

IOS Gateway BRI Backhaul with Cisco CallManager

4.1 Configuration Example

Document ID: 67021

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Introduction

Media Gateway Control Protocol (MGCP)–controlled backhaul of BRI signaling to Cisco CallManager allows centralized management of remote branch offices with BRI trunks. The ISDN D–channel signal information is backhauled to Cisco CallManager through a TCP session via the branch MGCP gateway. All Q.931 signaling messages are relayed back to the central Cisco CallManager without being parsed by the MGCP gateway.

This feature was implemented on the Cisco 2600XM, Cisco 2691, Cisco 3640, Cisco 3640A, Cisco 3660, Cisco 2800 series, Cisco 3700 series, and Cisco 3800 series. Refer to *Configuring MGCP–Controlled Backhaul of BRI Signaling in Conjunction with Cisco CallManager* for more information on platforms and Cisco IOS® Software Releases.

This document outlines the steps you need in order to configure the MGCP gateway and the Cisco CallManager for MGCP BRI backhaul with the Cisco 2800 and 3800 series routers.

Symptoms:

You can potentially encounter these symptoms when you configure Cisco CallManager with Cisco IOS MGCP gateways with BRI ports:

- The MGCP gateway does not register with Cisco CallManager. Refer to *MGCP Gateway Registration Failure with Cisco CallManager* for more information.
- The MGCP BRI port does not register with Cisco CallManager. Ensure that the BRI port is connected to the Telco line with Layer 1 and 2 in the active status.

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

The information in this document is based on these software and hardware versions:

- IP Communications high-density network modules (NM-HD), IP Communications High-Density Digital Voice Network Module (NM-HDV2), High-Density Analog and Digital Extension Module (EVM-HD) and Cisco 2800 and 3800 series routers with a BRI High-Speed WAN Interface Card (HWIC) interface with Cisco IOS Software Release 12.4(2)T
- Cisco CallManager 4.1(3) SR1 and later, latest Cisco CallManager Version 4.1 device package under Cisco CallManager Version 4.1 under Voice Software on Cisco.com

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Conventions

Refer to the Cisco Technical Tips Conventions for more information on document conventions.

BRI Backhaul Configuration

The BRI backhaul configuration consists of two parts:

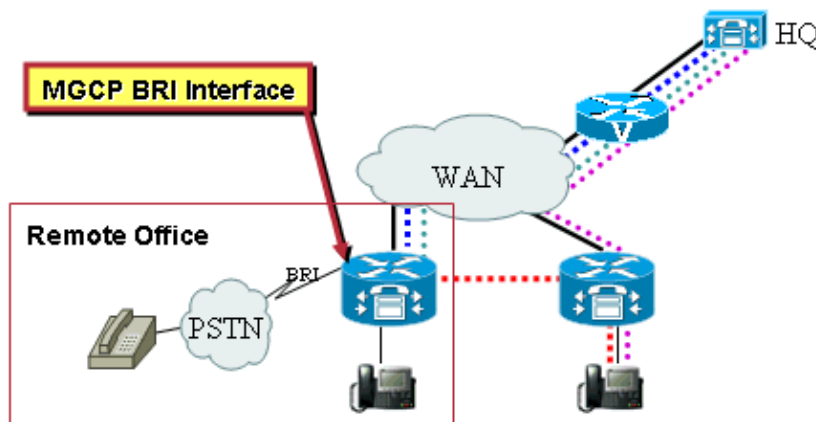
1. MGCP IOS Gateway Configuration
2. Cisco CallManager Configuration

In this section, you are presented with the information to configure the features described in this document.

Note: Use the Command Lookup Tool (registered customers only) to obtain more information on the commands used in this section.

Network Diagram

This document uses this network setup:



MGCP IOS Gateway Configuration

Complete these steps to configure BRI backhaul on the IOS gateway:

1. Configure the hostname for the router.

```
router(config)#hostname bri-gw
```

2. Configure the IP domain name. Make sure that the BRI gateway is reachable to Cisco CallManager and that it is in the reachable domain. This step is optional.

```
bri-gw(config)#ip domain-name cisco.com
```

3. Issue the **ccm-manager mgcp** command in global mode.

```
bri-gw(config)#ccm-manager mgcp
```

4. Issue the **isdn switch-type <switch-type>** command on the BRI and global interfaces if the switching type is not configured globally.

```
bri-gw(config)#isdn switch-type basic-net3
```

Note: Only basic-net3 is tested and supported. No other switch types are supported.

5. Issue the **isdn bind-l3 ccm-manager service mgcp** command on the BRI interface. Make sure to shut and no shut the interface.

```
bri-gw(config)#interface bri 0/0/0
bri-gw(config-if)#isdn bind-l3 ccm-manager service mgcp
```

6. Configure a dial peer with **mgcpapp** as the application and assign the BRI port to the dial peer.

```
dial-peer voice 1 pots
  application mgcpapp
  direct-inward-dial
  port 0/0/0
  forward-digits all
```

Note: Do not apply the **application mgcpapp** command to the POTS dial peer that supports BRI backhaul for Cisco IOS Software Release 12.3(7)T and later. Refer to Restrictions for MGCP–Controlled Backhaul of BRI Signaling.

7. Issue the **mgcp** command in global mode.

```
bri-gw(config)#mgcp
```

8. Issue the **mgcp call-agent <ccm ip address> service type mgcp version 0.1** command.

```
bri-gw(config)#mgcp call-agent 1.3.102.99 service type mgcp version 0.1
```

9. Configure the Secure RTP (SRTP) package, which enables the MGCP gateway to process SRTP packages.

```
mgcp package-capability rtp-package
```

Cisco CallManager Configuration

Complete these steps on the Cisco CallManager:

1. Add a new gateway.
2. Select the **Gateway type** (for example Cisco 2851) and select **MGCP** in the Device Protocol field.

System Route Plan Service Feature Device User Application Help

Cisco CallManager Administration
For Cisco IP Telephony Solutions

CISCO SYSTEMS

Add a New Gateway

Select the type of gateway you would like to create:

Gateway type*

Device Protocol*

* indicates required item

3. Configure the domain name to be <hostnameofrouter>.<domain-name>.

For example, bri-gw.cisco.com.

Note: Complete this step only if the domain name is configured on the gateway.

Gateway Configuration

[Back to Find/List Gateways](#)

Product: Cisco 2851
Protocol: MGCP
MGCP: New

Status: Ready

Domain Name*

Description

Cisco CallManager Group*

Installed Voice Interface Cards	Endpoint Identifiers
Module in Slot 0 <input type="text" value="NM-4VWIC-MBRD"/>	<input type="text" value=""/>
Module in Slot 1 <input type="text" value="NM-HD-2VE"/>	<input type="text" value=""/>
Module in Slot 2 <input type="text" value="EVM-HD"/>	<input type="text" value=""/>

Product Specific Configuration

Global ISDN Switch Type

Switchback Timing*

Switchback uptime-delay (min)

Switchback schedule (hh:mm)

4. Select the BRI module, which is placed in the router slot.

For example, select **Module in Slot 0** since the motherboard is considered as Slot 0 if the BRI VIC is placed in onboard HWIC Slot 2 of the motherboard. Then insert the gateway. This gives four options. Select and update Subunit 2 with the VIC2-2BRI-NT/TE since the HWIC slot used is 2.

MGCP : 2851-bri-gw.cisco.com

Status: Insert completed

Update Delete Reset Gateway

Domain Name* 2851-bri-gw.cisco.com

Description 2851-bri-gw.cisco.com

Cisco CallManager Group* Default

Installed Voice Interface Cards	Endpoint Identifiers
Module in Slot 0 NM-4VWIC-MBRD	
Subunit 0 < None >	
Subunit 1 < None >	
Subunit 2 < None >	
Subunit 3 < None >	
Module in Slot 1 NM-HD-2VE	
Subunit 0 VIC2-2BRI	Begin Port 0
Subunit 1 VIC-4FXS/DID	Begin Port 0
Subunit 2 < None >	
Subunit 3 < None >	
Module in Slot 2 EVM-HD	
Subunit 0 < None >	Begin Port 0
Subunit 1 < None >	Begin Port 0

5. Reset the gateway after you configure the BRI endpoint.

Gateway Configuration [Back to Find/List Gateways](#)

Product: Cisco 2851

Protocol: MGCP

MGCP : 2851-bri-gw.cisco.com

Status: Update completed

Update Delete Reset Gateway

Domain Name* 2851-bri-gw.cisco.com

Description 2851-bri-gw.cisco.com

Cisco CallManager Group* Default

Installed Voice Interface Cards	Endpoint Identifiers
Module in Slot 0 NM-4VWIC-MBRD	
Subunit 0 VIC2-2BRI	(0/0/0) (0/0/1)

6. Add a router pattern on the Cisco CallManager to route calls to the BRI gateway based on a destination pattern. Refer to Route Pattern Configuration.

Product : Cisco 2851

Gateway : New

Device Protocol: Digital Access BRI

Status: Ready

Insert

Device Information	BRI Protocol Type Specific Information
End-Point Name* BRI/SU0/SU0/P0@2851-bri-gw.cis	<input type="checkbox"/> Redirecting Number IE Delivery - Outbound
Description BRI/SU0/SU0/P0@2851-bri-gw.cis	<input type="checkbox"/> Redirecting Number IE Delivery - Inbound
Device Pool* Default	<input type="checkbox"/> Setup non-ISDN Progress Indicator IE Enable****
Device Destination* Use System Default	
Network Locale < None >	
Media Resource Group List < None >	
Location < None >	
AAR Group < None >	
Load Information	
	Product Specific Configuration
	Input Gain (-6..14 db)* 0
	Output Attenuation (-6..14 db)* 0
	Echo Cancellation Enable* Enable
	Echo Cancel Coverage (ms)* Default
	Incoming Call Mode* Voice
	Point To Point Setup* On
	TEI Negotiation* PowerUp
	TEI Preservation* Remove
	TEI Mode* Dynamic
	TEI Value (0..63)* 0
	Line Power* On
	Layer 1 Protocol Side* User
Interface Information	
BRI Protocol Type* BRI NET3	
Protocol Side* User	

Gateway Configuration

[Back to MGCP Configuration](#)
[Back to Find/List Gateways](#)
[Dependency Records](#)

Product : Cisco 2851
Gateway : BRI/S0/SU0/P0@2851-bri-gw.cisco.com
Device Protocol: Digital Access BRI
Registration: Unknown
IP Address:

Status: Insert completed.

Device Information

End-Point Name*	<input type="text" value="BRI/S0/SU0/P0@2851-bri-gw.cis"/>
Description	<input type="text" value="BRI/S0/SU0/P0@2851-bri-gw.cis"/>
Device Pool*	<input type="text" value="Default"/>
Device Destination*	<input type="text" value="Use System Default"/>
Network Locale	<input type="text" value="< None >"/>
Media Resource Group List	<input type="text" value="< None >"/>

- Issue the **no mgcp** command and then the **mgcp** command in global configuration mode for the gateway to register the BRI endpoints.

Verify

There is currently no specific verification information available for this configuration.

Troubleshoot

Use this section to troubleshoot your configuration.

Troubleshooting Commands

The Output Interpreter Tool (registered customers only) (OIT) supports certain **show** commands. Use the OIT to view an analysis of **show** command output.

Note: Refer to Important Information on Debug Commands before you use **debug** commands.

- **show ccm** Ensures that the gateway is registered to the Cisco CallManager.
- **show ccm backhaul** Displays the BRI endpoints which are backhauled.
- **show isdn status** Displays MULTI_FRAME_ESTABLISHED with Layer 2 being registered to Cisco CallManager.
- **show mgcp endpoints** Displays information for endpoints controlled by MGCP.
- **show mgcp connections** Displays the BRI endpoints in an MGCP call. In order to make sure that the MGCP call is secure, a flag called k is set to 1 for an encrypted secure call and 0 for a non-secure call.
- **show voice call status <id> sa** Displays the number of packets that are encrypted and decrypted for a certain call on the BRI.
- **debug ccm backhaul events** Displays Cisco CallManager backhaul events.
- **debug ccm backhaul packets** Displays Cisco CallManager backhaul packets.

This is sample output of the **show** commands:

```
R2851#show run interface bri 1/0/0
```

Building configuration...

Current configuration : 208 bytes

```
!  
interface BRI1/0/0  
no ip address  
  isdn switch-type basic-net3  
  isdn point-to-point-setup  
  isdn incoming-voice voice  
  isdn bind-l3 ccm-manager service mgcp  
  isdn skipsend-idverify  
no clns route-cache  
end
```

R2851#show ccm-manager

MGCP Domain Name: R2851.automation.com

Priority	Status	Host
----------	--------	------

=====

Primary	Registered	10.10.10.83
----------------	-------------------	--------------------

First Backup	None
--------------	------

Second Backup	None
---------------	------

Backhaul Link info:

Link Protocol:	TCP
Remote Port Number:	2428
Remote IP Address:	10.10.10.83
Current Link State:	OPEN

BRI Ports being backhauled:

Slot 2, VIC 0, port 0

Slot 1, VIC 0, port 0

R2851#show ccm-manager backhaul

Backhaul Link info:

Link Protocol:	TCP
Remote Port Number:	2428
Remote IP Address:	10.10.10.83
Current Link State:	OPEN

Statistics:

Packets recvd:	997
----------------	-----

Recv failures:	967
----------------	-----

Packets xmitted:	30
------------------	----

Xmit failures:	0
----------------	---

BRI Ports being backhauled:

Slot 2, VIC 0, port 0

Slot 1, VIC 0, port 0

R2851#show isdn status bri 1/0/0

Global ISDN Switchtype = primary-ni

%Q.931 is backhauled to CCM MANAGER 0x0003 on DSL 8. Layer 3 output may not apply

ISDN BRI1/0/0 interface dsl 8, interface ISDN Switchtype = basic-net3

L2 Protocol = Q.921 0x0000 L3 Protocol(s) = CCM MANAGER 0x0003

Layer 1 Status:

ACTIVE

Layer 2 Status:

TEI = 64, Ces = 1, SAPI = 0, State = MULTIPLE_FRAME_ESTABLISHED

Layer 3 Status:

0 Active Layer 3 Call(s)

Active dsl 8 CCBs = 0

The Free Channel Mask: 0x80000003

Total Allocated ISDN CCBs = 0

R2851#show mgcp connection

Endpoint Call_ID(C) Conn_ID(I) (P)ort (M)ode (S)tate (CO)dec (E)vent[SIFL]

(R)esult[EA] Crypto-suite(K)

```
1.BRI/S2/SU0/P0/1 C=D0000000010000ff000000F580000012,111,112 I=0x2 P=180 98,
16418 M=3 S=4,4 CO=1 E=2,0,0,2 R=0,0 K=1
2.2. BRI/S3/SU0/P0/2 C=D000000001000100000000F500000001,113,114 I=0x3 P=164
18,18098 M=3 S=4,4 CO=1 E=2,0,0,2 R=0,0 K=1
```

!--- Note: K = 1 for a secure call and 0 for a non-secure call.

```
R2851#show voice call stat 6f sample 5
Gathering information (5 seconds)...
CallID Port DSP/Ch Codec Rx/Tx En/De ERL/Reflctr Jitter
0x6F 2/0/0.0 13/1 g711ulaw 250/250 250/250 21.0/18 24/41
```

!--- Note: The En/De is 0/0 for a non-secure call.

You see this **debug** output when BRI endpoints register to the Cisco CallManager:

```
cmbh_rcv_callback: <-- Receiving backhaul msg for BR1/0/0 :
    bk_msg_type = ESTABLISH_REQ
    bk_chan_id (slot:port) = 1:0
    Q.931 length = 0
R2851#
cmbri_send_pak: --> Sending backhauled msg for BR1/0/0 :
    bk_msg_type = ESTABLISH_CFM
    bk_chan_id (slot:port) = 1:0
    Q.931 length = 0
```



Warning: Debug commands can severely degrade the performance of the router. Run these commands outside business hours.

Related Information

- [Voice Technology Support](#)
- [Voice and Unified Communications Product Support](#)
- [Troubleshooting Cisco IP Telephony](#) 
- [Technical Support & Documentation – Cisco Systems](#)

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