

# M7i and M10i Internet Routers Power Supply Installation Instructions

**12 January 2007**  
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This document describes how to remove and replace a power supply on a Juniper Networks M7i or M10i Internet router.

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## Power Supply Description

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The router uses either AC or DC power (see Figure 1 and Figure 2). The power supplies are internally connected to the midplane, which distributes the different output voltages they produce throughout the system and its components.

An enable control signal on the output connector ensures that the power supply is fully seated into the router midplane before the power supply can be turned on. The enable pin prevents a user-accessible energy hazard, so there is no interlocking mechanism. The enable pin disables the voltage at the output connector if the power supply is not turned off before removal.

On an M7i router, if two power supplies are installed, they are fully redundant and share the load during normal operation. A single power supply can provide full power for as long as the router is operational. Redundancy is necessary only if one of the power supplies fails.

On an M10i router, if three AC power supplies or four DC power supplies are installed, they are fully redundant and share the load during normal operation. Two power supplies can provide full power for as long as the router is operational. Redundancy is necessary only if one of the power supplies fails.

Power supplies are hot-removable and hot-insertable. Each power supply has a handle to facilitate removal from the chassis. When one power supply fails or is switched off, the remaining power supplies immediately and automatically assume the entire electrical load.

Each power supply has an LED that indicates power supply status. Table 3 on page 4 describes the LED states.



**WARNING:** For a complete list of safety warnings for this router, including translations, see the hardware guide for your router at <http://www.juniper.net/techpubs/hardware/>.

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**CAUTION:** Do not leave a power supply slot empty for more than a short time while the router is operational. The power supply must remain in the chassis for proper airflow.

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Figure 1: AC Power Supply

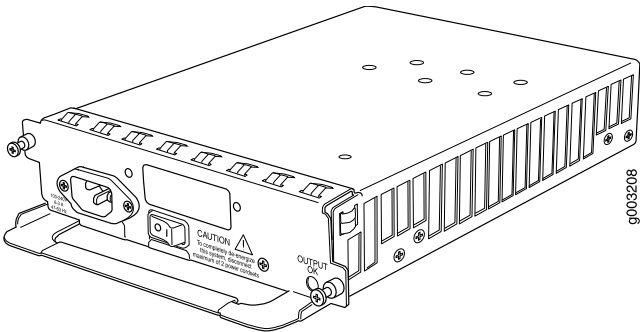
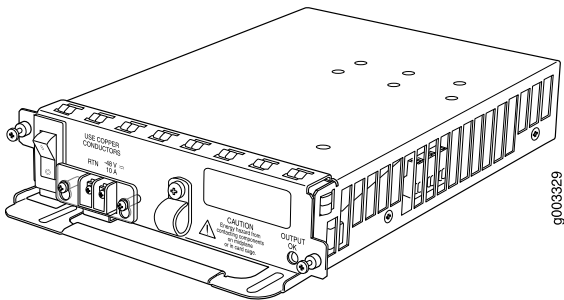


Figure 2: DC Power Supply



Power Supply Specifications

Table 1 on page 3 and Table 2 on page 4 list the electrical specifications for AC and DC power supplies.

Table 1: Electrical Specifications for AC Power Supply

| Description             | Specification  |
|-------------------------|--|
| Maximum power output    | 293 WDC  |
| AC input voltage        | Nominal: 100, 120, 200, 208, 220, 240 VAC<br>Operating range: 90 – 264 VAC |
| AC input line frequency | 47–63 Hz   |
| AC input current rating | 6–3 A  |

**Table 1: Electrical Specifications for AC Power Supply** *(continued)*

| Description     | Specification   |
|-----------------|---|
| Output voltages | + 3.3 V @ 40 A, + 2.5 V @ 20 A, + 5.0 V @ 15 A,<br>+ 12 V @ 3 A |

**Table 2: Electrical Specifications for DC Power Supply**

| Description             | Specification   |
|-------------------------|---|
| Maximum power output    | 293 W   |
| DC input voltage        | Nominal: -48 , -60 VDC<br><br>Operating range: -40.5 to -72 VDC |
| Input DC current rating | 10 A @ -48 V  |
| Output voltages         | + 3.3 V @ 40 A, + 2.5 V @ 20 A, + 5.0 V @ 15 A,<br>+ 12 V @ 3 A |

## Power Supply LED

Table 3 on page 4 describes the LED on both AC and DC power supplies.

**Table 3: States for Power Supply LED**

| Label     | Color | State       | Description  |
|-----------|-------|-------------|--|
| OUTPUT OK | Green | On steadily | Power supply is functioning normally, input is occurring, outputs are within range, and the temperature is within range. |
|           |       | Blinking    | Power supply is starting up, is not properly inserted, or airflow is not sufficient.                                     |

## Tools and Parts Required

To replace a power supply, you need the following tools and parts:

- Electrostatic bag or antistatic mat
- Electrostatic discharge (ESD) grounding wrist strap
- Phillips (+) screwdrivers, numbers 1 and 2

## Replace an AC Power Supply

To replace an AC power supply, perform the following procedures:

- Remove an AC Power Supply on page 5
- Install an AC Power Supply on page 6

## Remove an AC Power Supply

To remove an AC power supply, follow this procedure (see Figure 3 and Figure 4):

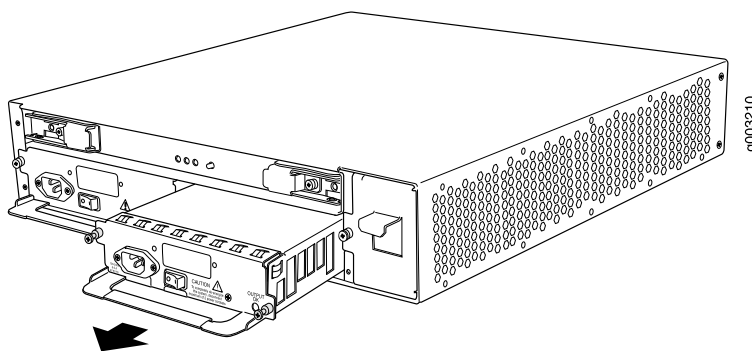
1. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis. Make sure the router is attached to a proper earth ground.
2. Press the power switch on the power supply faceplate to the **OFF (O)** position.

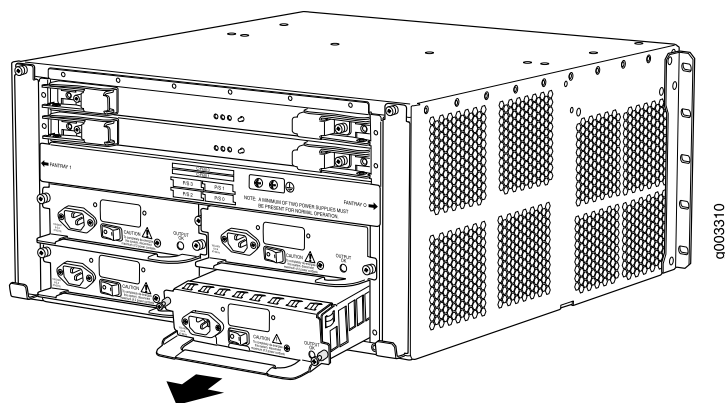


**NOTE:** If you are not removing the power supply, but simply powering it off, wait at least 60 seconds before turning it back on. If you need to power it off again, wait for at least 60 seconds after powering it on.

3. Unplug the power cord from the appliance inlet on the faceplate.
4. Loosen the thumbscrew at each corner of the power supply faceplate, using a Phillips screwdriver if necessary.
5. Grasp the handle on the power supply faceplate and pull firmly to slide the unit about halfway out of the chassis.
6. Place one hand under the power supply to support it, then slide it completely out of the chassis.

**Figure 3: Remove an AC Power Supply from an M7i Router**



**Figure 4: Remove an AC Power Supply from an M10i Router**

### ***Install an AC Power Supply***

To install an AC power supply, follow this procedure (see Figure 5 and Figure 6):

1. Verify that the switch on the power supply faceplate is in the **OFF (O)** position.
2. Locate the power cord shipped with the router, which should be appropriate for your geographical location.
3. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis. Make sure the router is attached to a proper earth ground.
4. Place one hand under the power supply and grasp the handle on the faceplate with the other hand. Slide the power supply into the chassis until it contacts the midplane.
5. Starting with the bottom screw, tighten (but do not overtighten) the thumbscrews at each corner of the power supply faceplate.
6. Insert the appliance coupler end of the power cord into the appliance inlet on the power supply faceplate and insert the plug into an AC power source

receptacle. Verify that the power cord does not block access to router components or drape where people could trip on it.

7. Press the power switch on the faceplate to the **ON** ( | ) position. When the power supply has powered on successfully, the green **OUTPUT OK** LED lights steadily.

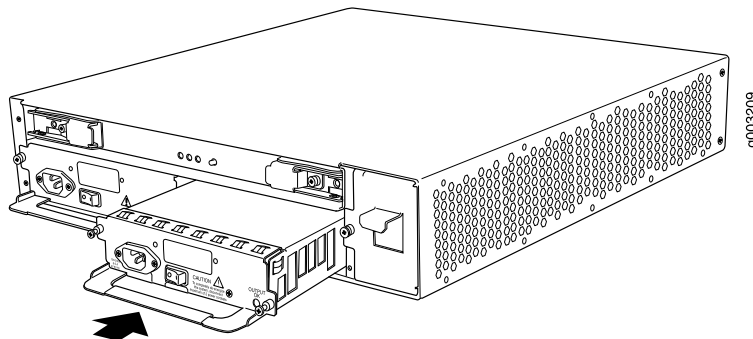


**NOTE:** After powering off a power supply, wait at least 60 seconds before turning it back on. After powering on a power supply, wait at least 60 seconds before turning it off.

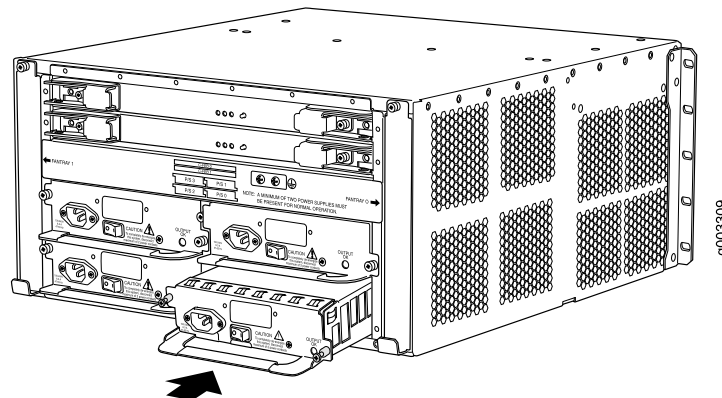
If the router is completely powered off when you power on the power supply, the Routing Engine boots as the power supply completes its startup sequence. If the Routing Engine finishes booting and you need to power off the router again, first issue the CLI `request system halt` command. For more information, see .

After a power supply is powered on, it can take up to 60 seconds for status indicators—such as LEDs on the power supply, `show chassis` commands, and messages on the craft interface LCD—to indicate that the power supply is functioning normally. Ignore error indicators that appear during the first 60 seconds.

**Figure 5: Install an AC Power Supply in an M7i Router**



**Figure 6: Install an AC Power Supply in an M10i Router**



## Replace a DC Power Supply

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To replace a DC power supply, perform the following procedures:

- Remove a DC Power Supply on page 8
- Install a DC Power Supply on page 9

## Remove a DC Power Supply

To remove a DC power supply, follow this procedure (see Figure 7 and Figure 8):

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. Make sure the router is attached to a proper earth ground.
2. Press the power switch for the power supply (located on the power supply faceplate) to the **OFF (O)** position.

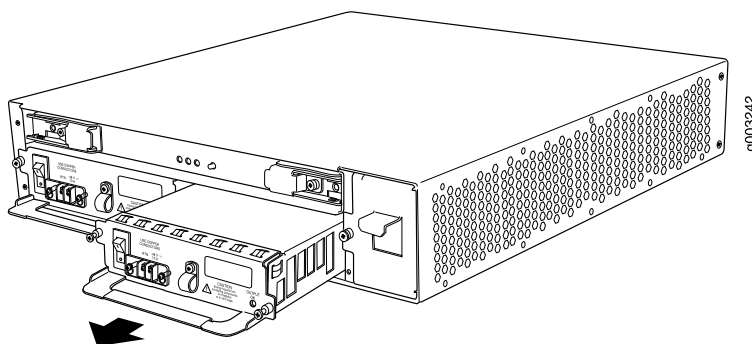
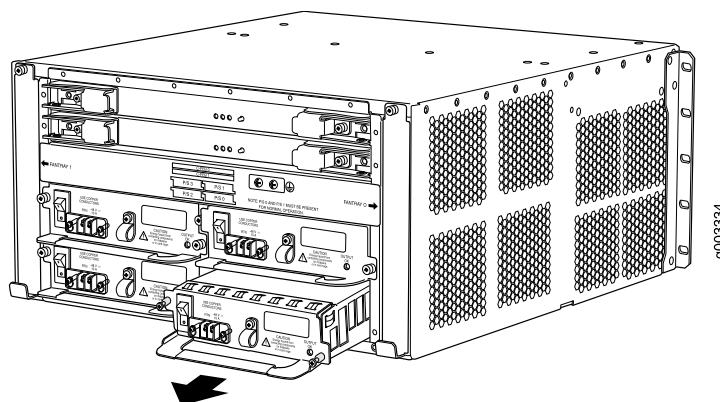


**NOTE:** If you are power cycling the power supply rather than shutting it off for a time, wait at least 60 seconds after turning it off before turning it back on. If you need to power it off again, wait for at least 60 seconds after powering it on.

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3. Shut off the power flowing to the power supply from the external power source, so that the voltage across the leads of the power cables is 0 V. Ensure that there is no chance that the cable leads might become active during the procedure.
4. Loosen the screws securing the clear cover over the field-wiring terminals and remove the cover.
5. Using a #1 Phillips screwdriver, turn the screw on each field-wiring terminal counter-clockwise to loosen the terminal connector from around the cable.
6. Remove the cables from the terminal connectors and from the hook located on the faceplate to the right of the field-wiring terminal.
7. Loosen the thumbscrew at each corner of the power supply faceplate, using a Phillips screwdriver if necessary.
8. Grasp the handle on the power supply faceplate and pull firmly to slide the unit about halfway out of the chassis.
9. Place one hand under the power supply to support it, then slide it completely out of the chassis.



**Figure 7: Remove a DC Power Supply from an M7i Router****Figure 8: Remove a DC Power Supply from an M10i Router**

### ***Install a DC Power Supply***

To install a DC power supply, follow this procedure (see Figure 9, Figure 10, Figure 11, and Figure 12):

1. Verify that there is no power flowing to the power supply from the external power source, so that the voltage across the leads of the power cables is 0 V. Ensure that there is no chance that the cable leads might become active during the procedure.
2. Verify that the power switch for the power supply (located on the power supply faceplate) is in the **OFF (O)** position.
3. Verify that the grounding cable is attached to the chassis and properly connected to an earth ground.
4. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis. Make sure the router is attached to a proper earth ground.
5. Place one hand under the power supply and grasp the handle on the faceplate with the other hand. Slide the power supply into the chassis until it contacts the midplane.

6. Starting with the bottom screw, tighten (but do not overtighten) the thumbscrews at each corner of the power supply faceplate.
7. Verify that a licensed electrician has attached a listed power cable lug to each power source cable.
8. Loop the power cables through the hook located on the faceplate to the right of the field-wiring terminals.
9. Depending on the type of power cable lugs used, loosen or remove the screws on the field-wiring terminals.
10. Insert the power cable lugs into the appropriate field-wiring terminals. Using a number 1 Phillips screwdriver, turn the screw on each field-wiring terminal clockwise to secure the power cable lug. Apply between 8 lb-in. (.9 Nm) and 9 lb-in. (1.02 Nm) of torque to each screw.
  - a. Insert the positive ( + ) source cable into the return terminal, which is labeled RTN.
  - b. Insert the negative ( - ) source cable into the input terminal, which is labeled -48V.



**NOTE:** The DC power supplies in slots P/S 0 and P/S 1 must be powered by dedicated power feeds derived from feed A, and the DC power supplies in slots P/S 2 and P/S 3 must be powered by dedicated power feeds derived from feed B. This configuration provides the commonly deployed A/B feed redundancy for the system. For information about connecting to DC power sources, see the router hardware guide.

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11. Verify that the DC source power cabling and the grounding cabling are correct, that they are not touching or blocking access to router components, and that they do not drape where people could trip on them.

12. Turn on the DC power source so that voltage flows to the power supply.
13. Press the switch on the power supply faceplate to the **ON** ( | ) position. When the power supply has powered on successfully, the green **OUTPUT OK** LED lights steadily.

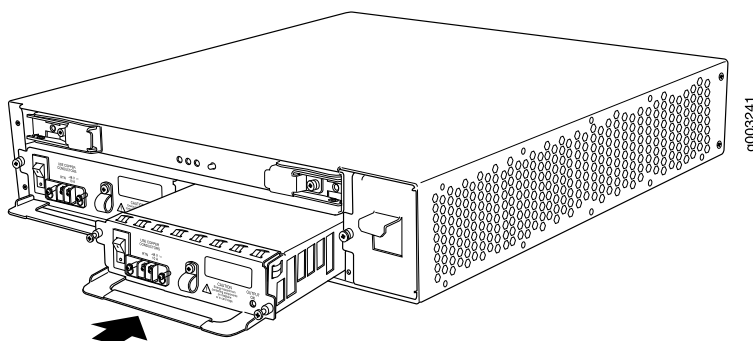


**NOTE:** After powering off a power supply, wait at least 60 seconds before turning it back on. After powering on a power supply, wait at least 60 seconds before turning it off.

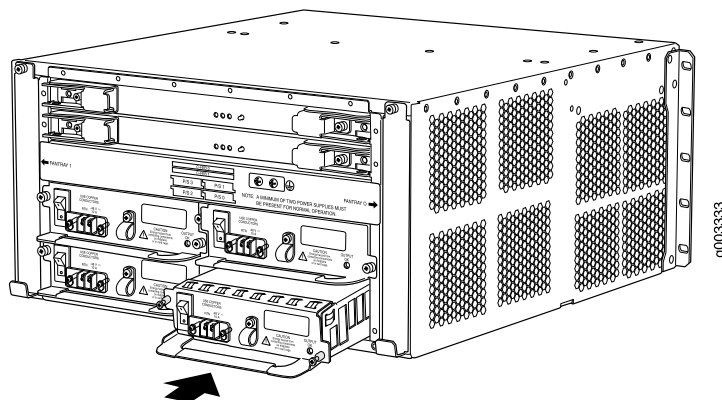
If the router is completely powered off when you power on the power supply, the Routing Engine boots as the power supply completes its startup sequence. If the Routing Engine finishes booting and you need to power off the router again, first issue the CLI `request system halt` command. For more information, see .

After a power supply is powered on, it can take up to 60 seconds for status indicators—such as LEDs on the power supply, `show chassis` commands, and messages on the craft interface LCD—to indicate that the power supply is functioning normally. Ignore error indicators that appear during the first 60 seconds.

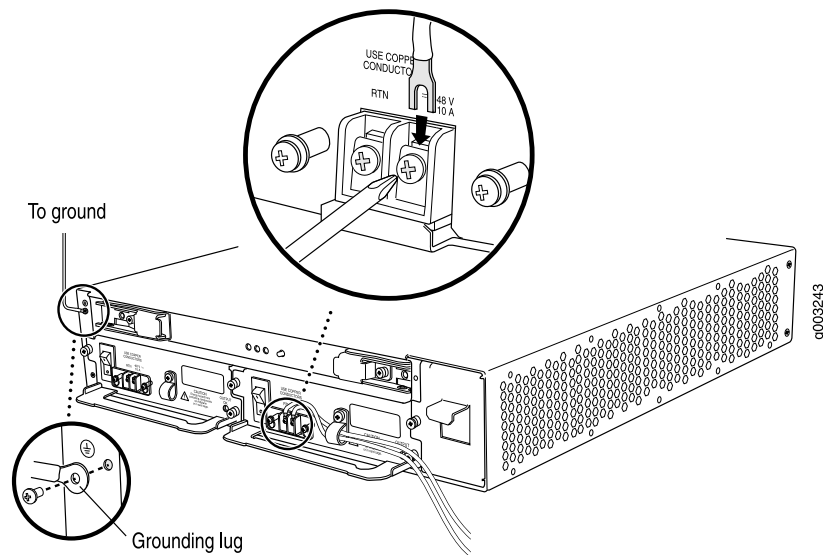
**Figure 9: Install a DC Power Supply in an M7i Router**



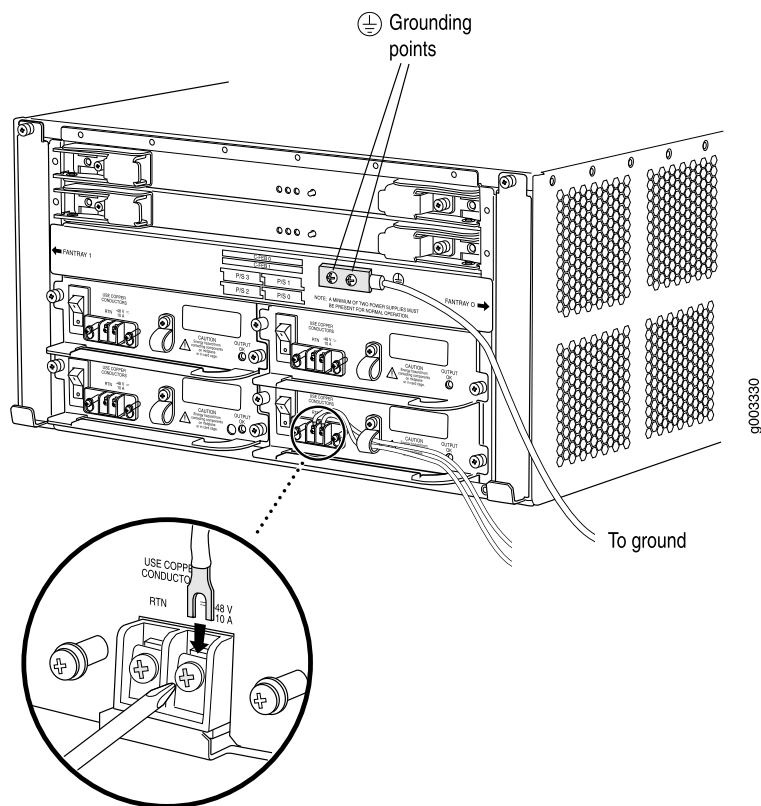
**Figure 10: Install a DC Power Supply in an M10i Router**



**Figure 11: Connect Power Cables to a DC Power Supply on an M7i Router**



**Figure 12: Connect Power Cables to a DC Power Supply on an M10i Router**



## List of Technical Publications

Table 4 on page 13 lists the software and hardware guides and release notes for Juniper Networks J-series, M-series, and T-series routing platforms and describes the contents of each document. Table 5 on page 16 lists the books included in the *Network Operations Guide* series.

**Table 4: Technical Documentation for Supported Routing Platforms**

| Book   | Description   |
|--|---|
| <b>JUNOS Internet Software for Supported Routing Platforms</b>       |   |
| <i>Class of Service</i>  | Provides an overview of the class-of-service (CoS) functions of the JUNOS software and describes how to configure CoS features, including configuring multiple forwarding classes for transmitting packets, defining which packets are placed into each output queue, scheduling the transmission service level for each queue, and managing congestion through the random early detection (RED) algorithm. |
| <i>CLI User Guide</i>  | Describes how to use the JUNOS command-line interface (CLI) to configure, monitor, and manage Juniper Networks routing platforms. This material was formerly covered in the <i>JUNOS System Basics Configuration Guide</i> .  |
| <i>Secure Configuration Guide for Common Criteria and JUNOS-FIPS</i> | Provides an overview of secure Common Criteria and JUNOS-FIPS protocols for the JUNOS Internet software and describes how to install and configure secure Common Criteria and JUNOS-FIPS on a routing platform.   |
| <i>Feature Guide</i>   | Provides a detailed explanation and configuration examples for several of the most complex features in the JUNOS software.  |
| <i>MPLS Applications</i>   | Provides an overview of traffic engineering concepts and describes how to configure traffic engineering protocols.  |
| <i>Multicast Protocols</i>   | Provides an overview of multicast concepts and describes how to configure multicast routing protocols.  |
| <i>Network Interfaces</i>  | Provides an overview of the network interface functions of the JUNOS software and describes how to configure the network interfaces on the routing platform.  |
| <i>Network Management</i>  | Provides an overview of network management concepts and describes how to configure various network management features, such as SNMP and accounting options.  |
| <i>Policy Framework</i>  | Provides an overview of policy concepts and describes how to configure routing policy, firewall filters, and forwarding options.  |
| <i>Routing Protocols</i>   | Provides an overview of routing concepts and describes how to configure routing, routing instances, and unicast routing protocols.  |
| <i>Services Interfaces</i>   | Provides an overview of the services interfaces functions of the JUNOS software and describes how to configure the services interfaces on the router.   |

**Table 4: Technical Documentation for Supported Routing Platforms** (*continued*)

| Book  | Description   |
|---|---|
| <i>Software Installation and Upgrade Guide</i>          | Provides a description of JUNOS software components and packaging, and includes detailed information about how to initially configure, reinstall, and upgrade the JUNOS system software. This material was formerly covered in the <i>JUNOS System Basics Configuration Guide</i> .   |
| <i>System Basics</i>                                    | Describes Juniper Networks routing platforms, and provides information about how to configure basic system parameters, supported protocols and software processes, authentication, and a variety of utilities for managing your router on the network.  |
| <i>VPNs</i>   | Provides an overview and describes how to configure Layer 2 and Layer 3 virtual private networks (VPNs), virtual private LAN service (VPLS), and Layer 2 circuits. Provides configuration examples.   |
| <b>JUNOS References</b>                                 |   |
| <i>Hierarchy and RFC Reference</i>                      | Describes the JUNOS configuration mode commands. Provides a hierarchy reference that displays each level of a configuration hierarchy, and includes all possible configuration statements that can be used at that level. This material was formerly covered in the <i>JUNOS System Basics Configuration Guide</i> .  |
| <i>Interfaces Command Reference</i>                     | Describes the JUNOS software operational mode commands you use to monitor and troubleshoot interfaces.  |
| <i>Routing Protocols and Policies Command Reference</i> | Describes the JUNOS software operational mode commands you use to monitor and troubleshoot routing policies and protocols, including firewall filters.  |
| <i>System Basics and Services Command Reference</i>     | Describes the JUNOS software operational mode commands you use to monitor and troubleshoot system basics, including commands for real-time monitoring and route (or path) tracing, system software management, and chassis management. Also describes commands for monitoring and troubleshooting services such as class of service (CoS), IP Security (IPSec), stateful firewalls, flow collection, and flow monitoring. |
| <i>System Log Messages Reference</i>                    | Describes how to access and interpret system log messages generated by JUNOS software modules and provides a reference page for each message.   |
| <b>J-Web User Guide</b>                                 |   |
| <i>J-Web Interface User Guide</i>                       | Describes how to use the J-Web graphical user interface (GUI) to configure, monitor, and manage Juniper Networks routing platforms.   |
| <b>JUNOS API and Scripting Documentation</b>            |   |
| <i>JUNOScript API Guide</i>                             | Describes how to use the JUNOScript application programming interface (API) to monitor and configure Juniper Networks routers.  |
| <i>JUNOScript API Configuration Reference</i>           | Provides reference pages for the configuration tag elements in the JUNOS XML API.   |

**Table 4: Technical Documentation for Supported Routing Platforms (continued)**

| Book   | Description   |
|--|---|
| <i>JUNOScript API Operational Reference</i>                | Provides reference pages for the operational tag elements in the JUNOS XML API.   |
| <i>NETCONF API Guide</i>                                   | Describes how to use the NETCONF API to monitor and configure Juniper Networks routing platforms.   |
| <i>JUNOS Configuration and Diagnostic Automation Guide</i> | Describes how to use the commit script and self-diagnosis features of the JUNOS software. This guide explains how to enforce custom configuration rules defined in scripts, how to use commit script macros to provide simplified aliases for frequently used configuration statements, and how to configure diagnostic event policies.                         |
| <b>JUNOS Comprehensive Index and Glossary</b>              |   |
| <i>JUNOS Comprehensive Index and Glossary</i>              | Provides a complete index of all JUNOS Internet software books, the <i>JUNOScript API Guide</i> , and the <i>NETCONF API Guide</i> . Also provides a comprehensive glossary.  |
| <b>Hardware Documentation</b>                              |   |
| <i>Hardware Guide</i>                                      | Describes how to install, maintain, and troubleshoot routing platforms and components. Each platform has its own hardware guide.  |
| <i>PIC Guide</i>   | Describes the routing platform's Physical Interface Cards (PICs). Each platform has its own PIC guide.  |
| <b>JUNOScope Documentation</b>                             |   |
| <i>JUNOScope Software User Guide</i>                       | Describes the JUNOScope software graphical user interface (GUI), how to install and administer the software, and how to use the software to manage router configuration files and monitor router operations.  |
| <b>J-series Services Router Documentation</b>              |   |
| <i>Getting Started Guide</i>                               | Provides an overview, basic instructions, and specifications for J-series Services Routers. The guide explains how to prepare your site for installation, unpack and install the router and its components, install licenses, and establish basic connectivity. Use the Getting Started Guide for your router model.  |
| <i>Basic LAN and WAN Access Configuration Guide</i>        | Explains how to configure the interfaces on J-series Services Routers for basic IP routing with standard routing protocols, ISDN backup, and digital subscriber line (DSL) connections.   |
| <i>Advanced WAN Access Configuration Guide</i>             | Explains how to configure J-series Services Routers in virtual private networks (VPNs) and multicast networks, configure data link switching (DLSw) services, and apply routing techniques such as policies, stateless and stateful firewall filters, IP Security (IPSec) tunnels, and class-of-service (CoS) classification for safer, more efficient routing. |
| <i>Administration Guide</i>                                | Shows how to manage users and operations, monitor network performance, upgrade software, and diagnose common problems on J-series Services Routers.   |

**Table 4: Technical Documentation for Supported Routing Platforms** (*continued*)

| Book  | Description   |
|---|---|
| <b>Release Notes</b>                          |   |
| <i>JUNOS Release Notes</i>                    | Summarize new features and known problems for a particular software release, provide corrections and updates to published JUNOS, JUNOScript, and NETCONF manuals, provide information that might have been omitted from the manuals, and describe upgrade and downgrade procedures. |
| <i>Hardware Release Notes</i>                 | Describe the available documentation for the routing platform and summarize known problems with the hardware and accompanying software. Each platform has its own release notes.  |
| <i>JUNOScope Release Notes</i>                | Contain corrections and updates to the published JUNOScope manual, provide information that might have been omitted from the manual, and describe upgrade and downgrade procedures.   |
| <i>J-series Services Router Release Notes</i> | Briefly describe Services Router features, identify known hardware problems, and provide upgrade and downgrade instructions   |

**Table 5: JUNOS Internet Software Network Operations Guides**

| Book                      | Description  |
|---------------------------|--|
| <i>Baseline</i>           | Describes the most basic tasks for running a network using Juniper Networks products. Tasks include upgrading and reinstalling JUNOS software, gathering basic system management information, verifying your network topology, and searching log messages.   |
| <i>Interfaces</i>         | Describes tasks for monitoring interfaces. Tasks include using loopback testing and locating alarms.   |
| <i>MPLS</i>               | Describes tasks for configuring, monitoring, and troubleshooting an example MPLS network. Tasks include verifying the correct configuration of the MPLS and RSVP protocols, displaying the status and statistics of MPLS running on all routers in the network, and using the layered MPLS troubleshooting model to investigate problems with an MPLS network. |
| <i>MPLS Log Reference</i> | Describes MPLS status and error messages that appear in the output of the show mpls lsp extensive command. The guide also describes how and when to configure Constrained Shortest Path First (CSPF) and RSVP trace options, and how to examine a CSPF or RSVP failure in a sample network.  |
| <i>Hardware</i>           | Describes tasks for monitoring M-series and T-series routing platforms.  |



## Requesting Support

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For technical support, open a support case with the Case Manager link at <http://www.juniper.net/support/> or call 1-888-314-JTAC (from the United States, Canada, or Mexico) or 1-408-745-9500 (from elsewhere).

## Revision History

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12 January 2007—530-018009-01 Revision 1. Corrected the input operating voltage range for DC power supplies to -40.5 through -72 VDC. Updated the torque specifications for securing the cable to a DC power supply. Added “A/B” feed redundancy note.

22 September 2003—530-009921-01 Revision 1.

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