Cisco VG400 Voice Gateway Hardware Installation Guide

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Introduction to Cisco VG400 Voice Gateway

Cisco medium-density Analog Voice Gateway provide enterprises, managed services providers, and service providers the ability to directly connect public-switched telephone networks (PSTNs) and existing telephony equipment to Cisco 4000 Series Integrated Services Routers. These FXS and FXO ports provide Dual-Tone Multifrequency (DTMF) detection, voice compression and decompression, call progress tone generation, Voice Activity Detection (VAD), echo cancellation, and adaptive jitter buffering. Cisco VG400 Voice Gateway is a medium-density analog voice gateway. It is an intermediate path that enables TDM to IP transition.

The Cisco VG400 Voice Gateway supports the following interfaces:

- Two RJ45 Gigabit Ethernet (GE) ports
- One RJ45 Console Port
- One USB 2.0 Port
- LED for System, GE Port, and Console Port Status

Features and Benefits of Cisco VG400 Voice Gateway

Cisco VG400 Voice Gateway provides VoIP connectivity to analog devices, such as analog desk phones, analog conference room phones, fax machines, and modems. Cisco 400 Voice Gateway provides several improvements from the previous high-density analog and digital extension modules (EVMs), in the following ways:

- **On-board Digital Signal Processor (DSP)**—The FXO and FXS ports contain an onboard DSP and don't require the router to have a dedicated packet voice DSP module (PVDM) on the motherboard. The DSP on the voice module is necessary for the voice features. It also provides for echo cancellation of up to 128-ms echo-tail length for demanding network conditions.
- **FXS-E (extended loops) support**—FXS ports on the new modules support FXS-E with the following details:

  - Higher loop current (35 mA) to accommodate specialty phones
  - Longer loop length for loops with 26 AWG wire, up to 11,000 feet (3400 meters)

- Higher ringing voltage (65 Vrms, no load)

- **FXO failover bypass ports**—A failover bypass port, also called a failover trunk bypass, provides a way to use designated analog phone ports to make phone calls through the PSTN during a power outage.

In addition to these features, Cisco 400 Voice Gateway also supports the following features:

- Caller line ID
- G.711, G.729a, and G.726
- G722, iLBC, GSMAMR-NB, and Internet Speech Audio Codec (iSAC)
- Fax detection, pass-through, and relay (T.38)
- Modem pass-through
- DTMF detection
- Echo cancellation
- Voice activity detection
- Comfort noise generation
- Real-Time Control Protocol (RTCP)
- Acoustic shock protection
- Real-Time Transport Protocol (RTP)
- RFC 4733 Digit Relay
- Noise reduction is on the roadmap

The FXS features include:

- Support for either FXS or DID functionality
- Message-Waiting Indicator (MWI)
- Cable detection: GR909 line test
- The FXO features include:
- Support for both ground-start and loop-start modes
- Support for FXO CAMA signaling type
- Call Detail Record (CDR) information
- Support for interworking with Cisco Unified Communications Manager (Skinny Client Control Protocol [SCCP]), H.323, Session Initiation Protocol (SIP), and Media Gateway Control Protocol (MGCP) 0.1
- Cable detection
- Overload protection

Analog Phone Connectivity

Cisco 400 Voice Gateway are ideal for analog phone deployments ranging from centralized to sparsely concentrated or distributed topologies. Cisco 400 Voice Gateway offer many supplementary analog calling features, depending on the call control and signaling type used. All supplementary analog features are supported through the FXS and FXO ports. The analog interface on Cisco 400 Voice Gateway also supports Feature Access Codes (FACs) for invoking supplementary services.

Fax and Modem Connectivity

FXS ports on Cisco 450 Voice Gateway support fax machines and modems. When using fax machines, the gateways support T.38 fax relay and fax pass-through. T.38 fax relay technologies allow transfer of faxes

across the network with high reliability using less bandwidth than a voice call. All modems can be connected to the Cisco VG Series Gateways and are transferred over the network using modem pass-through.

Protocols Supported

The voice gateways support the following protocols:

- SCCP
- H.323v4
- MGCP
- SIP
- Real-Time Transport Protocol (RTP)
- Secure Real-Time Transport Protocol (SRTP)
- Trivial File Transfer Protocol (TFTP)
- HTTP server
- Simple Network Management Protocol (SNMP)
- Telnet
- Dynamic Host Configuration Protocol (DHCP)
- DNS
- Cisco Unified Communications Manager or Cisco Unified Communications Manager Express redundancy support using Hot Standby Router Protocol (HSRP)
- Call survivability: MGCP failover to an H.323 connection to the Survivable Remote Site Telephony (SRST) router
- T.38 fax relay and modem pass-through
- Codec support: G.711, G.729. G.729a will be used if the gateway does not support G729 annex b
- RADIUS and TACACS+ for Telnet and authorization

Cisco VG400 Voice Gateway Chassis

The following figures show the front and back panels of the Cisco VG400 Voice Gateway Chassis:

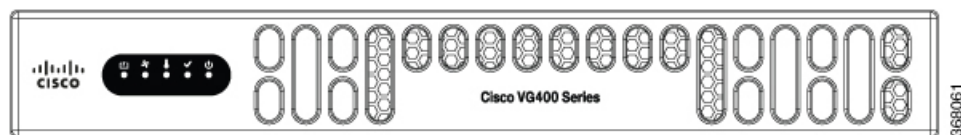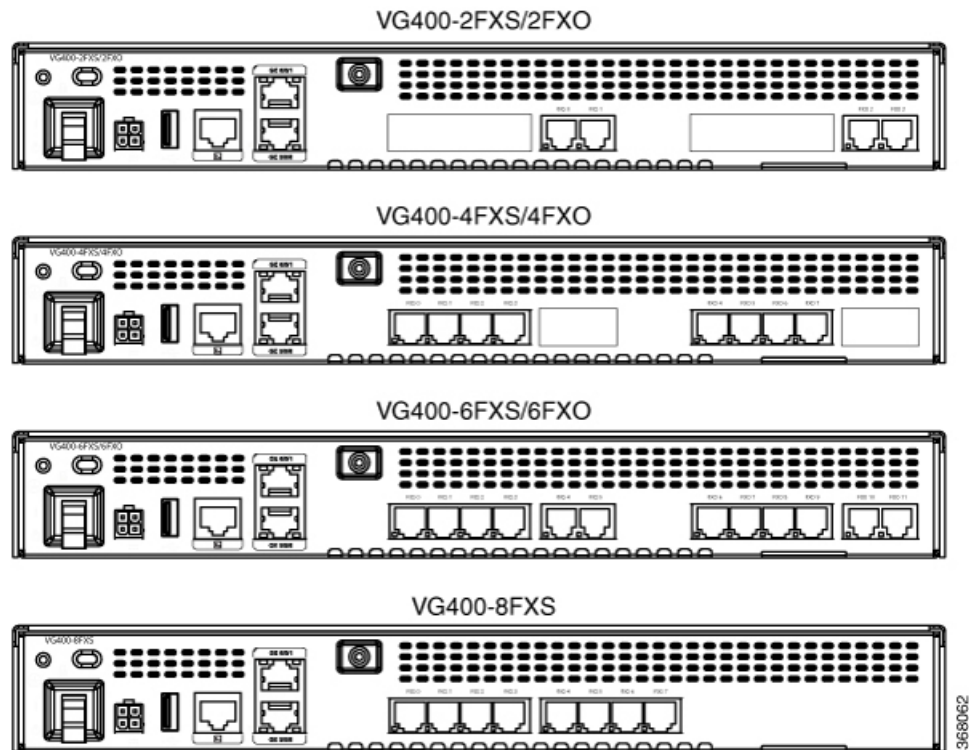*Figure 1: Front panel of the Cisco VG400 Voice Gateway*

Figure 2: Back Panel of the VG400 Voice Gateway

LED Indicators

The following table summarizes the LED indicators that are located in the bezel side of Cisco VG400 Voice Gateway:

Table 1:

LED	Represents	Color	Description
PWR	System Power	Green	System power is on and functions correctly
		Green blinking	System power is on and in the process of shutting down
		Amber	System power is up, but low level initialization has failed
		Amber blinking	System power is up, but the system has failed to come out of reset
		Off	System power is off

LED	Represents	Color	Description
STAT	System Status	Solid Green	System operates normally
		Blinking Amber	BIOS/RUMMON booting
		Amber	BIOS/ROMMON has completed booting, and system is at the ROMMON prompt or the booting platform software
FLASH	SystemFlash status	Blinking Green	Compact flash/eUSB flash is present and is currently being accessed. Note Do not remove the flash device while the system is powered on.
FXS/FXO	Voice port status	Green	The voice port is on an active call. That is, in an offhook state.
		Off	The voice port is not on an active call. That is, in an idle state or onhook state.
TEMP	Temperature Status	Solid Green	All the temperature sensors in the system are within the acceptable range
		Amber	One or more temperature sensors in the system are outside the acceptable range
		Off	Temperature is not being monitored
FAN	Fan status	Green	All the fans are operating
		Amber	One of the fans has stopped working
		Blinking Amber	Two or more fans have stopped working, or the fan tray has been removed
		Off	Fans are not monitored

Slot, Bay, and Ports

The FXO port is used to connect to PBX or key systems, or to provide off-premises connections to the PSTN. It supports battery reversal detection and caller ID. The FXO port is also used to connect to analog Centralized Automatic Message Accounting (CAMA) trunks to provide dedicated E-911 service (only in North America).

The FXS port is used to connect analog phones, modems, fax machines, and speaker phones to an enterprise IP voice system, to use them as extensions to your Cisco or third-party IP call-control system. Having these devices tightly integrated with the IP-based phone system is advantageous for increased manageability, scalability, and cost-effectiveness. The Direct Inward Dialing (DID) port is used to provide off-premises DID connection from the central office. It serves only incoming calls from the PSTN. The Caller ID feature is not supported in DID mode.

The following table provides information about Cisco 400 Voice Gateway SKU:

Table 2: Cisco 400 Voice Gateway FXS-E/DID, REN, Failed-over Port Support

Interface	Maximum Number of FXS-E Ports	Maximum Number or RENs	RJ-11 Connectors	Number of Failed-over Ports
VG400-2FXS/2FXO	2	10	FXS: 1x2 FXO: 1x2	2
VG400-4FXS/4FXO	4	12	FXS: 1x4 FXO: 1x4	4
VG400-6FXS/6FXO	6	12	FXS: 1x2 1x4 FXO: 1x2 1x4	6
VG400-8FXS	8	16	FXS: 1x4 1x4	—

Table 3: Slot, bay, and port information for Cisco VG400 FXS Port

Interface	Slot	Bay	Port
2FXS/2FXO 0/1/0-1	0	1	0-1
4FXS/4FXO 0/1/0-3	0	1	0-3
6FXS/6FXO 0/1/0-5	0	1	0-5
8FXS	0	1	0-7

Table 4: Slot, bay, and port information for Cisco VG400 FXO Port

Interface	Slot	Bay	Port
2FXS/2FXO 0/1/2-3	0	1	2-3
4FXS/4FXO 0/1/4-7	0	1	4-7
6FXS/6FXO 0/1/6-11	0	1	6-ll

Technical and Compliance Specifications

The following table details the technical specifications of Cisco VG400 Voice Gateway.

Table 5: Cisco VG400 Voice Gateway Technical Specifications

Feature	VG400-2FXS/2FXO	VG400-4FXS/4FXO	VG400-6FXS/6FXO	VG400-8FXS
Physical				
Dimensions (H x W x D)	1.72 x 12.7 x 10" (43.7 x 322.6 x 254 mm)	1.72 x 12.7 x 10" (43.7 x 322.6 x 254 mm)	1.72 x 12.7 x 10" (43.7 x 322.6 x 254 mm)	1.72 x 12.7 x 10" (43.7 x 322.6 x 254 mm)
Weight	6.75 lb (3.06 kg)	6.75 lb (3.06 kg)	6.75 lb (3.06 kg)	6.75 lb (3.06 kg)
Power				
AC power	63W	67W	72W	55W
Current	1.5 to 0.6A	1.5 to 0.6A	1.5 to 0.6A	1.5 to 0.6A
Voltage	100 to 240 VAC auto ranging	100 to 240 VAC auto ranging	100 to 240 VAC auto ranging	100 to 240 VAC auto ranging
On-hook voltage	-44V	-44V	-44V	-44V
Off-hook loop current	25 mA (maximum) for short loop-length-port 35 mA for long loop-length-port	25 mA (maximum) for short loop-length-port 35 mA for long loop-length-port	25 mA (maximum) for short loop-length-port 35 mA for long loop-length-port	25 mA (maximum) for short loop-length-port 35 mA for long loop-length-port
Operating temperature	32º to 104ºF (0º to 40ºC)	32º to 104ºF (0º to 40ºC)	32º to 104ºF (0º to 40ºC)	32º to 104ºF (0º to 40ºC)
Non-operating temperature	-40º to 158ºF (-40º to 70ºC)	-40º to 158ºF (-40º to 70ºC)	-40º to 158ºF (-40º to 70ºC)	-40º to 158ºF (-40º to 70ºC)

Feature	VG400-2FXS/2FXO	VG400-4FXS/4FXO	VG400-6FXS/6FXO	VG400-8FXS
FXS loop resistance	Up to 600 ohms for short loop-length-port Up to 1400 ohms for long loop-length-port	Up to 600 ohms for short loop-length-port Up to 1400 ohms for long loop-length-port	Up to 600 ohms for short loop-length-port Up to 1400 ohms for long loop-length-port	Up to 600 ohms for short loop-length-port Up to 1400 ohms for long loop-length-port
DID loop resistance	Up to 1800 ohms (including terminal equipment)	Up to 1800 ohms (including terminal equipment)	Up to 1800 ohms (including terminal equipment)	Up to 1800 ohms (including terminal equipment)
Ringtone	Configurable for different country requirements	Configurable for different country requirements	Configurable for different country requirements	Configurable for different country requirements
Ring voltage	54 Vrms into 5 ringer equivalence numbers (RENs) at zero-loop-length port (balanced) (short-loop-length port) 65 Vrms into 2 RENs at zero-loop-length port (balanced) (long-loop-length port)	54 Vrms into 5 ringer equivalence numbers (RENs) at zero-loop-length port (balanced) (short-loop-length port) 65 Vrms into 2 RENs at zero-loop-length port (balanced) (long-loop-length port)	54 Vrms into 5 ringer equivalence numbers (RENs) at zero-loop-length port (balanced) (short-loop-length port) 65 Vrms into 2 RENs at zero-loop-length port (balanced) (long-loop-length port)	54 Vrms into 5 ringer equivalence numbers (RENs) at zero-loop-length port (balanced) (short-loop-length port) 65 Vrms into 2 RENs at zero-loop-length port (balanced) (long-loop-length port)
Ring frequency	20, 25, 30, and 50 Hz	20, 25, 30, and 50 Hz	20, 25, 30, and 50 Hz	20, 25, 30, and 50 Hz
REN loading	5 RENs per port (short-loop-length port) 2 RENs per port (long-loop-length port)	5 RENs per port (short-loop-length port) 2 RENs per port (long-loop-length port)	5 RENs per port (short-loop-length port) 2 RENs per port (long-loop-length port)	5 RENs per port (short-loop-length port) 2 RENs per port (long-loop-length port)
RJ-11 FXS port terminating impedance option	600c, 600r, 900c, 900r, complex1, complex2, complex3, complex4, complex5, and complex6	600c, 600r, 900c, 900r, complex1, complex2, complex3, complex4, complex5, and complex6	600c, 600r, 900c, 900r, complex1, complex2, complex3, complex4, complex5, and complex6	600c, 600r, 900c, 900r, complex1, complex2, complex3, complex4, complex5, and complex6
Disconnect supervision	Power denial (calling party control and far-end disconnect)	Power denial (calling party control and far-end disconnect)	Power denial (calling party control and far-end disconnect)	Power denial (calling party control and far-end disconnect)
Caller ID	On-hook transmission of frequency-shift-keying (FSK) data Support for DTMF caller ID	On-hook transmission of frequency-shift-keying (FSK) data Support for DTMF caller ID	On-hook transmission of frequency-shift-keying (FSK) data Support for DTMF caller ID	On-hook transmission of frequency-shift-keying (FSK) data Support for DTMF caller ID

Feature	VG400-2FXS/2FXO	VG400-4FXS/4FXO	VG400-6FXS/6FXO	VG400-8FXS
FXS loop length	Short-loop-length port: 3000 ft (900 m) with 26 AWG, 5500 ft (1700 m) with 24 AWG Long-loop-length port: 11,000 ft (3400 m) with 26 AWG, 18,000 ft (5500 m) with 24 AWG	Short-loop-length port: 3000 ft (900 m) with 26 AWG, 5500 ft (1700 m) with 24 AWG Long-loop-length port: 11,000 ft (3400 m) with 26 AWG, 18,000 ft (5500 m) with 24 AWG	Short-loop-length port: 3000 ft (900 m) with 26 AWG, 5500 ft (1700 m) with 24 AWG Long-loop-length port: 11,000 ft (3400 m) with 26 AWG, 18,000 ft (5500 m) with 24 AWG	Short-loop-length port: 3000 ft (900 m) with 26 AWG, 5500 ft (1700 m) with 24 AWG Long-loop-length port: 11,000 ft (3400 m) with 26 AWG, 18,000 ft (5500 m) with 24 AWG
Ring Waveform	Sine wave if no DC offset	Sine wave if no DC offset	Sine wave if no DC offset	Sine wave if no DC offset
VMWI	FXS ports on VG400 support both FSK and DC voltage VMWI. Default to FSK. (DC voltage VMWI is only supported with STCAPP protocol)	FXS ports on VG400 support both FSK and DC voltage VMWI. Default to FSK. (DC voltage VMWI is only supported with STCAPP protocol)	FXS ports on VG400 support both FSK and DC voltage VMWI. Default to FSK. (DC voltage VMWI is only supported with STCAPP protocol)	FXS ports on VG400 support both FSK and DC voltage VMWI. Default to FSK. (DC voltage VMWI is only supported with STCAPP protocol)
Cables	Category 3 and Category 5	Category 3 and Category 5	Category 3 and Category 5	Category 3 and Category 5

The following table details the compliance specifications of Cisco VG400 Voice Gateway.

Compliance Specification	Description
Safety	• UL 60950-1 • CAN/CSA C22.2 No. 60950-1 • EN 60950-1 • AS/NZS 60950-1 • IEC 60950-1
Telecom	• TIA/EIA/IS-968 • CS-03 • TBR21 (FXO) • ES 201 970 (FXS) • S002, S003 • Homologation requirements vary by country and interface type. For specific country information, refer to the online approvals data base at: http://www.ciscofax.com.

Compliance Specification	Description
EMC	• 47 CFR, Part 15 • CES-003 Issue 4 • EN55022 Class A/B • CISPR22 Class A/B • AS/NZS 3548 Class A • VCCI V-3 • CNS 13438 • EN 300-386
Immunity	• EN 55024, CISPR 24 • EN50082-1 • EN 61000-6-1 • EN300-386

Platform and Software Requirements

Cisco 400 Voice Gateway is supported on IOS XE Release16.10.1. The ports provide gateway services for Cisco Unified Communications using Cisco Unified Communications Manager or Cisco Unified Communications Manager Express. The following list provides information about the software version that is compatible with the FXO and FXS ports:.

  • CUCM: 12.5.1, 12.0.1su2 and 12.0.1 (with device pack)

  • IOS XE: Version 16.10.1 and later

Configuration Methods

After Cisco 400 Voice Gateway is operational, use the procedures in *Cisco 400 Voice Gateway Software Configuration Guide* to configure the specific services and functions or to make changes to an existing configuration.

There are multiple methods for configuring Cisco 400 Voice Gateways:

  • System configuration dialog

  • Configuration mode: Cisco IOS software CLI

  • Setup command facility: Remote configuration through a LAN

  • SNMP-based application: CiscoView or HP OpenView

  • HTTP-based configuration server: Provides access to the CLI from a web browser

Planning Your Installation

This chapter provides preinstallation information, such as recommendations and requirements that must be met before installing Cisco VG400 Voice Gateway. Before you begin, inspect all items for shipping damage. If anything appears to be damaged or if you encounter problems installing or configuring the Voice Gateway, contact the customer service. Warranty, service, and support information is included in the Hardware Quick Start guide that is shipped with your product. See the following sections to prepare for installation:

Location and Mounting Requirements

The three mounting possibilities for your Cisco VG400 Voice Gateway are as follows:

- Rack-mount
- Wall-mount
- Bench-mount

The mounting location must provide the following:

- Access to the chassis.
- Access to a suitable power source.
- Access to an appropriate earth ground.
- Allowance for adequate heat dissipation and airflow around the chassis.

Temperature Control and Ventilation

The installation location (room, closet, or cabinet) for the Cisco VG400 Voice Gateway should always be well ventilated and provide adequate air circulation to ensure proper cooling. The room temperature should be maintained between 32 to 104°F (0 to 40°C).

Note The Cisco VG400 Voice Gateway chassis is designed for back and sides-to-front airflow.

Rack requirements

The following information can help you plan your equipment rack configuration:

- Allow clearance around the rack for maintenance.

- Enclosed racks must have adequate ventilation. Ensure that the rack is not congested, because the hardware generates heat. An enclosed rack should have louvered sides and a fan to provide cooling air. Heat generated by equipment at the bottom of the rack can be drawn upward into the intake ports of the equipment above it.

- When mounting a chassis in an open rack, ensure that the rack frame does not block the intake or exhaust ports. If the chassis is installed on slides, check the position of the chassis when it is seated in the rack.

If the Cisco VG400 Voice Gateway is installed in an enclosed rack with a ventilation fan at the top, make sure that heated air drawn upward from other equipment does not prevent adequate cooling.

If the chassis is installed using slide rails, check for blocked ventilation ports when it is in position in the rack or cabinet. Make sure that the ventilation ports of the Cisco VG400 Voice Gateway are not blocked.

Baffles can help isolate exhaust air from intake air. Baffles also help draw cooling air through the cabinet. The best location for the baffles depends on the airflow patterns in the rack. You can test the airflow by experimenting with different equipment arrangements.

Access to Chassis

Allow space at the rear of the chassis for cable connections. Also consider the need to access the chassis for future upgrades, maintenance, and troubleshooting.

Chassis grounding is provided through the power cable, which uses a standard grounding plug. However, the chassis also requires a reliable earth ground using the earth ground lug and hardware provided. For more information, see the Chassis Grounding section.

Power Source and Supply

Check the power at your site to ensure that you are receiving "clean" power (free of spikes and noise). Install a power conditioner if necessary.

A Cisco VG400 Voice Gateway with AC power supply auto selects power ranging from 100-240V. AC versions include a 6-foot (1.8-meter) electrical power cord.

To handle power failure conditions, an uninterrupted power supply (UPS) is needed. UPS is widely available in all markets, including emerging markets (due to prevalence of UPS for personal computers).

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. Statement 1071

SAVE THESE INSTRUCTIONS

Warning   This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than 20A Statement 1005

Network Cabling Considerations

The cable types that are used are dependent on the Cisco VG400 Voice Gateway that you are using. For more information, see the *Cable Specifications and Information* in this guide..

The following are the cable types that are used in Cisco VG400 Voice Gateway:

- GE cables
- Analog voice cables (RJ-11)

Distance Limitations for Interface Cables

When planning your installation, consider distance limitations and potential electromagnetic interference (EMI) as defined by the Electronic Industries Association (EIA). Distance limitation information is included for the following VG ports:

- Gigabit Ethernet Maximum Distance: The maximum segment distance for Gigabit Ethernet is 330 feet (100 meters) (specified in IEEE 802.3).
- FXS Analog Voice Port Maximum Distance: The maximum distance is established by a total allowable loop resistance, including the phone or terminal equipment, of 600 ohms.
- FXS-E (Extended loop) Analog Voice Port Maximum Distance: The maximum distance is established by a total allowable loop resistance, including the phone or terminal equipment, of 1400 ohms.

Note   Typically, a 26 AWG wire is equal to 81.6 ohm/Kft and 24 AWG wire is equal to 51.3 ohm/Kft.

Interference Considerations

When you run cables for any significant distance in an electromagnetic field, interference can occur between the electromagnetic field and the signals on the cables. This has two implications for the installation of terminal plant cabling:

- Unshielded plant cabling can emit radio interference.
- Strong electromagnetic interference (EMI), especially as caused by lightning or radio transmitters, can destroy the EIA/TIA-232 drivers and receivers in the Cisco vg400 Voice Gateway.

If you use twisted-pair cables with a good distribution of grounding conductors in your plant cabling, emitted radio interference is unlikely.

If you have cables exceeding recommended distances, or if you have cables that pass between buildings, give special consideration to the effect of lightning strikes or ground loops. If your site has these characteristics, consult experts in lightning suppression and shielding. The electromagnetic pulse caused by lightning or other high-energy phenomena can easily couple enough energy into unshielded conductors to destroy electronic devices.

Most data centres cannot resolve such infrequent, but potentially catastrophic problems just described without pulse meters and other special equipment. Take precautions to avoid these problems by providing a properly grounded and shielded environment and by installing electrical surge suppression.

If you remove any module, you must either install a module in its place or install a cover plate over the opening. All module openings must be either occupied or covered to prevent electromagnetic interference.

For advice on the prevention of electromagnetic interference, consult experts in radio-frequency interference (RFI).

Required tools and equipment for installation

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

You need the following tools and equipment to install and upgrade the Voice Gateway and its components:

- Standard flat-blade screwdriver as required for attaching the brackets, as per your mounting.

- Phillips screwdriver for attaching the brackets to the Voice Gateway.

- Mounting brackets and screws for the 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 applicable):

    - Eight wood screws or other fasteners, for installing the chassis on a wall.

    - An additional starter screw can be used to facilitate wall-mounting.

- An ESD-preventive wrist strap

- In addition, you might also need the following external equipment:

  - A Console terminal or PC with terminal emulation software

  - A PC running terminal emulation software for administrative access

  - Modem for remote access.

  - Analog voice RJ-11 cables

  - Ethernet switch

- A modem for remote configuration.

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

Installation Checklist

The Installation Checklist lists the tasks for installing a Cisco VG400 Voice Gateway. Print a copy of this checklist and mark the entries as you complete each task. For each Cisco VG400 Voice Gateway, include a copy of the checklist in your Site Log.

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		

Task	Verified by	Date
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		

Installing the Cisco VG400 Voice Gateway

The following chapter describes how to install and connect a Cisco VG400 Voice Gateway. The following sections provide the installation procedures in detail:

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. Statement 1071

Warning

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

Warning

Read the installation instructions before using, installing or connecting the system to the power source. Statement 1004

Warning

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

Safety Recommendations

Before you begin the installation, read the following safety warnings and 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 Installation of the equipment must comply with local and national electrical codes. Statement 1074

Warning Avoid using or servicing any equipment that has outdoor connections during an electrical storm. There may be a risk of electric shock from lightning. Statement 1088.

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

General Safety Practices

Follow these guidelines to ensure personal safety and to 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.

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).

Unpacking and Inspection

Do not unpack the Cisco VG400 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 VG400, 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 VG400 Voice Gateway
- Power cord (Auto expland via PDT)
- RJ-45-to-DB-25 adapter cable (labeled Console) - choose an option for this cable, or by default, the auto expand option is delivered
- RJ-45-to-DB-9 adapter cable (labeled Auxiliary) - choose an option for this cable, or by default, the auto expand option is delivered
- Rack-mounting - place an order through the ordering tool

Inspect all the items for shipping damage. If anything appears damaged, or if you encounter problems when installing or configuring your system, contaca customer service representative.

Install the Cisco VG400 Voice Gateway

You can install the Cisco VG400 Voice Gateway in one of the following ways:

Setting the Chassis on a Desktop

You can place the router on a desktop, bench top, or shelf.

✎

Note   Do not set the chassis in an area where the high acoustic noise can be an issue.

⚠️

Caution   Do not place anything on top of the hardware that weighs more than 5 lbs. or applies a point load of greater than 1 lbs. Excessive weight damages the chassis. Additionally, do not stack other electronic equipment on top of the hardware so as not to impede or interfere with the cooling mechanisms.

⚠️

Warning   To prevent airflow restriction, allow clearance around the ventilation openings to be at least 1 inch (2.54cms). Statement 1076.

After you install the voice gateway, you must connect the chassis to a reliable earth ground. For the chassis ground connection procedures, see the Chassis Grounding section.

Attach Cisco VG400 Voice Gateway Chassis to Wall

Step 1   Attach the voice gateway chassis to the wall by using the fasteners.

Note   The fasteners that you use must support the weight of the VG400 Voice Gateway.

The head diameter of the fasteners should be sized to fit in the key slot on the chassis bottom. The maximum diameter of the fastener head should not exceed .250" and the maximum shank diameter should not exceed .130".

You must adjust the fastener to allow for the head of the fastener insert into the key slot.

Caution   Your chassis installation must allow unrestricted airflow for chassis cooling.

Step 2   Attach the voice gateway to as shown in the following image.

Note   If you prefer, you can also install the voice gateway diagonally using the other two sides.
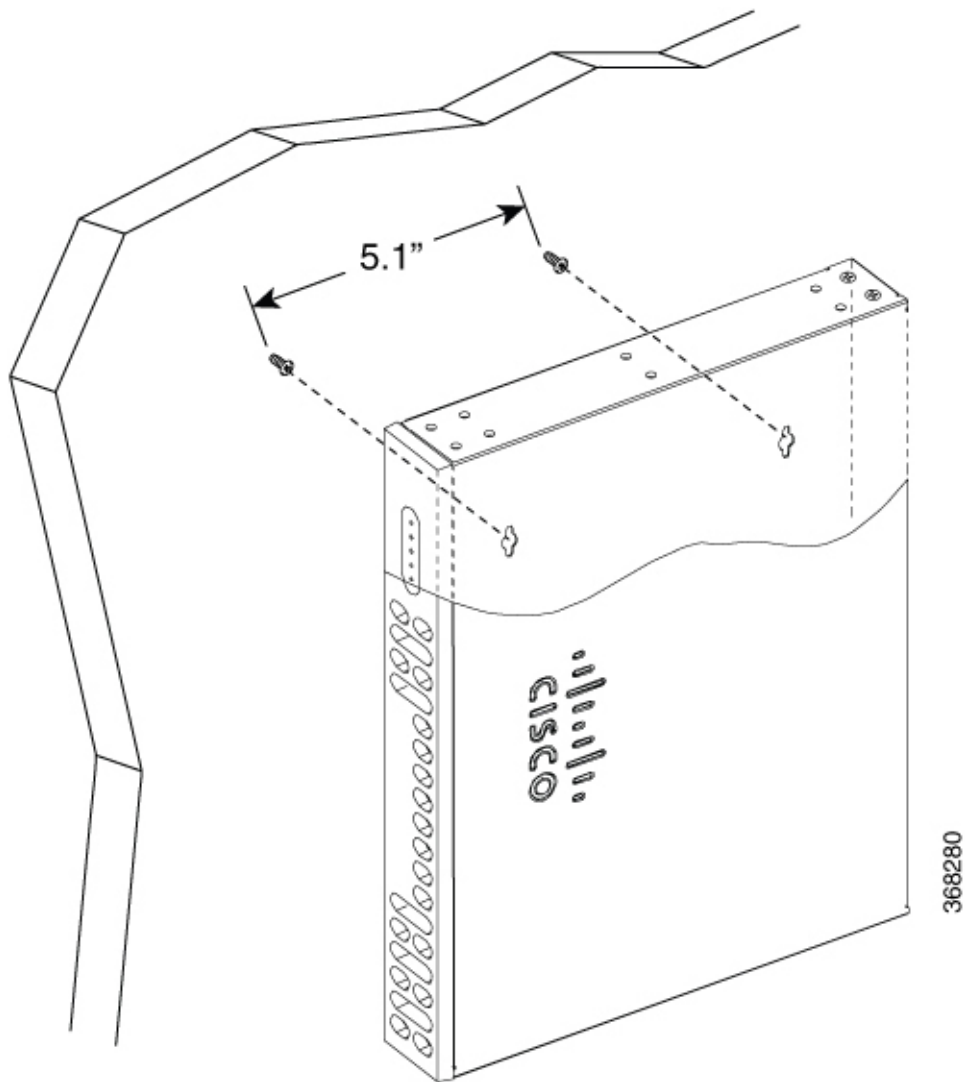
After you install the voice gateway, you must connect the chassis to a reliable earth ground. For the chassis ground connection procedure, see the *Chassis Grounding* section.

Mount Cisco VG400 Voice Gateway Chassis in Rack

⚠

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.

Cisco VG400 Voice Gateway can be installed in 19-inch (48.26-cm) EIA racks. Use the standard brackets shipped with the hardware for mounting the chassis in a 19-inch EIA rack.

You can mount the voice gateway in the following ways:

- Center-front mounting: Brackets attached in the center front of the chassis with only the front panel facing forward.

- Center-back mounting: Brackets attached in the center back of the chassis with only the back panel facing forward.

- Front mounting: Brackets attached at the front of the chassis with the front panel facing forward.

- Back mounting: Brackets attached at the back of the chassis with the back panel facing forward.

1. Attach the mounting brackets to the chassis as shown in the following images, using the screws provided.

   ⚠

   Caution Do not over-torque the screws. The recommended torque is 15 to 18 inch-lb (1.7 to 2.0 N-m).

2. Attach the second bracket to the opposite side of the chassis. Use a number-2 Phillips screwdriver to install the number-8 bracket screws.

   ⚠

   Caution Your chassis installation must allow unrestricted airflow for chassis cooling.

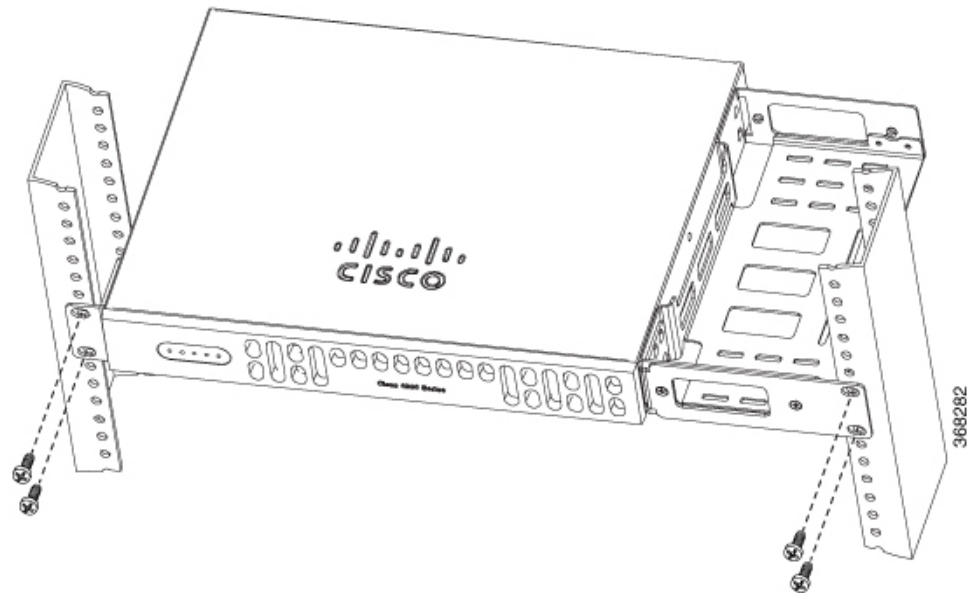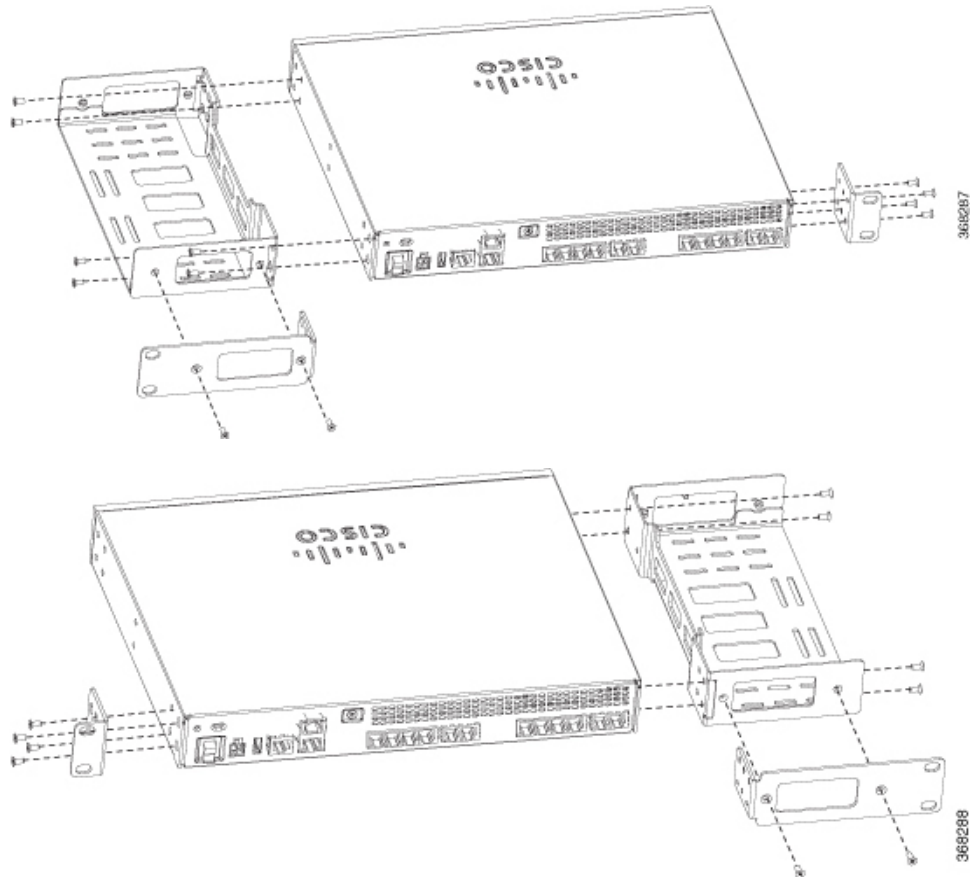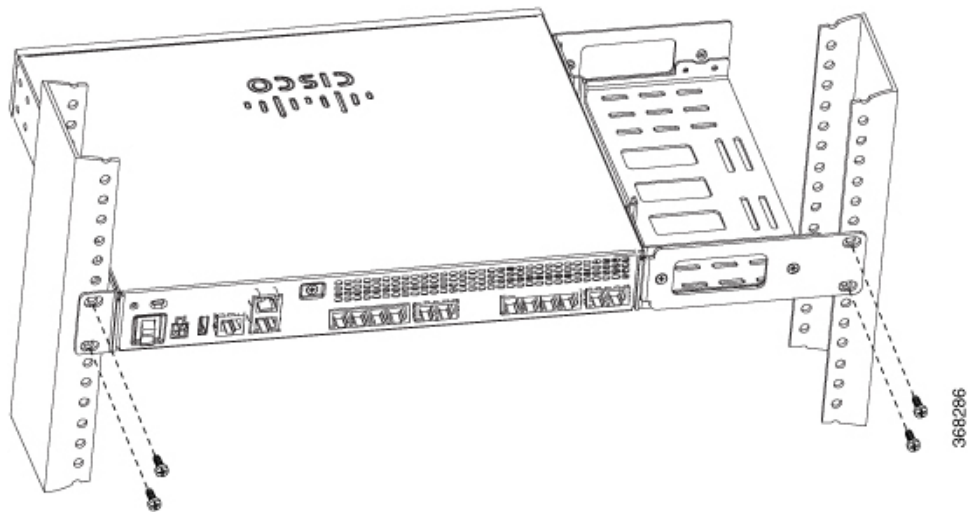*Figure 3: Bracket Installation for Front Mounting*
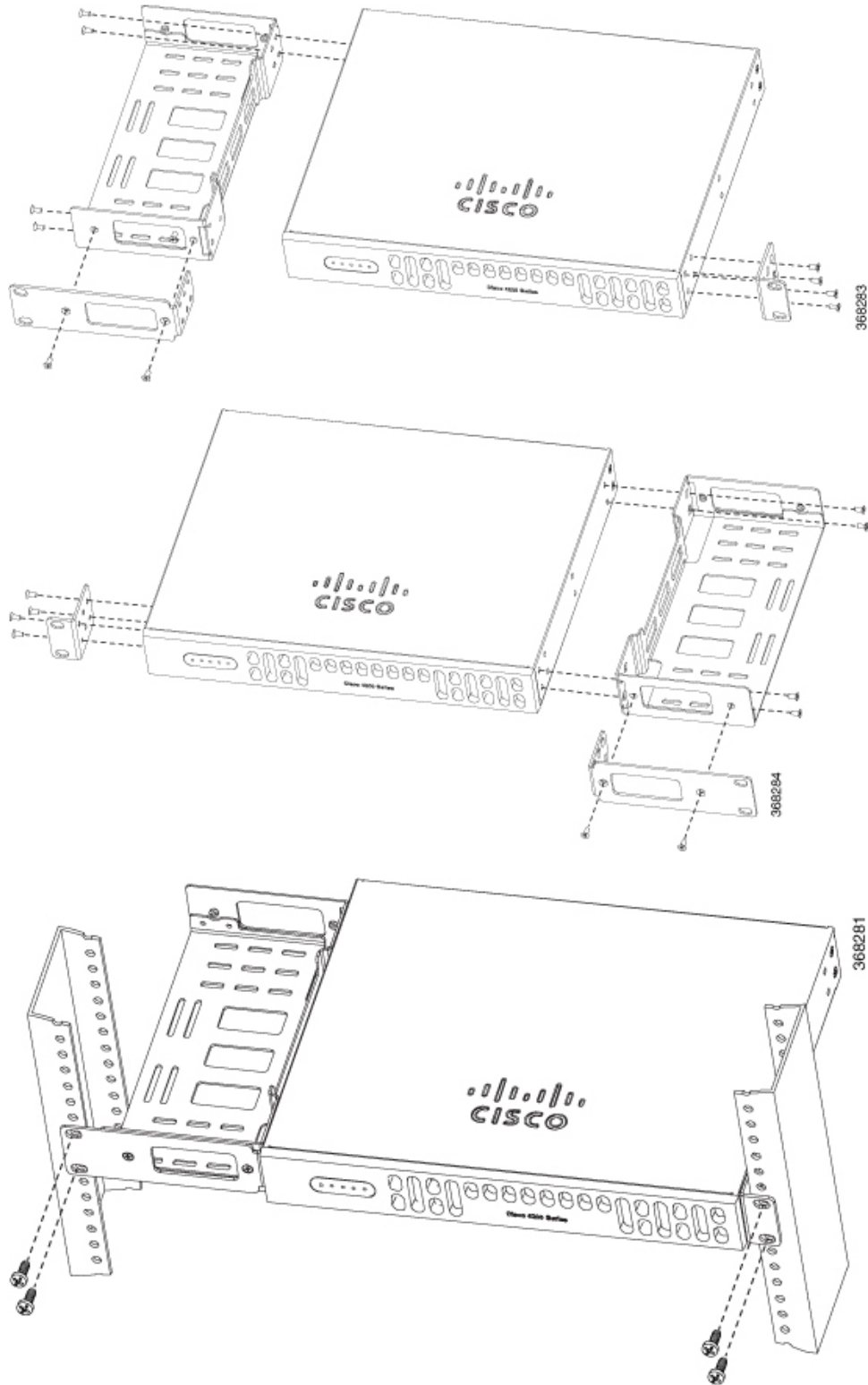
Figure 4: Bracket Installation for Back Mounting

3	Screws	4	19-inch EIA brackets

3. Use the screws provided with the rack to install the chassis in the rack. For the 19-inch EIA bracket, start the lower pair of screws first, and rest the brackets on the lower screws while you insert the upper pair of screws.

> **Tip** The screw slots in the brackets are spaced to line up with every second pair of screw holes in the rack. When the correct screw holes are used, the small, threaded holes in the brackets line up with unused screw holes in the rack. If the small holes do not line up with the rack holes, you must raise or lower the brackets to the next rack hole.

1	Mounting Screws (4)

After you install the voice gateway, you must connect the chassis to a reliable earth ground. For the chassis ground connection procedures, see the *Chassis Grounding* section.

Chassis Grounding

> **Warning** To reduce the risk of electric shock, the chassis of this equipment needs to be connected to permanent earth ground during normal use. Statement 445

Use a size 14 AWG (2 mm2) or larger copper wire and an appropriate user-supplied ring terminal with an inner diameter of 1/4 in. (5–7 mm).

To install the ground connection for your router, perform the following steps:

Step 1 Strip one end of the ground wire to the length required for the ring terminal.

Step 2 Crimp the ground wire to the ring terminal, using a crimp tool of the appropriate size.

Step 3 Attach the ground lug or ring terminal to the chassis as shown in the following image. Use one of the screws provided. Tighten the screws to a torque of 8 to 10 in-lb (0.9 to 1.1 N-m).

Figure 5: Chassis Ground Connection on the Voice Gateway
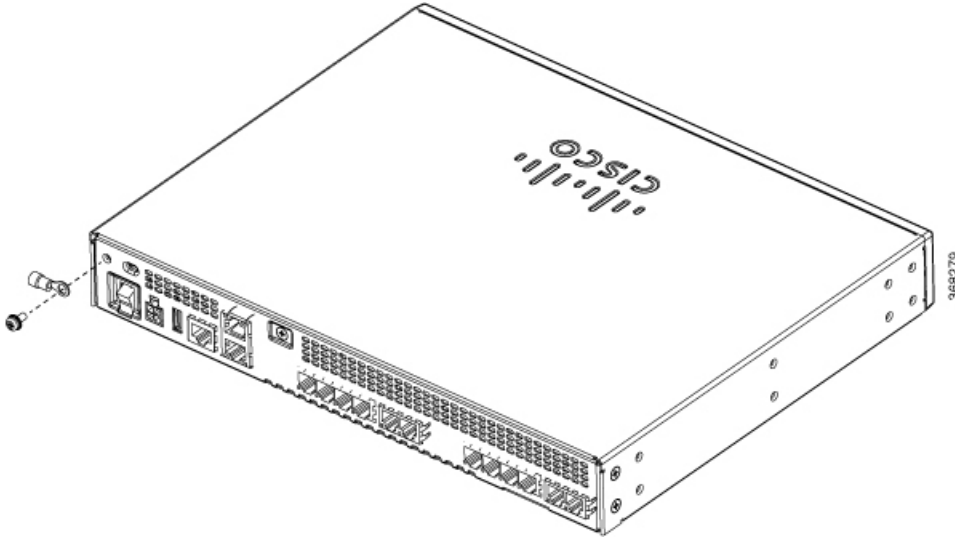
Step 4 Connect the other end of the ground wire to a known reliable earth ground point at your site.

Connect to Power Supply

This section explains how to connect AC power to the voice gateway.

Warning Read the installation instructions before using, installing or connecting the system to the power source. Statement 1004

Warning This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 20A Statement 1005

To connect the Cisco Voice Gateway to an AC power outlet, perform the following steps:

1. Connect the AC adapter to an AC power outlet.

2. Plug the adapter cord into the router.

Power-On Procedure

Perform this procedure to power on your Cisco VG400 Voice Gateway, and verify that it goes through its initialization and self-test. When this is finished, the Cisco VG400 Voice Gateway is ready to configure.

To power on the Cisco VG400 Voice Gateway, perform the following:

Before you begin

Before you power on the Cisco VG400 Voice Gateway, ensure that:

- The chassis is securely mounted

- Power cable is connected

- Interface cables are connected

SUMMARY STEPS

1. Power on your terminal or PC, and configure it for 9600 bps, 8 data bits, 1 stop bit, and no parity.
2. Move the Cisco VG400 Voice Gateway power switch to the ON position.
3. Enter **no** to proceed with manual configuration using the CLI:
4. Press Return to terminate autoinstall and continue with manual configuration.
5. Press Return to bring up the Router> prompt:
6. Enter privileged EXEC mode:
7. Continue with the Troubleshooting, on page 29 section.

DETAILED STEPS

Step 1 Power on your terminal or PC, and configure it for 9600 bps, 8 data bits, 1 stop bit, and no parity.

Step 2 Move the Cisco VG400 Voice Gateway power switch to the ON position.

The green LED next to the auxiliary port comes on and the fan starts to operate. If this does not happen, see the Troubleshooting, on page 29 section.

The following message is displayed at the end of the boot-up messages:

Example:

```
--- System Configuration Dialog ---
Would you like to enter the initial configuration dialog? [yes/no]:
```

Step 3 Enter **no** to proceed with manual configuration using the CLI:

Example:

```
Would you like to enter the initial configuration dialog? [yes/no]: no
Would you like to terminate autoinstall? [yes]
```

Step 4 Press Return to terminate autoinstall and continue with manual configuration.

Several messages are displayed, ending with a line similar to the following:

Example:

```
...
Copyright (c) 1986-2018 by cisco Systems, Inc.
Compiled <date
> <time
```

```
> by <person
>
```

Step 5 Press Return to bring up the Router> prompt:

Example:

```
...
flashfs[4]: Initialization complete.
Router>
```

Step 6 Enter privileged EXEC mode:

Example:

```
Router> enable

Router#
```

Step 7 Continue with the Troubleshooting, on page 29 section.

Note If the rommon 1> prompt appears, your system has booted in ROM monitor mode. For information on the ROM monitor, refer to the router rebooting and ROM monitor information in the Cisco IOS Configuration Fundamentals Configuration Guide for your Cisco IOS software release.

Troubleshooting

This section describes possible mechanical problems and corrective actions.

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

Warning   No user-serviceable parts inside. Do not open. Statement 1073

If there appears to be a malfunction, first check all cables and connections. If these are in order, see the Troubleshooting, on page 29 section for specific troubles and solutions.

For problems with the configuration, refer to Cisco vg400 Voice Gateway Software Configuration Guide..

Table 6: Troubleshooting the Cisco VG400 Voice Gateway

Symptom	Possible Cause	Corrective Action
Power LED and fan are off	Power source switched off	Switch power source on
	Faulty power cable	Check/replace power cable
	Faulty power source	Check/correct input power
	Faulty internal power supply	Contact Cisco[1] or your Cisco reseller
Power LED on; fan off	Faulty Cisco VG400	Contact Cisco 1 Technical Service Center or your Cisco reseller
Power LED off; fan on	Faulty Cisco VG400	Contact Cisco 1 or your Cisco reseller
No initialization response from Cisco VG400	Faulty modem console terminal	Check/replace modem/terminal
	Faulty cabling to terminal	Check/replace cable
	Faulty Cisco VG400	Contact Cisco 1 or your Cisco reseller
Unit shuts off after operating for some time	Overheating	Check ventilation
	Faulty Cisco VG400	Contact Cisco 1 or your Cisco reseller

Symptom	Possible Cause	Corrective Action
Console screen display freezes	Console fault	Reset/replace console
	Software error	Repeat power-on procedure
	Faulty Cisco VG400	Contact Cisco 1 or your Cisco reseller

[1] See the "Obtaining Technical Assistance" section.

CHAPTER 5

Configuration Methods

After Cisco 400 Voice Gateway is operational, use the procedures in *Cisco 400 Voice Gateway Software Configuration Guide* to configure the specific services and functions or to make changes to an existing configuration.

There are multiple methods for configuring Cisco 400 Voice Gateways:

- System configuration dialog

- Configuration mode: Cisco IOS software CLI

- Setup command facility: Remote configuration through a LAN

- SNMP-based application: CiscoView or HP OpenView

- HTTP-based configuration server: Provides access to the CLI from a web browser

Cable Specifications and Information

This appendix provides the connector and pinout information you need for making or purchasing cables used with Cisco VG400 Voice Gateway. To order cables from Cisco, see the *Obtaining Technical Assistance* section. This appendix contains the following sections:

- Console and Auxiliary Port Cables and Pinouts, on page 33
- Gigabit Ethernet Port Pinouts (RJ-45), on page 37

Console and Auxiliary Port Cables and Pinouts

Your Cisco VG400 Voice Gateway comes with the cable and adapters you need to connect a PC, an ASCII terminal, or a modem to your Cisco VG400 Voice Gateway. The cable kit includes:

- RJ-45-to-RJ-45 rollover cable
- RJ-45-to-DB-9 adapter cable for console connection
- RJ-45-to-DB-25 adapter cable for modem connection

The following illustrations and tables provide cable pinout information:

- Console port to a PC—See Table A-1 and A-4
- Console port to an ASCII terminal—See Table A-2 and Table A-4
- Auxiliary port to a modem—See Table A-3 and Table A-4

The console port is configured as data communications equipment (DCE); the auxiliary port is configured as data terminal equipment (DTE). Both are asynchronous serial ports and use RJ-45 connectors.

Console Port to PC

Figure A-1 shows the RJ-45-to-RJ-45 rollover cable assembly and the RJ-45-to-DB-9 female DTE adapter (labeled TERMINAL); Table A-1 lists the pinouts.
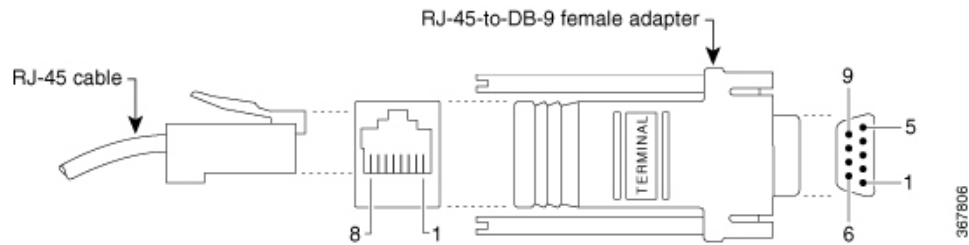
Figure 6: Console Port to PC—Cable and Adapter

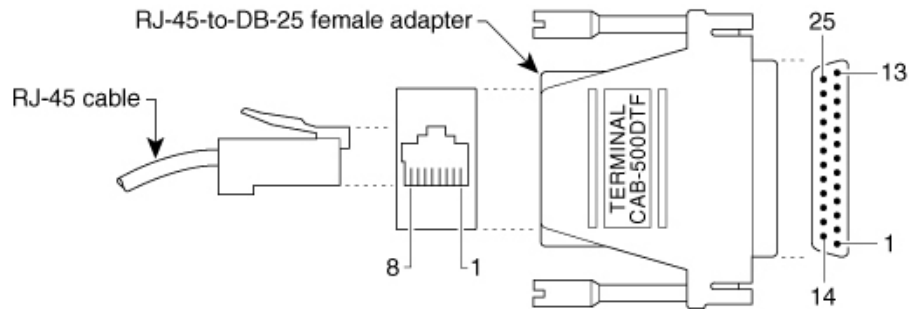
Table 7: Console Port to PC—Cable Pinouts (RJ-45 to DB-9)

Console Port (DCE, RJ-45)	RJ-45-to-RJ-45 Rollover Cable	RJ-45-to-DB-9 Adapter "TERMINAL"	PC Port (DTE, DB-9)		
Signal	RJ-45 Pin	RJ-45 Pin	RJ-45 Pin	DB-9 Pin	Signal
RTS	1[2]	8	8	8	CTS
DTR	2	7	7	6	DSR
TxD	3	6	6	2	RxD
GND	4	5	5	5	GND
GND	5	4	4	5	GND
RxD	6	3	3	3	TxD
DSR	7	2	2	4	DTR
CTS	81	1	1	7	RTS

[2] Pin 1 is connected to pin 8 inside the Cisco VG450 Voice Gateway.

Console Port to ASCII Terminal

Figure A-2 shows the RJ-45-to-RJ-45 rollover cable assembly and the RJ-45-to-DB-25 female DTE adapter (labeled TERMINAL); Table A-2 lists the pinouts.

Figure 7: Console Port to ASCII Terminal—Cable and Adapter

Table 8: Console Port to ASCII Terminal—Cable Pinouts (RJ-45 to DB-25)

Console Port (DCE, RJ-45)	RJ-45-to-RJ-45 Rollover Cable	RJ-45-to-DB-25 Adapter "TERMINAL"	Terminal Port (DTE, DB-25)		
Signal	RJ-45 Pin	RJ-45 Pin	RJ-45 Pin	DB-25 Pin	Signal
RTS	1[3]	8	8	5	CTS
DTR	2	7	7	6	DSR
TxD	3	6	6	3	RxD
GND	4	5	5	7	GND
GND	5	4	4	7	GND
RxD	6	3	3	2	TxD
DSR	7	2	2	20	DTR
CTS	81	1	1	4	RTS

[3] Pin 1 is connected to pin 8 inside the Cisco VG400 Voice Gateway.

Auxiliary Port to Modem

Figure A-3 shows the RJ-45-to-RJ-45 rollover cable assembly and the RJ-45-to-DB-25 male DCE adapter (labeled MODEM); Table A-3 lists the pinouts.

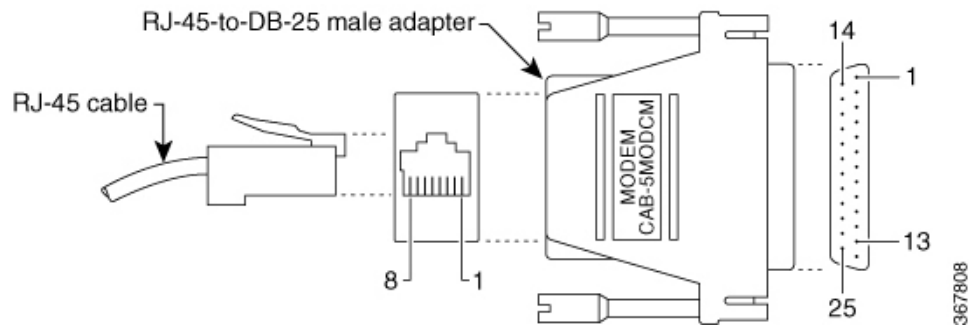*Figure 8: Auxiliary Port to Modem—Cable and Adapter*

Table 9: Auxiliary Port to Modem—Cable Pinouts (RJ-45 to DB-25)

Auxiliary Port (DTE, RJ-45)	RJ-45-to-RJ-45 Rollover Cable	RJ-45-to-DB-25 Adapter "MODEM"	Modem Port (DCE, DB-25)		
Signal	RJ-45 Pin	RJ-45 Pin	RJ-45 Pin	DB-25 Pin	Signal
RTS	1	8	8	4	RTS
DTR	2	7	7	20	DTR
TxD	3	6	6	2	TxD
GND	4	5	5	7	GND
GND	5	4	4	7	GND
RxD	6	3	3	3	RxD
DSR	7	2	2	8	DCD
CTS	8	1	1	5	CTS

Alternative Connections to Terminal and Modem

Your Cisco VG400 Voice Gateway ships with an RJ-45-to-RJ-45 rollover cable and two adapters for connection to a PC, a terminal, or a modem. If you want to use an RJ-45 straight-through cable or other adapters, see Table A-4 for usable cable and adapter combinations.

Table 10: Alternative Terminal and Modem Connections

Cisco VG400 Port Connection	RJ-45 Type Cable	Adapter
Console port to PC	Straight-through	DCE, DB-9 female
Auxiliary port to modem	Rollover[4]	DCE[5], DB-25, male
	Straight-through	DTE2, DB-25, male

[4] An octal cable or RJ-45 breakout cable is equivalent to a rollover cable.

[5] Modify the DB-25 adapter by removing the wire in pin 6 and placing it in the pin 8 position.

Gigabit Ethernet Port Pinouts (RJ-45)

Figure A-4 shows the RJ-45 connector wiring for the Gigabit Ethernet cable; Table A-4 lists the pinouts.

Note Pinout shown is for category 3, 4, or 5 10/100BASE-T connection to an Gigabit Ethernet switch.
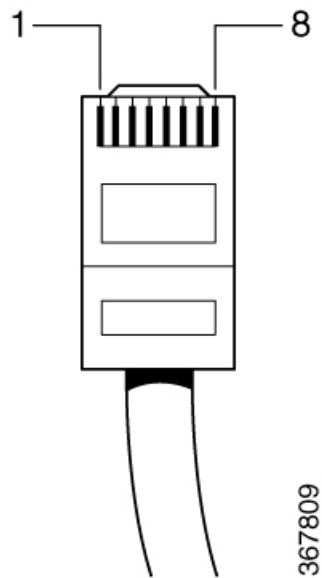
Figure 9: RJ-45 Connector Wiring

Table 11: Gigabit Ethernet Port Pinouts (RJ-45)

Pin[6]	Signal
1	TX+
2	TX−
3	RX+
4	–
5	–
6	RX−
7	–
8	–

[6] Any pin not referenced is not connected.