Abacus 5000 Video Quality Assessment Test System Overview

Abacus 5000 video quality assessment test system responds to the urgent need of determining video quality as well as a broad range of video distortion and degradation parameters under various network configurations and real-world load conditions.

Spirent has licensed the Psytechnics Perceptual Evaluation Video Quality Assessment (PEVQ) tool. It is a full reference video quality measurement tool based on the ITU J.144 standard. Spirent has integrated the PEVQ into its Abacus 5000 IP telephony test migration system.

The test system works by sending reference video clips into the device or system under test. Using a complex video quality assessment algorithm, the test system compares the received video clip from the output of the system under test to the reference clip and provides an MOS (Mean Opinion Score) video quality rating score on a scale of 1 to 5. Additionally, the test system provides several video degradation metrics, including:

■ Blockiness
■ Blurriness
■ Jerkiness
■ Frame freeze events
■ Frame skip events
■ Temporal complexity
■ Spatial complexity

In addition to performing this testing in a lab environment, two or more test systems can be distributed at various points in the network to perform pre-production assessment of voice and video quality in a real network environment with various levels of real world traffic load. This will help carriers diagnose problems in the network and get an accurate picture of what the network is capable of and where it may break down.

Abacus 5000 Video Monitoring and Quality Measurements Overview

Objectives of video testing include:
■ Evaluation of quality of video processing the system or device under test
■ Impact of network impairments on the quality of video transmission
■ Total quality of video communications

Evaluation of quality of video processing requires testing of:
■ Video codecs implementation
■ Work under the full load — stress tests
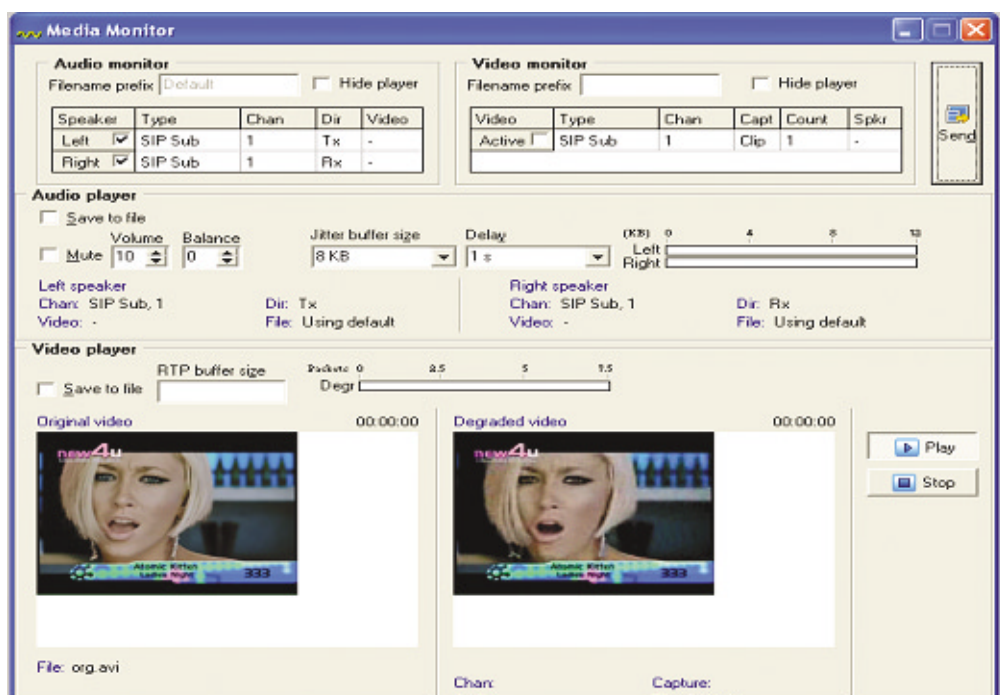■ Quality of communication links

Impact of network impairments requires evaluation of:
■ Packetization methods
■ Voice and video interleaving mechanisms
■ Encoding algorithms

Abacus 5000 Media Monitor Demo

Total quality of video communications includes evaluation of:
- Protocol implementation (conformance and interoperability)
- Video and voice quality measurements of received packets

Spirent video quality measurement software provides these benefits:
- MOS score evaluation
- Perceptual evaluation of video impairments as they are defined by ANSI Standard, ANSI T.1.801.02-1996
- Deliver video quality to end users
- Benchmark components
- Assess quality variation with time and network load
- Correlation with subjective testing
- Full range of diagnostics
- Based on J.144 compliant full reference techniques

Abacus 5000 real-time monitoring support includes:
- A stream as it is received from an Abacus 5000 ICG3 (Internet Call Generation Subsystem). The stream is in an encoded format and should be decoded into the original video source format. This stream is displayed in "Degraded" window
- Two streams, sent and received, simultaneously. Sent is in the "Reference" window and received in the "Degraded" window

The monitoring function is similar to the existing Abacus audio monitoring function.

On Page 1 is a snapshot of the configuration and control parameters of Abacus implementation for the monitoring function.

Video Quality Measurements' Algorithm Overview

The best way to measure video quality is to correlate video measurements with the experience of a viewer's opinion. The method to correlate a viewer's subjective opinion with the video measurements is Perceptual Evaluation of Video Quality (PEVQ).

Abacus 5000 implemented the licensed technology from Psytechnics, which is the global leader in video quality assessment software used to predict customer experience.

Psytechnics PEVQ tool is an active video model. It compares an original undistorted video sequence with a degraded version of the same video sequence that has been passed through the system under test. PEVQ provides an overall objective quality video model that correlates with subjective quality ratings obtained from tens of thousands of subjective tests.

PEVQ Viewer

The test configuration parameters and results are shown by PEVQ Viewer tool. The PEVQ graphical user interface includes:
- Video windows, in which the video material can be viewed for a quick visual assessment
- Graph windows, where a range of parameters calculated by the model can be displayed and assessed

PEVQ Viewer
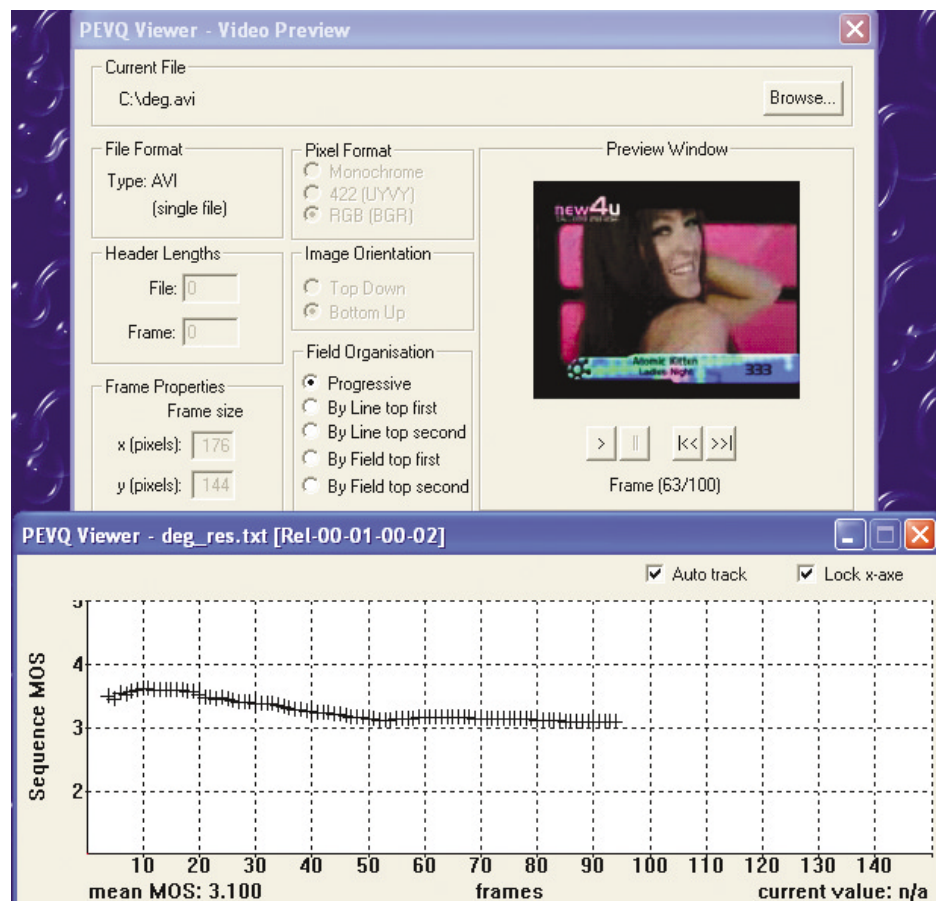
Video Quality Metrics

- **Frame MOS** – Measure of quality of each individual video frame
- **Sequence MOS** – Measure of the quality metric of the video sequence until the last frame
- **PSNR** – Peak Signal to Noise ratio between processed frame and its reference frame
- **Mean Squared Error** – Square of the pixel-to-pixel difference between degraded frame and its reference
- **Matched PSNR** – A modified Peak Signal to Noise Ratio between a processed video frame and its matched reference
- **Color PSNR** – The Peak Signal to Noise Ratio incorporating color
- **Temporal Complexity** – A measure of the level of motion in the video content. Scenes with low or no motion will have a low temporal complexity
- **Spatial Complexity** – A measure of the level of spatial details. Scenes with mainly plain areas will have low spatial complexity
- **Blockiness** – Block distortion is a spatial degradation and is caused by coding impairments
- **Blurriness** – Blurriness is a spatial degradation and is mostly caused by coding impairments
- **Jerkiness** – Jerkiness is motion perceived as a series of distinct "snapshots" rather than smooth and continuous motion
- **Frozen Frames** – This is the total number of video frames that were repeated up until the current frame
- **Frame Freeze** – This is the number of times non-consecutive frame freezes occurred up until the last frame
- **Skipped Frames** – This is the total number of video frames that were skipped up until the current frame
- **Frame Skip Events** – This is the number of times non-consecutive frame skips occurred up until the current frame
- **Jitter** – Jitter is the variation of frame alignment between reference and degraded sequences

Applications

Video telephony is the first application where Abacus 5000 provides video quality measurements.

For IP telephony applications Abacus emulates video phones. One scenario is when Abacus 5000 originates and terminates calls. Another scenario is when Abacus only originates or only terminates calls.

PEVQ Specifications

Operating Systems – Windows 2000, XP
Processor speed – 3GHz or above
Memory – 512MB or above
Disk space – As required for storage of video files

Ordering Information

SWF-3300: Full Reference Video Quality Measurements

For More Information

Abacus 5000 system information is at www.spirentcom.com/voice. Learn more about Spirent IP Telephony test systems and services; download product literature, white papers and test methodologies. Contact your local Spirent sales representative for details.

Spirent Global Services

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