

OPTICOM's Advanced ECHO Measurement Tool

ECHO provides accurate and repeatable estimates of the Echo Return Loss (ERL) occurring through a network by comparing the audio signal input to the network with the degraded audio signal output from the network. Compared to other echo measurement algorithms that are available on the market OPTICOM's approach is unique because it uses real voice signals for the measurement rather than sine tones. ECHO (is) can be widely used in active testing in both lab environments and in network test equipment. **OPTICOM's ECHO** measurement technology is the latest out of our family of products for network quality assessment tools. The current version of the algorithm detects the primary and secondary echo. The maximum echo delay that can be measured is of about 1 second. The echoes are characterized with the echo return loss (ERL) and their delay (echo tail length), plus they are tested whether they are in an acceptable range, or if they are perceived as annoying.

Voice Quality Testing

OPTICOM Product Line:
PESQ ITU-T P.862
3SQM ITU-T P.563
PSQM ITU-T P.861
ECHO
PEAQ ITU-T BS.1387
Video Quality
PEVQ
Network Quality
VQmon

Principle



OPTICOM's ECHO algorithm determines the echo delays with the help of a long term correlation of a speech signal at a voice network input and its output both at the near end side (see figure above). One advantage of using real speech signals over a simple sine tone – as many other algorithms propose – is, that it is a signal closer to the real world telephony situation. Sine tones might be treated more or less rigid by the network compared to real voice. Depending on the employed echo cancellation algorithm sine tones might be easily filtered out, whereas the same echo canceller might have difficulties treating a complex voice like echo signal. This feature becomes even more valuable in digital networks or VolP, where the echo tail length (=delay) becomes significantly longer due to additional signal processing. Another advantage is that through the speech signal's natural modulation a best match of the two signals can be found with higher accuracy as with sine tones thus making the results more robust against clipping and noise.

Key Features:

- Analyses degradation through echoes in audio signal
- Well established, repeatable results
- Available as DLL/Library optimized in performance and memory requirements
- Detailed statistics of the occurrence of echo delays in a histogram at the output for e.g. grafical display and further analysis
- Robust measurements even if the echoes are heavily distorted
- Echo delay resolution of ±1ms
- Multiple echo detection
- Classification of echo annoyance

The diagram below gives you an example of the results of a typical measurement with OPTICOM's ECHO tool after it was evaluated with a spread-sheet program. The diagram is divided into two distinct areas by an extrapolated and approximated TELR-curve according to ITU-T standard G.131: All echoes that do not reach out of the blue area are generally per-

ceived as annoying, while all peaks that reach into the orange area are sufficiently attenuated and are perceived as acceptable – if perceived at all. In the diagram above easily three echo peaks can be identified which lie in the blue area of the diagram meaning they are too loud to be negligible and which are very likely to be perceived as annoying by a talker.



Specifications

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Functionality

- ERL acc. ITU-T G.131 for one and more echoes
- Echo delay for one and more echoes
- Perceptual Estimation of Echo Annoyance, using subjective analysis results as stated in ITU-T G.131
- Narrowband and Wideband operation
- Real speech signals for analysis

Input data

- 16 bit linear audio sampled at 8kHz or 16kHz
- Input audio files 6 to 20 seconds in length

Output

- Maximum echo peak level
- ERL / Delay for multiple echoes
- Vectors with statistical information of the signal, e.g. ERL histogram

Platform

- Windows (NT, W2k, XP),
- Linux



About OPTICOM

With PSQM, PESQ and PEAQ, OPTICOM GmbH, the pioneer in perceptual quality testing has been providing three international world-class standards for voice and audio quality measurement since its foundation in 1995. With their new single-sided speech quality measure 3SQM™, a joint development with partners, the perceptual experts from Germany now presented their fourth ITU standard. At its 10th anniversary, the presentation of the new PEVQ™ video measure leverages the company's huge experience towards the multimedia testing domain. Recognized an industry reference, OPTICOM's OPERA voice/audio quality test tools are available to users world wide. And while specialized on OEM customers in particular, the directory of OEM licensees today reads like the 'Who-is-Who' of the Telecoms industry. OPTICOM is a privately held company located in Erlangen, Germany.

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