

Cisco PGW 2200 Echo Control Description

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Introduction

Most current switches and trunks are four-wire, and the loops are two-wire. If the impedance match at the four-wire to two-wire conversion point is not perfect, some of the transmitted energy reflects back to the receiver path. The transmission delay path becomes critical. When it is great enough, the users hear an echo of their voice. In other words, reflections that occur at the far end of the connection are not eliminated if the round-trip transit delay is greater than the echo-canceller memory. With the introduction of Voice over IP (VoIP), the data network adds to the transmission delay. In most configurations, the network deploys echo cancellors at all Public Switched Telephone Network (PSTN) interfaces. Echo Control Devices (ECDs) controlled by the logic described in International Telecommunication Union Telecommunication Standardization Sector (ITU-T) Recommendation Q.115 are designed to eliminate the echo of a voice or audio signal.

This document describes the basic items for the Cisco PGW 2200 in the way Media Gateway Control Protocol (MGCP) packets are sent to the gateway. The technique used in these ECDs to eliminate the echo is beyond the scope of this document.

Before You Begin

Requirements

Readers of this document should be knowledgeable of the following:

- MGCP Reference – RFC 2705
- Enhanced ITU-T G.168 Echo Cancellation
- The Appendix A Components, Processes, and Properties section of the Cisco Media Gateway Controller Software Release 9 Provisioning Guide (Refer to the `EchoCanRequired` parameter name.)
- Echo Analysis for Voice over IP

Components Used

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

- Cisco PGW 2200 Software Release 9.x and later

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, see the Cisco Technical Tips Conventions.

PGW 2200 Echo Control

The MGCP organizes the communication between a PGW 2200 (Call Agent [CA]) and a media gateway (AS5xxx) (such as a VoIP gateway or a Network Access Server [NAS]). This document explains how the two options (L:e on, L:e off) in the MGCP message work.

Based on the image in Call Flow, below, when the PGW 2200 (or CA1 in the image) receives an Initial Address Message (IAM), the PGW 2200 (or CA1) immediately sends a Create Connection (CRCX) request to the trunking gateway to connect to the incoming trunk. The CRCX is built up as shown in the following example:

```
MGCP..... -> CRCX 1981 s6/dsl-1/31@trunkgw1 MGCP 0.1
                C: EA
                L: e:on
                M: inactive
                R:
                S:
                X: 7BC
```

The PGW 2200 only sets echo control to "on" on the originating side of MGCP calls through the CRCX connection and the L: e:on. However, it is necessary for some calls to turn off these operations. The echo cancellation (ECAN) parameter e: can have two values: on (when the ECAN is requested) and off (when it is turned off).

The terminating side has L: e:off (echo off) in the MGCP CRCX. Because the switch thinks that it is not the latest switch (or the end switch) in the network, it turns the echo off, since echo happens at the end points nearest to the phone.

In determining the echo suppressor field, the most important part of an IAM Signaling System 7 (SS7) message is Echo Suppressor Ind. The following is an example of an IAM SS7 message:

```
*****Part of an IAM SS7 MESSAGE *****
CIC                               1
MESSAGE TYPE                       0x01 IAM - Initial_Address_Msg
NATURE_OF_CONNECTION               0x06
LENGTH:                            0x01 FIXED DATA 0x00
SATELLITE IND                      0 no_satellite_circuit_in_connection
CONTINUITY CHECK IND                0 Continuity_check_not_required
ECHO SUPPRESSOR IND                 0 outgoing_half_echo_suppressor_not_included
```

OR

```
1 outgoing_half_echo_suppressor_included
```

The ECD Bit = 0 or 1 in Scenario 1, below, is the ECD bit in the Nature Of Connection parameter and in the Backward Call Indicators parameter of the Address Complete Message (ACM) SS7 message.

In the IAM or ACM , the ECD bit is linked to:

- ECD=0 There is no ECAN on this leg, so it needs to be enabled.
- ECD=1 ECAN is already on this leg, so it does not need to be enabled.

For a generic network architecture on the PGW 2200 switched solution, you can change the EchoCanRequired parameter to match the requirement of the command below.

The command to enable ECAN for a trunk group is the following:

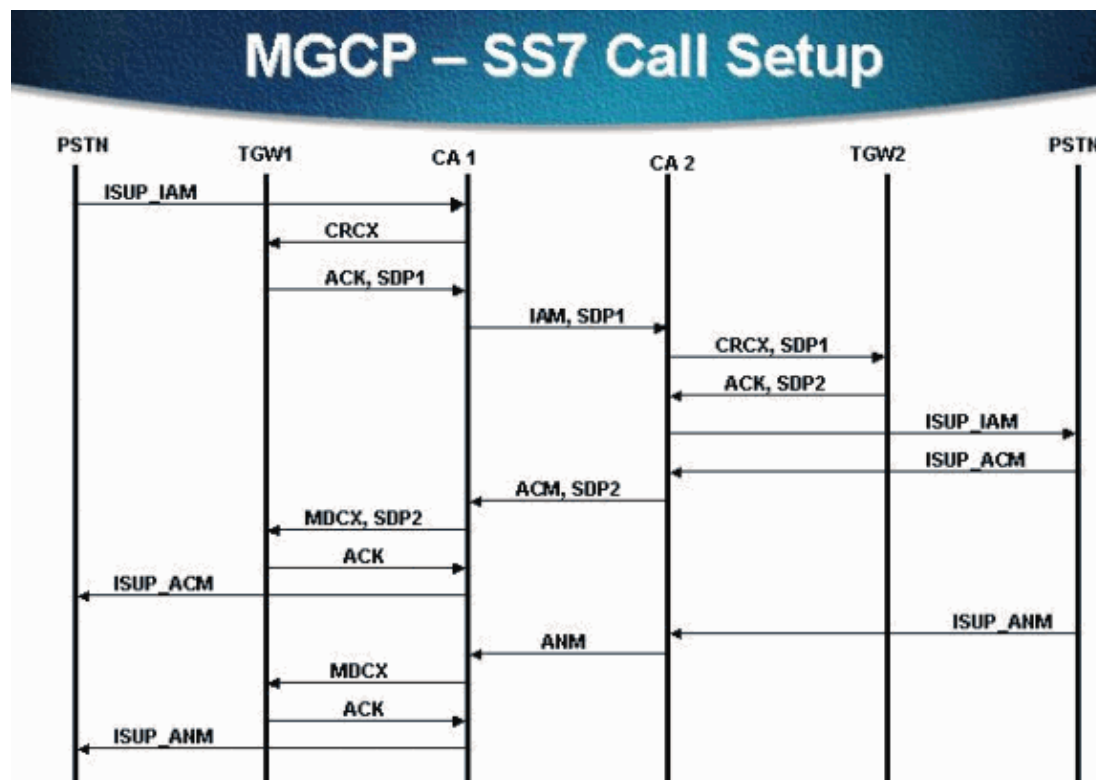
prov-add:trnkgprpprop:name=trunk_name,EchoCanRequired="1".

Note: In a SS7 terminated call, after in answer state. If the CPG with BCI is received from SS7 side and "EchoCanRequired=1" set on trunkgroup or sigpath, a MDCX is sent to GW to enable/disable the echo control. This is the behavior:

EchoCanRequired=1

1. if echo device in BCI =0, MDCX will sent down with e: on
 2. if echo device in BCI =1, MDCX will sent down with e: off
- EchoCanRequired=0
no MDCX will be sent down for echo control.

Call Flow



Note: This is a general call flow model of an MGCP call–setup situation. There is an Extended–ISDN User Part (E–ISUP) link between CA1 (PGW) and CA2 (PGW).

For an incoming IAM message with the ECD bit set to 0, the PGWA sends a CRCX [e : on] to Trunking Gateway A (TGWA). By E–ISUP, which has ECD equal to 1, the details are forwarded to PGWB . The second row of Scenario 1, below, shows how the ACM forwards the details to PGWA.

Scenario 1

IAM (ECD Bit=0) ----> PGWA [CA1] --> [EISUP] IAM (ECD Bit=1) --> PGWB [CA2] ----> IAM (ECD Bit=1)		
[TGW1] CRCX(e:on)		[TGW2]CRCX(e:off)
ACM (ECD Bit=1) <---- PGWA[CA1] <-- [EISUP] ACM (ECD Bit=1) -- PGWB[CA2] <---- ACM (ECD Bit=0)		
[TGW1]MDCX(e:off)		[TGW2]MDCX(e:on)

Note: Since neither switch has ECD (the bit equals "0" in IAM and ACM), both gateways must have ECAN on.

Scenario 2

In this scenario, the public SS7 switches at both ends are equipped with ECD. If the ACM message Echo control device indicator is set (Bit=1), the PGW does not send the modify with "echo off". PGWA should not send a Modify Connection (MDCX) (e:off) on ACM to the near-end gateway; otherwise, the far-end user hears an echo.

IAM (ECD Bit=1) ----> PGW2200-A --> [EISUP] IAM (ECD Bit=1) --> PGW2200-B ----> IAM (ECD Bit=1)	CRCX(e:off)	CRCX(e:off)
ACM (ECD Bit=1) <---- PGW2200-A <-- [EISUP] ACM (ECD Bit=1) <-- PGW2200-B <---- ACM (ECD Bit=1)	MDCX	MDCX

Scenario 3

In this scenario, the near-end switch is equipped with ECD, but the far-end switch is not.

IAM (ECD Bit=1) ----> PGW2200-A --> [EISUP] IAM (ECD Bit=1) --> PGW2200-B ----> IAM (ECD Bit=1)	CRCX(e:off)	CRCX(e:off)
ACM (ECD Bit=1) <---- PGW2200-A <-- [EISUP] ACM (ECD Bit=1) <-- PGW2200-B <---- ACM (ECD Bit=0)	MDCX	MDCX(e:on)

Scenario 4

In this scenario, the near-end switch is not equipped with ECD, but the far-end switch is.

IAM (ECD Bit=0) ----> PGW2200-A --> [EISUP] IAM (ECD Bit=1) --> PGW2200-B ----> IAM (ECD Bit=1)	CRCX(e:on)	CRCX(e:off)
ACM (ECD Bit=1) <---- PGW2200-A <-- [EISUP] ACM (ECD Bit=1) <-- PGW2200-B <---- ACM (ECD Bit=1)	MDCX	MDCX

Related Information

- [Cisco PGW 2200 Softswitch Tech Notes](#)
 - [Cisco PGW 2200 Softswitch Configuration Examples](#)
 - [Voice Technology Support](#)
 - [Voice and Unified Communications Product Support](#)
 - [Recommended Reading: Troubleshooting Cisco IP Telephony](#)
 - [Technical Support & Documentation – Cisco Systems](#)
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