Cisco VG400 Analog Voice Gateway

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The Cisco® VG400 Analog Voice Gateway enables an IP telephony solution to continue using traditional analog devices while taking advantage of the productivity afforded by IP infrastructure (Figure 1).

The Cisco Unified Communications portfolio of voice and IP communications products and applications enables organizations to communicate more effectively, helping them to streamline business processes, reach the right resource the first time, and improve revenue sales and profitability.

This portfolio is a critical part of the Cisco Business Communications Solution, an integrated solution for organizations of all sizes that also includes network infrastructure, security and network management products, wireless connectivity, and a lifecycle services approach, along with flexible deployment and outsourced management options, end-user and partner financing packages, and third-party communications applications.

Figure 1.
Cisco VG400 Analog Voice Gateway

The Cisco VG400 is a Cisco IOS® XE Software-based analog phone voice gateway. It connects analog phones, fax machines, modems, and speakerphones to an enterprise voice system based on Cisco Unified Communications Manager. The tight integration with the IP-based phone system is advantageous for increased manageability, scalability, and cost-effectiveness. Businesses can also use the VG400 with Cisco Unified Communications Manager Express to effectively augment an Integrated Services Router (ISR) environment. Either topology environment will support business needs for a high concentration of analog voice ports for modem calls, fax calls, and analog supplementary services (Figures 2 and 3).

The Cisco VG400 offers Cisco IOS XE Software manageability on analog phone lines to enable them to be used as extensions of the Cisco Unified Communications Manager or Cisco Unified Communications Manager Express system.

Features and Benefits

- Cisco IOS XE Software-based hardware: The hardware supports a uniform Cisco Command-Line Interface (CLI) and Simple Network Management Protocol Version 3 (SNMPv3) for ease of gateway configuration and operation.
- Robust voice quality: Cisco experience in providing toll-quality packet-voice service helps ensure that the VG400 provides the clear, robust voice quality end users have come to expect from telephony services.
- Investment protection: Customers can continue to use existing analog phones, fax machines, and modems while taking advantage of IP telephony. Basic analog phone connectivity is needed when the infrastructure (wiring) or application does not support or require IP phones. The Cisco VG400 is the ideal platform to support distributed and low- to medium-density analog phone line deployments, allowing organizations to deploy IP telephony without having to purchase IP phones for all users and to continue using existing devices. The VG400 can also be used in a Cisco Unified Communications Manager Express environment and migrated to a Cisco Unified Communications Manager deployment with 100 percent investment protection.
- Reduced barrier to entry: The Cisco VG400 provides a low-cost alternative for low-end analog phones and allows organizations to take advantage of IP telephony with a lower overall IP telephony investment.

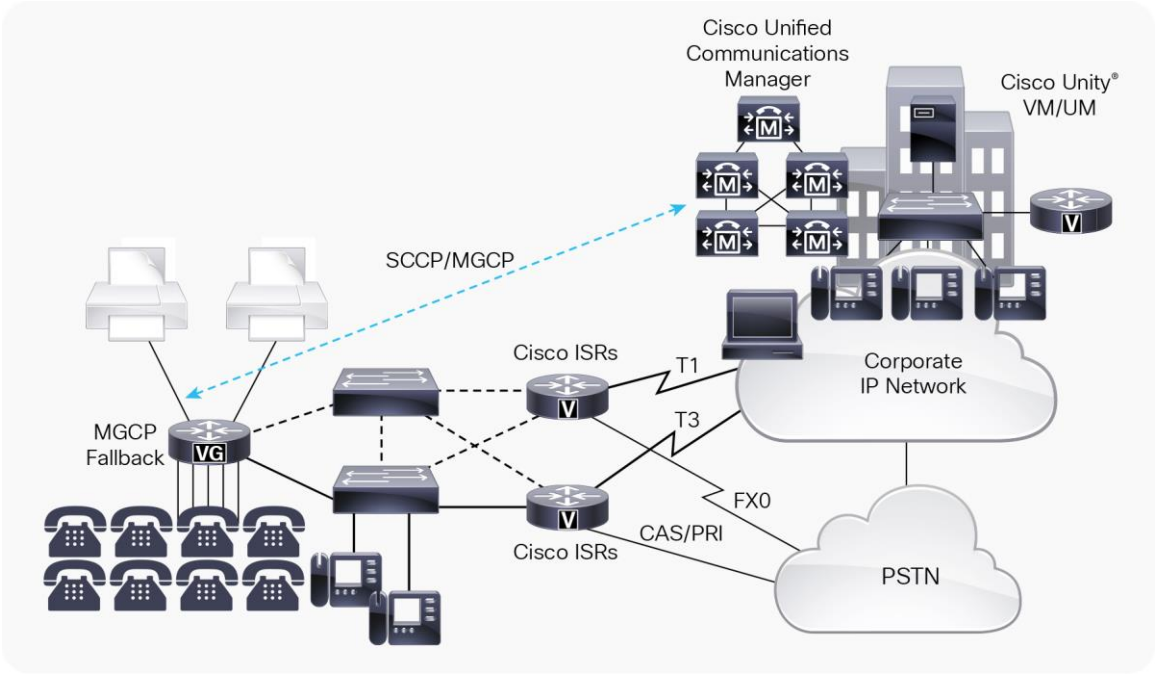

Figure 2.
VG400 Integration with Cisco Unified Communications Manager

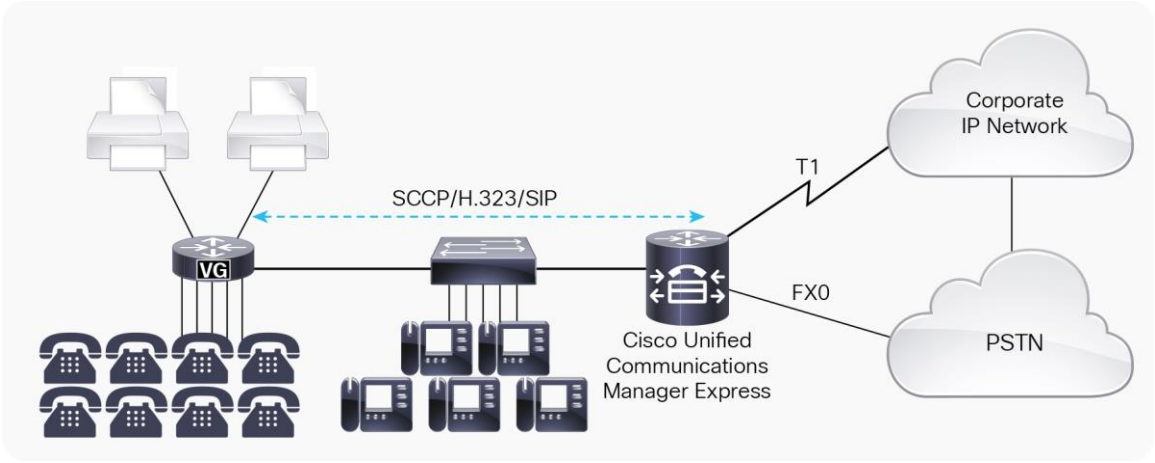

Figure 3.
VG400 Integration with Cisco Unified Communications Manager Express

Analog Phone Connectivity

The Cisco VG400 is ideal for analog phone deployments ranging from centralized to sparsely concentrated or distributed topologies. It provides high availability at locations with Media Gateway Control Protocol (MGCP) fallback, with ease of manageability using Cisco IOS XE Software monitoring features. It offers many supplementary analog calling features depending on the call control and signaling type used. Table 1 lists the supplementary analog calling features available.

Table 1. Supplementary Analog Features

	Skinny Client Control Protocol (SCCP) features with Cisco Unified Communications Manager	SCCP features with Cisco Unified Communications Manager Express	Session Initiation Protocol (SIP) features with Cisco Unified Communications Manager
Basic call	X	X	X
Call forward all	X	X	
Call forward busy	X	X	
Call forward cancel	X	X	
Call forward no answer	X	X	
Call hold or resume	X	X	X
Call pickup group	X	X	
Call pickup local	X	X	
Call transfer blind	X	X	
Call transfer consultative	X	X	X
Call waiting	X	X	X
Caller ID	X	X	X

	Skinny Client Control Protocol (SCCP) features with Cisco Unified Communications Manager	SCCP features with Cisco Unified Communications Manager Express	Session Initiation Protocol (SIP) features with Cisco Unified Communications Manager
Caller ID on call waiting	X	X	X
Malicious caller ID	X		
Conference call	Up to 3 parties	Up to 3 parties	
Impromptu conference call	Up to 3 parties	Up to 3 parties	
Meet-me conference call	X	X	
Directed call park		X	
Directed call pickup		X	
Directed call pickup of ringing extension		X	
Redial	X	X	
Speed dial	X	X	
Call toggle	X	X	X
Music on hold (MoH)	X		
Shared-line support*	X		
Shared-line privacy	X		
Precedence and preemption	X		
Call back on busy	X		
DC voltage Visible Message Waiting Indication (VMWI)	X		

*Simultaneous ringing, hold, and resume across analog and IP phones.

The Cisco VG400 supports SCCP Feature Access Codes (FACs) in conjunction with Cisco Unified Communications Manager and Cisco Unified Communications Manager Express. Refer to Cisco Unified Communications Manager and Cisco Unified Communications Manager Express documentation for details.

Fax and Modem Connectivity

The Cisco VG400 supports fax machines and modems. When connected to fax machines, the VG400 supports 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 VG400 and will be transferred over the network using modem pass-through.

Protocols supported

- SCCP
- H.323v4
- MGCP
- SIP
- Real-Time Transport Protocol (RTP)
- Secure Real-Time Transport Protocol (SRTP)
- Trivial File Transfer Protocol (TFTP)
- HTTP server
- SNMP
- Telnet
- Dynamic Host Configuration Protocol (DHCP)
- DNS
- Call survivability – MGCP failover to an H.323 connection to the SRST router
- T.38 Fax Relay and Fax Pass-Through
- V.150.1 MER Modem Relay, GW Controlled Modem Relay, and Modem Pass-Through
- Support G.711 and G.729a
- RADIUS and TACACS+ for Telnet and authorization

VG400 Models

The Cisco VG400 has a fixed port configuration with flexibility to configure FXS and FXO ports inside the same chassis.

The VG400 is available in the form factors depicted in Table 2.

Table 2. Form Factors

Model	Picture
VG400-6FXS/6FXO **6 FXS and 6 FXO**	
VG400-8FXS **8 FXS**	
VG400-4FXS/4FXO **4 FXS and 4 FXO**	
VG400-2FXS/2FXO **2 FXS and 2 FXO**	

The VG400 improves upon the previous generation of Cisco VG202XM and VG204XM Analog Voice Gateways. These improvements include:

- **On-board Digital Signal Processor (DSP):** The FXO and FXS in VG400 contain an onboard DSP and don't require the VG400 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 VG400 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.

Table 3 summarizes the supported FXO failover bypass and FXS-E-enabled ports in the VG400 models.

Table 3. Feature and Port Comparison

Part number	Number of FXS ports	Number of FXO ports	FXO failover bypass ports	FXS-E enabled ports
VG400-2FXS/2FXO	2	2	2	2
VG400-4FXS/4FXO	4	4	4	4
VG400-6FXS/6FXO	6	6	6	6
VG400-8FXS	8	–	–	8

Software Compatibility

The Cisco VG400 does not natively support Cisco Unified Border Element (CUBE), Cisco Unified Communications Manager Express, or Cisco Unified Survivable Remote Site Telephony (SRST). Additionally, it does not support DSP farm capability. These functions are available only in the Cisco 4000 Series Integrated Services Routers. Table 4 lists the software versions compatible with the VG400.

Table 4. Software Compatibility

Product category	Compatible versions
Cisco IOS XE compatibility	16.10.1 or later
Cisco Unified Communications Manager	12.0.1SU2 or later
Cisco Unified Communications Manager Express	All versions compatible with Cisco IOS XE 16.10.1 or later
Third-party call control	IP-based trunk: SIP and H.323

Technical Specifications

Table 5 lists the technical specifications for the Cisco VG400's FXS and FXO ports. Table 6 gives the environmental specifications for the VG400. Table 7 lists the regulatory standards compliance.

Table 5. Technical Specifications for FXS and FXO Ports

Feature	VG400-2FXS/2FXO	VG400-4FXS/4FXO	VG400-6FXS/6FXO	VG400-8FXS
Tip and ring interfaces for each FXS port (SLIC)				
Interface	FXS/FXO (RJ-11) RJ-11 ports 0 to 1: FXS RJ-11 ports 2 to 3: FXO	FXS/FXO (RJ-11) RJ-11 ports 0 to 3: FXS RJ-11 ports 4 to 7: FXO	FXS/FXO (RJ-11) RJ-11 ports 0 to 5: FXS RJ-11 ports 6 to 11: FXO	FXS/FXO (RJ-11) RJ-11 ports 0 to 7: FXS

Feature	VG400-2FXS/2FXO	VG400-4FXS/4FXO	VG400-6FXS/6FXO	VG400-8FXS
Address signaling formats	In-band dual-tone multifrequency (DTMF) Out-of-band pulse (8 to 12 pps)	In-band DTMF Out-of-band pulse (8 to 12 pps)	In-band DTMF Out-of-band pulse (8- to 2 pps)	In-band DTMF Out-of-band pulse (8 to 12 pps)
FXS signaling formats	FXS loop-start, ground-start, and direct inward dial (DID) signaling	FXS loop-start, ground-start, and DID signaling	FXS loop-start, ground-start, and DID signaling	FXS loop-start, ground-start, and DID signaling
FXO signaling formats	FXO loop start, ground start	FXO loop start, ground start	FXO loop start, ground start	N/A
FXS loop resistance	• Up to 600 ohms (including phone or terminal equipment) for short-loop-length port • Up to 1400 ohms (including phone and terminal equipment) for long-loop-length port			
DID loop resistance	• Up to 1800 ohms (including terminal equipment)			
On-hook voltage	• -44V			
Off-hook loop current	• 25 mA (maximum) for short-loop-length port • 35 mA (maximum) for long-loop-length port			
Ring tone	• 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)			
Ring frequency	• 20, 25, 30, and 50 Hz			
REN loading	• 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			
Disconnect supervision	• 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			
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			
Ring waveform	• Sine wave if no DC offset			
VMWI	• FXS ports support FSK VMWI • FXS ports on the VG400 support both FSK and DC voltage VMWI. They default to FSK. (DC voltage VMWI is supported only with the STCAPP protocol.)			
Cables	• Category 3 and Category 5			

Table 6. Environmental Specifications

Environment				
	VG400-2FXS/2FXO	VG400-4FXS/4FXO	VG400-6FXS/6FXO	VG400-8FXS

Environment				
Operating temperature	• 32° to 104°F (0° to 40°C)			
Nonoperating temperature	• -40° to 158°F (-40° to 70°C)			
AC Voltage	• 100 to 240 VAC auto ranging			
AC Current	• 1.5 to 0.6A			
AC input frequency	• 50-60 Hz			
Power	63W	67W	72W	55W
Weight	6.75 lb (3.06 kg)			
Dimensions (H x W x D)	1.72 x 12.7 x 10 in. (43.7 x 322.6 x 254 mm)			

Table 7. Regulatory Standards 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 database at: https://www.ciscofax.com/.
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

Table 8 gives the Cisco VG400 technical specifications.

Table 8. Technical Specifications

Category	
System	**VG400**
Processor	High-performance multicore processors
Memory DRAM	4 GB DDR3 SDRAM. Fixed on board
External USB 2.0 slots (type A)	1
Ethernet	Up to two 10/100/1000 Ethernet LAN ports
Power	
AC input current (max)	**Need Data**
External power supply dimensions	37 x 73 x 152 mm

Homologation

The VG400 is approved for the countries listed in Table 9 for off-premises (FXO) and on-premises (FXS) connections. Approval for other countries is in progress. Refer to the Cisco Telecom Approvals Website for approval progress for other countries: https://tools.cisco.com/cse/prdapp/jsp/externalsearch.do?action=externalsearch&page=EXTERNAL_SEARCH.

Table 9. Telecom Approvals

VG400-2FXS/2FXO	VG400-4FXS/4FXO	VG400-6FXS/6FXO	VG400-8FXS
United States	United States	United States	United States
Canada	Canada	Canada	Canada
CE countries[1]	Canada	Canada	Canada
Australia	Australia	Australia	Australia
Japan	Japan	Japan	Japan

[1] The CE mark is recognized in the following countries: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Gibraltar, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxemburg, Malta, Monaco, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, and United Kingdom.

Ordering Information

To order this product, use the information provided in Table 10.

Table 10. Ordering Information

Product number	Description
VG400-2FXS/2FXO	Cisco VG400 Analog Voice Gateway with 2 FXS and 2 FXO
VG400-4FXS/4FXO	Cisco VG400 Analog Voice Gateway with 4 FXS and 4 FXO
VG400-6FXS/6FXO	Cisco VG400 Analog Voice Gateway with 6 FXS and 6 FXO
VG400-8FXS	Cisco VG400 Analog Voice Gateway with 8 FXS

Services and Support

Using the Cisco Lifecycle Services approach, Cisco and our partners offer a broad portfolio of end-to-end services. These services are based on proven methodologies for deploying, operating, and optimizing IP communications solutions. Initial planning and design services, for example, can help you meet aggressive deployment schedules and minimize network disruption during implementation. Operate services reduce the risk of communications downtime with expert technical support. Optimize services enhance solution performance for operational excellence. Cisco and our partners offer a system-level service and support approach that can help you create and maintain a resilient, converged network that meets your business needs.

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