Overview for the Avaya G250 and Avaya G350 Media Gateways

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About this book

This guide contains information that you need to consider before implementing the Avaya G250 or Avaya G350 Media Gateway. Use this guide to learn what the G250/G350 can do and to plan how you will deploy a G250/G350 in your environment.

Audience

The information in this book is intended for use by Avaya technicians, provisioning specialists, Business Partners, and customers.

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Chapter 1: Introduction

The Avaya CM Branch Gateways (Avaya G250 and Avaya G350 Media Gateways) form part of Avaya's solution for extending communication capabilities from the headquarters of an organization to all collaborative branch locations. Avaya CM Branch Gateways help you provide the same high quality services to all organization members, regardless of their location.

The Branch Gateways are high-performance converged telephony and networking devices that are located in small branch locations, providing all infrastructure needs in one box — telephone exchange and data networking. The Branch Gateways each feature a VoIP engine, WAN router, and Power over Ethernet LAN connectivity. The G350 provides full support for legacy IP, DCP, and analog telephones. The G250 supports legacy IP and analog telephones. In addition, the G250-DCP model supports DCP telephones.

The G350 is designed for use in an eight to 72 user environment, aimed at branch offices with 16 to 40 stations. The G250 is designed for use in a two to 12 user environment, aimed at small branch offices with two to eight stations.

Telephone services on a Branch Gateway are controlled by a Media Gateway Controller (MGC). You can use an Avaya S8XXX Server running Communication Manager (CM) call processing software as an MGC. The gateway integrates seamlessly with Avaya S8700, S8710, S8720, S8730, S8500, S8400, and S8300 Servers to provide the same top quality telephony services to the small branch office as to the headquarters of the organization.

Note:

The S8700 Server cannot be upgraded to CM 5.0.

The Branch Gateways can subtend to an MGC located at the headquarters or the MGC can be installed locally. The Branch Gateways can optionally house an internal Avaya S8300 server for Enhanced Local Survivability (ELS), providing full MGC functionality in the event that the connection with the primary MGC is lost, or as the primary MGC for standalone deployment. When the primary MGC is located at a remote location, the Branch Gateway features Standard Local Survivability (SLS). SLS provides partial backup MGC functionality in the event that the connection with the primary MGC is lost.

In addition to advanced and comprehensive telephony services, the Branch Gateways provide full data networking services, precluding the need for a WAN router or LAN switch.

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Avaya G350 Media Gateway Overview

The G350 is a modular device, adaptable to support different combinations of endpoint devices. Pluggable media modules provide interfaces for different types of telephones and trunks. A combination is selected to suit the needs of the branch. A LAN media module with PoE standard compliant Ethernet ports provides support for IP telephones as well as all other types of data devices. A range of telephony modules provides full support for legacy equipment such as analog and digital telephones.

Avaya G250 Media Gateway Overview

The G250 supports the connection of PCs, LAN switches, IP telephones, analog telephones, and trunks, via fixed analog and PoE ports on the chassis. A media module slot supports either of two WAN media modules, for connection to a WAN. There are several models of the G250, with various port combinations for support of analog, BRI, or T1/E1 trunks or DCP telephones, as described below.

The G250 is available in the following models:

- Analog model (G250-Analog). The G250-Analog includes four analog trunk ports, two analog line ports, a Fast Ethernet WAN port, and eight PoE LAN ports.
- BRI model (G250-BRI). The G250-BRI includes two ISDN BRI trunk ports, one analog trunk port, two analog line ports, a Fast Ethernet WAN port, and eight PoE LAN ports.
- DCP model (G250-DCP). The G250-DCP provides twelve DCP (Digital Communications Protocol) ports, as well as four analog trunk ports, two analog line ports, a Fast Ethernet WAN port, and two LAN ports.
- DS1 model (G250-DS1). The G250-DS1 provides a T1/E1 and a PRI trunk port, enabling support of fractional T1/E1 and PRI. The G250-DS1 also includes one analog trunk port, two analog line ports, a Fast Ethernet WAN port, and eight PoE LAN ports.

Features

G250 and G350 features include:

- Voice
  - Support for traditional telephones and trunks. In particular, the G250 and G350 support:

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    - Two built-in line ports to support two analog telephones or incoming analog DID trunks
    - One analog trunk (four in the G250-Analog and the G250-DCP) to support a trunk or trunks of the following types:
        - Loop start
        - Ground start (G350 only)
        - CAMA (G350 only)
        - DIOD (Japan only)
  - Survivability features for continuous voice services
  - VoIP Media Gateway services
  - Call center capabilities
- WAN
  - WAN Quality of Service (QoS)
  - Routing protocols (OSPF, RIP)
  - PPPoE
  - Weighted Fair Queuing (WFQ)
  - Policy-based routing
  - DHCP client, server, and relay functions
  - GRE tunneling
  - Dynamic IP addressing
  - Fax and modem over IP
  - Object tracking
- Server
  - DHCP servers
  - TFTP servers
- LAN
  - Power-over-Ethernet LAN Switching
  - VLANs
  - Spanning Tree Protocols
    - IEEE 802.1D (STP)
    - IEEE 802.1w (RSTP) (G350 only)
  - Port mirroring
  - Port redundancy (G350 only)

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- Security
  - RADIUS Authentication support
  - SNMP traps (v1 and v2 only) sent to the primary controller
  - SNMP v3
  - SSH Authentication support
  - VPN support
  - 802.1x support
  - Secrets management with Master Configuration Key (MCK) encryption
- Provisioning
  - Avaya Communication Manager (CM) server management
  - Extensive alarming and troubleshooting features
  - Modem access for remote administration
- Survivability
  - MGC automatic switchover, migration, and survivability features
  - Modem backup connection to the MGC
  - Standard Local Survivability (SLS)
  - Dynamic Call Admission Control (CAC) for Fast Ethernet, Serial, and GRE tunnel interfaces
  - Inter-Gateway Alternate Routing (IGAR)
- Management applications
  - Avaya G250/G350 Manager
  - Embedded Web Manager (G350 only)

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G250 physical description

Figure 1: The Avaya G250-Analog Media Gateway Chassis

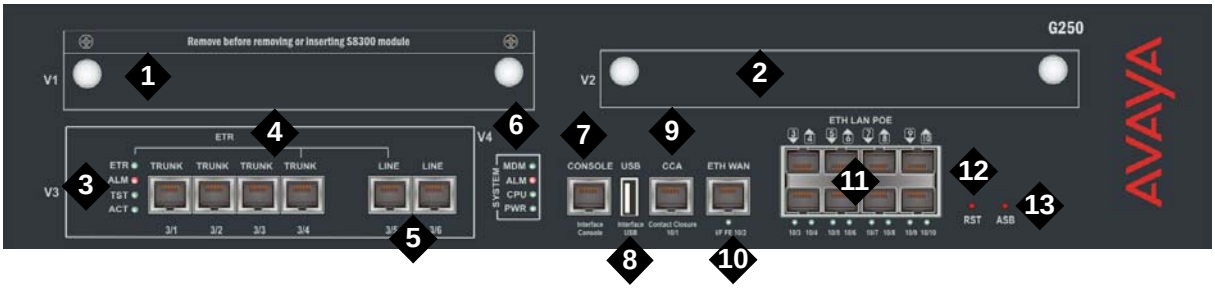

Figure notes:

1. V1 — ICC/LSP Slot
2. V2 — WAN Media Module Slot
3. Analog port LEDs
4. Analog trunks
5. Analog line ports
6. System LEDs
7. Console port
8. USB port
9. Contact Closure (CCA) port
10. Ethernet WAN (ETH WAN) port
11. PoE LAN (ETH LAN PoE) ports
12. Reset (RST) button
13. Alternate Software Bank (ASB) button

Figure 2: The Avaya G250-BRI Media Gateway Chassis

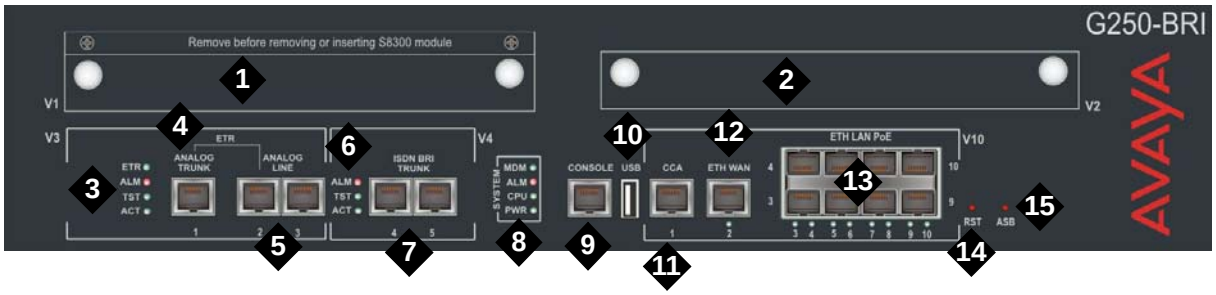

Figure notes:

1. V1 — ICC/LSP Slot
2. V2 — WAN Media Module Slot
3. Analog port LEDs
4. Analog trunk
5. Analog line ports
6. ISDN BRI LEDs
7. ISDN BRI trunks
8. System LEDs
9. Console port
10. USB port
11. Contact Closure (CCA) port
12. Ethernet WAN (ETH WAN) port
13. PoE LAN (ETH LAN PoE) ports
14. Reset (RST) button
15. Alternate Software Bank (ASB) button

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Figure 3: The Avaya G250-DCP Media Gateway Chassis

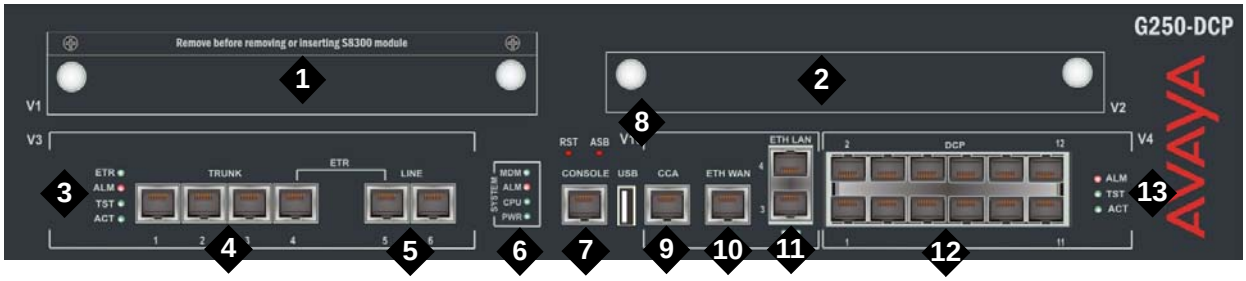

Figure notes:

1. V1 — ICC/LSP Slot
2. V2 — WAN Media Module Slot
3. Analog port LEDs
4. Analog trunks
5. Analog line ports
6. System LEDs
7. Console port
8. USB port
9. Contact Closure (CCA) port
10. Ethernet WAN (ETH WAN) port
11. ETH LAN ports
12. DCP ports
13. DCP port LEDs

Figure 4: The Avaya G250-DS1 Media Gateway Chassis

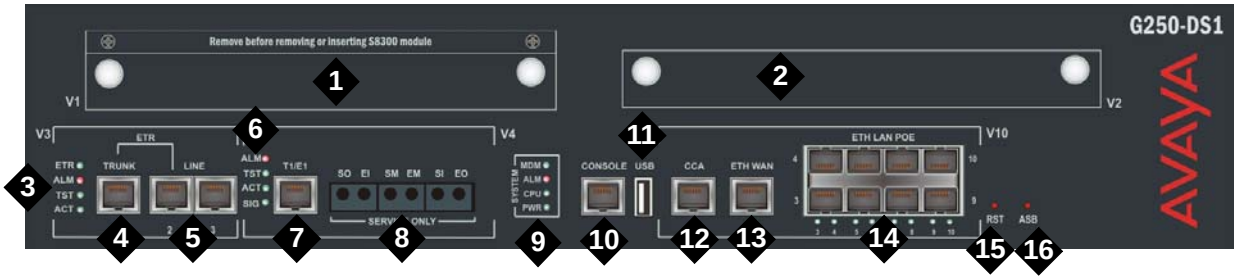

Figure notes:

1. V1 — ICC/LSP Slot
2. V2 — WAN Media Module Slot
3. Analog port LEDs
4. Analog trunk
5. Analog line ports
6. T1/E1/PRI trunk interface LEDs
7. T1/E1 interface
8. Service
9. System LEDs
10. Console port
11. USB port
12. Contact Closure (CCA) port
13. Ethernet WAN (ETH WAN) port
14. PoE LAN (ETH LAN PoE) ports
15. Reset (RST) button
16. Alternate Software Bank (ASB) button

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For information about the different media modules that can be housed in the G250 media module slots, see Chapter 2: Optional components.

Table 1: Fixed ports and buttons on the G250 front panel

Port	Description
TRUNK	Four analog trunk ports (G250-Analog Media Gateway, G250-DCP Media Gateway) or one analog trunk port (G250-BRI Media Gateway, G250-DS1 Media Gateway). These fixed trunk ports support loop-start, DIOD (for Japan only) trunks, and caller ID detection.
LINE	Two analog telephone ports. An analog relay provides Emergency Transfer Relay (ETR) feature. For the G250-Analog and G250-DCP, the relay is between TRUNK port 304 and LINE port 305. For the G250-BRI and G250-DS1, the relay is between TRUNK port 301 and LINE port 302. Also used for incoming analog DID trunks with either wink-start or immediate-start.
ISDN BRI TRUNK (G250-BRI Media Gateway)	Two 4 wire S/T ISDN BRI (Basic Rate Interface) 2B+D access ports with RJ-45 jacks. Each port interfaces to the central office at the ISDN T reference point. The ISDN BRI trunk ports do not support: • BRI stations • Combining both B channels together to form a 128-kbps channel
CONSOLE	Console RS-232 interface port for direct connection of CLI console. RJ-45 connector.
USB	USB port. Supports the connection of • USB flash drive • USB externally powered hub • The Multitech MultiModemUSB MT5634ZBA-USB-V92 USB modem
CCA	RJ-45 port for ACS (308) contact closure adjunct box.
ETH WAN	RJ-45 10/100 Base TX Ethernet port for connection to a cable or DSL broadband modem/ router.

1 of 2

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Table 1: Fixed ports and buttons on the G250 front panel (continued)

Port	Description
ETH LAN POE (G250-Analog, G250-BRI, and G250-DS1)	Eight Power over Ethernet (PoE) LAN ports with 80 watts (aggregated for all ports) for connecting IP phones or any Ethernet devices, such as PCs.
RST	Reset button. Resets chassis configuration.
ASB	Alternate Software Bank button. Reboots the G250 with the software image in the alternate bank.
DCP (G250-DCP)	Twelve DCP ports. These DCP ports are intended for in-building use only.
T1/E1 port (G250-DS1)	For T1, this port is capable of supporting inband signalling across all 24 channels (supports a maximum bandwidth of 1.536 Mbps). For E1, this port is capable of supporting R2MFC signalling across all 30 channels (supports a maximum bandwidth of 1.92 Mbps).
PRI port (G250-DS1)	The PRI port is capable of supporting PRI signalling for 23 or 30 bearer channels. NFAS signalling is not supported.
	2 of 2

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G350 physical description

Figure 5: The Avaya G350 Media Gateway Chassis

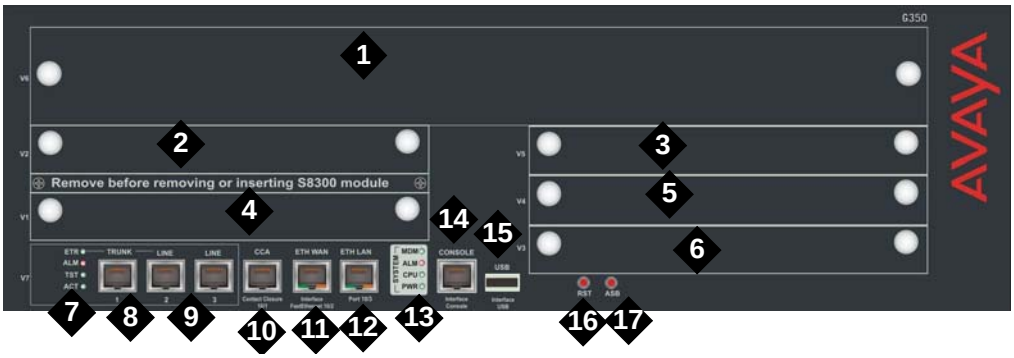

Figure notes:

1. V6 — high-density media module slot
2. V2 — standard media module slot
3. V5 — standard media module slot
4. V1 — slot for standard media module or S8300 Server
5. V4 — standard media module slot
6. V3 — standard media module slot
7. Analog port LEDs
8. Analog trunk
9. Analog line ports
10. CCA (Contact Closure) port
11. ETH WAN port
12. ETH LAN port
13. System LEDs
14. Console port
15. USB port
16. RST button
17. ASB button

For information about the different media modules that can be housed in the G350 media module slots, see Chapter 2: Optional components.

Table 2: Fixed ports and buttons on the G350 front panel

Port/Button	Description
TRUNK	An analog trunk port. Part of an integrated analog media module. The fixed trunk port supports loop-start, ground-start, CAMA, and DIOD (for Japan only) trunks.
LINE	Two analog telephone ports of the integrated analog media module. An analog relay between TRUNK port 7/1 and the furthest left LINE port 7/2 provides Emergency Transfer Relay (ETR) feature. Also used for incoming analog DID trunks.

1 of 2

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Table 2: Fixed ports and buttons on the G350 front panel (continued)

Port/Button	Description
CCA	RJ-45 port for ACS (308) contact closure adjunct box.
ETH WAN	RJ-45 10/100 Base TX Ethernet WAN port.
ETH LAN	RJ-45 10/100 Base TX Ethernet LAN port.
CONSOLE	Console port for direct connection of CLI console. RJ-45 connector.
USB	USB port. Supports the connection of: • USB flash drive • USB externally powered hub • The Multitech MultiModemUSB MT5634ZBA-USB-V92 USB modem
RST	Reset button. Resets chassis configuration.
ASB	Alternate Software Bank button. Reboots the G350 with the software image in the alternate bank.
	2 of 2

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Figure 6: The G350 front panel ports and slots

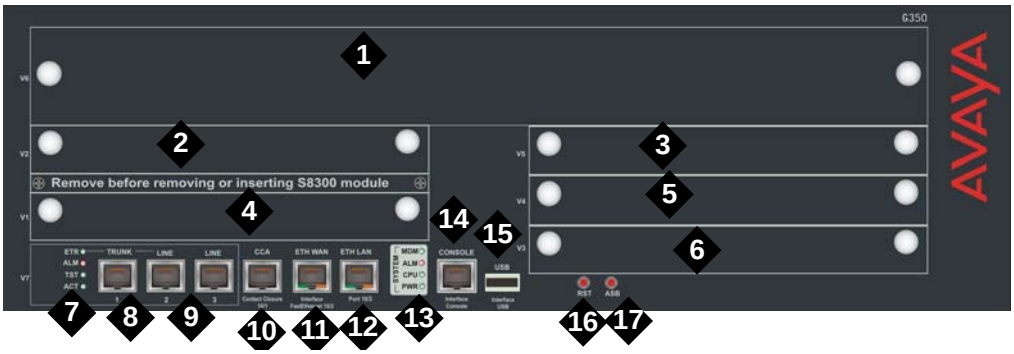

Figure notes:

1. V6 — high-density media module slot
2. V2 — standard media module slot
3. V5 — standard media module slot
4. V1 — slot for standard media module or S8300 server
5. V4 — standard media module slot
6. V3 — standard media module slot
7. Analog port LEDs
8. Analog trunk
9. Analog line ports
10. CCA (Contact Closure) port
11. ETH WAN port
12. ETH LAN port
13. System LEDs
14. Console port
15. USB port
16. RST button
17. ASB button

Table 3: Permitted slots for media modules

Media module	Permitted slots	Description
MM312	V6	Provides 24 ports for connecting DCP telephones.
MM314	V6	Provides one copper Gigabit Ethernet port and 24 10/100 Ethernet ports for connecting data devices. The 24 10/100 Ethernet ports can provide power to connected devices using Power over Ethernet (PoE).
MM316	V6	Provides one copper Gigabit Ethernet port and 40 10/100 Ethernet ports for connecting data devices. The 40 10/100 Ethernet ports can provide power to connected devices using Power over Ethernet (PoE).
MM340	V2, V3, V4, V5	Provides one E1/T1 data WAN port for connecting to a WAN endpoint device.

1 of 2

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Table 3: Permitted slots for media modules (continued)

Media module	Permitted slots	Description
MM342	V2, V3, V4, V5	Provides one universal serial data WAN access port for connecting to a WAN endpoint device.
MM710	V1, V2, V3, V4, V5	Provides one E1/T1 trunk port for connecting an E1/T1 telephone trunk.
MM711	V1, V2, V3, V4, V5	Provides eight universal analog ports for connecting analog telephones or trunks.
MM712	V1, V2, V3, V4, V5	Provides eight ports for connecting DCP telephones.
MM714	V1, V2, V3, V4, V5	Provides four analog ports for analog telephones and four analog ports for analog trunks.
MM716	V1, V2, V3, V4, V5	Provides one amphenol connector that connects to a punch down block to provide 24 analog line ports.
MM717	V1, V2, V3, V4, V5	Provides one amphenol connector that connects to a punch down block to provide 24 ports for connecting DCP telephones.
MM720	V1, V2, V3, V4, V5	Provides eight ports for connecting up to eight ISDN trunks or 16 ISDN BRI stations.
MM722	V1, V2, V3, V4, V5	Provides two ports for connecting ISDN trunks.
S8300	V1	Server
		2 of 2

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Chapter 2: Optional components

The Avaya G350 Media Gateway is a versatile device with powerful capabilities. To implement the various services that are supported, a variety of swappable internal components called media modules are available.

Unlike the G350, the Avaya G250 Media Gateway LAN switching and voice ports are built into the G250's chassis. However, the G250's WAN and call controller options are modular, and accommodate the G350's data WAN media modules, as well as the S8300 server.

Supported media modules in the G350

Table 4: Supported media modules

Media module	Description
S8300	CM server
Telephony media modules	
MM711	8 universal analog ports
MM714	4 analog telephone ports and 4 analog trunk ports
MM716	24 analog ports
MM312	24 DCP telephone ports
MM712	8 DCP telephone ports
MM717	24 DCP telephone ports
MM710	1 T1/E1 ISDN PRI trunk port
MM720	8 ISDN BRI trunk or endpoint (telephone or data) ports
MM722	2 ISDN BRI trunk ports
WAN media modules	
MM340	1 E1/T1 data WAN port

1 of 2

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Table 4: Supported media modules (continued)

Media module	Description
MM342	1 universal serial data WAN port
LAN media modules	
MM314	24 10/100 Ethernet ports with Power over Ethernet (PoE) and one Gigabit Ethernet copper uplink/access port.
MM316	40 10/100 Ethernet ports with Power over Ethernet (PoE) and one 10/100/1000 Ethernet copper uplink/access port.
	2 of 2

CAUTION:
The MM316, MM340, and MM342 are not supported by the Avaya G700 Media Gateway. Do not insert an MM316, MM340, or MM342 media module into an Avaya G700 Media Gateway.

S8300 server

The S8300 server is a Pentium-based processor that runs a Linux operating system. The S8300 runs Avaya Communication Manager (CM) to provide call control services to the G350. The G350 is compatible with Avaya CM from version 2.1 onwards and backwards compatible with Avaya CM 2.0.

The S8300 server features:

- Avaya Native Configuration Manager. An administration tool that provides terminal emulation capabilities and a variety of connectivity options you can save and reuse.
- A 30GB hard disk
- 512 MB RAM
- A WEB server used for the following:
  - Backups and restores for customer data
  - Easy access to view current alarms
  - The ability to perform server maintenance, shutdown, and status of the S8300 server
  - Security commands that can enable and disable the modem, start and stop the FTP server, and view the software license
  - SNMP access to configure trap destinations and stop and start the master agent
  - S8300 server configuration information and upgrade access

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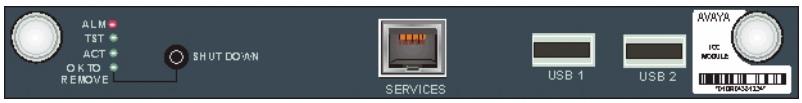
  - The ability to download the Avaya Native Configuration Manager from the S8300 server to a PC on the LAN

- Linux operating system (Redhat v8.x)
- Interface for IA770 INTUITY AUDIX Messaging, a software-only version of INTUITY AUDIX messaging that resides on the hard drive of the S8300 server. For more information, see the description of the S8300 server in the *Hardware Description and Reference for Avaya Communication Manager*, 555-245-207.
- Trivial File Transfer Protocol (TFTP) server
- Security/firewall configuration
- H.248 Media Gateway Signaling Protocol
- Control messages tunneled over H.323 Signaling Protocol
- One 10/100Base-T Ethernet switch port used as a Services port
- Two USB ports for modem connections
- SNMP alarming
- Support for remote call out alarming

Figure 7: The S8300 server



Telephony media modules

The G350 supports the MM711, MM714, and MM716 analog media modules, the MM312, MM712, and MM717 DCP media modules, the MM710 E1/T1 media module, and the MM720 and MM722 BRI media modules.

MM711 analog media module

The MM711 provides analog trunk and telephone features and functionality.

Configuring MM711 ports

The administrator can configure any of the eight ports of the MM711 as follows:

- Central office trunk, either loop start or ground start
- Analog Direct Inward Dialing (DID) trunks, either wink-start or immediate-start
- 2-wire analog Outgoing CAMA E911 trunks for connectivity to the PSTN

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- MF signaling is supported for CAMA ports
- Analog, tip/ring devices, such as single-line telephones with or without LED message waiting indication

MM711 also supports

- Three ringer loads (ringer equivalency number) for up to 2,000 feet (610 meters) for all eight ports
- Up to eight simultaneously-ringing ports

Note:

The media gateway achieves this number of ports by staggering the ringing and pauses between two sets of up to four ports.

- Type 1 Caller ID
- Ring voltage generation for a variety of international frequencies and cadences

Figure 8: The MM711 media module

MM714 analog media module

The MM714 analog media module provides four analog telephone ports and four analog trunk ports.

Note:

The four analog trunk ports *cannot* be used for analog DID trunks. Instead, the four analog telephone ports must be used.

Configuring MM714 ports

The MM714 provides you with the capability to configure any of the four trunk ports as:

- A loop start or a ground start central office trunk with a loop current of 18 to 120 mA
- A two-wire analog Outgoing CAMA E911 trunk, for connectivity to the PSTN. MF signaling is supported for CAMA ports.

Configuring MM714 line ports

The MM714 provides you with the capability to configure any of the four telephone ports as:

- A wink-start or an immediate-start DID trunk

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- Analog tip/ring devices such as single-line telephones with or without LED message waiting indication

MM714 also supports

- Three ringer loads, which is the ringer equivalency number for up to 2,000 feet (610 meters) for all eight ports
- Up to four simultaneously-ringing ports
- Type 1 caller ID and Type 2 caller ID
- Ring voltage generation for a variety of international frequencies and cadences

Figure 9: The MM714 media module

MM716 analog media module

The MM716 provides 24 analog ports supporting telephones, modem, and fax. These ports can also be configured as DID trunks with either wink-start or immediate-start. The 24 ports are provided via a 25 pair RJ21X amphenol connector, which can be connected by an amphenol cable to a breakout box or punch-down block.

Configuring MM716 ports

The MM716 provides you with the capability to configure any of the 24 ports as:

- Analog tip/ring devices such as single-line telephones with or without LED message waiting indication
- A wink-start or an immediate-start DID trunk

MM716 also supports

- Three ringer loads, which is the ringer equivalency number for up to 2,000 feet (610 meters) for all 24 ports
- Up to 24 simultaneously-ringing ports
- Type 1 caller ID
- Ring voltage generation for a variety of international frequencies and cadences

The MM716 is compatible with Avaya Communication Manager release 3.1 and higher, and branch gateway firmware version 25.0.0 and higher.

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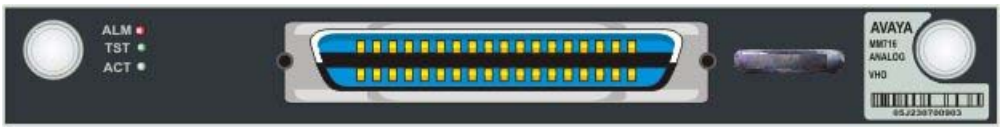
Figure 10: The MM716 media module



MM312 DCP media module

The MM312 DCP media module provides 24 Digital Communications Protocol (DCP) ports with RJ-45 jacks. The MM312 supports simultaneous operation of all 24 ports. Each port can be connected to a two-wire DCP telephone. See Appendix B: Supported Avaya telephones for a list of compatible DCP telephones.

Note:

The MM312 does not support four-wire DCP telephones.

Figure 11: The MM312 media module

MM712 DCP media module

The MM712 DCP media module provides eight DCP telephone ports. The ports support two-wire Digital Communications Protocol (DCP) telephones. See Appendix B: Supported Avaya telephones for a list of compatible DCP telephones.

Figure 12: The MM712 media module

MM717 DCP media module

The MM717 DCP media module provides 24 DCP ports of two-wire DCP functionality exposed as a single 25-pair amphenol connector. The DCP ports are exposed by connecting the module via a standard amphenol cable to a punch-down block with RJ-11 jacks. The MM717 allows you to use one of the smaller media module slots for a large number of DCP telephones.

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Figure 13: The MM717 media module

MM710 E1/T1 media module

The MM710 E1/T1 media module terminates an E1 or T1 trunk. The MM710 has a built-in Channel Service Unit (CSU) so an external CSU is not necessary. The CSU is only used for the T1 circuit.

The MM710 features:

- ISDN PRI capability (23B+D or 30B+D)
- Trunk signaling to support US and International CO or tie trunks
- Echo cancellation in either direction

Figure 14: The MM710 media module

MM720 BRI media module

The MM720 BRI media module provides eight ports with RJ-45 jacks that can be administered either as BRI trunk connections or BRI endpoint (telephone and data module) connections.

Note:

The MM720 BRI media module cannot be administered to support both BRI trunks and BRI endpoints at the same time. However, the MM720 BRI Media Module supports combining both B-channels together to form a 128-kbps channel. CM 3.1 enables combining B-channels, using BONDing, to form a higher bandwidth connection.
Finally, if the MM720 BRI Media Module is administered to support BRI endpoints, it cannot be used as a clock synchronization source.

For BRI trunking, the MM720 BRI media module supports up to eight BRI interfaces to the central office at the ISDN TE reference point. Information is communicated in two ways:

- Over two 64-kbps channels, called B1 and B2, that can be circuit-switched simultaneously
- Over a 16-kbps channel, called the D-channel, that is used for signaling. The MM720 occupies one time slot for all eight D channels.

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The circuit-switched connections have an A- or Mu-law option for voice operation. The circuit-switched connections operate as 64-kbps clear channels when in the data mode.

For BRI endpoints, the MM720 BRI media module supports up to 16 BRI stations and data modules that conform to AT&T BRI, World Class BRI, and National ISDN NI1/NI2 BRI standards. The MM720 BRI media module provides -40 volt phantom power to the BRI endpoints.

Figure 15: The MM720 media module

MM722 BRI media module

The MM722 BRI media module provides two 4 wire S/T ISDN BRI 2B+D access ports with RJ-45 jacks. Each port interfaces to the central office at the ISDN T reference point. Information is communicated in the same manner as for the MM720. See MM720 BRI media module on page 29.

Figure 16: The MM722 media module

Note:

The MM722 media module does not support BRI stations or combining both B channels together to form a 128-kbps channel.

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WAN media modules

The G350 supports the MM340 E1/T1 WAN and MM342 Universal Serial Port WAN media modules.

MM340 E1/T1 WAN media module

The MM340 E1/T1 WAN media module provides a data WAN access port for the connection of an E1 or T1 WAN.

Figure 17: The MM340 media module

MM342 universal serial data WAN media module

The MM342 media module provides one universal serial data WAN access port. MM342 supports the following WAN protocols:

- V.35/ RS449
- X.21

Necessary cable

For these connections, one of the following cables is necessary:

- Avaya Serial Cable DTE V.35 (Universal Serial Port to V.35)
- Avaya Serial Cable DTE X.21 (Universal Serial Port to X.21)

Figure 18: The MM342 media module

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LAN media modules

The G350 supports the MM314 and MM316 LAN media modules.

MM314 LAN media module

The MM314 LAN media module provides:

- 24 Ethernet 10/100 Base-T Ethernet access ports with inline Power over Ethernet (PoE)
- One Gigabit Ethernet copper port for server connection or uplink to another switch or router

The MM314 supports 48V DC inline power provided over standard category 5 UTP cables (up to 100m range) on each PoE port.

Power consumption for the MM314 media module is 335W.

MM314 features

- Priority power budgeting with configurable priorities
- Automatic load detection on ports
- Automatic device discovery
- Enable/disable port powering option
- Port monitoring
- Automatic recovery from overload shutdown
- Automatic recovery from no-load shutdown

Figure 19: The MM314 media module

Versions of the MM314 LAN media module with Material Code 700384 (C/S:2.0) require Avaya CM version 2.0 and higher, and G350 firmware version 25.0.0 and higher.

For more information about PoE, see Power over Ethernet (PoE) on page 46.

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MM316 LAN media module

The MM316 LAN media module provides:

- 40 Ethernet 10/100 Base-T Ethernet access ports with inline Power over Ethernet (PoE)
- One Gigabit Ethernet copper port for server connection or uplink to another switch or router

The MM316 supports 48V DC inline power provided over standard category 5 UTP cables (up to 100m range) on each PoE port.

Power consumption for the MM316 media module is 435W.

MM316 features

- Priority power budgeting with configurable priorities
- Automatic load detection on ports
- Automatic device discovery
- Enable/disable port powering option
- Port monitoring
- Automatic recovery from overload shutdown
- Automatic recovery from no-load shutdown

Figure 20: The MM316 media module

The MM316 is compatible with Avaya CM version 2.0 and higher, and G350 firmware version 25.0.0 and higher.

For more information about PoE, see Power over Ethernet (PoE) on page 46.

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Media module slot configurations in the G350

When choosing a combination of media modules to install in the G350 chassis, consider the slots in which each module type can be housed, and the limitations and recommendations regarding combinations of media modules.

Permitted slots

The G350 chassis has six media module slots, marked V1, V2, V3, V4, V5, V6 (see G350 physical description on page 19). Each media module is restricted to certain slots.

Table 5: Permitted slots for media modules

Media module	Permitted slots
MM312	V6
MM314	V6
MM316	V6
MM340	V2, V3, V4, V5
MM342	V2, V3, V4, V5
MM710	Any media module slot, V1-V5
MM711	Any media module slot, V1-V5
MM712	Any media module slot, V1-V5
MM714	Any media module slot, V1-V5
MM716	Any media module slot, V1-V5
MM717	Any media module slot, V1-V5
MM720	Any media module slot, V1-V5
MM722	Any media module slot, V1-V5
S8300	V1

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Combination limitations in the G350

The following limitations apply to stations and trunks in the G350:

- Up to a total of 72 stations (any mix of analog, DCP, IP)
- Up to a total of 60 trunks, subject to the following restrictions:
  - up to 2 E1 (T1) trunks
  - up to 40 analog trunks
  - up to 32 IP trunks at G711
- Up to a total of 132 TDM stations and trunks

The following limitations apply to combining media modules in the G350:

- No more than two of the following media modules: MM340 and MM710
- No more than three of the following media modules: MM716 and MM717

Supported media modules in the G250

The G250 supports the following Avaya media modules:

Table 6: Supported media modules

Media module	Description
S8300	CM server
WAN media modules	
MM340	1 E1/T1 data WAN port
MM342	1 universal serial data WAN access port

CAUTION:
The MM340 and MM342 media modules are not supported by the Avaya G700 Media Gateway. Do not insert an MM340 or MM342 media module into an Avaya G700 Media Gateway.

For information about the WAN media modules, see WAN media modules on page 31. For information about the S8300 server, see S8300 server on page 24.

The S8300 server can be inserted in slot V1. A WAN media module can be inserted in slot V2.

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Chapter 3: Summary of services

The Branch Gateway (G250 or G350) offers various services, which are described in Media gateway services on page 37, LAN services on page 45, and WAN services on page 47.

Media gateway services

The Avaya G250 and Avaya G350 Media Gateways provide a telephone exchange service, supporting the connection of various types of telephones and outside telephone lines. Telephones and lines are connected to the G250/G350 via ports and media modules on the chassis. Different media modules provide access ports for different types of telephones and lines.

Telephony services are controlled by a media gateway controller (MGC) running Avaya Communication Manager (CM) call processing software. You can use the Avaya CM to configure many advanced telephone exchange functions. For more information, see the *Administrator's Guide for Avaya Communication Manager*, 555-233-506.

This section describes the services the G250/G350 provides as a media gateway. All services are supported by both the G250 and the G350 except where otherwise specified.

Voice over IP (VoIP)

The Avaya G250 and Avaya G350 Media Gateways feature a VoIP engine that provides voice services over IP data networks. The G250/G350 allows you to use many types of telephones and trunks that do not directly support VoIP. The G250/G350 translates voice and signalling data between VoIP and the system used by the telephones and trunks, as follows: Avaya media modules convert the voice path of traditional circuits such as analog trunk, T1/E1, and DCP to a TDM bus inside the G250/G350. The VoIP engine then converts the voice path from the TDM bus to a compressed or uncompressed and packetized VoIP on an Ethernet connection.

Both the G250 and the G350 provide VoIP services over the LAN and WAN. The G350 supports the G.711 codec for up to 32 concurrent calls and the G.729 codec for up to 16 concurrent calls. The G250-Analog and G250-BRI support both the G.711 and the G.729 codec, for a total of 10 concurrent calls. The G250-DCP and G250-DS1 support both the G.711 and the G.729 codec, for a total of 16 concurrent calls.

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Physical media — G350

There are various types of telephones and lines supported by the G350 and access ports provided for their connection.

Telephones

The G350 supports IP telephones, Avaya DCP telephones, analog telephones, and BRI telephones. For information about which Avaya telephones are supported, see Appendix B: Supported Avaya telephones.

Telephones must be connected to the correct type of port for the telephone type. Different types of telephone ports are provided by different media modules and by fixed ports on the G350 front panel. The table below lists which ports you can use to connect each type of telephone. See Chapter 2: Optional components for more information about each type of port and media module.

Table 7: Telephones supported and ports provided

Telephone type	Ports
IP telephones	Switched Ethernet ports on the MM314 and MM316 LAN media modules. **Note:** The registration and signaling control information is under the direct control of the S8xxx server.
Avaya DCP digital telephones	DCP ports on the MM312, MM712, and MM717 media modules.
Analog telephones	• Analog line ports on the MM711, MM714, and MM716 analog media modules. • Fixed analog telephone line port, LINE (see G350 physical description on page 19).

Voice software

The G350 supports telephone calls between a computer on the network running Avaya Softphone software and analog telephones connected to the G350.

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Outside telephone lines

The table below lists which modules you can use to connect each type of outside line. See Chapter 2: Optional components for more information about each type of port and media module.

Table 8: Outside telephone lines supported and ports provided

Line Type	Ports
ISDN line	ISDN ports on the MM720 and MM722 BRI media modules.
Analog trunks	Analog trunk ports on the MM714 analog media module. Fixed analog trunk port, TRUNK (see G350 physical description on page 19). Universal analog ports on MM711. DID trunk ports with wink-start and immediate-start only on MM716.
T1/E1 voice lines	The T1/E1 port on the MM710 T1/E1 media module.

Physical media — G250

There are various types of telephones and lines supported by the G250 and access ports provided for their connection.

Telephones

The G250 supports IP telephones and analog telephones. The G250-DCP also supports Avaya DCP telephones. For information about which Avaya telephones are supported, see Appendix B: Supported Avaya telephones.

Telephones must be connected to the correct type of port for the telephone type. Different types of telephone ports are provided by fixed ports on the G250 front panel. The table below lists which ports you can use to connect each type of telephone. See G250 physical description on page 15 for more information about each type of port.

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Table 9: Telephones supported and ports provided

Telephone type	Ports
IP telephones	LAN ports on the G250 front panel. For PoE functionality, use an ETH LAN PoE port.
Analog telephones	LINE or ANALOG LINE ports on the G250 front panel.
DCP telephones	DCP ports on the G250-DCP front panel.

Voice software

The G250 supports telephone calls between a computer on the network running Avaya Softphone software and analog/DCP telephones connected to the G250.

Outside telephone lines

The table below lists which ports you can use to connect each type of outside line. See G250 physical description on page 15 for more information about each type of port.

Table 10: Outside telephone lines supported and ports provided

Line Type	Ports
ISDN lines	G250-BRI only — ISDN BRI TRUNK ports on the G250-BRI front panel.
Analog trunks	Analog TRUNK ports on the G250 front panel.
T1/E1 voice lines	T1/E1 port on the G250-DS1 front panel.

Media Gateway Controllers

A Media Gateway Controller (MGC) controls telephone services on a media gateway. An MGC may be internal to the media gateway or external to the media gateway. An Internal Call Controller (ICC) is an internal MGC. An External Call Controller (ECC) is an external MGC that communicates with the G250/G350 over the network.

An Avaya S8XXX server managed with Avaya Communication Manager (CM) software acts as an MGC for the Avaya G250 or Avaya G350 Media Gateway.

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Supported S8XXX servers

The MGCs supported by the Avaya G250 or Avaya G350 Media Gateway include both ECCs and ICCs. Both the G250 and the G350 support the following MGCs:

Table 11: MGCs supported by the Avaya G250 and Avaya G350 Media Gateways

MGCs	Type	Usage
Avaya S8300 Server	Media module	ICC, ECC or LSP
Avaya S8400 Server	External	ECC
Avaya S8500 Server	External	ECC or LSP
Avaya S8700 Server	External	ECC
Avaya S8710 Server	External	ECC
Avaya S8720 Server	External	ECC
Avaya S8730 Server	External	ECC

Note:

The S8700 Server cannot be upgraded to CM 5.0.

See Chapter 2: Optional components for information about the S8300 Server module.

Configuring G250/G350 options

The G250/G350 provides the following configuration options to help you ensure continuous telephone services:

- You can configure the G250/G350 to use up to four MGCs. If the MGC is an S8700, S8710, S8720, or S8730, the first server on the list will normally be the primary C-LAN board connected to the S8xxx server. If the MGC is an S8400 or S8500, the first server on the list will be either the primary C-LAN board connected to the S8xxx server or an Ethernet port on the server that has been enabled for processor Ethernet connections. If the MGC is an S8300, the first server on the list will be the IP address of the S8300. The remaining servers will be alternate C-LAN boards connected to the S8xxx server (S8400, S8500, or S8700-series servers), an S8300 configured as an LSP, or the port enabled as the Ethernet processor port on an S8500 configured as an LSP.
- Using the connection preserving migration feature, you can configure the G250/G350 to preserve the bearer paths of stable calls in the event that the G250/G350 migrates to another MGC (including an LSP), including migration back from an LSP to the primary MGC. A call for which the talk path between parties in the call has been established is considered stable. A call consisting of a user listening to announcements or music is not

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considered stable and is not preserved. Any change of state in the call prevents the call from being preserved. For example, putting a call on hold during MGC migration will cause the call to be dropped. Special features, such as conference and transfer, are not available on preserved calls. Connection preserving migration preserves all types of bearer connects except BRI. PRI trunk connections are preserved.

- You can configure Standard Local Survivability (SLS) to enable a local G250/G350 to provide a degree of MGC functionality when no link is available to an external MGC. SLS is configured on a system-wide basis using the Provisioning and Installation Manager (PIM). Alternatively, SLS can be configured from the individual G250/G350 itself using the CLI. SLS is supported as follows in the various Branch Gateway models:
  - G350 with C/S (hardware vintage) 3.0 and up: SLS supported for all analog interfaces, ISDN BRI/PRI trunk interfaces, non-ISDN digital DS1 trunk interfaces, IP phones, IP Softphone, and DCP phones.
  - G250-Analog: SLS supported for all analog interfaces, IP phones, and IP Softphone.
  - G250-BRI: SLS supported for all analog interfaces, ISDN BRI trunk interfaces, IP phones, and IP Softphone.
  - G250-DCP: SLS supported for all analog and DCP interfaces, IP phones, IP Softphone, and DCP phone.
  - G250-DS1: SLS supported for all analog interfaces, ISDN PRI trunk interfaces, non-ISDN digital DS1 trunk interfaces, IP phones, and IP Softphone.
- You can configure Enhanced Local Survivability (ELS) by installing an S8300 in the G250/G350 as a Local Survivable Processor (LSP). In this configuration, the S8300 is not the primary MGC but takes over to provide continuous telephone service if all external MGCs become unavailable. Calls in progress continue without interruption when the S8300 takes over.
- You can configure the dialer interface to connect to the G250/G350's primary MGC via a serial modem in the event that the connection between the G250/G350 and the MGC is lost.
- You can configure the Avaya CM to support the auto fallback feature, which enables a G250/G350 being serviced by an LSP to return to its primary MGC automatically when the connection is restored between the G250/G350 and the MGC. When the G250/G350 is being served by its LSP, it automatically attempts to register with its MGC at periodic intervals. The MGC can deny registration in cases in which it is overwhelmed with call processing, or in other configurable circumstances. By migrating the G250/G350 to the MGC automatically, a fragmented network can be unified more quickly, without the need for human intervention.

Note:

Auto fallback does not include survivability. Therefore, there is a short period during registration with the MGC during which calls are dropped and service is not available. This problem can be minimized using the connection preserving migration feature.

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- The G250/G350 features a dynamic trap manager, which enables you to ensure that the G250/G350 sends traps directly to the currently active MGC. If the MGC fails, the dynamic trap manager ensures that traps are sent to the backup MGC.

MGC management

The MGC is managed by the Avaya Communication Manager (CM). The G250/G350 supports Avaya Communication Manager (CM) release 5.0 and is backwards compatible with release 2.0 and above.

Avaya CM features

Avaya CM is an open, scalable, highly reliable, and secure telephony application. Avaya CM provides user and system management functionality, intelligent call routing, application integration and extensibility, and enterprise communications networking. Avaya CM offers over 500 features, in the following categories:

- Telephony features
- Localization
- Collaboration
- Mobility
- Messaging
- Telecommuting
- System management
- Reliability
- Security, privacy, and safety
- Hospitality
- Attendant features
- Networking
- Intelligent call routing
- Application programming interfaces

Avaya CM software applications

- Determine where to connect your telephone call based on the number you dial
- Assign numbers to local telephones
- Play dial tones, busy signals, and prerecorded voice announcements
- Allow or prohibit access to outside lines for specific telephones

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- Assign telephone numbers and buttons to special features
- Exchange call switching information with older telephone switches that do not support VoIP

For more information about Avaya CM software, see *Administrator's Guide for Avaya Communication Manager*, 555-233-506.

Additional features

The G250/G350 also provides voice-related features.

Call center capabilities

The G350 supports call center features according to the mode of deployment (see G350 physical description on page 19):

- Distributed Avaya Enterprise Connect mode. The G350 supports up to ten concurrent call center agents. This configuration is supported by CM 2.0 applications and above.
- Standalone mode. The G350 supports a call center application with up to ten concurrent agents. This application is supported by CM 2.1 and above.

Note:

The G250 does not support call center features.

Emergency Transfer Relay (ETR)

The Emergency Transfer Relay (ETR) feature provides basic telephone services in the event of a power outage or a failed connection to Avaya Communication Manager. Using ETR, you can connect:

- In the G350, the fixed analog trunk port (TRUNK - V701) to the first analog line port (LINE - V702)
- In the G250-Analog, the fourth fixed analog trunk port (TRUNK - V304) to the first line port (LINE - V305)
- In the G250-BRI, the fixed analog trunk port (TRUNK - V301) to the first analog line port (LINE - V302)
- In the G250-DCP, the fourth fixed analog trunk port (TRUNK - V304) to the first line port (LINE - V305)
- In the G250-DS1, the fixed analog trunk port (TRUNK - V301) to the first line port (LINE - V302)

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WARNING:
Do not enable ETR on ports used for DID.

An outside telephone exchange can be connected to the trunk port, and an analog telephone can be connected to the line port. All calls are then directed by the analog relay between the outside line and the analog telephone. A current-loop detection circuit prevents ongoing calls from being disconnected when normal functioning resumes. It is recommended that ETR not be enabled for line ports that are administered for use with analog DID trunks.

Contact closure

The contact closure feature is a controllable relay providing dry contacts for various applications. To implement the contact closure feature, connect an Avaya Partner Contact Closure Adjunct box to the CCA port on the G250/G350 chassis. The adjunct box provides two contact closures that can be operated in either a “normally closed” or “normally open” state. The contact closures can control devices such as devices that automatically lock or unlock doors or voice recording units. The CCA port can be configured so that the connected devices can be controlled by an end device, such as a telephone. For example, a user can unlock a door by keying a sequence into a telephone keypad.

Fax, modem, TTY over IP

The G250/G350 supports fax, modem, and TTY over IP.

LAN services

You can use both the Avaya G250 and Avaya G350 Media Gateways as a LAN switch. You can also integrate the G250/G350 into an existing LAN.

Physical media

The G350 provides LAN services through the following Ethernet ports for the connection of local data devices:

- Switched LAN ports. Configurable switched Ethernet ports on the MM314 media module (see MM314 LAN media module on page 32) and the MM316 media module (see MM316 LAN media module on page 33). The switched Ethernet ports support HP auto-MDIX, which automatically detects and corrects the polarity of crossed cables. This results in simplified LAN installation and maintenance.

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- Fixed LAN port. The fixed LAN port on the chassis, connected to the internal LAN switch. The fixed LAN port supports HP auto-MDIX, which automatically detects and corrects the polarity of crossed cables. This results in simplified LAN installation and maintenance.

The G250 provides LAN services through eight fixed ETH LAN PoE ports on the chassis.

Note:

The G250-DCP only has two fixed ETH LAN ports. These ports do not support PoE.

Power over Ethernet (PoE)

In the G350, the MM314 and MM316 media modules' ports provide power to data devices over the Ethernet connection (PoE). The ports support the connection of IP phones and wireless access points, which you may want to power through the G350.

In the G250, PoE service is provided by eight fixed ETH LAN PoE ports on the chassis.

Note:

The G250-DCP does not provide PoE service.

The inline PoE feature enables you to power data devices through the G250/G350. Power is distributed between the PoE ports, according to configured priorities. You configure the power priority on each port. Distribution is calculated from the actual power consumption.

An automatic discovery system detects when powered devices are connected to and removed from the PoE ports. Automatic load detection:

- Tests whether the device connected to the port requires remote powering
- Controls the power injection to the wires

VLANs

In the G350, you can configure VLANs on the fixed LAN port and on the MM314 and MM316 ports. In the G250, you can configure VLANs on all Ethernet ports except the WAN ETH port.

Both the G250 and the G350 support up to eight VLANs. The following VLAN features are supported:

- VLAN port grouping. Port VLANs can be used to group LAN ports into logical groups.
- Ingress VLAN Security. You configure a list of ingress VLANs on each port. Any packets tagged with an unlisted VLAN are dropped when received on the port.
- Class of Service (CoS) tagging. Packets are tagged with VLANs per CoS.
- Inter-VLAN routing. You can configure specific VLANs to permit access to the WAN while others can be configured to deny access to the WAN.

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Rapid Spanning Tree Protocol (RSTP)

The IEEE 802.1D (STP) and IEEE 802.1w (RSTP) Spanning Tree Protocols are supported on the MM314 and MM316 switched LAN ports.

Note:

STP is not supported in the G250.

Port mirroring

Both the G250 and the G350 support network traffic monitoring by port mirroring. You can configure port mirroring on any LAN port. You implement port mirroring by connecting an external traffic probe device to one of the LAN ports. The probe device monitors traffic that is sent and received through other ports by copying the packets and sending them to the monitor port.

Note:

You cannot configure port mirroring on the G350 fixed LAN port or the G250/G350 WAN Fast Ethernet ports.

Port redundancy

You can configure port redundancy on the G350. Port redundancy allows you to provide both a primary link and a backup link to an important resource.Port redundancy is supported between any two PoE ports on the MM314 or the MM316 media modules.

WAN services

The G250/G350 has an internal router and provides direct access to outside WAN lines. You can use the G250/G350 as the endpoint device for a WAN line. You can also use the G250/G350 as the router for a WAN line with an external endpoint device.

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Physical media

To use the G250/G350 as the endpoint device for a WAN, install a WAN media module and connect the WAN line to a port on the media module. When you connect a WAN line to a media module, the G250/G350 serves as the router for the WAN line.

You can also use the fixed ETH WAN Fast Ethernet port as a WAN endpoint by configuring the port's interface for PPPoE encapsulation (ADSL modem) or Ethernet-DHCP/static IP (cable modem).

To use the G250/G350 as a router, connect the external endpoint device to the fixed WAN port on the G250/G350 front panel using a standard network cable. See G250 physical description on page 15 and G350 physical description on page 19 for the location of the WAN port on the G250 and G350 front panels.

You can also use the fixed WAN port to connect a computer or other endpoint data device to the G250/G350.

Avaya G250 and G350 support

The G250/G350 supports the following types of data WAN line:

- E1/T1
- Universal Serial Port
- PPPoE (ADSL modem)
- Ethernet-DHCP/static IP (cable modem)

Media modules necessary for each WAN line

The table below lists which media modules to install to connect each type of outside WAN line. For more information about each type of media module, see Chapter 2: Optional components.

Table 12: Outside WAN lines supported and matching media modules

WAN line	Media modules
Universal Serial Port	MM342
E1/T1 data lines	MM340
PPPoE (ADSL modem)	Chassis
Ethernet (DHCP/static IP) (cable modem)	Chassis

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WAN features

The G350 supports the following WAN features. The G250 also supports these features, except where otherwise noted.

- Traffic shaping. The traffic shaping function estimates the parameters of the incoming traffic and takes action if it measures traffic exceeding agreed parameters. The action could be to drop the packets or mark them as being high drop priority.
- PPP over channeled and fractional E1/T1. The G250/G350 has the ability to map several PPP sessions to a single E1/T1 interface.

  Note:

  The G250 only supports fractional E1/T1.
- PPP over Universal Serial Port
- PPPoE
- Unframed E1 for enabling full 2.048 Mbps bandwidth usage
- Point-to-Point Frame Relay encapsulation over channelized/fractional/unframed E1/T1 ports or over a Universal Serial Port interface
- Frame Relay LMI types supported: ANSI (Annex D), ITU-T:Q-933 (Annex A0), LMI-Rev1, and No LMI
- Backup functionality supported between any type of Serial Layer 2 interface
- Dynamic Call Admission Control (CAC) for Fast Ethernet, Serial, and GRE tunnel interfaces. Dynamic CAC provides enhanced control over WAN bandwidth. When Dynamic CAC is enabled on an interface, the G250/G350 informs the MGC of the actual bandwidth of the interface and tells the MGC to block calls when the bandwidth is exhausted.
- Quality of Service (QoS). The G250/G350 uses Weighted Fair VoIP Queuing (WFVQ) as the default queuing mode for WAN interfaces. WFVQ combines weighted fair queuing (WFQ) for data streams and priority VoIP queuing to provide the real-time response time that is required for VoIP. The G250/G350 also supports the VoIP Queue and Priority Queue legacy queuing methods.
- Weighted Random Early Detection (WRED). The G250/G350 uses WRED on its ingress and egress queues to improve the performance of the network when overloaded. The purpose of WRED is to indicate to transmitting hosts to reduce their transmission speed when the ingress G350 queues are congested.
- Policy. Each interface on the G250/G350 can have four active policy lists:
  - Ingress Access Control List
  - Ingress QoS List
  - Egress Access Control List

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- Egress QoS List

  Access control lists define which packets should be forwarded or denied access to the network. QoS lists change the DSCP and 802.1p priority of routed packets according to the packet characteristics.

- Policy-based routing. The G250/G350 features policy-based routing, which uses a policy list structure to implement a routing scheme based on traffic source, destination, type, and other characteristics. You can use policy-based routing lists (PBR lists) to determine the routing of packets that match the rules defined in the list. Common applications include separate routing for voice and data traffic, routing traffic originating from different sets of users through different Internet connections (Internet Service Providers), and defining backup routes for defined classes of traffic.
- RTP Header Compression. The G250/G350 saves up to 60% of the bandwidth necessary using RTP compression. It also enhances the efficiency of voice transmission over the network by compressing the headers of Real Time Protocol (RTP) packets, thereby minimizing the overhead and the delays involved in RTP implementation.
- TCP Header Compression. The G250/G350 uses Transmission Control Protocol (TCP) header compression to reduce the amount of bandwidth needed for non-voice data. TCP header compression can be applied either as part of RTP Header Compression via IPCH, or using the Van Jacobson method defined in RFC 1144.
- Inter-Gateway Alternate Routing (IGAR). The G250/G350 uses IGAR as a means to use the PSTN as an alternative to the WAN interface under certain definable conditions. In providing an alternate routing mechanism, IGAR preserves the internal makeup of the call so that the call can be successfully terminated to its original internal destination.

Routing features

Both the G250 and the G350 have an internal router. You can configure the following routing features on the router:

- Interfaces
- Routing table
- VPN
- GRE tunneling
- DHCP and BOOTP relay
- DHCP server
- DHCP client
- Broadcast relay
- ARP table
- ICMP errors

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- RIP
- OSPF
- Route redistribution
- VRRP
- Fragmentation
- Static routes
- Policy based routing
- Distribution lists
- Dynamic IP addresses
- DNS resolver
- Unnumbered IP interfaces
- SYN cookies
- Keepalive packets
- Object tracking
- Backup interfaces

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Chapter 4: Management, Security, Alarms and Troubleshooting

Management applications

The Avaya G250 and Avaya G350 Media Gateways can be managed using any of the following applications:

- Avaya G250 and Avaya G350 Command Line Interfaces
- Avaya G250/G350 Manager and Embedded Web Manager
- Avaya Integrated Management
- Avaya QoS Manager

Avaya G250 and Avaya G350 Command Line Interfaces (CLI)

You can use the Avaya G250 or G350 CLI to configure the G250/G350 and its media modules. The CLI is a textual command prompt interface. It is similar to the CLI of many other network devices.

You can access the CLI with any of the following:

- Telnet through the network
- Telnet through dialup, using a dialup PPP network connection
- A console device connected to the Console port or on the G250/G350 front panel
- SSH (Secure Shell), which enables you to establish a remote session over a secured tunnel

For information about each command in the CLI, see the *Avaya G250 and Avaya G350 Media Gateway CLI Reference*, 03-300437.

For information about how to use the CLI to perform specific configuration tasks, see *Administration for the Avaya G250 and Avaya G350 Media Gateways*, 03-300436.

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Avaya G250/G350 Manager and Embedded Web Manager

Avaya G250/G350 Manager is a web-enabled graphical administration tool for configuring a single G250 or G350 device. You can use Avaya G250/G350 Manager to configure the G250 or G350 chassis and media modules. You can also use it for status monitoring and troubleshooting. You can open Avaya G250/G350 Manager in one of the following ways:

- From Avaya Integrated Management software
- From a web browser on a computer on the same network as the device (supported by the Avaya G350 only)

For information about Avaya G250/G350 Manager, see the *G250/G350/G450 Manager User Guide*, 14-300166.

Avaya Integrated Management

Avaya Integrated Management offers a comprehensive set of web-based network and system management solutions that support Avaya converged voice solutions. You can use Avaya Integrated Management to monitor SNMP traps on the G250/G350. You can also use Avaya Integrated Management to access Avaya G250/G350 Manager.

Avaya QoS Manager

You can use Avaya QoS Manager to configure G250/G350 QoS policy capabilities. You can access Avaya QoS Manager through Avaya Integrated Management software.

Management access security features

The G250/G350 features the following management security mechanisms:

- A basic authentication mechanism in which users are assigned passwords and privilege levels
- Support for user authentication provided by an external RADIUS server
- SNMPv3 user authentication
- Secure data transfer via SSH and SCP with user authentication

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- ASG authentication for remote service logins. ASG is a challenge-response authentication method that is more secure than password authentication and does not require a static password.

Network security features

The Avaya G250/G350 Media Gateway provides the following network security features:

- Private secure connections can be configured between the G250/G350 and a remote peer, using VPN (Virtual Private Network). VPN at the IP level is deployed using a standards-based set of protocols defined by the IETF called IPSec. IPSec provides privacy, integrity, and authenticity to information transferred across IP networks.
- Access to the G250/G350's LAN ports is authenticated using the 802.1x protocol. On the G350, you can enable 802.1x on the MM314 and MM316 media modules' 10/100 Ethernet ports. On the G250, you can enable 802.1x on the eight Ethernet LAN PoE ports located on the G250's front panel. The 802.1x protocol standard is extended to support an optional mode for authenticating multiple supplicants.
- Protection against DoS (Denial of Service) attacks via:
  - MSS notifications. The G250/G350 identifies predefined or custom-defined traffic patterns as suspected DoS attacks and generates SNMP notifications, referred to as Managed Security Services (MSS) notifications. MSS notifications are intercepted and, if certain conditions are met, may be forwarded to the Avaya Security Operations Center (SOC) as INADS alarms. The SOC is an Avaya service group that handles DoS alerts, responding as necessary to any DoS attack or related security issue.
  - SYN cookies, which protect against a well-known TCP/IP attack in which a malicious attacker targets a vulnerable device and effectively prevents it from establishing new TCP connections.

Alarms and troubleshooting features

The Avaya G250 and Avaya G350 Media Gateways have extensive features for error detection, alarms, and troubleshooting. Detailed diagnostic information and troubleshooting are provided by software-based solutions accessible by laptops in the field or remotely from an administrator's computer. *Administration for the Avaya G250 and Avaya G350 Media Gateways*, 03-300436, provides a comprehensive guide to configuring and using these solutions.

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Front panel LEDs

LEDs on the front panel of the G250 and G350 and their media modules give a quick overall understanding of the health of the system and subsystems. When alarms or problems occur, LEDs indicate that a technician's attention is needed.

Automatic error detection

During normal operations, software or firmware automatically detects and attempts to fix or circumvent error conditions. Errors are detected in two ways:

- Firmware on a system component during ongoing operations
- A "periodic test" or a "scheduled test" started by software

A technician can run more comprehensive tests on demand.

SNMP

The G250/G350 reports alarms using SNMP traps. The G350 fully supports SNMP versions SNMPv1, SNMPv2c, and SNMPv3. The G250 supports SNMPv3 for sending SNMPv1, SNMPv2c, and SNMPv3 traps, but does not support the SNMPv1 trap mechanism.

Packet sniffing

The G250/G350 features packet sniffing. All packets, including non-Ethernet packets, that pass through the G250/G350, are recorded. The recorded packets are stored in a file that can be uploaded either to the S8xxx server or to a PC and read by Ethereal for troubleshooting purposes.

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VoIP debugging using RTP-MIB

The G250/G350 includes the RTP-MIB feature for debugging QoS-related problems across the VoIP network without any dedicated hardware. During each RTP stream, counters representing various QoS metrics increment whenever configured thresholds for the metrics are exceeded. A limited history of the QoS metric statistics is stored on the G250/G350 for active and terminated RTP streams. Statistics can be displayed via the G250/G350 CLI. In addition, the G250/G350 can be configured to send SNMP traps to the SNMP trap manager on the S8xxx server at the termination of each RTP stream that has QoS problems. The traps are converted to syslog messages and stored for viewing in the messages file on the S8xxx server hard disk.

Object tracking

The G250/G350 includes object tracking. The purpose of object tracking is to track the state (up/down) of remote devices using keepalive probes, and notify registered applications when the state changes. Object tracking is utilized by applications such as VPN to track remote devices and take certain steps when the state of a remote device changes.

Converged Network Analyzer (CNA) test plug

CNA test plugs are a component of CNA, a distributed system tool for real-time network monitoring that detects and diagnoses converged network-related issues. CNA is deployed in the G250/G350 to identify any network conditions or impairments that can degrade the user experience for IP telephony and to monitor overall network performance. Test plugs in media gateways provide the ability to measure end-to-end service to the edge of the PSTN, or at points where codec changes are required for interworking between high (LAN) and low (WAN) speed links.

Link Layer Discovery Protocol (LLDP)

LLDP simplifies network troubleshooting and enhances the ability of network management tools to discover and maintain accurate network topologies in multi-vendor environments. LLDP defines a set of advertisement messages (TLVs), a protocol for transmitting the TLVs, and a method for storing the information contained in the received TLVs. This allows stations attached to a LAN to advertise information about the system and about the station’s point of attachment to the LAN to other stations attached to the same LAN. These can be reported to the management station via SNMP MIBs.

On the G250, LLDP is supported on all the Ethernet LAN ports on the chassis.

On the G350, LLDP is supported on the Ethernet LAN ports located on the MM314 and MM316 media modules.

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Chapter 5: Documentation

The following documentation is available to help you implement the G250 or G350 in your environment:

- *Installing and Upgrading the Avaya G250 Media Gateway*, 03-300434. Describes how to install and upgrade the G250, prepare the G250 for software configuration, and perform some basic configurations. This guide describes how to insert media modules and connect external devices to the G250 and media module ports.
- *Installing and Upgrading the Avaya G350 Media Gateway*, 03-300394. Describes how to install and upgrade the G350, prepare the G350 for software configuration, and perform some basic configurations. This guide describes how to insert media modules and connect external devices to the G350 and media module ports.
- *Quick Start for Hardware Installation for the Avaya G250 Media Gateway*, 03-300433. A concise installation guide covering assembly and basic configuration of the G250.
- *Quick Start for Hardware Installation for the Avaya G350 Media Gateway*, 03-300148. A concise installation guide covering assembly and basic configuration of the G350.
- *Administration for the Avaya G250 and Avaya G350 Media Gateways*, 03-300436. Describes how to configure and manage the G250/G350 after it is already installed. This guide contains detailed information about all the features of the G250/G350 and how to implement them.
- *Avaya G250/G350/G450 Manager User Guide,* 14-300166. Describes how to use the Avaya G250/G350/G450 Manager software to manage the G250/G350/G450.
- *Avaya G250 and Avaya G350 CLI Reference*, 03-300437. Describes the commands in the G250/G350 CLI.
- *Maintenance Alarms for Avaya Communication Manager, Media Gateways and Servers*, 03-300430. Describes MOs and how to resolve alarms.
- *Maintenance Commands for Avaya Communication Manager, Media Gateways and Servers*, 03-300431. Describes all the commands across platforms.
- *Maintenance Procedures for Avaya Communication Manager, Media Gateways and Servers*, 03-300432. Describes maintenance procedures such as network recovery.

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Appendix A: G250 and G350 capacities

G250 maximum media gateway capacities

Table 13: G250 media gateway capacities

Description	Capacity	Comments
Maximum number of G250 Media Gateways controlled by an external S8500 or S8700-series server	250	This number also applies if a combination of Avaya G700 Media Gateways, Avaya G450 Media Gateways, Avaya G350 Media Gateways, and G250 Media Gateways are controlled by the same external S8xxx server.
Maximum number of G250 Media Gateways controlled by an external S8300 server housed in a G700 Media Gateway	50	
S8xxx servers registered as Media Gateway Controllers. If an MGC becomes unavailable, the G250 uses the next MGC on the list.	4	The built-in SLS module can be considered a fifth MGC, although its functionality is more limited than that of a full scale S8xxx server.
Media module slots	2	One S8300 server slot (V1) for insertion of S8300 only. One WAN media module slot (V2) for insertion of a WAN media module only.
Maximum number of WAN media modules	1	Always in slot v2.
Maximum number of voice media modules	0	
Maximum total number of telephones supported by the G250	14	

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Table 13: G250 media gateway capacities (continued)

Description	Capacity	Comments
Maximum number of IP phones	12	Limited by the number of VoIP resources used and the calling patterns (VoIP to VoIP conferencing, VoIP to non-VoIP, etc.)
Maximum number of analog phones	2	
Maximum number of DCP phones	12	G250-DCP only. None in the other G250 models.
Maximum number of BRI endpoints	0	
DS1 facilities	1 T1/E1	G250-DS1 only. None in the other G250 models.
Maximum number of all trunks of any type	4 (5 on G250-BRI, 10 on G250-DS1)	
Maximum number of analog trunks	4 (G250-Analog, G250-DCP) 1 (G250-BRI, G250-DS1)	All ports are fixed.
Maximum number of BRI trunks	2 (G250-BRI only)	Four voice channels, two D-channels.
Maximum number of E1/T1 voice trunks	1	G250-DS1 only. None in the other G250 models.
Simultaneous two-way conversations from IP phone to legacy telephone or trunk	10 (G250-Analog, G250-BRI) 16 (G250-DCP, G250-DS1)	True for all codecs, and all encryption combinations.
Miscellaneous		
Fax capacity	4	Simultaneous fax transmissions using VoIP resources.
Touch-tone recognition (TTR)	8	Receivers
Tone Generation	As much as necessary for all TDM calls.	

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Table 13: G250 media gateway capacities (continued)

Description	Capacity	Comments
Announcements (VAL)	6 playback channels for playing announcements.	
	10 minutes for G711-quality stored announcements and up to five minutes for music-on-hold.	
		3 of 3

CAUTION:

Some capacities may change. For the most up-to-date list, see *Avaya Communication Manager System Capacities Table*, 03-300511.

G350 maximum media gateway capacities

Table 14: G350 media gateway capacities

Description	Standard Configuration	Enhanced Configuration	Comments
Media Gateway Limits			
Maximum number of G350 Media Gateways controlled by an S8500 or S8700-series server	250		This number also applies if the same external S8xxx server controls a combination of Avaya G700 Media Gateways, Avaya G450 Media Gateways, Avaya G350 Media Gateways, and G250 Media Gateways
Maximum number of G350 Media Gateways controlled by a S8300 server housed in a G700 Media Gateway.	50		
Maximum number of G350 or G250 Media Gateways controlled by a S8300 server housed in a G350 Media Gateway.	5		An S8300 housed in a G350 can also control G150 or Multitech Gateways
			1 of 3

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Table 14: G350 media gateway capacities (continued)

Description	Standard Configuration	Enhanced Configuration	Comments
Maximum total number of telephones supported by the G350	40	72	Limited by the physical hardware resources and what is supported in ASD
Maximum number of IP telephones per G350 Media Gateway	40	72 (using an external switch)	Limited by the physical hardware resources and what is supported in ASD
Maximum number of analog phones per G350 Media Gateway	40	72	
Maximum number of DCP phones per G350 Media Gateway	40	72	
Maximum number of BRI endpoints per G350 Media Gateway	16	64	Up to three MM720 BRI Media Modules can be inserted in any standard media module slots.
Simultaneous two-way conversations from IP phone to legacy telephone or trunk.	32 – G.711 16 – G.729a, G.726		Simultaneous two-way conversations limited by the VoIP engine, including call progress tones
Transcoding from G.711/ TDM phones to G.729 for IP phones	16		Simultaneous 2-way conversations. For TDM transcoding, the number 16 applies to conversations where one end of each conversation is on a G350 and transcoding occurs for that endpoint on the G350. If transcoding must occur on both ends of the conversation, the quantity of conversations is ten.
Maximum number of BRI trunks	16	32	
Maximum number of PSTN trunks	24 (T1) 30 (E1)	48 (T1) 60 (E1)	
Miscellaneous			
Fax capacity	8		Simultaneous fax transmissions using VoIP resources.

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Table 14: G350 media gateway capacities (continued)

Description	Standard Configuration	Enhanced Configuration	Comments
Touch-tone recognition (TTR)	15		
Tone Generation	15		
Announcements (VAL)	6 Playback, 1 Record		
			3 of 3

Note:

The maximum capacities in Advanced Configuration depend on the specific configuration of the Branch Gateway. Please verify your planned configuration on Avaya Solution Designer (ASD).

S8300 maximum capacities

Table 15: S8300 capacities

Item	Quantity Supported
Number of Users per S8300	450
Number of Trunks per S8300	450
Total Endpoints (Trunks and Users) per S8300	900
MGs per S8300	50
LSPs per S8300	50
MGs per LSP	50
Announcement Sources per S8300	50
Busy Hour Calls (Maximum, non-call center)	10,000
Locations	50

For a complete list of capacities, see *Avaya Communication Manager System Capacities Table*, 03-300511.

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Appendix B: Supported Avaya telephones

There are various Avaya telephones supported by the G250 and G350, including IP, DCP digital, and analog telephones.

Avaya IP telephones

The G250/G350 support the following Avaya IP telephones:

- Avaya 4602 IP Telephone
- Avaya 4602SW IP Telephone
- Avaya 4601 IP Telephone
- Avaya 4606 IP Telephone
- Avaya 4610 IP Telephone
- Avaya 4612 IP Telephone
- Avaya 4620 IP Telephone
- Avaya 4624 IP Telephone
- Avaya 4630 IP Screenphone
- Avaya 4630SW IP Screenphone
- Avaya 4690 IP Telephone

Note:

The Avaya 4630 IP and 4630SW IP Screenphones cannot be powered via PoE ports.

Avaya DCP digital telephones

The G250-DCP and the DCP media modules supported by the G350 support the following DCP telephones:

Note:

The G250 does not support DCP media modules, although the G250-DCP includes DCP ports on its chassis.

- Avaya 2402 Digital Telephone
- Avaya 2410 Digital Telephone
- Avaya 2420 Digital Telephone
- Avaya 2490 DCP Speakphone

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- Avaya 6402 and Avaya 6402D Digital Telephones
- Avaya 6408+ and Avaya 6408D+ Digital Telephones
- Avaya 6416D+ and 6416D+M Digital Telephone
- Avaya 6424D+ and 6424D+M Digital Telephone
- Avaya 8403 Digital Telephone
- Avaya 8405B and Avaya 8405D+ Digital Telephones
- Avaya 8410 and 8410D Digital Telephones
- Avaya 8411D Digital Telephone
- Avaya 8434DX Digital Telephone
- IP softphones that are configured as "Road Warrior" and "Take Over" a DCP station
- Definity Extender – Analog single endpoint
- Definity Extender – ISDN single endpoint 302 series Attendant Console (302D)
- Avaya 603E Call Master III
- Avaya 603F Call Master IV
- Avaya 607A Call Master V
- Avaya 606B1 Call Master VI
- Avaya eConsole R1 (PC Console R3 with 8411 digital telephone)
- Avaya IP eConsole

Avaya analog telephones

The G250 and G350 support the following Avaya analog telephones:

- Avaya 6211 Analog Telephone
- Avaya 6219 Analog Telephone
- Avaya 2500 and the Avaya 2554 Analog Terminals
- 2520 Explosive Atmosphere Telephone

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Appendix C: G250 technical specifications

The G250 technical specifications include physical dimensions and tolerances of the Avaya G250 Media Gateway, power cord specifications and media module specifications.

G250 specifications

The table of technical specifications provides detailed information on the physical dimensions and tolerances of the Avaya G250 Media Gateway:

Table 16: Avaya G250 Media Gateway specifications

Description	Value
Height	20 (3.5 in., 88 mm)
Width	17.3 in. (440 mm)
Depth	13.4 in. (340 mm)
Weight of empty chassis	16.5 lb. (6.5 kg)
Ambient working temperature	32° to 104°F (0° to 40°C)
Operation altitude	up to 6,560 ft. (2,000 m)
Front Clearance	12 in. (30 cm)
Rear Clearance	18 in. (45 cm)
Humidity	10-90% relative humidity
Power rating	90-264 VAC, 47-63 Hz, 2.2 A Max

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G250 power cord specifications

For North America: The cord set must be UL Listed/CSA Certified, 16 AWG, 3-conductor (3rd wire ground), type SJT. One end is to be terminated to an IEC 60320, sheet C13 type connector rated 10A, 250V. The other end is to be terminated to either a NEMA 5-15P attachment plug for nominal 125V applications or a NEMA 6-15P attachment plug for nominal 250V applications.

For Outside North America: The cord must be VDE Certified or Harmonized (HAR), rated 250V, 3-conductor (3rd wire ground), 1.0 mm2 minimum conductor size. The cord is to be terminated at one end to a VDE Certified/CE Marked IEC 60320, sheet C13 type connector rated 10A, 250V and the other end to a 3-conductor grounding type attachment plug rated at a minimum of 10A, 250V and a configuration specific for the region/country in which it will be used. The attachment plug must bear the safety agency certifications mark(s) for the region/country of installation.

G250 media module specifications

Table 17: Media modules

Description	Value
Height	2 cm
Width	17 cm
Depth	31 cm
Weight	300-400 grams

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Appendix D: G350 technical specifications

The G350 technical specifications include physical dimensions and tolerances of the Avaya G350 Media Gateway, power cord specifications, and media module specifications.

G350 specifications

The table of technical specifications provides detailed information on the physical dimensions and tolerances of the Avaya G350 Media Gateway:

Table 18: Avaya G350 Media Gateway specifications

Description	Value
Height	5.25 in. (133.3 mm)
Width	19 in. (482.6 mm)
Depth	15.75 in. (400 mm)
Weight of empty chassis	19.8 to 22.1 lb. (9 to 10 kg)
Ambient working temperature	32° to 104°F (0° to 40°C)
Operation altitude	up to 6,560 ft. (2000 m)
Front Clearance	12 in. (30 cm)
Rear Clearance	18 in. (45 cm)
Humidity	10-90% relative humidity
Power rating	90-264 VAC, 47-63 Hz, 7 A Max

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G350 power cord specifications

For North America: The cord set must be UL Listed/CSA Certified, 16 AWG, 3-conductor (3rd wire ground), type SJT. One end is to be terminated to an IEC 60320, sheet C13 type connector rated 10A, 250V. The other end is to be terminated to either a NEMA 5-15P attachment plug for nominal 125V applications or a NEMA 6-15P attachment plug for nominal 250V applications.

For Outside North America: The cord must be VDE Certified or Harmonized (HAR), rated 250V, 3-conductor (3rd wire ground), 1.0 mm2 minimum conductor size. The cord is to be terminated at one end to a VDE Certified/CE Marked IEC 60320, sheet C13 type connector rated 10A, 250V and the other end to a 3-conductor grounding type attachment plug rated at a minimum of 10A, 250V and a configuration specific for the region/country in which it will be used. The attachment plug must bear the safety agency certifications mark(s) for the region/country of installation.

G350 media module specifications

Table 19: Media modules

Description	Value
MM312, MM314, and MM316 media modules	
Height	4.4 cm
Width	39 cm
Depth	31 cm
Weight	3-4 kg
Other media modules	
Height	0.79 in. (2 cm)
Width	6.69 in. (17 cm)
Depth	12.20 in. (31 cm)
Weight	0.7-0.9 lb. (300-400 grams)

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