Troubleshooting No Ringback Tone on ISDN−VoIP (H.323) Calls

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Introduction

This document addresses call progress in−band related issues when interworking ISDN and H.323 signaling between VoIP and Public Switched Telephone Network (PSTN) networks. Challenges arise when Cisco VoIP router/gateways exchange signaling capabilities with the Telco switch.

Prerequisites

Requirements

The knowledge of H.323 and Cisco CallManager configuration is required in order to understand this document.

Components Used

This document uses Cisco CallManager and Cisco IOS® voice gateways for the solution of the problem discussed in this document.

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.

Problem Description

This document addresses call progress in−band related issues when interworking ISDN and H.323 signaling between VoIP and PSTN networks. Challenges arise when Cisco VoIP router/gateways exchange signaling capabilities with the Telco switch. This list describes common problem scenarios/symptoms:

- No Ringback Tone on VoIP Toll−Bypass Calls

  Symptom: A plain old telephone service (POTS) (PSTN/PBX) user places a call through Cisco router/gateways and does not hear a ringback tone before the call is answered.
- No Ringback Tone on VoIP Inbound Calls to Cisco CallManager (or Third Party VoIP Devices) through Cisco IOS Gateway

  Symptom: A POTS (PSTN/PBX) user places a call to an IP phone through a Cisco router/gateway and does not hear a ringback tone before the call is answered.
- No Ringback Tone on VoIP Outbound Calls from Cisco CallManager (or Third Party VoIP Devices) through Cisco IOS Gateway

  Symptom: A user places a call from an IP phone or third party device to an outside number through a Cisco router/gateway and does not hear a ringback tone.
- No Ringback Tone to PSTN (Cisco CallManager)

  Symptom: When calls come from the PSTN through Cisco CallManager, the caller does not hear a ringback tone. If the call is answered, both parties are able to hear each other, or the caller is able to hear Voice Mail prompts.
- No Ringback Tone to PSTN When IP phone Initiates a Call Transfer (Cisco CallManager 3.0 or Cisco Unity Voice Mail)

  Symptom: An inbound call from a Cisco gateway/router to Cisco CallManager or Cisco Unity Voice Mail that is transferred after the call is answered does not hear a ringback.
- No Ringback Tone for Calls from Cisco CallManager to Cisco CallManager Express

  Symptom: When a user dials from an IP phone registered to Cisco CallManager that is destined to an IP phone registered with Cisco CallManager Express, the ringback is not heard. This occurs even though the receiving phone rings and the call is completed.

Refer to Troubleshooting No Busy Tone and No Announcement Messages on ISDN−VoIP (H.323) Calls for more information on ISDN − VoIP (H.323) call progress in−band related issues.

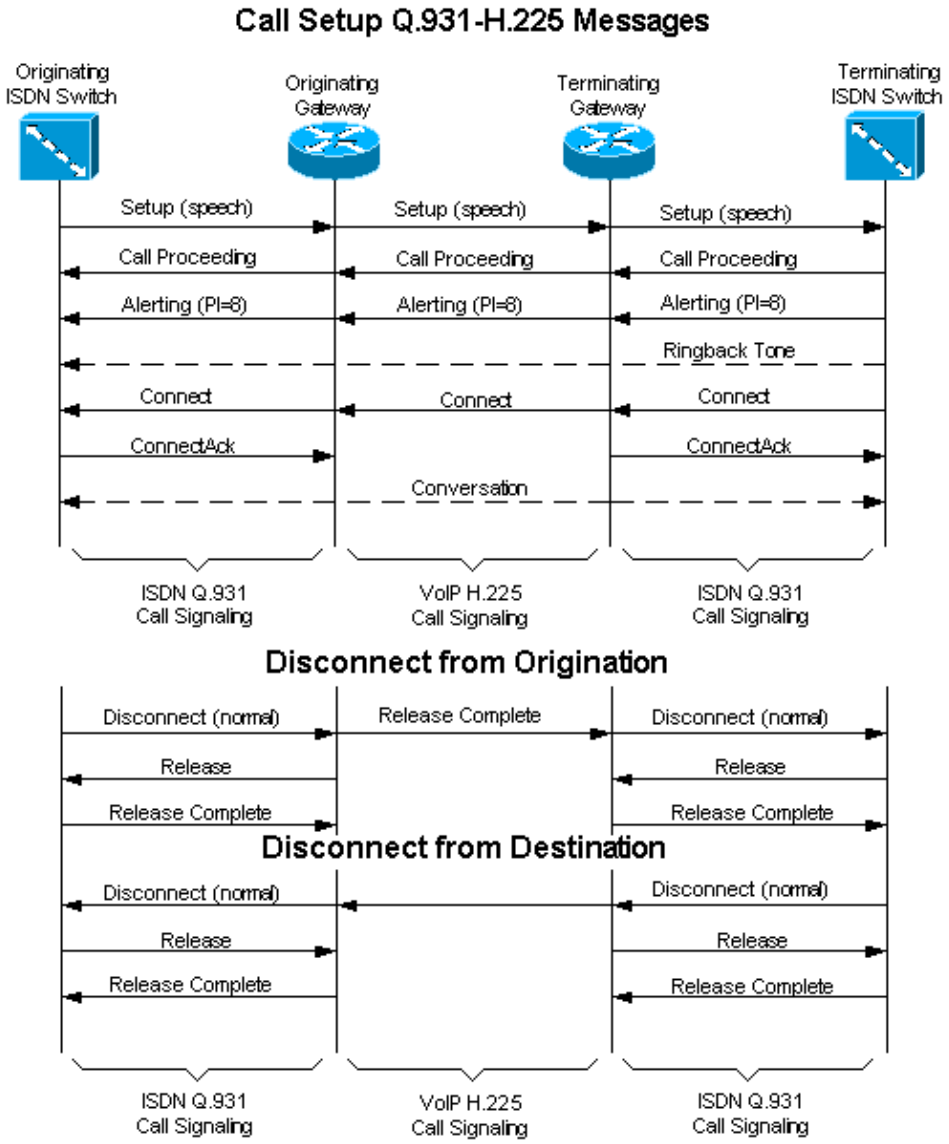
Note: Cisco recommends that you read the Background Information section before you read the Solutions section.

Background Information

ISDN−VoIP Interworking

Interworking is defined as the mapping of call signaling messages between two different protocol suites. This document focuses on ISDN and H.323 (VoIP) interworking issues. This diagram displays the call signaling messages in the ISDN (Q.931) and VoIP (H.225) call leg.

Note: H.225 is a protocol specified by H.323 for call signaling and call setup. H.225 specifies the use and support of Q.931. Refer to the H.323 Tutorial for more information on H.323.



Progress Tones and Progress Indicators

In−band progress tones, such as ringback and busy tones, and announcements, such as "The number you have dialed is no longer in service," are required to successfully signal voice calls. Progress tones are generated by the originating, terminating, or intermediate devices.

The indication of in−band tones and announcements is controlled by the Progress Indicator (PI) information element (IE) in ISDN and H.323 networks. The Progress Indicator signals those interworking situations where

in−band tones and announcements must be used. In the context of this document, these are the ITU Q.931 Progress Indicator values of interest:

- **Progress indicator = 1** Call is not end−end ISDN. Further call progress information can possibly be available in−band.
- **Progress indicator = 2** Destination address is non−ISDN.
- **Progress indicator = 3** Origination address is non−ISDN.
- **Progress indicator = 8** In−band information or an appropriate pattern is now available.

The indication that tones and announcements are available is signaled by an Alerting, Call Proceeding, Progress, Connect, Setup Ack or Disconnect message that contains a Progress Indicator equal to 1 or 8.

When a Setup message arrives at the originating gateway with a PI equal to 3, it means that the switch informs the gateway that in−band messages are expected.

Note: The lack of a PI in a message assumes that the originating device provides the appropriate tone signaling to the calling party. On the gateway, if you have configured to cut through voice and to send ringback tone, and you still do not hear the ringback tone, it is possibly an issue with the service provider PBX configuration.

Note: Analog and digital channel associated signaling (CAS) PSTN circuits usually carry the information as in−band information.

Voice Path Cut−through

Voice path cut−through is the completion of the bearer transmission path of a voice call. In a voice call, cut−through occurs in two stages:

- **Cut−through in the Backward Direction** This means that only the voice path from the called party to the calling party is complete.
- **Cut−through in Both Directions** This means that the voice path between the called and calling party is complete.

Tones and announcements can be generated either at the origination switch or the destination switch. If tones and announcements are generated by the destination switch, the voice transmission path in the backward direction, from the destination switch to the calling party, must be cut−through prior to the time that the tones and announcements are generated. Early cut−through of the backward bearer path (before the Connect message) is needed to transport in−band tones and announcements from called party to the calling party and to avoid speech clipping.

The call terminating Cisco router/gateway cuts through the audio path in the backward direction in order to transmit in−band information when the terminating ISDN switch sends to it these messages:

- Alert message with PI equal to 1 or PI equal to 8.
- Progress message with PI equal to 1 or PI equal to 8.
- Call Proceeding message with PI equal to 1 or PI equal to 8.
- Setup Ack message with PI equal to 1 or PI equal to 8.
- Disconnect message with PI equal to 1 or PI equal to 8.

Note: On terminating CAS interfaces, the Cisco router/gateway cuts through the audio in the backward direction once all the called number digits are sent.

The terminating Cisco router/gateway cuts through the audio path in both directions in these cases:

- Connect message is received on an ISDN interface.
- Answer supervision (off−hook) is received on a CAS interface.

Cut−through in both directions can be set on the gateways through the use of the **voice rtp send−recv** Cisco IOS global configuration command.

Solutions

In Cisco IOS Software Releases 12.1(3)XI1 and 12.1(5)T, Progress Indication is changed to provide better interworking between POTS and VoIP interfaces. This is mainly achieved through enabling and propagating end−to−end Progress Indication values that defines progress indication tone generation.

The usage of these commands assumes that you run Cisco IOS Software Release 12.1(3a)XI5 or 12.2(1) and later. Refer to Interworking Signaling Enhancements for H.323 and SIP VoIP and Cisco IOS Voice, Video, and Fax Command Reference, Release 12.2 for more information.

No Ringback Tone on VoIP Toll−Bypass Calls

Symptom

A POTS (PSTN/PBX) user places a call through Cisco router/gateways and does not hear a ringback tone before the call is answered.

Problem Description

In this scenario, the call terminating switch sends the ringback tone. It signals a PI=8 to the terminating Cisco router/gateway. The PI information is then forwarded to the originating gateway through an H.225 Progress message. The originating gateway is unable to decode the Progress message. It does not cut through the backward audio path to permit the transmission of the ringback tones. Some common scenarios are:

- A terminating gateway/router runs Cisco IOS Software Release 12.1(3)XI /12.1(5)T or later with an originating gateway that runs Cisco IOS Software Release 12.1T. The originating gateway does not understand the H.225 Progress message. It does not cut−through the audio path until the Connect message is received.
- A terminating Cisco gateway/router is connected to a CAS or analog interface. It sends the PI information in an H.225 Progress message to the originating gateway. The originating gateway/router is unable to decode the H.225 Progress message.
- The third party originating gateways and gatekeepers do not properly parse H.225 Progress messages.
- The ISDN switch sends back an in−band ringback, but the Alert message does not contain a PI.

Solutions

Try any of these solutions:

1. Configure the **voice call send−alert** Cisco IOS global configuration command in the terminating gateway/router.

   This command enables the terminating gateway to send an alert message instead of a progress message after it receives a call setup.

   Refer to Cisco IOS Voice, Video, and Fax Command Reference, Release 12.2 for more information on this command.
2. Upgrade the Cisco IOS Software on the originating gateway/router to Cisco IOS Software Release

12.1(3a)XI/12.1(5)T or later.

3. If the previous solution does not work, configure the terminating gateway to send a PI = 8 in the Alert message by configuring the **progress_ind alert enable 8** command under the **voice dial−peer # pots** configuration.

   This command overrides the PI value received in the ISDN alert message. It causes the router to cut through the audio path back towards the calling party prior to connect.

   Refer to Cisco IOS Voice, Video, and Fax Command Reference, Release 12.2 for more information on this command.

   Note: The **progress_ind alert** and **progress_ind setup** commands are hidden in some versions of Cisco IOS Software and can potentially not be visible within the help parser. However, if the **progress_ind progress** command is available in the help parser, these commands are also available and can be entered into the dial peer in their entirety. These commands subsequently appear in the running configuration.

No Ringback Tone on VoIP Inbound Calls to Cisco CallManager (or Third Party VoIP Devices) through Cisco IOS Gateway

Symptom

The POTS (PSTN/PBX) user places a call to an IP phone through a Cisco router/gateway and does not hear a ringback tone before the call is answered.

Problem Description

This is commonly caused when the inbound call does not come in to the Cisco gateway/ router with a PI=3. ISDN switches send the PI=3 in the Setup message to inform the gateway that the originating call is non−ISDN and in−band messages are expected. This scenario is also described in PSTN Callers not Hearing any Ring Back When they Call IP Phones.

Solutions

Complete one of these solutions:

1. Configure the **progress_ind setup enable 3** Cisco IOS command under the **voice dial−peer #** VoIP configuration in the Cisco gateway/router.

   This command forces the gateway/router to treat the inbound ISDN Setup message as if it came in with a PI equal to 3 and to generate an in−band ringback tone towards the calling party if the H.225 Alert message does not contain a PI of 1, 2 or 8.

   Refer to Cisco IOS Voice, Video, and Fax Command Reference, Release 12.2 for more information on this command.

   Note: The **progress_ind alert** and the **progress_ind setup** commands are hidden in some versions of Cisco IOS Software and are not visible within the help parser. However, if the **progress_ind progress** command is available in the help parser, these commands are also available and are entered into the dial peer in their entirety. These commands subsequently appear in the running configuration.
2. An alternate to the **progress_ind setup** command is the **dial−peer voice # voip** subcommand **tone ringback alert−no−pi** .

This causes the gateway to generate ringback towards the calling party if an alert is received on the IP call leg with no PI present. It differs from the **progress_ind setup** command in that the outbound H.225 setup message does not contain a PI of 3 with the **tone ringback** command. It is possible that some devices do not accept setup messages when a PI is included.

No Ringback Tone on VoIP Outbound Calls from Cisco CallManager (or Third Party Device) through Cisco IOS Gateway

Symptom

A user makes an outbound call from an IP phone to PSTN through an Cisco IOS gateway/router and does not hear a ringback tone.

Problem Description

In this situation, the originating device expects in−band ringback tones. Instead, either of these can possibly happen:

- The PSTN/switch does not provide the ringback tone.
- The Cisco IOS router/gateway does not cut through the audio to the originating device.

If the PSTN provides in−band ringback, and the Q.931 alert message does not provide a PI that indicates that there is in−band information, the gateway does not cut through the audio until the call is connected.

Solutions

Complete one of these solutions:

1. Ringback tones must come from the PSTN for trunk circuits in this situation. There are two dial−peer subcommands which can help. On the Cisco IOS router/gateway under the outgoing **voice dial−peer # pots**, configure these commands: .

   ```
   progress_ind alert enable 8
   progress_ind progress enable 8
   progress_ind connect enable 8
   ```

   The **progress_ind alert enable 8** command presents the Q.931 alert message to the software on the router/gateway as if the alert message had a PI of 8 and cut through the audio path. Refer to Configuring Progress Indicator in H.323 POTS Dial Peers for more information.

   Note: The **progress_ind alert** and **progress_ind setup** commands are hidden in some versions of Cisco IOS Software and can potentially not be visible within the help parser. However, if the **progress_ind progress** command is available in the help parser, these commands are also available and can be entered into the dial peer in their entirety. These commands subsequently appear in the running configuration.
2. If the previous command does not solve the problem, in Cisco IOS Software Releases from 12.2(1) to 12.2(2)T and later, configure the **progress_ind setup enable 3** command under the **voice dial−peer # pot** configuration.

   This command causes the gateway to send a PI with a value of 3 in the ISDN Setup message. This indicates to the PSTN/PBX that the originating device is a non−ISDN device and in−band information needs to be presented. It is recommended that this command be used in conjunction with the **progress_ind alert enable 8** command.

3. If the PSTN device is not able to generate ringback in−band (for example an ISDN phone directly connected to a BRI port on the gateway), the gateway can be configured to generate ringback on the IP call leg by configuring the **tone ringback alert−no−pi** command on the **dial−peer voice # pots**.

   When the ISDN alert is received with no PI present, the gateway generates the ringback in and includes a PI=0x8 in the H.225 alert message.

No Ringback to PSTN (Cisco CallManager)

Symptom

When calls come from the PSTN through Cisco CallManager, the caller does not hear a ringback tone. If the call is answered, both parties are able to hear each other or the caller is able to hear Voice Mail prompts.

Solution

In order to resolve this issue, set the Disable Alerting Progress Indicator service parameter to **False** in Cisco CallManager. This can be done when you log into the Cisco CallManager Admin page and complete these steps:

1. Go to the **Service** menu and select **Service Parameters** from the Cisco CallManager Administration page.
2. Choose the **Publisher CallManager Server** and **Cisco CallManager** service.
3. Scroll down to **Disable Alerting Progress Indicator** from the Clusterwide Parameters (Device − PRI and MGCP Gateway) section. Set this parameter to **False** and click **Update**.

No Ringback to PSTN when IP Phones Initiate a Call Transfer (Cisco CallManager 3.0 or Cisco Unity Voice Mail)

Symptom

When a call to an IP phone is answered and then transferred, the caller does not hear a ringback. When the transferred call is answered, both parties are able to hear each other.

Problem Description

From the perspective of the Cisco IOS gateway/router, the call is completed once the call is answered by an IP phone (through Cisco CallManager) or Cisco Unity Voice Mail system. Any further progress tones (in case of a call transfer) need to be generated by the terminating device. However, Cisco CallManager and Cisco Unity cannot generate the in−band progress tones.

Solutions

In order to solve this problem, either complete the steps outlined here, or configure the Cisco IOS gateway/router as an MGCP gateway instead of an H.323 gateway.

ToSend H.225 User Info Message: This parameter specifies whether Cisco CallManager sends an H.225 user information message or an H.225 information message.

1. First you must have Cisco CallManager 3.0 (8) or later.
2. From the Cisco CallManager Administration page (**http://<Your Cisco CallManager name or IP address>/ccmadmin/**), go to the Service menu. Select **Service Parameters**.
3. Perform these steps to each active Cisco CallManager server:

- In the Configured Services box, choose **Cisco CallManager**.
- In the Parameter drop−down list box, choose **ToSendH225UserInfoMsg**.
- Set the Value drop−down list box to **T** for true.
- Upgrade the router/gateway to Cisco IOS Software Release 12.2 (2.4) or later.

This problem is documented in Cisco bug ID CSCds11354 (registered customers only) .

Note: These fixes are valid for ringback tones, but not for other progress tones, such as busy signal.

Note: Some changes that are made in the options available for ToSendH225UserInfoMsg in the later releases of Cisco CallManager 3.3 and 4.0 are listed in the next section.

ToSendH225UserInfoMsg in Cisco CallManager 3.3

Cisco CallManager 3.3 has these options:

No Ring Back H.225 user information message or H.225 information message does not get sent to Cisco IOS gateway to play ringback tone.

User Info for Ring Back Tone Sends H.225 user information message to Cisco IOS gateway to play ringback tone.

H.225 Info for Ring Back H.225 information message gets sent to Cisco IOS gateway to play ringback tone.

Note: Cisco CallManager version 3.1 does not have the support for the H.225 Information message. Choose the **User Info for Ring Back Tone** option if you use inter−cluster trunks and any of the clusters run Cisco CallManager version 3.1 or earlier. However, if all of the clusters run Cisco CallManager 3.2(2a) or a later release, choose the **H225 Info for Ring Back** option. **Default: User Info for Ring Back Tone**.

ToSendH225UserInfoMsg in Cisco CallManager 4.0

Cisco CallManager 4.0 has these options:

In Cisco CallManager 4.0, this parameter specifies which message Cisco CallManager sends for the ringback tone or tone on hold.

Use ANN for Ring Back Uses Cisco Signaling Connection Control Part (SCCP) Annunciator to play a ringback tone (available in Cisco CallManager release 4.0 and later).

User Info for Call Progress Tone Sends an H.225 user information message to the Cisco IOS gateway to a play ringback tone or a tone on hold (this is the default).

H.225 Info for Call Progress Tone Sends an H.225 information message to the Cisco IOS gateway to a play ringback tone or tone on hold.

No Ringback Tone for Calls from Cisco CallManager to Cisco CallManager Express

Symptom

When a user dials from an IP phone registered to Cisco CallManager that is destined to an IP phone registered with Cisco CallManager Express, the ringback is not heard. This occurs even though the receiving phone rings and the call is completed.

Solution

In order to solve this issue, add these commands in the VoIP dial−peer that points towards the Cisco CallManager from the Cisco CallManager Express:

1. Add the **incoming called−number** command under the VoIP dial−peer that points to the Cisco CallManager.
2. Add the **delay transport−address** command, which forces the IP phone to create a ringback tone under the same dial−peer.

   Note: This command can be hidden in some versions of Cisco IOS.

   Refer to Enabling Interworking with Cisco CallManager for more information.

Related Information

- **Troubleshooting No Busy Tone and No Announcement Messages on ISDN−VoIP (H.323) Calls**
- **Voice Technology Support**
- **Voice and Unified Communications Product Support**
- **Troubleshooting Cisco IP Telephony**
- **Technical Support & Documentation − Cisco Systems**

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