Industry/Market
Audio Conferencing Services.

The Challenge
Improve the audio quality for business conferencing calls with as many as 1000 participants.

The Business Environment
As service providers transition to Voice over IP (VoIP), it’s necessary to ensure quality is on par with the Public Switched Telephone Network (PSTN).

The Solution
The service provider deployed the Radisys voice quality enhancement (VQE) software, which improved audio quality and generated objective measurements for administering service level agreements (SLAs).

The Benefits
The VQE software ran on a Radisys Convedia CMS–9000 media server, thereby minimizing end-to-end call path delay and saving the cost associated with a separate network element.

Customer Profile
The service provider delivers IP-based communications services, including conferencing and local/long distance calling, to businesses and consumers.
Improving VoIP Conference Quality | Radisys Case Study

No longer a niche technology, Voice over Internet Protocol (VoIP) is gaining traction among major carriers and service providers offering audio conferencing services. The industry is in the process of transitioning from circuit-switched to packet-switched networks in order to lower cost and ease the development of new features. The cost per line in a VoIP network is about one-fifth the cost of circuit-switched, and VoIP technology simplifies the integration of new features, like adding a supervisor recording function to the conference.

While VoIP networks provide significant economic benefits and enable powerful conferencing capabilities, they also present new technical challenges in maintaining acceptable voice quality. Delivering good voice quality is an important requirement in any VoIP conferencing system, as poor voice quality can lead to customer churn and negatively impact growth prospects. Consequently, it’s essential to address the three most common sources of audio quality problems in a network: audio noise, packet loss and echo.

Experiencing echo problems while hosting VoIP audio conferences, a leading provider of IP-based communications services was at risk of failing to satisfy service level agreements (SLAs). The service provider sought a solution capable of delivering high quality audio, comparable to the Public Switched Telephone Network (PSTN).

Two Architectural Approaches

The service provider evaluated two vendors, both having a different architectural approach to integrating voice quality enhancement (VQE) into the network. The first vendor solution was based on a specialized, dedicated single purpose network element situated between subscribers and the core of the network. The solution had two major drawbacks: a high price per line, and the expense and complexity of adding a dedicated network element. The vendor pricing model required the service provider to pay for echo cancellation on every line, although only 15-20 percent of the lines typically need it at a given time, according to industry studies.

The second solution added VQE software to the Radisys Convedia CMS-9000 Media Server, the currently deployed IP media server in this service provider’s network. Since it wasn’t necessary to add a new network element, which typically increases end-to-end call path delay, the solution was better equipped to address voice quality issues. In fact, the echo cancellation performance of the CMS-9000 Media Server met all the requirements of the service provider.

Furthermore, the solution performs dynamic echo cancellation on a subset of lines—the problematic lines—thus reducing license fees and the load on the server’s CPUs. Compared to the first vendor solution, the Radisys CMS-9000 Server delivered higher voice quality at about one-fifth the cost, after accounting for dynamic echo cancellation and deployment on an existing server (e.g., no extra hardware).

Our customer enabled the voice quality enhancement software on existing media servers, which simplified the deployment, lowered their CAPEX expenses and leveraged deployed systems without introducing new elements to the network.

David Smith General Manager, Media Service Business Unit at Radisys
Higher Audio Quality

Radisys’ integrated VQE technology cost-effectively overcomes voice quality challenges associated with an IP packet network, thereby increasing end-user satisfaction in VoIP conferences. The solution implements various mechanisms to address the common sources of audio quality problems, including audio noise, dropped packets and echo. The following describes just a few of the voice quality enhancement features.

• **Problem 1.** Audio noise coming from background sounds like dogs barking, planes flying overhead and people conversing nearby.

  **Solution:** Prevent unnecessary noise from being inserted into a VoIP recording or conference mix by attenuating (e.g., decrease amplification) the noise without impacting the voice signal.

• **Problem 2.** Dropped (or delayed) packets caused by congested IP networks.

  **Solution:** Synthesize audio with a prediction based on previously received packets, when there are audio gaps, using a technique called packet loss concealment.

• **Problem 3.** Acoustic echo, an irritating echo of someone’s voice, created when sound emanating from the receiver’s speaker (e.g., handset or speakerphone) is transmitted back by the receiver’s microphone.

  **Solution:** Compensate for the variable delay inherent in VoIP networks using sophisticated echo cancellation algorithms.

Voice Quality Metrics

Technology to remove audio quality impairments in a VoIP network is an important part of any solution. But service providers also need a standard, objective way to measure voice quality in order to accurately monitor performance levels and uphold service level agreements (SLAs) with customers.

The Radisys Media Server supports many voice quality metrics, and they are divided into three groups: packet, audio and acoustic echo cancellation (AEC). All statistics are captured for each leg of a conference call to help with granular troubleshooting of audio quality problems and performance measurement. Packet statistics measure performance with respect to packet throughput, loss and delay, while audio statistics measure speech and noise power levels. AEC statistics measure the echo delay and echo cancellation performance.