

ACX2000 Universal Access Routers

Quick Start

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Revision 01

This document describes how to install the Juniper Networks ACX2000 Universal Access Router.

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ACX2000 Quick Start Description

This Quick Start contains information you need to install and configure the router quickly. For complete installation instructions, see the *ACX2000 Universal Access Routers Hardware Guide* at <http://www.juniper.net/techpubs/>.



WARNING: This Quick Start contains a summary of safety warnings in “[Safety Warnings](#)” on page 18. For a complete list of warnings for this router, including translations, see the *ACX2000 Universal Access Routers Hardware Guide* at <http://www.juniper.net/techpubs/>.

The ACX2000 Universal Access Router is an Ethernet-optimized mobile backhaul router that provides both switching and carrier-class Ethernet routing. The ACX2000 router enables a wide range of business and residential applications and services, including microwave cell site aggregation, MSO mobile backhaul service cell site deployment, and service provider or operator cell site deployment. The ACX2000 router has high-density Ethernet interfaces and high-capacity switching throughput.

The ACX2000 router is a single-board router with a built-in Routing Engine and one Packet Forwarding Engine. The Packet Forwarding Engine has one “pseudo” Flexible PIC Concentrator (FPC 0). Because there is no switching fabric, the single Packet Forwarding Engine takes care of both ingress and egress packet forwarding.

The ACX2000 router is a compact gateway router that is one rack unit (U) tall. Several gateway routers can be stacked in a single floor-to-ceiling rack for increased port density per unit of floor space.

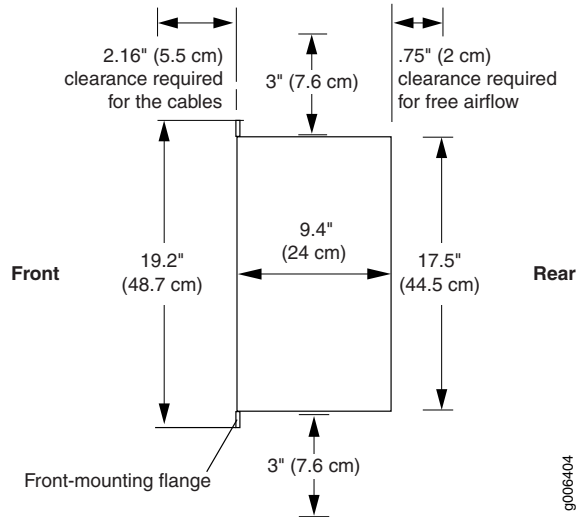
The ACX2000 router contains 16 T1 and E1 ports, 6 Gigabit Ethernet ports, and 2 PoE ports. The ACX2000 router also supports installation of two Gigabit Ethernet SFP transceivers and two 10-Gigabit Ethernet SFP+ transceivers.

Step 1: Prepare the Site for ACX2000 Installation

Prepare your site for ACX2000 installation by observing the following guidelines:

- You can install the gateway in a four-post rack or cabinet or an open-frame rack.
- The rack rails must be spaced widely enough to accommodate the chassis's external dimensions: 1.7 in. (4.4 cm) high, 9.4 in. (24 cm) deep, and 17.5 in. (44 cm) wide. The outer edges of the mounting brackets extend the width to 19.2 in. (48.7 cm).
- Two people are required to install the ACX2000 router. The rack must be strong enough to support the weight of the fully configured router, up to 7 lb (3.2 kg).
- For service personnel to remove and install hardware components, allow at least 2.16 in. (5.5 cm) in front of the router.
- The rack or cabinet must have an adequate supply of cooling air.
- Ensure that the cabinet allows the chassis hot exhaust air to exit from the cabinet without recirculating into the router.
- When deploying the router in environments where the router may operate between 131° F (55° C) and 149° F (65° C), allow a 1 rack unit (U) gap above and below the router.
- When installing the router in a cabinet, ensure that the bottom of the cabinet is closed and there is no opening.
- The router must be installed into a rack that is secured to the building structure.
- Mount the router at the bottom of the rack if it is the only unit in 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.
- Install the router only in restricted areas, such as dedicated equipment rooms and equipment closets, in accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code, ANSI/NFPA 70.

Figure 1: ACX2000 Rack Clearance and Chassis Dimensions



Step 2: Install the Router

- [Tools Required to Install the Router in a Rack on page 6](#)
- [Install the Mounting Brackets on page 6](#)
- [Install the ACX2000 Router in the Rack on page 7](#)

Tools Required to Install the Router in a Rack

To install the router in a rack, you need the following tools:

- Phillips (+) screwdriver, number 2
- ESD grounding wrist strap

Install the Mounting Brackets

Two mounting brackets for front or rear mounting ship with the router (see [Figure 2 on page 6](#) and [Figure 3 on page 6](#)).

Attach both mounting brackets to either the front or rear of the chassis:

1. Align the bracket with the two sets of mounting holes.
2. Insert the four screws at the top and bottom of the bracket and tighten each partially.
3. Tighten the four screws completely.
4. Repeat the procedure for the other bracket.

Figure 2: Install the Mounting Brackets to the Front of the ACX2000 Router

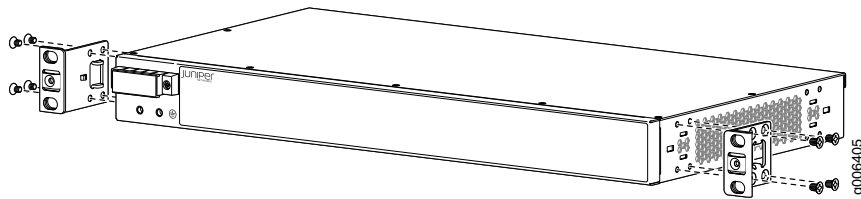
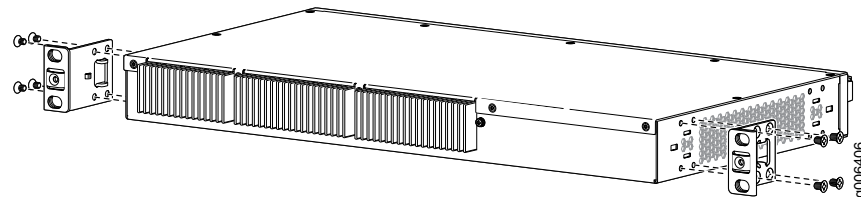


Figure 3: Install the Mounting Brackets to the Rear of the ACX2000 Router



Install the ACX2000 Router in the Rack

The router can be installed horizontally in a rack or cabinet.

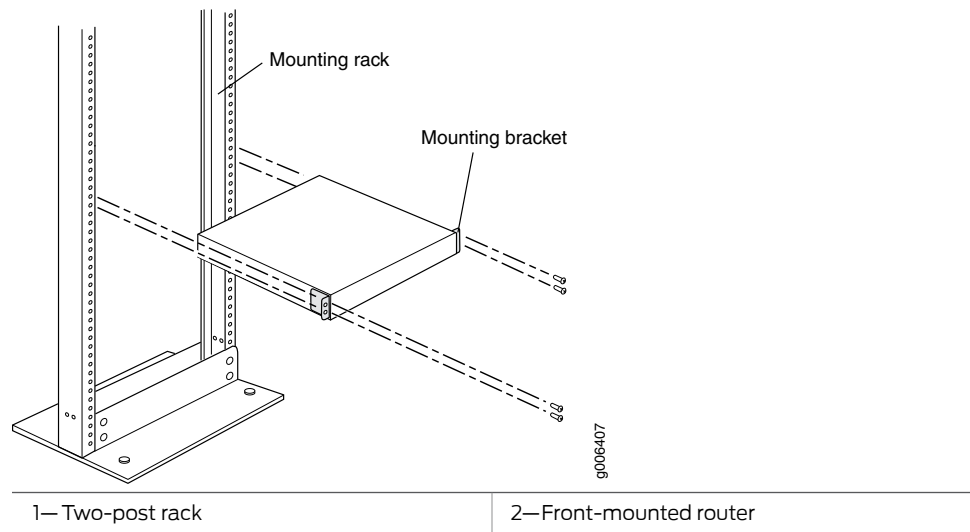


NOTE: For additional installation options, contact JTAC.

Two people are required to install the ACX2000 router. The chassis weighs approximately 7 lb (3.2 kg). To install the chassis (see [Figure 4 on page 7](#)):

1. Ensure that the rack is in its permanent location and is secured to the building. Ensure that the installation site allows adequate clearance for both airflow and maintenance.
2. Position the router in front of the rack or cabinet.
3. Have one person grasp both sides of the router, lift the router, and position it in the rack, aligning the mounting bracket holes with the threaded holes in the rack rails. Make sure the chassis is level.
4. Have the second person install a mounting screw into each of the open mounting holes aligned with the rack, starting from the bottom.
5. Visually inspect the alignment of the router. If the router is installed properly in the rack, all the mounting screws on one side of the rack should be aligned with the mounting screws on the opposite side and the router should be level.

Figure 4: Install the Front-Mounted Router in the Rack



Step 3: Ground the ACX2000 Router

You must ground the router before connecting power.

- [Tools Required to Ground the ACX2000 Router on page 8](#)
- [Connect the Grounding Cable on page 8](#)

Tools Required to Ground the ACX2000 Router

To ground the router, you need the following tools:

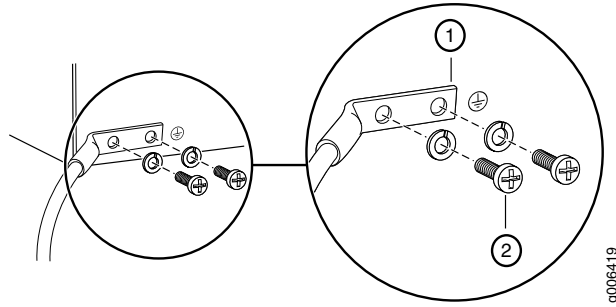
- Phillips (+) screwdriver, number 2
- ESD grounding wrist strap
- Two SAE 10-32 screws and flat washers (not provided)
- Grounding lug, Panduit LCD6-14BH-L or equivalent (not provided)
- Grounding cable, minimum 16 AWG (1.31 mm²) 90° C wire (not provided) for AC systems

Connect the Grounding Cable

You ground the router by connecting a grounding cable to earth ground and then attaching it to the chassis grounding points. To ground the router:

1. Verify that a licensed electrician has attached the cable lug provided with the router to the grounding cable.
2. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to an approved site ESD grounding point. See the instructions for your site.
3. Ensure that all grounding surfaces are clean and brought to a bright finish before grounding connections are made.
4. Connect the grounding cable to a proper earth ground.
5. Detach the ESD grounding strap from the site ESD grounding point.
6. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis.
7. Place the grounding cable lug over the grounding points on the front of the chassis (see [Figure 5 on page 9](#)).
8. Secure the grounding cable lug with the washers and screws. The holes are sized for SAE 10-32 screws.
9. Dress the grounding cable and verify that it does not touch or block access to router components, and that it does not drape where people could trip on it.

Figure 5: Grounding Points on the ACX2000 Router



1— Grounding lug

2— SAE 10-32 screw and washer

Step 4: Connect External Devices and Cables

Figure 6: Ethernet Cable Connector

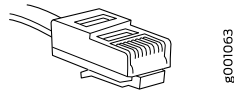
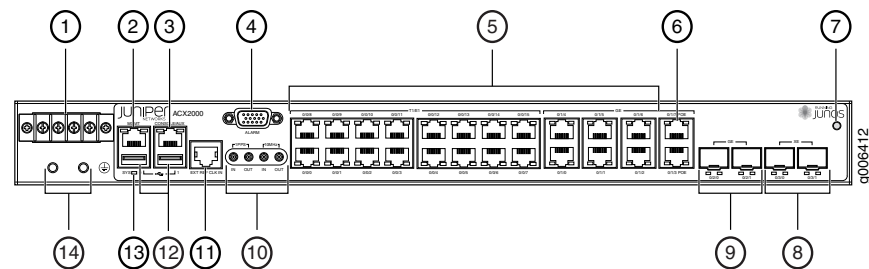


Figure 7: Front Panel of the ACX2000 Router



1—DC terminal	8—10-Gigabit Ethernet SFP+ ports
2—Management Ethernet port	9—Gigabit Ethernet SFP ports
3—Console or auxiliary port	10—External clocking ports
4—Alarm contact port	11—External clocking input port
5—T1/E1 and RJ45 Gigabit Ethernet network ports	12—USB ports
6—PoE Gigabit Ethernet ports	13—System LED
7—ESD point	14—Grounding terminal

- [Tools Required to Connect External Devices and Cables](#) on page 10
- [Connect the ACX2000 Router to a Network for Out-of-Band Management](#) on page 10
- [Connect the ACX2000 Gateway to a Management Console or Auxiliary Device](#) on page 11
- [Connect Network Interface Cables to the ACX2000 Router](#) on page 11

Tools Required to Connect External Devices and Cables

To connect external devices and cables to the router, you need the following tools:

- Ethernet cable with an RJ-45 connector attached (provided)
- RJ-45 to DB-9 serial port adapter (provided)
- Management host, such as a PC, with an Ethernet port (not provided)

Connect the ACX2000 Router to a Network for Out-of-Band Management

1. Turn off the power to the management device.
2. Plug one end of the Ethernet cable ([Figure 6 on page 10](#) shows the connector) into the **MGMT** port on the front of the chassis. [Figure 7 on page 10](#) shows the port.

3. Plug the other end of the cable into the network device.

Connect the ACX2000 Gateway to a Management Console or Auxiliary Device

1. Turn off the power to the console or auxiliary device.
2. Plug the RJ-45 end of the serial cable ([Figure 6 on page 10](#) shows the connector) into the **CONSOLE/AUX** port on the front panel. [Figure 7 on page 10](#) shows the ports.
3. Plug the female DB-9 end into the device's serial port.

Connect Network Interface Cables to the ACX2000 Router

1. Have ready a length of the type of cable used by the network ports. For cable specifications, see the [ACX2000 Universal Access Routers Hardware Guide](#).



NOTE: Shielded cables are required for outside deployment.

2. Remove the rubber safety plug from the cable connector port.



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



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.

3. Insert the cable connector into the cable connector port on the faceplate.
4. 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.



CAUTION: Avoid bending 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.



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.

Step 5: Connect Power to the ACX2000 Router



WARNING: You must ground the router before connecting the power cables.

- Tools Required to Connect Power to the ACX2000 Router on page 12
- Connect Power Cables on page 12

Tools Required to Connect Power to the ACX2000 Router

To connect power to the router, you need the following tools:

- Phillips (+) screwdriver, number 2
- ESD grounding wrist strap
- M3 screws and flat washers
- DC power source cables, minimum 14 AWG or as required by local code (not provided)
- Ring lugs, Molex 190700067 or equivalent, (not provided)

Connect Power Cables

The DC power supply has four terminals on the front panel, covered by a clear plastic cover.



WARNING: You must ground the router before connecting the DC power cables.

Table 1: ACX2000 DC Power System Input Voltage

Nominal Voltage	Specification
+24	Operating range: +18 to +30 VDC
-48	Operating range: -39 to -56 VDC
-60	Operating range: -39 to -72 VDC

1. Switch 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. Remove the clear plastic cover protecting the terminal on the faceplate.
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** DC 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. Remove the screws and flat washers from the terminals.
 5. Secure each power cable lug to the terminal with the flat washers and screw (see [Figure 8 on page 14](#)). Apply between 8 lb-in. (0.9 Nm) and 9 lb-in. (1.02 Nm) of torque to each screw. Do not overtighten the screw. (Use a number 2 Phillips screwdriver.)
 - a. Secure the positive (+) DC source power cable lug to the **RTN** (return) terminal.
 - b. Secure the negative (-) DC source power cable lug to the **-48V** (input) terminal.



CAUTION: Ensure that each power cable lug 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.



CAUTION: The maximum torque rating of the terminal screws on the DC power supply is 9 lb-in. (1.02 Nm). The terminal screws may be damaged if excessive torque is applied. Use only a torque-controlled driver to tighten screws on the DC power supply terminals. Use an appropriately-sized driver, with a maximum torque capacity of 9 lb-in. or less. Ensure that the driver is undamaged and properly calibrated and that you have been trained in its use. You may wish to use a driver that is designed to prevent overtorque when the preset torque level is achieved.

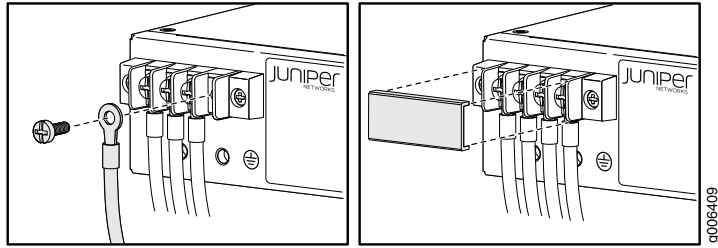
6. Replace the clear plastic cover over the terminals on the faceplate.
7. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to an approved site ESD grounding point. See the instructions for your site.
8. Connect each DC power cable to the appropriate external DC power source.



NOTE: For information about connecting to external DC power sources, see the instructions for your site.

9. Switch on the external circuit breakers to provide voltage to the DC power source cable leads. Observe the system LED on front of the router. If the DC power cable is correctly installed and functioning normally, the system LED lights green steadily. If the status LED indicates that the power supply is not functioning normally, repeat the installation and cabling procedures.

Figure 8: Connecting DC Power to the Router



Step 6: Perform Initial Software Configuration

This procedure connects the router to the network but does not enable it to forward traffic. For complete information about configuring the router to forward traffic, including examples, see the Junos OS configuration guides.

To configure the software:

- [Enter Configuration Mode on page 15](#)
- [Configure User Accounts and Passwords on page 15](#)
- [Configure System Attributes on page 16](#)
- [Commit the Configuration on page 16](#)

Enter Configuration Mode

1. Verify that the router is powered on.
2. Log in as the “root” user. There is no password.
3. Start the CLI.

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

4. Enter configuration mode.

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

Configure User Accounts and Passwords

For information about using an encrypted password or an SSH public key string (DSA or RSA), see *authentication*.

1. Add a password to the root administration user account. Enter a clear-text password.

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

2. Create a management console user account.

```
[edit]
root# set system login user user-name authentication plain-text-password
New Password: password
Retype new password: password
```

3. Set the user account class to **super-user**.

```
[edit]
root@# set system login user user-name class super-user
```

Configure System Attributes

1. 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
```

2. Configure the router's domain name.

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

3. 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
```

4. 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
```

5. Configure the IP address of a DNS server.

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

6. (Optional) Configure the static routes to remote subnets with access to the management port. Access to the management port is limited to the local subnet. To access the management port from a remote subnet, you need to add a static route to that subnet within the routing table. For more information about static routes, see the *Junos OS Administration Library for Routing Devices*.

```
[edit]
root@# set routing-options static route remote-subnet next-hop destination-IP retain
no-readvertise
```

7. Configure the telnet service at the [edit system services] hierarchy level.

```
[edit]
root@# set system services telnet
```

Commit the Configuration

1. (Optional) 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;  
        }  
      }  
    }  
  }  
}
```

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

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

3. (Optional) Configure additional properties by adding the necessary configuration statements. Then commit the changes to activate them on the router.

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

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

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

Safety Warnings



WARNING: See installation instructions before connecting the router. This is a summary of safety warnings. For a complete list of warnings for this router, including translations, see the *ACX2000 and ACX2100 Universal Access Routers Hardware Guide* at <http://www.juniper.net/techpubs/>.



WARNING: 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 or Type 4 ports as described in GR-1089-CORE, Issue 4) and require isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection to connect these interfaces metallically to OSP wiring.



CAUTION: Before removing or installing components of a router, attach an ESD strap to an ESD point, and place the other end of the strap around your bare wrist. Failure to use an ESD strap could result in damage to the router.

- Only trained and qualified personnel should install or replace the router.
- Perform only the procedures described in this quick start or the *ACX2000 and ACX2100 Universal Access Routers Hardware Guide*. Other services should 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 for site preparation in the *ACX2000 and ACX2100 Universal Access Routers Hardware Guide* 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 more than 10 degrees.
- To prevent injury, keep your back straight and lift with your legs, not your back.
- Mount the router at the bottom of the rack if it is the only unit in 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, always make the ground connection first and disconnect it last.
- Wire the DC power supply using the appropriate lugs. 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.
- The recommended maximum ambient temperature is 149°F (65°C). For safe operation take into consideration the internal temperature within the rack.
- Note the hot surface warning label on the top rear of the chassis.

Compliance Statements for NEBS

- The equipment is suitable for installation as part of the Common Bonding Network (CBN).
- The equipment is suitable for installation in locations where the National Electrical Code (NEC) applies.
- The battery return connection is to be treated as an isolated DC return (i.e., DC-I), as defined in GR-1089-CORE.

Compliance Statements for EMC Requirements for the ACX2000 Router

- [Canada on page 19](#)
- [European Community on page 19](#)
- [Declaration of Conformity on page 19](#)

Canada

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

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

European Community

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

Declaration of Conformity

This topic shows the Declaration of Conformity for the router.

Figure 9: ACX2000 Declaration of Conformity

JUNIPER
NETWORKS

Declaration of Conformity

CE

Juniper Networks, Inc.
1194 N. Mathilda Ave
Sunnyvale, CA 94089 USA

declares under our sole responsibility that the product:

ACX2000
Universal Access Router


is compliant with Directive 2002/95/EC (RoHS) Restriction on Hazardous Substances,
and is in conformity with the provisions of the following EC Directives, including all amendments,
and with national legislation implementing these directives:

Low Voltage Directive 2006/95/EC
EMC Directive 2004/108/EC

The following harmonized standards were applied:

EMC	EN 300 386 v1.5.1: 2010 EN 55022: 2006 + A1: 2007, Class A EN 55024: 1998 + A1:2001 + A2: 2003
Safety	EN 60950-1: 2006 + A1: 2010

This product carries the CE Mark, which was first affixed in 2011.

Place	Signature	Date
Sunnyvale, CA		5/18/2012

Michael J. Azar
Homologation Manager
1194 N. Mathilda Ave
Sunnyvale, CA 94089 USA

DoC: 11-0113

Junos OS Documentation and Release Notes

For a list of related Junos OS documentation, see <http://www.juniper.net/techpubs/software/junos/>.

If the information in the latest release notes differs from the information in the documentation, follow the *Junos OS Release Notes*.

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/>.

Requesting Technical Support

Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active J-Care or Partner Support Service support contract, or are covered under warranty, and need postsales 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/>
- 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, visit us at <http://www.juniper.net/support/requesting-support.html>

Revision History

June 2012—530-042107. Initial release.

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