

# 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.

At the transmission layer, broadcasters encounter familiar RF problems with a new challenge - coverage and interference problems caused by more channels at lower powers.

For multi-channel distribution, operators are relying 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, the quality must be assessed at multiple points across the network including a continuous test through an end point device (IRD or set top box) or end point IP stream sample.

**RTM systems compare the following:**

- Two reference inputs to two processed inputs
- Reference file to processed SDI input of same file feed
- Reference file to processed file

**RTM features:**

- Measures two video channel's quality in one system
- Measures audio quality and full program loudness
- Reports audio/video offset (lip-sync) to the millisecond, and end-to-end video delay as number of frames
- Measures VANC data integrity, line selectable
- Automatically records 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 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:**

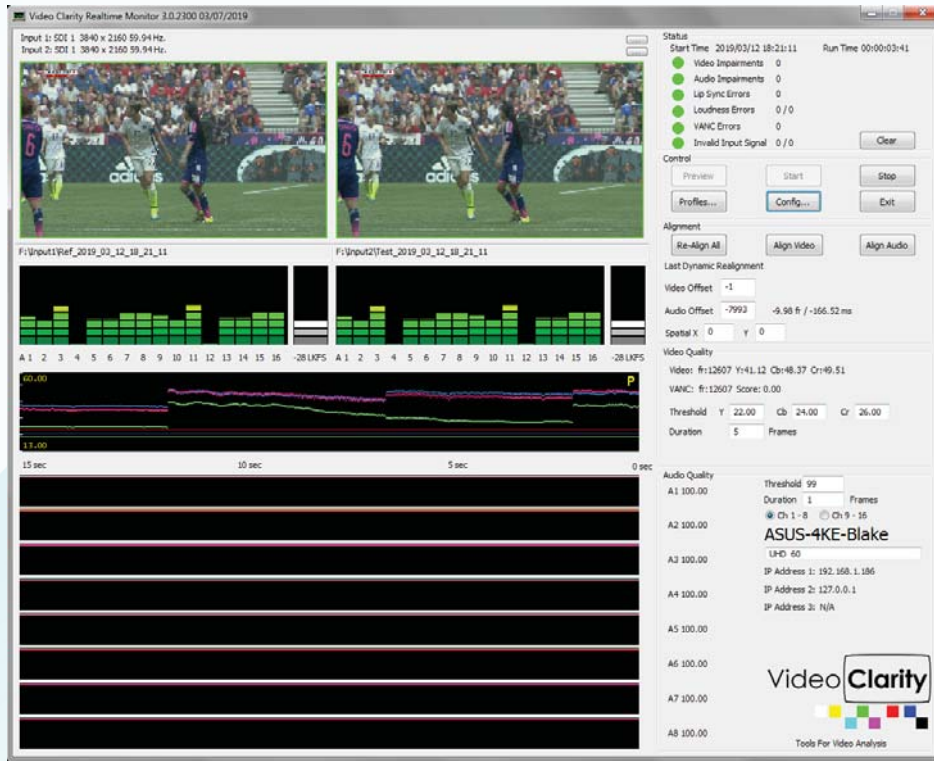
RTM includes a reference test sequence that can be exported as QuickTime, RAW file or recorded via RTM's HDSDI output. Once transferred, the sequence is then played from a server or Video Clarity Player in a remote site and transmitted to the studio location for live input to an RTM system which can 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 only the audio and video of each error with synced source content for off-line analysis**
- **Combining several A/V quality measurements into one solution that automatically compiles scores for any testing duration**

## RTM - Main User Interface



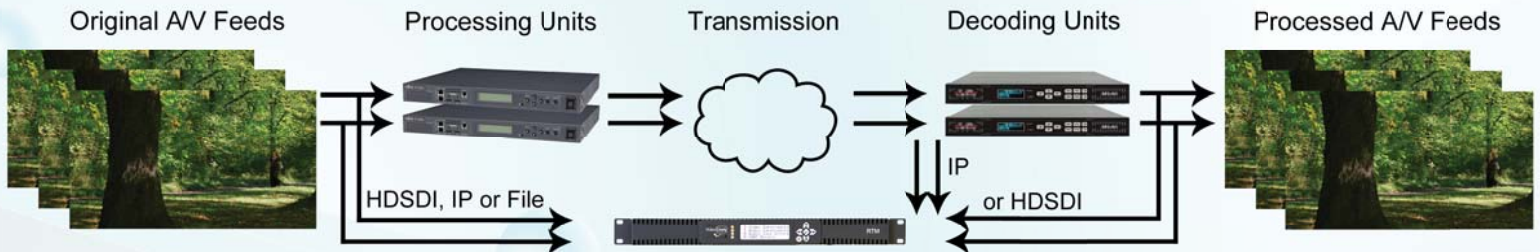
## Control

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

## RTM Player



## RTM - Dual-Channel Signal Flow Diagram



## 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:

- Two independent channels of testing
- Video quality with DMOS or PSNR
- Audio performance with aFreq
- Audio program group loudness
- A/V offset - non-invasive
- VANC data integrity per video line
- IP network packet loss indicator

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 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
- RTM-S2043 model includes source playback while testing one channel

## RTM 1RU Model: RTM-S1082



**Models:** RTM-S1082, RTM-S1082-IP\*  
**Storage:** 400 GB  
**Power:** 100 - 240VAC, 47-63Hz, 300W Max  
**GUI Display Output:** VGA, DP or HDMI  
**Includes:** RTM, Player & Manager, printed guide, 1 RU rack ears, one USB GNIC adapter  
 \*IP model excludes HDSDI video & audio I/O

**Video I/O:** ITU-601, SMPTE 259/292/296  
 - 4 HDSDI inputs, 2 playback outputs (BNC)  
 - Input 2 reference & 2 test signals up to 1080i 60Hz  
**Audio I/O:** 24 bit, 48 KHz  
 - 4 HDSDI inputs, 2 playback outputs (BNC)  
 - 16 channels of embedded audio per BNC  
 - Dolby® Digital Plus (input decoder incl.) or PCM  
 - 1 analog stereo alarm output - stereo mini

**IP Network Inputs:** 2 - 1000baseT - RJ45  
 1 - 1000baseT - USB/RJ45  
**Dimensions:** 17" W x 1.75" H x 10" D (1 RU)  
 43.2 cm x 4.5 cm x 25.4 cm  
**Weight:** 11.7 lbs, 5.3 Kg  
**Operating Temperature:** 0 - +40 Celsius  
**Storage Temperature:** -20 - +50 Celsius  
**Relative Humidity:** 5-95%, non condensing

## RTM Desktop, Rackmount and Portable Model: RTM-S2042



**RTM-S2042**  
**Storage:** 2.5 TB  
**Power:** 100 - 240VAC, 47-63Hz, Autodetect  
 300 Watts Max  
**GUI Display Output:** VGA, DP or HDMI  
**Includes:** RTM, Player & Manager, printed guide, 2 RU rack ears, keyboard, mouse, five SMB to BNC cable kit, one USB GNIC adapter

**Video I/O:** ITU-601, SMPTE 259/292/296  
 - 4 HDSDI inputs, 2 playback outputs (SMB/BNC)  
 - Input 2 reference & 2 test signals up to 1080i 60Hz  
**Audio I/O:** 24 bit, 48KHz  
 - 4 HDSDI inputs, 2 playback outputs (SMB/BNC)  
 - 16 channels of embedded audio per SMB/BNC  
 - Dolby® Digital Plus (input decoder incl.) or PCM  
 - 1 analog stereo alarm output - stereo mini

**IP Network Inputs:** 2 - 1000baseT - RJ45  
 1 - 1000baseT - USB/RJ45  
**Dimensions:** 8.6" W x 3.5" H x 13.75" D (2 RU)  
 22.0 cm x 9.0 cm x 35.0 cm  
**Weight:** 11.5 lbs, 5.4 Kg  
**Operating Temperature:** 0 - +40 Celsius  
**Storage Temperature:** -20 - +50 Celsius  
**Relative Humidity:** 5-95%, non condensing

## RTM 3G Desktop, Rackmount and Portable Model: RTM-S2043



**RTM-S2043**  
**Storage:** 2.5 TB  
**Power:** 100 - 240VAC, 47-63Hz, Autodetect  
 300 Watts Max  
**GUI Display Output:** VGA, DP or HDMI  
**Includes:** RTM, Player & Manager, printed guide, 2 RU rack ears, keyboard, mouse, four SMB to BNC cable kit, HDMI output cable, analog breakout cable, USB to GNIC adapter

**Video I/O:** ITU-601, SMPTE 259/292/296/424/425  
 - 4 3G HDSDI inputs, 2 playback outputs (SMB/BNC)  
 - Input 2 reference & 2 test signals up to 1080p 60Hz  
 - 1 HDMI 2.0b video & audio playback output  
**Audio I/O:** 24 bit, 48 KHz  
 - 4 HDSDI inputs, 2 playback outputs (SMB/BNC)  
 - 16 channels of embedded per SMB/BNC  
 - PCM or Dolby® Digital Plus input decoded  
 - 1 analog stereo alarm output - stereo mini

**IP Network Inputs:** 2 - 1000baseT - RJ45  
 1 - 1000baseT - USB/RJ45  
**Dimensions:** 8.6" W x 3.5" H x 13.75" D (2 RU)  
 22.0 cm x 9.0 cm x 35.0 cm  
**Weight:** 11.5 lbs, 5.4 Kg  
**Operating Temperature:** 0 - +40 Celsius  
**Storage Temperature:** -20 - +50 Celsius  
**Relative Humidity:** 5-95%, non condensing  
**RTM-S2043 includes playback while testing feature**