio o la manutenzione di questa unità in un supporto, occorre osservare speciali precauzioni per garantire che il sistema rimanga stabile. Le seguenti direttive vengono fornite per garantire la sicurezza personale:

- Il router deve essere installato in un telaio, il quale deve essere fissato alla struttura dell'edificio.
- Questa unità deve venire montata sul fondo del supporto, se si tratta dell'unica unità da montare nel supporto.
- Quando questa unità viene montata in un supporto parzialmente pieno, caricare il supporto dal basso all'alto, con il componente più pesante sistemato sul fondo del supporto.
- Se il supporto è dotato di dispositivi stabilizzanti, installare tali dispositivi prima di montare o di procedere alla manutenzione dell'unità nel supporto.

**Advarsel** Unngå fysiske skader under montering eller reparasjonsarbeid på denne enheten når den befinner seg i et kabinett. Vær nøye med at systemet er stabilt. Følgende retningslinjer er gitt for å verne om sikkerheten:

- Router må installeres i et stativ som er forankret til bygningsstrukturen.
- Denne enheten bør monteres nederst i kabinettet hvis dette er den eneste enheten i kabinettet.
- Ved montering av denne enheten i et kabinett som er delvis fylt, skal kabinettet lastes fra bunnen og opp med den tyngste komponenten nederst i kabinettet.
- Hvis kabinettet er utstyrt med stabiliseringsutstyr, skal stabilisatorene installeres før montering eller utføring av reparasjonsarbeid på enheten i kabinettet.

**Aviso** Para se prevenir contra danos corporais ao montar ou reparar esta unidade numa estante, deverá tomar precauções especiais para se certificar de que o sistema possui um suporte estável. As seguintes directrizes ajudá-lo-ão a efectuar o seu trabalho com segurança:

- O router deverá ser instalado numa prateleira fixa à estrutura do edifício.
- Esta unidade deverá ser montada na parte inferior da estante, caso seja esta a única unidade a ser montada.
- Ao montar esta unidade numa estante parcialmente ocupada, coloque os itens mais pesados na parte inferior da estante, arrumando-os de baixo para cima.
- Se a estante possuir um dispositivo de estabilização, instale-o antes de montar ou reparar a unidade.

**¡Atención!** Para evitar lesiones durante el montaje de este equipo sobre un bastidor, o posteriormente durante su mantenimiento, se debe poner mucho cuidado en que el sistema quede bien estable. Para garantizar su seguridad, proceda según las siguientes instrucciones:

- El router debe instalarse en un bastidor fijado a la estructura del edificio.
- Colocar el equipo en la parte inferior del bastidor, cuando sea la única unidad en el mismo.
- Cuando este equipo se vaya a instalar en un bastidor parcialmente ocupado, comenzar la instalación desde la parte inferior hacia la superior colocando el equipo más pesado en la parte inferior.
- Si el bastidor dispone de dispositivos estabilizadores, instalar éstos antes de montar o proceder al mantenimiento del equipo instalado en el bastidor.

**Varning!** För att undvika kroppsskada när du installerar eller utför underhållsarbete på denna enhet på en ställning måste du vidta särskilda försiktighetsåtgärder för att försäkra dig om att systemet står stadigt. Följande riktlinjer ges för att trygga din säkerhet:

- Router måste installeras i en ställning som är förankrad i byggnadens struktur.
- Om denna enhet är den enda enheten på ställningen skall den installeras längst ned på ställningen.
- Om denna enhet installeras på en delvis fylld ställning skall ställningen fyllas nedifrån och upp, med de tyngsta enheterna längst ned på ställningen.
- Om ställningen är försedd med stabiliseringsdon skall dessa monteras fast innan enheten installeras eller underhålls på ställningen.

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### Ramp Warning

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**WARNING:** When installing the hardware equipment, do not use a ramp inclined at more than 10 degrees.

**Waarschuwing** Gebruik een oprijplaat niet onder een hoek van meer dan 10 graden.

**Varoitus** Älä käyttää sellaista kaltevaa pintaa, jonka kaltevuus ylittää 10 astetta.

**Attention** Ne pas utiliser une rampe dont l'inclinaison est supérieure à 10 degrés.

**Warnung** Keine Rampen mit einer Neigung von mehr als 10 Grad verwenden.

**Avvertenza** Non usare una rampa con pendenza superiore a 10 gradi.

**Advarsel** Bruk aldri en rampe som heller mer enn 10 grader.

**Aviso** Não utilize uma rampa com uma inclinação superior a 10 graus.

**¡Atención!** No usar una rampa inclinada más de 10 grados

**Varning!** Använd inte ramp med en lutning på mer än 10 grader.

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- Related Documentation**
- [Definition of Safety Warning Levels on page 47](#)
  - [General Safety Warnings for Juniper Networks Hardware Equipment on page 51](#)

## General Laser Safety Guidelines for LN2600 Router

Devices with single-mode optical interfaces are equipped with laser transmitters, which are considered a Class 1 Laser Product by the U.S. Food and Drug Administration, and are evaluated as a Class 1 Laser Product according to EN 60825–1 + A11 + A2 requirements.

When working around devices with optical interfaces, observe the following safety guidelines to prevent eye injury:

- Do not look into unterminated ports or at fibers that connect to unknown sources.
  - Do not examine unterminated optical ports with optical instruments.
  - Avoid direct exposure to the beam.
- 



**WARNING:** Unterminated optical connectors can emit invisible laser radiation. The lens in the human eye focuses all the laser power on the retina, so focusing the eye directly on a laser source—even a low-power laser—could permanently damage the eye.

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- Related Documentation**
- [Definition of Safety Warning Levels on page 47](#)
  - [General Safety Warnings for Juniper Networks Hardware Equipment on page 51](#)
  - [Laser Safety Warnings for LN2600 Router on page 61](#)

## Laser Safety Warnings for LN2600 Router

- [Class 1 Laser Product Warning on page 61](#)
- [Class 1 LED Product Warning on page 61](#)
- [Laser Beam Warning on page 62](#)
- [Radiation from Open Port Apertures Warning on page 62](#)

### Class 1 Laser Product Warning



**WARNING:** Class 1 laser product.

**Waarschuwing** Klasse-1 laser produkt.

**Varoitus** Luokan 1 lasertuote.

**Attention** Produit laser de classe I.

**Warnung** Laserprodukt der Klasse 1.

**Avvertenza** Prodotto laser di Classe 1.

**Advarsel** Laserprodukt av klasse 1.

**Aviso** Produto laser de classe 1.

**¡Atención!** Producto láser Clase I.

**Varning!** Laserprodukt av klass 1.

### Class 1 LED Product Warning



**WARNING:** Class 1 LED product.

**Waarschuwing** Klasse 1 LED-product.

**Varoitus** Luokan 1 valodiodituote.

**Attention** Alarme de produit LED Class I.

**Warnung** Class 1 LED-Produktwarnung.

**Avvertenza** Avvertenza prodotto LED di Classe 1.

**Advarsel** LED-produkt i klasse 1.

**Aviso** Produto de classe 1 com LED.

**¡Atención!** Aviso sobre producto LED de Clase 1.

**Varning!** Lysdiodprodukt av klass 1.

### Laser Beam Warning

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**WARNING:** Do not stare into the laser beam or view it directly with optical instruments.

**Waarschuwing** Niet in de straal staren of hem rechtstreeks bekijken met optische instrumenten.

**Varoitus** Älä katso säteeseen äläkä tarkastele sitä suoraan optisen laitteen avulla.

**Attention** Ne pas fixer le faisceau des yeux, ni l'observer directement à l'aide d'instruments optiques.

**Warnung** Nicht direkt in den Strahl blicken und ihn nicht direkt mit optischen Geräten prüfen.

**Avvertenza** Non fissare il raggio con gli occhi né usare strumenti ottici per osservarlo direttamente.

**Advarsel** Stirr eller se ikke direkte på strålen med optiske instrumenter.

**Aviso** Não olhe fixamente para o raio, nem olhe para ele diretamente com instrumentos ópticos.

**¡Atención!** No mirar fijamente el haz ni observarlo directamente con instrumentos ópticos.

**Varning!** Rikta inte blicken in mot strålen och titta inte direkt på den genom optiska instrument.

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### Radiation from Open Port Apertures Warning

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**WARNING:** Because invisible radiation may be emitted from the aperture of the port when no fiber cable is connected, avoid exposure to radiation and do not stare into open apertures.

**Waarschuwing** Aangezien onzichtbare straling vanuit de opening van de poort kan komen als er geen fiberkabel aangesloten is, dient blootstelling aan straling en het kijken in open openingen vermeden te worden.

**Varoitus** Koska portin aukosta voi emittoitua näkymätöntä säteilyä, kun kuitukaapelia ei ole kytkettynä, vältä säteilylle altistumista äläkä katso avoimiin aukkoihin.

**Attention** Des radiations invisibles à l'il nu pouvant traverser l'ouverture du port lorsqu'aucun câble en fibre optique n'y est connecté, il est recommandé de ne pas regarder fixement l'intérieur de ces ouvertures.

**Warnung** Aus der Port-Öffnung können unsichtbare Strahlen emittieren, wenn kein Glasfaserkabel angeschlossen ist. Vermeiden Sie es, sich den Strahlungen auszusetzen, und starren Sie nicht in die Öffnungen!

**Avvertenza** Quando i cavi in fibra non sono inseriti, radiazioni invisibili possono essere emesse attraverso l'apertura della porta. Evitate di esporvi alle radiazioni e non guardate direttamente nelle aperture.

**Advarsel** Unngå utsettelse for stråling, og stirr ikke inn i åpninger som er åpne, fordi usynlig stråling kan emitteres fra portens åpning når det ikke er tilkoblet en fiberkabel.

**Aviso** Dada a possibilidade de emissão de radiação invisível através do orifício da via de acesso, quando esta não tiver nenhum cabo de fibra conectado, deverá evitar a exposição à radiação e não deverá olhar fixamente para orifícios que se encontrarem a descoberto.

**¡Atención!** Debido a que la apertura del puerto puede emitir radiación invisible cuando no existe un cable de fibra conectado, evite mirar directamente a las aperturas para no exponerse a la radiación.

**Varning!** Osynlig strålning kan avges från en portöppning utan ansluten fiberkabel och du bör därför undvika att bli utsatt för strålning genom att inte stirra in i oskyddade öppningar.

- Related Documentation**
- [Definition of Safety Warning Levels on page 47](#)
  - [General Safety Warnings for Juniper Networks Hardware Equipment on page 51](#)
  - [General Laser Safety Guidelines for LN2600 Router on page 60](#)

## Maintenance and Operational Safety Warnings for Juniper Networks Hardware Equipment

As you maintain the hardware equipment, observe the following warnings:

- [Jewelry Removal Warning on page 63](#)
- [Lightning Activity Warning on page 65](#)
- [Operating Temperature Warning on page 65](#)
- [Product Disposal Warning on page 66](#)

### Jewelry Removal Warning



**WARNING:** Before working on equipment that is connected to power lines, remove jewelry, including rings, necklaces, and watches. Metal objects heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals.

**Waarschuwing** Alvorens aan apparatuur te werken die met elektrische leidingen is verbonden, sieraden (inclusief ringen, kettingen en horloges) verwijderen. Metalen voorwerpen worden warm wanneer ze met stroom en aarde zijn verbonden, en kunnen ernstige brandwonden veroorzaken of het metalen voorwerp aan de aansluitklemmen lassen.

**Varoitus** Ennen kuin työskentelet voimavirtajohtoihin kytkettyjen laitteiden parissa, ota pois kaikki korut (sormukset, kaulakorut ja kellot mukaan lukien). Metalliesineet kuumenevat, kun ne ovat yhteydessä sähkövirran ja maan kanssa, ja ne voivat aiheuttaa vakavia palovammoja tai hitsata metalliesineet kiinni liitäntänapoihin.

**Attention** Avant d'accéder à cet équipement connecté aux lignes électriques, ôter tout bijou (anneaux, colliers et montres compris). Lorsqu'ils sont branchés à l'alimentation et reliés à la terre, les objets métalliques chauffent, ce qui peut provoquer des blessures graves ou souder l'objet métallique aux bornes.

**Warnung** Vor der Arbeit an Geräten, die an das Netz angeschlossen sind, jeglichen Schmuck (einschließlich Ringe, Ketten und Uhren) abnehmen. Metallgegenstände erhitzen sich, wenn sie an das Netz und die Erde angeschlossen werden, und können schwere Verbrennungen verursachen oder an die Anschlußklemmen angeschweißt werden.

**Avvertenza** Prima di intervenire su apparecchiature collegate alle linee di alimentazione, togliersi qualsiasi monile (inclusi anelli, collane, braccialetti ed orologi). Gli oggetti metallici si riscaldano quando sono collegati tra punti di alimentazione e massa: possono causare ustioni gravi oppure il metallo può saldarsi ai terminali.

**Advarsel** Fjern alle smykker (inkludert ringer, halskjeder og klokker) før du skal arbeide på utstyr som er koblet til kraftledninger. Metallgjenstander som er koblet til kraftledninger og jord blir svært varme og kan forårsake alvorlige brannskader eller smelte fast til polene.

**Aviso** Antes de trabalhar em equipamento que esteja ligado a linhas de corrente, retire todas as jóias que estiver a usar (incluindo anéis, fios e relógios). Os objectos metálicos aquecerão em contacto com a corrente e em contacto com a ligação à terra, podendo causar queimaduras graves ou ficarem soldados aos terminais.

**¡Atención!** Antes de operar sobre equipos conectados a líneas de alimentación, quitarse las joyas (incluidos anillos, collares y relojes). Los objetos de metal se calientan cuando se conectan a la alimentación y a tierra, lo que puede ocasionar quemaduras graves o que los objetos metálicos queden soldados a los bornes.

**Varning!** Tag av alla smycken (inklusive ringar, halsband och armbandsur) innan du arbetar på utrustning som är kopplad till kraftledningar. Metallobjekt hettas upp när de kopplas ihop med ström och jord och kan förorsaka

allvarliga brännskador; metallobjekt kan också sammansvetsas med kontakterna.

### Lightning Activity Warning



**WARNING:** Do not work on the system or connect or disconnect cables during periods of lightning activity.

**Waarschuwing** Tijdens onweer dat gepaard gaat met bliksem, dient u niet aan het systeem te werken of kabels aan te sluiten of te ontkoppelen.

**Varoitus** Älä työskentele järjestelmän parissa äläkä yhdistä tai irrota kaapeleita ukkosilmalla.

**Attention** Ne pas travailler sur le système ni brancher ou débrancher les câbles pendant un orage.

**Warnung** Arbeiten Sie nicht am System und schließen Sie keine Kabel an bzw. trennen Sie keine ab, wenn es gewittert.

**Avvertenza** Non lavorare sul sistema o collegare oppure scollegare i cavi durante un temporale con fulmini.

**Advarsel** Utfør aldri arbeid på systemet, eller koble kabler til eller fra systemet når det tordner eller lyner.

**Aviso** Não trabalhe no sistema ou ligue e desligue cabos durante períodos de mau tempo (trovoada).

**¡Atención!** No operar el sistema ni conectar o desconectar cables durante el transcurso de descargas eléctricas en la atmósfera.

**Varning!** Vid åska skall du aldrig utföra arbete på systemet eller ansluta eller koppla loss kablar.

### Operating Temperature Warning



**WARNING:** To prevent the hardware equipment from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of 158° F (70° C). To prevent airflow restriction, allow at least 6 inches (15.2 cm) of clearance around the ventilation openings.

**Waarschuwing** Om te voorkomen dat welke router van de router dan ook oververhit raakt, dient u deze niet te bedienen op een plaats waar de maximale aanbevolen omgevingstemperatuur van 70° C wordt overschreden. Om te voorkomen dat de luchtstroom wordt beperkt, dient er minstens 15,2 cm speling rond de ventilatie-openingen te zijn.

**Varoitus** Ettei router-sarjan reititin ylikuumentuisi, sitä ei saa käyttää tilassa, jonka lämpötila ylittää korkeimman suositellun ympäristölämpötilan 70° C. Ettei ilmanvaihto estyisi, tuuletusaukkojen ympärille on jätettävä ainakin 15,2 cm tilaa.

**Attention** Pour éviter toute surchauffe des routeurs de la gamme router, ne l'utilisez pas dans une zone où la température ambiante est supérieure à 70° C. Pour permettre un flot d'air constant, dégagez un espace d'au moins 15,2 cm autour des ouvertures de ventilations.

**Warnung** Um einen router der router vor Überhitzung zu schützen, darf dieser nicht in einer Gegend betrieben werden, in der die Umgebungstemperatur das empfohlene Maximum von 70° C überschreitet. Um Lüftungsverschluß zu verhindern, achten Sie darauf, daß mindestens 15,2 cm lichter Raum um die Lüftungsöffnungen herum frei bleibt.

**Avvertenza** Per evitare il surriscaldamento dei router, non adoperateli in un locale che ecceda la temperatura ambientale massima di 70° C. Per evitare che la circolazione dell'aria sia impedita, lasciate uno spazio di almeno 15,2 cm di fronte alle aperture delle ventole.

**Advarsel** Unngå overoppheting av eventuelle rutere i router Disse skal ikke brukes på steder der den anbefalte maksimale omgivelsestemperaturen overstiger 70° C (158° F). Sørg for at klaringen rundt lufteåpningene er minst 15,2 cm (6 tommer) for å forhindre nedsatt luftsirkulasjon.

**Aviso** Para evitar o sobreaquecimento do encaminhador router, não utilize este equipamento numa área que exceda a temperatura máxima recomendada de 70° C. Para evitar a restrição à circulação de ar, deixe pelo menos um espaço de 15,2 cm à volta das aberturas de ventilação.

**¡Atención!** Para impedir que un encaminador de la serie router se recaliente, no lo haga funcionar en un área en la que se supere la temperatura ambiente máxima recomendada de 70° C. Para impedir la restricción de la entrada de aire, deje un espacio mínimo de 15,2 cm alrededor de las aperturas para ventilación.

**Varning!** Förhindra att en router överhettas genom att inte använda den i ett område där den maximalt rekommenderade omgivningstemperaturen på 70° C överskrids. Förhindra att luftcirkulationen inskränks genom att se till att det finns fritt utrymme på minst 15,2 cm omkring ventilationsöppningarna.

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### Product Disposal Warning

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**WARNING:** Disposal of this product must be handled according to all national laws and regulations.

**Waarschuwing** Dit produkt dient volgens alle landelijke wetten en voorschriften te worden afgedankt.

**Varoitus** Tämän tuotteen lopullisesta hävittämisestä tulee huolehtia kaikkia valtakunnallisia lakeja ja säännöksiä noudattaen.

**Attention** La mise au rebut définitive de ce produit doit être effectuée conformément à toutes les lois et réglementations en vigueur.

**Warnung** Dieses Produkt muß den geltenden Gesetzen und Vorschriften entsprechend entsorgt werden.

**Avvertenza** L'eliminazione finale di questo prodotto deve essere eseguita osservando le normative italiane vigenti in materia

**Advarsel** Endelig disponering av dette produktet må skje i henhold til nasjonale lover og forskrifter.

**Aviso** A descarte final deste produto deverá ser efectuada de acordo com os regulamentos e a legislação nacional.

**¡Atención!** El desecho final de este producto debe realizarse según todas las leyes y regulaciones nacionales

**Varning!** Slutlig kassering av denna produkt bör skötas i enlighet med landets alla lagar och föreskrifter.

- 
- Related Documentation**
- [Definition of Safety Warning Levels on page 47](#)
  - [General Safety Warnings for Juniper Networks Hardware Equipment on page 51](#)

## Electrical Safety Guidelines and Warnings for the LN2600 Router

When working on equipment powered by electricity, follow the guidelines described in the following sections:

- [Grounded Equipment Warning on page 68](#)
- [Grounding Requirements and Warning on page 68](#)
- [Multiple Power Supplies Disconnection Warning on page 69](#)
- [Power Disconnection Warning on page 70](#)
- [General Electrical Safety Guidelines and Electrical Codes for the LN2600 Router on page 71](#)
- [In Case of an Electrical Accident on page 71](#)
- [DC Power Electrical Safety Warnings for Juniper Networks Hardware Equipment on page 72](#)

### Grounded Equipment Warning

---



**WARNING:** The router is intended to be grounded. Ensure that the router is connected to earth ground during normal use.

**Waarschuwing** Deze apparatuur hoort geaard te worden. Zorg dat de host-computer tijdens normaal gebruik met aarde is verbonden.

**Varoitus** Tämä laitteisto on tarkoitettu maadoitettavaksi. Varmista, että isäntälaitte on yhdistetty maahan normaalikäytön aikana.

**Attention** Cet équipement doit être relié à la terre. S'assurer que l'appareil hôte est relié à la terre lors de l'utilisation normale.

**Warnung** Dieses Gerät muß geerdet werden. Stellen Sie sicher, daß das Host-Gerät während des normalen Betriebs an Erde gelegt ist.

**Avvertenza** Questa apparecchiatura deve essere collegata a massa. Accertarsi che il dispositivo host sia collegato alla massa di terra durante il normale utilizzo.

**Advarsel** Dette utstyret skal jordes. Forviss deg om vertsterminalen er jordet ved normalt bruk.

**Aviso** Este equipamento deverá estar ligado à terra. Certifique-se que o host se encontra ligado à terra durante a sua utilização normal.

**¡Atención!** Este equipo debe conectarse a tierra. Asegurarse de que el equipo principal esté conectado a tierra durante el uso normal.

**Varning!** Denna utrustning är avsedd att jordas. Se till att värdenheten är jordad vid normal användning.

---

### Grounding Requirements and Warning

---

An insulated grounding conductor that is identical in size to the grounded and ungrounded branch circuit supply conductors, but is identifiable by green and yellow stripes, is installed as part of the branch circuit that supplies the unit. The grounding conductor is a separately derived system at the supply transformer or motor generator set.



**WARNING:** When installing the router, the ground connection must always be made first and disconnected last.

**Waarschuwing** Bij de installatie van het toestel moet de aardverbinding altijd het eerste worden gemaakt en het laatste worden losgemaakt.

**Varoitus** Laitetta asennettaessa on maahan yhdistäminen aina tehtävä ensiksi ja maadoituksen irti kytkeminen viimeiseksi.

**Attention** Lors de l'installation de l'appareil, la mise à la terre doit toujours être connectée en premier et déconnectée en dernier.

**Warnung** Der Erdschluß muß bei der Installation der Einheit immer zuerst hergestellt und zuletzt abgetrennt werden.

**Avvertenza** In fase di installazione dell'unità, eseguire sempre per primo il collegamento a massa e disconnetterlo per ultimo.

**Advarsel** Når enheten installeres, må jordledningen alltid tilkobles først og frakobles sist.

**Aviso** Ao instalar a unidade, a ligação à terra deverá ser sempre a primeira a ser ligada, e a última a ser desligada.

**¡Atención!** Al instalar el equipo, conectar la tierra la primera y desconectarla la última.

**Varning!** Vid installation av enheten måste jordledningen alltid anslutas först och kopplas bort sist.

---

### Multiple Power Supplies Disconnection Warning

---



**WARNING:** The router has more than one power supply connection. All connections must be removed completely to remove power from the unit completely.

**Waarschuwing** Deze eenheid heeft meer dan één stroomtoevoerverbinding; alle verbindingen moeten volledig worden verwijderd om de stroom van deze eenheid volledig te verwijderen.

**Varoitus** Tässä laitteessa on useampia virtalähdekytkentöjä. Kaikki kytkennät on irrotettava kokonaan, jotta virta poistettaisiin täysin laitteesta.

**Attention** Cette unité est équipée de plusieurs raccordements d'alimentation. Pour supprimer tout courant électrique de l'unité, tous les cordons d'alimentation doivent être débranchés.

**Warnung** Diese Einheit verfügt über mehr als einen Stromanschluß; um Strom gänzlich von der Einheit fernzuhalten, müssen alle Stromzufuhren abgetrennt sein.

**Avvertenza** Questa unità ha più di una connessione per alimentatore elettrico; tutte le connessioni devono essere completamente rimosse per togliere l'elettricità dall'unità.

**Advarsel** Denne enheten har mer enn én strømtilkobling. Alle tilkoblinger må kobles helt fra for å eliminere strøm fra enheten.

**Aviso** Este dispositivo possui mais do que uma conexão de fonte de alimentação de energia; para poder remover a fonte de alimentação de energia, deverão ser desconectadas todas as conexões existentes.

**iAtención!** Esta unidad tiene más de una conexión de suministros de alimentación; para eliminar la alimentación por completo, deben desconectarse completamente todas las conexiones.

**Varning!** Denna enhet har mer än en strömförsörjningsanslutning; alla anslutningar måste vara helt avlägsnade innan strömtillförseln till enheten är fullständigt bruten.

---

### Power Disconnection Warning

---



**WARNING:** Before working on the chassis or near power supplies, switch off the power at the DC circuit breaker.

**Waarschuwing** Voordat u aan een frame of in de nabijheid van voedingen werkt, dient u bij wisselstroom toestellen de stekker van het netsnoer uit het stopcontact te halen; voor gelijkstroom toestellen dient u de stroom uit te schakelen bij de stroomverbreker.

**Varoitus** Kytke irti vaihtovirtalaitteiden virtajohto ja katkaise tasavirtalaitteiden virta suojakytkimellä, ennen kuin teet mitään asennuspohjalle tai työskentelet virtalähteiden läheisyydessä.

**Attention** Avant de travailler sur un châssis ou à proximité d'une alimentation électrique, débrancher le cordon d'alimentation des unités en courant alternatif; couper l'alimentation des unités en courant continu au niveau du disjoncteur.

**Warnung** Bevor Sie an einem Chassis oder in der Nähe von Netzgeräten arbeiten, ziehen Sie bei Wechselstromeinheiten das Netzkabel ab bzw. schalten Sie bei Gleichstromeinheiten den Strom am Unterbrecher ab.

**Avvertenza** Prima di lavorare su un telaio o intorno ad alimentatori, scollegare il cavo di alimentazione sulle unità CA; scollegare l'alimentazione all'interruttore automatico sulle unità CC.

**Advarsel** Før det utføres arbeid på kabinettet eller det arbeides i nærheten av strømforsyningsenheter, skal strømledningen trekkes ut p vekselstrømsenheter og strømmen kobles fra ved strømbryteren på likestrømsenheter.

**Aviso** Antes de trabalhar num chassis, ou antes de trabalhar perto de unidades de fornecimento de energia, desligue o cabo de alimentação nas unidades de corrente alternada; desligue a corrente no disjuntor nas unidades de corrente contínua.

**¡Atención!** Antes de manipular el chasis de un equipo o trabajar cerca de una fuente de alimentación, desenchufar el cable de alimentación en los equipos de corriente alterna (CA); cortar la alimentación desde el interruptor automático en los equipos de corriente continua (CC).

**Varning!** Innan du arbetar med ett chassi eller nära strömförsörjningsenheter skall du för växelströmsenheter dra ur nätsladden och för likströmsenheter bryta strömmen vid överspänningsskyddet.

---

### General Electrical Safety Guidelines and Electrical Codes for the LN2600 Router

- Install the router in compliance with the following local, national, or international electrical codes:
  - United States—National Fire Protection Association (NFPA 70), United States National Electrical Code.
  - Canada—Canadian Electrical Code, Part 1, CSA C22.1.
  - Other countries—International Electromechanical Commission (IEC) 60364, Part 1 through Part 7.
- Locate the emergency power-off switch for the room in which you are working so that if an electrical accident occurs, you can quickly turn off the power.
- Do not work alone if potentially hazardous conditions exist anywhere in your workspace.
- Never assume that power is disconnected from a circuit. Always check the circuit before starting to work.
- Carefully look for possible hazards in your work area, such as moist floors, ungrounded power extension cords, and missing safety grounds.
- Operate the router within marked electrical ratings and product usage instructions.
- For the router and peripheral equipment to function safely and correctly, use the cables and connectors specified for the attached peripheral equipment, and make certain they are in good condition.

Many router components can be removed and replaced without powering off or disconnecting power to the router. Never install equipment if it appears damaged.

---

### In Case of an Electrical Accident

If an electrical accident results in an injury, take the following actions in this order:

1. Use caution. Be aware of potentially hazardous conditions that could cause further injury.
2. Disconnect power from the router.
3. If possible, send another person to get medical aid. Otherwise, assess the condition of the victim, then call for help.

## DC Power Electrical Safety Warnings for Juniper Networks Hardware Equipment

When working with DC-powered equipment, observe the following warnings:

- [DC Power Copper Conductors Warning on page 72](#)
- [DC Power Disconnection Warning on page 72](#)
- [DC Power Wiring Terminations Warning on page 74](#)

### DC Power Copper Conductors Warning

---



**WARNING:** Use copper conductors only.

**Waarschuwing** Gebruik alleen koperen geleiders.

**Varoitus** Käytä vain kuparijohtimia.

**Attention** Utilisez uniquement des conducteurs en cuivre.

**Warnung** Verwenden Sie ausschließlich Kupferleiter.

**Avvertenza** Usate unicamente dei conduttori di rame.

**Advarsel** Bruk bare kobberledninger.

**Aviso** Utilize apenas fios condutores de cobre.

**¡Atención!** Emplee sólo conductores de cobre.

**Varning!** Använd endast ledare av koppar.

---

### DC Power Disconnection Warning

---



**WARNING:** Before performing any procedures on power supplies, ensure that power is removed from the DC circuit. To ensure that all power is off, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.

**Waarschuwing** Voordat u een van de onderstaande procedures uitvoert, dient u te controleren of de stroom naar het gelijkstroom circuit uitgeschakeld is. Om u ervan te verzekeren dat alle stroom UIT is geschakeld, kiest u op het schakelbord de stroomverbreker die het gelijkstroom circuit bedient, draait de stroomverbreker naar de UIT positie en plakt de schakelaarhendel van de stroomverbreker met plakband in de UIT positie vast.

**Varoitus** Varmista, että tasavirtapiirissä ei ole virtaa ennen seuraavien toimenpiteiden suorittamista. Varmistaaksesi, että virta on KATKAISTU täysin, paikanna tasavirrasta huolehtivassa kojetaulussa sijaitseva suojakytkin, käännä suojakytkin KATKAISTU-asentoon ja teippaa suojakytkimen varsi niin, että se pysyy KATKAISTU-asennossa.

**Attention** Avant de pratiquer l'une quelconque des procédures ci-dessous, vérifier que le circuit en courant continu n'est plus sous tension. Pour en être sûr, localiser le disjoncteur situé sur le panneau de service du circuit en courant continu, placer le disjoncteur en position fermée (OFF) et, à l'aide d'un ruban adhésif, bloquer la poignée du disjoncteur en position OFF.

**Warnung** Vor Ausführung der folgenden Vorgänge ist sicherzustellen, daß die Gleichstromschaltung keinen Strom erhält. Um sicherzustellen, daß sämtlicher Strom abgestellt ist, machen Sie auf der Schalttafel den Unterbrecher für die Gleichstromschaltung ausfindig, stellen Sie den Unterbrecher auf AUS, und kleben Sie den Schaltergriff des Unterbrechers mit Klebeband in der AUS-Stellung fest.

**Avvertenza** Prima di svolgere una qualsiasi delle procedure seguenti, verificare che il circuito CC non sia alimentato. Per verificare che tutta l'alimentazione sia scollegata (OFF), individuare l'interruttore automatico sul quadro strumenti che alimenta il circuito CC, mettere l'interruttore in posizione OFF e fissarlo con nastro adesivo in tale posizione.

**Advarsel** Før noen av disse prosedyrene utføres, kontroller at strømmen er frakoblet likestrømkretsen. Sørg for at all strøm er slått AV. Dette gjøres ved å lokalisere strømbryteren på brytertavlen som betjener likestrømkretsen, slå strømbryteren AV og teipe bryterhåndtaket på strømbryteren i AV-stilling.

**Aviso** Antes de executar um dos seguintes procedimentos, certifique-se que desligou a fonte de alimentação de energia do circuito de corrente contínua. Para se assegurar que toda a corrente foi DESLIGADA, localize o disjuntor no painel que serve o circuito de corrente contínua e coloque-o na posição OFF (Desligado), segurando nessa posição a manivela do interruptor do disjuntor com fita isoladora.

**¡Atención!** Antes de proceder con los siguientes pasos, comprobar que la alimentación del circuito de corriente continua (CC) esté cortada (OFF). Para asegurarse de que toda la alimentación esté cortada (OFF), localizar el interruptor automático en el panel que alimenta al circuito de corriente continua, cambiar el interruptor automático a la posición de Apagado (OFF), y sujetar con cinta la palanca del interruptor automático en posición de Apagado (OFF).

**Varning!** Innan du utför någon av följande procedurer måste du kontrollera att strömförsörjningen till likströmskretsen är bruten. Kontrollera att all strömförsörjning är BRUTEN genom att slå AV det överspänningsskydd som skyddar likströmskretsen och tejpa fast överspänningsskyddets omkopplare i FRÅN-läget.

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### DC Power Wiring Terminations Warning

---



**WARNING:** When stranded wiring is required, use approved wiring terminations, such as closed-loop or spade-type with upturned lugs. These terminations should be the appropriate size for the wires and should clamp both the insulation and conductor.

**Waarschuwing** Wanneer geslagen bedrading vereist is, dient u bedrading te gebruiken die voorzien is van goedgekeurde aansluitingspunten, zoals het gesloten-lus type of het grijperschop type waarbij de aansluitpunten omhoog wijzen. Deze aansluitpunten dienen de juiste maat voor de draden te hebben en dienen zowel de isolatie als de geleider vast te klemmen.

**Varoitus** Jos säikeellinen johdin on tarpeen, käytä hyväksyttyä johdinliitäntää, esimerkiksi suljettua silmukkaa tai kourumaista liitäntää, jossa on ylöspäin käännetyt kiinnityskorvat. Tällaisten liitäntöjen tulee olla kooltaan johtimiin sopivia ja niiden tulee puristaa yhteen sekä eristeen että johdinosan.

**Attention** Quand des fils torsadés sont nécessaires, utiliser des douilles terminales homologuées telles que celles à circuit fermé ou du type à plage ouverte avec cosses rebroussées. Ces douilles terminales doivent être de la taille qui convient aux fils et doivent être refermées sur la gaine isolante et sur le conducteur.

**Warnung** Wenn Litzenverdrahtung erforderlich ist, sind zugelassene Verdrahtungsabschlüsse, z.B. Ringoesen oder gabelförmige Kabelschuhe mit nach oben gerichteten Enden zu verwenden. Diese Abschlüsse sollten die angemessene Größe für die Drähte haben und sowohl die Isolierung als auch den Leiter festklemmen.

**Avvertenza** Quando occorre usare trecce, usare connettori omologati, come quelli a occhiello o a forcella con linguette rivolte verso l'alto. I connettori devono avere la misura adatta per il cablaggio e devono serrare sia l'isolante che il conduttore.

**Advarsel** Hvis det er nødvendig med flertrådede ledninger, brukes godkjente ledningsavslutninger, som for eksempel lukket sløyfe eller spadetype med oppoverbøyde kabelsko. Disse avslutningene skal ha riktig størrelse i forhold til ledningene, og skal klemme sammen både isolasjonen og lederen.

**Aviso** Quando forem requeridas montagens de instalação eléctrica de cabo torcido, use terminações de cabo aprovadas, tais como, terminações de cabo em circuito fechado e planas com terminais de orelha voltados para cima. Estas terminações de cabo deverão ser do tamanho apropriado para os respectivos cabos, e deverão prender simultaneamente o isolamento e o fio condutor.

**¡Atención!** Cuando se necesite hilo trenzado, utilizar terminales para cables homologados, tales como las de tipo "bucle cerrado" o "espada", con las lengüetas de conexión vueltas hacia arriba. Estos terminales deberán ser del

tamaño apropiado para los cables que se utilicen, y tendrán que sujetar tanto el aislante como el conductor.

**Varning!** När flertrådiga ledningar krävs måste godkända ledningskontakter användas, t.ex. kabelsko av sluten eller öppen typ med uppåtvänd tapp. Storleken på dessa kontakter måste vara avpassad till ledningarna och måste kunna hålla både isoleringen och ledaren fastklämda.

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**Related  
Documentation**

- [Definition of Safety Warning Levels on page 47](#)
- [General Safety Warnings for Juniper Networks Hardware Equipment on page 51](#)
- [Preventing Electrostatic Discharge Damage to an LN2600 Router on page 54](#)
- [Fire Safety Requirements for Juniper Networks Hardware Equipment on page 54](#)
- [Installation Safety Warnings for Juniper Networks Hardware Equipment on page 55](#)
- [General Laser Safety Guidelines for LN2600 Router on page 60](#)
- [Laser Safety Warnings for LN2600 Router on page 61](#)
- [Maintenance and Operational Safety Warnings for Juniper Networks Hardware Equipment on page 63](#)

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## Agency Approvals and Compliance Statements for the LN2600 Router

- [Agency Approvals and Compliance Statements for the LN2600 Router on page 75](#)

### Agency Approvals and Compliance Statements for the LN2600 Router

The LN2600 router complies with the following standards:

- Safety
  - CAN/CSA-C22.2 No. 60950-1 (2007) Information Technology Equipment - Safety
  - UL 60950-1 (2nd Ed.) Information Technology Equipment - Safety
  - EN 60950-1 (2006 +A1:2009 +A1:2010 and A12:2011) Information Technology Equipment - Safety
  - IEC 60950-1 (2005 +A1:2009) Information Technology Equipment - Safety (All country deviations): CB Scheme report
  - EN 60825-1 (2007) Safety of Laser Products - Part 1: Equipment Classification
  - EN 60825-2 (2004 +A2:2010) Hazard Level 1
  - IEC 60529 Edition 2.1 Degrees of Protection provided by Enclosures (IP Code) IP64 requirement
  - IEC 60664 Edition 2 Table A.2 (altitude <5000m)

- GB4943.1-2011 (tropical climate area)
- GS mark
- EMC (Class A)
  - FCC 47CFR, Part 15 Class A - Rules for Radio Frequency Devices, USA
  - ICES-003 Issue 5(2012) - Information technology equipment, Canada
  - ETSI EN 300 386 V1.6.1 (2012) - Telecommunication Network Equipment, Europe
  - EN 55022 (2010) (CISPR22: 2008) - Information technology equipment, Europe
  - VCCI, V-3/2012.04 - Information Technology Equipment, Japan
  - AS/NZS CISPR22:2009 - Information technology equipment, Australia/New-Zealand
  - KN 22 (2009-12) - Information technology equipment, South Korea
  - BSMI CNS 13438 and NCC C6357 (2006) - Information Technology Equipment, Taiwan
  - TEC/EMI/TEL-001/01/FEB-09 - Information Technology Equipment, India
- EMI
  - ETSI EN 300 386 V1.6.1 (2012) - Telecommunication Network Equipment, Europe
  - EN 55024 (2010) (CISPR24: 2010) - Information technology equipment, Europe
  - KN 24 (2011-9) - Information technology equipment, South Korea
  - TEC/EMI/TEL-001/01/FEB-09 - Information Technology Equipment, India
- NEBS
  - SR-3580 NEBS Level 3
  - GR-63-Core: NEBS, Physical Protection
  - GR-1089-Core: EMC and Electrical Safety for Network Telecommunications Equipment
- GR-3108-Core, Network Equipment in the Outside Plant (OSP), class 3
- ATT-TP-76200 Network Equipment Power, Grounding, Environmental, and Physical Design Requirements
- Verizon TPR.9305 Verizon NEBS Compliance: NEBS Compliance Clarification Document
- ETSI EN 300 132-2 (2011) - Environmental Engineering (EE); Power Supply Interface at the Input to Telecommunications and Datacom (ICT) Equipment: Part 2; Operated by -48 V Direct Current (DC)
- ATIS-0600015.03.2009 Energy Efficiency for Telecommunication Equipment: Methodology for Measurement & Reporting for Router and Ethernet Switch Products
- ATIS-0600015.2009 Energy Efficiency for Telecommunication Equipment: Methodology for Measurement & Reporting – General Requirements

- VZ.TPR.9205 Verizon NEBS Compliance: Energy Efficiency Requirements for Telecommunications Equipment. Verizon Technical Purchasing Requirements Issue 5, October 2011
- IEC 61850-3 ed 1, 2002-01-16 - Communication networks and systems in substations, International
- TS 61000-6-5, ed1.0 (2001-07) - Immunity for power station and substation environments, International
- IEEE 1613: 2009 + 1613a (2011) - Communications Networking Devices Installed in Electric Power Substations, International



**NOTE:** Class 2 performance requirements are met only when the LN2600 router supports optical SFPs. When copper SFPs are supported, the LN2600 router meets the Class 1 performance requirements.

- EN 50121-4:2006; Part 4 - Railway applications. Europe

**Related  
Documentation**

- [Safety Warnings for the LN2600 Router on page 50](#)
- [Safety Guidelines for the LN2600 Router on page 49](#)



## APPENDIX B

# LN2600 Router Environmental Specifications

- [LN2600 Router Environmental Specifications on page 79](#)

## LN2600 Router Environmental Specifications

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[Table 8 on page 79](#) provides the required environmental conditions for normal router operation.

**Table 8: LN2600 Router Environmental Specifications**

Description	Value
Altitude	13,123 ft (4,000 m)
Relative humidity	Normal operation ensured in relative humidity range of 0% to 95%, noncondensing
Continuous operating temperature	-40° C through 71° C (-40° F through 160° F)
Industrial grade SFP temperature	Less than -40° C or greater than 71° C

**Related Documentation** • [LN2600 Rugged Security Router Features on page 4](#)



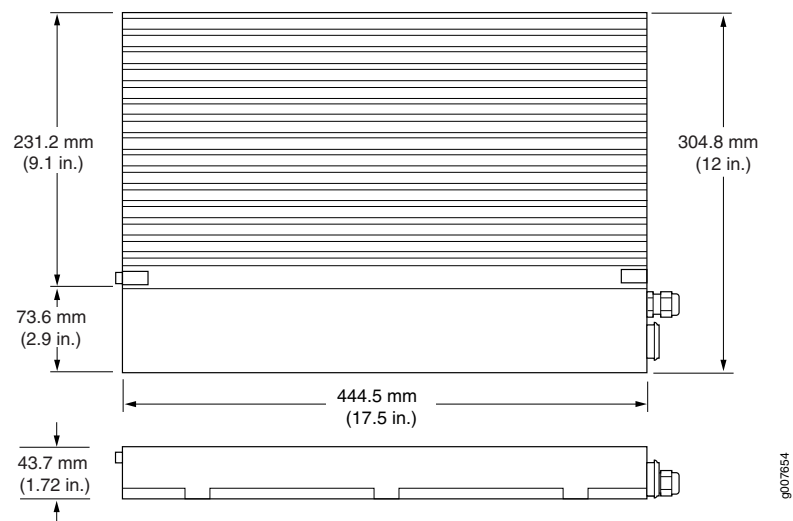
## APPENDIX C

# LN2600 Router Physical Specifications

- [LN2600 Router Physical Specifications on page 81](#)

## LN2600 Router Physical Specifications

Figure 23: LN2600 Router Physical Specifications



[Table 9 on page 81](#) provides the physical specifications of the LN2600 router.

Table 9: LN2600 Router Physical Specifications

Category	Specification
Width	444.5 mm (17.5 inches)
Height	43.68 mm (1.72 inches)
Depth	304.8 mm (12 inches)
Mounting	19 inches rack-mount or wall-mount

Table 9: LN2600 Router Physical Specifications (*continued*)

Category	Specification
Weight	6.8 kg (15 lb)
	9.5 kg (21 lb) with rack-mount kit
	19.5 kg (42 lb) with wall-mount kit

---

**Related Documentation** • [LN2600 Rugged Security Router Features on page 4](#)

## APPENDIX D

# LN2600 Router Power Requirements

- [LN2600 Router Power Requirements on page 83](#)

## LN2600 Router Power Requirements

Table 10 on page 83 lists the power requirements for the LN2600 router.

Table 10: LN2600 Router Power Requirements

Category	Specifications
Input voltage	-48 VDC
Input current	1.25 A @ -48 VDC
Maximum power dissipation	60 W

**Related Documentation** • [Powering on the LN2600 Router on page 22](#)



## PART 5

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- [Index on page 87](#)



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