

# Unified Border Element Transcoding Configuration Example

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## Introduction

The Cisco Unified Border Element (CUBE) supports transcoding for calls that pass through and that require different codecs on the two call legs. Transcoding between various codecs is supported, and CUBE inserts a transcoder based on configuration as well as a mismatch between the codecs negotiated on the two call legs of the calls.

Transcoding requires DSPs to terminate the RTP stream and to decode and encode the voice payload with the appropriate codec. The DSPs used by CUBE for transcoding may be either co-resident on the same router as CUBE or may be located on a separate router platform.

## Prerequisites

### Requirements

Ensure that you meet these requirements before you attempt this configuration:

- Basic knowledge of how to configure and use Cisco IOS voice (such as dial-peers)
- Basic knowledge of how to configure and use CUBE
- Basic knowledge of transcoding

### Components Used

The information in this document is based on:

- Cisco Unified Border Element that runs on a Cisco 3745 router and uses Cisco IOS release 12.3.11T or later

- Transcoding DSP resources on a Cisco AS5400XM access server with an AS5X-FC feature card populated with AS5X-PVDM2-64 DSP cards

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 Cisco Technical Tips Conventions for more information on document conventions.

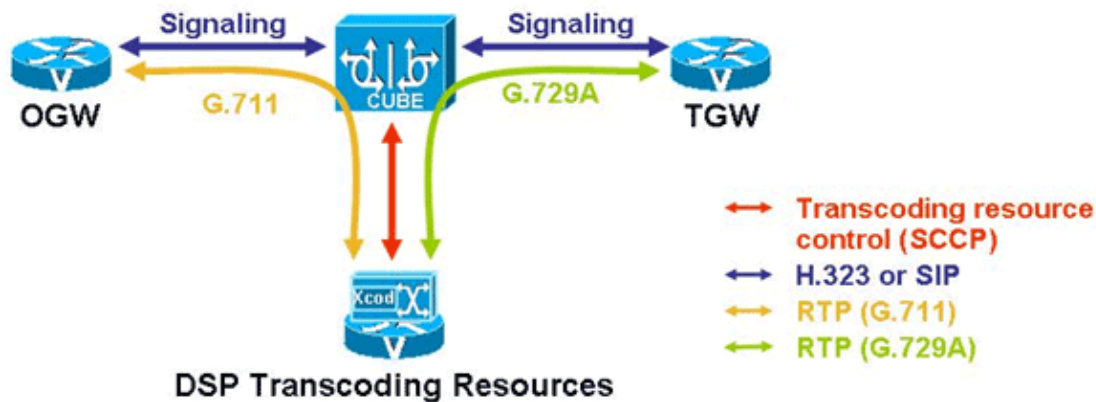
## Configure

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 figure shows an example of CUBE with external DSPs for transcoding:



The DSP resources can also be internal to (or co-resident of) the same router platform that hosts CUBE. If this is the case, the control of the DSP resources is local to the router, and the SCCP control flow in the figure is not present.

The DSP resources that CUBE uses for transcoding must be configured regardless of whether or not the DSPs are co-resident with CUBE. The only difference in the configurations is the IP addressing between CUBE and the DSP resources. For a co-resident configuration, the IP address is the same for both.

## Configuration Steps

This section describes how to configure external DSP transcoding. A Cisco 3745 router is used as a CUBE, and an AS5400XM is used for hosting the DSP resources for transcoding.

The configuration applies to this call flow:

1. The call starts from the OGW towards CUBE via H.323 with G.711.
2. CUBE forwards the call via H.323 to the TGW (which is configured for G.729).

3. For the call setup to the TGW to be successful, a codec conversion is required from G.711 to G.729. If transcoding resources are not configured or available, the call setup fails.

## CUBE Configuration for External Transcoding Control

A CUBE router is configured to control the DSP resources for transcoding. This configuration uses the **telephony-service** command, which is similar to the transcoding configuration for Cisco Unified Communication Manager Express. The DSP resources register with the *controlling* entity (which in this example is CUBE, but could also be CUCME or CUCM).

```
3745 CUBE
vdout3#show running-config | begin telephony
!
telephony-service
sdspfarm units 1 -- Specifies the maximum number of DSP farms that can
                  be registered to CUBE. A maximum of 5 DSP resource units
                  (farms) can be configured.
sdspfarm transcode sessions 128 -- Specifies the maximum transcoding
                                   sessions supported across all DSP farms registered
                                   with CUBE.
sdspfarm tag 1 vdout1 -- Specifies the device name of the DSP farm. For
                       uniqueness the device name can be the MAC address of the
                       DSP source interface. In this example the hostname of
                       the DSP farm router is used.
ip source-address 1.2.61.73 port 2000 The IP address and port-no: (TCP)
                                     of the interface through which SCCP messages are
                                     transmitted/received from CUBE.
```

## DSP Farm Configuration for Hosting External Transcoding DSP Resources

A router is configured to host DSP resources for transcoding used by a controlling entity, which in this example is CUBE on a different router. The DSP resources are registered with the controlling entity to make them available to call flows.

```
DSP Farm
vdout1#show running-config | begin voice-card
voice-card 1
 dsp services dspfarm - This makes the DSPs available for DSP farming
                       which includes transcoding services.

vdout1#show running-config | begin sccp
sccp local GigabitEthernet0/0 -- Defines the source interface of the DSP
                               farm through which SCCP messages are exchanged with
                               controlling CUBE.
sccp ccm 1.2.61.73 identifier 1 -- Specifies the IP address of the CUBE
                                 system that the DSP farm registers to. This should
                                 match the CUBE IP address on the ip source-address
                                 configuration on CUBE.

sccp
sccp ccm group 1 -- Group configuration for linking sccp ccm global
                 configurations as well as the dspfarm profile(s)
   bind interface GigabitEthernet0/0
   associate ccm 1 priority 1 -- Associate the sccp identifier ccm with
                              the sccp ccm group .
associate profile 1 register vdout1 -- Associate the dspfarm profile
                                     with the DSP farm device name. In this example the
                                     hostname of the DSP farm hosted router is used
                                     (vdout1). The same name must be used on CUBE where
```

```

                                sdspfarm tag 1 is configured.
!
dspfarm profile 1 transcode -- Configure the dspfarm profile to define
                                the codecs supported, the maximum sessions, and
                                enable SCCP.

    codec g711ulaw
    codec g711alaw
    codec g729ar8
    codec g729abr8
    codec g729r8
    codec g729br8
    maximum sessions 128
    associate application SCCP

```

## Full Sample Configurations for Internal Transcoding

This section provides a full configuration example for a setup where the same router (an AS5400XM) is configured both to host CUBE and the DSP resources for transcoding. Salient parts of the configuration are displayed in bold text.

The differences between this configuration setup and DSP Farm Configuration for Hosting External Transcoding DSP Resources are as follows:

- The actual DSP resources ( `voice-card x > dsp services dspfarm` ) and the controlling entity ( `telephony-service` ) appear on the same router.
- The IP address of the DSP resources ( `sccp ccm 9.13.29.30 identifier 1` ) and the IP address of the controlling entity ( `telephony-service > ip source-address 9.13.29.30 port` ) are the same.

5400XM
<pre> 5400XM#show run Building configuration...  Current configuration : 3149 bytes ! version 12.4 service config service timestamps debug datetime msec service timestamps log datetime msec no service password-encryption ! hostname 5400XM ! boot-start-marker no boot startup-test boot-end-marker ! logging buffered 100000000 debugging no logging console enable secret 5 \$1\$g301\$4BVklIIq97tihABYS6Guy/ enable password xxx ! resource-pool disable no aaa new-model ! resource policy ! <b>voice-card 1</b>   <b>dsp services dspfarm</b> ! voice-card 5 ! </pre>

```
ip cef
!
voice service voip
  allow-connections h323 to h323
  allow-connections h323 to sip
  allow-connections sip to h323
  allow-connections sip to sip
  h323
  modem passthrough none codec g729r8 pre-ietf
!
controller T1 5/0
  framing sf
  linecode ami
!
controller T1 5/1
  framing sf
  linecode ami
!
controller T1 5/2
  framing sf
  linecode ami
!
controller T1 5/3
  framing sf
  linecode ami
!
controller T1 5/4
  framing sf
  linecode ami
!
controller T1 5/5
  framing sf
  linecode ami
!
controller T1 5/6
  framing sf
  linecode ami
!
controller T1 5/7
  framing sf
  linecode ami
!
interface GigabitEthernet0/0
  ip address 9.13.29.30 255.255.255.0
  duplex auto
  speed auto
  negotiation auto
  no cdp enable
!
interface GigabitEthernet0/1
  no ip address
  shutdown
  duplex auto
  speed auto
  negotiation auto
  no cdp enable
!
interface Serial0/0
  no ip address
  shutdown
  clock rate 2000000
  no fair-queue
!
interface Serial5/0
  no ip address
  shutdown
```

```
!  
interface Serial0/1  
  no ip address  
  shutdown  
  clock rate 2000000  
  no cdp enable  
!  
ip route 0.0.0.0 0.0.0.0 9.13.29.1  
!  
no ip http server  
!  
dialer-list 1 protocol ip permit  
!  
sccp local GigabitEthernet0/0  
sccp ccm 9.13.29.30 identifier 1 version 4.0 -- Use its own IP address  
sccp  
!  
sccp ccm group 1  
  associate ccm 1 priority 1  
  associate profile 1 register XCODE123456  
  keepalive retries 1  
  keepalive timeout 10  
  switchover method immediate  
  switchback method immediate  
!  
dspfarm profile 1 transcode  
  codec g711ulaw  
  codec g711alaw  
  codec g729ar8  
  codec g729abr8  
  codec gsmfr  
  codec g729r8  
  codec g729br8  
  maximum sessions 10  
  associate application SCCP  
!  
dial-peer voice 1 voip  
  destination-pattern 630222100.  
  session protocol sipv2  
  session target ipv4:9.13.29.22  
  dtmf-relay rtp-nte digit-drop  
  codec g711ulaw  
!  
dial-peer voice 2 voip  
  session protocol sipv2  
  incoming called-number 630222100.  
  codec g729br8 bytes 10  
!  
dial-peer voice 3 voip  
  destination-pattern 2000  
  session protocol sipv2  
  session target ipv4:9.13.29.22  
  dtmf-relay rtp-nte digit-drop  
!  
dial-peer voice 4 voip  
  session protocol sipv2  
  incoming called-number 2000  
  codec g711ulaw  
!  
gatekeeper  
  shutdown  
!  
telephony-service  
  max-ephones 1  
  max-dn 1  
  ip source-address 9.13.29.30 port 2000 --> Use its own IP address
```

```
sdspfarm units 1
sdspfarm transcode sessions 10
sdspfarm tag 1 XCODE123456
ss7 mtp2-variant Bellcore 0
ss7 mtp2-variant Bellcore 1
ss7 mtp2-variant Bellcore 2
ss7 mtp2-variant Bellcore 3
!
line con 0
exec-timeout 0 0
logging synchronous
stopbits 1
line aux 0
stopbits 1
line vty 0 4
password cisco
login
!
scheduler allocate 10000 400
no process cpu extended
no process cpu autoprofile hog
end
```

## Verify

The output in this section pertains to the configuration setup for external transcoding.

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

## CUBE

The device name with which the DSP farm is registered with CUBE and the IP address of the DSP farm host router are displayed in bold text.

```
vdout3#show sdspfarm units
Load for five secs: 0%/0%; one minute: 0%; five minutes: 3%
Time source is NTP, 23:46:40.649 PST Tue Nov 21 2006

mtp-1 Device:vdout1 TCP socket:[1] REGISTERED
actual_stream:256 max_stream 256 IP:1.2.61.71 27519 MTP YOKO keepalive 45
Supported codec:
    G711Ulaw
    G711Alaw
    G729
    G729a
    G729b
    G729ab
max-mtps:1, max-streams:256, alloc-streams:256, act-streams:0
```

This output shows the CUBE configuration setup.

```
vdout3#show telephony-service
ip source-address 1.2.61.73 port 2000
max-ephones 128
max-dn 1
max-conferences 8 gain -6
dspfarm units 1
dspfarm transcode sessions 128
dspfarm 1 vdout1
```

This output shows that after a call is made the codecs (displayed in bold text) that are used for the call legs through CUBE.

```
vdouut3#show sdsfarm sessions active
Load for five secs: 1%/0%; one minute: 1%; five minutes: 1%
Time source is NTP, 23:52:43.922 PST Tue Nov 21 2006

Stream-ID:37 mtp:1 1.2.61.71 20190 Local:2000 START
usage: Ip-Ip
codec:G729 duration:20 vad:0 peer Stream-ID:38

Stream-ID:38 mtp:1 1.2.61.71 21326 Local:2000 START
usage: Ip-Ip
codec:G711Ulaw64k duration:20 vad:0 peer Stream-ID:37
```

This output shows the sessions active between the OGW and the TGW through CUBE.

```
vdouut3#show voip rtp connections
Load for five secs: 1%/0%; one minute: 1%; five minutes: 1%
Time source is NTP, 23:54:22.722 PST Tue Nov 21 2006
VoIP RTP active connections :
No. CallId      dstCallId  LocalRTP  RmtRTP  LocalIP      RemoteIP
1 3991          3992      18496    17430    1.2.61.73    1.2.61.48
2 3992          3991      17382    19706    1.2.61.73    1.2.61.68
Found 2 active RTP connections
```

This output shows a compact summary of the active sessions and the codecs (displayed in bold text) used by the call legs.

```
vdouut3#show call active voice compact
Load for five secs: 1%/0%; one minute: 1%; five minutes: 1%
Time source is NTP, 02:31:58.156 PST Wed Nov 22 2006
<callID> A/O FAX T<sec> Codec      type  Peer Address  IP R<ip>:<udp>
Total call-legs: 2
    4023 ANS      T25      g711ulaw  VOIP  P5200      1.2.61.48:16934
    4024 ORG      T25      g729r8   VOIP  P6200      1.2.61.68:17040
```

## DSP Farm Host

This output shows the status of the DSP resources registration status. Salient information appears in bold text.

```
vdouut1#show sccp
SCCP Admin State: UP
Gateway IP Address: 1.2.61.71, Port Number: 2000
IP Precedence: 5
User Masked Codec list: None
Call Manager: 1.2.61.73, Port Number: 2000
                Priority: N/A, Version: 3.1, Identifier: 1

Transcoding Oper State: ACTIVE - Cause Code: NONE
Active Call Manager: 1.2.61.73, Port Number: 2000
TCP Link Status: CONNECTED, Profile Identifier: 1
Reported Max Streams: 256, Reported Max OOS Streams: 0
Supported Codec: g711ulaw, Maximum Packetization Period: 30
Supported Codec: g711alaw, Maximum Packetization Period: 30
Supported Codec: g729ar8, Maximum Packetization Period: 60
Supported Codec: g729abr8, Maximum Packetization Period: 60
Supported Codec: g729r8, Maximum Packetization Period: 60
Supported Codec: g729br8, Maximum Packetization Period: 60
Supported Codec: rfc2833 dtmf, Maximum Packetization Period: 30
Supported Codec: rfc2833 pass-thru, Maximum Packetization Period: 30
Supported Codec: inband-dtmf to rfc2833 conversion, Maximum Packetization Period: 30
```

This output shows the configuration of the DSP resources (while idle).

```
vdouutl#show dspfarm all
Dspfarm Profile Configuration

Profile ID = 1, Service = TRANSCODING, Resource ID = 1
Profile Description :
Profile Admin State : UP
Profile Operation State : ACTIVE
Application : SCCP Status : ASSOCIATED
Resource Provider : FLEX_DSPRM Status : UP
Number of Resource Configured : 128
Number of Resource Available : 128
Codec Configuration
Codec : g711ulaw, Maximum Packetization Period : 30
Codec : g711alaw, Maximum Packetization Period : 30
Codec : g729ar8, Maximum Packetization Period : 60
Codec : g729abr8, Maximum Packetization Period : 60
Codec : g729r8, Maximum Packetization Period : 60
Codec : g729br8, Maximum Packetization Period : 60
```

SLOT	DSP	VERSION	STATUS	CHNL	USE	TYPE	RSC_ID	BRIDGE_ID	PKTS_TXED	PKTS_RXED
1	1	9.2.1	UP	N/A	FREE	xcode	1	-	-	-
1	1	9.2.1	UP	N/A	FREE	xcode	1	-	-	-
1	1	9.2.1	UP	N/A	FREE	xcode	1	-	-	-

This output shows the status of the DSP resources (after a call is made).

```
vdouutl#show sccp connections summary
SCCP Application Service(s) Statistics Summary:
Total Conferencing Sessions: 0, Connections: 0
Total Transcoding Sessions: 1, Connections: 2
Total MTP Sessions: 0, Connections: 0
Total ALG-Phone Sessions: 0, Connections: 0
Total BRI-Phone Sessions: 0, Connections: 0
Total SCCP Sessions: 1, Connections: 2
```

```
vdouutl#show dspfarm dsp active
SLOT DSP VERSION STATUS CHNL USE TYPE RSC_ID BRIDGE_ID PKTS_TXED PKTS_RXED

1 1 9.2.1 UP 1 USED xcode 1 15 9400 9405
1 1 9.2.1 UP 1 USED xcode 1 16 9400 9394
```

Total number of DSPFARM DSP channel(s) 1

This output shows the RTP sessions between the DSP resources (this router) and the controlling entity (CUBE). Two VoIP call legs with different codecs are shown. The legs are both established with CUBE (1.2.61.73).

```
vdouutl#show voip rtp connections
VoIP RTP active connections :
No. CallId dstCallId LocalRTP RmtRTP LocalIP RemoteIP
1 46 47 17668 2000 1.2.61.71 1.2.61.73
2 48 47 21530 2000 1.2.61.71 1.2.61.73
Found 2 active RTP connections

vdouutl#show call active voice compact
<callID> A/O FAX T<sec> Codec type Peer Address IP R<ip>:<udp>
Total call-legs: 2
46 ORG T150 g711ulaw VOIP P 1.2.61.73:2000
48 ORG T150 g729r8 VOIP P 1.2.61.73:2000
```

# Troubleshoot

Here are some useful troubleshooting commands for transcoding:

- **debug sccp messages**
- **debug ephone mtp**
- **debug ephone state**

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

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