



Echo Cancellation for VoIP Service Providers

Ditech Platform

Ditech's Echo Cancellation for VoIP solution is available on the Packet Voice Processor.



Packet Voice Processor™
1000Base-T/SX/LX

With the migration of telecommunication services from Time Division Multiplexing (TDM) to Voice over IP (VoIP), traditional voice quality impairments have combined with IP-based impairments to seriously degrade the overall quality of voice calls. Echo is one such problem that is being increasingly discovered in VoIP networks. Not only is the echo in VoIP networks more noticeable to users due to the added VoIP latency, it is also more difficult to eliminate. However, with Ditech Networks' Echo Cancellation solution, all forms of echo in the VoIP network can be treated, providing echo-free calls to all users.

Echo and the Effect of Delay

There are two forms of echo on voice networks, hybrid echo and acoustic echo. Hybrid echo is a linear electrical signal reflection that occurs at the 4-wire to 2-wire conversion point in a PSTN network (usually found in a Class 5 PSTN switch). Hybrid echo can enter the VoIP network wherever there is a connection between VoIP and PSTN networks. Acoustic echo is non-linear and is caused by poor acoustic isolation between the speaker and the microphone of a user's device (e.g., handset, headset, softphone, speakerphone). It can enter the VoIP

network from any source.

Both forms of echo become more noticeable and annoying to the caller with the added delay of the IP network. In fact, the added VoIP-induced delay can make what would formerly be considered minor echo annoying enough to cause users to abandon the call.

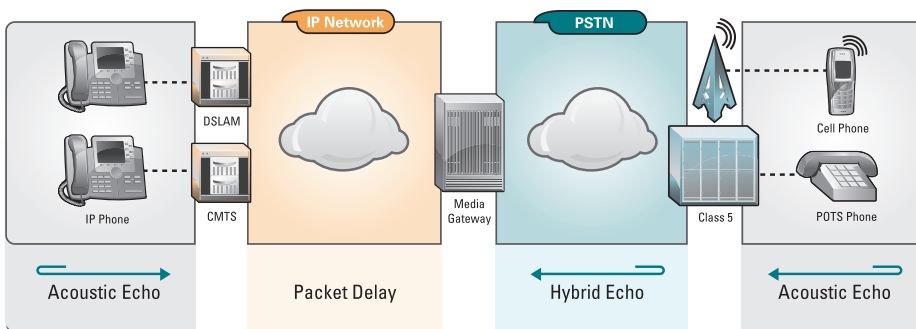


Figure 1 :: Echo in a VoIP Network

Echo in the VoIP Network

In addition to the effect of VoIP-induced delay on the noticeability and annoyance of echo, the architectural changes of the TDM-to-VoIP migration have also introduced echo issues into the VoIP network.

One change is the disappearance of traditional echo cancellers. As Class 5 Local Exchange Carriers (LECs) have expanded their use of VoIP Tandem services, the Class 4 echo canceller is no longer in the call path. In place of the switch-based echo canceller, the VoIP media gateway has become responsible for these functions.

Unfortunately, media gateways have limitations in their echo cancellation capability. First, a media gateway usually supports an echo tail of only 32 or 64 ms, when the network may have echoes with longer tail delays. Second, media gateways do not include acoustic echo cancellation, which becomes especially annoying with the added delay of the IP network. Third, media gateways do not provide bidirectional echo cancellation capabilities, thus leaving one side of the network unprotected. The media gateway was simply not designed to handle the amount and variety of echo that has become prevalent in the VoIP network.

Finally, as the network architecture has changed and the characteristics of end-to-end delay have changed, the echo itself has taken on a new form. Hybrid echo retains its linearity when confined to a TDM network or an IP network with zero packet jitter. But when packet jitter occurs, the hybrid echo characteristics become less linear. With this alteration to the nature of hybrid echo, current hybrid echo cancellers fail, even when the tail delay and echo amplitude are within the echo canceller's stated limits.

Echo is particularly problematic when working with interconnected VoIP networks. The service provider may not be sure of the echo treatment provided by peripheral network elements, and packet jitter from linked networks may not be predictable or controllable.

The Solution

As VoIP echo problems have been identified, the role and need of an IP-based echo canceller has become clear. IP-based echo cancellation is especially valuable for VoIP conferencing providers, VoIP-enabled LECs, ITSPs, and VoIP Tandem carriers. Many of these providers know echo issues well, as customers call to complain about the quality of their service.

Ditech Networks' Packet Voice Processor™ is the industry's most advanced IP-based echo cancellation solution. It provides hybrid echo cancellation with up to 278 ms of echo tail protection (128 ms dynamic tail + 150 ms bulk delay) and bidirectional acoustic echo control with protection of up to 400 ms, which is long enough to cover all VoIP calls, even those routed to/from wireless networks (additional delay).

The Packet Voice Processor is a scalable carrier-grade platform capable of supporting from 2,000 to 16,128 channels concurrently in a single system. Three systems can be installed into a 7' telco rack for support of over 40,000 concurrent channels.

Conclusion

Echo in VoIP can cause serious problems with customer satisfaction and retention rates. The increasing amount of VoIP-induced delay combined with network equipment that is not equipped to solve the problems has challenged VoIP carriers and service providers. But with Ditech's Packet Voice Processor, calls within the VoIP network can be treated, ensuring clear voice calls to all users of the network.

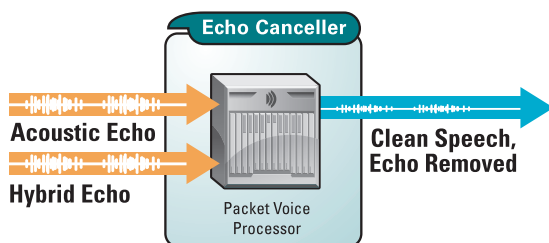


Figure 2 :: The VoIP Echo Cancellor