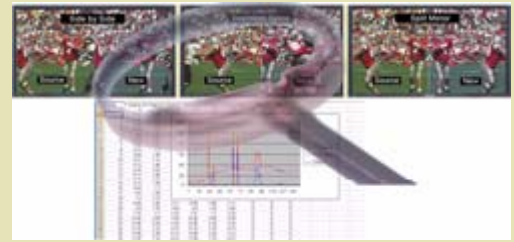


ClearView Video Analysis Systems



The ClearView Video Analysis Systems provide video researchers, compression developers, and hardware designers with the unique ability to capture, output and interactively analyze 100% uncompressed digital video.

To further simplify the work flow, any video sequence can be played; while capturing another video sequence, thus, combining the video server and capture device into one unit. By doing this, the original source is already inside the test equipment for easy comparison.

ClearView applies various objective metrics to the video sequences, generates graphs, and calculates an objective score. ClearView is the perfect hybrid system that simplifies subjective testing while providing real-time, repeatable objective measurements.

- ◆ Real-time picture difference display.
- ◆ Compare 2 stored HD or SD video sequences in Y'CbCr or RGB colorspaces.
- ◆ All television formats supported up to 2K.
- ◆ Quantitative industry-standard objective "No Reference" and "Reference" metrics.
- ◆ A minus B with thresholding on luma & chroma.
- ◆ Automated play-list, import, and logging capabilities.

All of the ClearView products use state-of-the-art, standards-based computer platforms and hardware interfaces. This ensures scalability, reliability, and easier support when compared to custom designs.

Features & Benefits

- Repeatable, Quantitative Video Quality Analysis
 - PSNR
 - Temporal Metric
 - Spatial Metric
- Measures impairment with Reference and No Reference models
- Presents multiple viewing modes for Subjective Video Assessment
- 50+ Test Patterns Preloaded

Applications

- Compression, Image Processing, Encoder Product Development
- Video/Display Graphic Product Development
- STB, Decoder, Encoder, and Video / Display Graphic Automated Testing/ QA
- Transmission Equipment Evaluations

Four ClearView Products to meet user's exacting needs.

ClearView Shuttle Broadcast - a portable, fixed function system that lets encoding and broadcast engineers take their latest developments to the field.

ClearView Shuttle DVI - a portable, fixed function system for testing Displays and Display Graphic Chips up to 1080/60P RGB.

ClearView Classic - a configurable system, which supports HD-SDI, SD-SDI, Component, Composite, S-Video, DVI, VGA, and DVB-ASI.

ClearView Extreme - an extreme performance work-horse which can play out dual stream 1080/60P or single stream 1080/120P RGB Video.

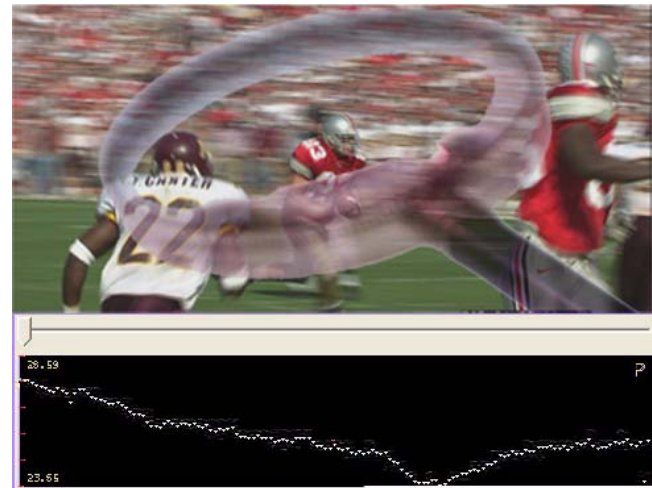
The ClearView measures video quality using reference and no-reference metrics. Compare video sequences that have been downloaded, recorded, or are part of the supplied reference library.

ClearView provides 3 metrics per frame: the signal to noise ratio, the temporal offsets, and the spatial activity. These numbers are plotted and logged, and any individual frame can be viewed in any of the viewing modes.

ClearView generates summary graphs, subjective viewing modes, and detailed raw numbers for each color component to help you to evaluate the equipment or transmission gear design.

And with the ClearView SDK, the user can custom script and automate any video test process.

Plotted Results with Viewing Mode



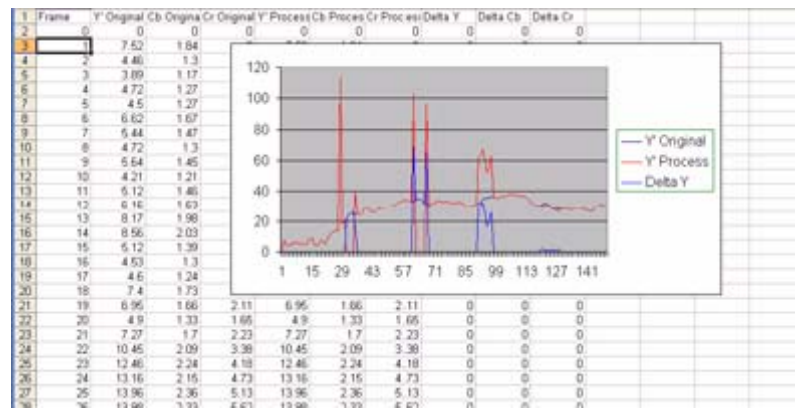
Logged Raw Data

```

ClearView Spatial Metric Log File
Video Output Device: No video output Module
Video Output Format: 1920 x 1080 30 Hz.
Analog Output Format:
Image Format: YCbCr 8 bpc
Library A: F:\Test\
Sequence A: Football uncomp 8-bit
First Frame A: 0
Last Frame A: 149
Speed A: 1.00
Library B: F:\Test\
Sequence B: Football 1080 8-bit impairment
First Frame B: 0
Last Frame B: 149
Speed B: 1.00

Frame Y/G Cb/B Cr/R Y/G Cb/B Cr/R Y/G Cb/B Cr/R
000000 051.28 008.85 012.58 051.28 008.85 012.58 000.00 000.00 000.00
000001 055.09 009.17 012.96 055.09 009.17 012.96 000.00 000.00 000.00
000002 057.20 009.31 013.14 057.20 009.31 013.14 000.00 000.00 000.00
000003 056.38 009.28 013.08 056.38 009.28 013.08 000.00 000.00 000.00
000004 055.87 009.26 013.05 055.87 009.26 013.05 000.00 000.00 000.00
000005 055.34 009.14 013.02 055.34 009.14 013.02 000.00 000.00 000.00
000006 054.37 009.28 012.98 054.37 009.28 012.98 000.00 000.00 000.00
000007 057.19 009.42 013.13 057.19 009.42 013.13 000.00 000.00 000.00
000008 055.27 009.51 013.07 055.27 009.51 013.07 000.00 000.00 000.00
000009 055.65 009.64 013.11 055.65 009.64 013.11 000.00 000.00 000.00
000010 057.09 009.47 013.14 057.09 009.47 013.14 000.00 000.00 000.00
000011 053.37 009.21 012.85 053.37 009.21 012.85 000.00 000.00 000.00
000012 053.77 009.04 012.91 053.77 009.04 012.91 000.00 000.00 000.00
000013 049.83 008.87 012.44 049.83 008.87 012.44 000.00 000.00 000.00
000014 052.97 009.05 012.71 052.97 009.05 012.71 000.00 000.00 000.00
    
```

Results Correlated off-line



Spatial Formula

PSNR Formula

$$d(x,y) = 10 \cdot \log_{10} \frac{255^2 \cdot n^2}{\sum_{i=1}^n \sum_{j=1}^n (x_{ij} - y_{ij})^2}$$

$$H_v = \begin{bmatrix} -1 & -2 & -1 \\ 0 & 0 & 0 \\ 1 & 2 & 1 \end{bmatrix}, H_h = \begin{bmatrix} -1 & 0 & 1 \\ -2 & 0 & 2 \\ -1 & 0 & 1 \end{bmatrix}$$

$$SI_v(i, j, n) = Y(i, j, n) \otimes H_v$$

$$SI_h(i, j, n) = Y(i, j, n) \otimes H_h$$

$$SI_r(i, j, n) = \sqrt{SI_v(i, j, n)^2 + SI_h(i, j, n)^2}$$

$$SI_{var}(n) = \frac{1}{P} \sum_i \sum_j (SI_r(i, j, n) - SI_{mean}(n))^2$$

$$SI_{stdv}(n) = \sqrt{SI_{var}(n)}$$

Temporal Formula

$$TI(i, j, n) = Y(i, j, n) - Y(i, j, n-1)$$

$$TI_{mean}(n) = \frac{1}{P} \sum_i \sum_j TI_r(i, j, n)$$

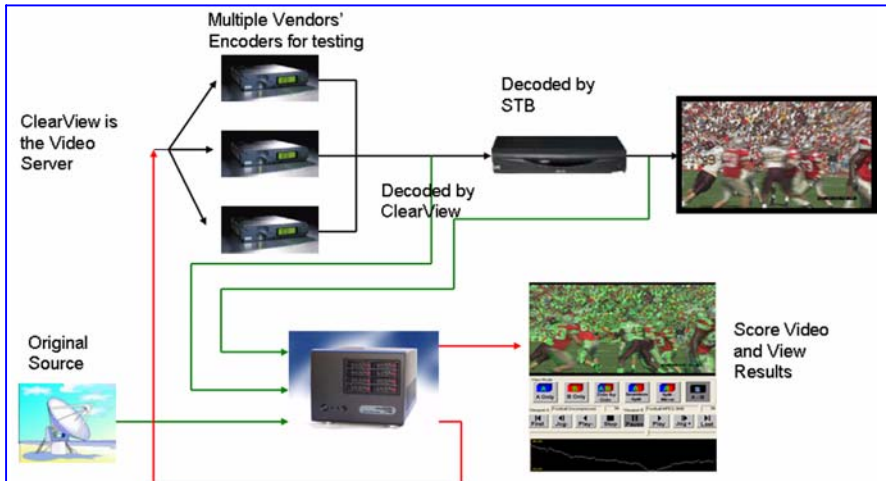
Subjective Viewing Modes



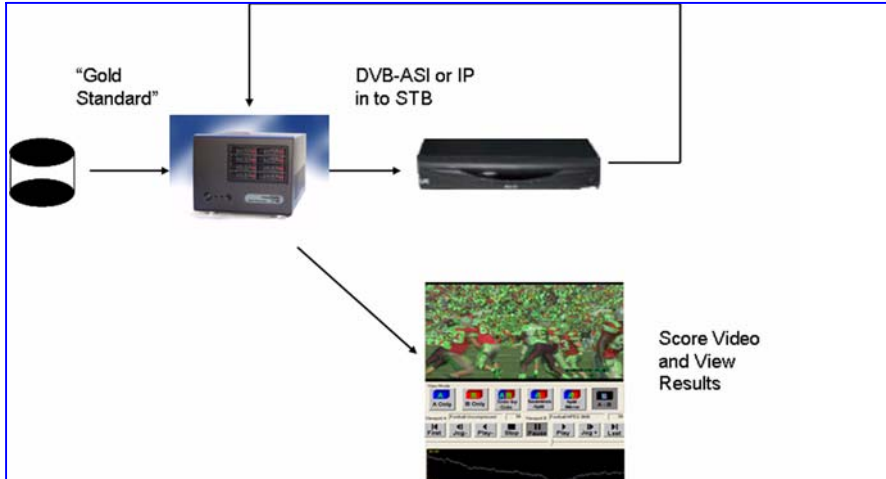
ClearView GUI



Broadcast/Encoder Video Testing



Set-Top Box (STB) Video Testing



Imported File Formats

- Avid AVR, DS HD/SD, DV (*.gen)
- Avid Meridian & YCbCr
- Avid OMFI (*.omf, *.omfi)
- AVR, JFIF, JPED, Meridian, RGB, YCbCr
- CineWave
- DPS Velocity Files (*.dps)
- DV Movies (*.dv, *.dif)
- DVS Direct File Format (*.dvs)
- DVSD, DV25, DV50, MPEG-I, MJPEG
- DigiSuite
- Headerless/Raw (*.hdr, *.yuv, *.rgb, *.raw)
- HiCon SLB32 RFB format (*.slb)
- Jaleo Direct Format (*.js)
- Media 100 MJPEG
- Microsoft AVI (*.avi)
- MPEG 1 4:2:0 (*.mpg, *.mpeg)
- MPEG 2 Elem. Stream, (4:2:0/4:2:2)
- MPEG 2 Program Stream, (4:2:0/4:2:2)
- MPEG 2 Transport Stream, (4:2:0/4:2:2)
- MPEG-4/AVC Elem. Stream (*.h264)
- MPEG-4/part 2 Elem. Stream (*.MP4)
- MXF Format (DV, DVCPPro50, MPEG, IMX)
- Newtek Video Toaster (*.rtv)
- PhotoShop FilmStrip (*.flm)
- Profile GXF Format/SMPT-360 (*.gxf)
- QuickTime Movies (*.mov)
- RealVideo (*.ra, *.rm, *.ram)
- SGI Movie Format (*.mv)
- Windows Media (*.asf, *.wmf, *.wmv)
- Accom YUV CCIR 601 8 Bit
- Cineon (CIN)
- DPIX (DPX)
- JPEG
- Microsoft BMP, DIB
- Photo CD PCD
- Photoshop PSD
- Portable anymap PNM
- Portable Bitmap Format PBM
- Portable graymap PGM
- Portable pixmap PPM
- Raw Y'CbCr 8-bit
- Raw Y'CbCr 10-bit
- Raw RGB
- Raw ARGB
- SGI RGB
- Sun Raster (.ras)
- Targa TGA, ICB, VDA, VST
- Targa 3000, Pinnacle
- TIFF, TIF

Exported File Formats

- Microsoft AVI (*.avi)
- Microsoft BMP
- Headerless/Raw (*.hdr, *.yuv, *.rgb, *.raw)

Custom File Formats

Available upon Request



ClearView Shuttles



Raid 0 Disk Array - 700 GB
 Supports video output rates up to
 - Single-Stream = 1 X 360 MB/s
 - Dual-Stream = 2 X 160 MB/sec
 PS-2 Keyboard & Mouse, 1 Giga-Bit
 Ethernet Port, 6 USB 2.0 Port, 1
 IEEE 1394A Port

Physical Specifications
 Dimensions 10"W x 8"H x 16"D
 250mm x 203mm x 407mm
 Weight 24 lbs. 12 KG.
 System In Case
 Weight 47 lbs. 25 KG

Temperature Operational:
 +5 - +35 C ,95%, non-condensing
 Temperature Storage:
 -20 - 50C, humidity ,95%, non-
 condensing
 Power
 90 - 250 VAC, 47 - 63 Hz, Autodetect.
 300W Max.

ClearView Shuttle DVI

DVI/VGA Output

DVI 1.0 Compliant Digital Output
 VESA Compliant Analog VGA Output
 Bit Depth: 24 Bits Per Pixel (RGB)

Array Payout Performance

Video Standard	Duration
1368x768@60P, 8-bit, 4:4:4	49 mins
1920x1080@120P, 8-bit, 4:4:4	25 mins

Support for non-standard DVI Displays.
 Able to ignore EDID data from Displays.
 Support for custom video rasters.

ClearView Shuttle Broadcast

Broadcast I/O

ITU-601, SMPTE 259/292/296
 8/10 bits per Component
 4:2:2 / 4:4:4 Sampling, Single/
 Dual-Link
 HD/SD SDI In
 HD/SD SDI, Component, S-
 Video, Composite Output
 Simultaneous I/O or 2 Outputs

Array Performance

Video Standard	Duration
1280x720@60P, 8-bit, 4:2:2	113mins
1920x1080@60i, 8-bit, 4:2:2	100mins
1920x1080@60P,8-bit, 4:2:2	50mins

ClearView Classic System/RAM/Disk Options



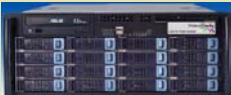
Dual GNIC, 120 GB HDD, XP Pro/64-bit, DVD/CD-RW, USB.
 4U Rackmount/Deskside Chassis.
 Supports All Configurable I/O Modules
 Raid 0 Disk Array.
 Supports video output rates to 450 MB/sec.

Memory Models
 Model: CV-S4041 (4GB)
 Model: CV-S4081 (8GB)
 Model: CV-S4161 (16GB)

High-Speed Disk Array Models
 Model: CV-HD-360 (360 GB)
 Model: CV-HD-720 (720 GB)
 Model: CV-HD-1440 (1440 GB)

Video Standard	RAM Performance			Video Standard	Array Performance		
	4GB	8GB	16GB		360GB	720GB	1440GB
1280x720/60p/YUV	27 secs	63 secs	135 secs	1280x720/60p/YUV	0:54 hr	1:48 hr	3:37 hr
1920x1080/60i/YUV	24 secs	56 secs	120 secs	1920x1080/60i/YUV	0:48 hr	1:36 hr	3:12 hr
1920x1080/120p/RGB	3 secs	7 secs	20 secs	1920x1080/60p/RGB	0:12 hr	0:24 hr	0:48 hr

ClearView Extreme



Dual GNIC, XP Pro, DVD/CD-RW, US. 4U Rackmount
 Chassis.High-Speed Raid 0 Array - 1.2 TB
 Supports video output rates to 950MB/sec.
 Supports Broadcast I/O, DVI/VGA Output, and DVB-ASI Modules

Array Performance

Video Standard	Duration
1368x768@60P, 8-bit, 4:4:4	84 mins
1920x1080@60P,8-bit, 4:2:2	85 mins
1920x1080@120P, 8-bit, 4:4:4	43 mins

Configurable Input/Output Modules

Broadcast Input/Output Module	ITU-601, SMPTE 259/292/296	525i @ 59.94Hz, 625i @ 50Hz
Model: CV-SDI-HO-DL	8/10 bits per Component 4:2:2 / 4:4:4 Sampling, Single/Dual-Link HD/SD SDI In HD/SD SDI, Component, S-Video, Composite Output Simultaneous I/O or 2 Outputs	720p @ 60, 59.94, 50 Hz 1080p @ 60, 59.94, 50, 30, 29.97, 25, 24 & 23.98 Hz 1080i @ 60, 59.94 & 50 Hz 2048x1080p & 1080psf 23.98, 24 Hz 2048x1556psf 14.98, 15Hz

DVI Input Modules	DVI 1.0 Compliant	VGA, SVGA, XGA, SXGA
Model: CV-DVI-I-720	170 MHz max. pixel clock	480p/60, 720p/60, 1080i/30 (540p)

DVI Input Modules	DVI 1.0 Compliant	VGA, SVGA, XGA, SXGA, UXGA
Model: CV-DVI-I-1080	170 MHz max. pixel clock	480p/60, 720p/60, 1080i/30 (540p), 1080p/60

DVI Output Module	DVI 1.0 Compliant Output	User-Defined Output Rasters - Examples:
Model: CV-DVI-O	Industry Standard Analog VGA Output Max Bit Depth: 24 Bits Per Pixel (RGB)	1920x1080 @ up to 120 fps 2048x1556 @ up to 72 fps

DVB/ASI Input/Output Module	Physical Interfaces:	MPEG2 Single Program Transport Streams (SPTS)
Model: CV-ASI-IO	Input (1) BNC Serial Digital (DVB-C) Output (1) BNC Serial Digital (DVB-C)	MPEG2 Multi-Program Transport Streams (MPTS).

Video Clarity, Inc. reserves the right to make changes at any time in order to improve and to supply the best products possible. Product design and specifications are subject to change without notice or obligation. Video Clarity, Inc.



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