



# Configuring MGCP-Controlled Backhaul of BRI Signaling in Conjunction with Cisco Unified Communications Manager

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The MGCP-Controlled Backhaul of Basic Rate Interface (BRI) Signaling in Conjunction with Cisco Unified Communications Manager feature provides MGCP service to remote-office gateways that connect by means of ISDN BRI trunks to a centralized Cisco Unified Communications Manager.

Feature benefits include the following:

- Centralized call-management architecture, enabling a high degree of network control
- Short voice cut-through times
- Graceful evolution to new technology and to AVVID

Only the ETSI BRI basic-net3 switch type is supported.

## Feature History for MGCP-Controlled Backhaul of BRI Signaling in Conjunction with Cisco Unified Communications Manager

Release	Modification
12.2(15)ZJ	This feature was introduced for Cisco Communications Manager 3.3(2) (formerly known as Cisco CallManager 3.3(2)).
12.3(2)T	This feature was integrated into Cisco IOS Release 12.3(2)T.
12.3(11)T	Support was added for Cisco Unified Communications Manager 4.1.
12.4(2)T	This feature was implemented on the Cisco 2600XM, Cisco 2691, Cisco 2800 series, Cisco 3700 series, and Cisco 3800 series.



**Finding Support Information for Platforms and Cisco IOS Software Images**

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

**Note**

For more information about this and related Cisco IOS voice features, see the following:

- “[Overview of Cisco Unified Communications Manager and Cisco IOS Interoperability](#)” on page 13.
- Entire Cisco IOS Voice Configuration Library—including library preface and glossary, other feature documents, and troubleshooting documentation—at [http://www.cisco.com/univercd/cc/td/doc/product/software/ios123/123cgr/voice\\_c/vcl.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios123/123cgr/voice_c/vcl.htm).

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## Prerequisites for MGCP-Controlled Backhaul of BRI Signaling

**Cisco Unified Communications Manager**

- Cisco Unified Communications Manager 4.1(1) or a later release

**Cisco Voice Gateway**

- 20-MB flash memory
- 64-MB DRAM
- One of the supported combinations of BRI voice interface card (VIC) and network module:
  - VIC-2BRI-NT/TE or VIC-2BRI-S/T in NM-1V or NM-2V with Cisco IOS Release 12.3(11)T or a later release
  - VIC2-2BRI-NT/TE in NM-HD-1V, NM-HD-2V, NM-HD-2VE, or NM-HDV2 with Cisco IOS Release 12.4(2)T or a later release
  - EM-4BRI-NT/TE in EVM-HD-8FXS/DID with Cisco IOS Release 12.4(2)T or a later release
- MGCP enabled globally in a VoIP network

- MGCP control of dial peers and voice ports
- MGCP single-point configuration enabled



**Note** For MGCP configuration instructions, see [“Configuring MGCP Gateway Support for Cisco Unified Communications Manager” on page 23.](#)

## Restrictions for MGCP-Controlled Backhaul of BRI Signaling

- BRI backhaul uses the enhanced interface numbering support available in Cisco IOS Release 12.3(11)T and later. Previous releases supported only the slot/subslot/port format with the subslot forced to 0 on the Cisco 2600 series, Cisco 3600 series, and Cisco 3700 series. Cisco IOS Release 12.3(11)T and later releases support both the slot/port and slot/subslot/port interface numbering formats for BRI backhaul.
- Only the ETSI BRI Basic-NET3 switch type is supported.
- BRI calls are cleared during MGCP gateway fallback and rehome because ISDN BRI L2 must be reinitiated and brought up again by the new L3 task.
- Do not add the **application mgcpapp** command to voice dial peers that support BRI backhaul.

## Information About MGCP-Controlled Backhaul of BRI Signaling

To configure MGCP-controlled backhaul of BRI signaling, you should understand the following concept:

- [MGCP-Controlled Backhaul of BRI Signaling, page 3](#)

## MGCP-Controlled Backhaul of BRI Signaling

The MGCP-Controlled Backhaul of BRI Signaling feature supports a centralized Cisco Unified Communications Manager architecture with BRI trunks connected to remote branch offices. Transporting signaling information from a branch-office MGCP gateway to a centralized media-gateway controller for processing is called backhaul. D-channel signal 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 MGCP gateway neither parses nor has any knowledge of the contents of those messages.

This feature enables you to connect remote ISDN PBXs and key systems to a Cisco ISDN BRI network termination (network side) or PSTN Class 4/5 switch through a Cisco ISDN BRI terminal equipment (as user side) interface. External call-control entities, such as one or more Cisco Unified Communications Manager servers, provide voice service between local and remote branch offices.

[Figure 9](#) depicts a typical network-side scenario. NT denotes network termination; TE denotes terminal equipment.

**Figure 9** Typical ISDN BRI Network-Side Scenario

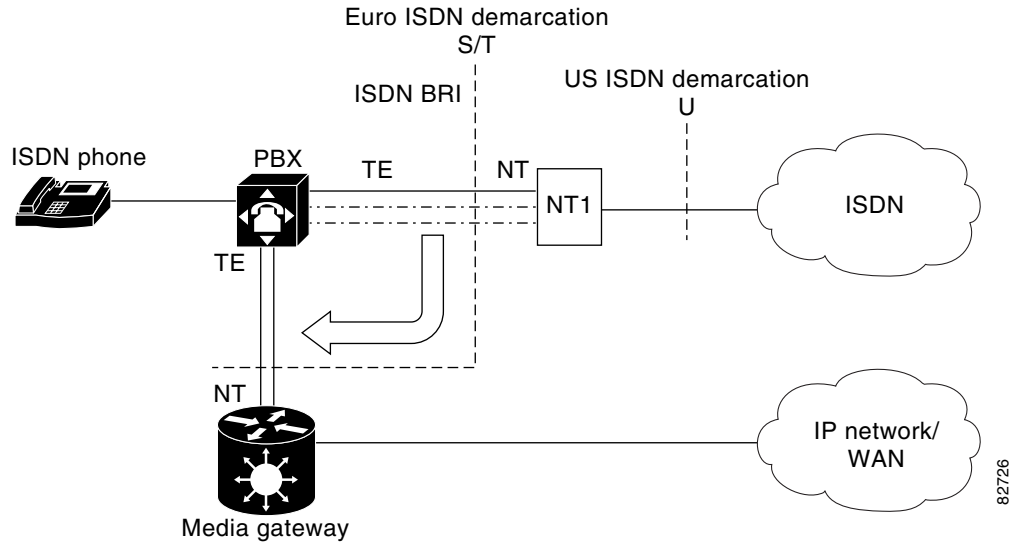
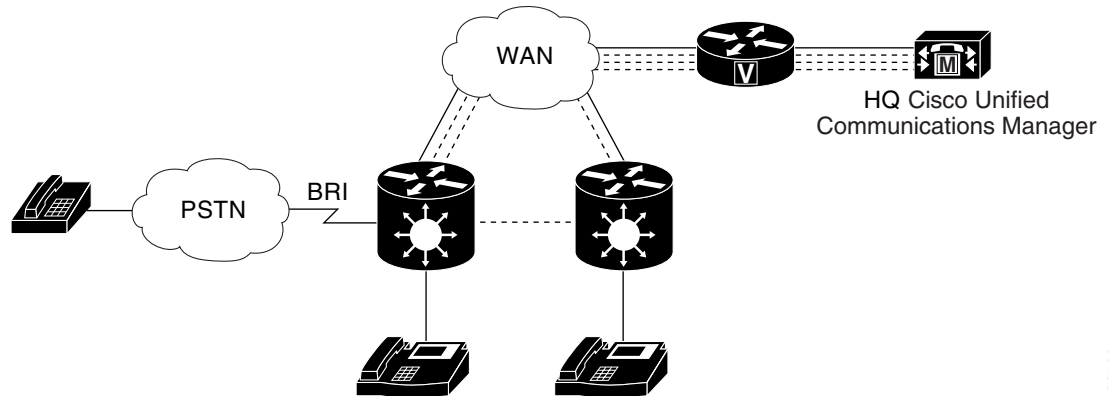


Figure 10 shows a typical user-side scenario.

**Figure 10** ISDN BRI User-Side Scenario



The following is the sequence of events during normal backhaul:

1. A call comes in from the PSTN and passes over the BRI trunk to the MGCP gateway.
2. The MGCP gateway passes signaling information from the call across the WAN to the Cisco Unified Communications Manager at headquarters.
3. The Cisco Unified Communications Manager instructs the MGCP gateway on how to set up and manage the call.
4. The call is established.

# How to Configure MGCP-Controlled Backhaul of BRI Signaling

This section contains the following procedures:

- [Configuring the BRI Interface as an MGCP-BRI Backhaul Endpoint, page 5](#) (required)
- [Verifying MGCP-BRI Backhaul Configuration, page 6](#) (optional)
- [Troubleshooting Tips for MGCP-Controlled Backhaul of BRI Signaling, page 8](#) (optional)

## Configuring the BRI Interface as an MGCP-BRI Backhaul Endpoint

### SUMMARY STEPS

1. `enable`
2. `configure terminal`
3. `interface bri slot/port`
4. `shutdown`
5. `isdn switch-type basic-net3`
6. `isdn bind-L3 ccm-manager service mgcp`
7. `no shutdown`
8. `no mgcp`
9. `mgcp`
10. `exit`

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<code>enable</code>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
Step 2	<code>configure terminal</code>  <b>Example:</b> Router# configure terminal	Enters global configuration mode on the BRI slot and port.
Step 3	<code>interface bri slot/port</code>  <b>Example:</b> Router(config)# interface bri 1/0	Configures the BRI interface as the MGCP-BRI backhaul endpoint. <ul style="list-style-type: none"> <li>• <i>Slot</i> and <i>port</i> syntax is platform-dependent; type ? to determine.</li> </ul> <p><b>Note</b> This command is supported only for a user-side ETSI NET3 switch-type.</p>

	Command or Action	Purpose
Step 4	<b>shutdown</b>  <b>Example:</b> Router(config-if)# shutdown	(Optional) Clears the interface of any active calls. If there are no active calls, you can skip this step.
Step 5	<b>isdn switch-type basic-net3</b>  <b>Example:</b> Router(config-if)# isdn switch-type basic-net3	Sets the central-office switch type on the ISDN interface to <b>basic-net3</b> .
Step 6	<b>isdn bind-L3 ccm-manager service mgcp</b>  <b>Example:</b> Router(config-if)# isdn bind-L3 ccm-manager service mgcp	Sets ISDN L3 binding on the BRI interface.
Step 7	<b>no shutdown</b>  <b>Example:</b> Router(config-if)# no shutdown	Restarts the interface if it was previously disabled.
Step 8	<b>no mgcp</b>  <b>Example:</b> Router(config-if)# no mgcp	Disables all MGCP applications and protocols.
Step 9	<b>mgcp</b>  <b>Example:</b> Router(config-if)# mgcp	Restarts MGCP and reregisters the gateway to Cisco Unified Communications Manager.
Step 10	<b>exit</b>  <b>Example:</b> Router(config-if)# end	Exits interface-configuration mode.

## Verifying MGCP-BRI Backhaul Configuration

### SUMMARY STEPS

1. **show isdn status**
2. **show ccm-manager**
3. **show ccm-manager backhaul**
4. **show mgcp endpoint**

### DETAILED STEPS

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**Step 1** **show isdn status**

Use the **show isdn status** command to verify that Layer 2 is established and that Layer 3 is configured as Cisco Unified Communications Manager. This output displays only if TEI negotiation is performed at startup.

```
Router# show isdn status
```

```
ISDN BRI1/1 interface
  dsl 1, interface ISDN Switchtype = basic-net3
  L2 Protocol = Q.921 L3 Protocol(s) = CCM-MANAGER
  Layer 1 Status:
    ACTIVE
  Layer 2 Status:
    TEI = 64, Ces = 1, SAPI = 0, State = MULTIPLE_FRAME_ESTABLISHED
```



**Note** Use this command only if TEI negotiation is done at startup. Otherwise, TEI negotiation is done when the first call is placed, so output shows Layer 2 with no TEI negotiated and Layer 3 as down.

### Step 2 show ccm-manager

Use the **show ccm-manager** command to verify your Cisco Unified Communications Manager configuration on the gateway.

```
Router# show ccm-manager
```

```
MGCP Domain Name:3845-1.cisco.com
Priority      Status      Host
=====
Primary      Registered  10.3.102.99
First Backup  None
Second Backup None

Current active Call Manager:  10.3.102.99
Backhaul/Redundant link port: 2428
Failover Interval:           30 seconds
Keepalive Interval:          15 seconds
Last keepalive sent:         20:58:35 UTC Sep 3 2004 (elapsed time:00:00:11)
Last MGCP traffic time:      20:58:35 UTC Sep 3 2004 (elapsed time:00:00:11)
Last failover time:          None
Last switchback time:        None
Switchback mode:             Graceful
MGCP Fallback mode:          Not Selected
Last MGCP Fallback start time: None
Last MGCP Fallback end time:  None
MGCP Download Tones:         Disabled

Configuration Error History:
FAX mode:cisco
```

### Step 3 show ccm-manager backhaul

Use the **show ccm-manager backhaul** command to display information about the BRI backhaul link.

```
Router# show ccm-manager backhaul
```

```
Backhaul Link info:
  Link Protocol:      TCP
  Remote Port Number:2428
  Remote IP Address: 10.3.102.99
  Current Link State:OPEN
  Statistics:
    Packets recvd:   4
    Recv failures:   0
```

```

Packets xmitted:2
Xmit failures: 0
BRI Ports being backhauled:
Slot 0, VIC 0, port 0
Slot 1, VIC 0, port 0

```

**Step 4 show mgcp endpoint**

Use the **show mgcp endpoint** command to display a list of your MGCP endpoints.

```
Router# show mgcp endpoint
```

```

BRI/S1/SU0/P1/1@3745-1
BRI/S1/SU0/P1/2@3745-1

```

## Troubleshooting Tips for MGCP-Controlled Backhaul of BRI Signaling

Table 10 lists commands that are available for troubleshooting your configuration.

**Table 10** Troubleshooting Commands

Command	Purpose
<b>command-type a-law</b>	Enables you to address poor voice quality. If your system uses a-law pulse-code modulation (PCM), use this command in interface-BRI configuration mode to reconfigure the BRI voice port in the gateway for a-law PCM. The system default is mu-law PCM.
<b>debug ccm-manager backhaul packets</b>	Displays debugging information about Cisco Unified Communications Manager backhaul message packets.
<b>debug isdn q931</b>	Displays debugging information about ISDN L3 Q.931 message packets.
<b>debug mgcp packets</b>	Displays debugging information about MGCP message packets.

## Configuring SRTP Mode on Cisco IOS MGCP Gateways

SRTP mode provides secure VoIP calls by addressing security requirements for privacy, integrity, and confidentiality of voice conversations. IPsec, a standards-based set of security protocols and algorithms, ensures that signaling information that is sent between the gateway and Cisco Unified Communications Manager are encrypted. Media encryption using standards-based Secure Real-Time Transport Protocol (SRTP) ensures that media streams between supported devices are secure.

Perform this task to configure SRTP mode on the gateway.



## Prerequisites for SRTP Mode

You should first establish an IPsec connection between Cisco Unified Communications Manager and the MGCP gateway before using the MGCP SRTP package. Otherwise, media keys are sent in clear text and your voice call is not considered secure.

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **mgcp package-capability srtp-package**
4. **mgcp validate call-agent source-ipaddr**
5. **exit**

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
Step 2	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.
Step 3	<b>mgcp package-capability srtp-package</b>  <b>Example:</b> Router(config)# mgcp package-capability srtp-package	Enables the MGCP gateway capability to process SRTP packages.
Step 4	<b>mgcp validate call-agent source-ipaddr</b>  <b>Example:</b> Router(config)# mgcp validate call-agent source-ipaddr	(Optional) Enables the MGCP application validation that packets received are sent by a configured call agent.
Step 5	<b>exit</b>  <b>Example:</b> Router(config)# exit	Exits global configuration mode.

## Configuration Examples for MGCP-Controlled Backhaul of BRI Signaling

This section provides the following configuration example:

- [MGCP BRI Backhaul on Cisco 3745: Example, page 10](#)
- [MGCP BRI Backhaul on Cisco 3640: Example, page 13](#)

## MGCP BRI Backhaul on Cisco 3745: Example

```

Router# show running-config

Building configuration...

Current configuration :3913 bytes
!
version 12.3
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname Router
!
boot-start-marker
boot-end-marker
!
!
no network-clock-participate slot 1
no network-clock-participate slot 2
no network-clock-participate slot 3
no network-clock-participate slot 4
no network-clock-participate wic 0
no network-clock-participate wic 1
no network-clock-participate wic 2
no network-clock-participate aim 0
no network-clock-participate aim 1
no aaa new-model
ip subnet-zero
ip cef
!
!
!
ip dhcp pool phone1
  host 10.3.102.102 255.255.0.0
  client-identifier 0100.1121.116b.dd
  option 150 ip 10.3.102.99
  default-router 10.3.102.2
!
!
ip domain name cisco.com
ip ids po max-events 100
no ftp-server write-enable
isdn switch-type basic-net3
voice-card 1
  no dspfarm
!
voice-card 2
  no dspfarm
!
voice-card 3
  no dspfarm
!
!
!
ccm-manager switchback immediate
ccm-manager fallback-mgcp

```

```
ccm-manager redundant-host 10.3.102.98
ccm-manager mgcp
!
!
!
interface FastEthernet0/0
 ip address 10.3.102.2 255.255.0.0
 duplex auto
 speed auto
!
interface FastEthernet0/1
 no ip address
 shutdown
 duplex auto
 speed auto
!
interface BRI1/0
 no ip address
 isdn switch-type basic-net3
 isdn incoming-voice voice
 isdn bind-l3 ccm-manager service mgcp
 isdn skipsend-idverify
!
interface BRI1/1
 no ip address
 isdn switch-type basic-net3
 isdn protocol-emulate network
 isdn layer1-emulate network
 isdn incoming-voice voice
 isdn skipsend-idverify
!
interface BRI2/0
 no ip address
 isdn switch-type basic-net3
 isdn incoming-voice voice
 isdn bind-l3 ccm-manager service mgcp
 isdn skipsend-idverify
!
interface BRI2/1
 no ip address
 isdn switch-type basic-net3
 isdn protocol-emulate network
 isdn layer1-emulate network
 isdn incoming-voice voice
 isdn skipsend-idverify
!
interface BRI3/0
 no ip address
 isdn switch-type basic-net3
 isdn incoming-voice voice
 isdn bind-l3 ccm-manager service mgcp
 isdn skipsend-idverify
!
interface BRI3/1
 no ip address
 isdn switch-type basic-net3
 isdn protocol-emulate network
 isdn layer1-emulate network
 isdn incoming-voice voice
 isdn skipsend-idverify
!
!
ip default-gateway 10.3.0.1
ip classless
```

```

ip route 0.0.0.0 0.0.0.0 10.3.0.1
!
ip http server
no ip http secure-server
!
!
access-list 10 deny 10.3.102.99 log
access-list 10 permit any
!
!
!
control-plane
!
!
call application alternate DEFAULT
!
!
voice-port 1/1/0
!
voice-port 1/1/1
!
voice-port 2/0/0
!
voice-port 2/0/1
!
voice-port 3/0/0
!
voice-port 3/0/1
!
voice-port 3/1/0
!
voice-port 3/1/1
!
voice-port 3/1/2
!
voice-port 3/1/3
!
!
mgcp
mgcp call-agent 10.3.102.99 service-type mgcp version 0.1
mgcp package-capability srtp-package
!
mgcp profile default
!
!
!
dial-peer voice 1 pots
  application mgcpapp
  direct-inward-dial
  port 3/0/0
  forward-digits all
!
dial-peer voice 100 voip
  application mgcpapp
  destination-pattern 9...
  session target ipv4:10.3.102.1
  incoming called-number .
!
dial-peer voice 2 pots
  destination-pattern 5001
  port 3/1/0
!
dial-peer voice 4 pots
  destination-pattern 6T

```

```
    direct-inward-dial
    port 3/0/1
    !
dial-peer voice 3 pots
    destination-pattern 5002
    port 3/1/3
    !
dial-peer voice 11 pots
    destination-pattern 2T
    direct-inward-dial
    port 2/0/1
    !
dial-peer voice 12 pots
    application mgcpapp
    direct-inward-dial
    port 2/0/0
    forward-digits all
    !
    !
    !
call-manager-fallback
    max-conferences 8
    ip source-address 10.3.102.2 port 2000
    max-ephones 2
    max-dn 4
    !
    !
line con 0
    exec-timeout 0 0
line aux 0
line vty 0 4
    login
    !
end
```

## MGCP BRI Backhaul on Cisco 3640: Example

```
version 12.2
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
no service dhcp
!
hostname 3640
!
!
voice-card 3
!
ip subnet-zero
!
!
ip domain name cisco.com
!
isdn switch-type primary-qsig
!
!
voice call carrier capacity active
!
voice service voip
    h323
    call start slow
    !
```

```

!
!
!
mta receive maximum-recipients 0
ccm-manager mgcp
!
controller T1 3/0
  framing esf
  clock source internal
  linecode b8zs
  pri-group timeslots 1-24 service mgcp
!
controller T1 3/1
  framing esf
  linecode b8zs
!
!
!
interface FastEthernet0/0
  ip address 10.15.43.101 255.255.0.0
  duplex auto
  speed auto
  no cdp enable
!
interface Serial0/0
  no ip address
  encapsulation frame-relay
  shutdown
  clockrate 125000
  frame-relay lmi-type ansi
!
interface FastEthernet0/1
  no ip address
  shutdown
  duplex auto
  speed auto
!
interface Serial0/1
  no ip address
  shutdown
  clockrate 125000
!
interface BRI1/0
  no ip address
  isdn switch-type basic-net3
  isdn incoming-voice voice
  isdn bind-13 ccm-manager service mgcp
!
interface BRI1/1
  no ip address
  isdn switch-type basic-qsig
!
interface Serial3/0:23
  no ip address
  no logging event link-status
  isdn switch-type primary-qsig
  isdn incoming-voice voice
  no cdp enable
!
ip default-gateway 10.15.10.11
ip classless
ip route 0.0.0.0 0.0.0.0 10.15.10.11
ip http server
!

```

```
ip pim bidir-enable
!
!
!
call rsvp-sync
!
voice-port 1/0/0
!
voice-port 1/0/1
!
voice-port 2/0/0
!
voice-port 2/0/1
!
voice-port 2/1/0
!
voice-port 2/1/1
!
voice-port 3/0:23
!
mgcp
mgcp call-agent 10.14.181.10 service-type mgcp version 0.1
mgcp sdp simple
!
mgcp profile default
!
!
!
dial-peer cor custom
!
!
!
dial-peer voice 6000 pots
  application mgcpapp
  port 2/0/0
!
dial-peer voice 4000 pots
  application mgcpapp
  port 2/0/1
!
!
line con 0
  exec-timeout 0 0
line aux 0
line vty 0 4
  login
!
!
end
```

## Where to Go Next

- To configure conferencing, transcoding, and MTP support on a Cisco IOS gateway, see [“Configuring Enhanced Conferencing and Transcoding for Voice Gateway Routers” on page 67](#).
- To enable MGCP PRI backhaul support, see [“Configuring MGCP PRI Backhaul and T1 CAS Support for Cisco Unified Communications Manager” on page 113](#).
- To download region-specific tones and their associated frequencies, amplitudes, and cadences, see [“Configuring Tone Download to MGCP Gateways” on page 145](#).

## Additional References

- “[Cisco Unified Communications Manager and Cisco IOS Interoperability Features Roadmap](#)” on [page 9](#)—Describes how to access Cisco Feature Navigator; also lists and describes, by Cisco IOS release, Cisco Unified Communications Manager and Cisco IOS interoperability features.
- “[Overview of Cisco Unified Communications Manager and Cisco IOS Interoperability](#)” on [page 13](#)—Describes basics of underlying technology and lists related documents.
- “[Configuring ISDN BRI](#)” in the *Cisco IOS Dial Technologies Configuration Guide*, Release 12.4—Describes how to configure ISDN BRI on the voice gateway.
- “[ISDN Switch Types, Codes, and Values](#)” appendix in the *Debug Command Reference*, Release 12.4—Describes supported switch types.
- [Cisco Unified Communications Manager documentation](#)—Describes how to install and configure Cisco Unified Communications Manager.

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