

Cisco VG Series Analog Voice Gateways

The Cisco® VG350, VG320, VG310, VG204XM, and VG202XM Analog Voice Gateways allow you to use your IP telephony solution with traditional analog devices while taking advantage of the productivity afforded by IP infrastructure.

Unified communications enables organizations to collaborate more effectively and streamline business processes. Reach the right resource the first time. Improve productivity and profitability. Even in an IP world, however, many organizations still use analog devices such as phones, faxes, and modems, and want or need to continue to after migration to IP telephony. Important use cases for analog gateways include:

- Budget constraints during migration to unified communications: You don't have to replace your entire phone system as you move to unified communications. Cisco VG Series Gateways help you migrate at your own pace and budget: you can enjoy the benefits of unified communications and still use your existing analog devices.
- Meeting regulatory requirements: Many countries or industry markets require analog devices in certain use cases. Using Cisco VG Series, these organizations can still meet regulatory requirements but also have the benefits of unified communications.
- Environments that require phone service but do not have power and require long loop lengths: Examples include ranger stations, phones along railroad tracks, and some military deployments such as remote outposts.
- Harsh environments: Industries such as mining and manufacturing have harsh environments in which analog phones often have better endurance.
- Requirements for lighter IT infrastructure: Analog phones need fewer switch ports and have no power requirements.

Figure 1. Cisco VG350 Analog Voice Gateway



Figure 2. Cisco VG204XM Analog Voice Gateway



Figure 3. Cisco VG202XM Analog Voice Gateway



The Cisco VG Series Analog Voice Gateways are Cisco IOS[®] Software-based (Figures 1 through 3). The Cisco VG350 is a high-density 160-port gateway, the Cisco VG320 is a 48-port gateway, the Cisco VG310 is a 24-port gateway, and the Cisco VG204XM and VG202XM are low-density 4- and 2-port gateways, respectively. These gateways connect analog phones, fax machines, modems, and speakerphones to an enterprise IP voice system, so you can 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 Cisco VG Series supports high to low concentrations of analog voice ports for modem calls, fax calls, and analog supplementary services.

The Cisco VG350 is built on the Cisco 3945 Integrated Services Router (ISR) powered by high-performance multicore processors. In this platform, you can achieve power redundancy by installing an optional integrated redundant power supply (RPS), which helps decrease network downtime and protects the network from power-supply failures. The VG320 and VG310 are built on the Cisco 2901 platform, powered by a single high-performance core processor. They provide high availability during power failure through an external universal power supply (UPS).

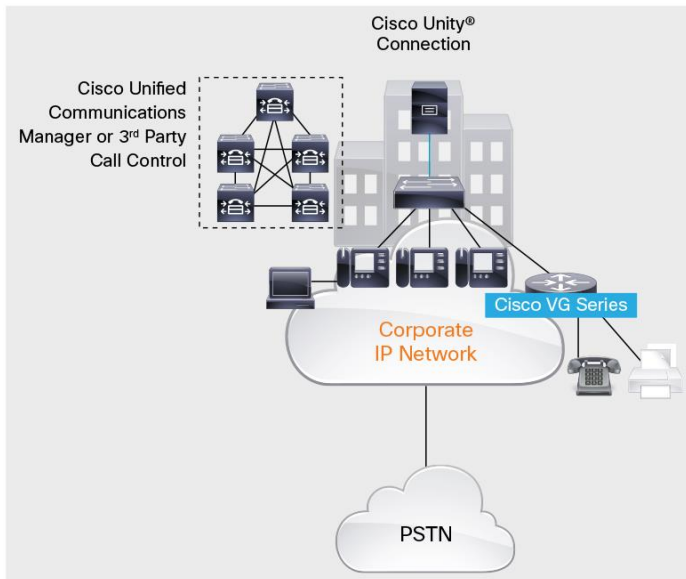
The Cisco VG350, VG320, and VG310 offer 19-inch rack-mount chassis, and the Cisco VG204XM and VG202XM offer desktop form-factor chassis with a fanless design.

Features and Benefits

- Familiar Cisco IOS Software-based hardware: The hardware includes uniform Cisco command-line interface (CLI) and Simple Network Management Protocol Version 3 (SNMPv3) support for ease of gateway configuration and operation.
- Robust voice quality: Cisco experience in providing toll-quality packet-voice service helps ensure that the Cisco VG350, VG320, VG310, VG204XM, and VG202XM provide the clear, robust voice quality end users have come to expect from telephony services.
- Low- to high-density solutions: With solutions from 2 to 160 ports, organizations can have the right-size platform for the right-size deployment.
- The VG310 and VG320 can support foreign exchange office (FXO), foreign exchange station (FXS), T1/E1 Primary Rate Interface (PRI), channel associated signaling (CAS), and Basic Rate Interface (BRI) 2- and 3-port voice interface cards (Cisco VIC2 and VIC3, respectively).
- Cisco EnergyWise[®] support: Lower per-port power consumption is supported on the VG350.
- Support for long loop lengths: Loop lengths up to 30,000 ft (9,144m) are supported.
- Interoperability: Cisco VG Series works with Cisco and third-party IP private branch exchanges (PBXs).

- High availability: With these gateways you will experience less voice downtime due to WAN link failure. The Cisco VG Series has built-in Media Gateway Control Protocol (MGCP) failover to an H.323 connection to a Survivable Remote Site Telephony (SRST) router. This failover maintains voice service for analog endpoints if the WAN link fails or you lose connectivity to the Cisco Unified Communications Manager, Cisco Business Edition, or Cisco Hosted Collaboration Solution (HCS). Figure 4 shows integration of the Cisco VG Gateway with Cisco Unified Communications Manager.

Figure 4. Cisco Voice Gateway Integration with Cisco Unified Communications Manager



Analog Phone Connectivity

The Cisco VG Series is ideal for analog phone deployments ranging from centralized to sparsely concentrated or distributed topologies. These analog voice gateways provide a high level of availability at locations with MGCP fallback, with ease of manageability using Cisco IOS Software monitoring features. They offer many supplementary analog calling features depending on the call control and signaling type used. Refer to Table 1 for the supplementary analog calling features available.

Table 1. Analog Supplementary Features Available on Analog Voice Gateways

Feature	Skiny Client Control Protocol (SCCP) Features with Cisco Unified Communications Manager, Cisco Business Edition, and Cisco HCS	SCCP Features with Cisco Unified Communications Manager Express	Session Initiation Protocol (SIP) Features with Cisco Unified Communications Manager, Cisco Business Edition, and Cisco HCS
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	

Feature	Skiny Client Control Protocol (SCCP) Features with Cisco Unified Communications Manager, Cisco Business Edition, and Cisco HCS	SCCP Features with Cisco Unified Communications Manager Express	Session Initiation Protocol (SIP) Features with Cisco Unified Communications Manager, Cisco Business Edition, and Cisco HCS
Call transfer consultative	X	X	X
Call waiting	X	X	X
Caller ID	X	X	X
Caller ID on call waiting	X	X	X
Malicious caller ID	X		
Conference call	Up to 3 parties	Up to 3 parties	Up to 3 parties
Ad hoc 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	X		
Shared-line support*	X		
Shared-line privacy	X		
Precedence and preemption	X		
Call back on busy	X		
DC voltage visual message waiting indicator (VMWI)	X		

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

The Cisco VG Series also supports feature access codes (FACs) for invoking supplementary services.

Fax and Modem Connectivity

The Cisco VG Series supports fax machines and modems. When using fax machines, the gateways support T.38 fax relay, and fax pass-through. Cisco and 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 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
- SNMP
- Telnet
- Dynamic Host Configuration Protocol (DHCP)
- Domain Name System (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 SRST router
- T.38 fax relay, and modem pass-through
- Coder/decoder (codec) support, G.711, and G.729a
- RADIUS and TACACS+ for Telnet and authorization

Technical Specifications

Table 2 lists technical specifications of the gateways.

Table 2. Technical Specifications

Category	Cisco VG350	Cisco VG310	Cisco VG320	Cisco VG204XM and VG202XM
System				
Processor	High-performance multicore processors	High-performance processor	High-performance processor	Power QUICC (power PC-based) processor
Memory (default)	1-GB synchronous dynamic RAM (SDRAM)	1-GB SDRAM	1-GB SDRAM	256-MB double data rate 2 (DDR2) RAM
Compact Flash	256 MB	256 MB, 1 slot	256 MB, one slot	128-MB NAND Flash
Ethernet	Up to three 10/100/1000 Ethernet WAN ports are supported. Two of the 10/100/1000 Ethernet WAN ports can support Small Form-Factor Pluggable (SFP)-based connectivity instead of RJ-45 ports, enabling fiber connectivity.	Two 1-Gbps Ethernet ports	Two 1-Gbps Ethernet ports	Two 10/100BASE-T Ethernet ports
Console and auxiliary (maximum)	A new, innovative, mini-B USB console port supports management connectivity when traditional serial ports are not available. Traditional console and auxiliary ports are also available	A new, innovative, mini-B USB console port supports management connectivity when traditional serial ports are not available. Traditional console and auxiliary ports are also available.	A new, innovative, mini-B USB console port supports management connectivity when traditional serial ports are not available. Traditional console and auxiliary ports are also available.	Up to 115.2 kbps per port are supported.
Power				
AC input voltage	100- to 240-VAC autoranging	100 to 240 VAC	100 to 240 VAC	100 to 240 VAC
AC input current (maximum)	7.1 to 3.0 amps	0.6 to 1.35 amp	0.6 to 1.35 amp	0.5 amp
DC input voltage	-	12V	12V	12V
Frequency	47 to 63 Hz	47 to 63 Hz	47 to 63 Hz	50 to 60 Hz

Category	Cisco VG350	Cisco VG310	Cisco VG320	Cisco VG204XM and VG202XM
Power dissipation	230 watts (maximum consumption) (power supply rated for 540W capacity)	135W	135W	30W
Redundant power supply (RPS)	Optional integrated RPS	External UPS	External UPS	-
Physical				
Width	17.25 in. (438.15 mm)	17.5 in. (444.5 mm)	17.5 in. (444.5 mm)	8.81 in. (223.8 mm)
Height	5.25 in. (133.35 mm)	1.75 in. (44.4 mm) (add 0.17 in. for optional rubber feet)	1.75 in. (44.4 mm) (add 0.17 in. for optional rubber feet)	1.78 in. (45.2 mm) with rubber feet
Depth	18.75 in. (476.25 mm)	13.5 in. (342.9 mm)	13.5 in. (342.9 mm)	8.13 in. (206.5 mm)
Weight (maximum)	48.08 lb (21 kg)	15.2 lb (6.91 kg)	15.8 lb (7.2 kg)	2.98 lb (1.351 kg)
Mounting	3 rack units (3RU), 19 in.; EIA 23 in.	Rack- and wall-mountable	Rack- and wall-mountable	Desktop- and wall-mountable
Environment				
Operating temperature	32 to 104°F (0 to 40°C)	32 to 104°F (0 to 40°C)	32 to 104°F (0 to 40°C)	32 to 104°F (0 to 40°C)
Nonoperating temperature	-40 to 158°F (-40 to 70°C)	-40 to 158°F (-40 to 70°C)	-40 to 158°F (-40 to 70°C)	-22 to 149°F (-30 to 65°C)
Operating humidity	5 to 95%	10 to 85%	10 to 85%	10 to 85% noncondensing
Noise level (maximum)	Sound pressure: 57.6 dB typical, 77.6 dB maximum Sound power: 67.8 dB typical, 84.7 dB maximum	64 dB	64 dB	No fan, 0 db
On- or off-premises	On-premises only, restricted access area, permanent ground required, to be installed and serviced only by trained professionals	On-premises only, restricted access area, permanent ground required, to be installed and serviced only by trained professionals	On-premises only, restricted access area, permanent ground required, to be installed and serviced only by trained professionals	On-premises only, permanent ground required, to be installed and serviced only by trained professionals
Tested Compatibility				
Cisco IOS Software Release	15.2(4)M or later	15.4(3) or later	15.4(3) or later	15.3(2)T or later
Cisco Unified Communications Manager, Business Edition, and Cisco HCS version	8.6(2)SU2, 9.0.1, or later	9.1(2)SU2 or later	9.1(2)SU2 or later	6.1.3, 7.0.1 or later
Cisco Unified Communications Manager Express version	7.1, 8.0, or later	9.0 or later	9.0 or later	7.0.1 or later
Third-party call control	Future	Time-division multiplexing (TDM) trunk: QSIG, ISDN T1 (NI, NI2, DMS-100, and 5ESS), ISDN E1 (QSIG and NET5), and T1 CAS IP-based trunk: SIP and H323	TDM trunk: QSIG, ISDN T1 (NI, NI2, DMS-100, and 5ESS), ISDN E1 (QSIG and NET5), and T1 CAS IP-based trunk: SIP and H323	-

Category	Cisco VG350	Cisco VG310	Cisco VG320	Cisco VG204XM and VG202XM
Tip and Ring Interfaces for Each FXS Port (SLIC)				
Interface type	FXS (on-premises connection only) (RJ-21) (Optional high-speed WAN interface card [HWIC] FXS modules on motherboard have RJ-11 connectors.)	FXS (on-premises connection only) (RJ-21) (Optional HWIC FXS modules on motherboard have RJ-11 connectors.)	FXS (on-premises connection only) (RJ-21) (Optional HWIC FXS modules on motherboard have RJ-11 connectors.)	FXS (on-premises connection only)
Address signaling formats	In-band dual-tone multifrequency (DTMF) Out-of-band pulse (8-12 pulses per second [pps])	In-band DTMF Out-of-band pulse (8-12 pps)	In-band DTMF Out-of-band pulse (8-12 pps)	In-band DTMF Out-of-band pulse (8-12 pps)
FXS signaling formats	Part numbers SM-D-72FXS and SM-D-48FXS-E support loop-start and ground-start signaling. HWIC slots on motherboard support FXS loop-start, ground-start, and DID signaling.	Loop- and ground-start signaling are supported. HWIC slots on motherboard support FXS loop-start, ground-start, and DID signaling.	Loop- and ground-start signaling are supported. HWIC slots on motherboard support FXS loop-start, ground-start, and DID signaling.	Loop- and ground-start signaling are supported.
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	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	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	Up to 600 ohms (including the phone or terminal equipment)
Direct inward dialing (DID) loop resistance	Up to 1800 ohms (including terminal equipment)	Depends on HWIC card inserted	Depends on HWIC card inserted	-
On-hook voltage	-44V	-44 V	-44 V	-43 V
Off-hook loop current	25 mA (maximum) for short-loop-length port 35 mA (maximum) for long-loop-length port	25 mA (maximum) for short-loop-length port 35 mA (maximum) for long-loop-length port	25 mA (maximum) for short-loop-length port 35 mA (maximum) for long-loop-length port	25 mA (maximum)
Ring tone	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) 62 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) 62 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) 62 Vrms into 2 RENs at zero-loop-length port (balanced) (long-loop-length port)	54 Vrms into 5 RENs at zero-loop-length port (balanced) if no DC offset
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
Ring waveform	Sine wave if no DC offset	Sine wave if no DC offset 20- and 24-VDC offset trapezoidal	Sine wave up to 35-VDC offset	Sine wave up to 35-VDC offset
Ring load	-	-	-	5 RENs with no DC offset 2 RENs with DC offset

Category	Cisco VG350	Cisco VG310	Cisco VG320	Cisco VG204XM and VG202XM
REN loading	5 RENs per port (short-loop-length port) 2 RENs per port (long-loop-length port) (maximum 40 total RENs loads per SM-D-72FXS module; maximum 30 total RENs loads per SM-D-48FXS-E module)	5 RENs per port (short-loop-length port) 2 RENs per port (long-loop-length port) (total 16 total RENs loads)	5 RENs per port (short-loop-length port) 2 RENs per port (long-loop-length port) (total 24 total RENs loads)	5 RENs per port, 12 RENs per system (maximum)
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	600-ohm complex, 600-ohm real, 900-ohm complex, 900-ohm real, complex1, and complex2
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	On-hook transmission of FSK data	On-hook transmission of FSK data	On-hook transmission of FSK data
FXS loop length	Short-loop-length port 3000 ft, 26 AWG 5500 ft, and 24 AWG Long-loop-length port 11,000 ft, 26AWG 18,000 ft, and 24 AWG	Short-loop-length port 3000 ft, 26 AWG 5500 ft, and 24 AWG Long-loop-length port 11,000 ft, 26AWG 18,000 ft, and 24 AWG	Short-loop-length port 3000 ft, 26 AWG 5500 ft, and 24 AWG Long-loop-length port 11,000 ft, 26AWG 18,000 ft, and 24 AWG	3000 ft, 26 AWG
Category cable	Category 3 and Category 5	Category 3 and Category 5	Category 3 and Category 5	Category 3 and Category 5
Physical connector	RJ-21 and RJ-11	RJ-21	RJ-21	RJ-11
Number of connectors or ports	160 (144 using two SM-D-72FXS modules with RJ-21 connectors and 16 using FXS VIC modules with RJ-11 connectors)	24 FXS ports	48 FXS ports	2 FXS ports on VG202XM 4 FXS ports on VG204XM
Mean time between failures (MTBF)	1,390,019 hours	316,842 hours at 40 °C 479,635 hours at 25 °C	248,721 hours at 40 °C 349, 826 hours at 25 °C	200,000 hours
Certifications				
Safety	<ul style="list-style-type: none"> • UL 60950-1 • CAN/CSA C22.2 No. 60950-1 • EN 60950-1 • AS/NZS 60950-1 • IEC 60950-1 	<ul style="list-style-type: none"> • UL 60950-1 • CAN/CSA C22.2 No. 60950-1 • EN 60950-1 • AS/NZS 60950-1 • IEC 60950-1 	<ul style="list-style-type: none"> • UL 60950-1 • CAN/CSA C22.2 No. 60950-1 • EN 60950-1 • AS/NZS 60950-1 • IEC 60950-1 	<ul style="list-style-type: none"> • UL 60950 • CAN/CSA C22.2 No. 60950 • IEC 60950 • EN 60950-1 • AS/NZS 60950
Immunity	<ul style="list-style-type: none"> • EN 55024, CISPR 24 • EN50082-1 • EN 61000 	<ul style="list-style-type: none"> • EN 55024, CISPR 24 • EN50082-1 • EN 61000 	<ul style="list-style-type: none"> • EN 55024, CISPR 24 • EN50082-1 • EN 61000 	<ul style="list-style-type: none"> • EN300386 • EN55024/CISPR24 • EN50082-1 • EN61000-6-1
EMC	<ul style="list-style-type: none"> • 47 CFR, Part 15 • ICES-003 Class A • EN55022 Class A • CISPR22 Class A • AS/NZS 3548 Class A • VCCI V-3 • CNS 13438 • EN 300-386 	<ul style="list-style-type: none"> • 47 CFR, Part 15 • ICES-003 Class A • EN55022 Class A • CISPR22 Class A • AS/NZS 3548 Class A • VCCI V-3 • CNS 13438 • EN 300-386 	<ul style="list-style-type: none"> • 47 CFR, Part 15 • ICES-003 Class A • EN55022 Class A • CISPR22 Class A • AS/NZS 3548 Class A • VCCI V-3 • CNS 13438 • EN 300-386 	<ul style="list-style-type: none"> • FCC Part 15 Class B • ICES-003 Class B • EN55022 Class B • CISPR22 Class B • VCCI Class B • EN 300386 Class B • EN61000-3-3 • EN61000-3-2

Category	Cisco VG350	Cisco VG310	Cisco VG320	Cisco VG204XM and VG202XM
TELECOM	<ul style="list-style-type: none"> • TIA/EIA/IS-968 • CS-03 • ANSI T1.101 • ITU-T G.823, G.824 • IEEE 802.3 • RTTE Directive • Homologation requirements vary by country and interface type. For specific country information, refer to the online approvals data base at: http://www.ciscofax.com. 	<ul style="list-style-type: none"> • TIA/EIA/IS-968 • CS-03 • ANSI T1.101 • ITU-T G.823, G.824 • IEEE 802.3 • RTTE Directive • Homologation requirements vary by country and interface type. For specific country information, refer to the online approvals data base at: http://www.ciscofax.com. 	<ul style="list-style-type: none"> • TIA/EIA/IS-968 • CS-03 • ANSI T1.101 • ITU-T G.823, G.824 • IEEE 802.3 • RTTE Directive • Homologation requirements vary by country and interface type. For specific country information, refer to the online approvals data base at: http://www.ciscofax.com. 	<ul style="list-style-type: none"> • The Cisco VG202XM and VG204XM platforms comply with FCC Part 68, CS-03, European Directive 99/5/EC, and other standards. • Homologation requirements vary by country and interface type. For specific country information, refer to the online approvals data base at: http://www.ciscofax.com.
Lot 26 Compliance Info				Power in efficient idle mode: <ul style="list-style-type: none"> • VG202XM: 6.68W • VG204: 7.56W Products do not have Wi-Fi interface.

This equipment complies with all the regulatory requirements for connection to the communications networks of each country in which it is sold.

Ordering Information

To order this product, use the information provided in Table 3.

Table 3. Ordering Information

Product Number	Product Description
VG350-144FXS/K9	Cisco VG350 144 FXS Bundle
VG350-98FXSE/K9	Cisco VG350 96 FXS OPX-Lite Bundle
VG350-72F48E/K9	Cisco VG350 72 FXS & 48 FXS OPX-Lite Bundle
VG350/K9	Cisco VG350 High Density Voice over IP Analog Gateway (A la carte option)
VG320	Modular 48 FXS Port Voice over IP Gateway
VG310	Modular 24 FXS Port Voice over IP Gateway
VG204XM	Cisco VG204XM Analog Phone Gateway
VG202XM	Cisco VG202XM Analog Phone Gateway

Although this data sheet focuses on Cisco standalone analog gateways, the Cisco VG Series Analog Voice Gateways also provide high-density analog service modules (SM-D-72FXS and SM-D-48FXS-E) that are deployed on Cisco Integrated Services Routers (ISRs). More information about these voice gateways is available at: <http://www.cisco.com/go/vg>, and information about the Cisco ISRs is available at: <http://www.cisco.com/go/isr>.

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.




Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV Amsterdam,
The Netherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at www.cisco.com/go/offices.

 Cisco and the Cisco logo are trademarks or registered trademarks of Cisco and/or its affiliates in the U.S. and other countries. To view a list of Cisco trademarks, go to this URL: www.cisco.com/go/trademarks. Third party trademarks mentioned are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (1110R)