# 860 DSPi VoIP RTP MOS Test

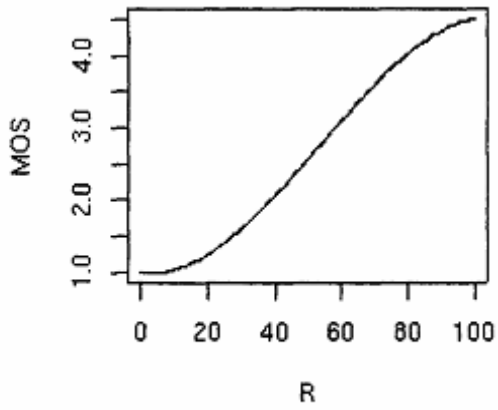
The ITU-T's E-Model is a network planning tool used in the design of hybrid circuit switched and packet-switched networks for carrying high quality voice applications. The tool estimates the relative impairments to voice quality when comparing different network equipment and network designs.

A basic result of the E-Model is the calculation of the R-factor, which is a simple measure of voice quality ranging from a best case of 100 to a worst case of 0. The Rfactor uniquely determines the familiar Mean Opinion Score (MOS), which is the arithmetic average of opinion when "excellent" quality is given a score of 5, "good" a 4, "fair" a 3, "poor" a 2, and "'bad" a 1. The parameters for the computation of the R-factor are codec impairments, delay (latency), delay variation (jitter), and packet loss.

The tool provides a means to estimate the subjective Mean Opinion Score (MOS) rating of voice quality over these planned network environments.

The specific method is:

- Measure the low-level transport metrics (characterizing the channel), which impact voice performance, i.e., delay, delay variation and packet loss
- Combine the packet loss and delay variation measurements, jitter buffer operations, packet size and coder frame size into an error mask (the exact sequence of good and bad coder frames) that can be characterized in a simple manner (e.g., average frame loss rate along with some measure of burstiness)
- Combine the characterized error mask with the coder and its frame-loss concealment algorithm via a look-up table (or curve fit) based on subjective testing to produce an E-Model equipment impairment factor




*A plot showing the relationship between the R-factor and the MOS*

For Additional Help Contact
Trilithic Applications Engineering
1-800-344-2412 or 317-895-3600
support@trilithic.com or
www.trilithic.com

The Error Mask characterizes the salient features of the loss distribution as observed by the decoder. (Note: This loss distribution captures both the transport packet loss and the loss in the decoder's jitter buffer due to late packet arrivals.) When the Error Mask is combined with the specific loss concealment algorithm implemented within codec, we generate an Equipment Impairment Factor, which captures the expected impairment of the codec under the above conditions. From this, the E-Model provides a means to estimate a quality score for the conversational voice application.

The decoder must intentionally delay the variable delayed, arriving voice packets in its jitter buffer in order to reconstruct a synchronous bit stream. In some cases this jitter buffer delay is not large enough to absorb the transport delay variation. The result is jitter buffer losses as observed by the decoder expected impairment of the codec under the above conditions. From this, the E-Model provides a means to estimate a quality score for the conversational voice application.

> **Note:** The parameters in the computation of the R-factor are codec impairments, delay (latency), delay variation (jitter), and packet loss.

For Additional Help Contact
Trilithic Applications Engineering
1-800-344-2412 or 317-895-3600
support@trilithic.com or
www.trilithic.com