Installing the Cisco VG224 Voice Gateway

This chapter contains the procedures for installing your Cisco VG224 voice gateway and consists of the following sections:

Tip While you do this installation, record your progress and site information. See the suggested format in the "Keeping Track–Checklist" section on page 3-4.

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

Warning **Read the installation instructions before connecting the system to the power source.** Statement 1004

Safety Recommendations

The following information is included to alert you to safety recommendations and best practices when working with this equipment.

Maintaining Safety with Electricity

Follow these guidelines when working on equipment powered by electricity.

Warning **Do not work on the system or connect or disconnect cables during periods of lightning activity.** Statement 1001

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

General Safety Practices

Follow these guidelines to ensure personal safety and protect the equipment:

- Keep the chassis area clear and dust-free during and after installation.
- Put the removed chassis cover in a safe place.
- Keep tools away from walk areas where you and others could fall over them.
- Do not wear loose clothing that could get caught in the chassis.
- Wear safety glasses if you are working under any conditions that might be hazardous to your eyes.

Warning **This equipment must be installed and maintained by service personnel as defined by AS/NZS 3260. Incorrectly connecting this equipment to a general-purpose outlet could be hazardous. The telecommunications lines must be disconnected 1) before unplugging the main power connector or 2) while the housing is open, or both.** Statement 1043

Safety Tips

Use these tips as safety guidelines when installing or working around this equipment.

- Locate the emergency power-off switch for the room in which you are working. Then, if an electrical accident occurs, you can act quickly to turn off the power.
- Disconnect all power before installing or removing a chassis.
- Do not work alone if potentially hazardous conditions exist.
- Never assume that power is disconnected from a circuit. Always check.

- Look carefully for possible hazards in your work area, such as moist floors, ungrounded power extension cables, and missing safety grounds.
- If an electrical accident occurs, proceed as follows:
  - Use caution; do not become a victim yourself.
  - Turn off power to the system.
  - If possible, send another person to get medical aid. Otherwise, assess the condition of the victim and then call for help.
  - Determine if the person needs rescue breathing or external cardiac compressions; then take appropriate action.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. ESD occurs when electronic components are improperly handled; it can result in complete or intermittent failures.

Always follow ESD-prevention procedures when removing and replacing components.

- Ensure that the chassis is electrically connected to earth ground.
- Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact.
- Connect the clip to the ESD-strap connection jack (to the left of the power switch on the rear of the chassis) or to an unpainted chassis frame surface.

Caution For safety, periodically check the resistance value of the antistatic strap, which should be between 1 and 10 megohm (Mohm).

Site Log

We recommend that you maintain a Site Log to record all actions relevant to the system. Site Log entries might include the following:

- Installation—Print a copy of the Installation Checklist and insert it into the Site Log.
- Upgrades and maintenance—Use the Site Log to record ongoing maintenance and expansion history. Update the Site Log to reflect the following:
  - Configuration changes
  - Maintenance schedules, requirements, and procedures performed
  - Comments, notes, and problems
  - Changes and updates to Cisco IOS software

Keeping Track–Checklist

We recommend that you use an installation checklist and maintain a Site Log.

Installation Checklist

The Installation Checklist (see Figure 3-1) lists the tasks for installing a Cisco VG224 voice gateway. Print a copy of this checklist and mark the entries as you complete each task. For each Cisco VG224 voice gateway, include a copy of the checklist in your Site Log.

Figure 3-1 Installation Checklist

Installation Checklist for site _____

Cisco VG name/serial number _____

Task	Verified by	Date
Background information placed in Site Log		
Environmental specifications verified		
Site power voltages verified		
Installation site prepower check completed		
Required tools available		
Additional equipment available		
Cisco VG received		
Quick start guide received		
Regulatory compliance and safety information received		
Information packet, warranty card, and Cisco.com card received		
Software version verified		
Rack, desktop, or wall-mounting of chassis completed		
Initial electrical connections established		
ASCII terminal attached to console port		
Modem attached to console port (for remote configuration)		
Signal distance limits verified		
Startup sequence steps completed		
Initial operation verified		

Mounting Tools and Equipment

Obtain the following tools and parts to install a Cisco VG224 voice gateway:

- Standard flat-blade screwdriver as required for attaching brackets to rack or wall
- Phillips screwdriver for attaching brackets to a Cisco VG224 voice gateway
- Mounting brackets and screws for 24-inch rack, if required
  - Four telco machine screws, for installing the chassis in a rack (use the screw size required by the rack)
- Screws and anchors for wall-mounting, if required
  - Eight wood screws or other fasteners, for installing the chassis on a wall. An additional starter screw can be used to facilitate wall-mounting.
- ESD-preventive wrist strap

In addition, you might need the following external equipment:

- Console terminal, or personal computer with terminal emulation software
- PC running terminal emulation software for administrative access
- Modem for remote access
- Analog voice RJ-21 cable
- Ethernet switch
- Modem for remote configuration

Unpacking and Inspection

Do not unpack the Cisco VG224 until you are ready to install it. If the installation site is not ready, keep the chassis in its shipping container to prevent accidental damage.

The Cisco VG224, cables, printed publications, and any optional equipment you ordered might be shipped in more than one container. When you unpack each shipping container, check the packing list to ensure that you received all the following items:

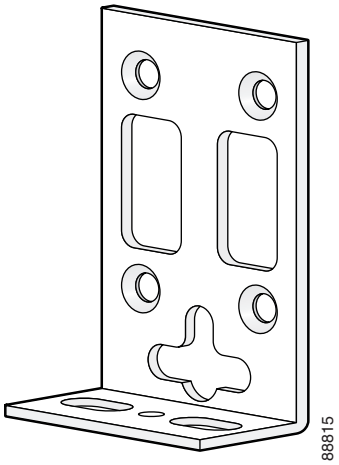
- Cisco VG224
- Power cord, 6-foot (1.8-meter)
- RJ-45-to-DB-25 adapter cable (labeled *Console*)
- RJ-45-to-DB-9 adapter cable (labeled *Auxiliary*)
- Rack-mounting brackets for 19-inch rack (one pair) with screws for attaching to chassis
- Chassis guard for wall-mounting applications
- Grounding lug and fasteners
- *Cisco VG224 Voice Gateway Quick Start Guide*
- *Cisco VG224 Voice Gateway Regulatory Compliance and Safety Information*

Inspect all items for shipping damage. If anything appears damaged, or if you encounter problems when installing or configuring your system, contact a customer service representative. (See the "Obtaining Technical Assistance" section on page xvi.)

Rack-Mounting the Chassis

Your chassis ships with a pair of brackets for use with a 19-inch rack or mounting on the wall. The bracket is shown in Figure 3-2.

Figure 3-2 Quick Mounting Bracket



Mounting Screws

Two sets of mounting screws are provided, in separate packages. Take care to use each screw type, and washers as needed, in the appropriate locations. Table 3-1 clarifies the differences between rack-mounting and wall-mounting screws.

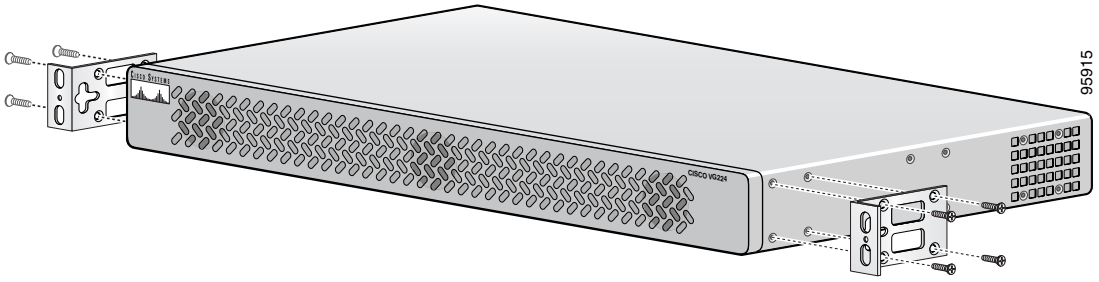
Table 3-1 Rack-Mounting Versus Wall-Mounting Screws

Rack-mounting	Wall-mounting
• Eight countersunk Phillips head screws (four per bracket)	• Four 6–32 slotted hex screws (two per bracket) and four plastic washers
• Washers are not required	• Washers are required

Attaching the Brackets

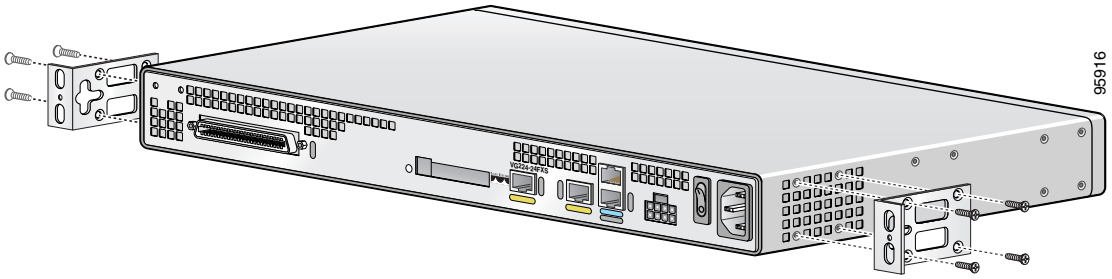
To install the chassis in a rack with the front panel forward, attach the brackets as shown in Figure 3-3.

Figure 3-3 19-Inch Rack Installation—Front Panel Forward



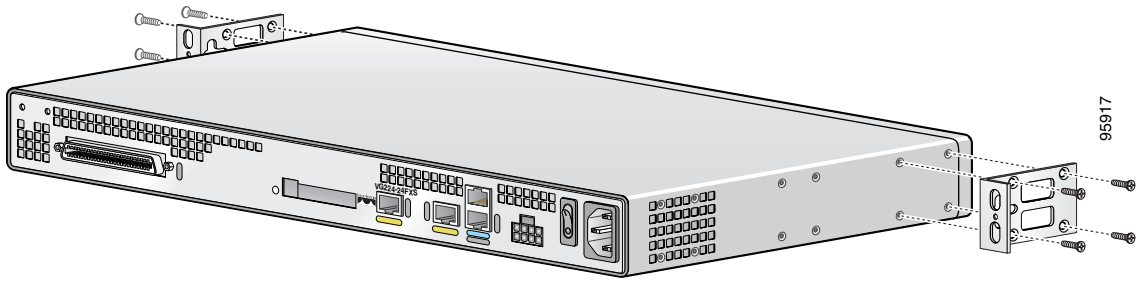
To install the chassis in a rack with the rear panel forward, attach the brackets as shown in Figure 3-4.

Figure 3-4 19-Inch Rack Installation—Rear Panel Forward



To install the chassis in a center-mount telco rack, attach the brackets as shown in Figure 3-5.

Figure 3-5 Telco 19-Inch Rack Installation—Rear Panel Forward



Installing the Cisco VG224 Voice Gateway in a Rack

The following warning applies only when the unit is rack-mounted:

Warning **To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:**

This unit should be mounted at the bottom of the rack if it is the only unit in the rack.

When mounting this unit 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 unit in the rack. Statement 1006

To rack-mount the chassis, follow this procedure:

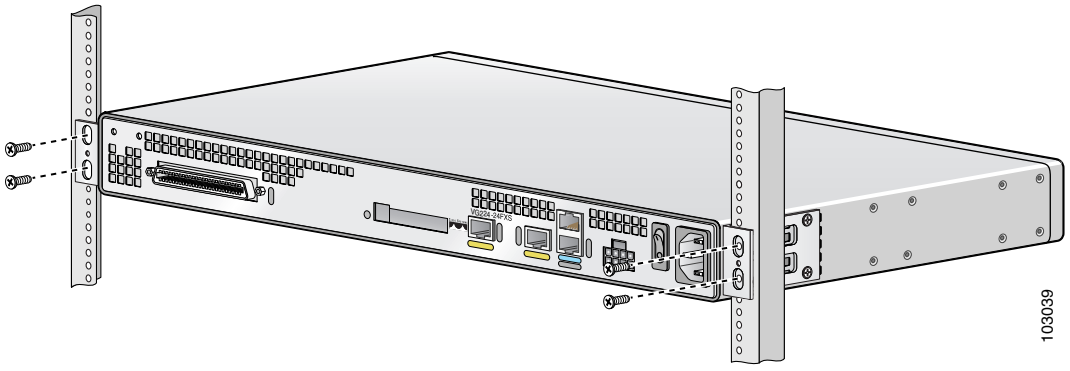
Step 1 Choose one of the methods shown in Figure 3-3 on page 3-7, Figure 3-4 on page 3-7, or Figure 3-5 on page 3-7, and attach the long leg of the mounting brackets to the chassis, as shown.

Caution Make sure to use the correct screws for this mounting option (see Table 3-1 on page 3-6).

Screws are included for attaching the brackets to the chassis, but not for installing the chassis in a rack or on a wall. You need four additional machine screws to install the chassis in a rack. Use the screw size required by your rack. After the brackets are secured to the chassis, you can rack-mount the chassis.

Step 2 Using screws that you provide, attach the chassis to the rack as shown in Figure 3-6 on page 3-8.

Figure 3-6 Attaching the Chassis to the 19-Inch Rack



Wall-Mounting the Chassis

The following warning applies only when the unit is wall-mounted:

Warning **This unit is intended to be mounted on a wall. Please read the wall-mounting instructions carefully before beginning installation. Failure to use the correct hardware or to follow the correct procedures could result in a hazardous situation to people and damage to the system.** Statement 248

Caution You can wall-mount the unit with either the right or left side facing up; however, the front and rear panels must be vertical.

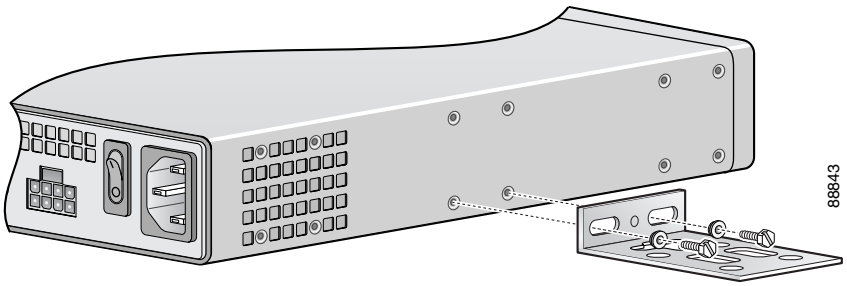
Note For information about obtaining the chassis guard, refer to field notice number 28655, *VG224 Chassis Guard - Safety Regulation*, at http://www-tac.cisco.com/Support_Library/field_alerts/fn28655.html.

To wall-mount the chassis, follow this procedure:

Step 1 Attach the short leg of one bracket to the chassis, as shown in Figure 3-7, using two 6-32 x 1/4 slotted hex screws (provided). Be sure to use a plastic washer (provided) with each screw; the narrow end of the washer must fit into the bracket slot, facing the chassis.

Caution Be sure to use the correct screws and plastic washers for this mounting option. (See Table 3-1 on page 3-6.)

Figure 3-7 Attaching the Brackets for Wall-Mounting



Step 2 Attach the second bracket to the opposite side of the chassis.

Step 3 Attach the router to the wall using the brackets previously attached and attachment hardware that you provide as follows:

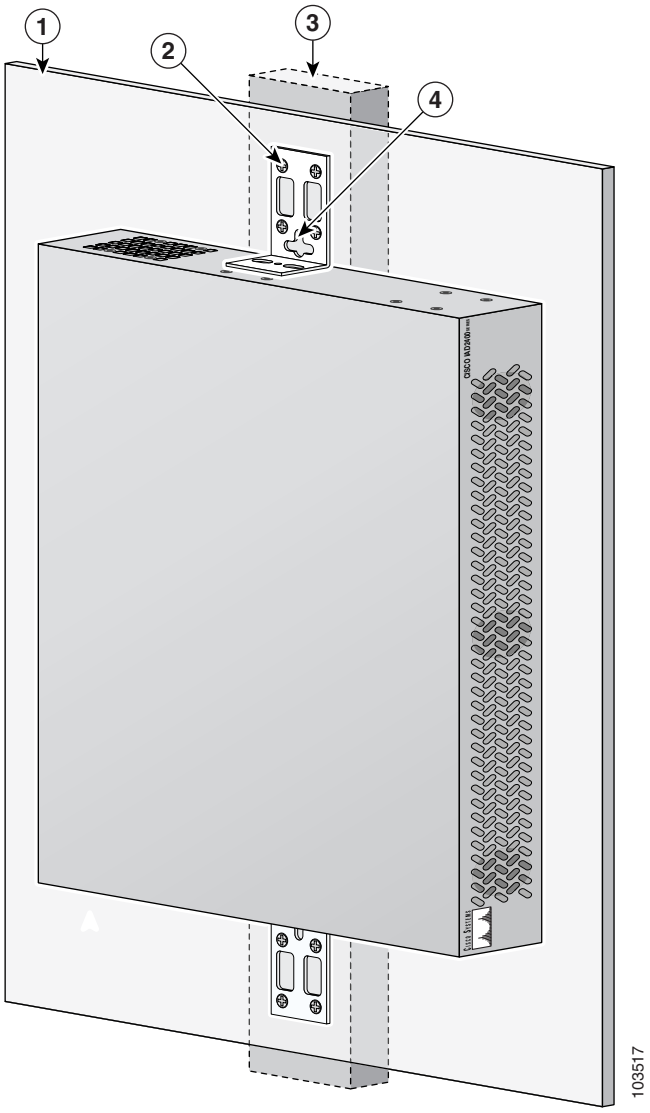
- You can install a starter screw in the wall, and hook the bracket keyhole over the screw. This holds the unit in place for easy installation of the attachment screws.
- Attach both brackets to the wall.

Note For attaching to a wall stud, each bracket requires two #10 wood screws (round- or pan-head) with #10 washers, or two #10 washer-head screws. The screws must be long enough to penetrate at least 3/4 inch (20 mm) into supporting wood or metal wall stud.

Note For hollow-wall mounting, each bracket requires two wall anchors with washers. Wall anchors and washers must be size #10.

- Figure 3-8 shows the orientation required for installation.

Figure 3-8 Wall-Mounting the Chassis



1	Wall	**3**	Wall stud
2	Bracket	**4**	Keyhole for starter screw

Bench-Top Installation

Step 1 Verify that there is a suitable AC power outlet available.

Caution Do not plug this unit into an AC outlet that does not have a UL-certified receptacle that is properly tied into building ground.

Step 2 Place the four rubber feet (from the accessory kit) in the four indentations on the underside of the chassis.This helps provide proper airflow through and around the chassis.

Step 3 Place the Cisco VG224 voice gateway on a smooth, flat surface.

Caution Do not place anything on top of the chassis that weighs more than 10 lb (4.5 kg). Excessive weight on top can damage the chassis.

Installing the Ground Connection

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 **AC connected units must have a permanent ground connection in addition to the power cable ground wire. NEBS-compliant grounding satisfies this requirement.** Statement 284

Warning **Use copper conductors only.** Statement 1025

You must connect the chassis to a reliable earth ground; the ground wire must be installed in accordance with local electrical safety standards.

- For NEBS-compliant grounding, use size AWG 6 (13 mm^2) wire and the ground lug provided in the accessory kit.
- For NEC-compliant grounding, use size AWG 14 (2 mm^2) or larger wire and an appropriate user-supplied ring terminal.

- For EN/IEC 60950-compliant grounding, use size AWG 18 (1 mm^2) or larger wire and an appropriate user-supplied ring terminal.

To ground the chassis, follow this procedure:

Step 1 Locate a suitable ground location.

Tip Use a multimeter to measure the resistance between various ground locations, such as the following:

- Between the ground of a junction box (outlet) and the ground of a power tap
- Between the ground of a junction box and a metal water pipe
- Between the Cisco VG224 voice gateway chassis and the ground of a power tap
- Between the Cisco VG224 voice gateway chassis and the ground of a junction box

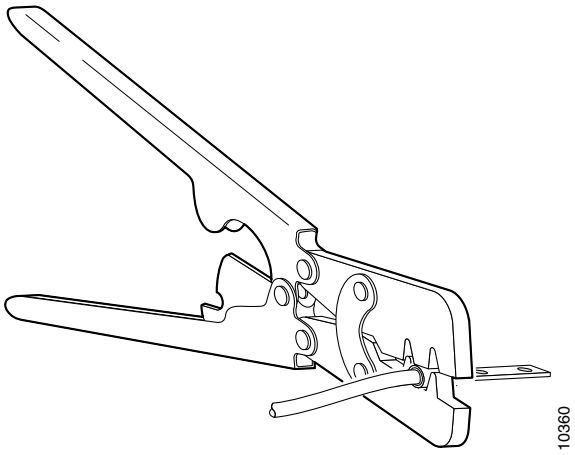
A good ground connection should read between 0.0 and 0.5 ohms.

Step 2 Strip one end of the ground wire to the length required for the ground lug or terminal.

- For the NEBS ground lug—approximately 0.75 in. (20 mm)
- For user-provided ring terminal—as required

Step 3 Crimp the ground wire to the ground lug or ring terminal, using a crimp tool of the appropriate size. (See Figure 3-9.)

Figure 3-9 Crimping a Ground Lug onto the Ground Wire



Step 4 Attach the ground lug or ring terminal to the chassis as shown in Figure 3-10 or Figure 3-11. For the ground lug, use the two screws with captive locking washers provided. For a ring terminal, use one of the screws provided. Use a number 2 Phillips screwdriver, and tighten the screws to a torque of 8 to 10 in-lb (0.9 to 1.1 N-m).

Note You can orient the crimped end of the ground lug in either direction (right or left).

Step 5 Connect the other end of the ground wire to a grounding point at your site.

Figure 3-10 NEBS-Compliant Chassis Ground Connection Using Ground Lug

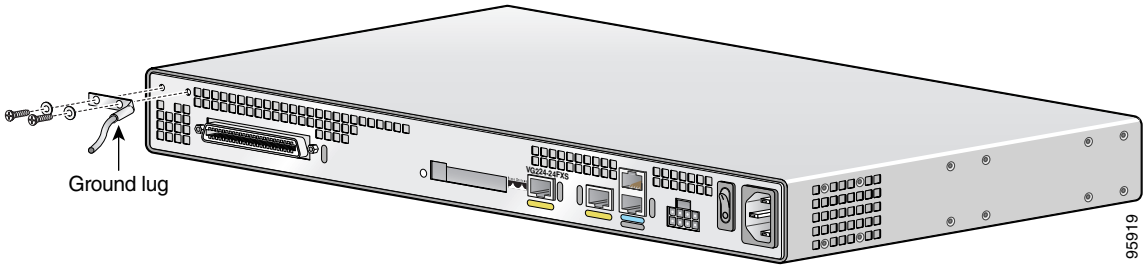
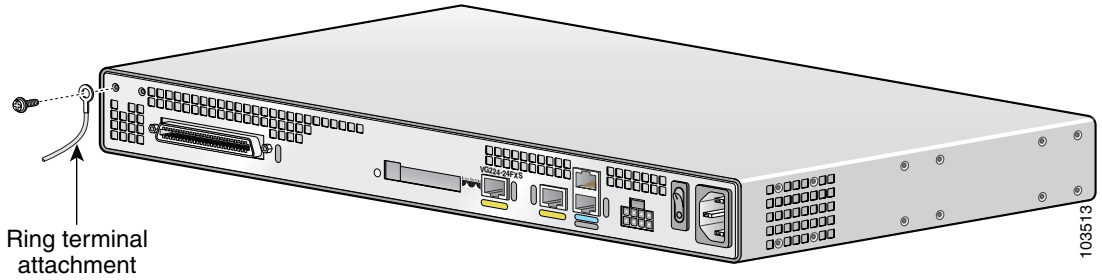


Figure 3-11 Chassis Ground Connection Using Ring Terminal



Connecting Cables

For cables not included with your Cisco VG224 voice gateway, pinout information is in Appendix A, "Cable Specifications and Information." Cisco VG224 voice gateway ports are color-coded for identification.

Warning **Do not work on the system or connect or disconnect cables during periods of lightning activity.** Statement 1001

Warning **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than:**
120 VAC, 15A (240 VAC, 10A international) Statement 1005

Warning **To prevent accidental discharge in the event of a power line cross, route on-premise wiring away from power cables and off-premise wiring, or use a grounded shield to separate the on-premise wiring from the power cables and off-premise wiring. A power line cross is an event, such as a lightning strike, that causes a power surge. Off-premise wiring is designed to withstand power line crosses. On-premise wiring is protected from power line crosses by a device that provides overcurrent and overvoltage protection. Nevertheless, if the on-premise wiring is in close proximity to, or not shielded from, the off-premise wiring or power cables during a lightning strike or power surge, the on-premise wiring can carry a dangerous discharge to the attached interface, equipment, and nearby personnel.** Statement 338

Table 3-2 shows the results of the NEBS Type 1/3 power cross tests (tip/ring to ground) performed on the Cisco VG224 voice gateway FXS ports.

Table 3-2 Results of the NEBS Power Cross Tests on FXS Ports

NEBS Tests	Results
50 V/0.33 A; 15 minutes	Pass
100 V/0.17 A; 15 minutes	Pass
200 V/1.00 A; 1–second pulses, 60 repetitions	Pass

Note The installation must comply with all applicable codes.

LAN and Power Cables

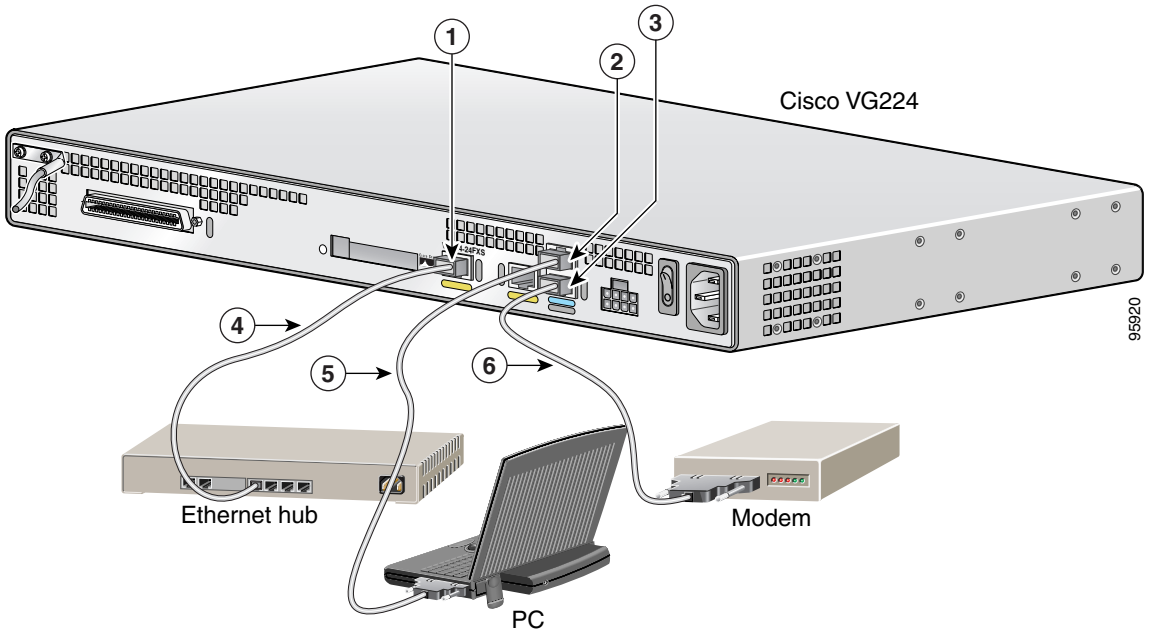
These cables and connections are described in Table 3-3 and in Figure 3-12.

Table 3-3 LAN, Administrative Access, and Power Cable Selection

Port or Connection	Color or Type	Connected To	Cable
Fast Ethernet	Yellow	Fast Ethernet switch	Straight-through Fast Ethernet cable (not included)
Console	Light blue	PC or ASCII terminal communication (COM) port	RJ-45-to-DB9 console cable (included)
Auxiliary	Black	Modem for remote access	RJ-45-to-DB25 auxiliary cable (included)
Power (not shown)	Power	100–240 VAC, 50–60 Hz	Grounding power cord (included)[1]

1. Power cables vary to meet local requirements.

Figure 3-12 LAN and Administrative Access Connections



1	Fast Ethernet port	**4**	Fast Ethernet (straight-through)
2	Console port	**5**	RJ-45-to-DB9 console cable
3	AUX port	**6**	RJ-45-to-DB25 auxiliary cable

Connecting the Input Power

Caution The Cisco VG224 voice gateway chassis provides inputs for both AC and DC power. Design your installation to use only one type of power. *Do not use AC and DC power at the same time*. If you do, the unit stops operating, and you need to reboot it with only a single power source.

Cable

Use the AC power cable.

Procedure

Step 1 Connect the AC power cable (supplied) to the recessed power plug on the rear of the concentrator.

Step 2 Plug the cable into a power source with a voltage of 100 to 240 VAC.

Connecting the Console Port to a PC or an ASCII Terminal

Use the procedure in this section to connect the console port to a PC running terminal emulation software.

Note The console port does not support hardware flow control.

Cable

Use an RJ-45-to-RJ-DB-9 console cable (see item 5 in Figure 3-12 on page 3-15)

For pinouts, see Table A-1 on page A-3 and Table A-2 on page A-4 in Appendix A, “Cable Specifications and Information.”

Procedure

Step 1 Configure the terminal emulation software requirements:

9600 baud
8 data bits
1 stop bit
no parity
no flow control

Connecting the Auxiliary Port to a Modem

Use the procedure in this section to connect the auxiliary port to a modem.

Cable

Use an RJ-45-to-DB25 auxiliary cable (labeled *Modem*).

For pinouts, see Table A-3 on page A-5 and Table A-4 on page A-5 in Appendix A, "Cable Specifications and Information."

Procedure

Step 1 Connect the cable from the auxiliary port (black) to the DB-25 port on the modem. (See item 6 in Figure 3-12 on page 3-15.)

Step 2 Configure the modem.

a. Match the transmission speed of the auxiliary port (default is 9600 baud).

b. Set the hardware flow control for Data Carrier Detect (DCD) and Data Terminal Ready (DTR) operation.

Note The baud rate for the auxiliary (and console) port can be configured in software for 1200, 2400, 4800, 19200, 38400, 57600, and 115200.

Connecting the Fast Ethernet Port to the Fast Ethernet Switch

Use the procedure in this section to connect a Fast Ethernet port to the Fast Ethernet switch.

Cable

Use a straight-through Fast Ethernet cable (not included).

Procedure

Step 1 Connect the cable from a Fast Ethernet port to an available port on the Fast Ethernet switch. (See item 4 in Figure 3-12 on page 3-15.)

Step 2 Connect the second cable if it is required.

Note Not all models have two ports.

Voice Cables

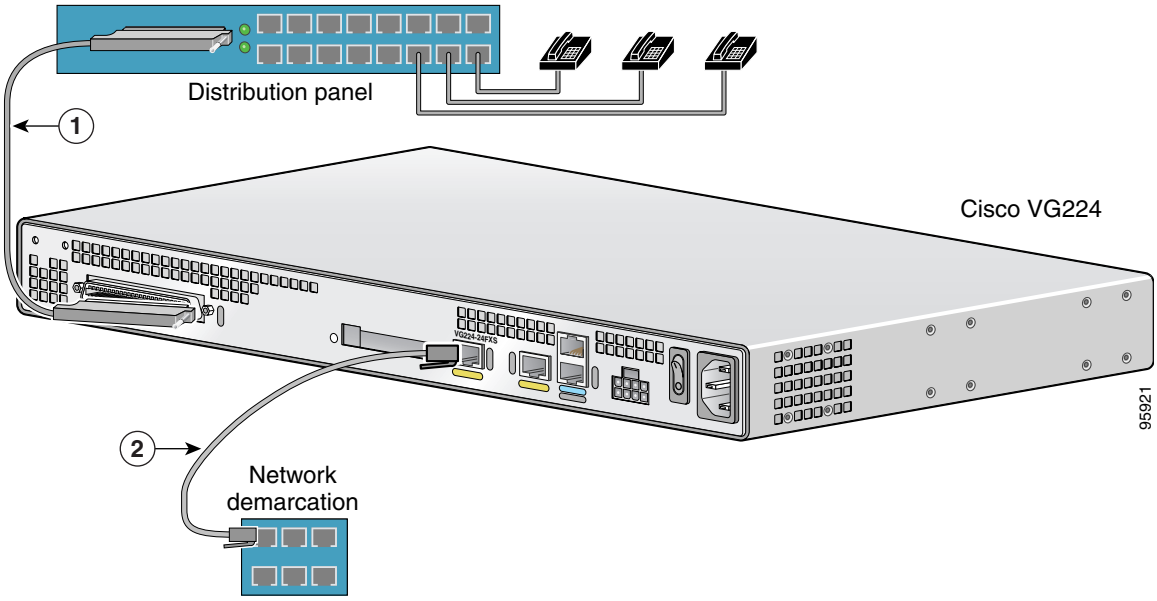
Warning **For connections outside the building where the equipment is installed, the following ports must be connected through an approved network termination unit with integral circuit protection. FXS/T3/E3** Statement 1044

Warning **This equipment contains a ring signal generator (ringer), which is a source of hazardous voltage. Do not touch the RJ-11 (phone) port wires (conductors), the conductors of a cable connected to the RJ-11 port, or the associated circuit-board when the ringer is active. The ringer is activated by an incoming call.** Statement 1042

The analog FXS voice cables and connections are:

Color or Type	Connected To	Cable
RJ-21	Distribution panel	RJ-21-to-RJ-21 straight-through cable (not included)

Figure 3-13 WAN and Voice Connections



1	RJ-21 cable	2	RJ-45 cable (through a patch panel) to central office

Connecting the Analog Voice Interface to a Distribution Panel

To connect the multiport analog voice interface to a distribution panel, which connects to telephones, faxes, or analog PBX equipment, use the following procedure. (See Figure 3-14.)

Cable

Use an RJ-21 cable with Amphenol 50-pin connectors (not included).

For RJ-21X/CA21A pinouts, see Table A-5 on page A-6 in Appendix A, "Cable Specifications and Information."

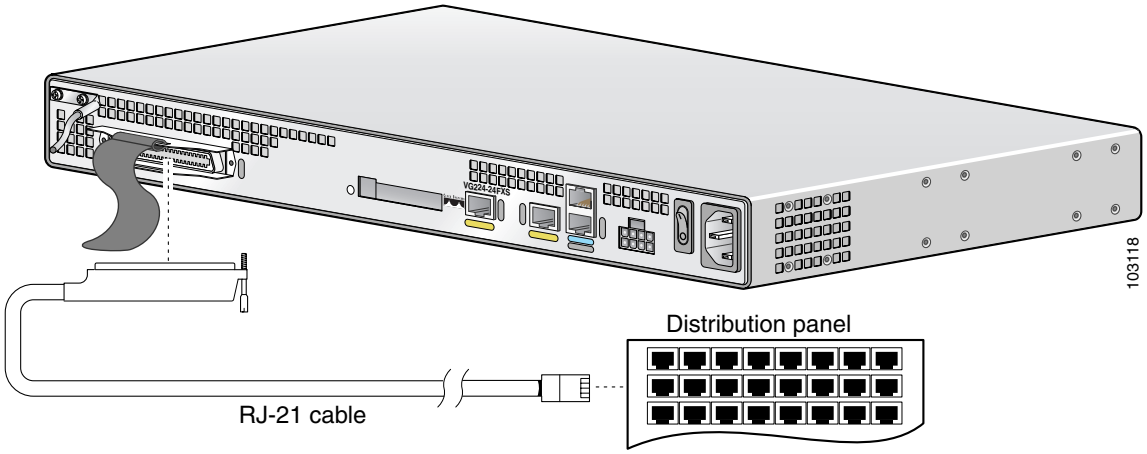
Warning **This equipment contains a ring signal generator (ringer), which is a source of hazardous voltage. Do not touch the RJ-11 (phone) port wires (conductors), the conductors of a cable connected to the RJ-11 port, or the associated circuit-board when the ringer is active. The ringer is activated by an incoming call.** Statement 1042

Procedure

Step 1 Connect the RJ-21 cable from the analog voice multiport to the distribution panel.

Step 2 Secure the cable in place using the strap.

Figure 3-14 Analog Voice Connection



Ports, Connectors, and Pinouts

Table 3-4 summarizes the cable connections between Cisco VG224 voice gateway and the network and user interfaces. Find the port and the equipment or network type in the table; then look at the applicable pinout table in Appendix A, "Cable Specifications and Information."

Table 3-4 Cable Use Reference Table

Cisco VG224 Port	Port Color	Connector/Cable	Interface To	Pinout Information
Console	Light blue	RJ-45/Rollover	PC	Table A-1
			ASCII terminal	Table A-2
Auxiliary	Black	RJ-45/Rollover	Modem	Table A-3
Fast Ethernet	Yellow	RJ-45/Fast Ethernet	LAN	Table A-5
Analog voice multiport	Gray	RJ-21X/ 50-conductor	Distribution panel for analog telephone, fax, PBX, or central office line	Table A-5

Remote Terminal Connections (If Applicable)

If you are configuring a Cisco VG224 voice gateway from a remote location, connect the modem and the remote PC or terminal to the telephone network as described in this section.

Connecting to a Modem

To connect the local modem and the remote modem to live telephone outlets, use standard telephone cables.

Connecting to a Remote PC

To link a Cisco VG224 voice gateway to a remote PC, use the following procedure:

Note The remote PC must be running terminal emulation software.

Step 1 Connect the remote PC and modem.

Step 2 Set the PC terminal emulation software requirements:

9600 baud
8 data bits
1 stop bit
no parity
no flow control.

Step 3 Key in and dial the telephone number of the Cisco VG224 voice gateway external modem.

Connecting to a Remote ASCII Terminal

To link a Cisco VG224 voice gateway to a remote ASCII terminal, such as a VT100, use the following procedure:

Step 1 Connect the remote ASCII terminal and modem.

Step 2 Set the terminal requirements:

9600 baud
8 data bits
1 stop bit
no parity
no flow control.

Step 3 Key in the telephone number of the Cisco VG224 voice gateway external modem, or, if you are using a Hayes-compatible modem, enter **ATDT** and the number to be dialed.

Connecting Backup Power

A Cisco VG224 voice gateway can be installed with optional backup power. Backup power to a DC-powered chassis is provided by a 12-volt battery backup system; see the "Connecting a Backup Battery to a DC-Powered Cisco VG224" section for connection instructions. Backup power to an AC-powered chassis is provided by an uninterruptible power supply (UPS); see the "Connecting a UPS to an AC-Powered Cisco VG224" section for connection instructions.

Caution The Cisco VG224 chassis provides inputs for both AC and DC power. Design your installation to use only one type of power. *Do not use AC and DC power at the same time.* If you do, the unit stops operating, and you must reboot it with only a single power source.

The maximum power requirement for the Cisco VG224 voice gateway is 70 W.

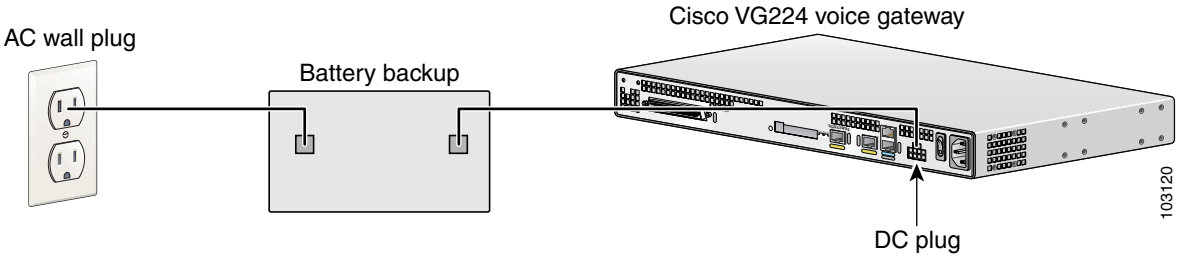
Connecting a Backup Battery to a DC-Powered Cisco VG224

Connect a 12-volt backup battery to the DC input connector on your Cisco VG224 voice gateway. Before you install a backup battery, be sure to read the installation instructions for the backup battery equipment.

Figure 3-15 shows a setup using an external backup battery.

Note Figure 3-15 shows one possible setup; please review your backup battery documents before setting up your system.

Figure 3-15 Connecting a Battery Backup to a DC-Powered Cisco VG224



Caution Use a backup battery only if you are not using AC to power your Cisco VG224 voice gateway. *Do not use AC and DC power at the same time*. If you do, the unit stops operating, and you need to reboot it with only a single power source.

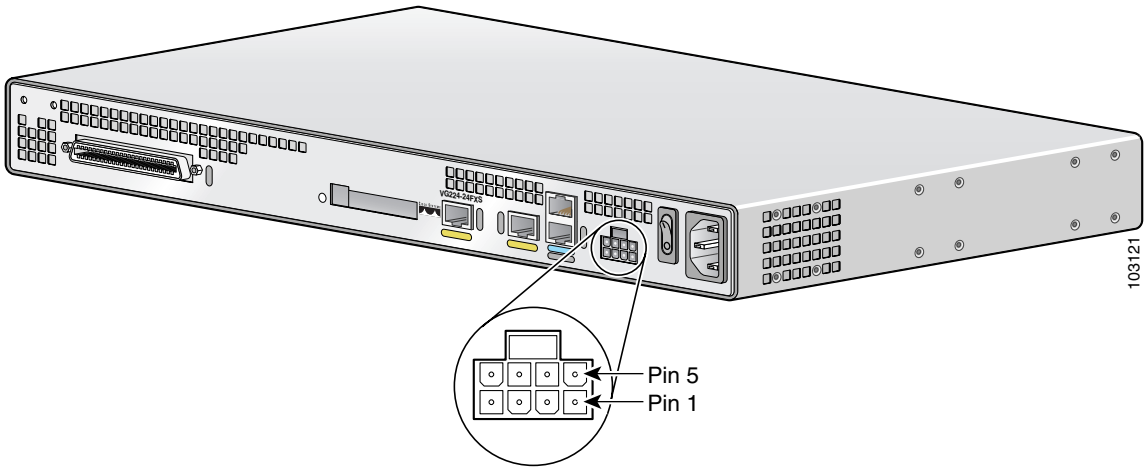
Note We recommend a 12-volt automotive battery if you require longer periods of battery backup (up to 8 hours).

Figure 3-16 shows the DC power connector. See Table 3-5 for pinout information for the DC power connector on the Cisco VG224 voice gateway.

Table 3-5 Pinouts for DC Power Connector

Pin Number	Descriptions	Pin Number	Descriptions
1	GND (input enable)	5	ON_BAT (battery is on)
2	+12V (power)	6	+12V (power)
3	REP_BAT (replace battery)	7	LOW_BAT (battery is low)
4	GND (power return)	8	GND (power return)

Figure 3-16 DC Power Connector



Connecting a UPS to an AC-Powered Cisco VG224

Connect an uninterruptible power supply to the AC input on your Cisco VG224 voice gateway. Before you install a UPS, be sure to read the installation instructions for the UPS.

Figure 3-17 shows a setup using a UPS.

Note Figure 3-17 shows one possible setup; please review your UPS documents before setting up your system.

Figure 3-17 Connecting a UPS to an AC-Powered Cisco VG224