



M160TM Internet Router

Quick Start

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This *Quick Start* contains information you need to install and configure the router quickly. For complete installation instructions, see the *M160 Internet Router Hardware Guide* at www.juniper.net/techpubs/hardware/.



WARNING: This *Quick Start* contains a summary of safety warnings on page 22. For a complete list of warnings for this router, including translations, see the *M160 Internet Router Hardware Guide* at www.juniper.net/techpubs/hardware/.

The M160 Internet router is a complete routing system that provides SONET/SDH, ATM, Ethernet, and channelized interfaces for large networks and network applications, such as those supported by Internet service providers (ISPs). The router accommodates up to eight Flexible PIC Concentrators (FPCs), which can each be configured with a variety of network media types, altogether providing up to 32 OC12/STM4, 32 OC48/STM16, or eight OC192/STM64 ports per system.

The router height of 35 in. (89 cm) enables stacked installation of two M160 systems in a single floor-to-ceiling rack, for increased port density per unit of floor space. The router's maximum aggregate throughput is 160 gigabits per second (Gbps) simplex or 80 Gbps full duplex. The router provides very high throughput for any combination of Physical Interface Cards (PICs) that does not exceed 3 Gbps on an FPC1 or 10 Gbps on an FPC2. A combination that exceeds this number is supported, but constitutes oversubscription.

The router is shipped in a wooden crate. A wooden pallet forms the base of the crate. The router chassis is bolted to this pallet. The shipping crate contains:

- One accessory box (the box to which this *Quick Start* is taped)
- One Juniper Networks M160 router
- One *Quick Start* (this document)

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Step 1: Preparing the Site

Rack-Mounting Requirements

- You can install the router in a four-post rack or cabinet or an open-frame rack.
- The rack rails must be spaced widely enough to accommodate the router chassis's external dimensions: 35.00 in. (89 cm) high, 29 in. (73.6 cm) deep, and 17.5 in. (44.5 cm) wide. The front support posts and center-mounting brackets extend the width to 19 in. (48.3 cm).
- The rack must be strong enough to support the weight of the fully configured router, up to about 360 lb (164 kg).
- For service personnel to remove and install hardware components, there must be adequate space at the front and back of the router. Allow at least 24 in. (61.0 cm) both in front of and behind the router.
- The rack or cabinet must have an adequate supply of cooling air.
- In a closed cabinet, there must be a minimum of 6 in. (15.2 cm) of unobstructed airflow behind the router, or airflow baffles must be installed to prevent recirculation of hot air and overheating.
- If the router is the only unit in the rack, mount it at the bottom of the rack.
- When mounting the router in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.

Tools Required

- A mechanical lift – recommended
- 9/16-in. open-end or socket wrench to remove bracket bolts from the shipping pallet
- 5/32-in. Allen wrench for tightening the mounting screws
- Phillips screwdriver, numbers 1 and 2
- Flat-blade screwdriver, approximately 1/4 in. (6 mm), for removing craft interface from front impeller if you installing the router without a lift
- Electrostatic discharge wrist strap
- Antistatic mat

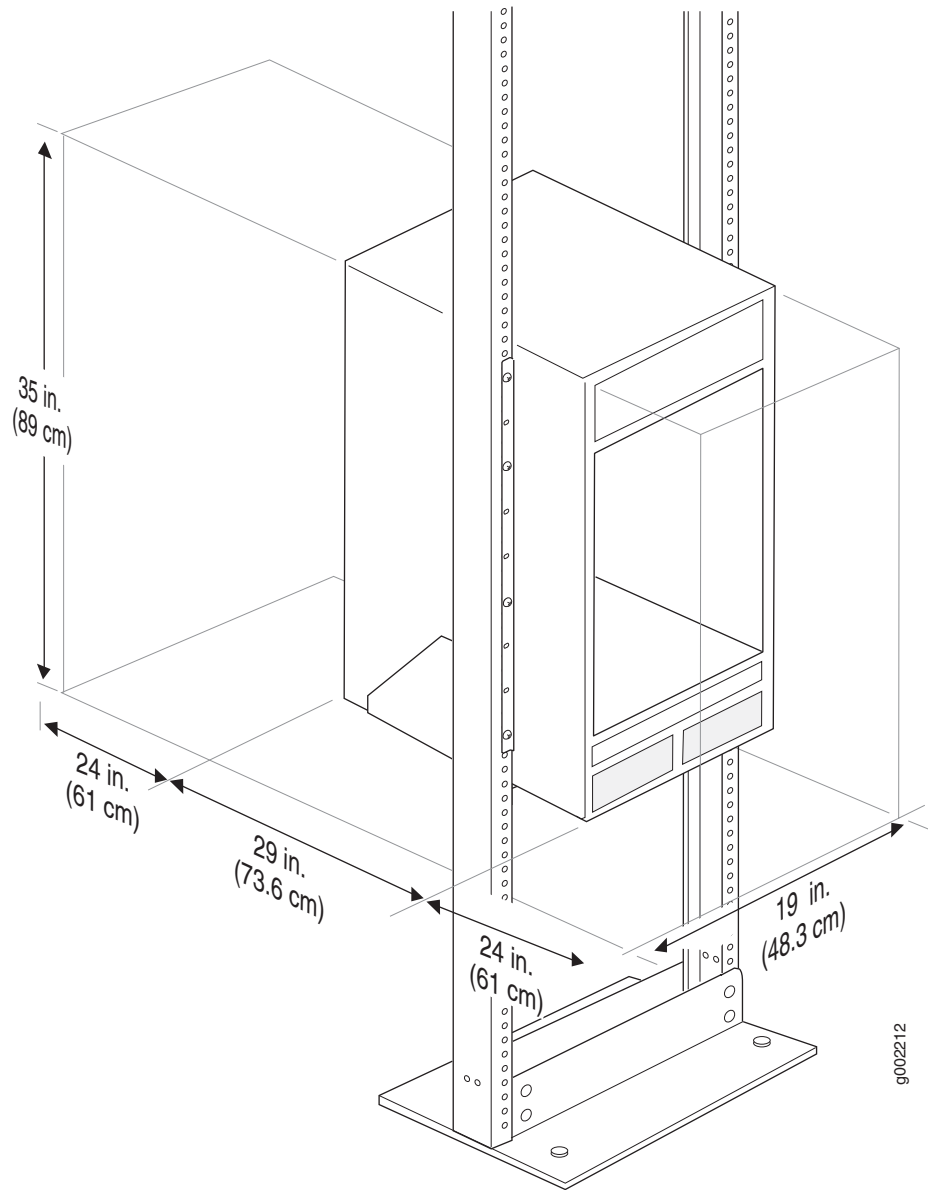


Figure 1: Rack Clearances and Router Dimensions

Step 2: Installing the Mounting Hardware

To install the mounting hardware in a four-post rack or cabinet or an open-frame rack, perform one of the following procedures:

- Installing the Mounting Hardware in a Four-Post Rack or Cabinet on page 6
- Installing the Mounting Hardware in an Open-Frame Rack on page 7

Installing the Mounting Hardware in a Four-Post Rack or Cabinet

Before you install the router, you must install the mounting shelf.

To install the large mounting shelf, follow this procedure:

1. On each front rack rail, install a cage nut 0.88 in. (2.2 mm) up from the bottom of a “U” division.
2. Partially insert a mounting screw into each hole with a cage nut.
3. Install the shelf on the front rack rails. Rest the bottom slot in each ear on one of the mounting screws.
4. Insert a cage nut behind each hole in the ears of the shelf.
5. Partially insert a mounting screw into the top hole in each ear of the shelf.
6. Tighten all the screws completely.

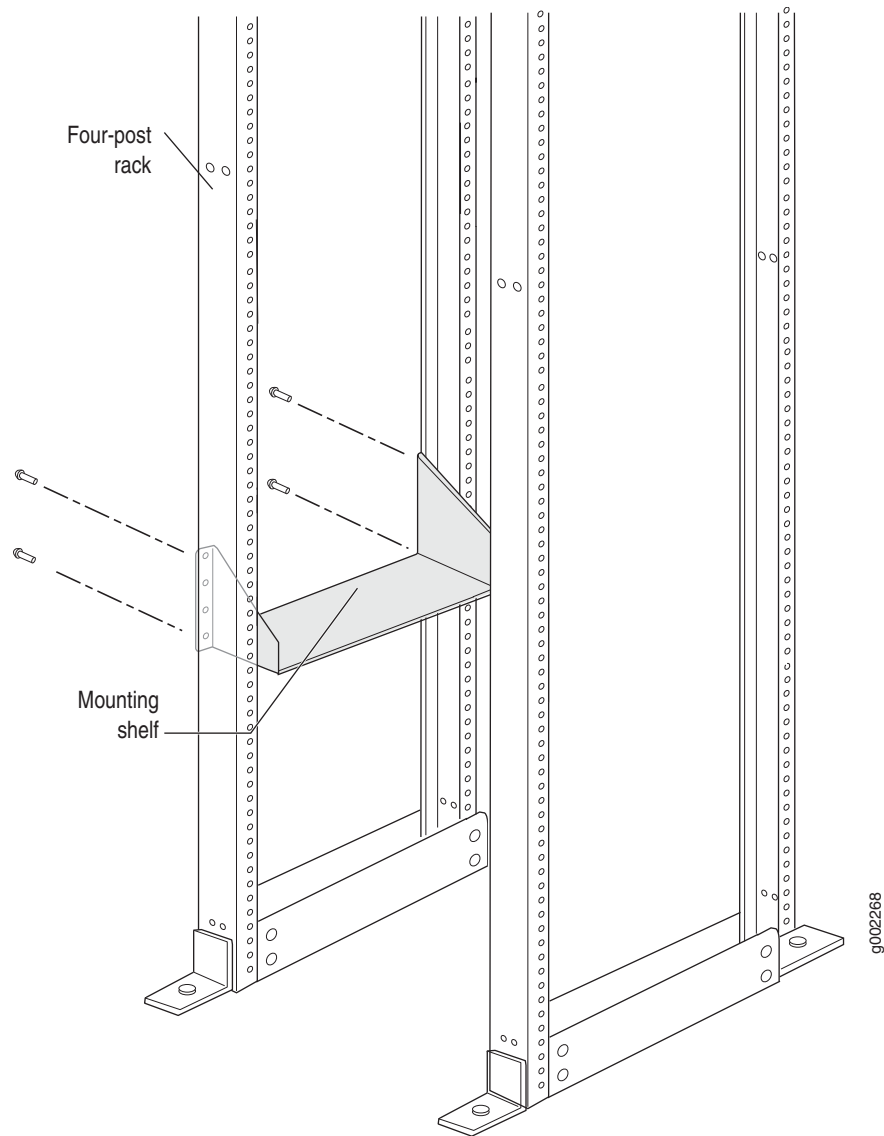


Figure 2: Mounting Hardware for a Four-Post Rack or Cabinet

Installing the Mounting Hardware in an Open-Frame Rack

Before you install the router, you must install the mounting shelf.

To install the mounting shelf, follow this procedure:

1. On the rear of each rack rail, partially insert a mounting screw 0.88 in. (2.2 mm) above the bottom of a “U” division.
2. Install the shelf on the rack. Rest the bottom slot in each ear on one of the installed mounting screws.

3. Partially insert screws into the open holes in the ears of the large shelf.
4. Tighten all the screws completely.

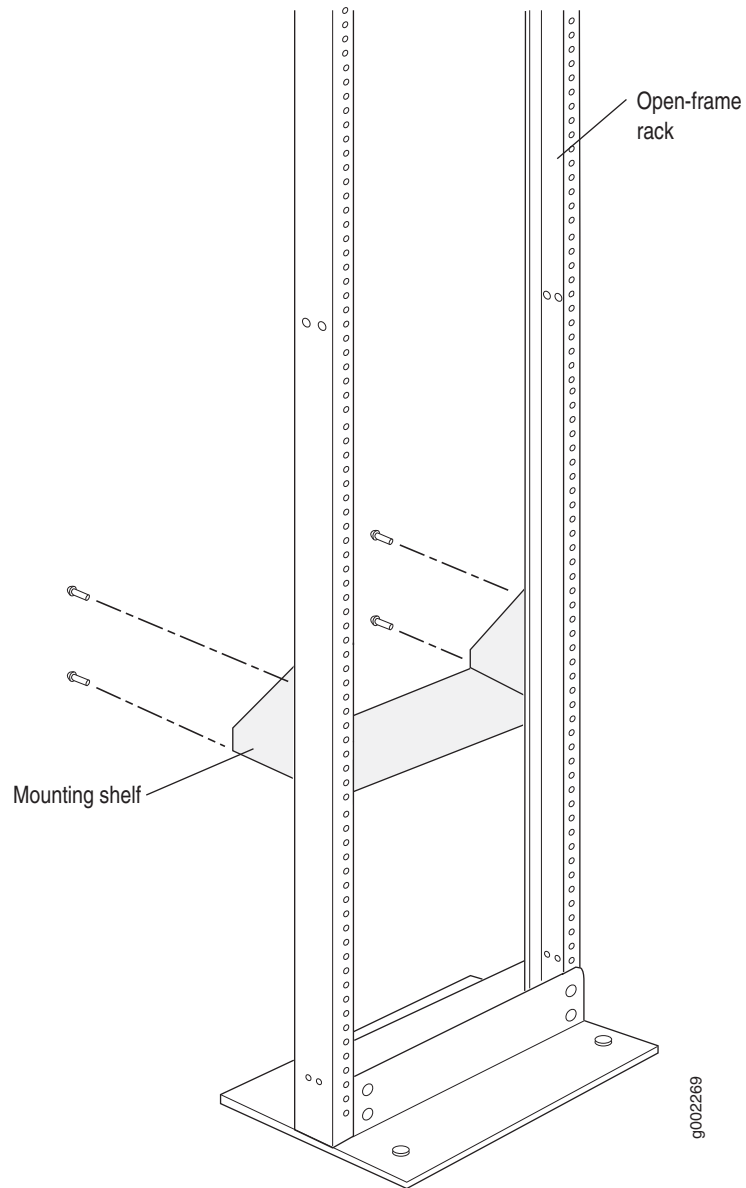


Figure 3: Mounting Hardware for an Open-Frame Rack

Step 3: Installing the Router

Because of the router's size and weight, we recommend you install the router using a mechanical lift. The procedure for installing the router depends on whether you use a mechanical lift:

- Installing the Router Using a Lift on page 9
- Installing the Router Without a Mechanical Lift on page 11

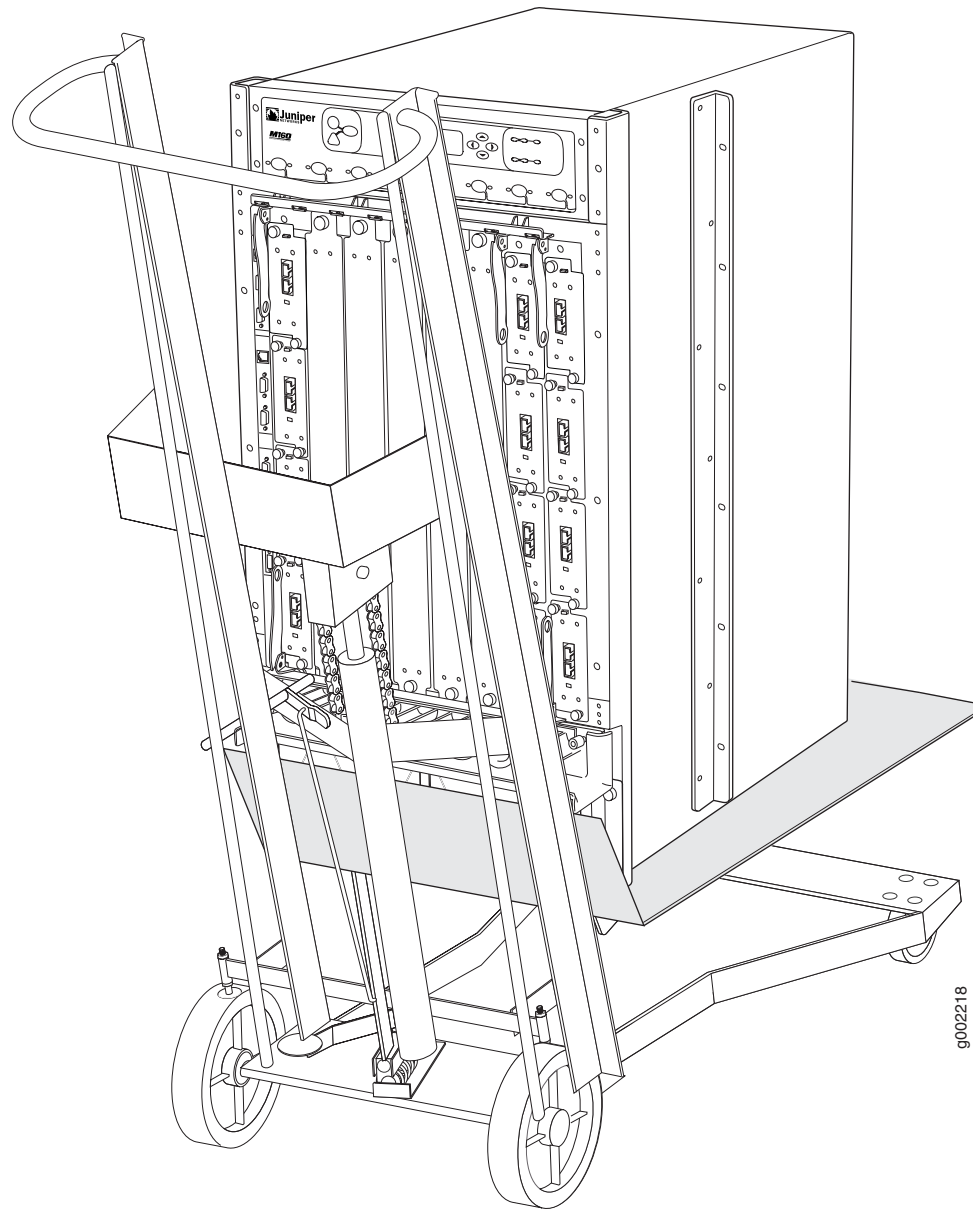
Installing the Router Using a Lift

1. Make sure the rack is properly secured to the building in its permanent location.
2. If you are front-mounting the router, remove the center-mounting ear from each side of the chassis.
3. Load the router onto the lift, making sure it rests securely on the lift platform.



CAUTION: Do not lift the router using the installation handle. Use these handles only to help position the router.

4. Using the lift, position the router in front of the rack or cabinet, centering it in front of the mounting shelf.
5. Slide the router onto the mounting shelf.
6. Align the bottom hole in both front support posts or center-mounting ears with a hole in each rack rail, making sure the chassis is level.
7. Install one of the mounting screws provided into each of the two aligned holes. Use a 5/32-in. Allen wrench to tighten the screws.
8. Moving up each post or ear, install a screw in every mounting hole.
9. Verify that all the mounting screws on one side of the rack are aligned with the mounting screws on the opposite side and that the router is level.
10. Proceed to “Step 4: Connecting External Devices and PIC Cables” on page 15.



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Figure 4: Loading the Router onto the Lift

Installing the Router Without a Mechanical Lift

To install the router without a mechanical lift, perform all of the following procedures:

- Removing Components on page 11
- Lifting the Router into the Rack on page 13
- Reinstalling Components on page 14

Removing Components

Before lifting the router, you must remove the following components:

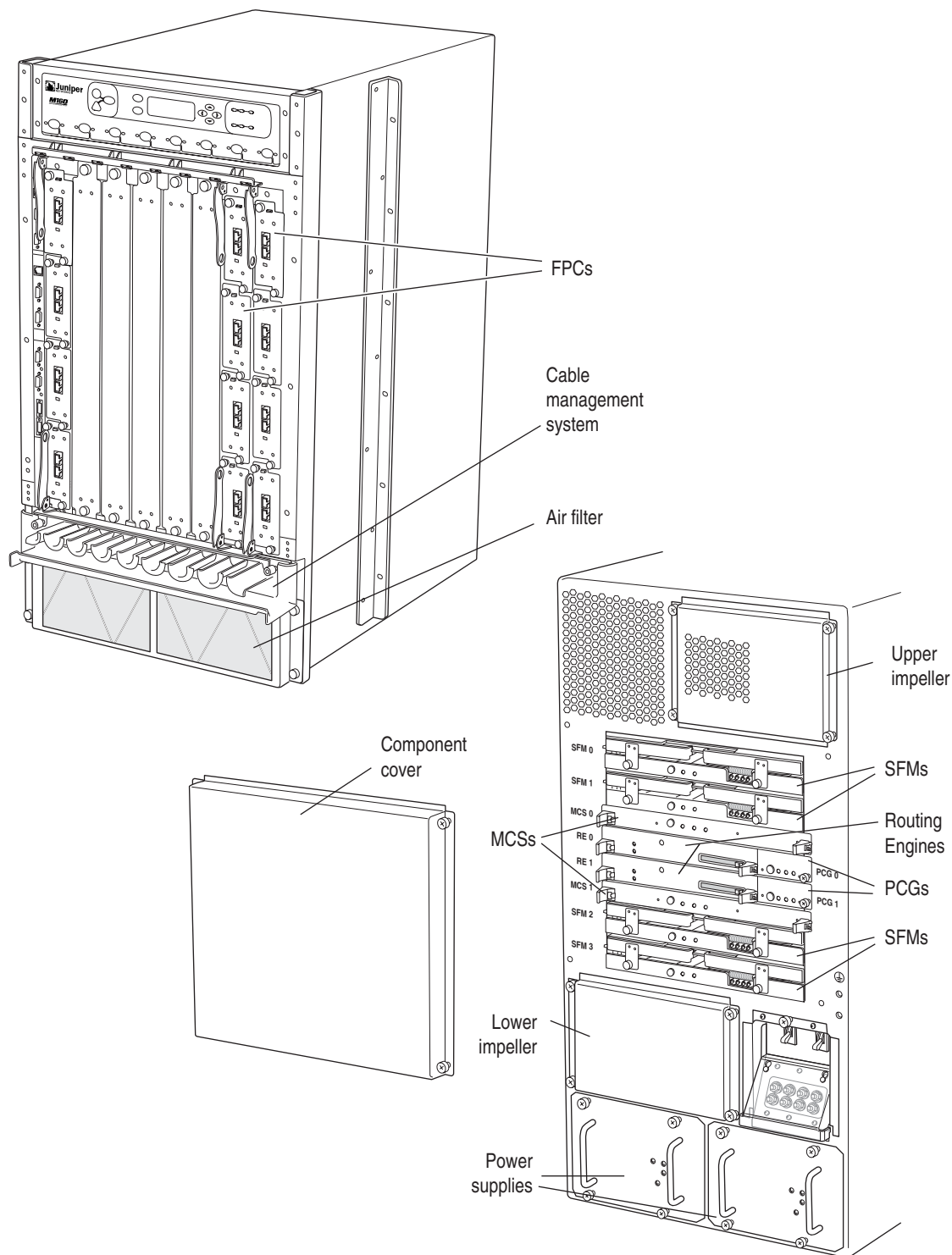
- Power supplies
- Rear component cover
- Rear upper impeller assembly
- Rear lower impeller assembly
- Craft interface and front impeller assembly
- Switching and Forwarding Modules (SFMs)
- Miscellaneous Control Subsystems (MCSs)
- Packet Forwarding Engine Clock Generators (PCGs)
- Routing Engines
- Fan trays
- Flexible PIC Concentrators (FPCs)

To remove the components from the router, perform the following procedure:

1. Slide each component out of the chassis evenly so that it does not become stuck or damaged.
2. Label each component as you remove it so you can reinstall it in the correct location.
3. Immediately store each removed component in an electrostatic bag.
4. Do not stack removed components. Lay each one on a flat surface.



For complete instructions on removing router components, see the chapter about installing the chassis manually in the *M160 Internet Router Hardware Guide*.



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Figure 5: Components to Remove from the Router

Lifting the Router into the Rack

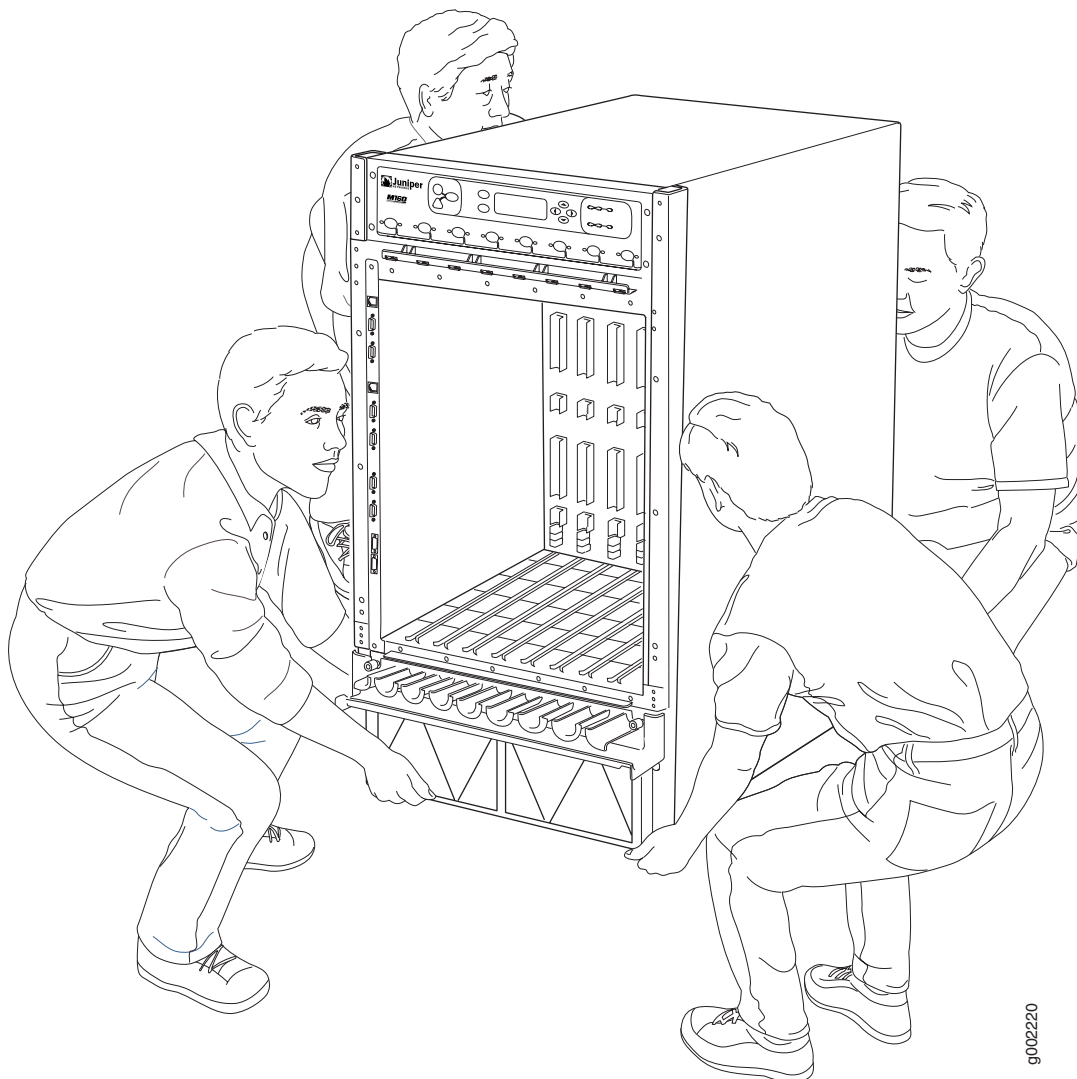
Lifting the chassis and mounting it into a rack requires three people to lift and a fourth person to secure the mounting screws. The empty chassis weighs over 115 lb (52 kg).

1. Make sure the rack is properly secured to the building in its permanent location.
2. If you are front-mounting the router, remove the center-mounting ear from each side of the chassis.
3. Attach the lifting handle to the rear of the chassis, screwing the thumbscrews at its corners into the holes located next to the SFM slots on the chassis.
 - If you are installing the chassis in a lower rack space, use the set of holes adjacent to the slots labeled SFM 0 and SFM 1.
 - If you are installing the chassis in an upper rack space, use the set of holes adjacent to the slot covers labeled Do not install an SFM in this slot.
4. Move the router as close as possible to the rack. Use a pallet jack if one is available.
5. Prepare to lift the router. One person stands behind the chassis and grasps the lifting handle, and one person stands on each side of the chassis. Each grasps the bar at the bottom of the FPC card cage with one hand and places the other hand under the chassis near the rear. Carefully lift the chassis onto the mounting shelf.



Do not lift the router using the installation handle or the handles on top of the chassis. Use these handles only to help position the router.

6. Align the bottom hole in both front support posts or center-mounting ears with a hole in each rack rail, making sure the chassis is level.
7. Install one of the mounting screws provided into each of the two aligned holes. Use a 5/32-in. Allen wrench to tighten the screws.
8. Moving up each post or ear, install a screw in every mounting hole.
9. Verify that all the mounting screws on one side of the rack are aligned with the mounting screws on the opposite side and that the router is level.



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Figure 6: Lifting the Router into the Rack

Reinstalling Components

1. Slide each component into the chassis evenly so that it does not become stuck or damaged.
2. Tighten the captive screws for each component. See the chapter about reinstalling components in the *M160 Internet Router Hardware Guide*.
3. Proceed to “Step 4: Connecting External Devices and PIC Cables” on page 15.

Step 4: Connecting External Devices and PIC Cables

To connect external devices and PIC cables, perform the following procedures:

- Connecting a Management Console on page 15
- Connecting to a Network for Out-of-band Management on page 15
- Connecting the PIC Cables on page 15

Connecting a Management Console

1. Turn off the power switch on the console.
2. Plug the female end of the RS-232 serial connector into the **CONSOLE** port on the Connector Interface Panel (CIP).
3. Tighten the screws on the connector. Attach the other end of the cable to the console or auxiliary device.

Connecting to a Network for Out-of-band Management

1. Plug one of the Ethernet cable connectors into the **ETHERNET** port on the CIP.
2. Plug the other end into the networking device.

Connecting the PIC Cables

1. Identify the appropriate cable to be connected to each PIC.



WARNING: Do not look directly into the PIC transceivers or into the ends of fiber-optic cables. Fiber-optic cables contain laser light sources that can damage your eyes.

2. Insert the appropriate cable connector into the PIC cable receptacle.
3. Drape the cable over the bobbins of the cable management system to protect them from bending past their recommended bend radius.



CAUTION: 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.

4. Insert the appropriate cable connector into the cable connector port on the FIC or PIC faceplate.



CAUTION: Avoid bending fiber-optic cable beyond its maximum bend radius. An arc smaller than a few inches in diameter can damage the cable and cause problems that are difficult to diagnose.



CAUTION: 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.

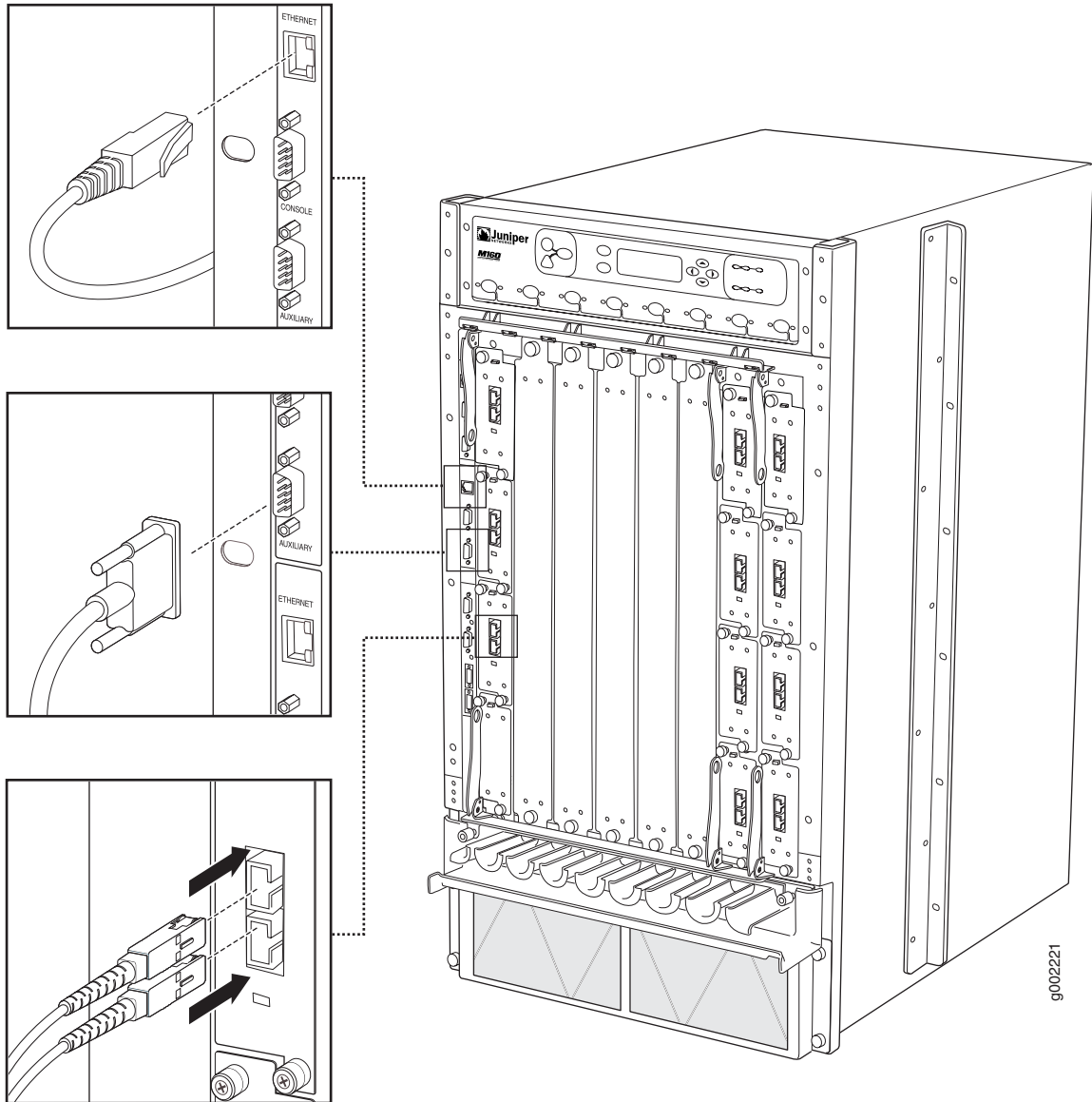


Figure 7: Connecting External Devices and PIC Cables

Step 6: Connecting Ground and Power Cables

Connect DC power to the router by attaching a grounding cable to the chassis grounding points and attaching power cables from external power sources to the terminal studs on the circuit breaker box. Power and grounding cables are not supplied with the router. For cable specifications, see the section on DC power specifications in the *M160 Internet Router Hardware Guide*.



NOTE: The router must be connected to at least two separate external DC power sources.



CAUTION: 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 the circuit breaker box. You must ensure that power connections maintain the proper polarity. The power source cables might be labeled (+) and (–) to indicate their polarity.

To connect DC power to the router, follow this procedure:

1. Verify that there is no power flowing from either 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. For each power supply, verify that the power switch on the circuit breaker box is in the **OFF (O)** position.
3. Verify that a licensed electrician has attached the cable lugs provided with the router to the grounding and power cables.
4. Connect the grounding cable to a proper earth ground for both external power sources, if it is not already attached.
5. Align the holes in the grounding cable lug over the chassis grounding points located on the right rear frame of the chassis. Place a washer over one hole and screw in a 1/4-20 UNC bolt. Repeat for the other hole in the lug. The washers and bolts are provided with the router.



NOTE: Do not substitute metric bolts such as M6 for the 1/4-20 UNC bolts that screw into the grounding points; bolts other than 1/4-20 UNC bolts can strip the threading in the grounding points.

6. Using a Phillips screwdriver, loosen and remove the screws securing the protective shield over the terminal studs on the circuit breaker box. Remove the cover.

7. Install one flat washer and nut (in that order) on each power terminal stud:
 - If no washers and nuts are already installed, they are in the accessory box.
 - If two pairs of nuts and washers are installed on the studs, use a 7/16-in. nut driver or wrench to loosen the outer nut on each stud. Remove the outer nuts and washers, leaving the inner nut and washer on each stud.



CAUTION: Do not substitute a metric nut driver or wrench. A tool that does not fit the nuts exactly can damage them. If a 7/16-in. tool is not available, use pliers or an adjustable wrench.



CAUTION: The inner washer and nut prevent direct contact between the power cable lug and the circuit breaker box, which can cause a short circuit.

8. Slide the power cable lugs onto the terminal studs:
 - Connect the positive (+) source cable lugs to the return terminals, which are labeled RTN(+).
 - Connect the negative (–) source cable lugs to the input terminals, which are labeled –48V.
9. Install another flat washer and nut (in that order) on each terminal stud to secure the power cable lug. Using a 7/16-in. nut driver or wrench, tighten the nuts.
10. Verify that the 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.
11. Replace the protective shield over the terminal studs and use a Phillips screwdriver to tighten the screws.

Step 7: Performing Initial Software Configuration

Turn the circuit breaker for each power supply to the on position (I) to boot the router. On AC devices, the **OUTPUT OK** LED on the power supply faceplate blinks, then lights steadily. On DC devices, the green **CB ON** LED lights steadily, the blue **OUTPUT OK** LED blinks for a short time, then lights steadily, and the amber **CB OFF** LED does not light.

1. Log in as the “root” user. There is no password.

2. Start the CLI.

```
root# cli
root@>
```

3. Enter configuration mode.

```
cli> configure
[edit]
root@#
```

4. Configure the name of the router. If the name includes spaces, enclose the name in quotation marks.

```
[edit]
root@# set system host-name host-name
```

5. Configure the router’s domain name.

```
[edit]
root@# set system domain-name domain-name
```

6. Configure the IP address and prefix length for the router’s Ethernet interface.

```
[edit]
root@# set interfaces fxp0 unit 0 family inet address address/prefix-length
```

7. Configure the IP address of a backup router, which is used only while the routing protocol is not running.

```
[edit]
root@# set system backup-router address
```

8. Configure the IP address of a DNS server.

```
[edit]
root@# set system name-server address
```

9. Set the root authentication password by entering a clear-text password, an encrypted password, or an ssh public key string (DSA or RSA).

```
[edit]
root@# set system root-authentication plain-text-password
New password: password
Retype new password: password
```

or

```
[edit]
root@# set system root-authentication encrypted-password encrypted-password
```

or

```
[edit]
root@# set system root-authentication ssh-dsa public-key
```

or

```
[edit]
root@# set system root-authentication ssh-rsa public-key
```

10. Optionally, display the configuration to verify that it is correct.

```
[edit]
root@# show
system {
    host-name host-name;
    domain-name domain-name;
    backup-router address;
    root-authentication {
        authentication-method (password | public-key);
    }
    name-server {
        address;
    }
}
interfaces {
    fxp0 {
        unit 0 {
            family inet {
                address address/prefix-length;
            }
        }
    }
}
}
```

11. Commit the configuration to activate it on the router.

```
[edit]
root@# commit
```

12. Optionally, configure additional properties by adding the necessary configuration statements. Then commit the changes to activate them on the router.

```
[edit]
root@host-name# commit
```

13. When you have finished configuring the router, exit configuration mode.

```
[edit]
root@host-name# exit
root@host-name>
```

The commands in Steps 4 through 11 connect the router to the network but do not enable it to forward traffic. For complete information about the commands to issue in Step 12, including examples, see the JUNOS Internet software configuration guides.

Safety Warnings



IMPORTANT: See installation instructions before connecting to the router. This is a summary of safety warnings. For a complete list of warnings for this router, including translations, see the *M160 Internet Router Hardware Guide* at www.juniper.net/techpubs/hardware/.

- The people installing or replacing the router must be trained and qualified.
- Perform only the procedures described in this *Quick Start* or the *M160 Internet Router Hardware Guide*. Other services must be performed by authorized service personnel only.
- Read the installation instructions before you connect the router to a power source.
- Before installing the router, read the guidelines in the section of the *M160 Internet Router Hardware Guide* describing router site preparation to make sure that the site meets power, environmental, and clearance requirements for the router.
- When installing the router, do not use a ramp inclined at more than 10 degrees.
- Manually installing the router requires three people to lift. Before lifting the chassis, remove components and attach the installation handle as described in the *M160 Internet Router Hardware Guide*. To prevent injury, keep your back straight and lift with your legs, not your back. Do not attempt to lift the chassis by the power supply handles or the handles on the top of the router.
- If the router is the only unit in the rack, mount it at the bottom of the rack.
- When mounting the router 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 or servicing the router in the rack.
- When removing or installing an electrical component, always place it component-side up on a flat antistatic surface or in an electrostatic bag.
- When you install the router, the ground connection must always be made first and disconnected last.
- Use copper conductors only.

- Wire the DC power supply using the appropriate lugs. When connecting power, the proper wiring sequence is ground to ground, + RTN to + RTN, then -48 V to -48 V. When disconnecting power, the proper wiring sequence is -48 V to -48 V, + RTN to + RTN, then ground to ground. Always connect the ground wire first and disconnect it last.
- Do not work on the system or connect or disconnect cables during electrical storms.
- 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 become welded to the terminals.
- Failure to observe these safety warnings can result in serious physical injury.

How to Request Support

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

If you are reporting a software problem, please issue the following command from the CLI before contacting support:

```
user @ host> request support information | save filename
```

For documentation issues, fill out the bug report form located at:
<http://www.juniper.net/techpubs/docbug/docbugreport.html>.

To provide a core file to Juniper Networks for analysis, **gzip** the file, rename the file to include your company name, copy it to **ftp.juniper.net:pub/incoming**, and then send the filename, along with software version information (the output of the **show version** command) and the configuration, to **support@juniper.net**.

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M160 Internet Router Quick Start

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YEAR 2000 NOTICE

Juniper Networks hardware and software products are Year 2000 compliant. The JUNOS software has no known time-related limitations through the year 2038. However, the NTP application is known to have some difficulty in the year 2036.