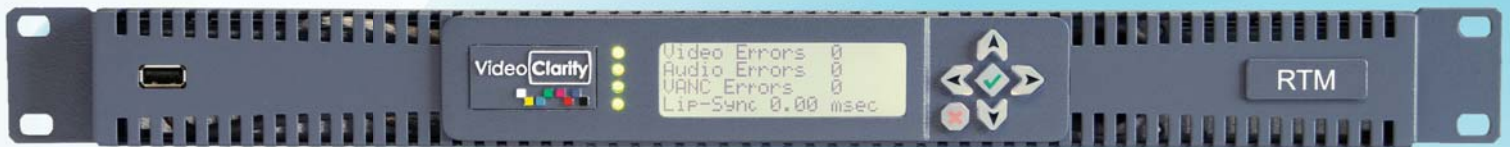


RTM

Real-Time A/V Quality Monitor/Recorders



Video **Clarity**



Tools for Video Analysis

Today's multi-device delivery scenario - to TV, PC and handheld devices - puts high demands on broadcasters, multi-channel operators, and product manufacturers.

Digital media transmission now requires most live or stored assets to be prepared in different formats and delivered through a diverse set of network paths to the consumer.

Advertisers and program providers demand high quality. The technology required to deliver multiple formats and versions of the same asset is now highly complex which can lead to errors that affect quality. Therefore, a high priority should be placed on constantly testing at each step in the delivery chain so that the desired user experience is achieved.

Testing digital assets and delivery methods for quality has also led to new challenges. While experienced analog engineers could detect and classify errors by predictable means, new digital technologies have created a dynamic environment. Minor imperfections generally have no noticeable effect on quality in a digital transmission until the degradation hits a threshold. This unpredictable "digital cliff" drops quality to unacceptable levels.

At the processing layer, problems arise when down-converting 4K to HD or from HD to SD or lower resolutions, and compressing the signal into the available bandwidth. Also the separate processing of audio, video, and data can lead to synchronization problems.

Broadcasters have a new challenge to channel share inside specified bandwidth constrains and therefore need to monitor quality of all programs from a stat-mux pool rather than apply specific bit rates to each program.

Some multi-channel distribution operators rely on a multiplicity of distribution steps in the network and therefore latency, packet loss and synchronization add additional potential for low quality events.

Errors in one layer can cause errors in the next. For example blockiness caused by compression looks similar to packet loss/bit errors hidden by the set-top box (receiver).

For this reason quality must be assessed at the processing point and also through the end point device such as a professional receiver-decoder or set top box.

RTM systems compare the following:

- Multiple references to corresponding processed feeds
- Reference file to processed SDI input of same file feed
- Reference file to processed file

RTM features:

- Measuring multiple video channels for quality
- Measuring audio quality and each program's loudness
- Reporting A/V offset (lip-sync) to the millisecond, and end-to-end video delay as number of frames
- Monitoring VANC data integrity, line selectable
- Automatically recording the degraded A/V signal and reference input during low quality periods

Degradation thresholds may be pre-configured by your engineering staff in RTM for reliably finding errors in several key areas:

- Video fine detail - issues such as blur or blockiness
- Gross video impairments - loss of signal, freezes
- Audio silence, pops, clicks and distortions
- Audio loudness according to ITU-R BS.1770-3
- Audio/video offset (lip-sync) errors with a plus or minus measurement accurate to the millisecond

Applications:

- Broadcast quality monitoring and error recording
- Automatic quality analysis of IP streams or file assets
- Long duration processing product QA testing
- Television production truck to central office lip-sync and A/V quality pre-check as single ended test

Single Ended Test Operations:

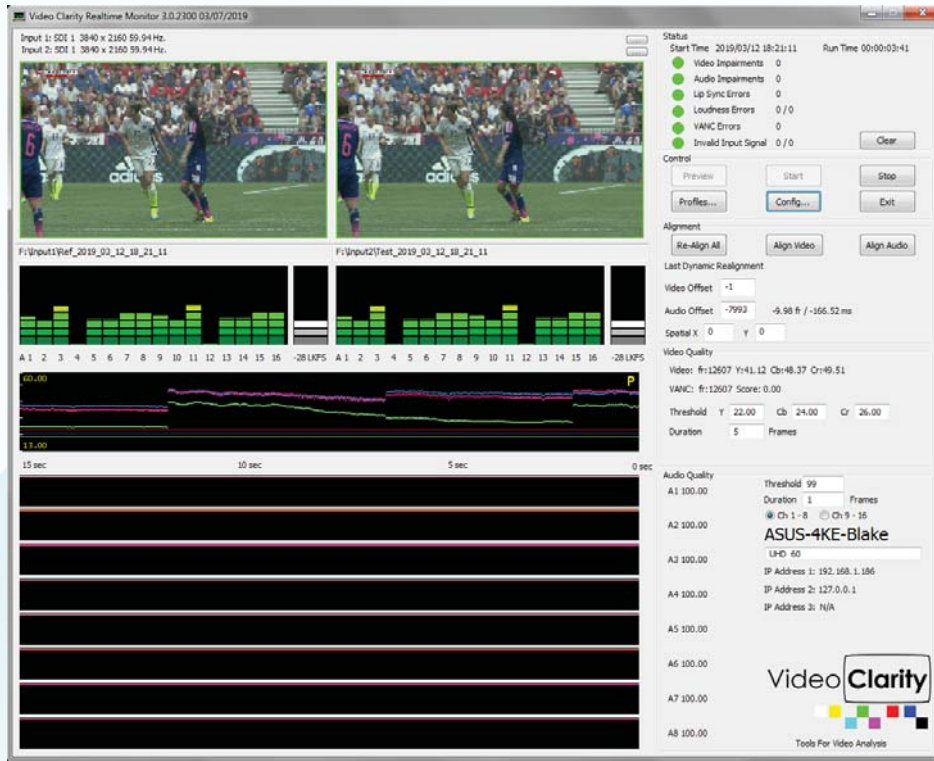
RTM includes a reference test sequence that can be exported as QuickTime, RAW file or recorded via RTM's HDSDI output. Once transferred, the sequence is then played from a server or Video Clarity Player in a remote site and transmitted to the studio location for live input to an RTM system which can then check lip-sync and video/audio quality.

As a full-reference monitoring device, RTM is not influenced by the "artistic" quality of the source.

RTM saves valuable time and money by:

- Finding quality problems that you have missed
- Confirming errors that you have already observed
- Recording the audio and video of each error with instant recall and side-by-side playback analysis
- Combining several A/V quality measurements into one solution that compiles test scores for any duration

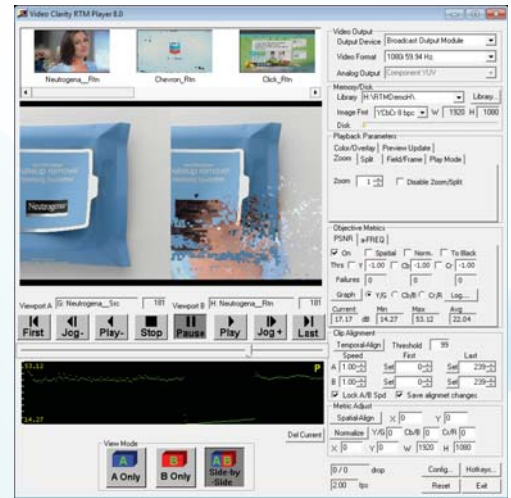
RTM - Main User Interface



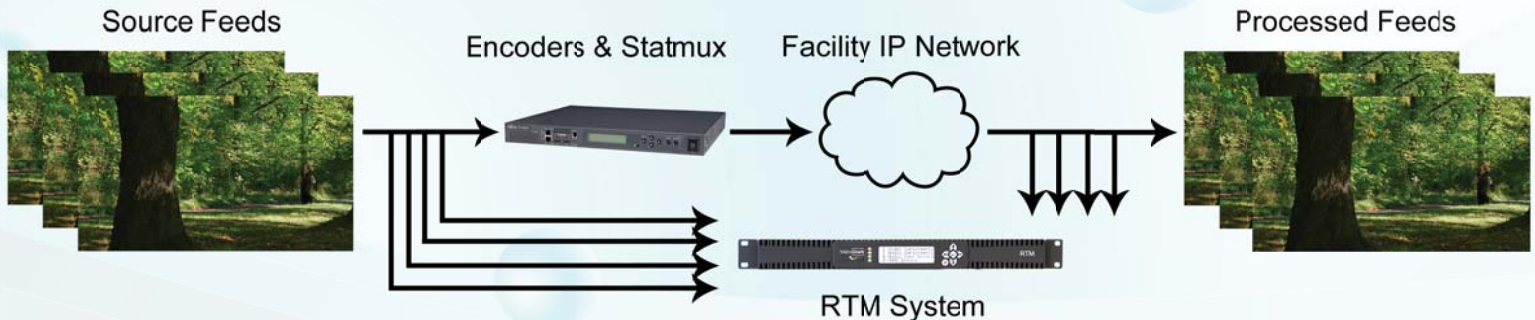
Control

RTM is controlled via its graphical user interface, command line or REST API
- The included RTM Manager also provides browser based set up and control of one or multiple RTM systems and instances

RTM Player



RTM - Multi-Channel Signal Flow Example - Four HD Channel Tests



Operation

RTM Automatically:

- Finds motion/transitions in audio/video
- Aligns video inputs spatially/temporally
- Aligns audio source to processed
- Calculates accurate audio/video offset
- Reports source to decode time in frames

Set automatic recordings based on:

- Pre-set degradation thresholds
- Frequency of error event
- Consecutive number of events

Dynamically realigns:

- Missing frames/samples
- Changes in processing or network delay and reports end-to-end delay changes

Continually reports and logs:

- Video quality with DMOS or PSNR
- Audio performance with aFreq
- Audio program group loudness
- A/V offset to the millisecond
- VANC data integrity per video line
- IP network packet loss
- End to end video delay

Records upon threshold breaks in:

- Video quality and audio quality
- Audio/Video offset (lip sync)
- VANC data integrity per video line

Records MPEG transport along with video errors for off line .ts file analysis.

Off-line Analysis

- Review RTM logs with RTM Log Grapher or easily export to Excel
- Drag and drop test log files on RTM Player GUI to restore recordings
- Comparatively view the recorded source and test video as side-by-side via the video output *or in a separate window on the desktop of the RTM*

RTM systems include:

- RTM, RTM Player with file exporter
- Interactive RTM Log Grapher
- RTM Manager and RTM Scheduler
- Each model may apply video source playback while testing one channel

RTM with Four SDI or No SDI interfaces - Models: RTM-S1083 and RTM-S1083-IP



Models: RTM-S1083, RTM-S1083-IP*

Storage: 2.0 TB, *IP model: without SDI I/O

Power: 100 - 240VAC, 47-63Hz, 300W Max

GUI Display Outputs: DVI, DP, or HDMI

Includes: RTM, Player & Manager, system guide pdf, 1RU rack ears, USB GNIC adapter, four SMB to BNC cables, HDMI output cable, analog breakout cable

Video I/O: SMPTE 259, 292, 296, 424, 425

- 4 3G-SDI inputs, 2 shared playback outputs (SMB)

- 1 HDMI 1.4 video & audio playback output

- Test Examples: 4 HD, 3 HD + 4 SD, 2 HD + 8 SD**

Audio I/O: 24 bit, 48 KHz

- 4 HDSDI inputs, 2 shared outputs (SMB)

- 16 channels of embedded audio per SMB

- PCM or Dolby® Digital Plus input decoded for test

IP Network Inputs: 2 - 1000baseT - RJ45

1 - 1000baseT - USB/RJ45

Dimensions: 17" W x 1.75" H x 10" D (1RU)

43.2 cm x 4.5 cm x 25.4 cm

Weight: 11.5 lbs, 5.2 Kg

Operating Temperature: 0 - +40 Celsius

Storage Temperature: -20 - +50 Celsius

Relative Humidity: 5-95%, non condensing

RTM with Eight SDI Interfaces - Model: RTM-S1084



Model: RTM-S1084

Storage: 2.0 TB

Power: 100 - 240VAC, 47-63Hz, Autodetect 300 Watts Max

GUI Display Outputs: DVI, DP, or HDMI

Includes: RTM, RTM Player, RTM Manager, system guide, 1RU rack ears, ten SMB to BNC cable kit, one USB GNIC adapter

Video I/O: SMPTE 259, 292, 296, 424, 425

- 8 3G-SDI inputs, 2 shared playback outputs (SMB)

- Input reference and test signals via SDI or IP

- Test Examples: 4 HD, 3 HD + 4 SD, 2 HD + 8 SD**

Audio I/O: 24 bit, 48KHz

- 8 3G-SDI inputs, 2 shared outputs (SMB)

- 16 channels of embedded audio per SMB

- PCM or Dolby® Digital Plus input decoded for test

IP Network Inputs: 2 - 1000baseT - RJ45

1 - 1000baseT - USB/RJ45

Dimensions: 17" W x 1.75" H x 13.75" D (1RU)

43.2 cm x 4.5 cm x 35.0 cm

Weight: 12.5 lbs, 5.7 Kg

Operating Temperature: 0 - +40 Celsius

Storage Temperature: -20 - +50 Celsius

Relative Humidity: 5-95%, non condensing

RTM Desktop, Portable, or Rackmount Models: RTM-S2043 and RTM-S2044



Models: RTM-S2043*, RTM-S2044

Storage: 4.0 TB

Power: 100 - 240VAC, 47-63Hz, Autodetect 300 Watts Max

GUI Display Outputs: DVI, DP, or HDMI

Includes: RTM, Player & Manager, system guide pdf, 2RU rack ears, keyboard, mouse, four SMB to BNC cable kit, HDMI output cable, analog breakout cable, USB to GNIC adapter

Video I/O: SMPTE 259, 292, 296, 424, 425

- 4* or 8 3G-SDI inputs, 2 shared outputs (SMB)

- 1 HDMI 1.4 video & audio playback output*

- Test Examples: 4 HD, 3 HD + 4 SD, 2 HD + 8 SD**

Audio I/O: 24 bit, 48 KHz

- 4* or 8 3G-SDI inputs, 2 shared outputs (SMB)

- 16 channels of embedded per SMB

- PCM or Dolby® Digital Plus input decoded for test

*Items with asterisk are applied to RTM-S2043 only

IP Network Inputs: 2 - 1000baseT - RJ45

1 - 1000baseT - USB/RJ45

Dimensions: 8.6" W x 3.5" H x 13.75" D (2RU)

22.0 cm x 9.0 cm x 35.0 cm

Weight: 11.5 lbs, 5.2 Kg

Operating Temperature: 0 - +40 Celsius

Storage Temperature: -20 - +50 Celsius

Relative Humidity: 5-95%, non condensing

**Applying source scaling reduces SD test count