



Voice Enhancement for Conferencing Services

Ditech Platform

Ditech's Conferencing Voice Enhancement solution is available on the following platforms:

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



BVP Flex f600 OC-3/DS-3/STS-1/STM-1

QVP E800/T800 Carrier Shelf E1/T1



QVP E800/T800 Enterprise Shelf E1/T1

Teleconferencing is an important tool in today's global business environment, and use time for audio conference calls is projected to increase rapidly in the next five years. With conferencing, though, call impairments such as echo and noise are heard by all attendees, and an increasing number of customers are using their mobile phones to join meetings from remote and noisy locations.

Ditech Networks' conferencing solutions reduce noise, eliminate echo, and increase the intelligibility of calls, ensuring a positive and productive conference, regardless of the method used to join the meeting or technology used to provide the conferencing service.

When joining a teleconference, remote attendees are in a wide range of environments, such as on a speakerphone, riding in a car, using a hands-free connection, sitting in a hotel lobby or airport, riding a subway train, attending a trade show, or walking on busy streets. Callers in these locations introduce background noise, acoustic echo, and mismatched speech levels into the audio bridge. These impaired signals are broadcast to all the participants, often making the teleconference difficult or impossible to conduct. Remote callers are often asked to mute their phones or drop off the call.

Remote attendees may also call in from any network worldwide, sometimes introducing hybrid echo. Hybrid echo is especially problematic on conference calls because if there is echo on a line, every person (except the person on the line creating the echo) hears the echo whenever any of the attendees talk, creating an extremely difficult call that must be restarted.

Ditech's solutions eliminate remote and wireless impairments before they reach the conferencing equipment, dramatically improving the experience of the conference call for all participants and maximizing per-port usage times for the provider.

Ditech's Conferencing solutions with Voice Quality Assurance (VQA™) are designed for both VoIP and TDM conferencing services. For VoIP conferencing, the Packet Voice Processor™ resolves additional IP issues, such as packet loss and jitter, and can also perform codec transcoding, normalizing the codec for the conferencing application.

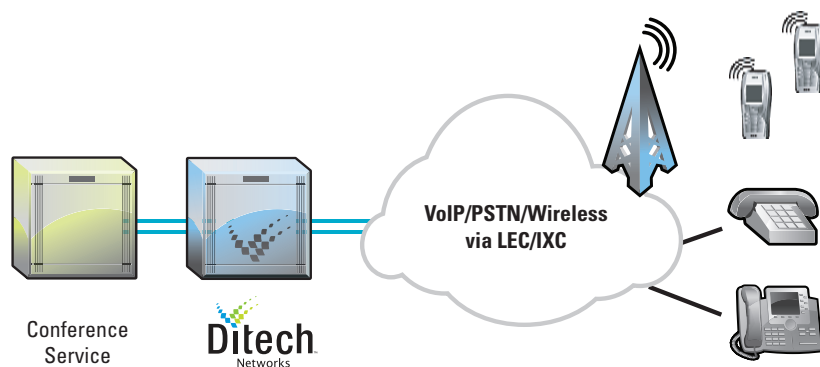


Figure 1 :: Typical Conferencing Services Application

Ditech's VQA solutions are tested and proven to dramatically improve voice quality by enhancing speech intelligibility and removing impairments, such as background noise, hybrid echo, acoustic echo, and level mismatch, through the use of specialized DSP algorithms.

Measurements in live networks using test systems compliant with the emerging ITU-T G.160 specification show significant improvement in signal-to-noise ratio (SNR) and total noise reduction, well in excess of values recommended by G.160. These measurements correspond with the results of subjective user tests, proving the perceived voice quality is significantly improved with Ditech's VQA technology.

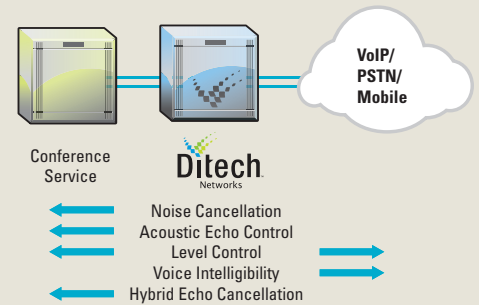


Figure 2 :: VQA Features for Conferencing

Noise Cancellation Features

Reduces background noise without suppressing voice volume to improve the sound quality of calls.

Industry-Leading Performance: Advanced multi-band spectral processing techniques remove up to 21 dB of noise during both speech and pauses, providing a dramatic increase in quality for calls placed from noisy environments.

Excellent Speech Quality: Advanced noise suppression techniques function only when noise is present, resulting in excellent clean speech performance with no speech degradation.

Rapid Convergence: Dynamically adapts to changes in noise spectrum, in real time, converging or re-converging in less than 200 ms.

SNR Adaptive Noise Cancellation: Automatically adjusts noise reduction performance to match changing noise levels, providing callers with consistent noise reduction for both tandem (on-net mobile to mobile) and off-net (mobile to PSTN) calls.

Enhanced VAD Post-Processor: Unique two-pass algorithm provides an extremely accurate determination of speech vs. noise, providing excellent noise reduction performance under all noise conditions.

Adjustable Noise Floor: Spectrally-matched comfort noise can be customized by the operator to provide high or low levels of residual comfort noise in accordance with subscriber preferences.

Acoustic Echo Control Features

Addresses the echo that is common from handsets and handsfree units.

Industry-Leading Performance: Selectable WAEPL from 45 dB to an industry-leading 15 dB ensures protection from even the strongest echo sources, while maintaining excellent double-talk performance.

Converged-Network Ready: Effectively removes acoustic echo with delays up to 400 ms in each direction, providing maximum performance for wireless, wireline, and VoIP environments.

Adaptive Delay Mode: Automatically adjusts to actual detected delay on a per-call, per-channel basis, avoiding the need to configure a fixed bulk delay for each channel in advance.

Spectral Comfort Noise Match: Automatically generates comfort noise to match actual background noise levels and spectral characteristics, providing improved conversational call quality without an annoying "dead air" effect.

Level Control Features

Automatically adjusts volume to bring voice to a comfortable listening level.

Adaptive Level Control: Automatically adjusts input signal levels up to ± 15 dB to meet configured target level of between -3 and -24 dBm0.

Dynamic Level Control: Advanced design provides amplification of speech independently of noise, providing increased SNR and improved subjective speech quality compared to traditional linear gain control methods. (BVP Flex and QVP.)

High Level Compensation: Prevents clipping or codec distortions by automatically attenuating input signal levels that are too high, while maintaining integrity of low-level signals.

Low Level Compensation: Automatically raises low-level input signals by up to 15 dB to a comfortable listening level. (BVP Flex and QVP.)

Automatic Listener Enhancement: Applies up to 9 dB gain to output signal level in response to high background noise level in the listener's environment, automatically increasing volume in loud listening environments.

Voice Intelligibility Features

Enables callers to more easily distinguish and understand voice in loud environments.

Enhanced Voice Intelligibility: Rebalances spectral signature of input signals to enhance critical speech formants, providing increased clarity and improved speech recognition.

Unvoiced Speech Enhancement: Selectively enhances unvoiced speech formants (soft sounds such as "th", "f", etc.) for improved subjective speech quality, especially in the presence of high ambient noise environments.

Ambient Noise Level Adaptation: Dynamically adjusts the degree of spectral enhancement to compensate for the ambient noise characteristics of the listener's environment.

Hybrid Echo Cancellation Features

Completely eliminates hybrid echo from wireline sources.

Industry's Longest Tail Delay: Leading hybrid echo cancellation solution compensates for network delays up to 192 ms (128 ms for Packet Voice Processor), ensuring consistently clear, echo-free calls, even in the face of network migration of TDM to VoIP.

Fast, Stable Convergence: Less than 50 ms, with 30 dB or better ERL+ERLE.

Industry-Leading Performance: Cancels echo with ERL up to 0 dB; >35 dB ERLE (with 6 dB ERL) at -10 dBm0 input.

Residual Echo Control: >65 dB ERLE, with NLP enabled.

Voice Quality Monitoring Features

Ditech's Experience Intelligence™ (EXI) delivers an essential set of voice quality statistics, including:

- Speech and noise levels
- Echo delay and return loss
- R factors
- Mean Opinion Scores (MOS)

The data are collected continuously and non-intrusively on a per-call basis, providing the industry's most comprehensive assessment of call quality.



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