



Preparing Your Site for Installation

This chapter contains important safety information you should know before working with the Cisco ASR 1000 Series Aggregation Services Routers and guides you through the process of preparing your site for router installation.

This chapter contains the following sections:

- [Prerequisites and Preparation](#) , on page 1
- [Safety Guidelines](#) , on page 2
- [Compliance Requirements](#), on page 3
- [Cautions and Regulatory Compliance Statements for NEBS](#) , on page 4
- [Standard Warning Statements](#), on page 4
- [Site Planning](#), on page 8
- [Preventing Electrostatic Discharge Damage](#), on page 18
- [Electrical Safety](#), on page 19
- [Receiving the Cisco ASR 1000 Series Router](#), on page 20
- [Chassis-Lifting Guidelines](#), on page 21
- [Tools and Equipment](#), on page 21
- [Checking the Shipping Container Contents](#), on page 22
- [Cisco ASR 1000 Series Router Installation Checklist](#), on page 23

Prerequisites and Preparation

Before you perform any of the procedures in this guide, we recommend that you:

- Read the safety guidelines in the next section and review the electrical safety and ESD-prevention guidelines in this guide.
- Ensure that you have all of the necessary tools and equipment (see [Tools and Equipment](#), on page 21).
- Have access to the *Cisco ASR 1000 Series Aggregation Services Routers Software Configuration Guide* (an online document that is available for viewing or download at Cisco.com) during the installation.
- The power and cabling requirements that must be in place at your installation site
- The equipment required to install the router
- The environmental conditions your installation site must meet to maintain normal operation

Before installing your Cisco ASR 1000 Series Aggregation Services Router, you must consider power and cabling requirements that must be in place at your installation site, special equipment for installing the router,

and the environmental conditions your installation site must meet to maintain normal operation. This chapter guides you through the process of preparing for router installation.

The shipping package for the router is engineered to reduce the chances of product damage associated with routine material handling experienced during shipment:

- Router should always be transported or stored in its shipping package in the upright position.
- Keep the router in the shipping container until you have determined the installation site.



Note Inspect all items for shipping damage. If an item appears damaged, contact a Cisco customer service representative immediately.

Safety Guidelines

Before you begin the installation or replacement procedure, review the safety guidelines in this section to avoid injuring yourself or damaging the equipment.



Note This section contains guidelines and do not include every potentially hazardous situation. When you install a router, always use common sense and caution.

Safety Warnings

Safety warnings appear throughout this publication in procedures that, if performed incorrectly, might harm you. A warning symbol precedes each warning statement.

Before you install, configure, or perform maintenance on the router, review the documentation for the procedure you are about to perform, paying special attention to the safety warnings. If you need translations of the safety warnings.



Note Do not unpack the system until you are ready to install it. Keep the chassis in the shipping container to prevent accidental damage until you determined an installation site. Use the appropriate unpacking documentation included with the system.

Read the installation instructions in this document before you connect the system to its power source. Failure to read and follow these guidelines could lead to an unsuccessful installation and possibly damage to the system and components.

Safety Recommendations

The following guidelines will help to ensure your own safety and protect your Cisco equipment. This list does not cover all potentially hazardous situations, so *be alert*.

- Cisco safety policy is that all of its routers must conform to the requirements of IEC 60950, with appropriate national deviations, as a minimum. In addition, Cisco routers must also meet the requirements of any other normative documents (for example, standards, technical specifications, laws or regulations).
- Review the safety warnings listed in the *Regulatory Compliance and Safety Information for the Cisco ASR 1000 Series Aggregation Services Routers* that accompanied your Cisco ASR 1000 Series Router, before installing, configuring, or maintaining the router.
- Never attempt to lift an object that might be too heavy for you to lift by yourself.
- Always turn all power supplies off and unplug all power cables before opening the chassis.
- Always unplug the power cable before installing or removing a chassis.
- Keep the chassis area clear and dust free during and after installation.
- Keep tools and chassis components away from walk areas.
- Do not wear loose clothing, jewelry (including rings and chains), or other items that could get caught in the chassis. Fasten your tie or scarf and sleeves.
- The Cisco ASR 1000 Series Routers operate safely when it is used in accordance with its marked electrical ratings and product usage instructions.

Compliance Requirements

This section includes Safety Compliance and Network Equipment Building Systems (NEBS) standards. The Cisco ASR 1000 Series Routers are in compliance with national and international standards as described in the following table.

You must observe the following safety guidelines when working with any equipment that connects to electrical power or telephone wiring. These guidelines help you avoid injuring yourself or damaging the devices.

Table 1: Compliance Requirements

Safety Compliance and NEBS Requirements	
Specification	Description
Safety	Caution To comply with Class A emissions requirements, shielded-twisted pair T1/E1 cables must be used with the 8-port channelized T1/E1 SPA interface in any Cisco ASR 1000 chassis.
Telcordia NEBS GR-1089-Core Statement	Caution To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, for Ethernet RJ-45 ports, use only shielded Ethernet cables that are grounded on both ends. In a NEBS installation, all Ethernet ports are limited to intrabuilding wiring.
	GR-1089
	GR-63

Cautions and Regulatory Compliance Statements for NEBS

The following table lists cautions, regulatory compliance statements, and requirements for the Network Equipment-Building System (NEBS) certification from the Telcordia Electromagnetic Compatibility and Electrical Safety – Generic Criteria for Network Telecommunications Equipment (A Module of LSSGR, FR-64; TSGR, FR-440; and NEBSFR, FR-2063) Telcordia Technologies Generic Requirements, GR-1089-CORE.

Attach an ESD-preventive wrist strap to your wrist and to a bare metal surface.



Caution To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, for Ethernet RJ-45 ports, use only shielded Ethernet cables that are grounded on both ends. In a NEBS installation, all Ethernet ports are limited to intrabuilding wiring.



Caution The intrabuilding ports of the equipment or subassembly is only suitable for connection to intrabuilding or unexposed wiring or cabling. The intrabuilding ports of the equipment or subassembly **MUST NOT** be metalically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use only as intrabuilding interfaces (Type 2 or Type 4 ports as described in GR-1089-CORE), and require isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection in order to connect these interfaces metalically to OSP wiring.

Products that have an AC power connection are intended for deployments where an external surge protective device (SPD) is used at the AC power service equipment as defined by the National Electric Code (NEC).

This product is designed for a common bonding network (CBN) installation.

This product can be installed in a network telecommunication facility or location where the NEC applies.

An electrical conducting path shall exist between the product chassis and the metal surface of the enclosure or rack in which it is mounted or to a grounding conductor. Electrical continuity shall be provided by using thread-forming type mounting screws that remove any paint or nonconductive coatings and establish a metal-to-metal contact. Any paint or other nonconductive coatings shall be removed on the surfaces between the mounting hardware and the enclosure or rack. The surfaces shall be cleaned and an antioxidant applied before installation.

The grounding architecture of this product is DC-isolated (DC-I).

DC-powered products have a nominal operating DC voltage of 48 VDC. Minimal steady state DC operating voltage is 40.5 VDC. Reference American National Standards Institute (ANSI) T1.315, Table 1.

Standard Warning Statements

This section describes the warning definition and then lists core safety warnings grouped by topic.



Warning

This warning 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. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device.

Note: SAVE THESE INSTRUCTIONS Statement 1071

General Safety Warnings



Warning

Read the installation instructions before you connect the system to its power source. Statement 1004



Warning

Ultimate disposal of this product should be handled according to all national laws and regulations. Statement 1040



Warning

No user-serviceable parts inside Do not open. Statement 1040



Warning

Installation of the equipment must comply with local and national electrical codes. Statement 1074



Warning

To comply with the Class A emissions requirements shielded twisted pair T1/E1 cables must be used for SPA-8-Port Channelized T1/E1 SPA (SPA-8XCHT1/E1) on the Cisco ASR 1006, ASR 1004, and ASR 1002. EN55022/CISPR22 Statement



Warning

To comply with Class A emissions requirements- shielded management Ethernet, CON, and AUX cables on the Cisco ASR 1002 Router must be used.



Warning

Power cable and AC adapter - When installing the product, please use the provided or designated connection cables/power cables/AC adaptors. Using any other cables or adapters could cause a malfunction or a fire. Electrical Appliance and Material Safety Law prohibits the use of certified cables (that have the 'UL' shown on the code) for any other electrical devices than products designated by Cisco. The use of cables that are certified by Electrical Appliance and Material Safety Law (that have 'PSE' shown on the code) is not limited to Cisco-designated products. Statement 371



Warning Only trained and qualified personnel should be allowed to install or replace this equipment. Statement 1030



Warning This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: AC power supplies for the Cisco ASR 1004 Router, Cisco ASR 1006 Router, and Cisco ASR 1002 Router: 120 VAC, 20A U.S. maximum. DC power supplies for the Cisco ASR 1004 Router: 40A U.S. maximum. DC power supplies for the Cisco ASR 1006 Router: 50A U.S. maximum. DC power supplies for the ASR 1002 Router: 30A U.S. maximum. Statement 1005



Warning This product requires short-circuit (overcurrent) protection to be provided as part of the building installation. Install only in accordance with national and local wiring regulations. Statement 1045



Warning This unit may have more than one power supply connection. All connections must be removed to de-energize the unit. Statement 1028



Warning This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security. Statement 1017



Warning The plug-socket combination must be accessible at all times, because it serves as the main disconnecting device. Statement 1019



Warning Hazardous voltage or energy may be present on the DC power terminals. Always replace cover when terminals are not in service. Be sure uninsulated conductors are not accessible when cover is in place. Statement 1075



Warning Use copper conductors only. Statement 1025



Warning This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024



Warning Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing. Statement 1034



Warning Class 1 laser product. Statement 1008



Warning Class 1 LED product. Statement 1027



Warning Laser radiation is present when the system is open. Statement 1009



Warning Do not stare into the laser beam. Statement 1010



Warning Class I(CDRH) and Class 1M (IEC) laser products. Statement 1055



Warning Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard. Statement 1056



Warning There is the danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions. Statement 1015



Warning Do not touch or bridge the metal contacts on the battery. Unintentional discharge of the batteries can cause serious burns. Statement 341



Warning To prevent personal injury or damage to the chassis, never attempt to lift or tilt the chassis using the handles on modules (such as power supplies, fans, or cards); these types of handles are not designed to support the weight of the unit. Statement 1032



Warning To prevent the system from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of: 40 degrees C. Statement 1047

**Warning**

This equipment must be externally grounded using a customer-supplied ground wire before power is applied. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 366

**Warning**

Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place. Statement 1029

Site Planning

This section contains site planning information, and will help you plan for the installation of the Cisco ASR 1000 Series Routers.

General Precautions

Observe the following general precautions when using and working with your Cisco ASR 1000 Series Routers.

- Keep your system components away from radiators and heat sources and do not block cooling vents.
- Do not spill food or liquids on your system components and never operate the product in a wet environment.
- Do not push any objects into the openings of your system components. Doing so can cause fire or electric shock by shorting out interior components.
- Position system cables and power supply cables carefully. Route system cables and the power supply cable and plug so that they cannot be stepped on or tripped over. Be sure that nothing else rests on your system component cables or power cable.
- Do not modify power cables or plugs. Consult a licensed electrician or your power company for site modifications. Always follow your local and national wiring rules.
- If you turn off your system, wait at least 30 seconds before turning it on again to avoid system component damage.

Site Selection Guidelines

The Cisco ASR 1000 Series Routers require specific environmental operating conditions. Temperature, humidity, altitude, and vibration can affect the performance and reliability of the router. The following sections provide specific information to help you plan for the proper operating environment.

The Cisco ASR 1000 Series Routers are designed to meet the industry EMC, safety, and environmental standards described in the *Regulatory Compliance and Safety Information for the Cisco ASR 1000 Series Aggregation Services Routers* document.

Site Environmental Requirements

Environmental monitoring in the Cisco ASR 1000 Series router protects the system and components from damage caused by excessive voltage and temperature conditions. To ensure normal operation and avoid

unnecessary maintenance, plan and prepare your site configuration *before* installation. After installation, make sure the site maintains the environmental characteristics as shown in the following table.

Table 2: Cisco ASR 1000 Series Router Environmental Tolerances

Environmental Characteristic	Minimum	Maximum
Steady State Operating	0 degree C	50 degree C (50 degrees C at 10,000 feet)
Storage	-20 degrees C	+70 degrees C
Humidity operating (noncondensing)	10%	90%
Humidity nonoperating (noncondensing)	5%	95%
Altitude operating: over allowable temperature range (0 to 50 degrees C)	-500 feet	10,000 feet
Altitude, nonoperating: over allowable temperature range	-1000 feet	50,000 feet
Thermal shock non-operating with change over time of 3 minute	-25 degrees C	+70 degrees C
Thermal Shock - Operating at 2.5 degree C per minute	0 degrees C	+50 degrees C

Physical Characteristics

Be familiar with the physical characteristics of the Cisco ASR 1000 Series Router to assist you in placing the system at the proper location.

For information regarding rack widths supported for ASR 1000 Routers, see the following sections:

19 in.— [General Rack Selection Guidelines, on page 16](#)

23 in.— [Guidelines for 23 in. \(Telco\) Racks, on page 17](#)

The following table shows the weight and dimensions of the Cisco ASR 1000 Series Routers.

Table 3: Physical Characteristics of Cisco ASR 1000 Series Routers

Characteristic	Cisco ASR 1001	Cisco ASR 1002, 1002-F, and 1002-X ¹	Cisco ASR 1004	Cisco ASR 1006	Cisco ASR 1013
Height	1.71 in. (43.43 mm) —1RU; rack-mount per EIA RS-310	3.47 in. (88.13 mm) —2RU; rack-mount per EIA RS-310	6.95 in. (176.53 mm)—4RU; rack-mount per EIA RS-310	10.47 in. (265.43 mm)—6RU; rack-mount per EIA RS-310	22.75 in. (57.8 cm)—13 RU
Width	17.3 in. (439.42 mm)	17.25 in. (438.15 mm)	17.25 in. (438.15 mm)	17.25 in. (438.15 mm)	17.25 in. (438.15 mm)

Characteristic	Cisco ASR 1001	Cisco ASR 1002, 1002-F, and 1002-X ¹	Cisco ASR 1004	Cisco ASR 1006	Cisco ASR 1013
Depth	22.50 in. (571.5 mm) Depth includes cable-management brackets; card and power-supply handles for mounting in a 600mm-enclosed cabinet.	20.75 in. (527.05 mm) Depth includes cable-management brackets; card and power-supply handles for mounting in a 600mm-enclosed cabinet "hardware-platform = Comment">.	22.50 in. (571.5 mm) Depth includes cable-management brackets; card and power-supply handles for mounting in a 600mm-enclosed cabinet.	22.50 in. (571.5 mm) Depth includes cable-management brackets; card and power-supply handles for mounting in a 600mm-enclosed cabinet.	22.60 in. (600.2 mm) Depth includes cable-management brackets; card and power-supply handles for mounting in a 600mm-enclosed cabinet "hardware-platform = Comment">.
Weight	<ul style="list-style-type: none"> • 23.30 lb (10.6 kg) (with dual AC power and integrated daughter card) • 22.70 lb (10.3 kg) (with dual DC power and integrated daughter card) • 25 lb (11.35 kg) fully loaded 	<ul style="list-style-type: none"> • 40 lb (18.143 kg) for a fully loaded Cisco ASR 1002 Router or Cisco ASR 1002-F Router • 43.35 lb (19.662 kg) for a fully loaded Cisco ASR 1002-X Router 	50 lb (22.679 kg) fully loaded	75 lb (34.019 kg) fully loaded	<ul style="list-style-type: none"> • Loaded with AC power supply — 184 lb (83.46 kg) • Loaded with DC power supply — 190.6 lb (86.45 kg) • Total weight with superslots — 202 lb (91.62 kg) with AC and 208.60 lb (94.61 kg) with DC

¹ Unless otherwise noted, the physical characteristics for the Cisco ASR 1002-F Router and Cisco ASR 1002-X Router remain the same as those for the Cisco ASR 1002 Router.

The following list describes additional Cisco ASR 1000 Series chassis characteristics:

- Cisco ASR 1001 Router:
 - Chassis height meets EIA-310 rack spacing 1RU (1.71 in./43.43 mm), universal rack-mount
 - Chassis width meets EIA-310 19-in. (17.3 in./439.42 mm) wide with rack brackets
 - Cable-management brackets allow a bend radius of 1.5 in. (38.1 mm) for cables
 - Ships with forward rack-mount brackets installed and an extra set included in the accessory kit
- Cisco ASR 1002 Router and Cisco ASR 1002-X Router:
 - Chassis height meets EIA-310 rack spacing 2RU (3.47 in./ 88.138 mm), universal rack-mount
 - Chassis width meets EIA-310 19-in. (17.25 in./438.15 mm) wide with rack brackets

- Cable-management brackets at the Cisco ASR 1002 Router location can hold 16 ports of STP/UTP RJ 45 cables
 - Cable-management brackets allow a bend radius of 1.5 in. (38.1 mm) for cables
 - Adjustable rack-mount brackets allow for a front to rear rail variance distance of 15.50 in./394 mm to 19.00 in./482.6 mm
- Cisco ASR 1004 Router:
 - Chassis height meets EIA-310 rack spacing 4RU (6.95 in./176.53 mm), universal rack-mount
 - Chassis width meets EIA-310 19-in. (17.25 in./438.15 mm) wide with rack brackets
 - Cable-management brackets at each Cisco ASR 1000 Series SPA Interface (SIP) locations can hold 16 ports of STP/UTP RJ 45 cables
 - Cable-management brackets allow a bend radius of 1.5 in. (38.1 mm) for cables
 - Adjustable rack-mount brackets allow for a front to rear rail variance distance of 15.50 in./394 mm to 19.00 in. /482.6 mm
 - Cisco ASR 1006 Router:
 - Chassis height meets EIA-310 rack spacing 6RU (10.47 in./266 mm), universal rack-mount
 - Chassis width meets EIA-310 19-in. (17.25 in./438.15 mm) wide with rack brackets
 - Cable-management brackets at each Cisco ASR 1000 Series SPA Interface (SIP) locations can hold 16 ports of STP/UTP RJ 45 cables
 - Cable-management brackets allow a bend radius of 1.5 in. (38.1 mm) for cables
 - Adjustable rack-mount brackets allow for a front to rear rail variance distance of 15.50/394mm to 19.00/482.6mm
 - Cisco ASR 1013 Router:
 - Chassis height meets EIA-310 rack spacing 13RU (22.8 in./579.12 mm), universal rack-mount
 - Chassis width meets EIA-310 19-in. (17.25 in./438.15 mm) wide with rack brackets
 - Cable-management brackets allow a bend radius of 1.5 in. (38.1 mm) for cables
 - Adjustable rack-mount brackets allow for a front to rear rail variance distance of 15.50/394mm to 19.00 in./482.6 mm
 - Ships with forward rack-mount brackets installed and an extra set in the accessory kit

Floor Loading Considerations

Ensure that the floor under the rack supporting the Cisco 1000 Series Routers is capable of supporting the combined weight of the rack and all other installed equipment.

To assess the weight of the fully configured Cisco 1000 Series Router respectively, refer to the table in [Physical Characteristics, on page 9](#) section.

For additional information about floor loading requirements, consult the document *GR-63-CORE, Network Equipment Building System (NEBS) Requirements: Physical Protection* .

Site Power Guidelines

The Cisco ASR 1000 Series Routers have specific power and electrical wiring requirements. Adhering to these requirements ensures reliable operation of the system. Follow these precautions and recommendations when planning your site for the Cisco ASR 1000 Series Router:

- The redundant power option provides a second, identical power supply to ensure that power to the chassis continues uninterrupted if one power supply fails or input power on one line fails.
- In systems configured with the redundant power option, connect each of the two power supplies to a separate input power source. If you fail to do this, your system might be susceptible to total power failure due to a fault in the external wiring or a tripped circuit breaker.
- To prevent a loss of input power, be sure the total maximum load on each circuit supplying the power supplies is within the current ratings of the wiring and breakers.
- Check the power at your site before installation and periodically after installation to ensure that you are receiving clean power. Install a power conditioner if necessary.
- Provide proper grounding to avoid personal injury and damage to the equipment due to lightning striking power lines or due to power surges. The chassis ground must be attached to a central office or other interior ground system.



Caution

This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations.



Note

The Cisco ASR 1000 Series Router installation must comply with all applicable codes and is approved for use with copper conductors only. The ground bond fastening hardware should be of compatible material and preclude loosening, deterioration, and electrochemical corrosion of hardware and joined material. Attachment of the chassis ground to a central office or other interior ground system must be made with an AWG #6 gauge wire, copper ground conductor at a minimum.

Electrical Circuit Requirements

Each Cisco 1000 Series Router requires a dedicated electrical circuit. If you equip it with dual power feeds, provide a separate circuit for each power supply to avoid compromising the power redundancy feature.

The Cisco ASR 1000 Series Routers can be powered by a DC or AC source. Ensure that the equipment grounding is present and observe power strip ratings. Make sure that the total ampere rating of all products plugged into the power strip does not exceed 80% of the rating.

The following table contains specifications for DC-powered systems for all Cisco ASR 1000 Series Routers.

Table 4: Cisco ASR 1000 Series Router DC Power Supply System Input Requirements

Cisco ASR 1000 Series Router DC Power Supply	System Input Rating (Amps)	Circuit Breaker Amps	AWG # Wire		
				Minimum	Maximum
Cisco ASR 1006	40	Always 50	Always AWG #6 wire		
Cisco ASR 1004	24	30	40	10	8
Cisco ASR 1002	16	20	30	12	10

Cisco ASR 1000 Series Router DC Power Supply	System Input Rating (Amps)	Circuit Breaker Amps	AWG # Wire		
Cisco ASR 1013	40	Always 50	Always AWG #6 wire		
Cisco ASR 1001	14	20	30	10	10
For example, the Cisco ASR 1002 Router DC power supply, with 16 Amp input rating must use an AWG #12 gauge wire for a 20 A circuit breaker and an AWG #10 gauge wire for a 30 A circuit breaker.					



Note All Cisco ASR 1000 Series Router AC power supplies require a 20 A circuit breaker.

The AC and DC power supplies for the Cisco ASR 1000 Series Routers support different types of power supply switches.

The following table lists AC and DC power supply system rating requirements for all Cisco ASR 1000 Series Routers.

Table 5: AC and DC Power Supply System Rating Specifications for the Cisco ASR 1000 Series Routers

Description	Specification
Power supply declared ratings	AC = 100-240 VAC DC = -48/ -60 VDC
Line frequency rating	50/60 Hz for AC power supplies

Site Cabling Guidelines

This section contains guidelines for wiring and cabling at your site. When preparing your site for network connections to the Cisco 1000 Series Router, consider the type of cable required for each component, and the cable limitations. Consider the distance limitations for signaling, EMI, and connector compatibility. Possible cable types are fiber, thick or thin coaxial, foil twisted-pair, or unshielded twisted-pair cabling.

Also consider any additional interface equipment you need, such as transceivers, hubs, switches, channel service units (CSUs), or data service units (DSUs).

Before you begin, read these important notes about cabling:

- The E1 interface on the Cisco 8-Port Channelized T1/E1 SPA interface uses RJ-48c receptacles for E1 (120-Ohm) cables with RJ-45 connectors. You can use all ports simultaneously. Each E1 connection supports interfaces that meet the G.703 standards. The RJ-45 connection does not require an external transceiver. The E1 ports are E1 interfaces that use 120-ohm shielded twisted-pair (STP) cables.

- Shielded cables must be used to connect to the DB-25 alarm connector on both the AC and DC power supplies in order to comply with FCC/EN55022/CISPR22 Class A emissions requirements. For information about the power supply DB-25 alarm connector and alarm LEDs, see the xref “How Cisco ASR1000-RP Alarm Monitoring Works” section on page 2-22 .



Warning Shielded T1/E1 cables must be used to comply with FCC/EN55022/CISPR22 Class A emissions requirements on the 8-port channelized T1/E1 SPA interface.

Before you install the Cisco 1000 Series Router, have all additional external equipment and cables on hand. For ordering information, contact a customer service representative.

The extent of your network and the distances between network interface connections depend in part on the following factors:

- Signal type
- Signal speed
- Transmission medium

The distance and rate limits referenced in the following sections are the IEEE-recommended maximum speeds and distances for signaling purposes. Use this information as a guideline in planning your network connections >*prior to* installing the Cisco 1000 Series Router.

If wires exceed recommended distances, or if wires pass between buildings, give special consideration to the effect of a lightning strike in your vicinity. The electromagnetic pulse caused by lightning or other high-energy phenomena can easily couple enough energy into unshielded conductors to destroy electronic devices. If you have had problems of this sort in the past, you may want to consult experts in electrical surge suppression and shielding.

Asynchronous Terminal Connections

The route processors provide a console port to connect a terminal or computer for local console access. The route processors also provide an auxiliary port for additional connections and for diagnostic use.

Both ports have RJ-45 connectors, support RS-232 asynchronous data, and have distance recommendations specified in the IEEE RS-232 standard.

Interference Considerations

When wires are run for any significant distance, there is a risk that stray signals will be induced on the wires as interference. If interference signals are strong, they can cause data errors or damage to the equipment.

The following sections describe sources of interference and how to minimize its effects on the Cisco ASR 1000 Series Router system.

Electromagnetic Interference

All equipment powered by AC current can propagate electrical energy that can cause electromagnetic interference (EMI) and possibly affect the operation of other equipment. The typical sources of EMI are equipment power cords and power service cables from electric utility companies.

Strong EMI can destroy the signal drivers and receivers in the Cisco ASR 1000 Series Router and even create an electrical hazard by causing power surges through power lines into installed equipment. These problems are rare, but could be catastrophic.

To resolve these problems, you need specialized knowledge and equipment, which could consume substantial time and money. However, you should ensure that you have a properly grounded and shielded electrical environment, paying special attention to the need for electrical surge suppression.

The following table lists electrode magnetic compliance standards for the Cisco ASR 1000 Series Routers.

Table 6: EMC Standards

EMC Standards	FCC 47 CFR Part 15 Class A
	VCCI Class A
	AS/NSZ Class A
	ICES-003 Class A
	EN55022/CISPR 22 Information Technology Equipment (Emissions)
	EN55024/CISPR 24 Information Technology Equipment (Immunity)
	EN300 386 Telecommunications Network Equipment (EMC)
	EN50082-1/EN61000-6-1 Generic Immunity Standard
CE marking	UL60950-1
	CSA C22.2 No. 60950-1-03
	EN 60950-1
	IEC 60950-1
	AS/NZS 60950.1

Radio Frequency Interference

When electromagnetic fields act over a long distance, radio frequency interference (RFI) can be propagated. Building wiring can often act as an antenna, receiving the RFI signals and creating more EMI on the wiring.

If you use twisted-pair cable in your plant wiring with a good distribution of grounding conductors, the plant wiring is unlikely to emit radio interference. If you exceed the recommended distances, use a high-quality twisted-pair cable with one ground conductor for each data signal.

Lightning and AC Power Fault Interference

If signal wires exceed recommended cabling distances, or if signal wires pass between buildings, you should consider the effect that a lightning strike in your vicinity might have on the Cisco ASR 1000 Series Router.

The electromagnetic pulse (EMP) generated by lightning or other high-energy phenomena can couple enough energy into unshielded conductors to damage or destroy electronic equipment. If you have previously experienced such problems, you should consult with RFI/EMI experts to ensure that you have adequate electrical surge suppression and shielding of signal cables in your Cisco ASR 1000 Series Router operating environment.

Rack-Mounting Guidelines

This section describes guidelines on rack-mounting.

Precautions for Rack-Mounting

The following rack-mount guidelines are provided to ensure your safety:

- Do not move large racks by yourself. Due to the height and weight of a rack, a minimum of two people are required to accomplish this task.
- Ensure that the rack is level and stable before extending a component from the rack.
- Ensure that proper airflow is provided to components in the rack.
- Do not step or stand on any component or system when servicing other systems or components in a rack.
- When mounting the Cisco ASR 1000 Series 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, then install the stabilizers before mounting or servicing the unit in the rack.

General Rack Selection Guidelines

Cisco ASR 1000 Series Routers can be mounted in most two-post or four-post, 19-in. equipment racks that comply with the Electronics Industries Association (EIA) standard for equipment racks (EIA-310-D 19-in.). The rack must have at least two posts with mounting flanges to mount the chassis.



Caution When mounting a chassis in any type of rack equipment, ensure that the inlet air to the chassis does not exceed 131°F (55°C).

The distance between the center lines of the mounting holes on the two mounting posts must be 18.31 in. ± 0.06 in. (46.50 cm ± 0.15 cm). The rack-mounting hardware included with the chassis is suitable for most 19-in. equipment racks.

Consider installing the Cisco ASR 1000 Series Router in a rack with the following features:

- NEBS compliant, 19-in. (48.3 cm) wide rack.
- EIA or ETSI hole patterns in the mounting rails. Required mounting hardware is shipped with the Cisco ASR 1000 Series Router. If the rack that you plan to install the system in has metric-threaded rails, you must provide your own metric mounting hardware.
- Perforated top and open bottom for ventilation to prevent overheating.
- Leveling feet for stability.



Note The Cisco ASR 1000 Series Router should *not* be installed in an enclosed rack because the chassis requires an unobstructed flow of cooling air to maintain acceptable operating temperatures for its internal components. Installing the router in any type of enclosed rack—even with the front and back doors removed—could disrupt the air flow, trap heat next to the chassis, and cause an overtemperature condition inside the router. If you use an enclosed rack, make certain that there are air vents on all sides of the rack and there is proper ventilation.

Guidelines for 23 in. (Telco) Racks

If needed, you can also install the Cisco ASR 1000 Series Routers in 23 in. (Telco) racks. For information on adapters needed for 23 in. racks, please contact the Newton Instrument Company:

- <http://www.ewton.com>
- 111 East A Street, Butner NC, USA, 27509
- 919 575-6426

Equipment Rack Guidelines

The placement of the rack can affect personnel safety, system maintenance, and the system ability to operate within the environmental characteristics described in the *Site Environmental Requirements* topic. Choose a proper location for the Cisco ASR 1000 Series Router by following the guidelines below.

Locating for Safety

If the Cisco ASR 1000 Series Router is the heaviest or the only piece of equipment in the rack, consider installing it at or near the bottom to ensure that the rack center of gravity is as low as possible.

For additional information about the proper placement of electronic equipment, see the document *GR-63-CORE, Network Equipment Building System (NEBS) Requirements: Physical Protection*.

Locating for Easy Maintenance

Keep at least 3 feet of clear space in front and behind the rack. This space ensures that you can remove the Cisco ASR 1000 Series Router components and perform routine maintenance and upgrades easily.

Avoid installing the Cisco ASR 1000 Series Router in a congested rack and consider how the routing of cables from other pieces of equipment in the same rack could affect access to the routers cards.

The front and top of the chassis must remain unobstructed to ensure adequate airflow and prevent overheating inside the chassis.

Allow the following clearances for normal system maintenance:

- At the top of the chassis—At least 3 in. (7.6 cm)
- In the front of the chassis—3 to 4 ft (91.44 cm to 121.92 cm)



Note When installing the Cisco ASR 1013 chassis in a 42RU equipment rack, allow at least one to two inches (2.54 cm to 5.08 cm) of vertical clearance between the router and any equipment above or below it.

To avoid problems during installation and ongoing operation, follow these general precautions when you plan the equipment locations and connections:

- Use the **show environment all** command regularly to check the internal system status. The environmental monitor continually checks the interior chassis environment; it provides warnings for high temperature and creates reports on any occurrences. If warning messages are displayed, take immediate action to identify the cause and correct the problem.
- Keep the Cisco ASR 1000 Series Router off the floor and out of areas that collect dust.
- Follow ESD prevention procedures to avoid damage to equipment. Damage from static discharge can cause immediate or intermittent equipment failure.

Locating for Proper Airflow

Ensure the location of the Cisco 1000 Series Router has enough airflow to keep the system operating within the environmental characteristics and the air temperature is sufficient to compensate for the heat dissipated by the system.

Avoid locating the Cisco 1000 Series Router in a location in which the chassis air intake vents could draw in the exhaust air from adjacent equipment. Consider how the air flows through the Cisco 1000 Series Router. The Cisco 1000 Series Router airflow direction is front to back with ambient air drawn in from the venting located on the chassis front sides.

Site Planning Checklist

Use the following checklist to perform and account for all the site-planning tasks described in this chapter:

- The site meets the environmental requirements.
- The site air conditioning system can compensate for the heat dissipation of the Cisco ASR 1000 Series Routers.
- The floor space that the Cisco ASR 1000 Series Routers occupy can support the weight of the system).
- Electrical service to the site complies with the requirements.
- The electrical circuit servicing the Cisco ASR 1000 Series Routers complies with the requirements).
- Consideration has been given to the console port wiring, and limitations of the cabling involved, according to TIA/EIA-232F.
- The Cisco ASR 1000 Series Router Ethernet cabling distances are within limitations.
- The equipment rack in which you plan to install the Cisco ASR 1000 Series chassis complies with requirements.
- Careful consideration has been given to safety, ease of maintenance, and proper airflow in selecting the location of the rack.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) damage, occurs when electronic cards or components are improperly handled and can result in complete or intermittent failures. The performance routing engine (PRE), and all line cards consist of a printed circuit card that is fixed in a metal carrier. Electromagnetic interference (EMI) shielding and connectors are integral components of the carrier. Although the metal carrier helps to protect the cards from ESD, use an antistatic strap each time you handle the modules. Handle the carriers by the edges only; never touch the cards or connector pins.



Caution Always tighten the captive installation screws on all system components when you are installing them. These screws prevent accidental removal of the module, provide proper grounding for the system, and help to ensure that the bus connectors are properly seated in the backplane.

Static electricity can harm delicate components inside your system. To prevent static damage, discharge static electricity from your body before you touch any of your system components, such as a microprocessor. As you continue to work on your system, periodically touch an unpainted metal surface on the computer chassis.

Following are guidelines for preventing ESD damage:

- Always use an ESD-preventive wrist or ankle strap and ensure that it makes good skin contact. Before removing a card from the chassis, connect the equipment end of the strap to the ESD plug at the bottom of the chassis below the power entry modules.
- Handle line cards by the faceplates and carrier edges only; avoid touching the card components or any connector pins.
- When removing a card, place the removed module component-side-up on an antistatic surface or in a static-shielding bag. If the module will be returned to the factory, immediately place it in a static-shielding bag.
- Avoid contact between the modules and clothing. The wrist strap protects the card from ESD voltages on the body only; ESD voltages on clothing can still cause damage.
- When transporting a sensitive component, first place it in an antistatic container or packaging.
- Handle all sensitive components in a static-safe area. If possible, use antistatic floor pads and workbench pads.



Caution For safety, periodically check the resistance value of the antistatic strap. The measurement should be between 1 and 10 ohms.



Caution Always tighten the captive installation screws on all the system components when you are installing them. These screws prevent accidental removal of the module, provide proper grounding for the system, and help ensure that the bus connectors are properly seated in the backplane.



Note The ESD strap socket can be in a different location on each Cisco ASR 1000 Series Router.

Electrical Safety

All system components are hot-swappable. They are designed to be removed and replaced while the system is operating without presenting an electrical hazard or damage to the system.

Follow these basic guidelines when you are working with any electrical equipment:

- Before beginning any procedures requiring access to the chassis interior, locate the emergency power-off switch for the room in which you are working.
- Disconnect all power and external cables before installing or removing a chassis.
- Do not work alone when potentially hazardous conditions exist.
- Never assume that power has been disconnected from a circuit; always check.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe. Never install equipment that appears damaged.
- Carefully examine your work area for possible hazards such as moist floors, ungrounded power extension cables, and missing safety grounds.

In addition, use the guidelines that follow when working with any equipment that is disconnected from a power source but is still connected to telephone wiring or other network cabling.

- Never install telephone wiring during a lightning storm.

- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.

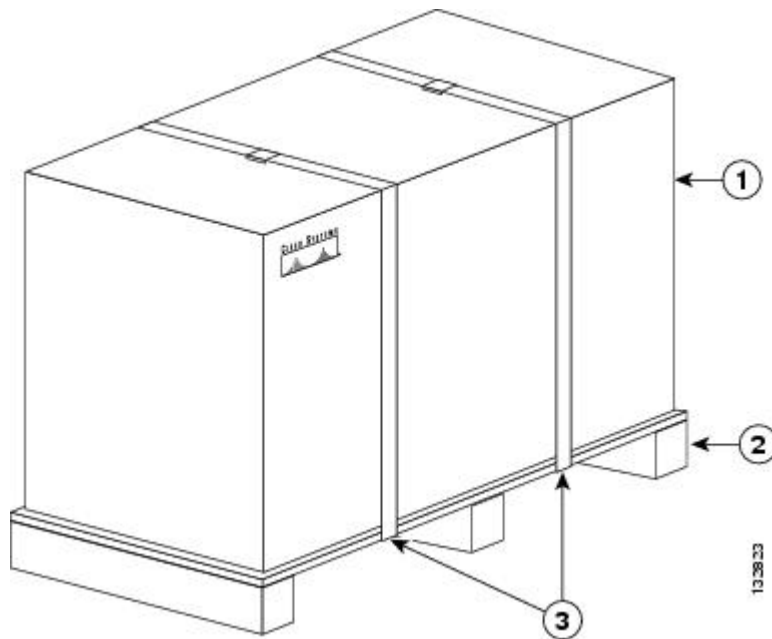


Warning Do not work on the system or connect or disconnect cables during periods of lightning activity. Statement 1006

Receiving the Cisco ASR 1000 Series Router

Each Cisco ASR 1000 Series chassis is shipped in a container that is strapped to a pallet as illustrated in the following figure.

Figure 1: Cisco ASR 1000 Series Router Packaged for Shipping



1	Outside carton	3	Packing straps
2	Pallet	—	—



Note We recommend that you have at least two people available to help with the installation and ensure safe lifting.

Chassis-Lifting Guidelines

The chassis is not intended to be moved frequently. Before you install the system, ensure that your site is properly prepared so you can avoid having to move the chassis later to accommodate power sources and network connections.

Two or more people are required to lift the chassis. Each time you lift the chassis or any heavy object, follow these guidelines:

- Never attempt to lift the chassis by yourself. Because of the size and weight of the chassis, use at least two people to safely lift and move it without causing injury to yourself or damaging the equipment.
- Ensure that your footing is solid, and balance the weight of the chassis between your feet.
- Lift the chassis slowly; never move suddenly or twist your body as you lift.
- Keep your back straight and lift with your legs, not your back. If you must bend down to lift the chassis, bend at the knees, not at the waist, to reduce the strain on your back muscles.
- Do not remove installed components from the chassis.
- Always disconnect all external cables before lifting or moving the chassis.

**Warning**

To prevent injury and equipment damage, never attempt to lift or tilt the router chassis using the handles on the fan tray or on line cards. These handles do not support the weight of the chassis.

SUMMARY STEPS

1. Each person should stand on either side of the chassis and place one hand under the air intake at the bottom front of the chassis.
2. With the other hand, grasp the top rear of the chassis under the air exhaust and carefully lift the chassis.

DETAILED STEPS

Step 1 Each person should stand on either side of the chassis and place one hand under the air intake at the bottom front of the chassis.

Step 2 With the other hand, grasp the top rear of the chassis under the air exhaust and carefully lift the chassis.

Tools and Equipment

The tools and equipment listed below are recommended as the minimum necessary to install the Cisco ASR 1000 Series Router. You may need additional tools and equipment to install associated equipment and cables. You may also require test equipment to check electronic and optical signal levels, power levels, and communications links.

- Phillips hand screwdriver
- 3.5mm flat-blade screwdriver
- Tape measure (optional)
- Level (optional)

- Power drill
- 8-gauge wire
- Rack-mount brackets
- Cable-management brackets

Unpacking and Verifying Shipping Contents

When you receive your chassis, perform the following steps and use the shipping contents checklist from the next section:

SUMMARY STEPS

1. Inspect the box for any shipping damage. (if there is damage contact your service representative).
2. Unpack the Cisco ASR 1000 Series Router.
3. Perform a visual inspection of the chassis.
4. After you have unpacked the system verify that you have received all of the required components. Using the packing list as a guide, take the following steps to check the contents of the Cisco ASR 1000 Series Router shipping container:
5. Check the contents of the boxes containing accessory items. Verify that you have received all equipment listed in your order.
6. Check that all Cisco ASR 1000 Series route processors, Cisco ASR 1000 Series embedded services processors, Cisco ASR 1000 Series SPA interface processors (SIPs), and power supplies you ordered are installed in the chassis. Ensure that the configuration matches the packing list.

DETAILED STEPS

-
- | | |
|---------------|--|
| Step 1 | Inspect the box for any shipping damage. (if there is damage contact your service representative). |
| Step 2 | Unpack the Cisco ASR 1000 Series Router. |
| Step 3 | Perform a visual inspection of the chassis. |
| Step 4 | After you have unpacked the system verify that you have received all of the required components. Using the packing list as a guide, take the following steps to check the contents of the Cisco ASR 1000 Series Router shipping container: |
| Step 5 | Check the contents of the boxes containing accessory items. Verify that you have received all equipment listed in your order. |
| Step 6 | Check that all Cisco ASR 1000 Series route processors, Cisco ASR 1000 Series embedded services processors, Cisco ASR 1000 Series SPA interface processors (SIPs), and power supplies you ordered are installed in the chassis. Ensure that the configuration matches the packing list. |
-

Checking the Shipping Container Contents

Use the components list shown in the following table to check the contents of the Cisco ASR 1000 Series Router shipping container. Do not discard the shipping container. You need the container if you move or ship the Cisco ASR 1000 Series Router in the future.

Table 7: Cisco ASR 1000 Series Router Shipping Container Contents

Component	Description
Chassis	Cisco ASR 1000 Series Router configured with dual AC or dual DC power supplies and a shared port adapter blank panel if a shared port adapter has not been ordered.
Accessories Kit	Front and rear chassis rack-mount brackets that you will attach to the chassis with the respective screws
Note You must order the Accessories Kit separately if you order the Cisco ASR 1009-X Router or Cisco ASR 1006-X Router chassis as a spare.	Three sets of screws, one set for: <ul style="list-style-type: none"> • Front rack-mount brackets (use the black screws) • Rear rack-mount brackets (use the package with the 5 screws) • Cable-management brackets (use the package with the 4 screws)
	Two cable-management brackets with U-feature design devices attached, with a different size for each chassis.
	1 RJ-45 to RJ-45 crossover cable 1 RJ-45 to DB-9 (female) adapter
ESD, Wrist Strap (disposable)	One disposable wrist strap
Documentation	<i>Regulatory Compliance and Safety Information for the Cisco ASR 1000 Series Aggregation Services Routers</i> at http://www.cisco.com/c/en/us/td/docs/routers/asr1000/rcsi/asr1rcsi.html .
Optional Equipment	Power cord if an AC power supply was shipped. There are none for the DC power supply units.



Note Most Cisco documentation is online or on the Cisco Documentation DVD. Documentation that ships with your Cisco ASR 1000 Series Router includes the *Regulatory Compliance and Safety Information for the Cisco ASR 1000 Series Aggregation Services Routers* document, and the *Documentation Roadmap for Cisco ASR 1000 Series*, which provides links and information for the Cisco ASR 1000 Series Aggregation Services Routers documentation.

Cisco ASR 1000 Series Router Installation Checklist

To assist you with your installation and to provide a historical record of what was done by whom, photocopy the Cisco ASR 1000 Series Router Installation Checklist shown in the following table. Use this to record when each procedure or verification is completed. When the checklist is completed, place it in your site log along with the other records for your new router.

Table 8: Cisco ASR 1000 Series Router Installation Checklist

Task	Verified By	Date
Date chassis received		
Chassis and all accessories unpacked		
Types and numbers of interfaces verified		
Safety recommendations and guidelines reviewed		
Installation Checklist copied		
Site log established and background information entered		
Site power voltages verified		
Site environmental specifications verified		
Required passwords, IP addresses, device names, and so on, available		
Required tools available		
Network connection equipment available		
Cable-management brackets installed (optional, but recommended)		
AC power cable(s) connected to AC source(s) and router		
DC power cable(s) connected to DC source(s) and router		
Network interface cables and devices connected		
System power turned on		
System boot complete (STATUS LED is on)		
Shared port adapters are operational		
Correct hardware configuration displayed after system banner appears		