



# PEVQ™ — Perceptual Evaluation of Video Quality

**PEVQ** provides mean opinion score (MOS) estimates of the video quality degradation occurring through a network, e.g. in video telephony networks. PEVQ can be ideally applied to test video streaming, video conferencing and IPTV applications. The degraded video signal output from a network is analyzed by comparison to the undistorted reference video signal on a perceptual basis. PEVQ is based on the approach to model the human visual system with which anomaly perceived in the video signal can be detected and quantified by a multitude of key performance indicators (KPIs).

OPTICOM, the leading provider of signal based perceptual measurement technology for voice, audio and video, offers its new easy to use **PEVQ V 2.0** measurement as an OEM solution. PEVQ evaluates the quality of CIF, QCIF, VGA and Rec. 601 video formats based on perceptual measurement, reliably, objectively and fast.

PEVQ is based on the earlier PVQM technology developed by KPN Research and new developments of OPTICOM.

## Video Quality Testing

### OPTICOM Product Line:

#### Voice/Audio Quality

PSQM ITU-T P.861

PESQ ITU-T P.862

3SQM ITU-T P.563

ECHO

PEAQ ITU-T BS.1387

#### Video Quality

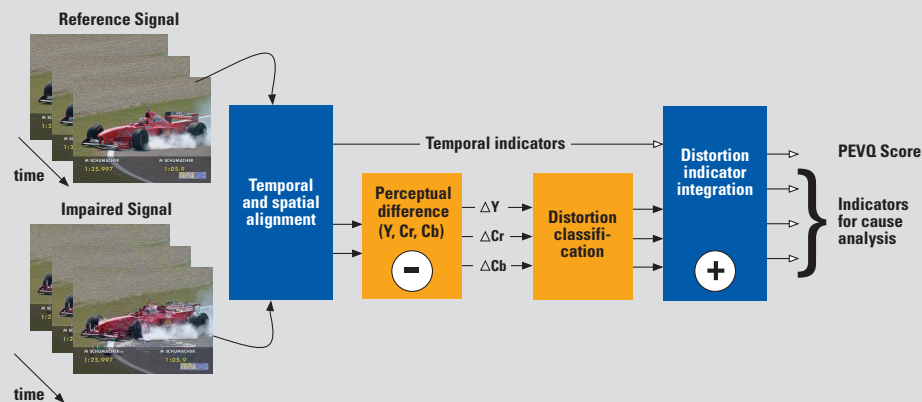
PEVQ

#### Network Quality

VQmon

## Principle

PEVQ is a full reference, intrusive measurement algorithm for video quality. Its basic structure is shown in the figure below.



The algorithm can be divided up into four separate blocks. The first block – pre-processing stage – is responsible for the spatial and temporal alignment of the reference and the impaired signal. This process ensures that only corresponding frames are compared to each other.

The second block calculates the perceptual difference of the aligned signals. Perceptual means that only those differences are taken into account which are actually perceived by a human viewer. Furthermore the activity of the motion in the reference signal provides another indicator representing the temporal information.

This indicator is important as it takes into account that in frame series with low activity the perception of details is much higher than in frame series with quick motion.

The third block in the figure classifies the previously calculated indicators and detects certain types of distortions.

Finally, in the fourth block all the appropriate indicators according to the detected distortions are aggregated, forming the final result - the mean opinion score (MOS). The MOS value describes the video quality on a range from 1 for very bad quality, to 5 for excellent quality.

### Key Features:

- Analysis of video quality
- Outputs MOS score that correlates well with subjective MOS
- Additional KPIs for detailed analysis
- Measurement with QCIF (real time), CIF, VGA and Rec. 601 video sizes
- Perceptually based end-to-end quality analysis
- Available as DLL/Library or Source
- Applications: IPTV, streaming video, 3G, video telephony

Besides the final quality score additional indicators are provided at the output of the algorithm for further cause analysis.

This approach to video quality estimation includes the effects of both packet level impairments (loss, jitter) and signal related impairments such as blockiness, jerkiness, blur and distortions caused by coding processes.

## Specifications

### PEVQ - Perceptual Evaluation of Video Quality

#### Functionality

- Perceptual Evaluation of Video Quality- PEVQ, with mapping to MOS scale (1 bad, ... 5 excellent quality)

#### Output

##### PEVQ MOS

The PEVQ MOS value lies within a range from 1 (bad) to 5 (excellent). The PEVQ MOS is based on a multitude of perceptually motivated parameters.

##### Distortion indicators

For a more detailed analysis the perceptual level of distortion in the luminance, chrominance and temporal domain are provided.

##### Delay

The delay of each frame of the test signal related to the reference signal.

##### Brightness

The brightness of the reference and degraded signal.

##### Contrast

The contrast of the distorted and the reference sequence.

##### PSNR

To allow for a coarse analysis of distortions in different domains the PSNR is provided for the Y, Cb and Cr components separately.

##### Jerkiness

describes the smoothness of a video playback which is often impaired by down-sampling, coding processes and perturbed transmissions.

#### Complexity

- PEVQ is widely optimized and is capable of processing QCIF streams faster than real-time on a 3GHz Pentium 4 machine.

Future releases will be further optimized in computational performance and prediction accuracy to provide a complete picture of a quality estimate. OPTICOM's roadmap for PEVQ targets at candidating in the competition of the Video Quality Experts Group (VQEG) for the best video quality measurement model.



#### About OPTICOM

*With PSQM, PESQ and PEAQ, OPTICOM GmbH, the pioneer in perceptual quality testing has been providing four 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 latest 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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#### Input

- AVI with RGB24 video data
- QCIF, CIF, VGA and Rec. 601 frame sizes
- 6 to 20 seconds in length

##### Blur

is a distortion characterized by reduced sharpness of contour edges and spatial detail.

##### Blockiness

is often the result of a low bit rate coding that uses a block matching algorithm for the motion estimation and a coarse quantization for the image blocks.

##### Frame Skips and Freezes

are temporal artefacts occurring in video transmissions caused by e.g. overloaded networks.

##### Effective Frame Rate

Down-sampling of a video signal on a frame by frame basis often results in loss of information which often leads to the degradation of the video signal. The effective frame rate is an indicator quantifying the severeness of such a process.

##### Temporal and Spacial Activity

Temporal and spacial activity indicators quantify the amount of activity /movement in the video content. These indicators are derived from ITU-T recommendation P.910.

#### Platforms

- Windows
- Linux