

Comparing Voice Quality Measurement Standards

Audio Clarity

The effectiveness of a telephone conversation depends on its clarity. If the conversation does not sound good, the listener is annoyed and the speaker is unable to express the message. The clarity of the conversation must be maintained end-to-end, from the speaker to the listener. This topic lists the factors affecting audio clarity.

Factors Affecting Audio Clarity

- **Fidelity (transmission bandwidth versus original)**
- **Echo**
- **Delay**
- **Delay variation (jitter)**

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The clarity, or cleanliness and crispness, of the audio signal is of utmost importance. The listener should recognize the identity of the speaker and sense the mood. Factors that can affect clarity include:

- **Fidelity:** Consistency of transmission bandwidth to the original bandwidth. The bandwidth of the transmission medium almost always limits the total bandwidth of the spoken voice. Human speech typically requires a bandwidth from 100 to 10,000 Hz, although 90 percent of speech intelligence is contained between 100 and 3000 Hz.
- **Echo:** A result of electrical impedance mismatches in the transmission path. Echo is always present. The two components that affect echo are amplitude (loudness of the echo) and delay (the time between the spoken voice and the echoed sound). You can control echo using suppressors or cancellers.
- **Delay:** The time between the spoken voice and the arrival of the electronically delivered voice at the far end. Delay is affected by a number of factors, including distance (propagation delay), coding, compression, serialization, and buffers.

- **Delay variation:** Because of the nature of an IP delivery network, the arrival of coded speech at the far end of a Voice over IP (VoIP) network can vary. The varying arrival time of the packets can cause gaps in the re-creation and playback of the voice signal. These gaps are undesirable and cause the listener great annoyance. Delay is induced in the network by variation in the routes of individual packets, contention, or congestion. You can solve variable delay by using dejitter buffers.