PESQ and POLQA software options forAPx500

Perceptual audio testing with APx audio analyzers

APx500 PESQ software option measurement pane and G.R.A.S. KEMAR manikin with mobile phone (not included)

Key Features

- PESQ or POLQA available separately.

- Integrated perceptual analysis of degradations in voice signals.

- Objective, repeatable results using algorithms that conform to international standards.

- High correlation with subjective MOS.

- Automatic time alignment.

- Use with any APx audio interfaces: PDM, analog balanced/unbalanced, AES3 and S/PDIF digital, HDMI, Bluetooth™, and serial digital.

- Incorporate into any APx project or report.

- Compatible with APx515, 525, and 585 families.

APx Perceptual Audio tests

AP offers **PESQ** and **POLQA** Perceptual Audio tests as software options for APx500.

Many voice communications devices, notably mobile phones and *Bluetooth®* accessories, employ codecs and DSP that significantly alter sound in order to accommodate low bitrate and lossy networks. Despite these compromises, people understand one another quite well over these systems; this is because the adjustments are selected to allow adequate speech perception despite measurable shortcomings in distortion, frequency response, and other traditional audio measurements.

The Perceptual Evaluation of Speech Quality **(PESQ)** and Perceptual Objective Listening Quality Assessment **(POLQA)** test methodologies are widely used to quantify speech quality in telecommunications and voice-specific audio. Developed by OPTICOM GmbH, **PESQ** and **POLQA** form the basis of ITU-T Recommendations P.862 and P.863, respectively. **PESQ** targets low bandwidth devices such as telephones, smartphones and hands-free devices, while **POLQA** extends perceptual audio test to encompass wide-band speech, acoustic interfaces and more.

Results from each are expressed as **MOS** (Mean Opinion Score) directly in APx500, and achieve a very high correlation with results obtainable using human subjects in a way that is faster, more repeatable, less expensive, and fully automated.

Test methodology

In traditional perceptual measurements, a group of people is assembled and asked to compare speech samples before and after processing by a device or network. The resulting comparative sound quality is ranked on a scale from 1 to 5; the average of these responses is the Mean Opinion Score (MOS).

PESQ and **POLQA** use psycho-acoustic modeling to closely predict results obtained from real human subjects. Measurements obtained are unaffected by human temperament or test conditions, and the results are completely repeatable.

Perceptual audio testing in APx500

Both **PESQ** and **POLQA** in APx500 provide standard MOS results for a single speech sample. The **PESQ/POLQA Average** measurement allows you to run a collection of different voice samples and then display the resulting overall score.
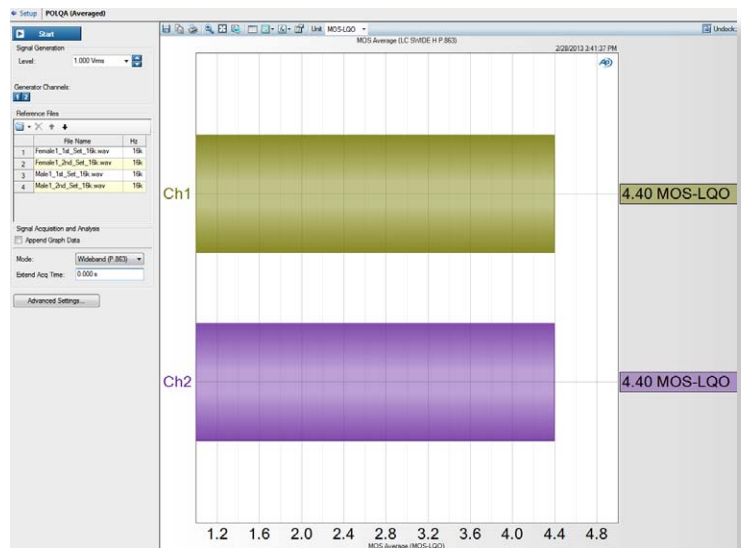
The **PESQ/POLQA** measurements may also return results in a *quality vs. time* display to help pinpoint specific problems such as clipped words or dropouts. Additional results show average delay, delay vs. time, and the reference and the acquired waveforms.

All measurements let you choose to analyze the entire signal, or to look at only the active speech or silence.
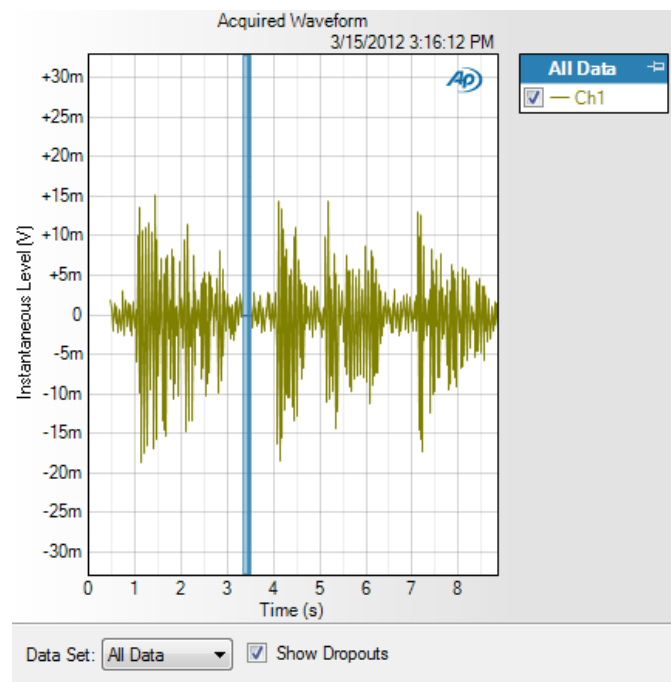
PESQ vs. POLQA

PESQ and **POLQA** are similar in goal, but differ in several key applications. **PESQ** is an older and very widely used tool for evaluating speech quality on communications networks with restricted bandwidth, while **POLQA** is newer and handles variations such as wideband audio, acoustic transducers, DSP and level variations. Many manufacturers specify one or the other as part of a testing and approval regimen.

▲
MOS Average Score
MOS scores may be displayed as an accumulated average or per speech sample.

▲
MOS over time
Analyze MOS as a function of time within a speech sample to detect glitches and dropouts (PESQ shown above)

	PESQ	POLQA
Measurements with acoustic transducers, ear and mouth simulators	No	Yes
Correct scoring with high background noise	No	Yes
AMR vs. EVRC codec comparison	No	Yes
Effects of speech level in samples	No	Yes
Narrowband (300 Hz - 3400 Hz)	Yes	Yes
Wideband (100 Hz - 7000 Hz)	Yes	Yes
Super Wideband (50 Hz - 14000 Hz)	No	Yes
Linear Frequency distortion sensitivity	No	Yes

PESQ/POLQA Option Specs

Type
PESQ: ITU-T P.862 Perceptual Objective Listening Quality Assessment with mapping to MOS scale

POLQA: ITU-T P.863 Perceptual Objective Listening Quality Assessment with mapping to MOS scale

Input
PESQ: 16 bit linear audio sampled at 8 kHz or 16 kHz, voice samples 6 to 20 seconds

POLQA: 16 bit linear audio sampled at 8 kHz, 16 kHz or 48 kHz, voice samples 6 to 12 seconds

Measurements
PESQ
POLQA
MOS
Instantaneous MOS vs. time
Average MOS (Active Speech and Silence)
MOS per sample file

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