



MGCP Basic CLASS and Operator Services

This feature module describes the Media Gateway Control Protocol (MGCP) Basic CLASS and Operator Services (BCOS) features, and includes:

- Feature Overview, page 1
- Supported Platforms, page 9
- Supported Standards, MIBs, and RFCs, page 10
- Prerequisites, page 10
- Configuration Tasks, page 11
- Configuration Examples, page 12
- Command Reference, page 12
- Debug Commands, page 12
- Glossary, page 13

Feature Overview

The MGCP BCOS are a set of calling features, sometimes called “custom calling” features, that use MGCP to transmit voice, video, and data over the IP network. These features are usually found in circuit-based networks. MGCP BCOS brings them to the Cisco IOS gateways on packet-based networks.

The MGCP BCOS software is built on the MGCP CAS PBX and AAL2 software package, and supports MGCP 0.1 and the earlier protocol versions Simple Gateway Control Protocol (SGCP) 1.1 and 1.5.

The following MGCP BCOS features are available on Residential Gateways (RGWs) and Business Gateways (BGWs):

- Distinctive power ring
- Visual Message Waiting Indicator
- Caller ID
- Caller ID with Call Waiting
- Call Forwarding
- Ring Splash
- Distinctive Call Waiting Tone
- Message Waiting Tone

- Stutter Dial Tone
- Off-Hook Warning Tone

The following two features can be run as RGW or trunking gateway (TGW) features:

- 911 calls

This feature is supported in SGCP mode on Cisco uBR924, Cisco 3660, and Cisco AS5300 platforms and in MGCP mode on all five supported platforms.

- Three-Way Calling

This feature is supported on the Cisco 3660 and Cisco AS5300 TGW platforms and on the Cisco MC3810 series, Cisco 2600, and Cisco uBR924 RGW platforms. This feature cannot be supported on the G.728 and G.723 codecs.

Distinctive Power Ring

A telephone rings in a distinctive pattern when a call comes in from a predefined telephone number. The following patterns are available:

- R1: one long ring
- R2: long ring -long ring
- R3: short ring-short ring-long ring
- R4: short ring - long ring - short ring
- R5: one short ring

Visual Message Waiting Indicator

A light will go on when a message is waiting for the line.

Caller ID

The calling party's telephone number, date, and time of the call appear on the receiving telephone's display between the first and second rings. A maximum of 18 digits are shown., and private and unlisted numbers are displayed. If the called party answers the phone on the first ring, the calling party's number does not appear.

If the called party has an appropriate name display unit, the calling party's name and telephone number appear on the display. The name and number appear between the first and second rings.

If the calling party has blocked Caller ID from displaying the telephone number, the called party sees "P" for private or "Anonymous" on the display unit.

Caller ID with Call Waiting

If the called party has Caller ID and has enabled the Call Waiting feature, then the calling party's name (if an appropriate display unit is available) and telephone number appear while the called party is on the line with another call.

If the calling party has blocked Caller ID from displaying the name and telephone number, the called party will see "P" for private or "Anonymous" on the display unit.

Call Forwarding

The following scenarios are available:

- The call agent transfers all incoming calls to a designated telephone number when the called number does not answer after a predetermined interval.
- The call agent transfers all incoming calls to a designated telephone number when the called number is busy.
- The call agent transfers all incoming calls to a specific destination when the user enters a code and a destination telephone number that receives the calls. The user is responsible for all charges between the original called number and the receiving telephone number.
- A user can activate Call Forwarding remotely using a touch-tone telephone and a user-defined personal identification number (PIN), which, by default, is the last four digits of the user's telephone number. The original destination telephone emits a Ring Splash when a call is forwarded.

Ring Splash

Also known as Reminder Ring, Ring Splash is activated when the user enables Call Forwarding on the telephone. The user hears Distinctive Power Ring R5 when the line is idle and a call has been forwarded. This reminds the user that Call Forwarding is active.

Distinctive Call-Waiting Tone

The called party hears four audible tone patterns (*waiting tones*, or WTs) when a call is waiting on the called party's line. The call agent provides the following tone patterns in sequence as the incoming call continues to wait:

- WT1: one short tone
- WT2: short tone–short tone
- WT3: short tone–short tone–short tone
- WT4: short tone–long tone–short tone

Message Waiting Tone

For users with an active voice mail system, a special dial tone is heard when the user goes off-hook and a message is waiting. The dial tone is a sequence of 10 short tones followed by a steady tone. If the user has a telephone with a visual message indicator, the indicator light goes on when a message is waiting.

Stutter Dial Tone

This tone is used in place of the dial tone to indicate that a message is waiting. When the user goes off-hook, a sequence of three short tones followed by a steady tone is heard.

Off-Hook Warning Tone

The user hears this tone when the telephone is off-hook. The tone is repeated bursts of sound of rising pitch.

911 Calls

The user can make a 911 call to an Emergency Service Bureau (ESB), and the call is maintained as long as the ESB does not hang up. If the user hangs up, the call is maintained. If the user hangs up and picks up the phone again, the call resumes. If the user hangs up and does not pick up the phone again, the ESB can ring the user and resume the call.

This feature is available in SGCP mode on the Cisco uBR924, Cisco 3660, and Cisco AS5300 platforms and in MGCP mode on all supported platforms.

Three-way Calling (TWC)

The user can create a 3-way call by pressing the switchhook quickly to put the first call on hold, dial a third party, and press the switchhook again quickly to join all parties to the call. This feature is supported on all five platforms.

Caveats for Three-way Calling:

- The user who sets up the 3-way call must be connected to a residential gateway, which handles the call setup. TWC is transparent to a trunking gateway.
- Only the G.711u and G.711a codecs support TWC. If any part of a 3-way call is made on a codec other than the G.711u, that codec must be switched to G.711u mode before the second switchhook flash in order for the 3-way call to be set up.
- TWC supports calls originating as Voice over IP or Voice over AAL2 calls, not Voice over ATM or Voice over Frame Relay calls. However, if the network has ATM or Frame Relay as a transport protocol, the VoIP call is completed.
- The user originating the 3-way call is the *controller*. Each of the two other users on the call can add another person onto the call, which is referred to as *call chaining*. Those new users can also add another person to the call. However, when five people in total are on the call, adding more users causes voice quality to degrade.
- If the controller of the call hangs up, all the users are disconnected from the call. If one of the non-controller users hangs up, the remaining users are still connected to the call.
- If the controller presses the switchhook quickly for a third time, the last user connected to the call is dropped from the call.
- If two users are on a call and a third user calls one of them, that third user cannot be joined (bridged) into the two-party call.

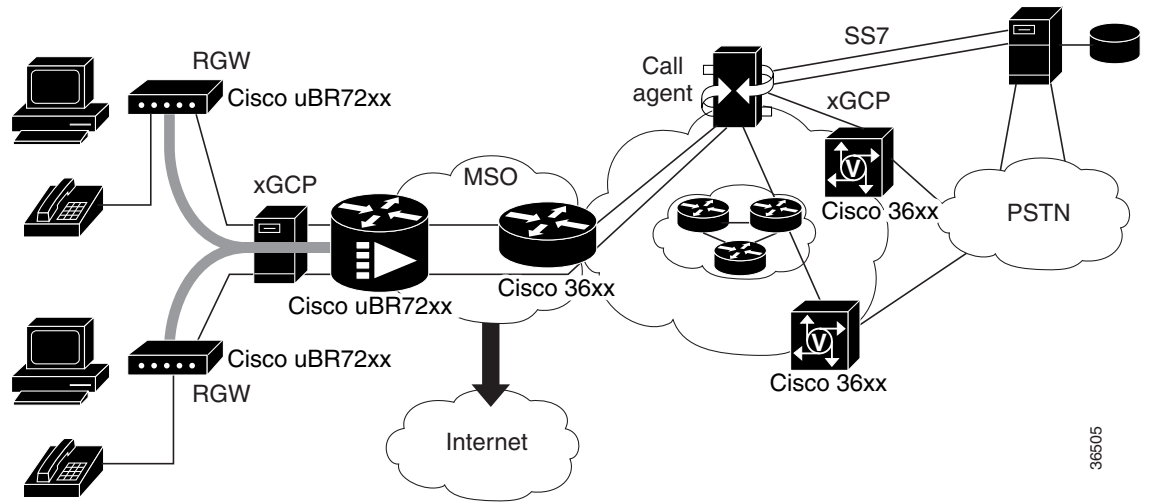
Examples of Service Provider Solutions

The Basic CLASS and Operator Services features support MGCP solutions in the following areas:

- Residential cable access

A CLEC can use residential cable access to provide residential customers with basic telephony and data services. CLASS features and Three-way calling, Caller ID with Call Waiting, and Distinctive Call Waiting Tone are features that support these customers. Figure 1 illustrates a possible residential cable access solution:

Figure 1 Residential Cable Access Solution



Note that in Figure 1, the residential gateway (the Cisco uBR924 platform) must support the CLASS features and 911 capability.

- IP Centrex and IP PBX

In these solutions, a call agent provides business voice services that are traditionally offered by a circuit-based PBX. CLASS features and Three-way calling, Caller ID with Call Waiting, Distinctive Call Waiting Tone, and Visual Message Waiting Indicator are features suitable for these customers. Figure 2 illustrates an IP Centrex solution:

Figure 2 IP Centrex Solution



Analog phones

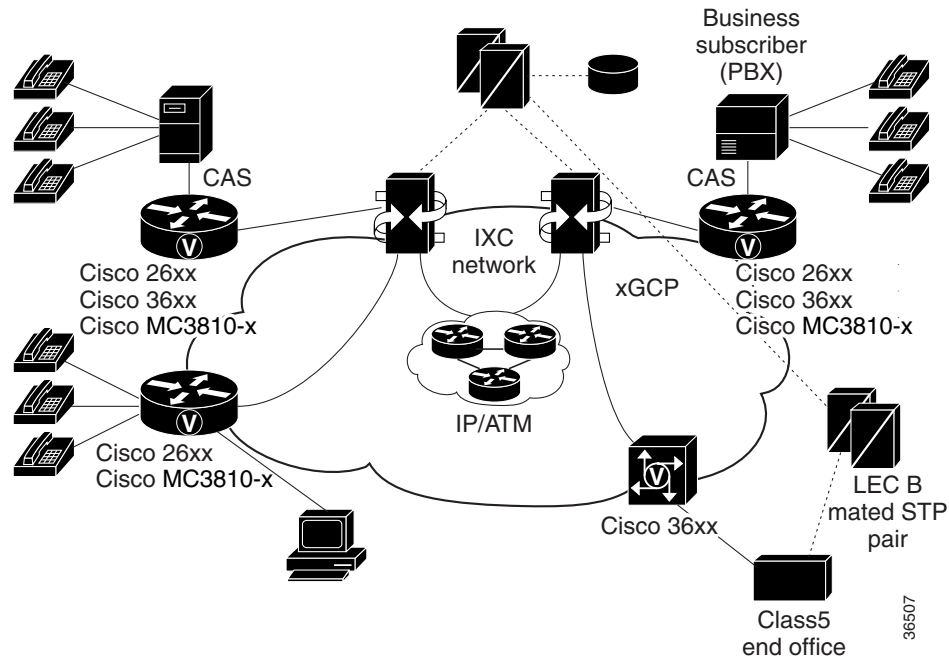
36506

In Figure 2, the residential gateway (the Cisco uBR924 and Cisco 2600 series platforms) must support the CLASS features.

- Integrated Access

A CLEC or IXC can provide small, medium, and large businesses with integrated voice and data access services. The integrated access device can be located at the central office or on the customer’s premises. Access to the subscriber can be analog or digital, and transport of voice and data can be over IP, Frame Relay, or ATM. CLASS features and Three-way calling, Caller ID with Call Waiting, Distinctive Call Waiting Tone, and Visual Message Waiting Indicator are features suitable for these customers. Figure 3 illustrates an integrated access solution:

Figure 3 Integrated Access Solution

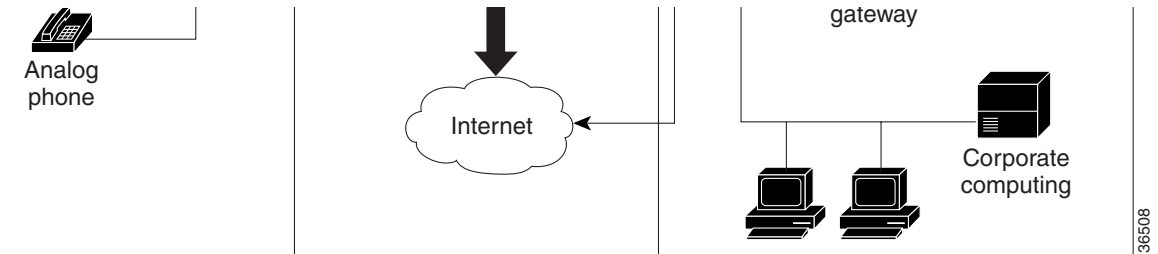


In Figure 3, the residential gateway (the Cisco 2600 series and Cisco MC3810 series platforms) must support the CLASS features.

- Telecommuter or Small Office-Home Office Solution

Figure 4 illustrates a telecommuter or small office-home office solution:

Figure 4 *Telecommuter or Small Office-Home Office Solution*



In Figure 4, the residential gateway (the Cisco uBR924 platform) must support the CLASS features.

Other solutions are possible using the MGCP open protocol.

Benefits

- The merged SGCP/MGCP software for RGWs, BGWs, and TGWs enables easier development and growth of Cisco and customer solutions.
- MGCP BCOS satisfies the requirements for providing basic CLASS services on IOS gateways that enable multiple xGCP solutions, particularly residential gateway and IP Centrex.

Restrictions

- For the Cisco MC3810 series platform, the MGCP BCOS software is supported on the HCM version of the DSP card; it is not supported on the VCM version.

To check the type of DSP card in your Cisco MC3810 series platform, enter a **show version** command at the EXEC prompt. For example: `Router# show version`

If you have an HCM card, the following line appears as part of the **show version** information:

```
1 6-DSP (slot 2) High Performance Compression Module(v01.A0)
```

If you have an VCM card, the following line appears as part of the **show version** information:

```
1 6-DSP (slot 2) Voice Compression Module(v255.V7)
```

If you have the HCM card, the MGCP BCOS features will function properly. If you have the VCM card, the feature is not supported.

- The G.728 and G.723 codecs do not support three-way calling.

Related Features and Technologies

Voice over IP (VoIP)

Related Documents

General reference documents:

- *Cisco IOS Multiservice Applications Command Reference*
http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/multi_r/index.htm
- *Cisco IOS Multiservice Applications Configuration Guide*
http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/multi_c/index.htm

Feature documents:

- *MGCP CAS PBX and AAL2 PVC*
http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121newft/121limit/121x/121xm/121xm_5/ftmgcpba.htm
- *Voice Over ATM with AAL2 Trunking on Cisco MC3810 Series Concentrators*
http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121newft/121limit/121x/121xa/121xa_1/aal2_fm.htm
- *Media Gateway Control Protocol for the Residential Gateway Support*
<http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121newft/121t/121t3/mgcp1213.htm>
- *Simple Gateway Control Protocol Support for the Cisco MC3810 and Cisco 3600 Series Routers*
http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/120newft/120limit/120xk/1207xk/sgcp_6xk.htm

Product documents:

- *Cisco uBR924 Software Configuration Guide*
http://www.cisco.com/univercd/cc/td/doc/product/cable/cab_modm/ubr924/scg924/index.htm
- *Software Configuration Guide* (for Cisco 2600 series and Cisco 3600 series Access Routers)
http://www.cisco.com/univercd/cc/td/doc/product/access/acs_mod/cis3700sw_conf/37_swcf/index.htm
- *Cisco 1750 Voice-Over-IP Software Configuration Guide*
http://www.cisco.com/univercd/cc/td/doc/product/access/acs_mod/1700/1750/1750voip/index.htm
- *Cisco AS5300 Software Configuration Guide*
http://www.cisco.com/univercd/cc/td/doc/product/access/acs_serv/5300/53swcf2/index.htm

Supported Platforms

- Cisco 1750 Modular Access Router
- Cisco 2600 Series Modular Access Routers
- Cisco 3620, 3640, and 3660 Multiservice Platforms

- Cisco AS5300 Multiservice Platform
- Cisco MC3810 Series Multiservice Access Concentrator
- Cisco uBR924 Cable Access Router

Supported codecs:

- G711alaw
- G711ulaw
- G723a
- G723r
- G726r
- G728
- G729a
- G729b
- G729r

Supported Standards, MIBs, and RFCs

Standards

- RTP and RTCP 1889 and 1890
- IETF MGCP draft version 0.1 dated November 9, 1998

MIBs

XGCP-MIB

To obtain lists of MIBs supported by platform and Cisco IOS and to download MIB modules, go to the Cisco MIB web site on Cisco Connection Online (CCO) at <http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>.

RFCs

- MGCP 2705
- SDP 2327 is not completely implemented.

Prerequisites

Complete the following tasks before configuring this feature:

- Configure IP routing

For more information on IP routing, refer to *Cisco IOS IP and IP Routing Configuration Guide* at: http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/ip_c/index.htm

- Configure voice ports

For more information on configuring voice ports, refer to *Cisco IOS Multiservice Applications Configuration Guide* at:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/multi_c/index.htm

- Configure Voice over IP

For more information on configuring Voice over IP, refer to *Cisco IOS Multiservice Applications Configuration Guide* at:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/multi_c/index.htm

- Set up the call agent(s)

For more information on setting up call agents, refer to the documentation that accompanies the call agents used in your network configuration.

Configuration Tasks

No special configuration tasks are required to initiate MGCP BCOS. MGCP BCOS co-resides with MGCP CAS PBX and AAL2 PVC software, for which configuration activities are required. These are discussed in *MGCP CAS PBX and AAL2 PVC* at:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121newft/121limit/121x/121xm/121xm_5/ftmgcpba.htm

Troubleshooting MGCP Basic CLASS and Operator Services Configurations

The following MGCP BCOS features do not work on telephones from all manufacturers when the telephones are connected to a Cisco MC3810 series platform:

- CID – Caller ID
- VMWI – Visual Message Waiting Indicator
- CIDCW – Caller ID with Call Waiting

The following table summarizes the findings for the models tested:

Table 1 *Telephones and Feature Compatibilities*

Telephone	CID	VMWI	CIDCW
Casio TI-345	Y	–	N
Casio TI-360	Y	–	N
Dial Digital CP-2892C	Y	Y	Y
GE 29299GE1-A	Y	–	Y
Panasonic KX-TSC55-b	Y	Y	Y
Panasonic KX-TSC7	Y	N	N
Sony IT-ID80	Y	–	Y

To correct this operation, change the idle voltage in the voice port from low to high.

To change the voice port idle voltage, perform these additional steps:

- If the phone is already connected to the voice port, lift the phone's handset.
- If the phone is not connected to the voice port:
 - a. Attach the phone to the voice port.
 - b. Do a "shut" to the voice port.
 - c. Do a "no shut" to the voice port.
 - d. Lift the phone's handset.

Configuration Examples

No new or modified configuration settings are needed to implement MGCP Basic CLASS and Operator Services. Please refer to *MGCP CAS PBX and AAL2 PVC* at the following site for sample configurations:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121newft/121limit/121x/121xm/121xm_5/ftmgcpba.htm

Command Reference

No new or modified configuration commands are needed to implement MGCP Basic CLASS and Operator Services. Please refer to *MGCP CAS PBX and AAL2 PVC* at the following site for more information on the MGCP commands:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121newft/121limit/121x/121xm/121xm_5/ftmgcpba.htm

Debug Commands

No new debug commands are needed for MGCP Basic CLASS and Operator Services. Please refer to *MGCP CAS PBX and AAL2 PVC* at the following site for more information on the MGCP debug commands:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121newft/121limit/121x/121xm/121xm_5/ftmgcpba.htm

Glossary

AL2—ATM Adaptation Layer 2

AAL5—ATM Adaptation Layer 5

BGW—see Business Gateway

Business Gateway—An xGCP media gateway which is a business customer premises equipment that has connection(s) to the VoIP network as well as connection(s) to the user's telephony equipment (typically a PBX, a corporate LAN or WAN). Such gateways are used to eliminate or reduce the need for individual medium (voice, data, and so forth) connectivity.

CA—Call Agent

Call Agent—An intelligent entity in an IP telephony network which handles call control in an MGCP model Voice over IP network.

CAS—Channel Associated Signaling

CCS—Common Channel Signaling

CID—AAL2 Channel Identifier

CLASS—Custom Local Area Subscriber Services, usually referred to as “Custom Calling” features

DS-0—64 kbps channel in a T1/E1 line

DTMF—Dual Tone Multi-frequency

E&M—Ear and Mouth analog signaling

FXO—Foreign Exchange Operator—An interface from a telephone to a PSTN central office or a station interface on a PBX.

FXS—Foreign Exchange Station—An interface that connects to a telephone, key set, or PBX to supply ring, voltage, and dial tone.

Media Gateway—Equipment that connects the PSTN or a PBX with the VoIP network. It is controlled by a call agent via MGCP.

MGC—Media Gateway Controller. Another name for Call Agent.

MGCP—Media Gateway Control Protocol

Package—A set of signals and events that define a type of voice endpoint or connection. Examples include line-package, trunk-package, dtmf-package, and atm-package. See the commands `mgcp default-package`, page 65, and `mgcp package-capability`, page 76, for more information on using these packages.

PRI—ISDN primary rate interface

PSTN—Public Switched Telephone Network

PVC—Permanent Virtual Circuit

Residential Gateway—An xGCP media gateway which is customer premises equipment that has connection(s) to the VoIP network as well as connection(s) to user's telephony equipment.

RGW—see Residential Gateway

RTCP—RTP Control Protocol. The protocol monitors an RTP connection and conveys information about the on-going session.

RTP—Real-Time Transport Protocol. The protocol provides end-to-end network transport functions for applications transmitting real-time data and services such as payload type identification, sequence numbering, timestamping, and delivery monitoring.

SGCP—Simple Gateway Control Protocol

SPVC—Soft Permanent Virtual Circuit

SVC—Switched Virtual Circuit

TGW—see Trunking Gateway

Trunking Gateway—An xGCP media gateway that provides connectivity between the PSTN and VoIP networks.

TSE—Inband Telephony Signaling Events

VAD—Voice Activity Detection

VCC—Virtual Channel Connection (used where it may be a PVC, SPVC, or SVC)

VoIP—Voice over IP

VToA—Voice Trunking on ATM