

Understanding the Clear Channel Codec Configuration in the Cisco PGW 2200

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Introduction

This document addresses some issues related to the use of the clear channel codec in Cisco voice gateways controlled by a Cisco public switched telephone network (PSTN) Gateway (PGW) 2200. To establish a call in a Signaling System (SS) 7 network, a PGW 2200 requires the voice gateways to use the clear channel codec to transparently transport the channels that require such handling. The decision to do so is made based on the bearer channel characteristics requested in the SS7 Initial Address Message (IAM). This is the first message to set up a call in an SS7 network.

Media Gateway Control Protocol (MGCP) supports the ability for the call agent to influence the codec negotiation by providing a Local Connection Option (LCO). The LCO limits the types of codecs proposed by the voice gateways. The LCO can be part of the ingress Create Connection (CRCX), or the egress CRCX MGCP messages.

Although not truly a compression algorithm, some Cisco gateways support clear channel data indication through the 'a' sub-parameter of the LCO. However, not all versions of all gateways use the same string to indicate this feature. Not all voice gateways support clear channel. See here for more details.

In this document, there is a brief description of the PGW behavior during a call in which clear channel is required.

If a call arrives and transfer capability is unrestricted, then:

- If `GWClearChannelAlgorithm` is equal to the default value of "null," the call is cleared with cause bearer capability not available.
- If `GWClearChannelAlgorithm` contains a codec string (and if the transfer rate is 32 or 64 K), the call continues. The CRCX sent to the GW from the PGW contains an LCO with the codec string(s) taken from the parameter `GWClearChannelAlgorithm`. The gateway then switches to this codec.

- If the PGW controls gateways that have different codec strings, these strings are listed (separated by semicolons) in GWClearChannelAlgorithm. The resulting MGCP LCO contains all of them.This allows the gateway to pick up the one it likes.

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

This configuration was developed and tested with these software and hardware versions:

- Cisco PGW 2200 Software Version 9.2.2
- Cisco AS5xx0 Universal Gateways Version 12.2(11)T
- Voice Interworking Service Module (VISM) 2.2
- Cisco MGX 8260 Media Gateway Software Version 1.2.2

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

For more information on document conventions, refer to the Cisco Technical Tips Conventions.

Background Information

Cisco PGW 2200

The Cisco PGW 2200 support for clear channel calls starts with software version 7.4.11.

A parameter in the /opt/CiscoMGC/etc/XEConfigParms.dat Cisco PGW 2200 environment configuration file controls the behavior.

```
GWClearChannelAlgorithm = <codec1>[; <codec2> &]
```

The format is a string of semicolon-separated clear channel codec strings.

Cisco AS5xx0 Universal Gateways

Clear channel codec support is introduced with version 12.2(11)T (G.Clear, GSMFR, and G.726 Codecs and Modem and Fax Passthrough).

The clear channel codec string is "G.nX64."

Voice Interworking Service Module (VISM)

Clear channel codec support is present in firmware version 2.0 and later.

The clear channel codec string is "G.nX64" in the VISM 2.0 firmware version.

The clear channel codec string changed to "CCD" in VISM firmware version 2.1.

In the current version, the string is configurable to match other gateways' strings (the default value is "CCD").

For more information, refer to VISM 3.0 CLI commands.

Cisco MGX 8260 Media Gateway

A Cisco MGX 8260 Media Gateway is used as a time-division multiplexing (TDM) unit. However, it requires that "PCMA" or "PCMU" be configured as the clear channel string to be able to TDM-switch any calls that trigger "clear channel" treatment in the PGW.

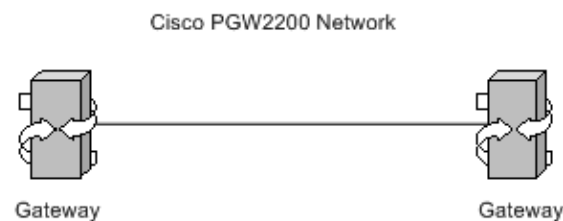
For more information, refer to the Cisco MGX 8260 Command Line Interface Guide.

Configure

Note: To find additional information on the commands used in this document, use the Command Lookup Tool (registered customers only).

Network Diagram

This document applies to any PGW 2200-controlled network. A generic setup is shown in this diagram:



Configurations

The examples show MGCP traces for clear channel call flows. The purpose of the trace is to give a working scenario template to aid troubleshooting. In all these examples, the PGW sends a clear channel codec LCO string with multiple codecs to accommodate gateways with different clear channel codec strings.

This is the clear channel configuration used in the PGW 2200:

```
mgcusr@mgc-bru-20% pwd
/opt/CiscoMGC/etc
mgcusr@mgc-bru-20% grep GWClearChannelAlgorithm XECfgParm.dat
*.GWClearChannelAlgorithm = G.Clear;CCD;G.nX64
mgcusr@mgc-bru-20%
```

The SS7 trace is shown to keep track of call status. To save length, the SS7 trace does not show the IAM detail. The key parameter is the presence of a 64 K unrestricted value in the transmission medium required information field:

```
TRANSMISSION MEDIUM REQUIRED 0x02
LENGTH: 0x01 FIXED DATA 0x02
TRANSMISSION MEDIUM REQUIRED 2 64_kbps_unrestricted
```

Two examples are shown here:

- VISM
- AS5400 and AS5300

Note: The trace output here represents an SS7 and MGCP trace for clear channel call setup. This involves PGW (IP address 10.48.84.20) and VISM with version 2.2 firmware (IP address 22.22.22.1). There is no special clear channel configuration on the VISM. The PGW SS7 point code (SS7 address) is 1.4.1.

```
VISM
7:16:15.270806 1-010-1[02129] 1-004-1[02081] ITU ISUP. -
> IAM (01) CIC=00118 CDPN=748158002F SLS=06 Pr:0 Ni:NTL

17:16:15.290560 10.48.84.20:2427 22.22.22.1:2427 MGCP..... -> CRCX
494 vism/e1-1/25@vism21-8850-3 MGCP 0.1
C: 25
L: e:off,a:G.Clear;CCD;G.nX64,s:off,e:off
M: inactive
R:
S:
X: 1ED

17:16:15.297165 22.22.22.1:2427 10.48.84.20:2427
MGCP..... -> 200 494 OK
I: 9e
v=0
o=- 0 0 IN IP4 22.22.22.1
s=-
c=IN IP4 22.22.22.1
t=0 0
m=audio 49466 RTP/AVP 102 103 104
a=rtpmap:102 CCD/8000
a=rtpmap:103 X-NSE/8000
a=rtpmap:104 X-cisco-rtp/8000
a=fmtp:103 0-15,192-198,200-202,204
a=fmtp:104 0-15

17:16:15.310887 10.48.84.20:2427 22.22.22.1:2427
MGCP..... -> CRCX 495 vism/e1-1/31@vism21-8850-3 MGCP
0.1
C: 25
L: e:off,a:G.Clear;CCD;G.nX64,s:off,e:off
M: sendrecv
v=0
o=- 0 0 IN IP4 22.22.22.1
s=- c=IN IP4 22.22.22.1 t=0 0
m=audio 49466 RTP/AVP 102 103 104
a=rtpmap:102 CCD/8000
a=rtpmap:103 X-NSE/8000
a=rtpmap:104 X-cisco-rtp/8000
a=fmtp:103 0-15,192-198,200-202,204
a=fmtp:104 0-15

17:16:15.327079 22.22.22.1:2427 10.48.84.20:2427
MGCP..... -> 200 495 OK
I: 9f
v=0
o=- 0 0 IN IP4 22.22.22.1
s=-
c=IN IP4 22.22.22.1
t=0 0
m=audio 49468 RTP/AVP 102 103
a=rtpmap:102 CCD/8000
```

```

a=rtpmap:103 X-NSE/8000
a=fmtp:103 0-15,192-198,200-202,204

17:16:15.340566 1-004-1[02081] 1-010-1[02129] ITU ISUP. -
> IAM (01) CIC=00124 CDPN=8158002F SLS=12 Pr:0 Ni:NTL

17:16:15.637277 1-010-1[02129] 1-004-1[02081] ITU ISUP. -
> ACM (06) CIC=00124 SLS=12 Pr:0 Ni:NTL

17:16:15.640714 1-010-1[02129] 1-004-1[02081] ITU ISUP. -
> CPG (2c) CIC=00124 SLS=12 Pr:0 Ni:NTL

17:16:15.643433 1-010-1[02129] 1-004-1[02081] ITU ISUP. -
> ANM (09) CIC=00124 SLS=12 Pr:0 Ni:NTL

17:16:15.651174 10.48.84.20:2427 22.22.22.1:2427
MGCP..... -> MDCX 497 vism/el-1/25@vism21-8850-3 MGCP
0.1
C: 25
I: 9e
L: e:off,a:G.Clear;CCD;G.nX64,s:off,e:off
M: sendrecv
R:
S:
X: 1F0
v=0
o=- 0 0 IN IP4 22.22.22.1
s=-
c=IN IP4 22.22.22.1
t=0 0
m=audio 49468 RTP/AVP 102 103
a=rtpmap:102 CCD/8000
a=rtpmap:103 X-NSE/8000
a=fmtp:103 0-15,192-198,200-202,204

17:16:15.666920 22.22.22.1:2427 10.48.84.20:2427
MGCP..... -> 200 497 OK
v=0
o=- 0 0 IN IP4 22.22.22.1
s=-
c=IN IP4 22.22.22.1
t=0 0
m=audio 49466 RTP/AVP 102 103
a=rtpmap:102 CCD/8000
a=rtpmap:103 X-NSE/8000
a=fmtp:103 0-15,192-198,200-202,204

17:16:15.680859 1-004-1[02081] 1-010-1[02129] ITU ISUP. -
> ACM (06) CIC=00118 SLS=06 Pr:0 Ni:NTL

17:16:15.681104 1-004-1[02081] 1-010-1[02129] ITU ISUP. -
> ANM (09) CIC=00118
SLS=06 Pr:0 Ni:NTL

```

Note: In the trace output here, the SS7 and MGCP trace for clear channel call setup involves PGW (IP address 10.48.84.20), AS5400 (IP address 10.48.84.10), and AS5300 (IP address 10.48.84.189). The PGW uses the same configuration as in the previous example. The AS5400 and AS5300 do not use any special MGCP configuration for clear channel codec.

AS5400 and AS5300

```

17:38:15.785997 1-010-1[02129] 1-004-1[02081] ITU ISUP. -
> IAM (01) CIC=00001 CDPN=728158002F SLS=01 Pr:0 Ni:NTL

```

```
17:38:15.800523 10.48.84.20:2427 :2427 MGCP..... -> CRCX
961 s0/ds1-0/1@v5300-4.cisco.com MGCP 0.1
C: 61
L: e:off,a:G.Clear;CCD;G.nX64,s:off,e:off
M: inactive
R:
S:
X: 3C0

17:38:16.400018 10.48.84.189:2427 10.48.84.20:2427
MGCP..... -> 200 961 OK
I: 2
v=0
o=- 2 0 IN IP4 10.48.84.189
s=Cisco SDP 0
c=IN IP4 10.48.84.189
t=0 0
m=audio 16814 RTP/AVP 125 125
a=rtpmap:125 G.nX64/8000
a=rtpmap:125 G.nX64/8000
a=X-sqn:0
a=X-cap: 1 image udptl t38

17:38:16.420429 10.48.84.20:2427 10.48.84.10:2427
MGCP..... -> CRCX 963 s7/ds1-0/31@v5400-3.cisco.com MGCP
0.1
C: 61
L: e:off,a:G.Clear;CCD;G.nX64,s:off,e:off
M: sendrecv
R:
S:
X: 3C2
v=0
o=- 2 0 IN IP4 10.48.84.189
s=Cisco SDP 0
c=IN IP4 10.48.84.189
t=0 0
m=audio 16814 RTP/AVP 125 125
a=rtpmap:125 G.nX64/8000
a=rtpmap:125 G.nX64/8000
a=X-sqn:0
a=X-cap: 1 image udptl t38

17:38:16.442958 10.48.84.10:2427 10.48.84.20:2427
MGCP..... -> 200 963 OK
I: 5F
v=0
o=- 95 0 IN IP4 10.48.84.10
s=Cisco SDP 0
c=IN IP4 10.48.84.10
t=0 0
m=audio 19114 RTP/AVP 125 98
a=rtpmap:125 G.nX64/8000
a=rtpmap:98 telephone-event/8000
a=fmtp:98 0-15

17:38:16.460455 1-004-1[02081] 1-010-1[02129] ITU ISUP. -
> IAM (01) CIC=00062 CDPN=8158002F SLS=14 Pr:0 Ni:NTL

17:38:16.753369 1-010-1[02129] 1-004-1[02081] ITU ISUP. -
> ACM (06) CIC=00062 SLS=14 Pr:0 Ni:NTL

17:38:16.755868 1-010-1[02129] 1-004-1[02081] ITU ISUP. -
> CPG (2c) CIC=00062 SLS=14 Pr:0 Ni:NTL

17:38:16.758480 1-010-1[02129] 1-004-1[02081] ITU ISUP. -
```

```

> ANM (09) CIC=00062 SLS=14 Pr:0 Ni:NTL

17:38:16.770600 10.48.84.20:2427 10.48.84.189:2427
MGCP..... -> MDCX 965 s0/ds1-0/1@v5300-4.cisco.com MGCP
0.1
C: 61
I: 2
L: e:off,a:G.Clear;CCD;G.nX64,s:off,e:off
M: sendrecv
R:
S:
X: 3C4
v=0
o=- 95 0 IN IP4 10.48.84.10
s=Cisco SDP 0
c=IN IP4 10.48.84.10
t=0 0
m=audio 19114 RTP/AVP 125 98
a=rtpmap:125 G.nX64/8000
a=rtpmap:98 telephone-event/8000
a=fmtp:98 0-15

17:38:16.779317 10.48.84.189:2427 10.48.84.20:2427
MGCP..... -> 200 965 OK
v=0
o=- 2 0 IN IP4 10.48.84.189
s=Cisco SDP 0
c=IN IP4 10.48.84.189
t=0 0
m=audio 16814 RTP/AVP 125 98
a=rtpmap:125 GnX64/8000
a=rtpmap:98 telephone-event/8000
a=fmtp:98 0-15
a=X-sqn:0
a=X-cap: 1 image udpt1 t38

17:38:16.801004 1-004-1[02081] 1-010-1[02129] ITU ISUP. -
> ACM (06) CIC=00001 SLS=01 Pr:0 Ni:NTL

17:38:16.801132 1-004-1[02081] 1-010-1[02129] ITU ISUP. -
> ANM (09) CIC=00001 SLS=01 Pr:0 Ni:NTL

```

Verify

There is currently no verification procedure available for this configuration.

Troubleshoot

Use this information to troubleshoot your configuration.

Troubleshoot Commands

Certain **show** commands are supported by the Output Interpreter Tool (registered customers only). This allows you to view an analysis of **show** command output.

This is a short selection of **debug** commands that help you to quickly find and resolve clear channel codec issues.

Note: Before you issue **debug** commands, refer to Important Information on Debug Commands.

VISM Connection Commands

- **dspxgcpcons** Displays a list of MGCP connections on a VISM card.
- **dspxgcpcon <conn_ID> 2** Displays the details about a specific connection (<conn_ID> comes from dspxgcpcons).
- **ccConnTablePrint** Displays a list of MGCP connections on a VISM card.
- **dspm_endpt_info <end_point_number>** Displays the details about a specific connection on an endpoint.
- **dspm_table** Displays the information about DSPs (codec, connections, upspeed, etc.).

AS5400/AS5350 Connection Commands

- **show mgcp connections** Displays the active MGCP–controlled connections.
- **show call voice active [brief]** Displays the contents of the active call table. It shows all of the calls currently connected through the router.
- **show spe voice active <slot/spe>** Displays Nextport SPE card voice call information.

AS5300 Connection Commands

- **show mgcp connections** Displays the active MGCP–controlled connections.
- **show call voice active [brief]** Displays the contents of the active call table. It shows all of the calls currently connected through the router.
- **test dsp** The DSP information command menu.

MGCP Traces for AS5xx

- **debug mgcp packet [<end_point_name>]** Gets the MGCP trace on a few endpoints to reduce the command output.

MGCP Traces for VISM (shellConn)

- **ccDbgPrint** Gets the current debug status.
- **ccDbgOn "DSPM",4,1** Enables DSP debug.
- **ccDbgOn "CC",4,1** Enables MGCP debug.
- **ccDbgOn "CC",1,0** Disables MGCP debug.
- **ccDbgOn "DSPM",1,0** Disables DSP debug.

Other Useful Tools

- **External LAN sniffer** An external analyzer. It is used to collect large quantities of data.
- **Snooper** Cisco trace tool for UNIX.

Related Information

- **Voice Technology Support**
 - **Voice and Unified Communications Product Support**
 - **Recommended Reading: Troubleshooting Cisco IP Telephony**
 - **Technical Support – Cisco Systems**
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