



Overview of Cisco Unified Communications Manager and Cisco IOS Interoperability

This chapter provides an overview of Cisco Unified Communications Manager and Cisco IOS interoperability.



Note

For more information about Cisco IOS voice features, see the entire Cisco IOS Voice Configuration Library—including library preface and glossary, feature documents, and troubleshooting information—at http://www.cisco.com/univercd/cc/td/doc/product/software/ios123/123cgcr/voice_c/vcl.htm.

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Information About Cisco Unified Communications Manager and Cisco IOS Interoperability

To configure a Cisco IOS voice gateway to interoperate with Cisco Unified Communications Manager, you should understand the following concepts:

- [Cisco AVVID, page 14](#)
- [Cisco Unified Communications Manager Interoperability, page 14](#)
- [MGCP Voice Gateways, page 14](#)
- [MGCP Advantages Over H.323, page 17](#)
- [Conferencing and Transcoding, page 18](#)

Cisco AVVID

Cisco voice gateway routers can be deployed in a Cisco Unified Communications Manager IP-telephony network using the Cisco Architecture for Voice, Video, and Integrated Data (AVVID), a baseline infrastructure that enables enterprises to design networks that scale to meet e-business demands for business solutions such as e-learning and customer care.

Voice and video solutions based on Cisco AVVID include:

- Client devices such as IP phones
- Directory services
- IP-based business applications
- Network management
- Scalable call processing
- Service and support
- Video conferencing

Cisco Unified Communications Manager Interoperability

Cisco Unified Communications Manager is the software-based call-processing component of voice gateways in a VoIP network. It extends enterprise telephony features and functions to packet telephony network devices such as IP phones, media processing devices, VoIP gateways, and multimedia applications.

Additional data, voice, and video services such as unified messaging, multimedia conferencing, collaborative contact centers, and interactive multimedia response systems interact through the Cisco Unified Communications Manager application programming interface (API). Cisco Unified Communications Manager also supports third-party applications.

Cisco IOS gateways connect AVVID networks to traditional telephone trunks or analog and digital devices. The trunks are connected to the PSTN or existing PBX systems, legacy telephones, and voice conference units. Cisco IOS voice gateways communicate with Cisco Unified Communications Manager using H.323 or Media Gateway Control Protocol (MGCP).

- In H.323 mode, the Cisco voice gateway communicates with Cisco Unified Communications Manager as an intelligent gateway device.
- In MGCP mode, the Cisco voice gateway operates as a stateless client, giving Cisco Unified Communications Manager full control.

MGCP Voice Gateways

Cisco Unified Communications Manager provides a central point of configuration, administration, and control for MGCP voice gateways. Using Cisco IOS software, voice gateways are configured as MGCP gateways. Cisco Unified Communications Manager acts as an MGCP call agent, controlling the setting up and tearing down of connections between the endpoints in a VoIP network and endpoints in the public switched telephone network (PSTN), while managing all dial-plan related configuration elements.

With MGCP, dial plans are configured centrally in Cisco Unified Communications Manager, instead of in each gateway. All Cisco MGCP gateways in a Cisco AVVID-enabled IP telephony network can be automatically configured by downloading XML files from Cisco Unified Communications Manager.

Cisco MGCP gateways also provide multiple levels of failover capabilities, including Survivable Remote Site Telephony (SRST) support to prevent call-processing interruptions or dropped calls if there is a Cisco Unified Communications Manager or WAN failure.

MGCP gateways support the following Cisco Unified Communications Manager features:

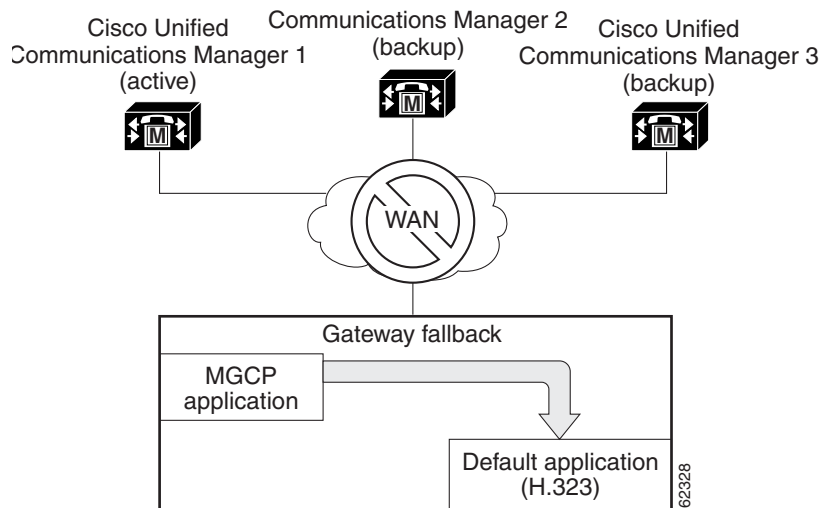
- [MGCP Gateway Fallback, page 15](#)
- [MGCP PRI Backhaul, page 16](#)
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- [Multicast Music-On-Hold, page 16](#)
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MGCP Gateway Fallback

MGCP gateway fallback improves the reliability of PSTN interfaces in an IP-telephony network by providing basic call processing support when an MGCP gateway loses connectivity to all of its configured Cisco Unified Communications Manager servers. Each Cisco Unified Communications Manager server is potentially available as a backup call agent through a prioritized list of call agents that is configured on the MGCP gateway.

On startup, the MGCP voice gateway attempts to establish a connection to the highest order Cisco Unified Communications Manager server on the configured list. If the attempt is successful, the gateway registers itself with the primary (highest priority) call agent. If no call agent in this prioritized list is accessible, the gateway uses its default H.323 session application (Version 2) to perform basic call-handling functions (see [Figure 1](#)).

Figure 1 *MGCP Gateway Fallback Transition to Default H.323 Session Application*



MGCP PRI Backhaul

MGCP PRI backhaul is a method for transporting complete IP telephony signaling information from an ISDN PRI interface on an MGCP gateway to Cisco Unified Communications Manager through a Transmission Control Protocol (TCP) connection. It terminates all of the ISDN PRI Layer 2 (Q.921) signaling functions on the MGCP gateway and packages all of the ISDN PRI Layer 3 (Q.931) signaling information into packets for transmission to Cisco Unified Communications Manager through an IP tunnel. This ensures the integrity of the Q.931 signaling information that passes through the network for managing IP telephony devices.

MGCP BRI Backhaul

MGCP-controlled backhaul of BRI signaling provides service to remote-office gateways that connect by means of ISDN BRI trunks to a centralized Cisco Unified Communications Manager. D-channel signaling information is backhauled to Cisco Unified Communications Manager through a TCP session. All Q.931 messages are passed through the TCP connection between the Cisco MGCP gateway and Cisco Unified Communications Manager. The feature enables you to connect remote ISDN PBXs and key systems to a Cisco ISDN BRI network termination (network side) or a PSTN Class 4/5 switch through a Cisco ISDN BRI terminal equipment (as user side) interface.

Multicast Music-On-Hold

Multicast music-on-hold (MOH) functionality enables the streaming of music from an MOH server to the voice interfaces of on-net and off-net callers that are placed on hold. This integrated multicast capability is implemented through the H.323 signaling in Cisco Unified Communications Manager.

Network Specific Facilities

The MGCP Gateway Support for Cisco Unified Communications Manager Network Specific Facilities (NSF) feature supports the use of the ISDN NSF information element in the route pattern, enabling facilities or services to be invoked on a call-by-call basis. Without NSF configuration, you must configure associated gateways as standalone H.323 gateways for which NSF services are configured locally within the router. No configuration is required on the MGCP gateway to use the NSF feature.

Single-Point Configuration

When you configure MGCP gateways to interoperate with Cisco Unified Communications Manager, you can use a centralized TFTP boot directory on a host device in your network to automatically download most of the Cisco IOS configuration in an XML file. A Cisco Unified Communications Manager server can be concurrently configured as a TFTP server.

The XML file is generated by using the web-based Cisco Unified Communications Manager graphical user interface (GUI). When the network administrator changes the configuration information in the database, Cisco Unified Communications Manager instructs the MGCP gateway to download the modified XML file.

Supplementary Services

Supplementary services include call forwarding, call hold, call transfer when the line is busy or there is no answer, and three-party call conferencing to and from the PSTN or a private branch exchange (PBX).

- Call forwarding—Enables you to forward calls dialed from the original location to a remote location within or across the network.
- Call hold—Places the handset in mute mode. The transmitter and receiver functions are disengaged until the hold button is pressed again to reconnect the parties.
- Call transfer—Transfers a call to a third party through a preprogrammed button that produces a recall dial tone. The receiver of the call then dials the third-party number, waits for the line to ring and for the new called party to answer, and then hangs up.
- Three-party call conferencing—Adds a third party to a call. It is similar to the transfer function, but rather than the call being transferred to a third party, the third party called is added to the call.

Switchover (Failover)

A Cisco MGCP gateway first connects—that is, registers—to a primary Cisco Unified Communications Manager. If connection to the primary fails, the gateway registers automatically to a backup if one exists and, if that connection also fails, to a second backup if one exists. When connection to the primary is restored, the gateway automatically registers to the primary. Existing connections are preserved during the switchover.

Switchback

Switchback is the process that MGCP gateways use to reestablish communication with the primary Cisco Unified Communications Manager server when it becomes available after losing connectivity. Switchback mode can occur immediately, at a specified time after the last active call ends, or after a specified length of time. During the switchback, existing connections are preserved.

Tones and Cadences

Tones and cadences are preconfigured based on the network locale in Cisco Unified Communications Manager. It is no longer necessary to configure the **cptone** command on the MGCP gateway. The static tone table used for a voice port is determined by the network locale that is specified for the voice port in Cisco Unified Communications Manager. The network locale for each voice port is downloaded in the gateway's XML configuration file.

The Customizable Tone Download to Cisco IOS MGCP Gateways from Cisco Unified Communications Manager feature enables the downloading of region-specific tones and the associated frequencies, amplitudes, and cadences in up to two custom tone files.

MGCP Advantages Over H.323

Using MGCP provides advantages over H.323, including the following:

- Centralized call-management architecture
MGCP enables external control of network signaling. Handling of Layer 3 call processing centrally in the network is advantageous to network operators who need a high degree of control over their networks.
- Shorter voice cut-through times

MGCP speeds voice cut-through as compared to H.323 for both initial call setup and redirects. Voice cut-through is the time from when the called party goes offhook to when both parties are able to receive voice from the other. Long cut-through times can prevent deployment of viable IP telephony solutions in centralized environments.

Conferencing and Transcoding

The digital-signal-processor (DSP) farm functionality on Cisco IOS gateways provides conference, transcode, and hardware MTP capability by using DSP resources on high-density digital voice/fax network modules such as the NM-HDV and NM-HDV2. DSP farms are configured on the voice gateway and managed by Cisco Unified Communications Manager through Skinny Client Control Protocol (SCCP).

Additional References

The following sections provide references for Cisco IOS Interoperability with Cisco Unified Communications Manager.

Related Documents

Related Topic	Document Title
<i>Additional Cisco IOS Voice Configuration Library documents, including library preface and glossary</i>	Cisco IOS Voice Configuration Library at http://www.cisco.com/univercd/cc/td/doc/product/software/ios123/123cgr/voice_c/vcl.htm
Cisco IOS command references	<ul style="list-style-type: none"> <i>Cisco IOS Debug Command Reference, Release 12.4T</i> at http://www.cisco.com/univercd/cc/td/doc/product/software/ios124/124tcr/tdb_r/index.htm <i>Cisco IOS Voice Command Reference</i> at http://www.cisco.com/univercd/cc/td/doc/product/software/ios123/123tcr/123tvr/index.htm
Cisco IOS configuration examples	<p>Cisco Systems Technologies website at http://cisco.com/en/US/tech/index.html</p> <p>Note From the website, select a technology category and subsequent hierarchy of subcategories, then click Technical Documentation > Configuration Examples.</p>
Cisco IOS software system messages	<i>Cisco IOS Software System Messages</i> at http://www.cisco.com/univercd/cc/td/doc/product/software/ios124/124sup/124sms/index.htm
Cisco IOS troubleshooting information	<i>Cisco IOS Voice Troubleshooting and Monitoring Guide</i> at http://www.cisco.com/univercd/cc/td/doc/product/software/ios123/123cgr/vvfax_c/voipt_c/index.htm

Related Topic	Document Title
Cisco Unified Communications Manager <ul style="list-style-type: none"> • Administration and configuration • Upgrading • Transcoder services and configuration • Voice-conference services and configuration 	<ul style="list-style-type: none"> • Cisco Unified CallManager Administration Guide, Release 4.0(1) • Cisco Unified CallManager System Guide, Release 4.0(1) • Cisco Unified CallManager Features and Services Guide, Release 4.0(1) • Upgrading Cisco Unified CallManager Release 4.0(1) • “Transcoders” chapter in the <i>Cisco Unified Communications Manager System Guide</i> • “Transcoder Configuration” chapter in the <i>Cisco Unified Communications Manager Administration Guide</i> • “Conference Bridges” chapter in <i>Cisco Unified CallManager System Guide</i>, Release 4.0(1) • “Conference Bridge Configuration” chapter in <i>Cisco Unified CallManager Administration Guide</i>, Release 4.0(1)
<ul style="list-style-type: none"> • MCID • MLPP 	<p>“Malicious Caller Identification” chapter in the <i>Cisco Unified Communications Manager Features and Services Guide</i></p> <p>“Multilevel Precedence and Preemption” chapter in the <i>Cisco Unified Communications Manager Features and Services Guide</i></p>
Fallback support for Cisco IP phones	Cisco Survivable Remote Site Telephony (SRST) Version 3.0
Interface configuration	Cisco IOS Interface and Hardware Component Command Reference , Release 12.4T
IP addressing and services	Cisco IOS IP Addressing Services , Release 12.4T
Routing process and routing protocols for networks	Cisco IOS IP Application Services Configuration Guide , Release 12.4T
MGCP concepts and configuration procedures	Cisco IOS MGCP and Related Protocols Configuration Guide
Network module installation	“Connecting Voice Network Modules” chapter in the <i>Cisco Network Modules Hardware Installation Guide</i>
Hardware installation	Modular Access Routers documentation

Standards

Standards	Title
H.225	Call Signaling Protocols and Media Stream Packetization for Packet-based Multimedia Communication Systems
H.323 Annex M.1	Tunnelling of Signalling Protocol (QSIG) in H.323
I.251.7	Malicious Call Identification (MCID)
I.255.3	Multi-Level Precedence and Preemption Service (MLPP)
ITU-T Recommendation Q.931	<i>ISDN User-Network Interface Layer 3 specification</i> (ITU-T specification for signaling to establish, maintain, and clear ISDN network connections).
Q.81.7	Malicious Call Identification (MCID)
Q.951.7	Stage 3 Description for Number Identification Supplementary Services Using DSS 1: Malicious Call Identification (MCID)
TIA/EIA-464-B	<i>Requirements for Private Branch Exchange (PBX) Switching Equipment</i>

MIBs

MIBs	MIBs Link
<ul style="list-style-type: none"> • Transcoding: <ul style="list-style-type: none"> – Access Environment MIB – CDP MIB – Cisco Stack MIB – DSP Management MIB – RFC 1157 SNMP – RFC 1213 MIB II – RFC 1573 MIB II Interface Extensions – RFC 1643 Ethernet MIB – RFC 1757 Ethernet RMON – Voice Common Interface MIB – Voice Dial MIB 	<p>To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:</p> <p>http://www.cisco.com/go/mibs</p>

RFCs

RFCs	Title
RFC 2833	RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals

Technical Assistance

Description	Link
The Cisco Technical Support & Documentation website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/techsupport

■ **Additional References**