Video Clarity

Tools for Video Analysis

Real-Time Monitor (RTM) System Guide

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1 Real Time Monitoring (RTM) System

At the processing layer, problems arise when down-converting HD to SD, changing formats, and compressing the signal into the available bandwidth. Also the separate processing of audio, video, and data can lead to synchronization problems.

At the transmitting layer, broadcasters encounter their familiar RF problems with a new challenge - coverage and interference problems caused by more channels at lower powers. Broadcasters rely on telecommunication technology so latency, packet loss, and synchronization add additional concerns.

Errors in one layer can cause errors in the next. For example blockiness caused by compression looks similar to packet loss/bit errors.

For this reason, the quality must be monitored at multiple points across the network including at the end users device (set-top box, mobile).

RTM - a full reference broadcast quality monitor:
- Measures the audio and video quality
- Measures the audio and video delay (lip-sync)
- Measures the audio program loudness of both source (1) and test (2) input
- Measures the VANC data lines integrity
- Alarms and records the A/V sequences if any of the above have fallen below the degradation threshold as set by the user

The degradation threshold is pre-configured by your engineering team and set to detect:
- Fine detail - blur, blockiness, and
- Gross impairment - loss of signal, picture freezes, lip-sync.

RTM can compare any combination of
- SDI input
- IP input
- File input

Applications
- In-service broadcast monitoring
- Long duration QA testing for networks or devices
-Television Production Truck to Central Office lip-sync and quality pre-check

RTM includes reference test patterns, which can be exported as QuickTime, RAW, or AVI files or played through SDI outputs. These can be stored in your Production Truck to check lip-sync and A/V quality or can be used for QA testing.

Being a full-reference monitoring device, RTM is not influenced by the “artistic” quality of the source.

RTM continually aligns to measure lip-sync and it reports any frame loss.

2 Hardware Quick Setup Guide

Figure 1: RTM-1RU Back Panel

Models: RTM-S1081 (discontinued model)
RTM-S1082 (discontinued model)

Figure 2: RTM-1RU Front Controls

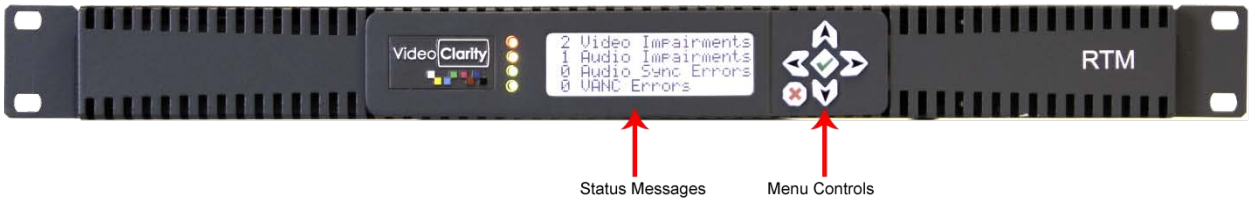


Figure 3: RTM-3G Back Panel

Models: RTM-S3082 (discontinued model)
RTM-S3083 (discontinued model)

Figure 4: RTM 3G Portable Back Panel (supplied with SMB to BNC, mini HDMI and also supplied with analog breakout cables for playback)

Model: RTM-S2043 (discontinued model)

This unit has its HDSDI connector labels 1,2,3,4.
Inputs are connections 1 and 2. Outputs are connections 3 and 4.

Figure 5: RTM HD 2U Portable Back Panel (supplied with 5 SMB to BNC conversion cables)
Model: RTM-S2042 (discontinued model)

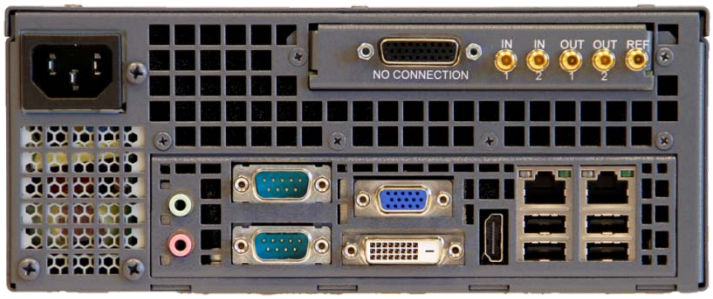


Figure 6: RTM 4K Back Panel (Supplied with two sets of Quad SMB to BNC conversion cables for inputs 1 and 2 and mini HDMI cables for error recording playback from either or both outputs)
Models: RTM-S8084 (10 TB storage model) (discontinued model)

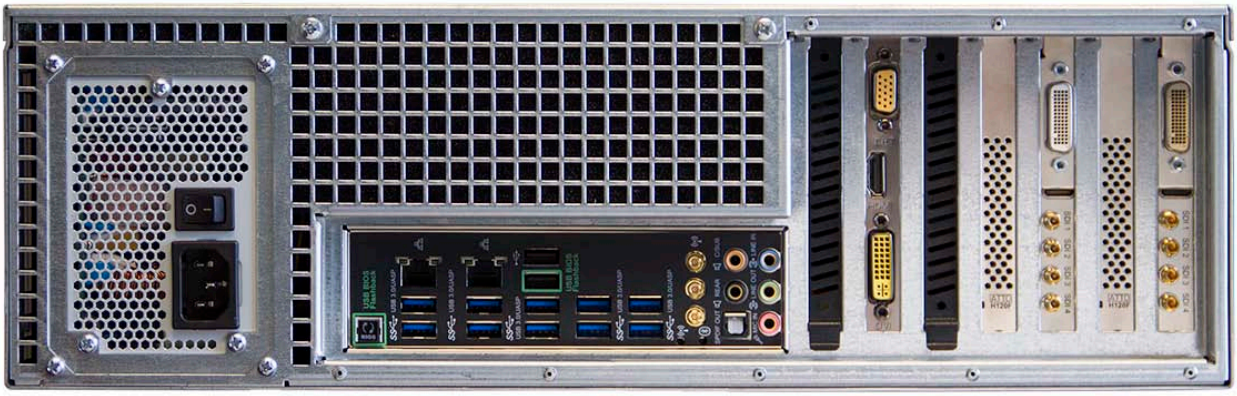


Figure 7: RTM Back Panel (Supplied with four SMB to BNC cables for inputs and mini HDMI cables for error recording playback)
Model: RTM-S1083 (shown) or RTM-S1083-IP which has no SDI, HDMI, or Analog interfaces

Figure 8: RTM Back Panel (Supplied with eight SMB to BNC cables for inputs)
Model: RTM-S1084

Figure 9: RTM Portable Back Panel (Supplied with four SMB to BNC cables for inputs and mini HDMI cables for error recording playback)

Model: RTM-S2043

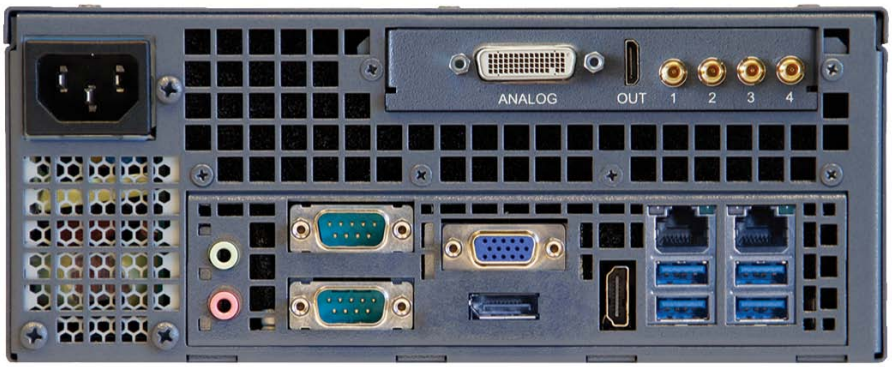


Figure 10: RTM Portable Back Panel (Supplied with eight SMB to BNC cables for inputs)

Model: RTM-S2044

Figure 11: RTM 4K Back Panel (Supplied with five SMB to BNC conversion cables for 4 inputs and one reference. Optional uncompressed IP card shown in photo.

Model: RTM-S8085 (8 TB storage model)

RTM 4K Important Notes:
4K monitoring and measurement test operation is for 3840x2160p resolution input via Quad HDSDI on Input 1 to be compared to same frame rate and resolution on Quad HDSDI Input 2. Frame rates of 3840X2160p video supported on both inputs are 60, 59.94, 50, 30, 29.97, 25, 24, or 23.98Hz. Other modes of operation such as IP stream decoding or file-based operation at the 4K resolution and frame rates are not supported.

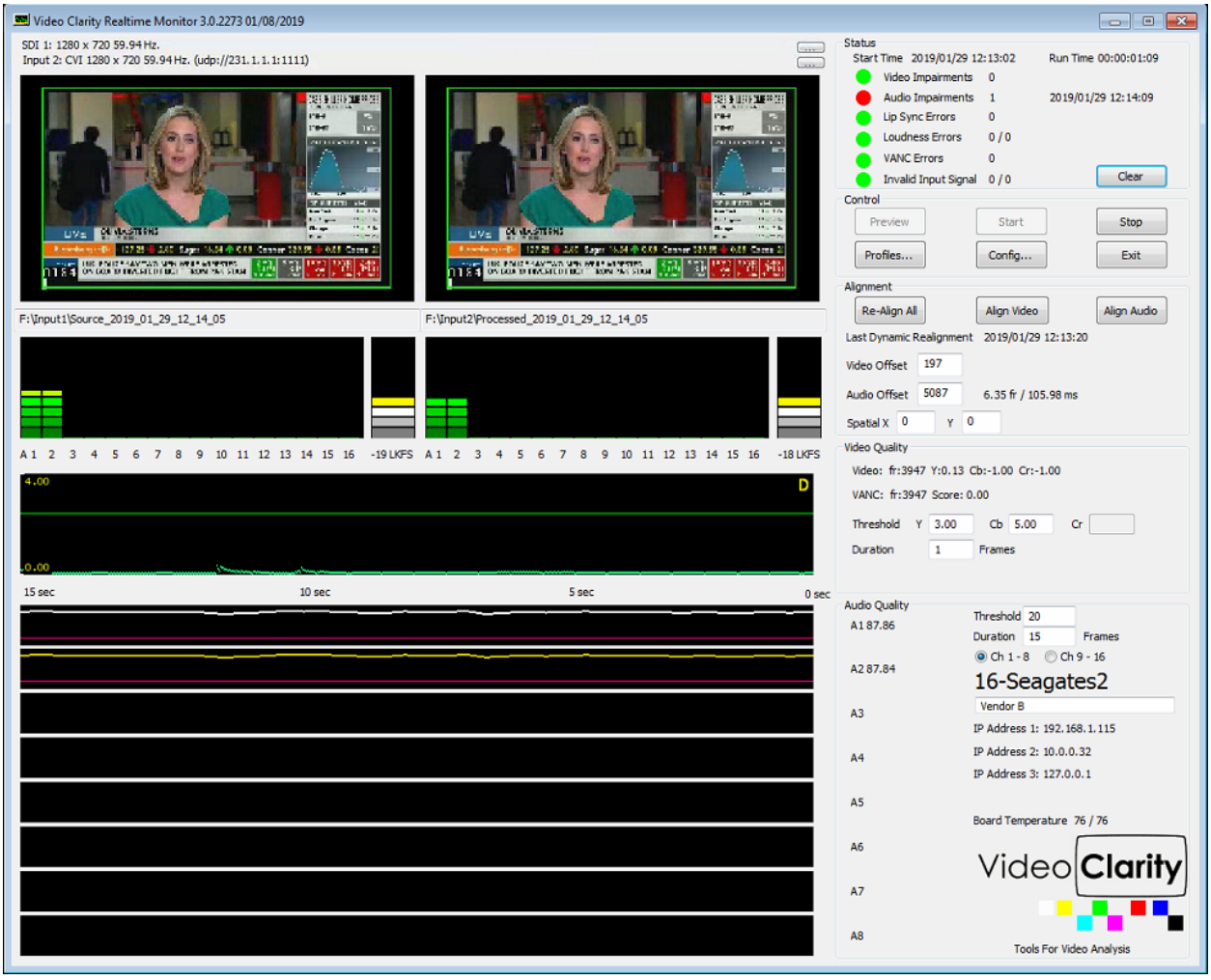
To operate RTM (regardless of model):

- Connect the included USB Keyboard and Mouse
- Connect a HDMI, DVI or VGA monitor to the system graphics output connector
- Connect signals to Input 1 and Input 2 (For file-based operation, this is not necessary)
- Connect signals for Input 1 and 2 via IP GNIC (applied up to HD or lower resolutions only) can selected for MPEG stream decoding on Input tab in Configuration menu with same NIC or separate NIC interfaces.
- The Output connectors are an echo output of the input (except when using the separate RTM Player application).

The hardware specifications of each system above is detailed in the RTM datasheets or on the Video Clarity website here.

3 Software Quick Setup Guide

Figure 4: RTM Running



After launching the RTM application if it not set for automatic start, then all you have to do is press the Start button in the Control pane.

Pressing Start will include a full alignment, which independently aligns the audio and video streams. Upon completion, the alignment pane is updated:

- The video offset is noted in frames
- The audio alignment with respect to the video offset is noted in samples, frames, and time (milliseconds/ms)
- The video spatial alignment in pixels is noted.

For the example above, the audio offset is -17.7ms, which means that the audio is ahead of the video by ½ a frame.

The video, audio, and VANC are compared against a threshold/duration, and if they exceed the designated limits:

- a recording is started of both incoming signals,
- a log entry is made,
- the status in the Status pane is updated,

- an audio alert is generated,
- the status on the 1RU's front panel is updated, and
- a log file (.psnr or .audio) is created which contains the difference values for the created recordings. This log file can be dragged/dropped onto ClearView for easy setup and post-anlysis.

It is expected that the incoming signals will drift from each other over time. For example, the delay between the signals may be 344 frames for a day, 343, for a day, and back to 344 the next. This is due to several factors including:

- the sources not being genlocked
- the sources changing between national and local feeds

RTM is aware of this and compensates for it using dynamic re-alignment.

The remainder of the screen is devoted to showing the quality over time. The 2 videos are shown side-by-side after alignment. This is a decimated image and does not necessarily show the entirety of the video quality. The min/max amplitude of the audio is shown as a meter per channel up to 8 channels.

Several graphs are depicted:

- A Volume activity meter is provided for each audio channel per input
- An LKFS meter is provided reporting Loundness in real-time
- To the right of this metering A/V offset is reported in samples (window), frames and ms
- Video graph is showing the PSNR score over time
- Audio graph is showing the frequency/amplitude of each channel score over time.

RTM reliably detects MPEG breakups, frozen video, lost audio, A/V offset (lip sync) and most typical causes of impairments found in broadcasts today. The picture below shows each section of the graphical reporting structure.

Figure 5: Graphs for audio metering, video and audio score running continuously

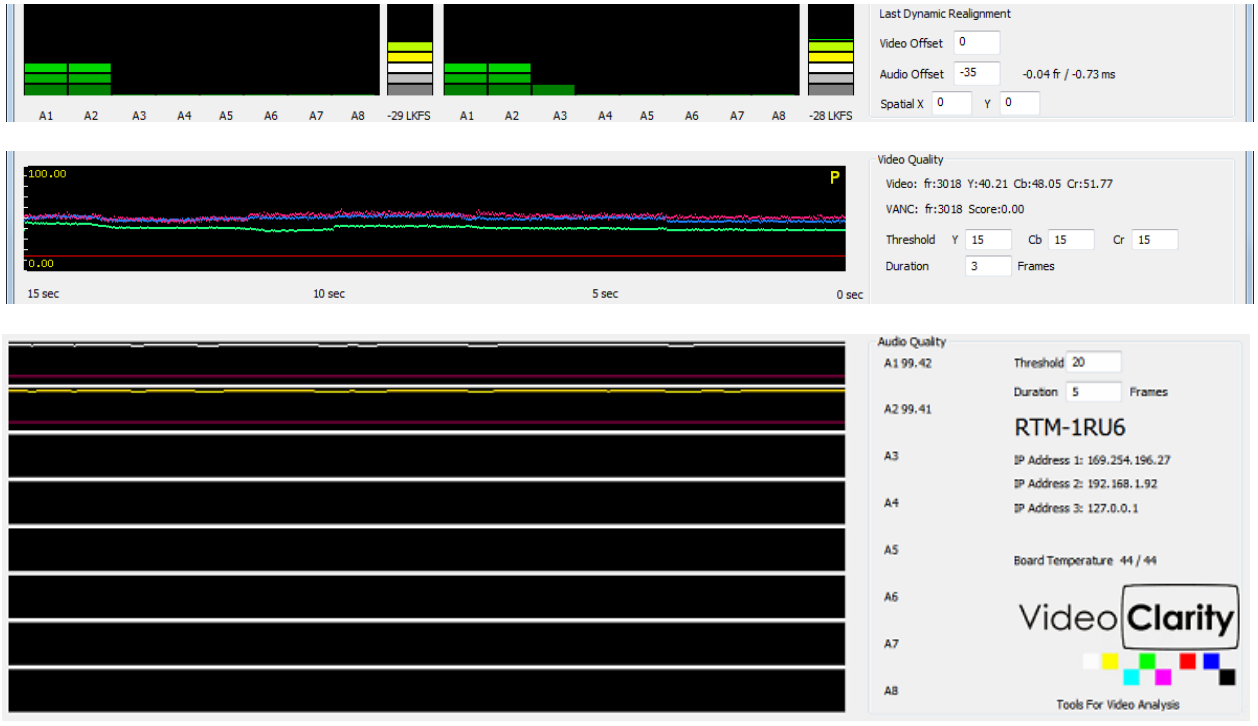


Figure 6: Detected Impairment Example (top-bottom view from ClearView)

The log files are saved in the ClearView Video Analysis format, which means that they can be played back using:

- The included RTM Player application, or
- Further analyzed using ClearView, which can generate detailed reports.

4 Typical Applications

4.1 Long Duration Testing

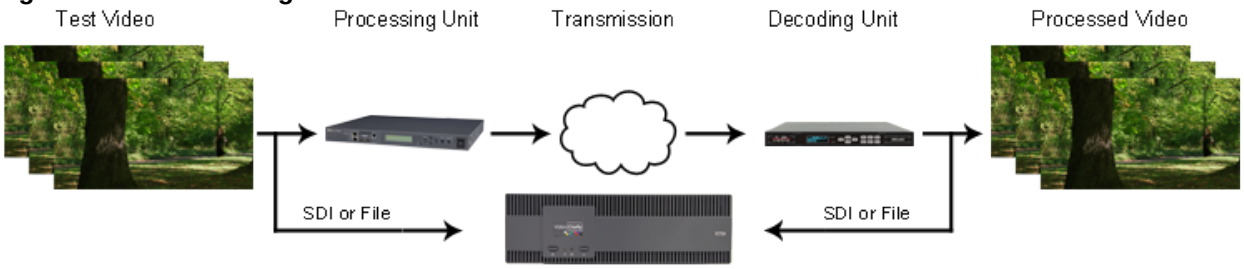
What would happen if the video processing units did not produce an error for several hours or days? Perhaps a particular set of input data sent at just the wrong time was needed to create the problem. This type of problem is very difficult to replicate, but it will be the first problem that your customer's find.

RTM can be used for nearly any extended duration quality monitoring applications. Plug in 2 SDI streams or 1 stream and a file, and RTM will alarm when the quality exceeds the threshold. It will also save the streams before and after the condition for inspection.

Regardless of the input, RTM continually monitors and records the A/V stream when the

- Audio or Video quality drops below a defined threshold,
- Lip-sync exceeds the delay thresholds, or
- Ancillary data (VANC) is missing.

Figure 7: Standard long duration test



4.2 Broadcast Monitoring

Once captured, many problems can be classified

- The video is black
- The audio is silent
- The video and/or audio is distorted
- The video and audio are out of sync with reference to each other
- The ancillary data (closed captioning, subtitles, etc.) is not intact or timed properly

Errors will occur. Simple errors are easily found and corrected, but some happen infrequently and/or in the presence of special conditions.

The recorded stream is stored in the ClearView sequence folder format for further analysis and classification.

In addition, RTM reports

- The average A/V quality,
- A/V delay/offset, and
- Any dropped frames and then dynamically realigns.

4.2.1 Reference Content Caused the Error

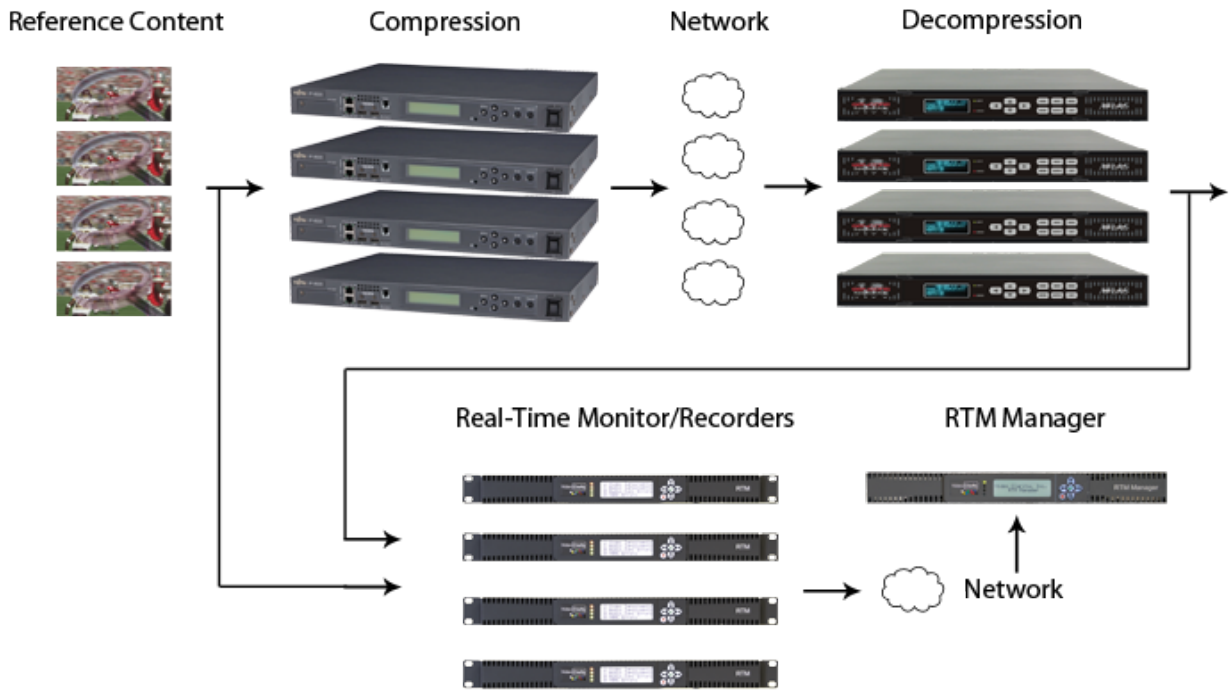
At times the reference content can have break-ups in it, and this can cause the processed content to further break-up or completely freeze.

4.2.2 Processing Content Caused the Error

By putting traffic on the network or by over-compressing the reference, the received (set-top box output) may have breakups.

The only way to find these is to monitor every channel at the end-points and then diagnose problems backwards in time until you find the problem.

Figure 8: Network using multiple RTMs

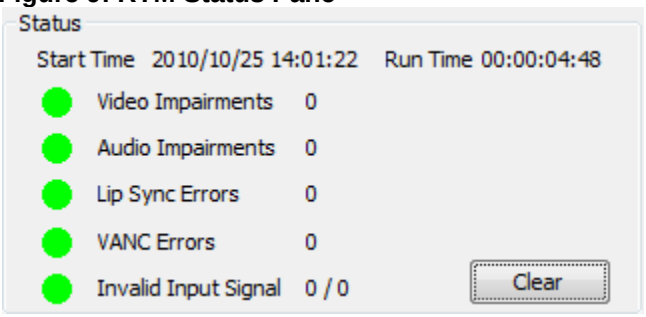


5 Setting RTM Parameters

Upon startup, RTM will launch with the configuration from the last time that it was operating. The parameters on this page, can be changed while, the system is running.

5.1 RTM Status

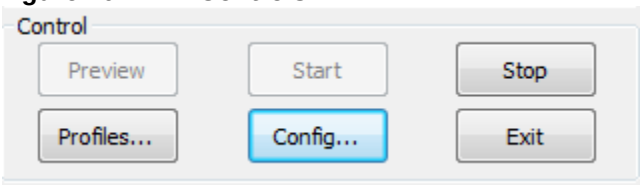
Figure 9: RTM Status Pane



Status Messages	This is the current status of each type of error. If the status is red, then an error has occurred. The number of errors is noted. *NOTE: details are in the RTM log files.*
Clear	This resets the status to 0 errors and turns everything green.

5.2 RTM Controls

Figure 10: RTM Controls



Preview	Pressing this button acquires the audio and video and shows the 2 images in the preview pane. It does not start the operation of checking quality.
Start	Pressing this button performs the operations of preview and starts the operation of checking quality.
Stop	Pressing this button stops the operations of RTM.
Profiles	Pressing this button allows you to load a configuration profile that you have previously saved. This includes network configurations for IP.
Config	Pressing this button brings up the configuration menu
Exit	Pressing this button exits RTM (closes the application).

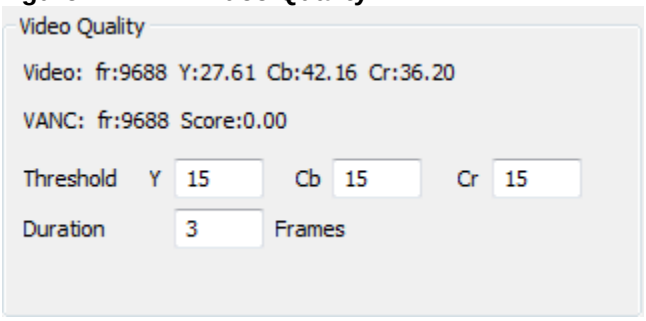
5.3 RTM Alignment

Figure 11: RTM Alignment

Re-Align All	This button does a full alignment of the video and audio.
Align Video	This button aligns the videos but does not align the audios
Align Audio	This button aligns the audios assuming that the current video alignment is correct. *NOTE: if the video alignment is not correct, then the audio alignment may fail.*
Video Offset	This is the calculated video offset in frames after the alignment has completed. *NOTE: alignment is automatic from start* *NOTE 2: you can type in your own alignment*
Audio Offset	This is the calculated audio offset in samples relative to the 2 video streams being aligned. *NOTE: it is also show in video frames and milliseconds (ms)* *NOTE2: you can type in your own alignment*
Spatial X, Y	This is the calculated spatial offset because the 2 videos may have a pixel shift up/down. If the offset is know, you can type in the numbers here and turn off the automatic calculation to speed up the alignment process.

5.4 RTM Video Quality

Figure 12: RTM Video Quality

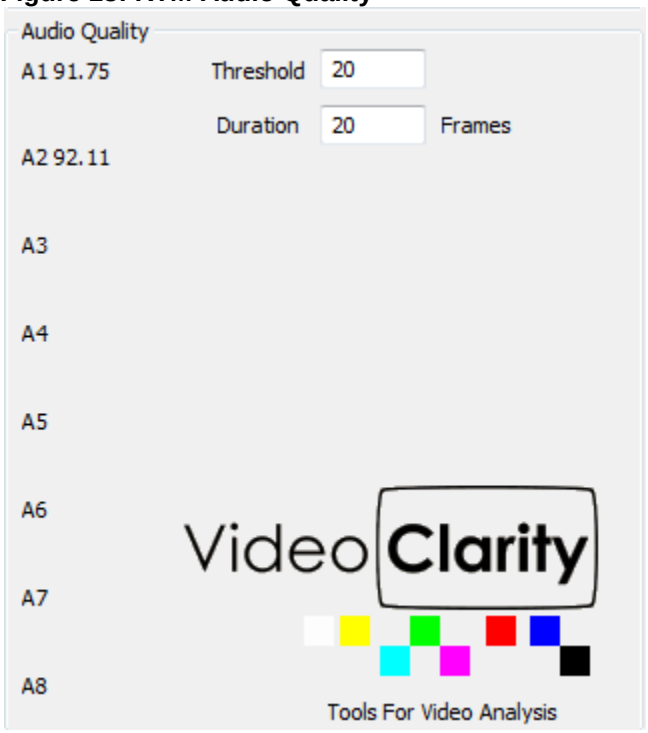


Status	These are status message which display the current frame that is being analyzed (relative to 0/start), the video quality score for Y, Cb, and Cr, and the VANC score based on which lines are being evaluated.
Threshold	The video quality is deemed to be poor if the falls below the threshold stated here. The threshold can be different for Y, Cb, and Cr.
Duration	This value defines how many consecutive video quality failures are needed to trigger a recording.

	NOTE: there are more parameters under the Configure Sequence Creation Pane. *NOTE2: Dynamic re-alignment may notice that the video is not aligned and reset the error counter after making a correction.*

5.5 RTM Audio Quality

Figure 13: RTM Audio Quality



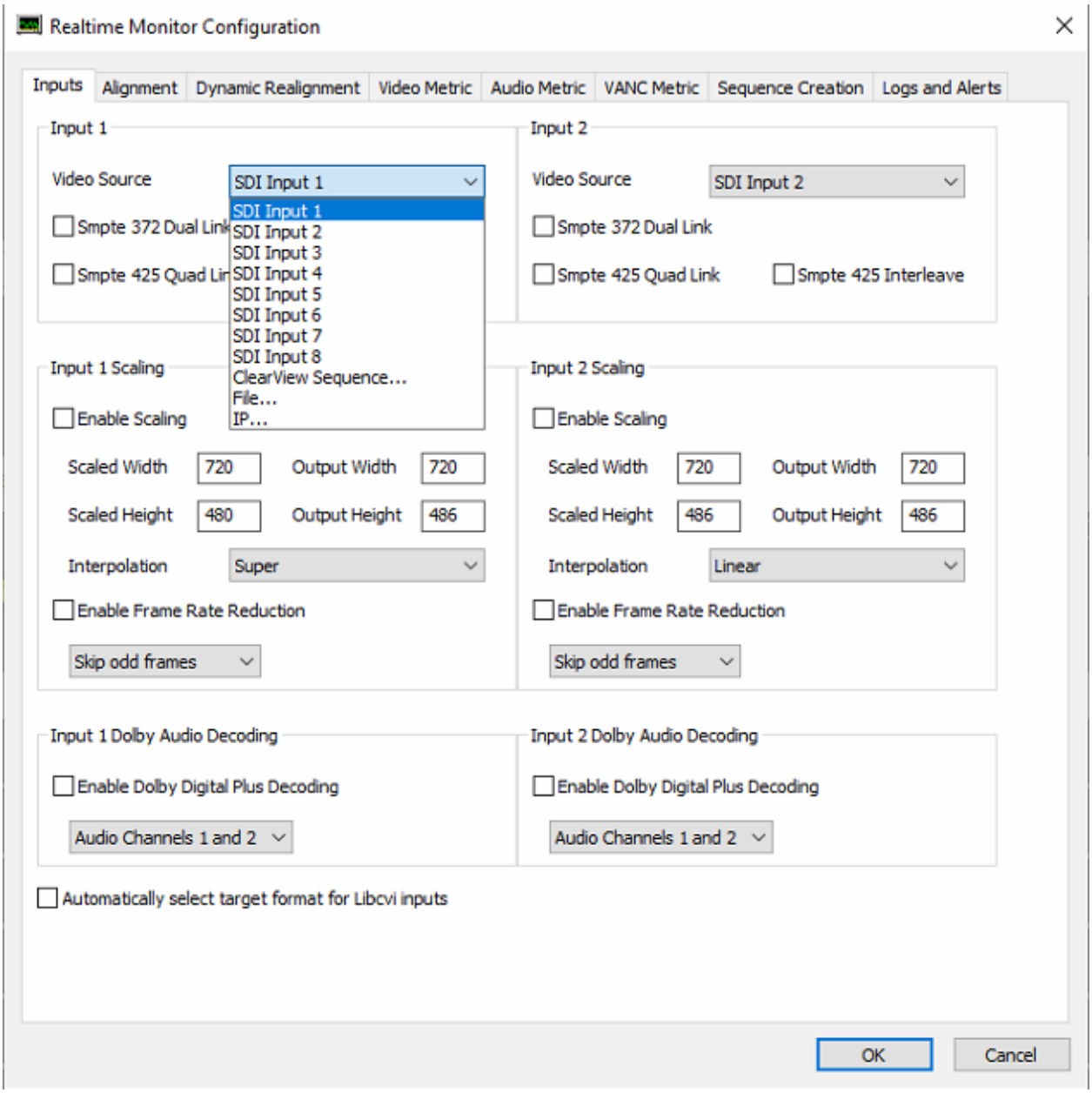
Status	These are status message which display the current audio quality score for each active audio channel.
Threshold	The video quality is deemed to be poor if the falls below the threshold stated here.
Duration	This value defines how many consecutive audio quality failures are needed to trigger a recording. *NOTE: there are more parameters under the Configure Sequence Creation Pane.*

6 Setting Normal Configuration Parameters

Pressing Config from the main RTM page, lets you setup the general configurable parameters. Each of these will be discussed in this section.

6.1 Inputs Pane

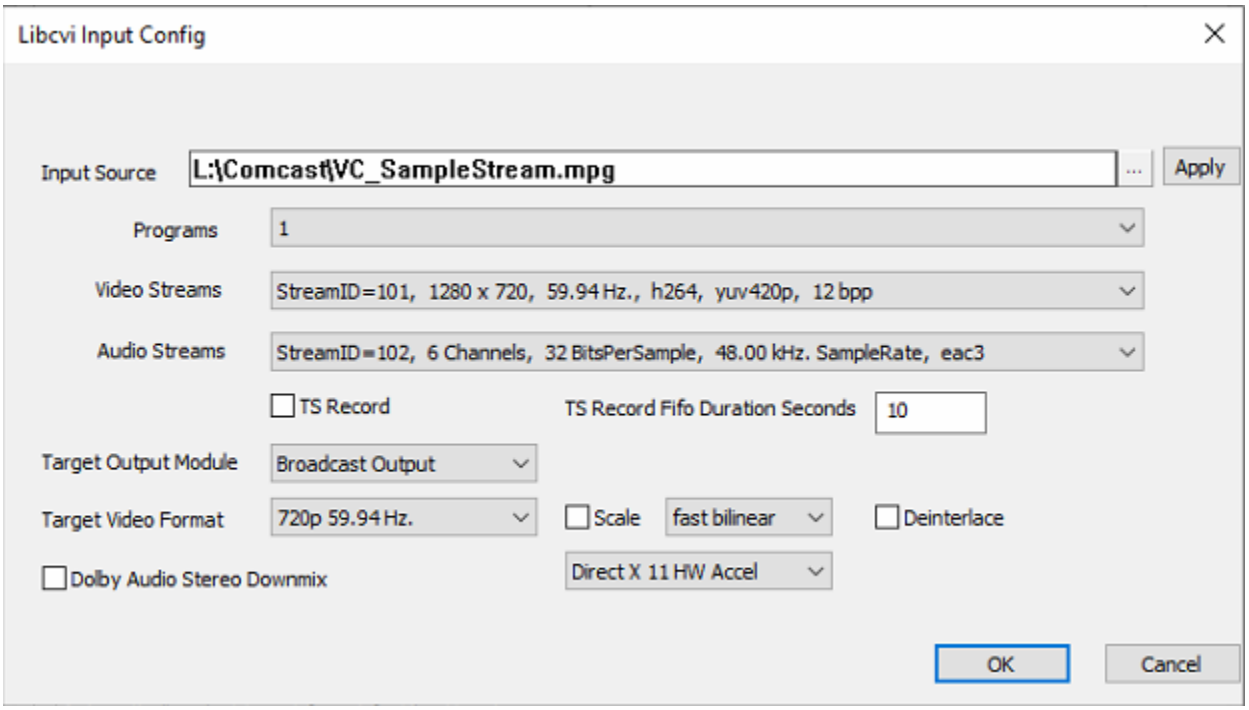
Figure 14: Video Input Pane



Video Source	SDI Input is the hardware input. IP is compressed IP stream input File is compressed/uncompressed file input ClearView Sequence is a file input which has already been brought

	into a ClearView library. *Note: You must use ClearView to convert the compressed or uncompressed file into the appropriate format or you can record the input.*
Enable Scaling	Select to enable scale source or test side inputs to desired X/Y res.
Scaled Width/Height	Input correct Width/Height of the desired test resolution to match either input 1 or input 2.
Output Width/Height	Output width/height is determining how the video is formatted to play back via ClearView or RTM Player applications. Must be equal to existing output format drop down values if it is to be played back on RTM or ClearView physical (HDSDI or HDMI) outputs.
Enable Frame Rate Reduction	This setting allows control parameter to be set for type of frame rate reduction per drop down menu.
Video Input	Select from SDI, ClearView Sequence, IP/Compressed or Watch Folder input. Note: ClearView Sequence is an already imported file as an input to RTM, *therefore you must use ClearView or ClearView File Importer to convert the compressed or uncompressed file into the appropriate format before you can select and use a file as the input.*
Dual Link	Select this option if the SDI feed is dual link, or level B.
Dolby Audio	Select to enable Dolby audio decode. Please note that you need a Dolby decode license to enable this setting.

6.1 IP and File Configuration Pane



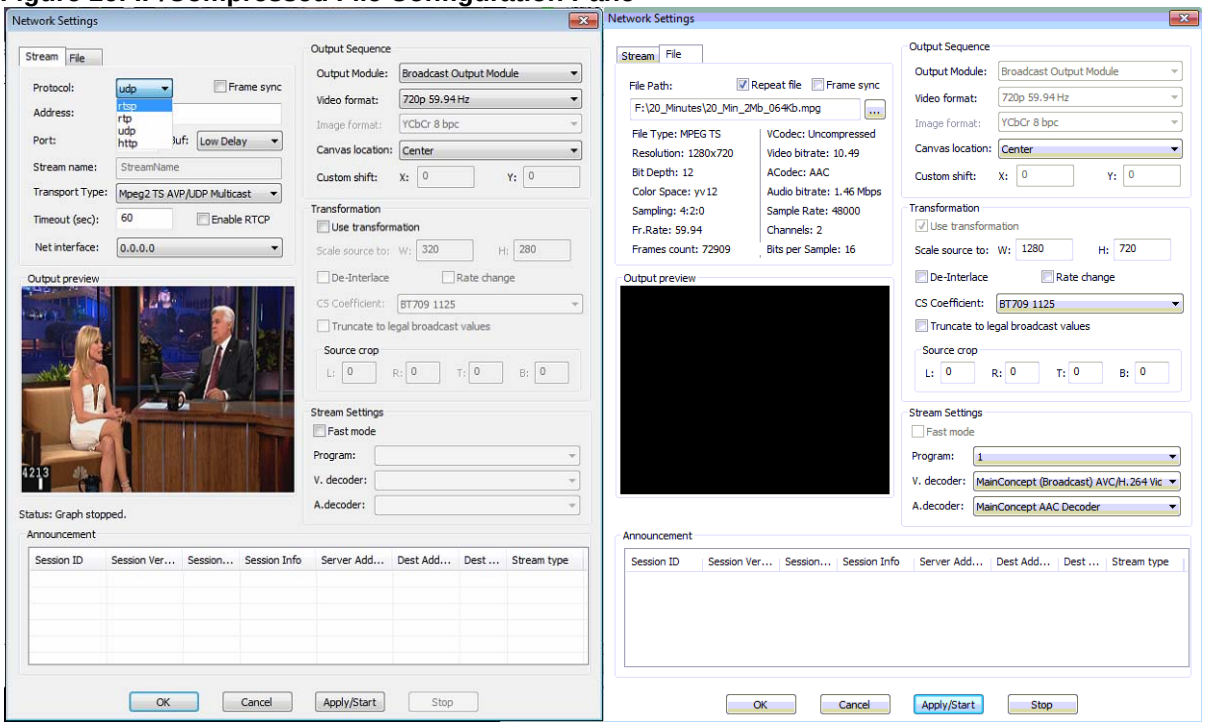
6.1.1 Settings

Source Selection	Set the source to be file or compressed IP stream
Input Source	Prompts user to select file or input stream information
Program	Select the Program to decode if MPTS

Video Stream	If a program ID isn't available select video stream
Audio Stream	If a program ID isn't available select audio stream
TS Record	Application will record raw .ts file when impairment occurs
TS Record Fifo duration	Duration of recording
Target Output Module	Option to select default broadcast formats or non-standard video formats
Target Video Format	Sets target video format. If left blank the application should set this based off source file properties
Scale	Allows the user to scale to target video resolution
Scale Dropdown Selection	
De-interlace	Enables ffmpeg based de-interlacer.
Dolby Audio Stereo Downmix	
Hardware Acceleration	

6.2 Legacy IP/Compressed Configuration Pane

Figure 16: IP/Compressed File Configuration Pane



6.2.1 Legacy IP Stream Settings

Protocol	Rtsp, rtp, udp or http protocols are supported, select one that is matching the incoming stream protocol
Address	Input the correct and active IP address of the incoming target stream to test
Port	IP port number, usually four digits
Stream Name	Name the stream if desired
Transport Type	Select from drop down menu only
Timeout	Time to wait before the system will time out if stream not detected

Net Interface	Auto detect or static input number as may be required by the network
Announcements	Session announcements on IP network detected

6.2.2 Legacy File Settings

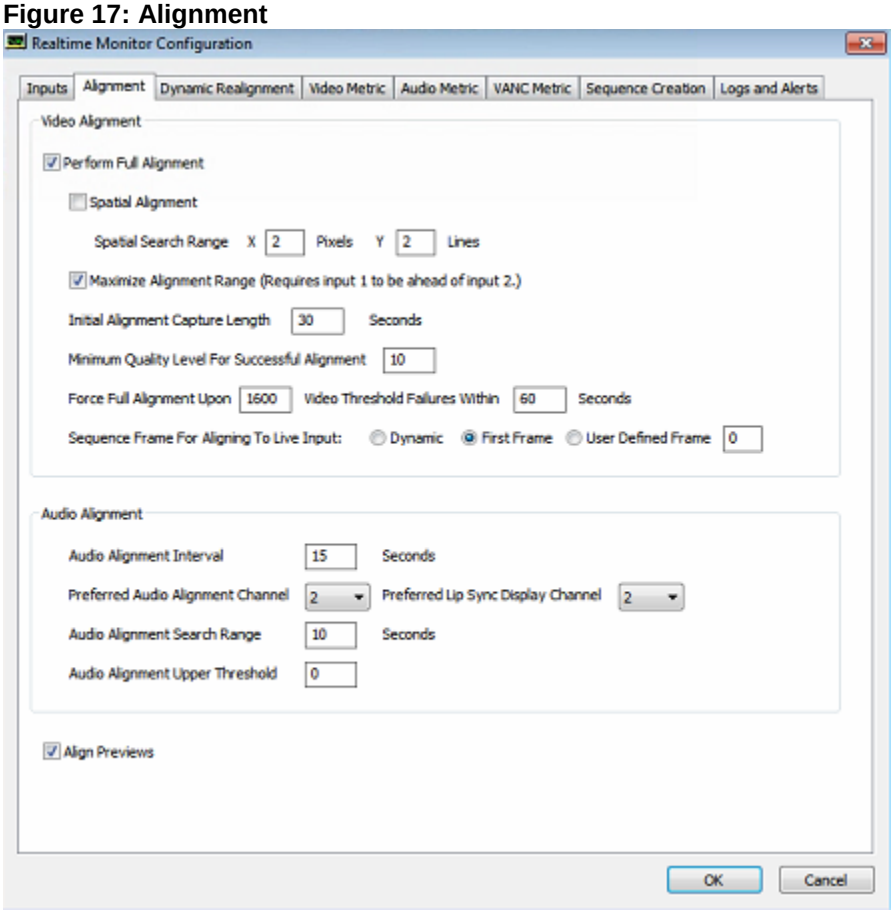
File Path	Locate file on your network or a location on the local file system
Repeat File	This setting is if you want to run a loop test so that the file repeats itself as a test run for longer than the actual file length
Frame Sync	Synchronizes the playout of files to live video

6.2.3 Output and Stream Settings

Output Module	If greyed out you must stop RTM and also stop any preview in this window for this to become active. Module selected is for one of two - No Video Output Module: In this case the tested format is a non-broadcast format that may not need errors to be played back via HDSDI (or HDMI) outputs. - Broadcast Output Module: Select this option if the input format is one that is a broadcast format compatible with HDSDI as in the Video Format drop down.
Video Format	Select one of the formats from the drop down menu. If the video format is non-broadcast and not one in this dropdown menu. Open ClearView or RTM Player (model dependent as to which you use) and then select No Video Output Module
Image Format	Predefined list if Broadcast Output module is selected. Must match input format or if not truncation may occur. If No Video Output Module is selected then a predefined list will populate based on defined parameters in ClearView or RTM Player before starting RTM.
Canvas Location	Test format location selection via drop down to be placed within Broadcast Video Output format selected.
Custom Shift	X defined number of pixels to shift image in canvas location to the right from selected canvas location. Y entered number of pixels will shift images in canvas location to the downward direction from selected canvas location.
Use Transformation	Checked box activates scaling function, unchecked is deactivated
Scale Source To	Input size to scale input video resolution to new size
De-Interlace	Takes progressive formats to interlaced format at scale resolution and frame rate selected
Rate Change	Rate at which video will be recorded when faults occur and are recorded
CS Coefficient	Selection in drop down for standard definition or high definition standards if color space conversion is required
Truncate to Legal Broadcast Values	Truncates luma and chroma to 15 to 240 for 8 bit video
Source Crop	L = Number of pixel to crop from left side of picture R = Number of pixels to crop from right side of picture T = Number of pixels to crop from top side of picture B = Number of pixels to crop from bottom side of picture
Fast Mode	Automatically selects the current network filter
Program	Selects the PID within the mux
V. Decoder	Applied video decoder, drop down selection (may be stream dependent at times which one of these provides best results)
A. Decoder	Applied audio decoder should be selected depending on audio codec in stream

6.3 Alignment Pane

Figure 17: Alignment



6.3.1 Video Alignment

Enable Full Alignment	Checking this box will enable a full alignment when the Start button (from the main RTM window), on startup, or when RTM realizes that it cannot dynamically realign.
Spatial Align	This flag enables a spatial test between the two incoming signals. Since compression algorithms often eliminate the border pixels knowing that the TV will over-scan (e.g. MPEG generates a 704x480 image to fill a 720x486 video display), the decoding device needs to orient the picture. Thus, a horizontal or vertical shift will take place. RTM needs to detect and compensate for this shift before the monitoring begins. *NOTE: if you know the spatial offsets, you can uncheck this box and simply type in the values on the main RTM page's alignment pane.*
Max X, Max Y	This is the maximum horizontal and vertical search range for spatial alignment. The values are X – 0..8 and Y – 0..8.
Maximize Alignment Range	When RTM starts it must first determine the temporal and possible spatial offsets between two signals. This is done by capturing a number of frames from both inputs and then finding a best match between the two and determining the temporal and spatial offsets. In situations where delay is greater than 100 frames, this box should be checked. *NOTE: requires Input 1 to be ahead of Input 2*

Align Disk Files	This flag enables RTM to use the hard disk during full alignment to store the sequences; instead of RAM. The advantage is that the number of frames can be larger. The only downside is that it requires some hard disk space.
Max Alignment Capture Frames	For the initial full alignment, RTM will record from both inputs for as many frames as are defined in this field. During this time interval, both inputs must have at least 2 temporally significant events. *NOTE: Time is saved by properly setting this value. If you know your delay is < 3 seconds, 12 seconds would most often be sufficient for Max Alignment Frames. A value of 0 uses the maximum available in the 8 GB of onboard RAM.*
Full alignment threshold	When using the video quality metric, this minimum value must be met before stating successful alignment. The number is on a 0-100 scale where anything over 15 or 20 is good.
Full alignment upon Video Threshold Failures Within	If RTM sees too many errors over a period of time, it can be caused by no longer being in alignment. This setting tells RTM how many errors are too many in what period of time (seconds) set by the user.
Sequence Frame For Aligning Live Input	When running from a ClearView sequence, this allows you to choose which frame to align from. Dynamic means the RTM to operate the same way it does with every other input and allows it to use a frame selected by the RTM. First Frame means the RTM will use the first frame of the sequence for alignment. User Defined Frame means the RTM will use the frame defined by the value set by the user to find the alignment.

6.3.2 Audio Alignment

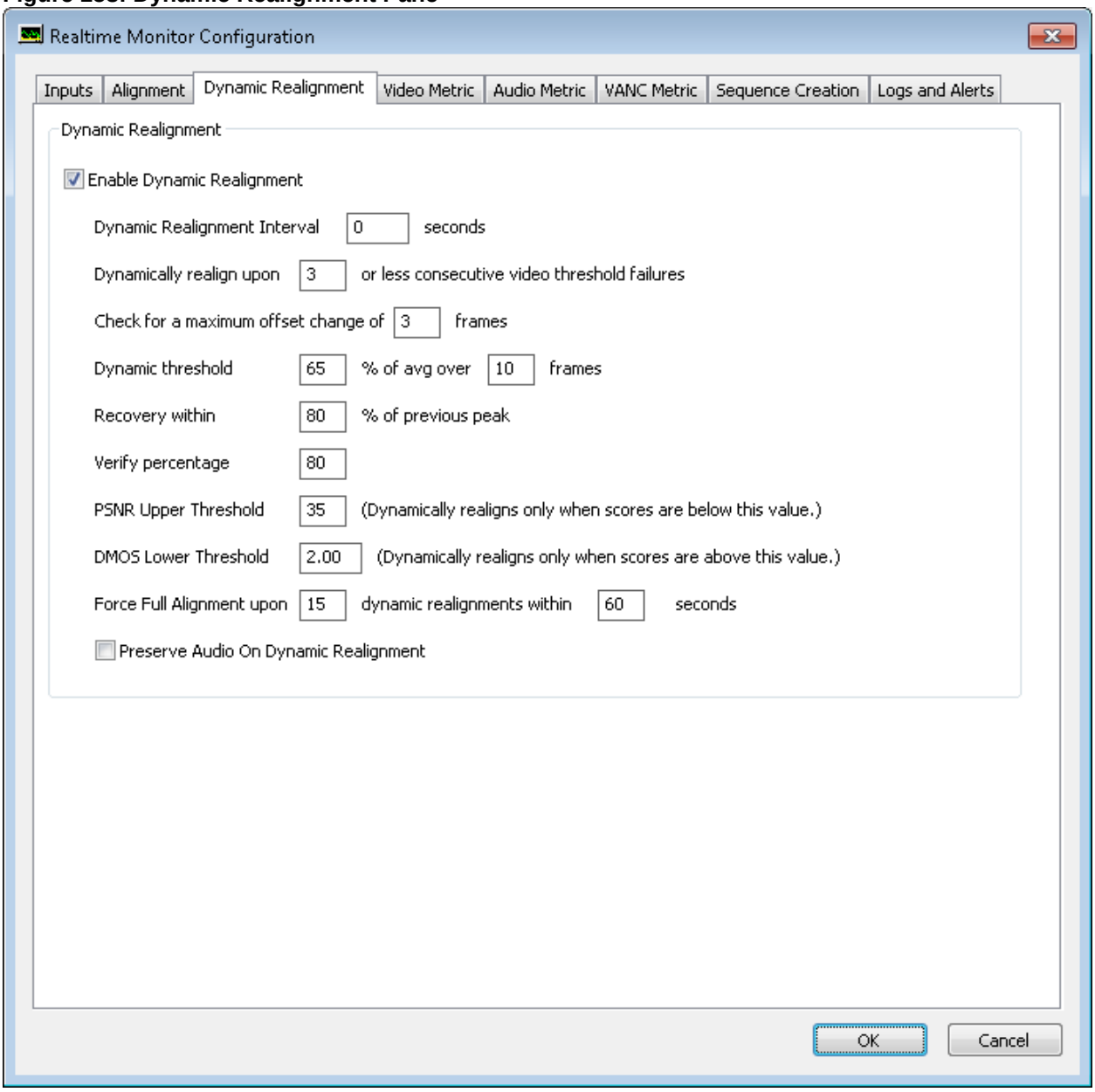
Audio Alignment Intervals	Defines how often RTM will check for audio drift. This is also how often the file AudioAlign.log is updated. AudioAlign.log records the value of the audio offset for long-term monitoring. *NOTE: this is in seconds.*
Preferred Audio Alignment Channel	RTM will first try to use this audio channel for audio alignment. The audio channel must be enabled and the audio on this channel must have sufficient audio events required to perform a successful alignment. If the preferred audio alignment channel does not contain enough audio information, then RTM will circulate through all of the enabled audio channels looking for sufficient audio information.
Preferred Lip Sync Display Channel	RTM will use the selected channel as the display on the front facing LCD and when using RTM server commands; it will also return this channel. The None selection means that it will cycle through each channel and display each channel for a small amount of time.
Audio Alignment Search Range Seconds	When measuring the audio quality a number of seconds should be grouped together before processing.
Audio Alignment Threshold	When the audio alignment threshold is set to a non-zero value and all enabled audio channels have an average value greater than or equal to this threshold, then the periodic audio alignment is skipped. At least one enabled audio channel must have an average value less than this threshold for the periodic audio alignment to occur.

6.3.3 Preview

Align Previews	This flag enables Video alignment on the main RTM page

6.4 Dynamic Realignment Pane

Figure 158: Dynamic Realignment Pane

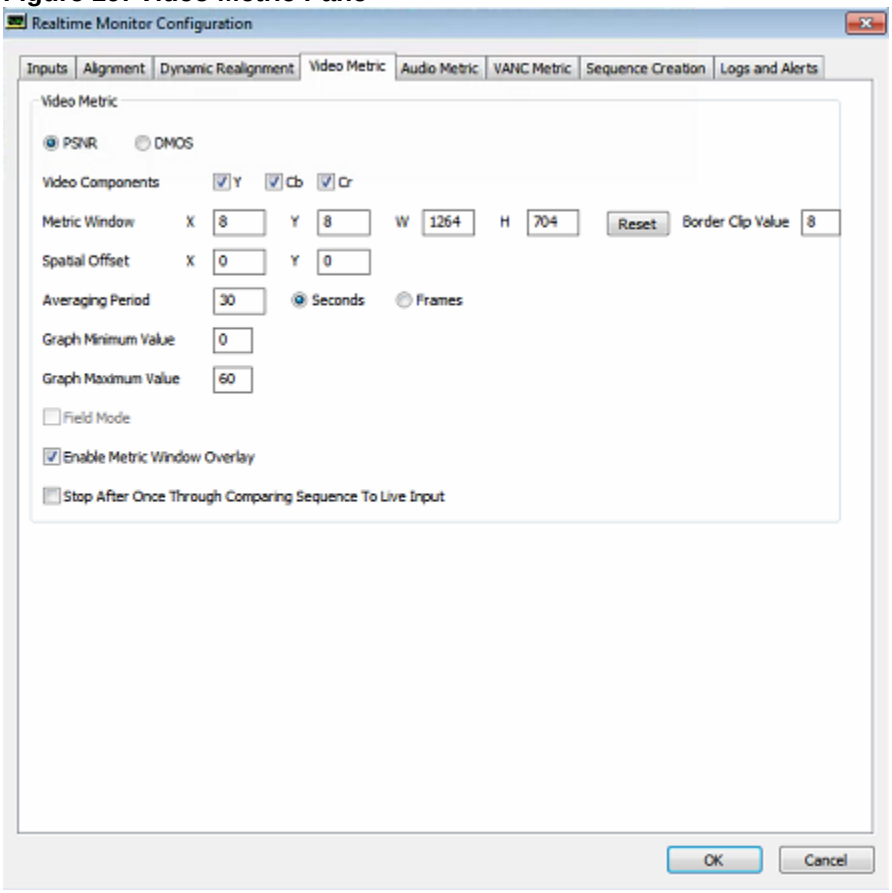


Enable Dynamic Re-Alignment	Checking this box will enable a dynamic re-alignment if the video quality drops for X number of consecutive video quality failures. *NOTE: this can happen if the source changes or if the inputs are not genlocked. If you know this should not occur, then uncheck this box.*
Dynamic Realignment Interval	RTM will automatically check for a dynamic realignment at this user defined interval
Dynamically Re-Align upon	This defines how many frames (or less) to check the alignment when the video quality drops below the threshold. *NOTE: 2 is a fairly safe number. It will take care of genlock issues*

	and/or momentarily dropping frames.
Check for maximum alignment	When a dynamic re-alignment happens, this value determines how many frames will be searched in each direction for the best new-match for video offset.
Dynamic thresholds for PSNR and DMOS	If the video quality scores drop below (or above when running DMOS) the running average, but they have not hit the error threshold, it can indicate that a dynamic re-alignment is needed. This setting tells RTM to check the dynamic re-alignment if the video quality score drops below a percentage of average over a period of time (frames)
Recovery within	After dynamic re-alignment, verify that the video quality has improved. The first check is that it is within X percentage of the previous peak score. *NOTE: a failure will trigger a full alignment if allowed.*
Verify Percentage	After dynamic re-alignment, verify that the video quality has improved. The second check is that it is within X percentage of the previous average score. *NOTE: a failure will trigger a full alignment if allowed.*
Upper Threshold	Dynamically realigns only when video metric scores are below this value.
Max Realignments	If RTM sees too many dynamic re-alignments over a period of time, it can indicate that a full alignment is needed. This setting tells RTM how many re-alignments are too many in what period of time (seconds).
Preserve Audio	If a video frame is dropped while decoding from an IP feed then RTM will drop an audio file to stay properly aligned

6.5 Video Metric Pane

Figure 19: Video Metric Pane

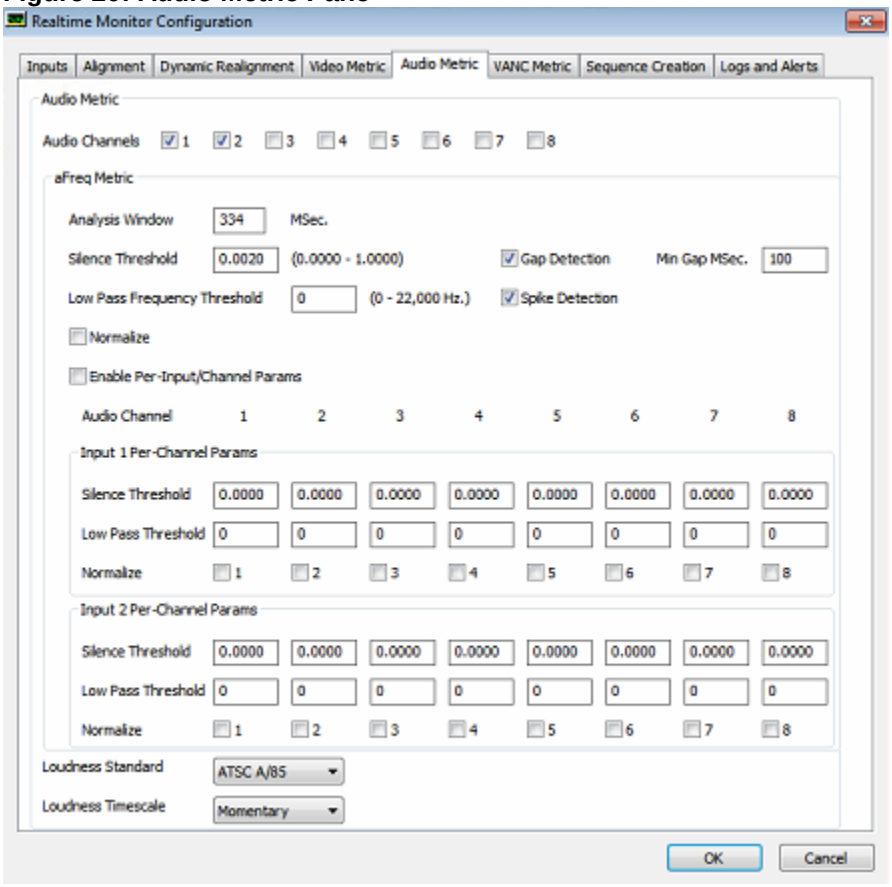


Video Metric Selection	Selection of two: 1. PSNR – Objective video performance metric. Use when overall performance of video over time is the goal. Can be used to track general quality of video with average log. 2. DMOS – The MS-SSIM metric on the DMOS scale. This metric is set to 0-4. A high score denotes lower video quality. 3.6 – 4.0 is generally considered to be unwatchable 3.0 – 3.5 is a range that is objectionable to viewers .4 – 2.99 is a range approximating broadcast/cable/IPTV quality 0 – .4 is generally production and contribution quality 0 is no defects
Video Components	Checking these boxes will enable/disable the measurement of the various components. *NOTE: you must check at least 1 box or video quality will not be measured.*
Metric Window	This defines the area of the incoming picture format where the video quality will be measured. *NOTE: several advanced compression algorithms blur the image around the edges assuming that the TVs over-scan.*
Reset	Reset returns the Metric Window to the full size of the image
Border clip value	Instead of setting the PSNR Metric Window size using X, Y, W, and H. You can state that there is an equal border around the edges of X pixels

	NOTE: X, Y, W, and H will be automatically set.
Spatial Offset	This is carried over from the RTM main alignment pane. You can set it here as well.
Average Period	Defines how often the file *psnrAvg.Log or dmosAvg.Log* will be updated. This logfile contains the Min, Max, Average, and Mean values for this many seconds or frames of video.
Graph Minimum Value	Normally, the graph is shown on a 0 to 100 scale where 100 is perfect quality. You can change this if you know that your normal values are between 0 (minimum) and 40 (maximum) to make the graphs easier to read. *NOTE: the real values will be measured and logged.*
Graph Maximum Value	Normally, the graph is shown on a 0 to 100 scale where 100 is perfect quality. You can change this if you know that your normal values are between 0 (minimum) and 40 (maximum) to make the graphs easier to read. *NOTE: the real values will be measured and logged.*
Field Mode	This flag forces RTM to run in field mode instead of frame mode. It will compensate for field roll. *NOTE: it will not compensate for field flip*
Enable Metric Window Overlay	This setting, when checked, will place a green colored box upon the incoming video thumbnails on the RTM main screen for a visual representation of the Video Metric Window or area of measurement setting.
Stop After Once Through Comparing Sequence to Live Input	This selection stops the RTM session when comparing input to a file after the file has completed playing once. Unchecked will continue to loop the file and compare to incoming video feed (assuming that incoming video is also the same video in a loop).

6.6 Audio Metric Pane

Figure 20: Audio Metric Pane

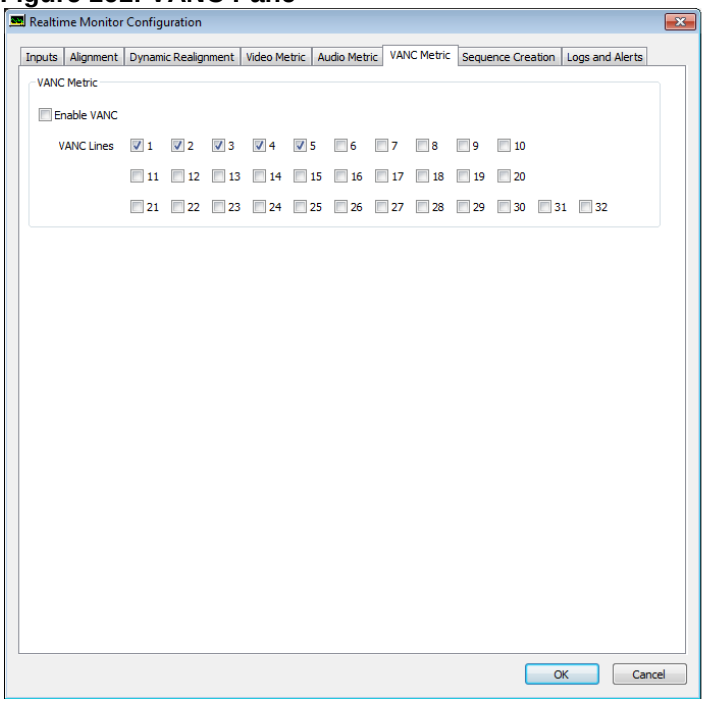


Audio Channels	Checking these boxes will enable audio quality measurements on any of the inputs. The algorithm performs quality measurements assuming mono for each channel (i.e. each channel is judged separately).
Frequency Analysis	To measure the audio quality this algorithm measures the frequency/amplitude response of the two streams and then correlates their differences. This flag enables this Metric *NOTE: this is normally used*
Analysis Window Msec	When measuring the audio quality a number of seconds should be grouped together before processing. This is the number of seconds. *NOTE: the number is in video frames and the audio samples are calculated based on the frequency.*
Silence Threshold	If RTM detects silence or very low audio, then it can force a score. Perfect Score: if both streams have silence or very low audio Poorest Score: if one stream has silence and the other does not This is the level for audio to be detected as silence. *NOTE: setting this to 0 (zero) turns this analysis off.*
Low Pass Frequency Threshold	When using Frequency/Amplitude to analyze the audio quality, some low frequencies could be ignored. This value tells RTM to ignore frequencies below this number *NOTE: setting this to 0 (zero) turns this analysis off.*
Gap Detection	When measuring audio quality RTM will alarm on gaps in audio greater than the Min Gap MSec value.
Spike Detection	When measuring audio quality RTM will alarm when the audio hits the

	maximum loudness value
Normalize	This flag enables the detection of normalizing amplitude differences before performing audio PSNR
Enable Per-Input/Channel Params	When enabled, normalization, silence threshold and low-pass threshold are defined separately for each audio channel. Silence threshold is also defined for each input. When disabled, then normalization, silence threshold and low-pass threshold are global across all audio channels and both inputs.
Loudness Standard	Dropdown window selectable based on regional standard required for the given test being run.
Loudness Timescale	Dropdown window selectable based on interval in time the Loudness measurement being performed requires.
Note for Uneven silence, Spike and Gap Detection	Before the aFreq score is calculated these are flagged Uneven Silence – 2 Maximum loudness value (Spike) – 3 Gap in audio based on min gap MSec value - 10

6.7 VANC Metric Pane

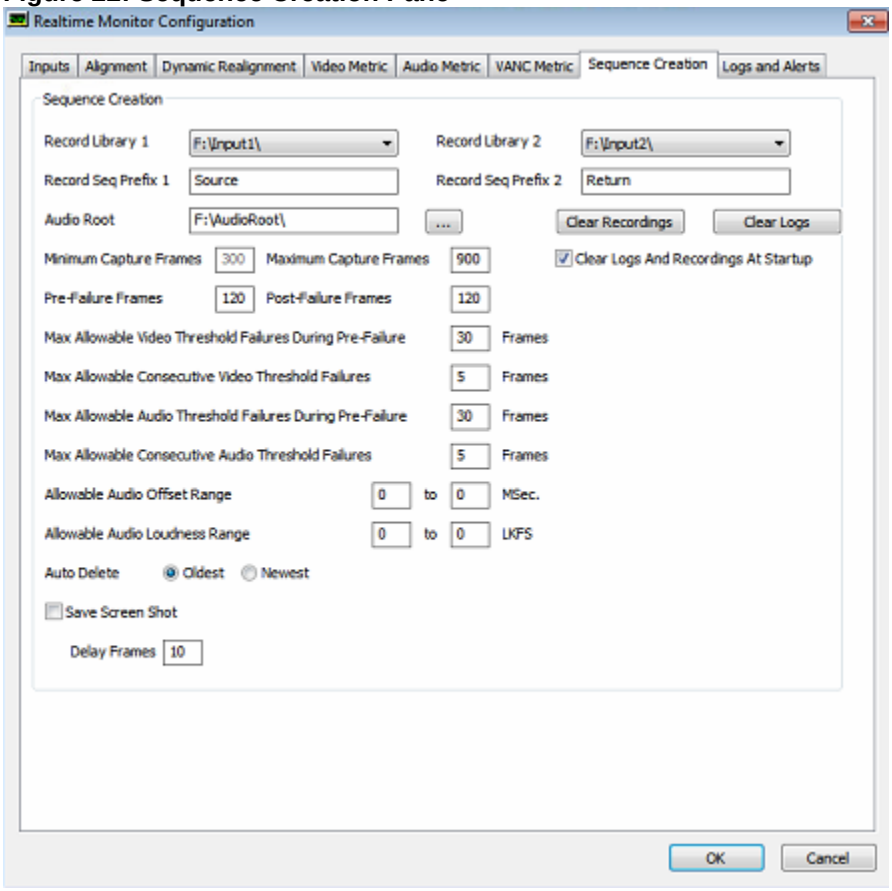
Figure 161: VANC Pane



Enable VANC	This flag enables VANC processing
VANC	Checking these boxes will enable VANC quality measurements on any of the inputs. The algorithm performs quality measurements on each line separately and will report which lines exceed the threshold.

6.8 Sequence Creation Pane

Figure 22: Sequence Creation Pane

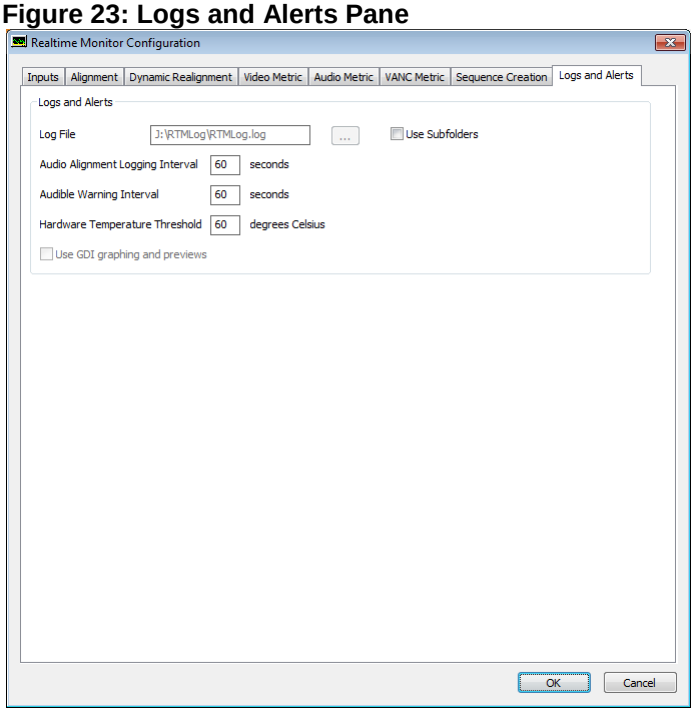


Record Library	This is the library where the recorded sequences are stored upon error. *NOTE: One library must be located on the "G: array" and the other must be on the "H: array". To create new libraries, use the ClearView Library Manager. RTM does not have the ability to create new libraries.*
Record Seq Prefix	This field defines the base name of all recordings. The text that is automatically concatenated is the following: YYYYMMDD_HH_MM_SS. *NOTE: that the entire sequence name cannot exceed 35 characters.*
Audio Root	The Audio streams should be stored in a different directory than the video. This is the audio location. The video root will be appended to this audio root to form the exact name of the audio sequences.
Clear Recordings	This button clears the contents of the currently selected record library. Be aware that it removes all recordings (sequences), even from prior sessions.
Clear Logs	This button clears the log files, but it does not clear the recordings.
Minimum Capture Frames	Note: This value has been disabled in newer versions of RTM, replaced by pre/post-failure frames. This defines the number of frames that will be buffered. If any error is triggered, then these frames will be recorded for further analysis.
Maximum Capture Frames	Since errors may occur near the end of the buffered number of frames, RTM compensates by looking beyond the minimum captured

	frames and may write a bigger file up to this limit.
Pre-Failure Frames	Number of frames setting. Set the number according to frames required to be recorded before any video or audio threshold failure and error condition recording.
Post-Failure Frames	Number of frames setting. Set the number according to frames required to be recorded after any video or audio threshold failure condition or score becomes within threshold set.
Max allowable video threshold failures	This value defines how many video quality failures are needed to trigger a recording within the Minimum Capture Frames.
Max allowable consecutive video failures	This value defines how many consecutive video quality failures are needed to trigger a recording within the Minimum Capture Frames. *NOTE: if dynamic re-alignment is checked and an alignment problem is detected, then errors will be reset.* *NOTE 2: consecutive failures should be set lower than allowable failures.*
Max allowable audio threshold failures	This value defines how many video quality failures are needed to trigger a recording within the Minimum Capture Frames.
Max allowable consecutive audio failures	This value defines how many consecutive video quality failures are needed to trigger a recording within the Minimum Capture Frames. *NOTE: consecutive failures should be set lower than allowable failures.*
Allowable Audio Offset Range	This should probably be set to the SMPTE specification based on which points are measured. It is a variable because SMPTE defines the range based on the measuring points.
Allowable Audio Loudness Range	This is the range that is acceptable. RTM will alarm if the loudness falls outside of this range.
Auto Delete	If the disk fills to near maximum, sequences will need to be deleted. This flag enables deleting the oldest files or the newest files.
Save Screen Shot	When an error occurs, the video frame that triggered the error (even if it is a VANC or Audio quality error) can be saved as a single image.
Delay Frames	This saves to save the screen shot X frames after the triggered event.
Clear Logs and Recordings	RTM will delete all of the current logs, and recordings when starting the application.

6.9 Logs and Alerts Pane

Figure 23: Logs and Alerts Pane



Log Files	All events are logged. These events include startup conditions, alignment parameters, realignment, etc. The log file is stored at the location specified here.
Use Subfolders	The log file can become very long as we append information about start/stops from all operations into the same log file. Instead of this, you may want a log file every time you start and stop and the log file will be put into a subfolder with the time/date appended to it. This flag enables writing multiple log files per stop/start; as opposed to one big log file.
Audio Alignment Logging Interval	This defines the interval in seconds between each entry into the audio alignment log. It must be greater than or equal to the audio alignment interval.
Audio Warning Interval	When an error occurs, a log entry is written, the count is increased on the main RTM page, if you are running the 1RU RTM, the front panel count is increased. In addition to these, an audible alert can sound. This audio alert can happen 1 time or it can happen at a frequency until you clear it. This is the audio warning frequency. *NOTE: 0 (zero) is generate an audio warning 1 time.*
Hardware Temperature Threshold	A threshold that if surpassed will alert in the RTMonitor GUI.
Use GDI Graphing and Previews	Most of the time, RTM uses DirectX. Some machines do not operate properly, with DirectX. If your Video Clarity support engineer tells you to check this box, RTM can run in Graphics Device Interface (GDI) mode, which is the older way. This flag enables this mode.

7 Log Files

RTM creates average log files, and error log files which are located in F:\RTMLog

1 AudioAlign.log
2 AudioAvg.log
3 RTMLog.log
4 PSNRAvg.log / DMOSAvg.log
5 .psnr/ .dmos and .audio files

7.1 AudioAlign.log

This is a tab-delimitated text file containing the time between audio alignments, the current audio offset relative to the video and whether the audio alignment passed or failed (Fail: N is passed).

2010/10/26 19:05:09	Audio Alignment	Audio Offset: 0 samples	0.0000 frames	0.0000 msec Video Offset: 0	Fail: N
2010/10/26 19:05:14	Audio Alignment	Audio Offset: 0 samples	0.0000 frames	0.0000 msec Video Offset: 0	Fail: N
2010/10/26 19:05:19	Audio Alignment	Audio Offset: 0 samples	0.0000 frames	0.0000 msec Video Offset: 0	Fail: N
2010/10/26 19:05:29	Audio Alignment	Audio Offset: 0 samples	0.0000 frames	0.0000 msec Video Offset: 0	Fail: N
2010/10/26 19:05:29	Audio Alignment	Audio Offset: 0 samples	0.0000 frames	0.0000 msec Video Offset: 0	Fail: N
2010/10/26 19:05:39	Audio Alignment	Audio Offset: 0 samples	0.0000 frames	0.0000 msec Video Offset: 0	Fail: N
2010/10/26 19:05:44	Audio Alignment	Audio Offset: 0 samples	0.0000 frames	0.0000 msec Video Offset: 0	Fail: N
2010/10/26 19:05:49	Audio Alignment	Audio Offset: 0 samples	0.0000 frames	0.0000 msec Video Offset: 0	Fail: N
2010/10/26 19:05:59	Audio Alignment	Audio Offset: 0 samples	0.0000 frames	0.0000 msec Video Offset: 0	Fail: N
2010/10/26 19:05:59	Audio Alignment	Audio Offset: 0 samples	0.0000 frames	0.0000 msec Video Offset: 0	Fail: N

7.2 AudioAvg.log

This is a tab-delimitated text file containing the average audio scores for all 8 channels of audio

```
Date/Time               Ch 1 Average    Ch 1 Minimum    Ch 1 Maximum    Ch 1 Std Dev    Ch 2 Average    Ch 2 Minimum    Ch 2 Maximum
Minimum         Ch 4 Maximum    Ch 4 Std Dev    Ch 5 Average    Ch 5 Minimum    Ch 5 Maximum    Ch 5 Std Dev    Ch 6 Average    Ch 6
Ch 8 Average    Ch 8 Minimum    Ch 8 Maximum    Ch 8 Std Dev
2015/06/09 10:17:20     093.2477        085.7490        095.2334        002.0599        093.2455        085.7877        095.1958
000.0000        000.0000        000.0000        000.0000        000.0000        000.0000        000.0000        000.0000        000.0
000.0000        000.0000        000.0000        000.0000        807.8958 msec
2015/06/09 10:17:50     092.6773        080.5965        095.2513        003.1330        092.6646        080.1704        095.2648
000.0000        000.0000        000.0000        000.0000        000.0000        000.0000        000.0000        000.0000        000.0
000.0000        000.0000        000.0000        000.0000        807.8958 msec
2015/06/09 10:18:20     090.9232        061.5843        094.9821        005.5307        090.9276        061.7162        094.9931
000.0000        000.0000        000.0000        000.0000        000.0000        000.0000        000.0000        000.0000        000.0
000.0000        000.0000        000.0000        000.0000        807.8958 msec
2015/06/09 10:18:50     091.3578        052.5703        100.0000        008.8782        091.4047        051.7556        100.0000
000.0000        000.0000        000.0000        000.0000        000.0000        000.0000        000.0000        000.0000        000.0
000.0000        000.0000        000.0000        000.0000        807.8958 msec
2015/06/09 10:19:20     092.3228        077.5007        095.8150        003.6655        092.3534        076.6564        095.6264
000.0000        000.0000        000.0000        000.0000        000.0000        000.0000        000.0000        000.0000        000.0
000.0000        000.0000        000.0000        000.0000        807.8958 msec
2015/06/09 10:19:50     092.5974        079.9296        095.5318        003.5048        092.5974        079.7537        095.3972
000.0000        000.0000        000.0000        000.0000        000.0000        000.0000        000.0000        000.0000        000.0
000.0000        000.0000        000.0000        000.0000        807.8958 msec
2015/06/09 10:20:20     093.0629        085.8415        095.2262        002.2239        093.0644        085.7151        095.2066
000.0000        000.0000        000.0000        000.0000        000.0000        000.0000        000.0000        000.0000        000.0
000.0000        000.0000        000.0000        000.0000        807.8958 msec
2015/06/09 10:20:50     092.5071        080.6006        095.2210        003.2709        092.4982        080.1737        095.2112
000.0000        000.0000        000.0000        000.0000        000.0000        000.0000        000.0000        000.0000        000.0
000.0000        000.0000        000.0000        000.0000        807.8958 msec
```

7.3 RTMLog.log

This is the main status log for RTM. It stores all relevant information required for tracking historical data such as settings, frequency of impairments, detected video delay, loss of signal time, etc.

```
2010/10/26 19:19:42   Full Alignment                        Video Offset: 0          Value: 18.3742
2010/10/26 19:19:42   Monitor Started
2010/10/26 19:19:42   Version: 1.0.3633.0                   Build Date: 10/25/2010
2010/10/26 19:19:42   Video Input 1: SDI In 1
2010/10/26 19:19:42   Video Input 2: SDI In 2
2010/10/26 19:19:42   Analog Video Format 1: 525 Component Beta US
2010/10/26 19:19:42   Analog Video Format 2: 525 Component Beta US
2010/10/26 19:19:42   Audio Input 1: SDI Embedded
2010/10/26 19:19:42   Audio Input 2: SDI Embedded
2010/10/26 19:19:42   Library 1: G:\Src\
2010/10/26 19:19:42   Library 2: H:\Imp\
2010/10/26 19:19:42   Sequence 1: Input1_20101026_19_19_33
2010/10/26 19:19:42   Sequence 2: Input2_20101026_19_19_33
2010/10/26 19:19:42   Frames To Record: 450
2010/10/26 19:19:42   Max Frames To Record: 600
2010/10/26 19:19:42   Log File: E:\RTMLog\RTMlog.log
2010/10/26 19:19:42   Enable Log File Overwrite: 1
2010/10/26 19:19:42   Psnr Components       Y: 1      Cb: 1      Cr: 1
2010/10/26 19:19:42   Psnr Window X: 8      Y: 8      W: 1264    H: 704
2010/10/26 19:19:42   Spatial Offset        X: 0      Y: 0
2010/10/26 19:19:42   Temporal Components   Y: 1      Cb: 0      Cr: 0
2010/10/26 19:19:42   Temporal Window       X: 8      Y: 8       W: 1264    H: 704
```

7.4 Session.log

This shows the average score from the last RTMonitor run.

Date/Time	Y Average
2019/01/29 12:15:11	000.2240
2019/01/29 12:17:48	001.2240

7.5 psnrAvg.log/dmosAvd.log

This is a tab-delimitated text file containing the time of the average video quality. Each component is shown (Y, Cb, and Cr) along with the Average, Minimum, Maximum, and Standard Deviation of each component. Need new screne shot

Date/Time	Y Average	Y Minimum		Y Maximum		Y Std Dev	Cb Average		Cb Minimum		Cb Maximum
Cb Std Dev	Cr Average	Cr Minimum		Cr Maximum		Cr Std Dev					
2010/10/26 18:46:54	026.5061	025.2716	027.6854	000.4733	031.3782	029.6923	032.7982	000.6296	033.2322	031.7935	034.4151
000.5406											
2010/10/26 18:48:16	026.5113	025.2716	027.6854	000.4660	031.3871	029.6923	032.7982	000.6196	033.2405	031.7935	034.4151
000.5339											
2010/10/26 18:55:26	026.5061	025.2716	027.6854	000.4660	031.3803	029.6923	032.7982	000.6191	033.2339	031.7935	034.4151
000.5336											
2010/10/26 18:56:26	026.5141	025.2716	027.6854	000.4669	031.3930	029.6923	032.7982	000.6224	033.2494	031.7935	034.4151
000.5393											
2010/10/26 18:57:26	026.5127	025.2716	027.6854	000.4666	031.3903	029.6923	032.7982	000.6216	033.2460	031.7935	034.4151
000.5374											
2010/10/26 18:58:26	026.5121	025.2716	027.6854	000.4665	031.3872	029.6923	032.7982	000.6199	033.2394	031.7935	034.4151
000.5337											
2010/10/26 19:05:29	026.5141	025.2716	027.6854	000.4668	031.3934	029.6923	032.7982	000.6225	033.2499	031.7935	034.4151
000.5396											
2010/10/26 19:07:45	026.5109	025.2716	027.6854	000.4660	031.3866	029.6923	032.7982	000.6197	033.2404	031.7935	034.4151
000.5341											

7.6 psnr/ .dmos and .audio files.

Whenever a threshold is reached and a recording is started, either a .psnr/.dmos or .audio file is also created in the RTMLog folder. These files contain the measured quality values for the associated recording. These files can also be dragged/dropped onto ClearView for easy synchronized playback and post analysis.

ClearView PSNR Log File (V7.0) 10/15/10 15:53:41
Created by Video Clarity Realtime Monitor 1.0 10/08/2010

Video Output Device: Broadcast Output Module
Video Output Format: 720p 60.00 Hz.
Analog Output Format:
Image Format: YCbCr 8 bpc
Enable VANC: 0

Threshold Y: -1.00
Threshold Cb: -1.00
Threshold Cr: -1.00
Spatial X: 0
Spatial Y: 0
Normalize Y: 0
Normalize Cb: 0
Normalize Cr: 0
Metric Window X: 0
Metric Window Y: 0
Metric Window W: 1280
Metric Window H: 720
Psnr Limit Numerator: 1

Library A: H:\Imp\
Sequence A: Input1_20101015_15_53_36
First Frame A: 0
Last Frame A: 299
Speed A: 1.00

Library B: G:\Src\
Sequence B: Input2_20101015_15_53_36
First Frame B: 0
Last Frame B: 299
Speed B: 1.00

Sequence Metric Y Min: 13.88
Sequence Metric Y Max: 100.00
Sequence Metric Y Avg: 99.71
Sequence Metric Cb Min: 26.20
Sequence Metric Cb Max: 100.00
Sequence Metric Cb Avg: 99.75
Sequence Metric Cr Min: 20.13
Sequence Metric Cr Max: 100.00
Sequence Metric Cr Avg: 99.73

Frame	Y/G	Cb/B	Cr/R	Y/G	Cb/B	Cr/R	Y/G	Cb/B	Cr/R	Fail Y	FailCb	FailCr
000000	000.00	000.00	000.00	000.00	000.00	000.00	100.00	100.00	100.00	000000	000000	000000
000001	000.00	000.00	000.00	000.00	000.00	000.00	100.00	100.00	100.00	000000	000000	000000
000002	000.00	000.00	000.00	000.00	000.00	000.00	100.00	100.00	100.00	000000	000000	000000
000003	000.00	000.00	000.00	000.00	000.00	000.00	100.00	100.00	100.00	000000	000000	000000
000004	000.00	000.00	000.00	000.00	000.00	000.00	100.00	100.00	100.00	000000	000000	000000
000005	000.00	000.00	000.00	000.00	000.00	000.00	100.00	100.00	100.00	000000	000000	000000
000006	000.00	000.00	000.00	000.00	000.00	000.00	100.00	100.00	100.00	000000	000000	000000
000007	000.00	000.00	000.00	000.00	000.00	000.00	100.00	100.00	100.00	000000	000000	000000
000008	000.00	000.00	000.00	000.00	000.00	000.00	100.00	100.00	100.00	000000	000000	000000
000009	000.00	000.00	000.00	000.00	000.00	000.00	100.00	100.00	100.00	000000	000000	000000
000010	000.00	000.00	000.00	000.00	000.00	000.00	100.00	100.00	100.00	000000	000000	000000
000011	000.00	000.00	000.00	000.00	000.00	000.00	100.00	100.00	100.00	000000	000000	000000
000012	000.00	000.00	000.00	000.00	000.00	000.00	100.00	100.00	100.00	000000	000000	000000
000013	000.00	000.00	000.00	000.00	000.00	000.00	100.00	100.00	100.00	000000	000000	000000

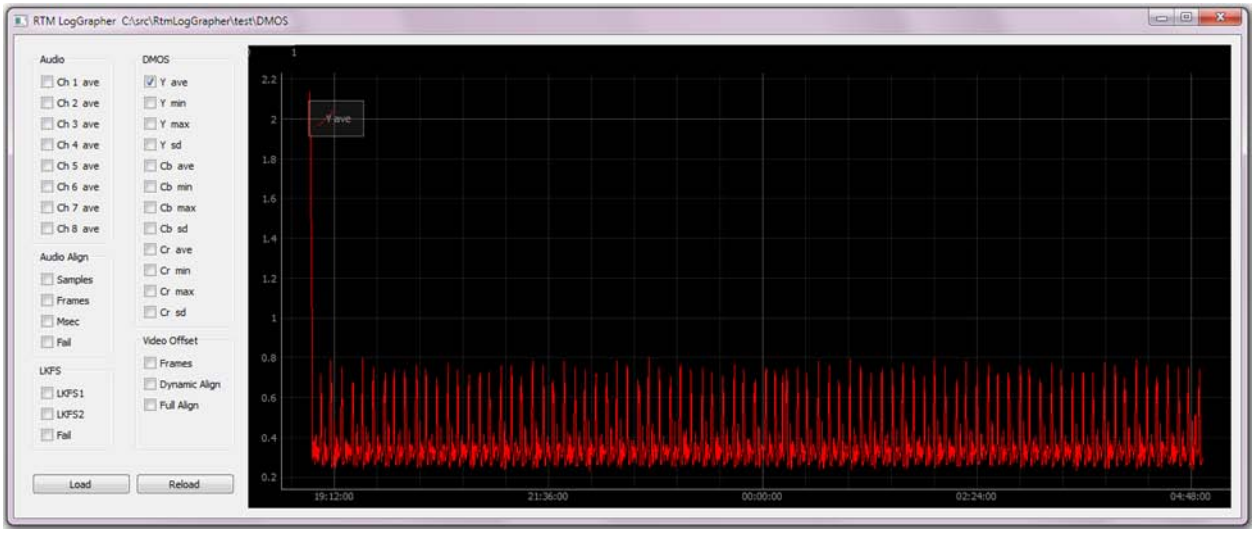
8 RTM Log Grapher

RTM Log Grapher makes it easy to visualize test log data in a graph form. Graphs can be produced from saved logs on any computer running widows or can be used on the system running the test. The Log Grapher produces CSV files in sets of comparative graphs by metric type that can be manipulated to zoom into potentially large data sets.

8.1 The Application

Upon opening the RTM log graphing application a log file will open followed by a graphing window. Metrics you can graph individually or simultaneously are as follows:

- PSNR Y, CR, CB
- DMOS Y
- Audio Channels
- LKFS
- Audio alignment
- Video Offset for both dynamic realignment and full alignment



8.2 Interaction with the GUI

Panning	Dragging the left button will allow you to pan
Scaling	Dragging the right button allows you to scale. Left/Right scales horizontally. Up/Down scales vertically
Zooming	Mouse wheel spin zooms the scene in and out
Reset	Clicking on the “A Box” in the bottom left corner of the scene will undo all panning/scaling/zooming
View All	Right click selection that adjusts the display so that multiple graphs are visible at the same time, even if their Y axis ranges do not overlap
Export	Right click selection that allows user to export the current scene in the graphing tool

9 Command-Line Interface

The monitoring process can also be programmatically controlled via scripting by using RTMServer.exe and rtm.exe

9.1 RTMServer.exe

Once started, RTMServer.exe will receive commands from rtm.exe (the client) and allow scriptable control of the RTM system. This allows the ability for multiple units to be controlled from a single controller application. Commands can also be sent from other machines which have access to the RTM system via a network.

RTM ships with a desktop shortcut to start RTMServer. Double-Click to start and then open a DOS command window to send commands to RTMServer using the client rtm.exe.

9.2 rtm.exe

This is the client executable which acts as the command-line interface. This program must either be in the folder where commands are sent from or it the “path” environment variable.

To view a list of RTM commands, type RTM ?.

To get a syntax description of the RTM commands, type RTM ? <command name>

To execute any command, type RTM <command name>.

The following is a list of RTM commands.

Command	Description	Usage
INPUTS		
SetInput	Sets the input type for each input	SetInput input(0/1) InputType(0:SDI 3:Sequence 7:IP 8:File)
GetInput	Returns the input type	GetInput input(0/1)
BROADCAST INPUTS		
SetSDIInput	Enables SDI input and sets the physical port	SetSDIInput input(0/1) sdiPort(0 - 7)
GetSDIInput	Returns the physical port set	SetSDIInput input(0/1) sdiPort(0 - 7)
SetDualLink	Sets SMPTE 372 dual link	SetDualLink input(0/1) bEnable(0/1)
GetDualLink	Returns dual link configuration	GetSDIInput input(0/1)
SetQuadLink	Sets SMPTE 425 quad link	SetQuadLink input(0/1) bEnable(0/1)
GetQuadLink	Returns quad link configuration	GetQuadLink input(0/1)
SetTSI	Sets SMPTE 425 interleave	SetTSI input(0/1) bEnable(0/1)
GetTSI	Returns Interleave configuration	GetTSI input(0/1)
SetBroadcastScaling	Enables and sets SDI scaling	SetBroadcastScaling input(0/1) enable(0/1) width height outputwidth outputheight

GetBroadcastScaling	Returns SDI scale settings	GetBroadcastScaling input(0/1)
SetBroadcastScalingType	Sets scaling type	SetBroadcastScalingType input(0/1) type(0=Nearest Neighbor, 1=Linear, 2=Cubic, 3=Super)
GetBroadcastScalingType	Returns scaling type	GetBroadcastScalingType input(0/1)
SetRateConvert	Sets SDI rate conversion	SetRateConvert input(0/1) bEnable convertMethod(0/1)
GetRateConvert	Returns SDI rate conversion setting	GetRateConvert input(0/1)
SetBroadcastDolby	Sets Dolby Digital plus decoding	SetBroadcastDolby input(0/1) bEnable(0/1)
GetBroadcastDolby	Returns DD+ setting	GetBroadcastDolby input(0/1)
IP INPUTS		
SetIpOrFileSource	Sets the input to be IP or file	SetIpOrFileSource input(0/1) bFile(0/1)
SetIPStream	Sets the input IP stream	SetIPStream input(0/1) ipStream
SetIPProgramID	Sets the Program ID	SetIPProgramID input(0/1) programID
SetIPVideoID	Sets the Video ID	SetIPVideoID input(0/1) videoStreamID
SetIPAudioID	Sets the Audio ID	SetIPAudioID input(0/1) audioStreamID
SetIPTargetOutputModule	Sets the target output module	SetIPTargetOutputModule input(0/1) outputModule(0=No Video Output, 1=Broadcast)
SetIPTargetVideoFormat	Sets the target video format	SetIPTargetVideoFormat input(0/1) vidFmt
SetIPScaling	Sets scaling to target video format	SetIPScaling input(0/1) bScale(0/1)
SetIPScalingType	Sets the scaling type	SetIPScalingType input(0/1) type type(0=Fast Bilinear, 1=Bilinear, 2=Bicubic, 3=Experimental, 4=Neighbor, 5=Area, 6=Bicublin, 7=Gauss, 8=Sinc, 9=Lanczos, 10=Spline)
SetIPDeinterlace	Sets the deinterlace filter	SetIPDeinterlace input(0/1) bDeinterlace(0/1)
SetIPHwAccel	Sets hardware acceleration type	SetIPHwAccel input(0/1) hwAccelMode(0=None,1=DX9,2=DX11,3=QSync,-1=Get Value)
SetIPDolbyDownmix	Sets the Dolby downmix filter	SetIPDolbyDownmix input(0/1) enable(0/1)
SetIPTSRecord	Sets the TS record	SetIPTSRecord input(0/1) enable(0/1)
SetIPTSRecordDuration	Sets the TS record duration in seconds	SetIPTSRecordDuration input(0/1) duration(fifo length in seconds)
GetIpOrFileSource	Returns the input stream	GetIpOrFileSource input(0/1
GetIPStream	Returns the IP stream set	GetIPStream input(0/1)
GetIPProgramID	Returns the Program ID	GetIPProgramID input(0/1)
GetIPVideoID	Returns the Video ID	GetIPVideoID input(0/1)
GetIPAudioID	Returns the Audio ID	GetIPAudioID input(0/1)
GetIPTargetOutputModule	Returns the target output module	GetIPTargetOutputModule input(0/1)
GetIPTargetVideoFormat	Returns the target video format	GetIPTargetVideoFormat input(0/1)
GetIPScaling	Returns if scaling is set or not	GetIPScaling input(0/1)

GetIPScalingType	Returns scaling type	GetIPScalingType input(0/1)
GetIPDeinterlace	Returns if deinterlace is set or not	GetIPDeinterlace input(0/1)
GetIPHwAccel	Returns hardware acceleration setting	GetIPHWAccel input(0/1)
GetIPDolbyDownmix	Returns Dolby downmix setting	GetIPDolbyDownmix input(0/1)
GetIPTSRecord	Returns if TS record is set or not	GetIPTSRecord input(0/1)
GetIPTSRecordDuration	Returns TS record duration	GetIPTSRecordDuration input(0/1)
FILE INPUTS		
SetIpOrFileSource	Sets the input to be IP or file	SetIpOrFileSource input(0/1) bFile(0/1)
SetFile	Sets the file input	SetFile input(0/1) file
SetFileProgramID	Sets the Program ID	SetFileProgramID input(0/1) programID
SetFileVideoID	Sets the Video ID	SetFileVideoID input(0/1) videoStreamID
SetFileAudioID	Sets the Audio ID	SetFileAudioID input(0/1) audioStreamID
SetFileTargetOutputModule	Sets the target output module	SetFileTargetOutputModule input(0/1) outputModule(0=No Video Output, 1=Broadcast)
SetFileTargetVideoFormat	Sets the target video format	SetFileTargetVideoFormat input(0/1) vidFmt
SetFileScaling	Sets scaling to target video format	SetFileScaling input(0/1) bScale(0/1)
SetFileScalingType	Sets the scaling type	SetFileScalingType input(0/1) type type(0=Fast Bilinear, 1=Bilinear, 2=Bicubic, 3=Experimental, 4=Neighbor, 5=Area, 6=Bicublin, 7=Gauss, 8=Sinc, 9=Lanczos, 10=Spline)
SetFileDeinterlace	Sets the deinterlace filter	SetFileDeinterlace input(0/1) bDeinterlace(0/1)
SetFileHwAccel	Sets hardware acceleration type	SetFileHwAccel input(0/1) hwAccelMode(0=None,1=DX9,2=DX11,3=QSync,-1=Get Value)
SetFileDolbyDownmix	Sets the Dolby downmix filter	SetFileDolbyDownmix input(0/1) enable(0/1)
GetIpOrFileSource	Returns the input file	GetIpOrFileSource input(0/1
GetFile	Returns the file set	GetFile input(0/1)
GetFileProgramID	Returns the Program ID	GetFileProgramID input(0/1)
GetFileVideoID	Returns the Video ID	GetFileVideoID input(0/1)
GetFileAudioID	Returns the Audio ID	GetFileAudioID input(0/1)
GetFileTargetOutputModule	Returns the target output module	GetFileTargetOutputModule input(0/1)
GetFileTargetVideoFormat	Returns the target video format	GetFileTargetVideoFormat input(0/1)
GetFileScaling	Returns if scaling is set or not	GetFileScaling input(0/1)
GetFileScalingType	Returns scaling type	GetFileScalingType input(0/1)
GetFileDeinterlace	Returns if deinterlace is set or not	GetFileDeinterlace input(0/1)
GetFileHwAccel	Returns hardware acceleration setting	GetFileHWAccel input(0/1)
GetFileDolbyDownmix	Returns Dolby downmix setting	GetFileDolbyDownmix input(0/1)
SEQUENCE INPUTS		

SetSequence	Sets ClearView Sequence	SetSequence input(0/1) Library Sequence
GetSequence	Returns ClearView Sequence set	GetSequence input(0/1)
ALIGNMENT		
AlignVideo	Aligns video	AlignVideo
AlignAudio	Aligns audio	AlignAudio
SetFullAlign	Sets video alignment settings	SetFullAlign bEnable(0/1) captureSeconds threshold minOffset
GetFullAlign	Returns alignment settings	GetFullAlign
GetFullAlignStatus	Returns alignment status	GetFullAlignStatus
GetAlignmentStatus	Returns audio/video alignment offsets	GetAlignmentStatus
GetAlignmentFailCode	Returns a number which explains a Failure in the Alignment	GetAlignmentFailCode
SetSpatialRange	Sets spatial alignment settings	SetSpatialRange bEnable(0/1) XRange YRange
GetSpatialRange	Returns spatial alignment range	GetSpatialRange
SetSpatialX	Sets spatial offset in X direction	SetSpatialX x
GetSpatialX	Returns spatial offset in X direction	GetSpatialX
SetSpatialY	Sets spatial offset in Y direction	SetSpatialY y
GetSpatialY	Returns spatial offset in Y direction	GetSpatialY
SetLipSync	Sets audio alignment settings	SetLipSync minthreshold maxThreshold preferredChannel averagingPeriod preferredChannel: -2=All -1=None 0-15=Channels
GetLipSync	Returns audio alignment settings	GetLipSync
SetDynamicAlign	Sets dynamic realignment settings	SetDynamicAlign bEnable(0/1) FrameRange
GetDynamicAlign	Returns dynamic realignment settings	GetDynamicAlign
VIDEO CONFIG		
SetVideoMetric	Sets video metric	SetVideoMetric metricIdx(0=PSNR,1=DMOS)
GetVideoMetric	Returns video metric	GetVideoMetric
SetVideoComponent	Sets Y, Cb and Cr components	SetVideoComponent component(0-2) bEnable(0/1)
GetVideoComponent	Returns component settings	GetVideoComponent component(0-2)
SetVideoThreshold	Sets video failure thresholds	SetVideoThreshold component(0-2) threshold(0-100)
GetVideoThreshold	Returns video threshold settings	GetVideoThreshold component(0-2)
SetVideoDuration	Sets video failure duration	SetVideoDuration component(0-2) duration
GetVideoDuration	Returns video failure	GetVideoDuration component(0-2)

	duration	
SetMetricWindow	Sets metric window	SetMetricWindow X Y Width Height
GetMetricWindow	Returns metric window	GetMetricWindow
SetBorderValue	Sets metric window border size	SetBorderValue value
GetBorderValue	Returns metric window	GetBorderValue
SetVideoStatusAveraging	Sets application status averaging period	SetVideoStatusAveraging averagingPeriod
GetVideoStatusAveraging	Returns application status averaging period	GetVideoStatusAveraging
SetVideoLogAveraging	Sets logging averaging period	SetVideoLogAveraging averagingPeriod bInFrames
GetVideoLogAveraging	Returns logging averating period	GetVideoLogAveraging
AUDIO CONFIG		
SetAudioChannel	Sets audio channels on or off	SetAudioChannel channel(1-16) bEnable(0/1)
GetAudioChannel	Returns audio channel status	GetAudioChannel channel(1-16)
SetAudioThreshold	Sets audio low pass threshold	SetAudioThreshold channel(1-16) threshold(0-100)
GetAudioThreshold	Returns audio low pass threshold	GetAudioThreshold channel(1-16)
SetAudioDuration	Sets audio duration	SetAudioDuration channel(1-16) threshold(0-100)
GetAudioDuration	Returns audio duration	GetAudioDuration channel(1-16)
GetAudioChannelsEnabled	Returns audio channels enabled	GetAudioChannelsEnabled
SetLoudness	Sets loudness thresholds	SetLoudness minThreshold maxThreshold
GetLoudness	Gets loudness threshold	GetLoudness
VANC CONFIG		
SetVANCLine	Sets which VANC lines to monitor	SetVancLine line bEnable(0/1)
GetVANCLine	Returns VANC lines set	GetVancLine line
SetVANC	Enables VANC monitoring	SetVanc lines enable(0/1) lines:0 Enable VANC, 4-25 Enable Single Line, 26 Enable All Lines
GetVANC	Returns VANC status	GetVanc
GENERAL CONFIG		
SetRTMLogFileName	Sets RTMLog location	SetRTMLogFileName location bUseSubFolders(0/1)
GetRTMLogFileName	Returns RTMLog location	GetRTMLogFileName
GetOutputLibrary	Returns record library	GetOutputLibrary input(0/1)
SetSessionName	Sets session name	SetSessionName name
GetSessionName	Returns session name	GetSessionName
SetPreviews	Enables/disables	SetPreviews bEnable(0/1)

	previews	
GetPreviews	Returns preview status	GetPreviews
SetNewFolder	Creates new Windows directory	SetNewFolder folderName
GENERAL COMMANDS		
Preview	Previews the inputs	Preview
Realign	Realigns the inputs	Realign [bNoWaitForVideo(0/1)] [bNoWaitForAudio(0/1)] [TimeOut(seconds)] Note: Not specifying TimeOut or set to -1 will realign until it aligns
Start	Starts the RTM application	Start
Stop	Stops the RTM application	Stop
SetVideoOffset	Manually sets video offsets	SetVideoOffset offset
ClearImpairments	Clears impairments	ClearImpairments
ClearLogs	Clears logs	ClearLogs
ClearRecordings	Clears recordings	ClearRecordings
Exit	Exits RTM	Exit [appCode] appCode should be greater than 0
RestoreConfig	Restores RTM profile	RestoreConfig file
SaveConfig	Saves RTM profile	SaveConfig file [bOverWrite]
ShellCmd	Enables Windows shell command	ShellCmd cmd
STATUS		
GetVersion	Returns RTM version	GetVersion
GetVersionDate	Returns RTM build date	GetVersionDate
GetRunTime	Returns application run time	GetRunTime
GetStartTime	Returns application start time	GetStartTime
GetStatus	Returns RTM status	GetStatus
GetManagerStatus	Returns RTM Manager status	GetManagerStatus
GetOperationalStatus	Returns operational status	GetOperationalStatus
GetInputSignalStatus	Returns input signal status	GetInputSignalStatus
GetInvalidSignals	Returns invalid signal status	GetInvalidSignals
GetRTMErrorCode	Returns RTM error codes which are listed at bottom of table	GetRTMErrorCode Returns a number which explains an Error that happens in RTM
GetInputVideoFormat	Returns input video fomat	GetInputVideoFormat input(0/1) [bNative(0/1)]
GetBoardTemp	Returns board temperature	GetBoardTemp [module]
SetMulticast	Sets status broadcast multicast address	SetMulticast interval Secs/Frames(0/1) mcastAddr port localIPAddr
GetMulticast	Returns status broadcast multicast	GetMulticast

	address	
IMPAIRMENTS AND METRIC SCORES		
GetVideoImpairments	Returns number of video impairments	GetVideoImpairments
GetVideoMin	Returns minimum video metric value	GetVideoMin componentIdx
GetVideoMax	Returns maximum video metric value	GetVideoMax componentIdx
GetVideoAvg	Returns average video metric value	GetVideoAvg componentIdx
GetVideoStdDev	Returns standard deviation video metric value	GetVideoStdDev componentIdx
GetAudioImpairments	Returns number of audio impairments	GetAudioImpairments
GetAudioMin	Returns minimum audio metric value	GetAudioMin channelIdx
GetAudioMax	Returns maximum audio metric value	GetAudioMax channelIdx
GetAudioAvg	Returns average audio metric value	GetAudioAvg channelIdx
GetAudioStdDev	Returns standard deviation audio metric value	GetAudioStdDev channelIdx
GetVANCErrors	Returns number of vanc errors	GetVANCErrors
GetVANCMin	Returns minimum vanc score	GetVANCMin lineIdx
GetVANCMax	Returns maximum vanc score	GetVANCMax lineIdx
GetVANCAvg	Returns average vanc score	GetVANCAvg lineIdx
GetVANCStdDev	Returns standard deviation vanc metric	GetVANCStdDev lineIdx
GetLipSyncErrors	Returns number of lip sync errors	GetLipSyncErrors
GetLoudnessErrors	Returns number of loudness errors	GetLoudnessErrors

RTM Error return codes:
NO ERR 0
NO GOOD COMPARISON FRAME 1
ABORT 2
BAD BUFFER 3
THRESHOLD FAILURE 4
VERIFY PREVIOUS 5
VERIFY NEXT 6
MEMORY ALLOCATION 7
VERIFY FAILURE 8
INCONSISTENT OFFSETS 9
SPATIAL VERIFY NO CHANGE 10 // Obsolete
OFFSET OUTSIDE RANGE 11
CORRELATION THRESHOLD FAILURE 12
CORRELATION INVALID INDEX 13

CORRELATION AMBIGUITY 14
CORRELATION INVALID OFFSET 15
CORRELATION NEGATIVE OFFSET 16
MAX TEMPORAL VALUE THRESHOLD 17
SPREAD THRESHOLD 18
NO MATCH 19
BAD BUFFER PTR 20 // causes of BAD BUFFER
FILE OPEN 21
FILE READ 22
NO INPUT 1 23
NO INPUT 2 24
MISSMATCH FORMAT 25