

Technical Bulletin 16249

Troubleshooting Audio and Echo Issues on SoundPoint® IP Phones



This technical bulletin provides a series of recommendations to troubleshoot certain audio and echo issues.

This information applies to SoundPoint IP phones running SIP application version 2.0.1 or later. This technical bulletin is up-to-date for SIP application version 3.1.1.

Symptoms

Users of SoundPoint IP phones experience echo issues. The echo is most noticeable when making calls to a party located outside your organization's network when a gateway is part of the overall connection.

Possible issues include:

- **Echo on external calls through a gateway.** The user, calling an outside number through a gateway, may hear echo on all terminations (handset, headset, handsfree) that persists during the call.
- **Internal calls (no gateway), handsfree echo.** User "A" talks to user "B", where "B" is using a SoundPoint IP phone in handsfree mode. User "A" may hear echo at the start of a call that trains away, but it can recur during the call.
- **Internal calls (no gateway), handset/headset to handset/headset echo.** For handset/headset to handset/headset calls, echo is heard if both users have the volume set very high.

Causes

On SoundPoint IP phones, certain audio and echo issues can be traced back to different sources:

- **Gateways.** Incorrect settings for CISCO's echo canceller and certain CISCO gateways configured with "CISCO Trust" enabled (sends messages that are only relevant to a CISCO phone) may lead to echo issues for SoundPoint IP phones. Handsfree echo is due to the adaptive echo canceller taking a few seconds to train.

The echo heard during gateway calls is the result of the line echo canceller in the gateway failing to adequately cancel echo generated by analog 4-wire to 2-wire converters or acoustic coupling in the equipment on the PSTN side of the gateway.

- **Incorrect Configuration Files.** A mismatch between application version and configuration files can lead to numerous audio problems including echo, static, and ‘squeal’ if the DSP code and/or audio gains have changed. There are also configuration parameters for acoustic echo cancellation and suppression.
- **Environmental.** Low-level background noise – for example, a server or music from PC speakers – can cause echo and/or distortion in speakerphone audio, as can something as simple as shuffling a pile of papers too closely to the phone.
- **Hardware.** In rare cases, a hardware issue can cause echo, for example, acoustic, mechanical or electrical coupling.
- **User.** If users turn up the volume on the phone to the maximum level, they will experience echo issues.
- **Room Acoustics.** Large rooms or rooms with a great quantity of glass or metal can cause echo issues.

Resolutions

The phones are designed for use under ‘normal’ circumstances – for example, the handset used a reasonable distance from the user’s mouth and speaking at a ‘normal’ volume into the speakerphone at a ‘normal’ distance from the microphone. Excessive variations in these conditions can cause echo or garbled audio.

Packet captures can be used to identify the echo source. Taking captures right at the phone at each end of the conversation, and on either side of the gateway will go a long way to narrowing down the element causing the echo. For example, if the far end complains of echo, but the near end phone audio is clear, the problem is almost certainly network-related.

Another troubleshooting method would be to place an IP-to-IP call between two phones that are experiencing echo – if the echo persists, then there is likely a configuration (or possibly hardware) issue in one or both phones. If the echo goes away, that is another indicator that the echo is likely being caused by the network and you have no control over it.

The recommended solutions include:

1. Upgrade Software

Upgrade your SoundPoint IP phones to the latest SIP application. Refer to the VoIP SIP Software Release matrix on the Polycom Customer Support web site at

http://downloads.polycom.com/voice/voip/sip_sw_releases_matrix.html.

Ensure you are using the default configuration files, especially the default audio parameters.

2. Reduce Tx Signal Level

For handset issues:

- In the **sip.cfg** configuration file, reduce the value of `voice.gain.tx.analog.handset` by 6. As of SIP 3.0, `voice.gain.tx.analog.handset` is set to 6.

For headset issues:

- In the **sip.cfg** configuration file, reduce the value of `voice.gain.tx.analog.headset` by 3. As of SIP 3.0, `voice.gain.tx.analog.headset` is set to 3.

Note

There is a side effect to reducing the Tx signal level. The loudness of the Tx signal is reduced by 6dB and phone users may sound 'quiet' to the parties that are talking with at the far end.

3. Enable Echo Cancellation

For handset issues:

- In the **sip.cfg** configuration file, set `voice.aec.hs.enable` and `voice.aes.hs.enable` to 1.

For headset issues:

- In the **sip.cfg** configuration file, set `voice.aec.hd.enable` and `voice.aes.hd.enable` to 1.

4. Gateway Settings

There is a default CISCO gateway setting, "echo canceller coverage".

The default setting for this parameter is 64ms. In some cases, it may have been modified (as low as 24ms) for performance-related reasons. Polycom recommends that "echo canceller coverage" be set to 64ms when SoundPoint IP phones are in use. For information about your specific CISCO gateway, refer to your gateway documentation or contact your CISCO vendor.

Note

CISCO phones do not have the same echo problems at lower settings, because the CISCO handset transmit level is several dB lower than for Polycom phones.

Different tuning parameters (for example, non-linear processor enabled or disabled, and impedance) may be required. The software running on the gateway may need to be upgraded.

SLR (Send Loudness Rating)

Handset: The TIA 810 standard specifies an SLR of 8 +/- 4.

Handsfree: The TIA 810 standard specifies an SLR of 13 +/- 4.

The handsfree echo has been reduced as much as possible by tuning the parameters that are sent to the DSP code running in the SoundPoint IP phones.

Status

Polycom recommends that any configuration changes noted in the previous section be made.

Trademark Information

Polycom®, SoundPoint®, SoundStation®, and the Polycom logo design are registered trademarks of Polycom, Inc. in the U.S. and various countries. All other trademarks are the property of their respective companies.