quantumdata™ 980 Series Test Systems
Overview of Applications

TELEDYNE LECROY
Everywhereyoulook™

Platforms and Modules

quantumdata 980 Test Platforms

980B Front View

980R Front View

980B Advanced Test Platform – Features / Modules

980B Test Platform

Standard Features:

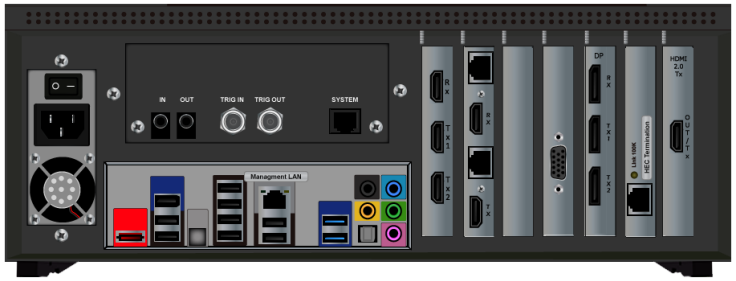
- 15 inch touch screen – 1280 x 768 resolution.
- Operates through embedded touch display or remote GUI from host PC.
- Accommodates 3-4 980 series modules.
- Command line control via telnet.
- Software upgradable.

Modules:

- HDMI 48G Protocol Analyzer / Generator module for HDMI Testing.
- HDMI 18G Video Generator module for HDMI Testing.
- HDMI 18G Protocol Analyzer / Generator module for HDMI Testing (“Rx/Tx module”).
- HDMI 1.4 300MHz Protocol Analyzer module.
- DisplayPort 1.2 Video Generator / Analyzer module.
- DisplayPort 1.4 Video Generator / Analyzer module.
- SDI Video Generator module.
- Phy & Protocol Aux Channel Analyzer module.

980R Advanced Test Platform – Features / Modules

980R Test Platform



Standard Features:

- 7 inch touch screen – 800 x 480 resolution.
- Rack mountable.
- Operates through embedded touch display or remote GUI from host PC.
- Accommodates 3-4 980 series modules.
- Command line control via telnet.
- Software upgradable.

Modules:

- HDMI 48G Protocol Analyzer / Generator module for HDMI Testing.
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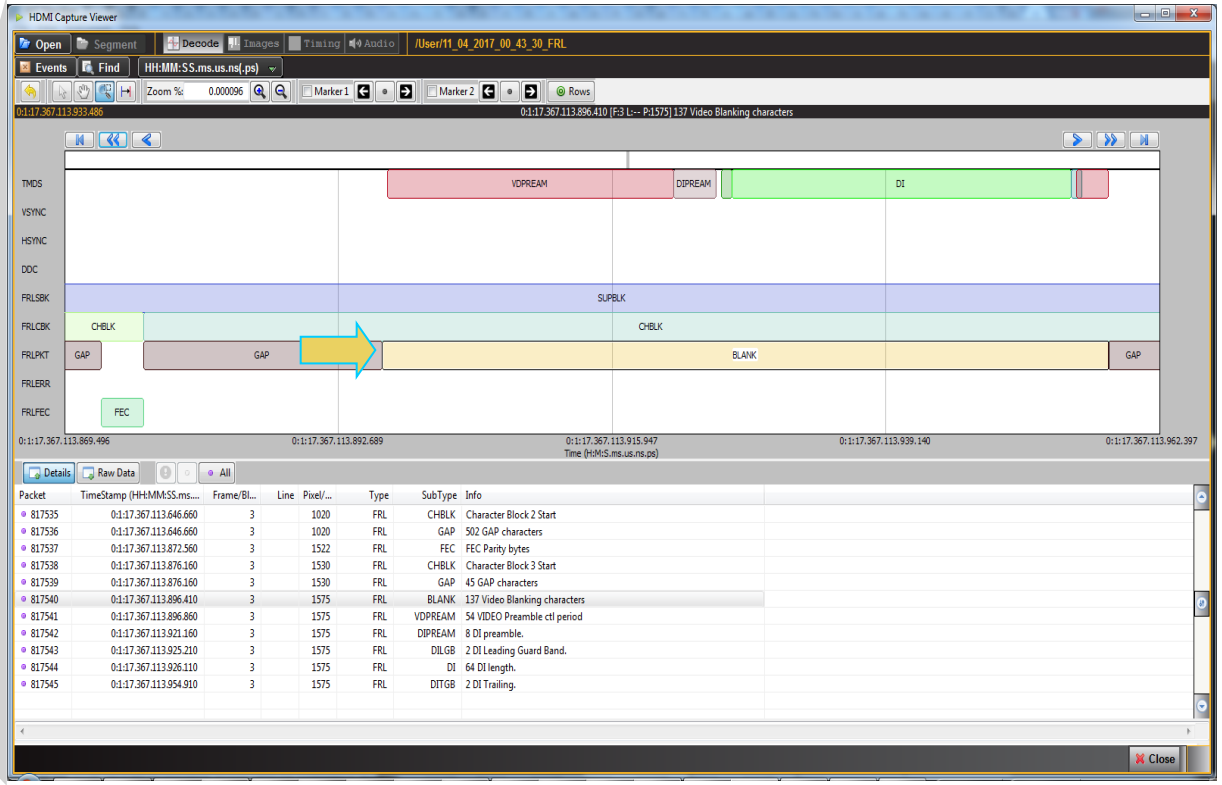
- DisplayPort 1.2 Video Generator / Analyzer module.
- DisplayPort 1.4 Video Generator / Analyzer module.
- SDI Video Generator module.
- Phy & Protocol Aux Channel Analyzer module.

Applications

980 48G Protocol Analyzer / Generator module for HDMI Testing

980 48G Protocol Analyzer module for HDMI Testing – Capture/Store

- HDMI 2.1 Analysis of 48G sources.
  - Emulate an HDMI 2.1 Fixed Rate Link (FRL) Sink for Source Analysis - Capture, Decode, Store incoming HDMI 2.1 FRL packet streams with Forward Error Correction (FEC) blocks.
  - Decode and depict underlying TMDS protocol and control elements.
  - Support link training mechanism associated with, and required for, FRL transmission
  - Discover root cause of interoperability issues.



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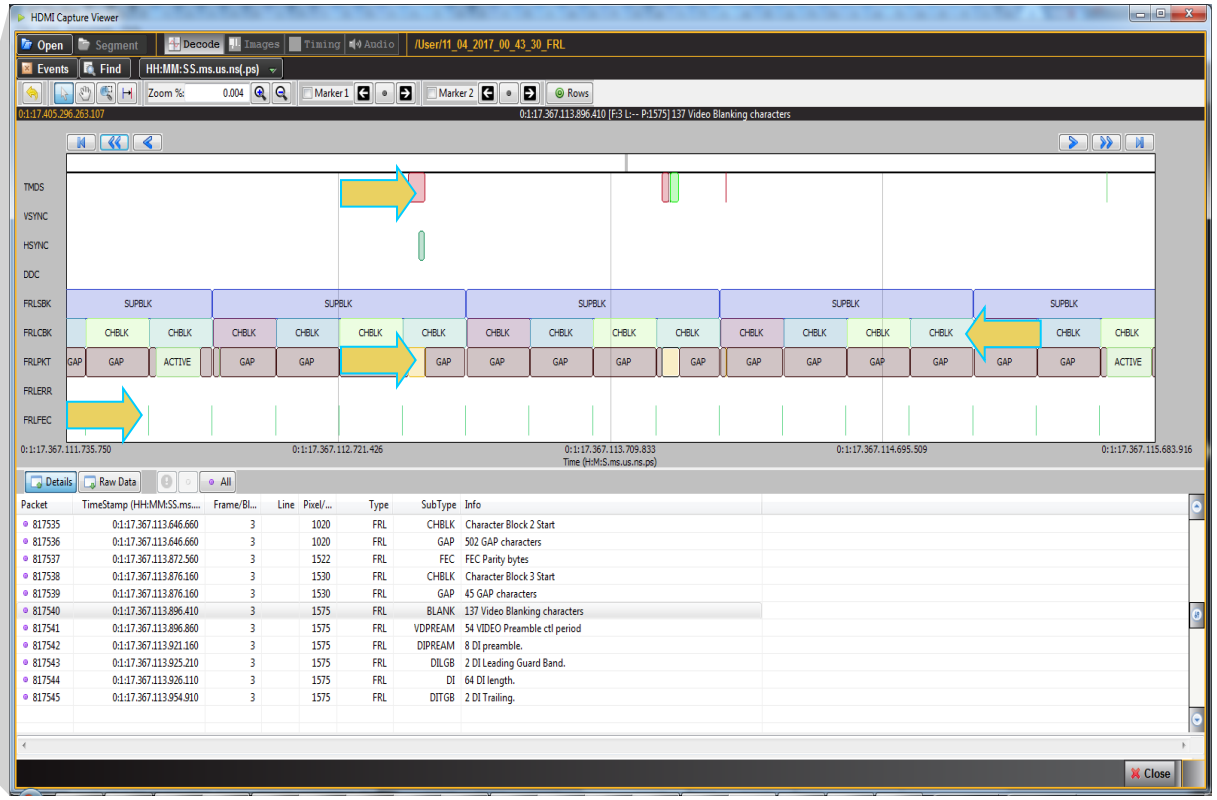
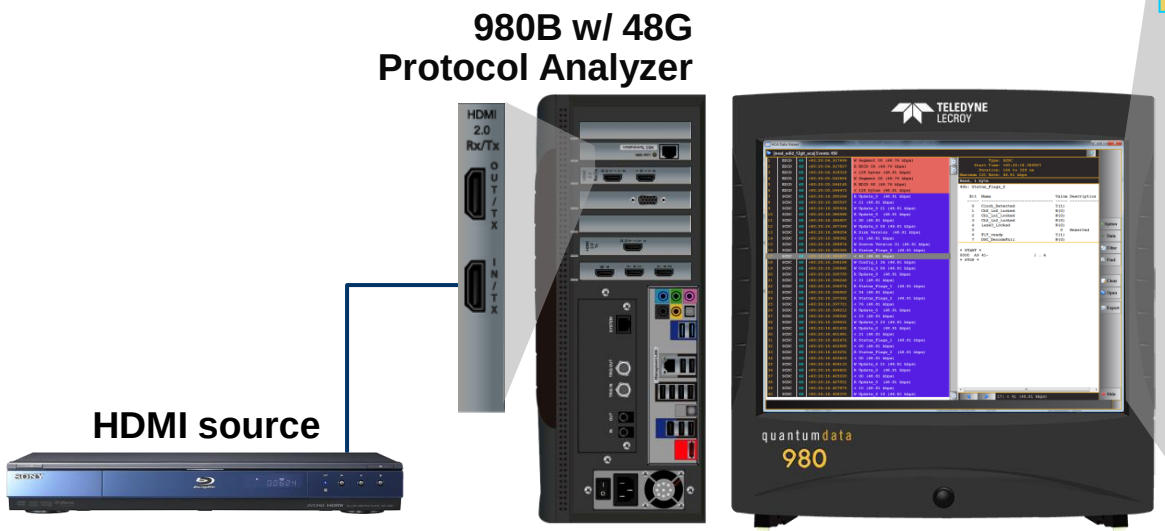
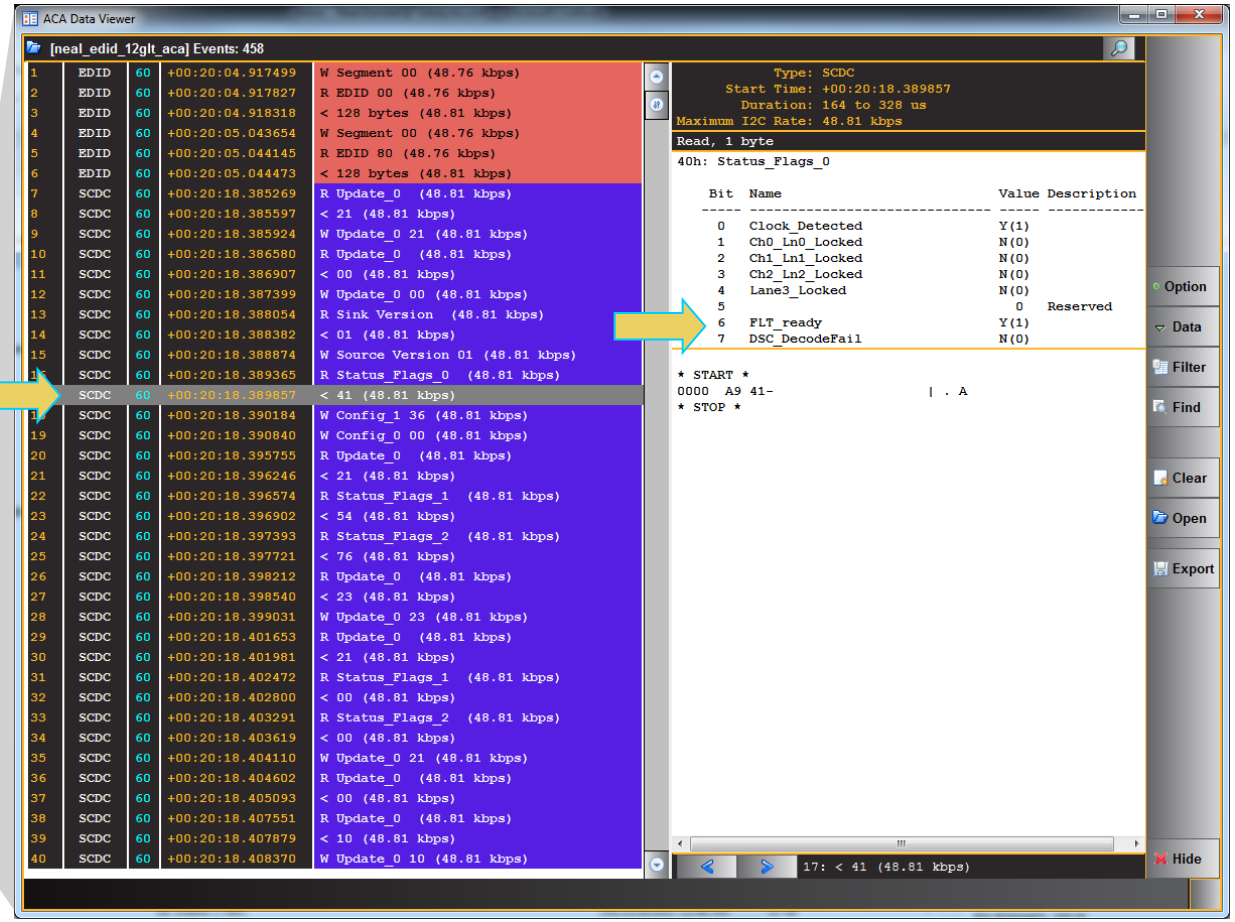


980 48G Protocol Analyzer / Generator module for HDMI Testing – Aux Channel Monitoring

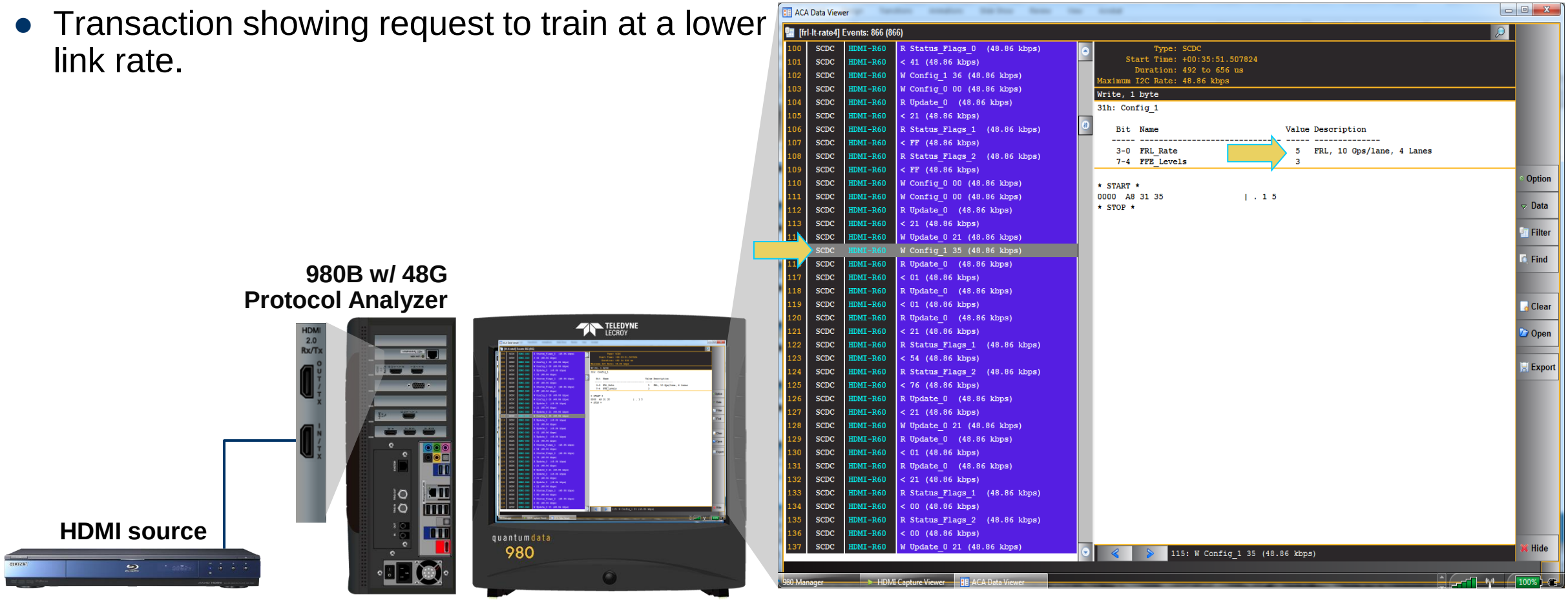
- HDMI Source Analysis – Aux channel analysis of FRL Link Training transactions.
  - Support link training mechanism associated with, and required for, FRL transmission.
  - Capture link training SCDC register transactions over the DDC channel with the Aux Channel Analyzer (ACA) utility.
  - Wait for indication FRL Link Training is ready.





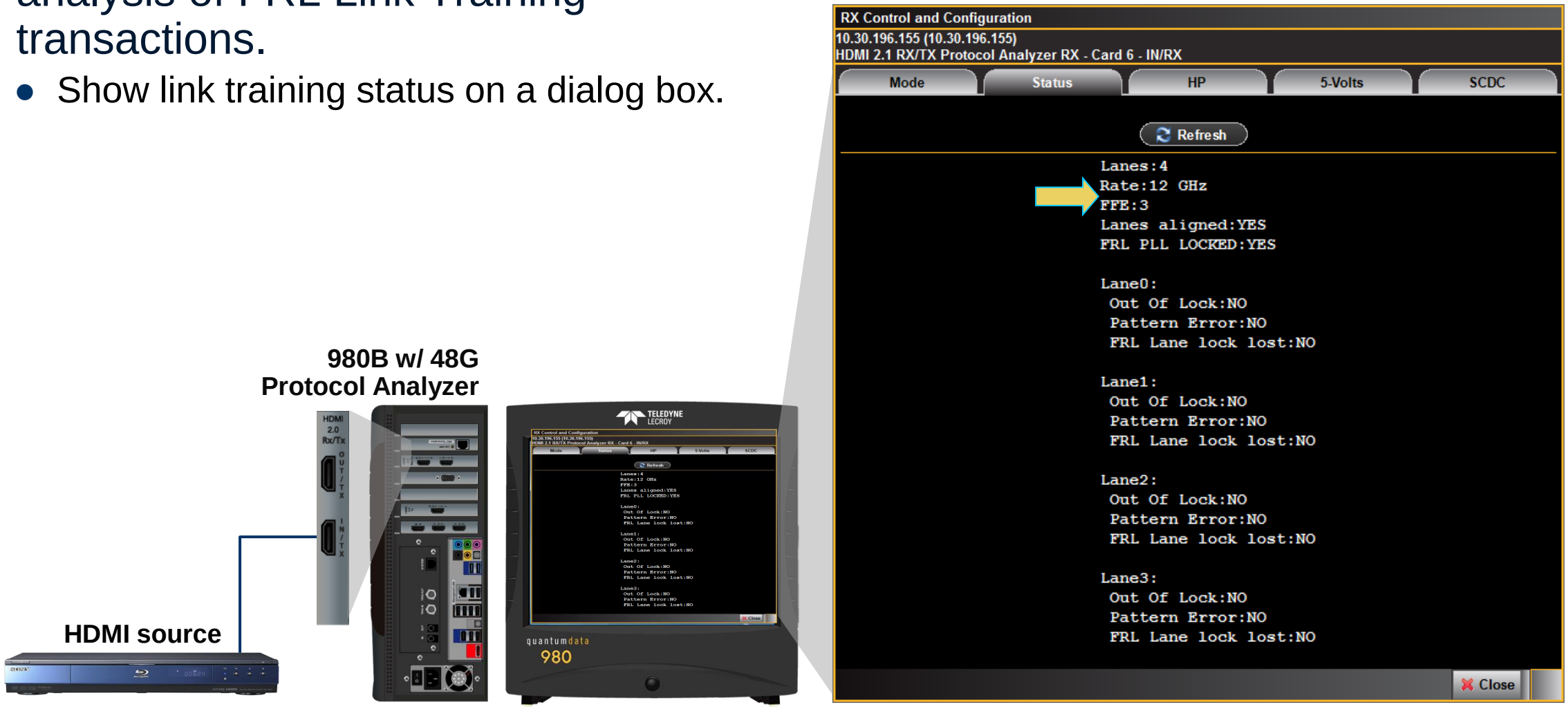
980 48G Protocol Analyzer / Generator module for HDMI Testing – Aux Channel Monitoring

- HDMI Source Analysis – Aux channel analysis of FRL Link Training transactions.
  - Transaction showing request to train at a lower link rate.



980 48G Protocol Analyzer / Generator module for HDMI Testing – Aux Channel Monitoring

- HDMI Source Analysis – Aux channel analysis of FRL Link Training transactions.
  - Show link training status on a dialog box.



Applications

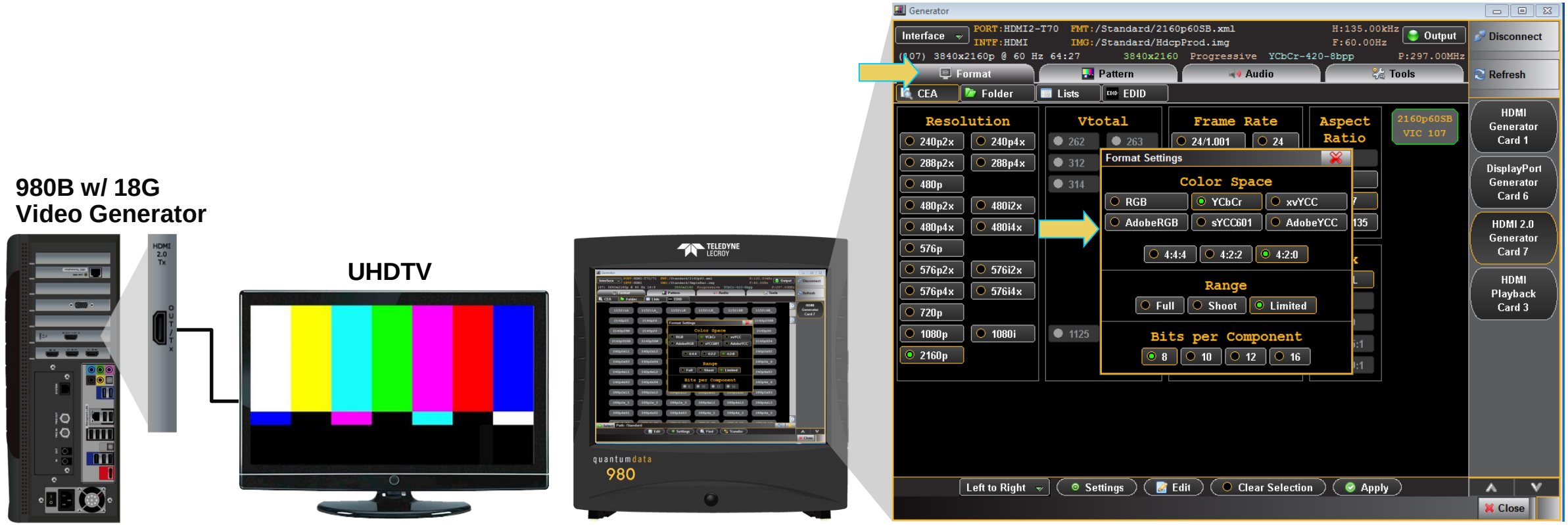
HDMI 18G Video Generator module for HDMI Testing

980 18G Video Generator module for HDMI Testing – Video Test

- HDMI Video Test of an HDMI 2.0 sink device
  - Run video tests with HDMI 2.0 4K formats at 50/60Hz up to 600MHz pixel rate (18Gb/s data rate).
  - Run video tests including advanced features such as deep color and 3D.
  - Supports 21:9 aspect ratio.
  - Use extensive format and test pattern library.

980 18G Video Generator module– Video Test

- HDMI Video Test of an HDMI 2.0 sink device
  - Test HDMI 2.0 4K ultra high definition TVs at 50/60Hz using HDMI 2.0 4:2:0 pixel encoding.



980 18G Video Generator module for HDMI Testing – Video Test

- HDMI 3D Video Test of an HDMI 2.0 sink device
  - Test 3D video on HDMI 2.0 4K ultra high definition TVs.

980 18G Video Generator module for HDMI Testing – Audio Test

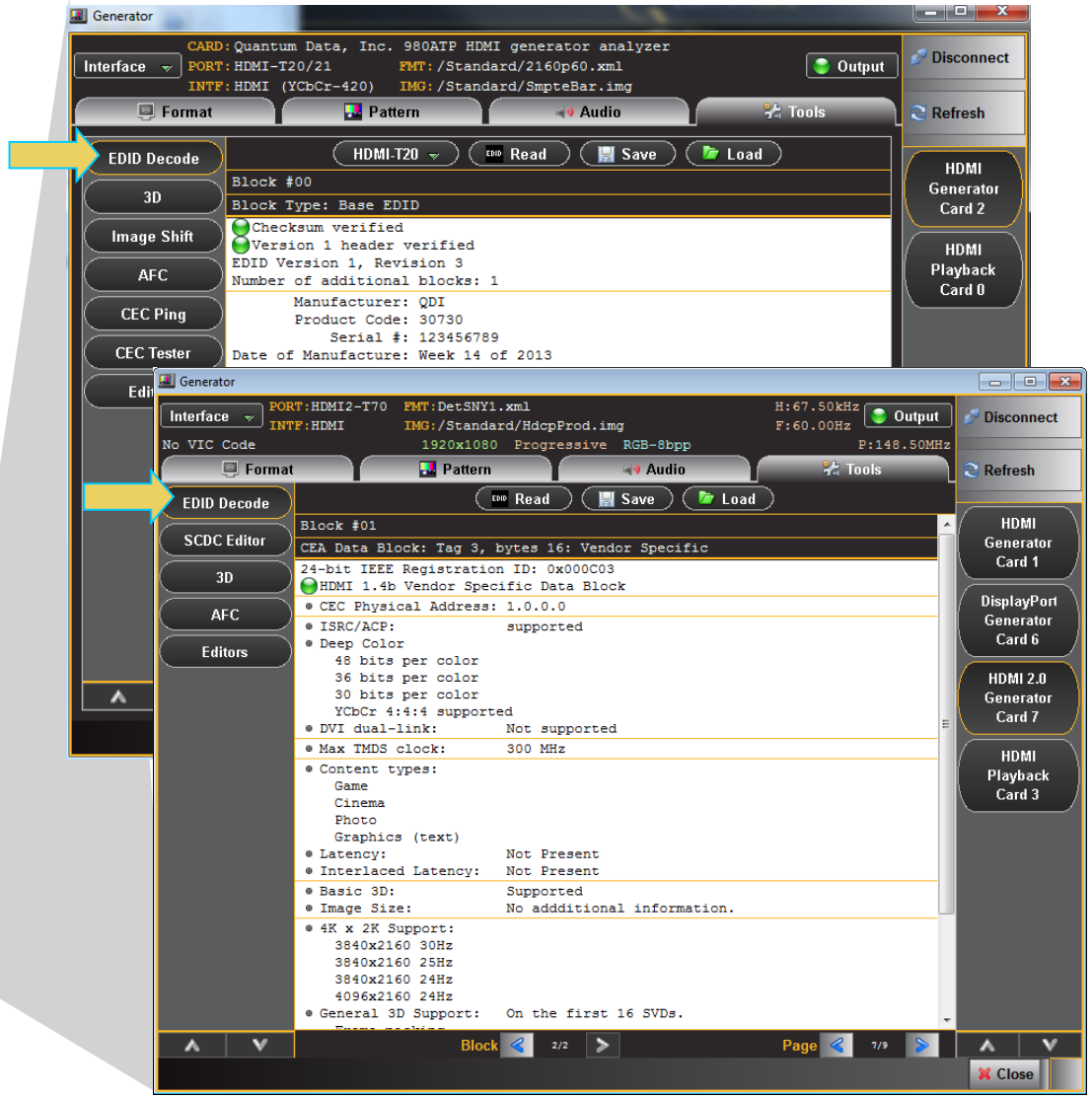
- HDMI Video Test of an HDMI audio rendering device
  - Run LPCM uncompressed formats with programmable audio parameters.

980 18G Video Generator module for HDMI Testing – Audio Test

- HDMI Video Test of an HDMI audio rendering device
  - Select from a variety of Dolby and DTS compressed audio clips.

980 18G Video Generator module for HDMI Testing – EDID Test

- HDMI EDID verification test of an HDMI sink device
  - View the entire EDID in human readable text.
  - Check for checksum and header errors.



980 18G Video Generator module for HDMI Testing – Read EDID with HDR

- Read EDID of an HDMI 2.0 Ultra HD Sink
  - Verify Summary Page.
  - Select EDID block and page for viewing.
  - Save EDID for sharing with colleagues.
  - Verify VSDB for HDR Support (lower right)

980 18G Video Generator module for HDMI Testing – SCDC Test

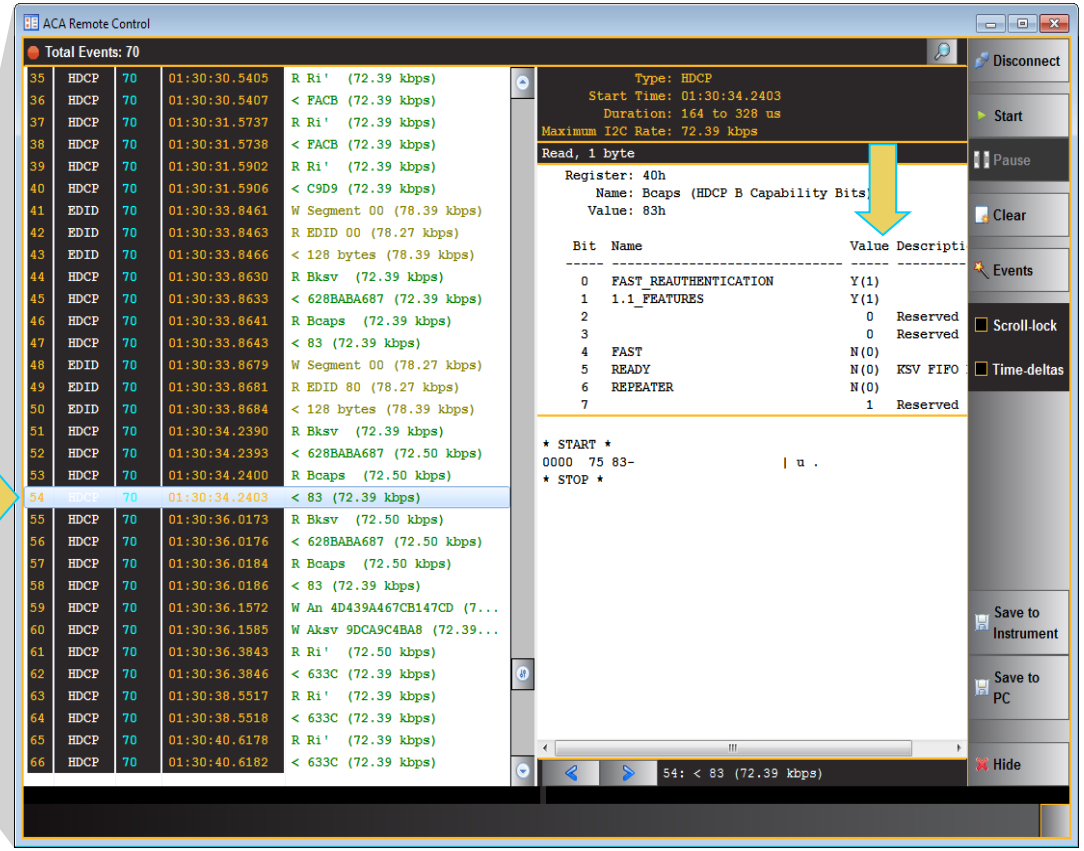
- HDMI SCDC verification test of an HDMI sink device
  - View SCDC registers in human readable text.

980 18G Video Generator module for HDMI Testing – HDCP Sink Test

- HDCP verification test of an HDMI sink device
  - Verify HDCP authentication.
  - View results on connected display.

980 18G Video Generator module for HDMI Testing – HDCP 1.4 Sink Monitoring

- HDCP verification with an HDMI sink device
  - Verify HDCP authentication transactions on Auxiliary Channel Analyzer (ACA) utility.
  - Identify cause of HDCP interoperability problems.
  - Save results and disseminate to colleagues at other locations.

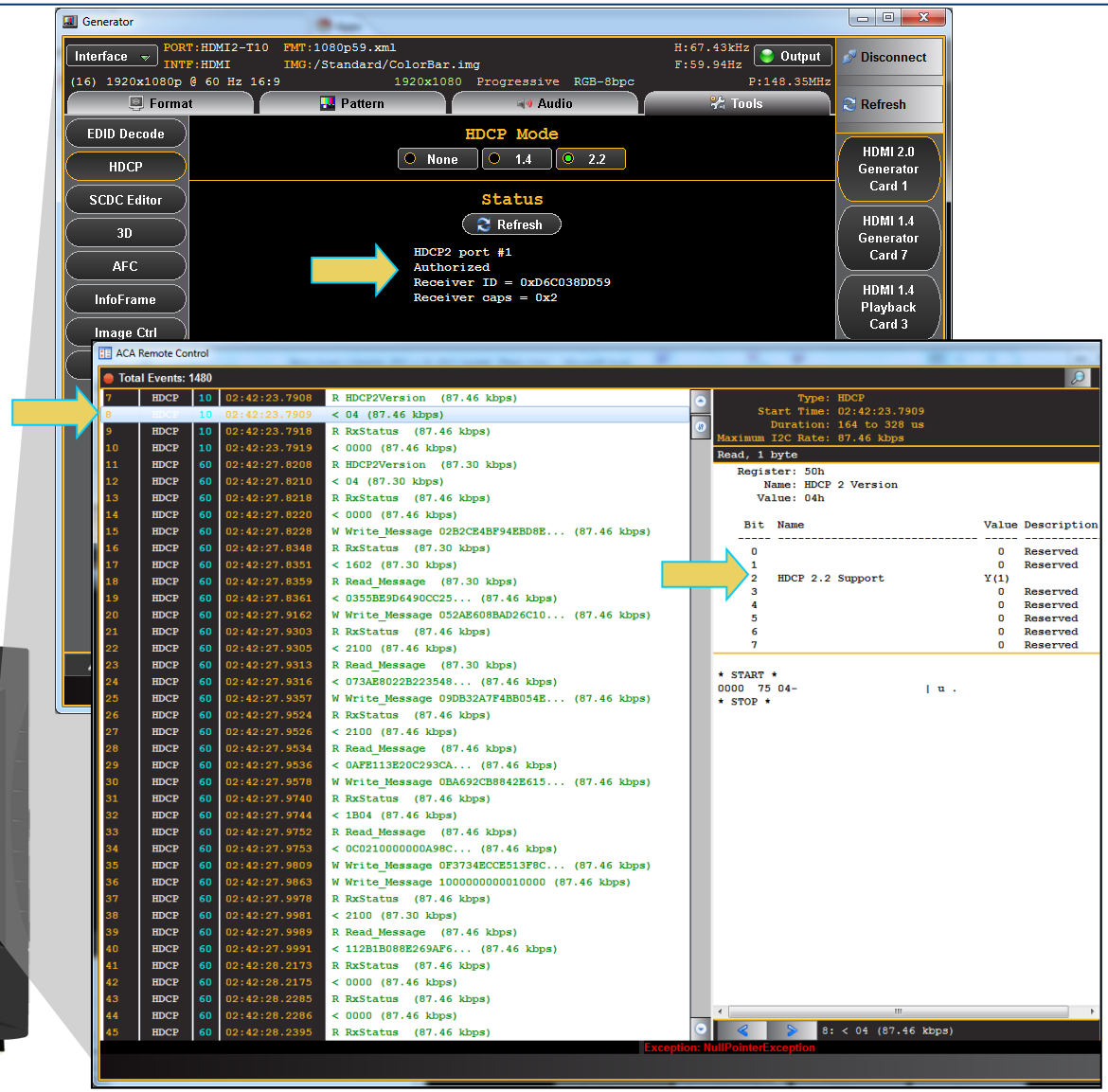


980 18G Video Generator module – HDCP 2.2 Sink Functional Test

- HDCP 2.2 verification with an HDMI 2.0 sink device
  - View pass/fail results on UHDTV under test.
  - Verify HDCP authentication transactions on Auxiliary Channel Analyzer (ACA) utility.
  - Identify cause of HDCP interoperability problems.
  - Save results and disseminate to colleagues at other locations.

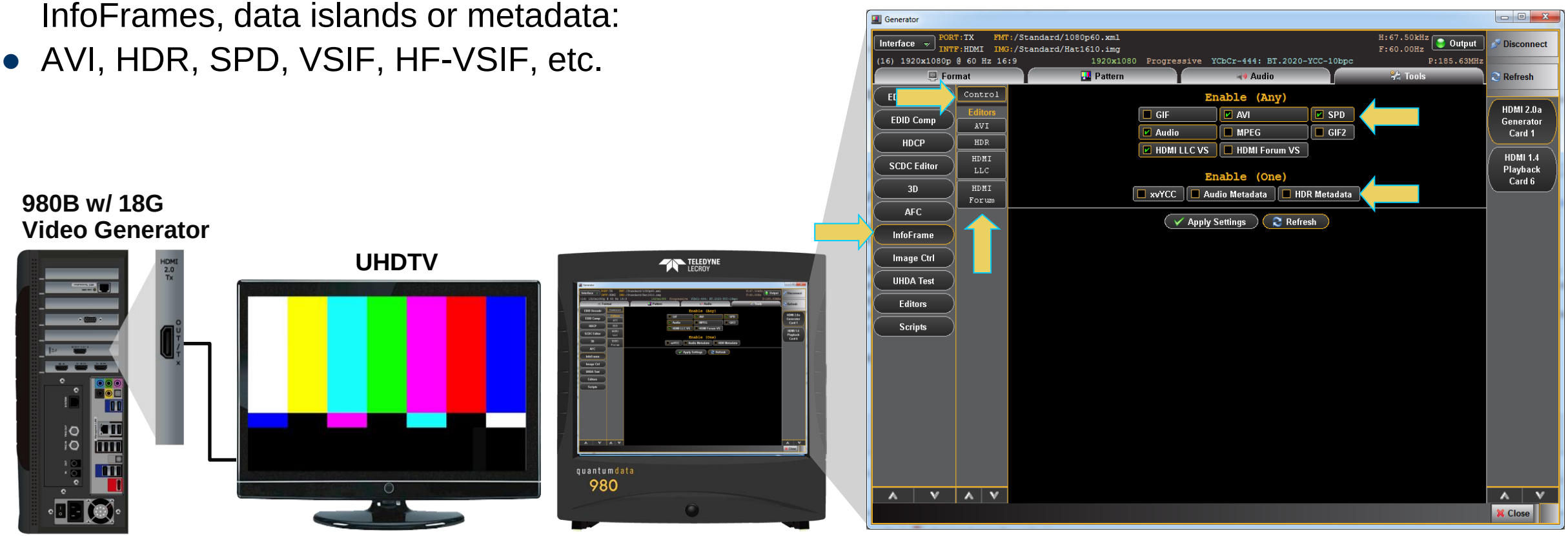
980B w/ 18G Video Generator

UHDTV



980 18G Video Generator module for HDMI – Controlling/Configuring InfoFrames

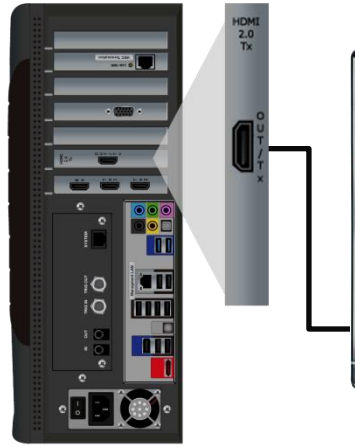
- Control (enable/disable) and configure data island and InfoFrames for transmission
  - Enable or disable the transmission of various InfoFrames, data islands or metadata:
  - AVI, HDR, SPD, VSIF, HF-VSIF, etc.



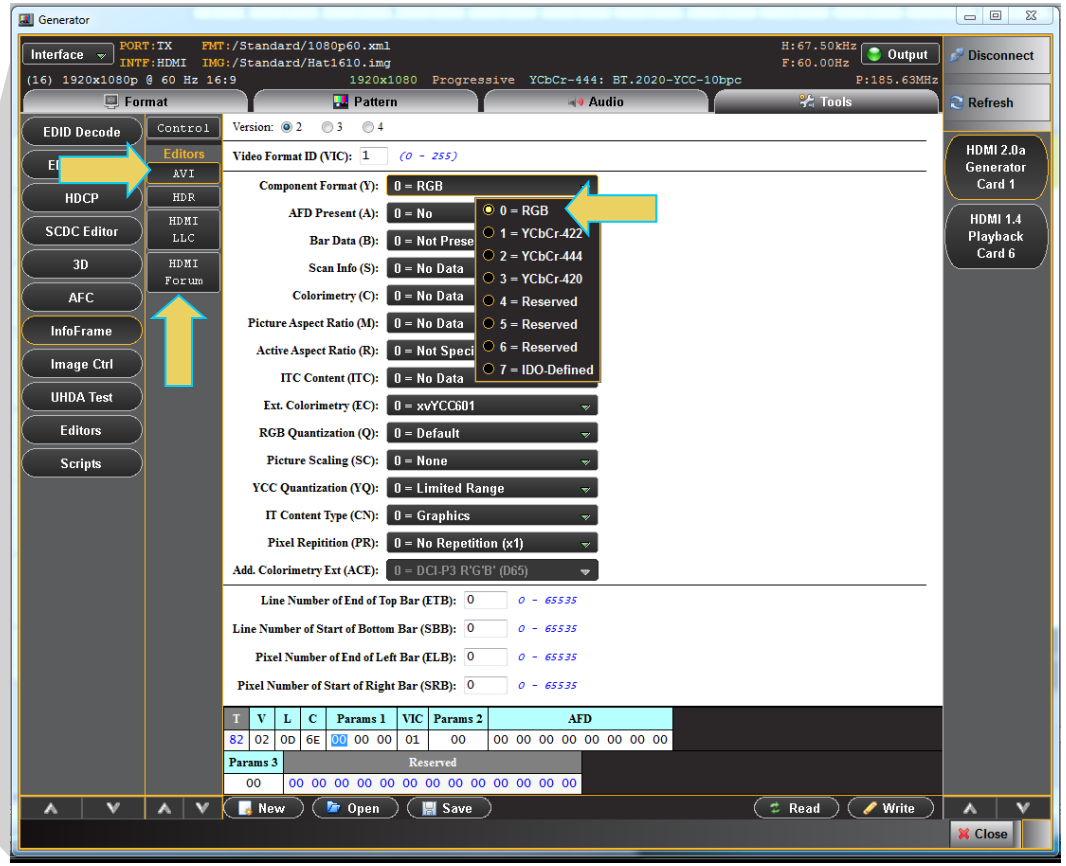
980 18G Video Generator module for HDMI – Configuring InfoFrame Parameter Values

- Control (enable/disable) and configure data island and InfoFrames for transmission
  - Configure custom values for InfoFrame parameters for transmission.
  - Configure values for AVI, HDR, VSIF and
  - HF-VSIF.

980B w/ 18G Video Generator



UHDTV



980 18G Video Generator module for HDMI – Configuring HDR InfoFrame Values

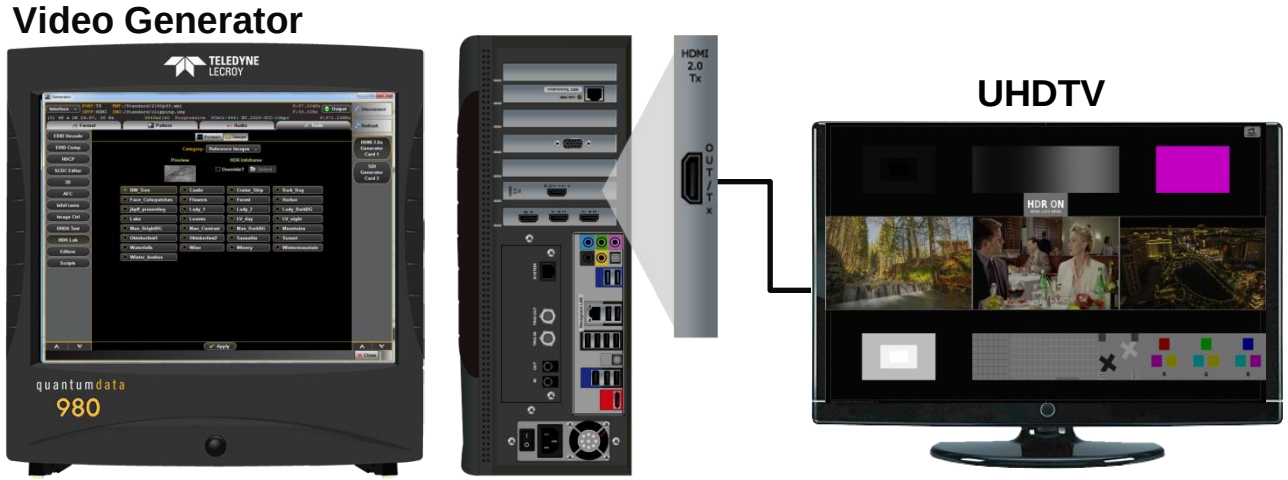
- Configure HDR metadata values for transmission
  - Configure custom values for all parameters for HDR InfoFrame.

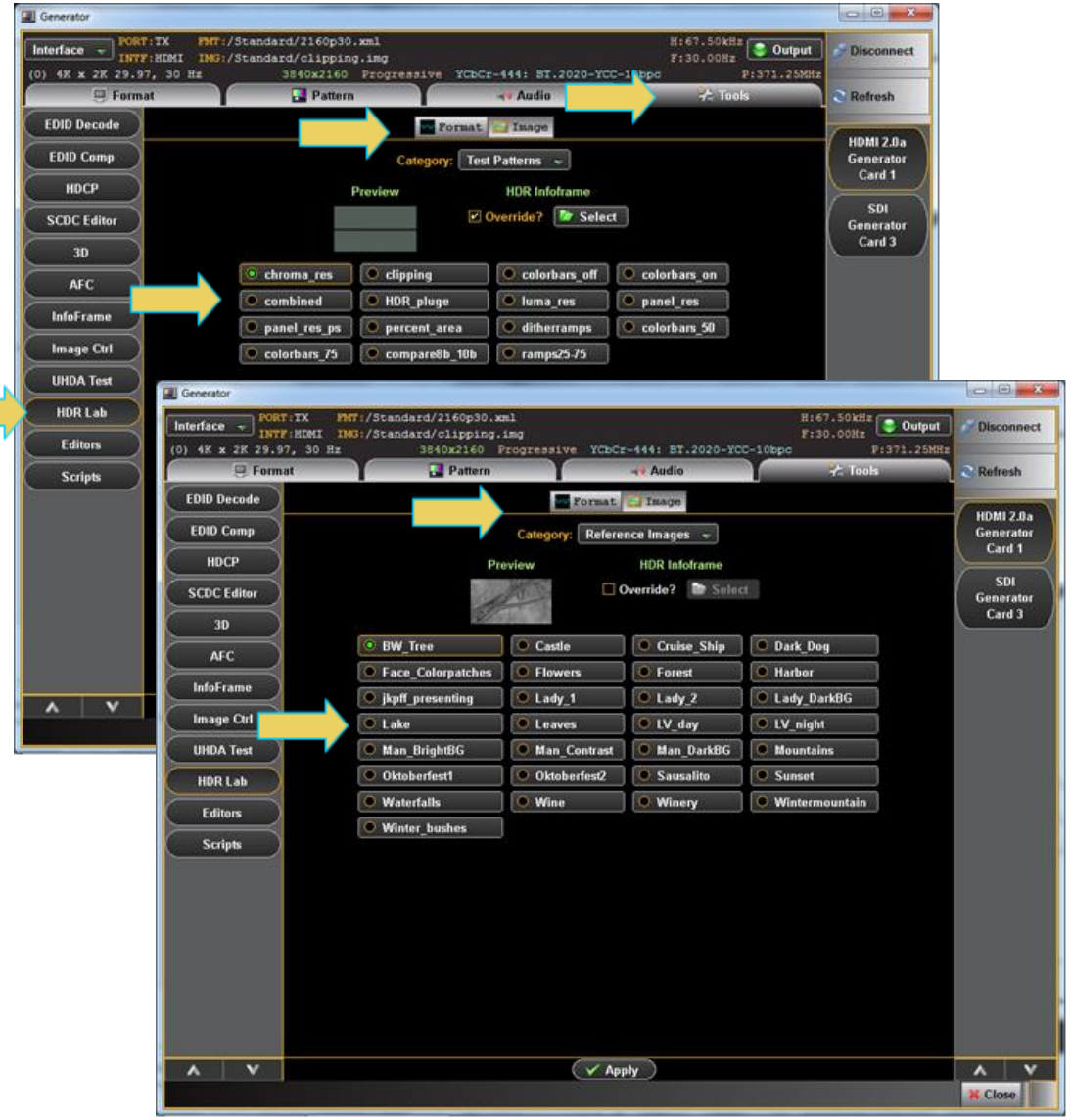
980 18G Video Generator module for HDMI – HDMI 2.0 High Dynamic Range

- Run HDMI 2.0 HDR functional tests at 18G:
  - Select HDR test image.
  - Transmit HDR InfoFrames to display to test its response.

980 18G Video Generator module for HDMI – "HDR Lab" Utility

- HDR Lab Test Patterns/Reference Images:
  - The HDR Lab utility is an optional test pattern pack (15 test patterns and 30 reference images).
  - Addresses the HDR needs of the industry from Device Manufacturers to HDR content Post-Production.
  - Joint effort with Teledyne LeCroy and industry experts Florian Friedrich and Joe Kane.
  - Verifies HDR metadata, color grading and color decoding throughout the post production process.
  - Uses a variety of test patterns to verify HDR attributes such as: peak brightness, native contrast, average brightness level, signal clipping, and color gamut on an HDR-capable UHD TV.



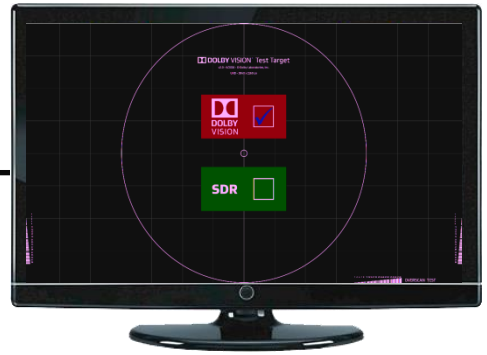


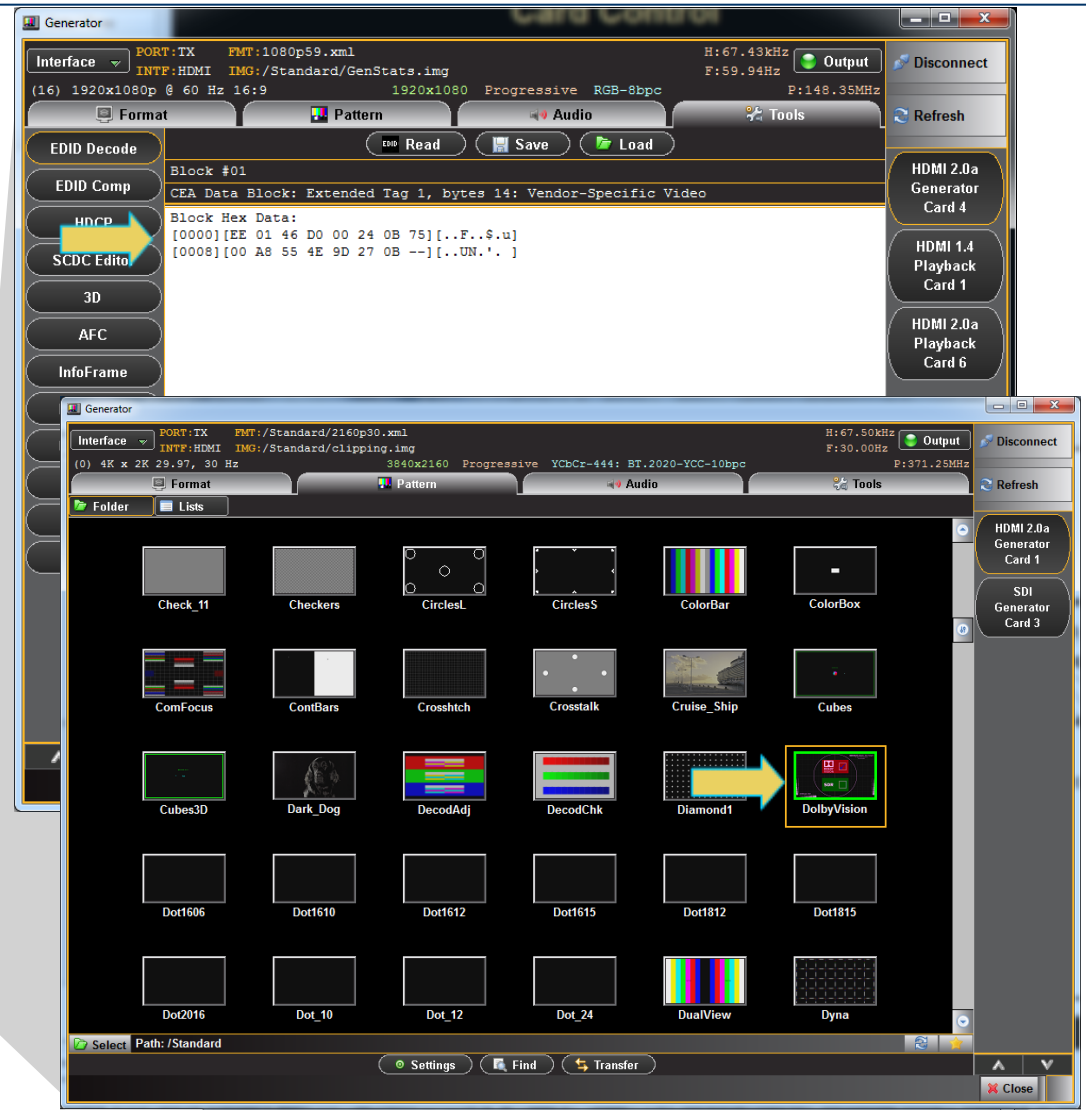
980 18G Video Generator module for HDMI – Select Dolby Vision Test Pattern

- Select HDR Test Patterns
  - HLG - provides assurance that the HDR infoframe is not impeding the ability of the display to render of the image.
  - **Dolby Vision** – Verifies:
    - Dolby Vision display's Dolby Vision-specific EDID data
    - Response to the Dolby Vision protocol handshake
    - Handling of the Dolby Vision signal and metadata.

980B w/ 18G Video Generator

UHDTV

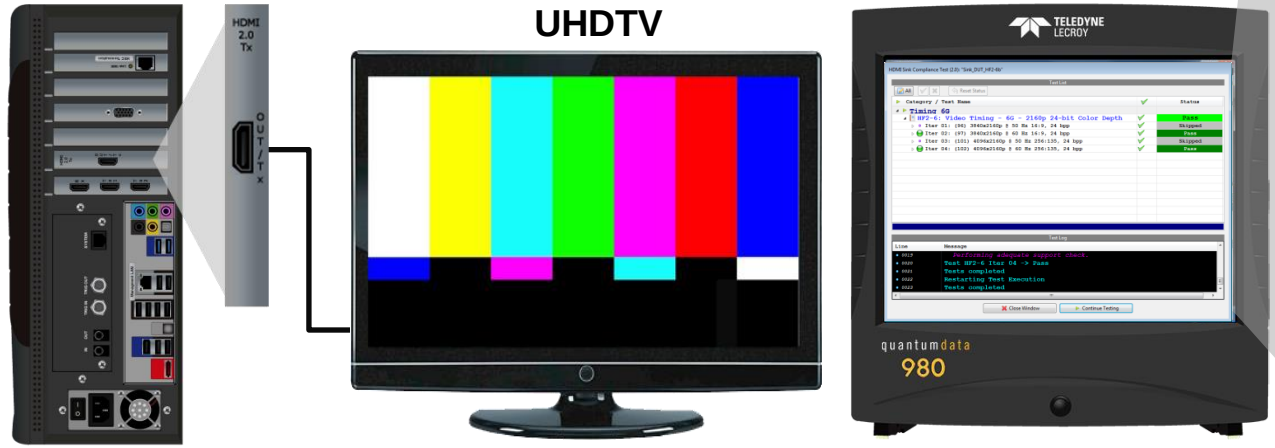




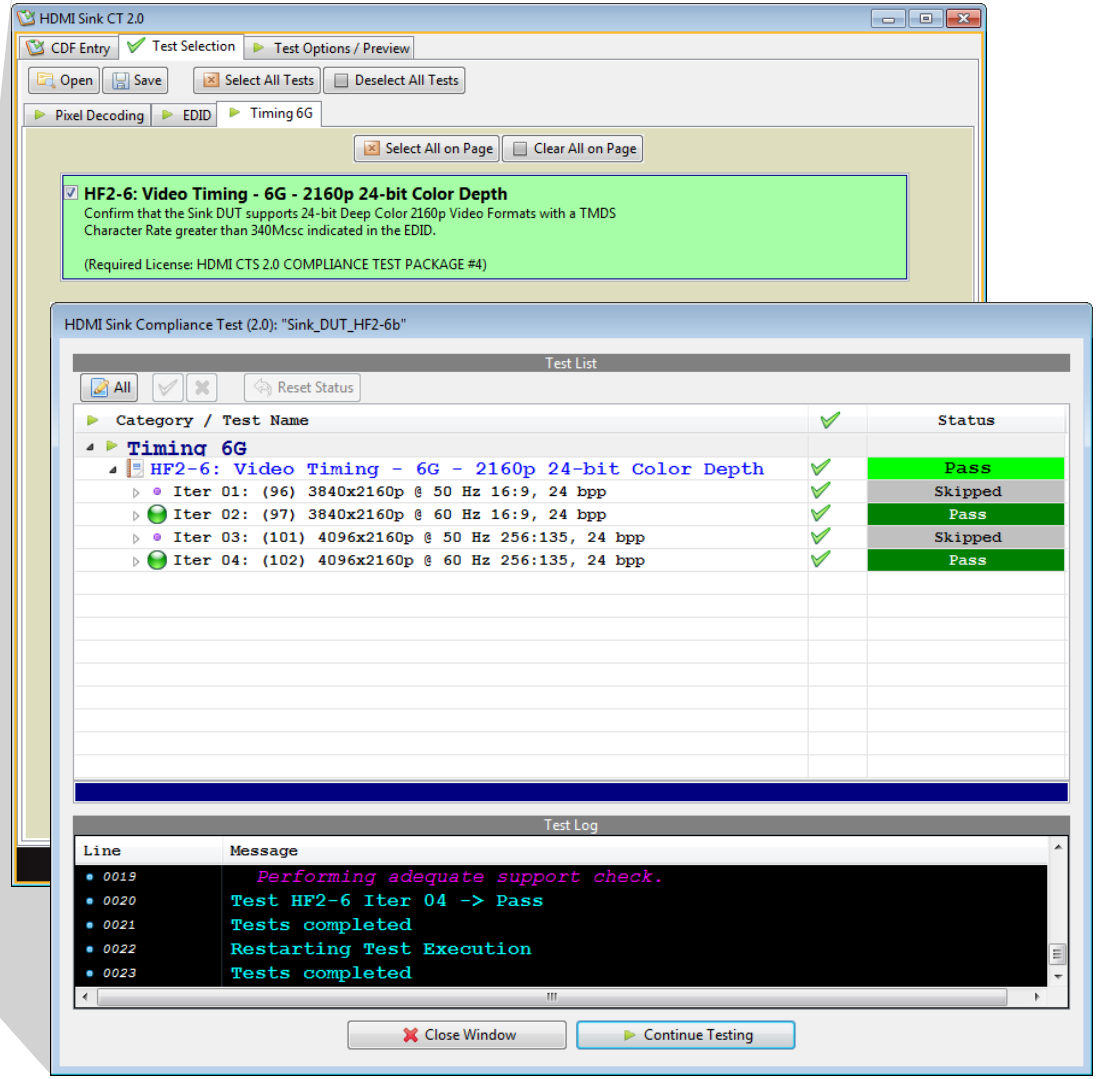
980 18G Video Generator module for HDMI – HDMI 2.0 Sink Compliance

- Run HDMI 2.0 Compliance test at 18G
  - Pre-test or self-test your HDMI 2.0 sink device to reduce costs and meet product time to market requirements.
  - View detailed results, identify root cause of failures.
  - Disseminate results to other subject matter experts.
  - Test sections covered:
    - **8.2 TMDS, 8.3 Pixel Decoding, 8.4 Timing, 8.5 Audio, 8.7 HDMI VSIF, 8.8.9 HDMI HDR, 9.7 Repeater Input.**

980B w/ 18G Video Generator



UHDTV



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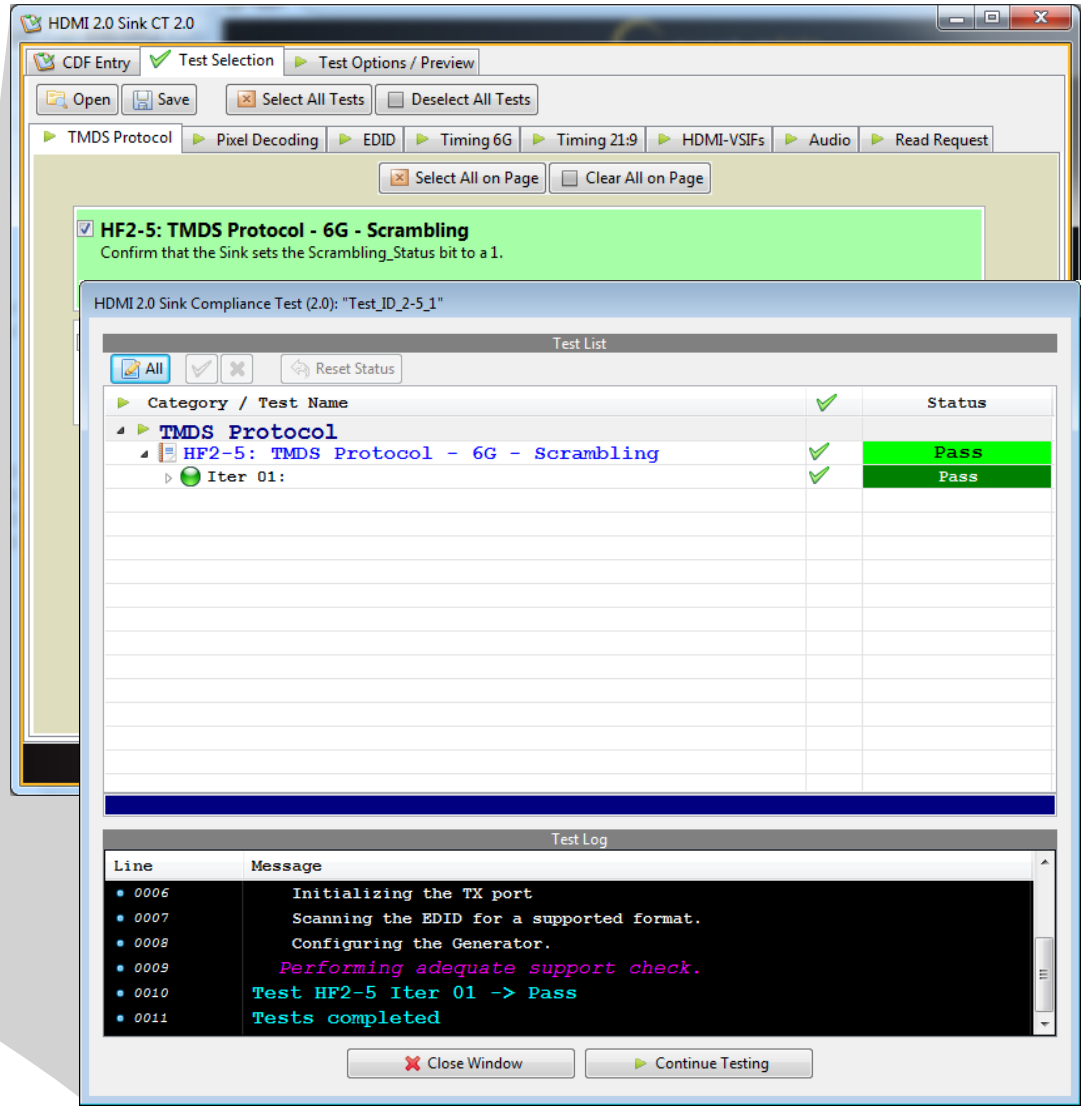
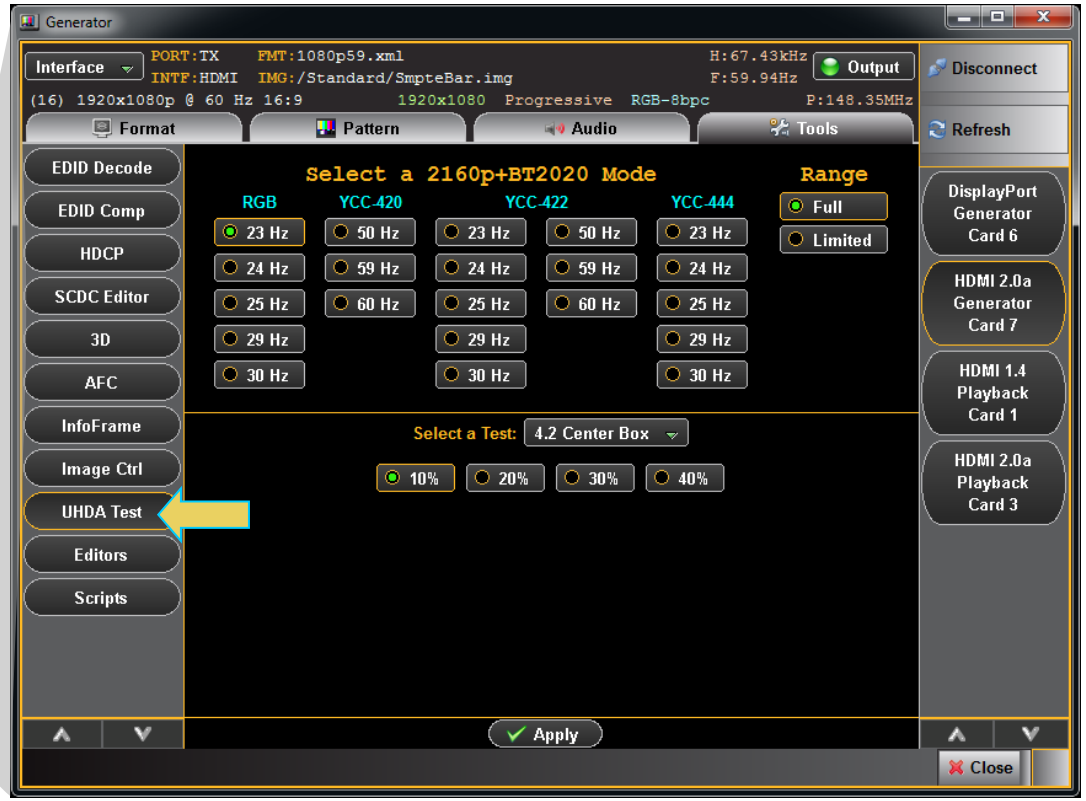


980 18G Video Generator module for HDMI – UHDA Sink Compliance

- Run Ultra HD Alliance Sink Compliance test
  - Pre-test or self-test your HDMI 2.0 UHD sink device to reduce costs and meet product time to market requirements.
  - Tests covered:
    - **4.2 HDR: Peak White, 4.3 HDR Black Level, 4.4 HDR Tone Mapping, 4.5 Wide Color Gamut, 4.6 Resolution, 4.7 Input Frame Rate and Bit Depth, 4.8 Grey Scale Tracking.**

980B w/ 18G Video Generator

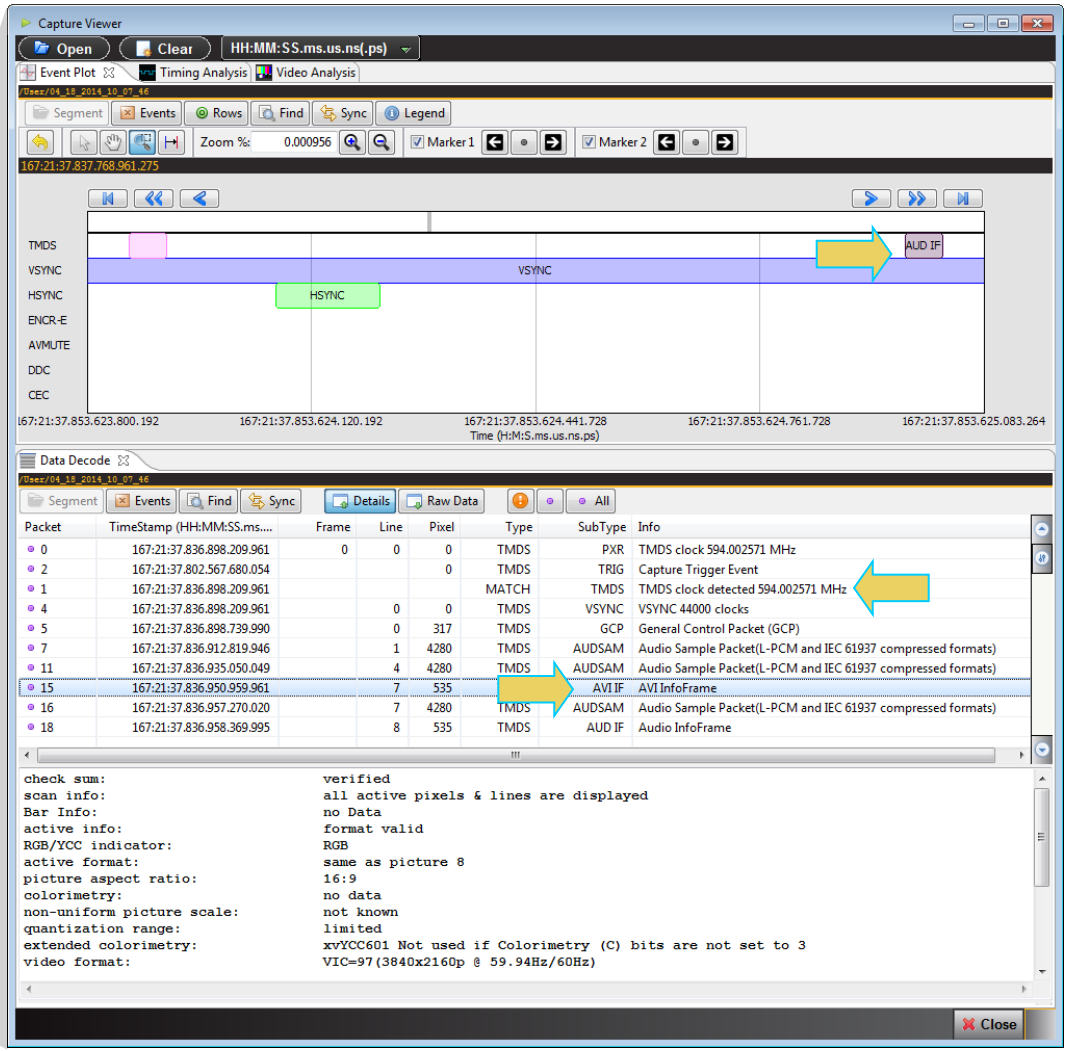


Applications

980 18G Protocol Analyzer / Generator module for HDMI Testing

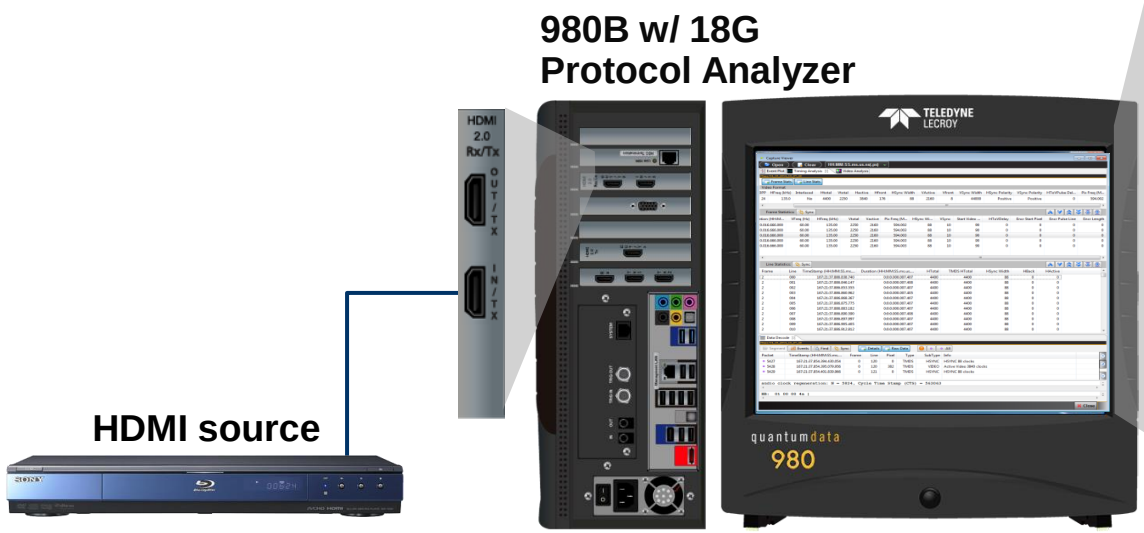
980 18G Protocol Analyzer module for HDMI Testing – Capture/Store

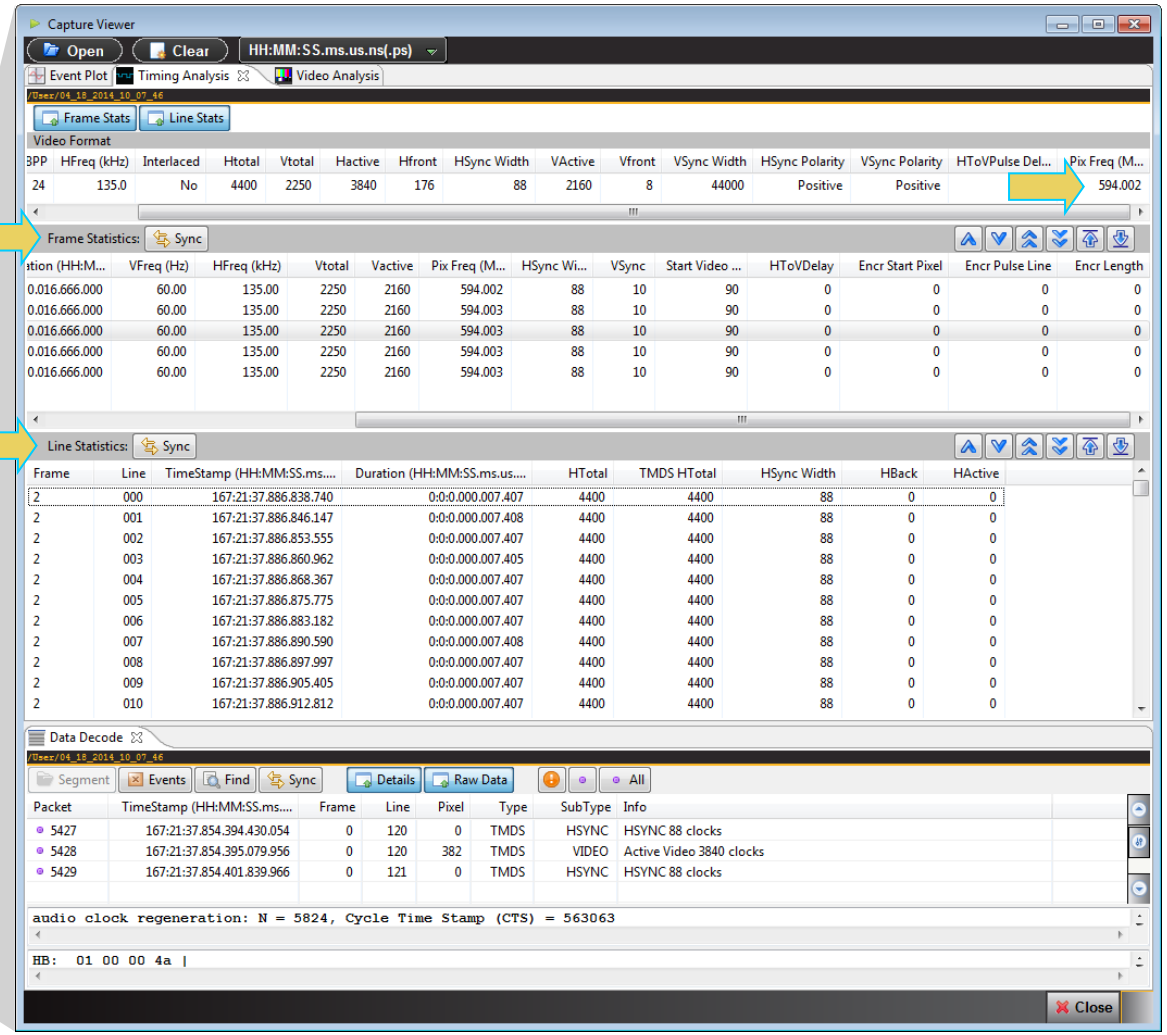
- HDMI 2.0 Analysis of 18G sources.
  - Discover root cause of interoperability issues.
  - Set triggers to capture specific sets of data.
  - Analyze HDMI metadata, protocol, control, timing, auxiliary data including HDR with HDMI 2.0 4K UHD video streams up to 600MHz.
  - View data in graphical timeline or table form.
  - View precise time stamps for all data.
  - Verify data island packets values.
  - Locate data through filtering and search utilities.



980 18G Protocol Analyzer module for HDMI Testing – Timing Analysis

- HDMI Source Analysis – Timing Analysis of 18G sources.
  - View summary timing for multiple frames.
  - View frame timing parameters.
  - View line timing parameters.
  - Identify timing errors.



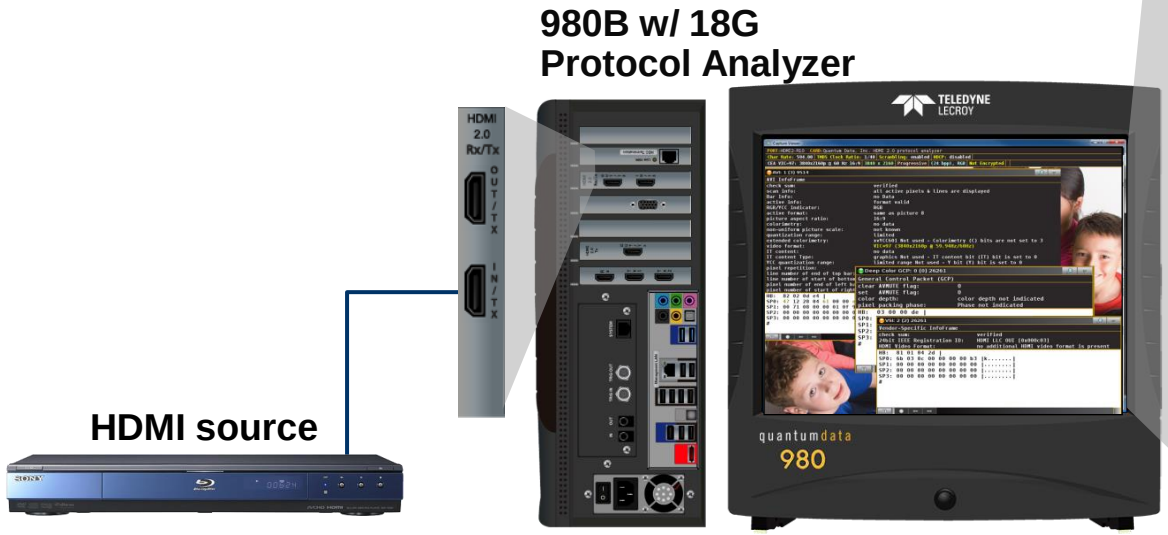


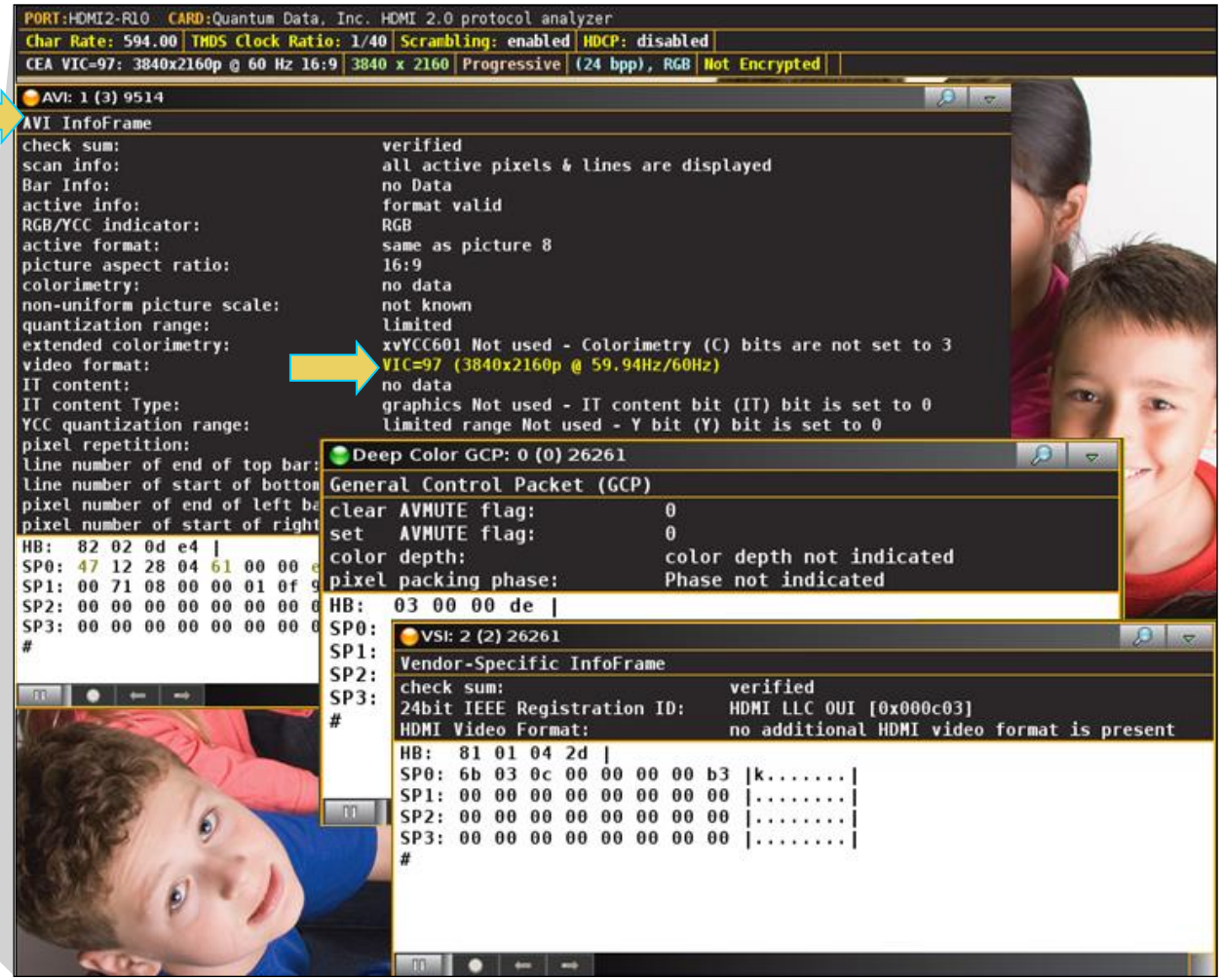
980 18G Protocol Analyzer module for HDMI Testing – Video Analysis

- HDMI 2.0 Source Analysis – Video Analysis of 18G sources.
  - View video frame thumbnails.
  - View pixel values for any frame.

980 18G Protocol Analyzer module for HDMI Testing – View Real Time Video/Metadata

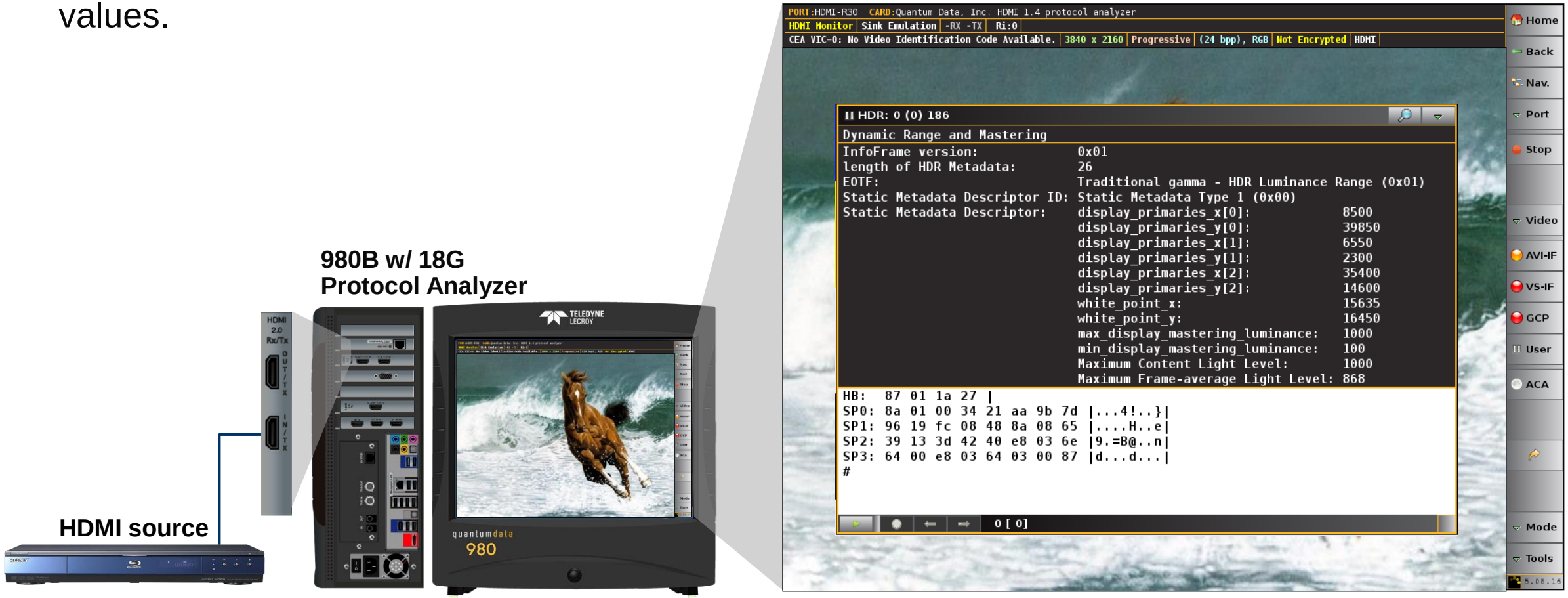
- HDMI Source Analysis – Real Time Analysis of 18G sources (video and metadata)
  - View incoming video in real time.
  - View video parameters in real time.
  - Identify changes in video parameters as they occur.
  - Examples show AVI InfoFrame, GCP packets and Vendor Specific Infoframe.





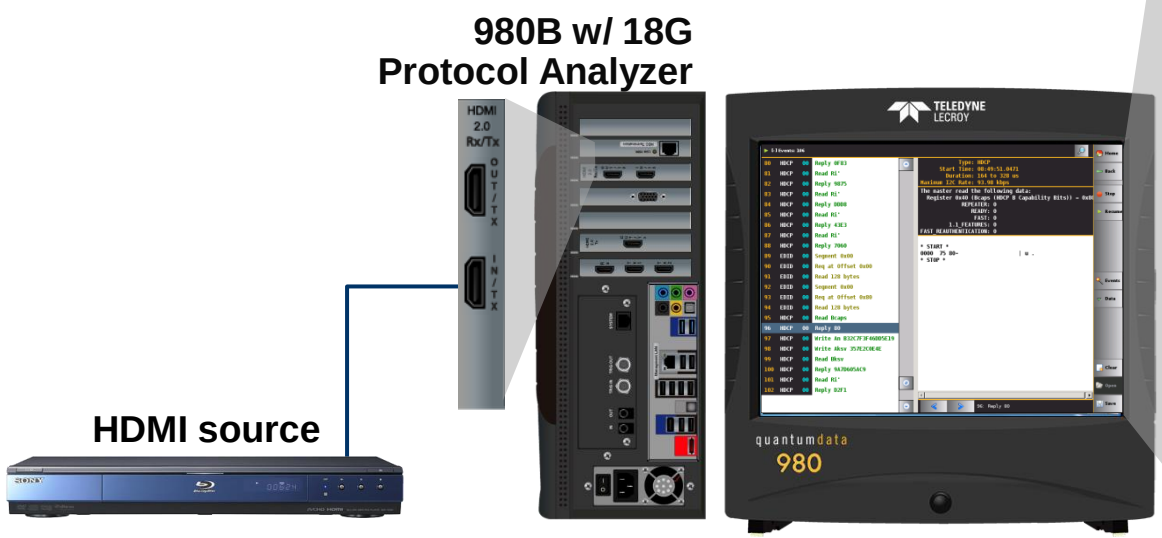
980 18G Protocol Analyzer module for HDMI Testing – HDR Source Functional Test

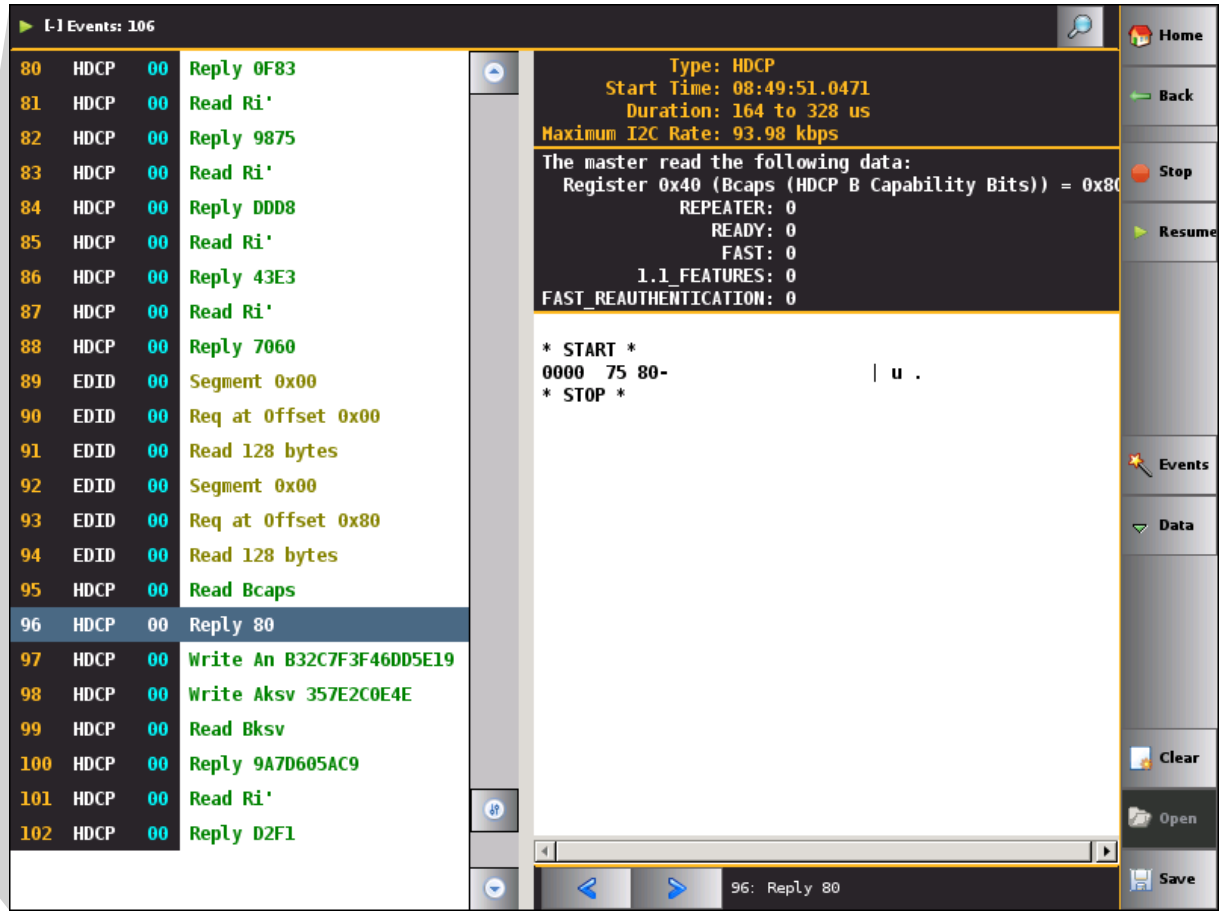
- View High Dynamic Range InfoFrame from incoming source.
  - Verify High Dynamic Range InfoFrame values.



980 18G Protocol Analyzer module for HDMI Testing – Aux Channel Monitoring

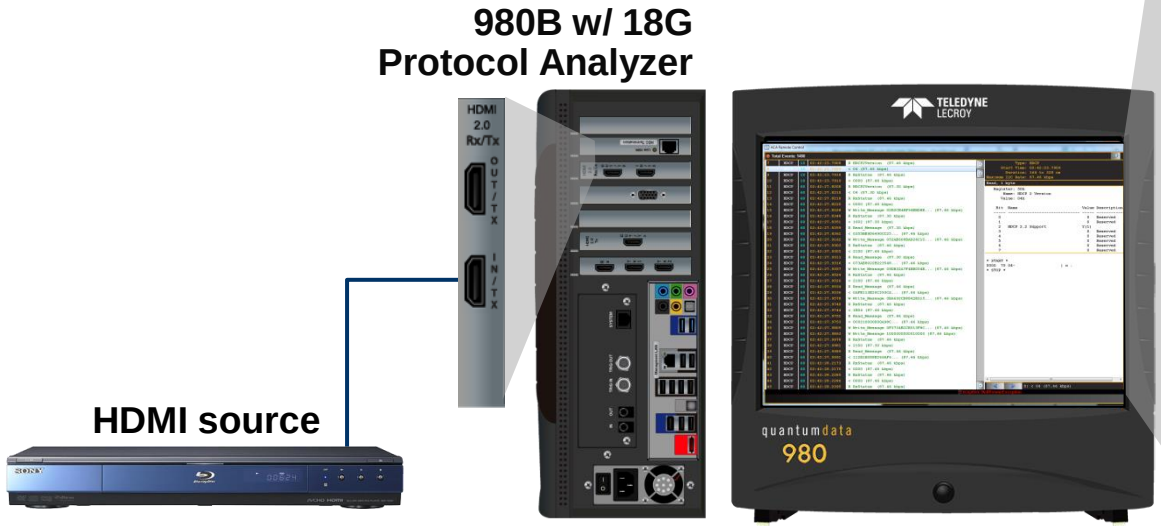
- HDMI Source Analysis – Real Time Analysis (auxiliary data)
  - View EDID exchange data in real time.
  - View HDCP 1.4 and 2.2 authentication transactions in real time.
  - View details of each transaction.
  - Disseminate traces to subject matter experts.

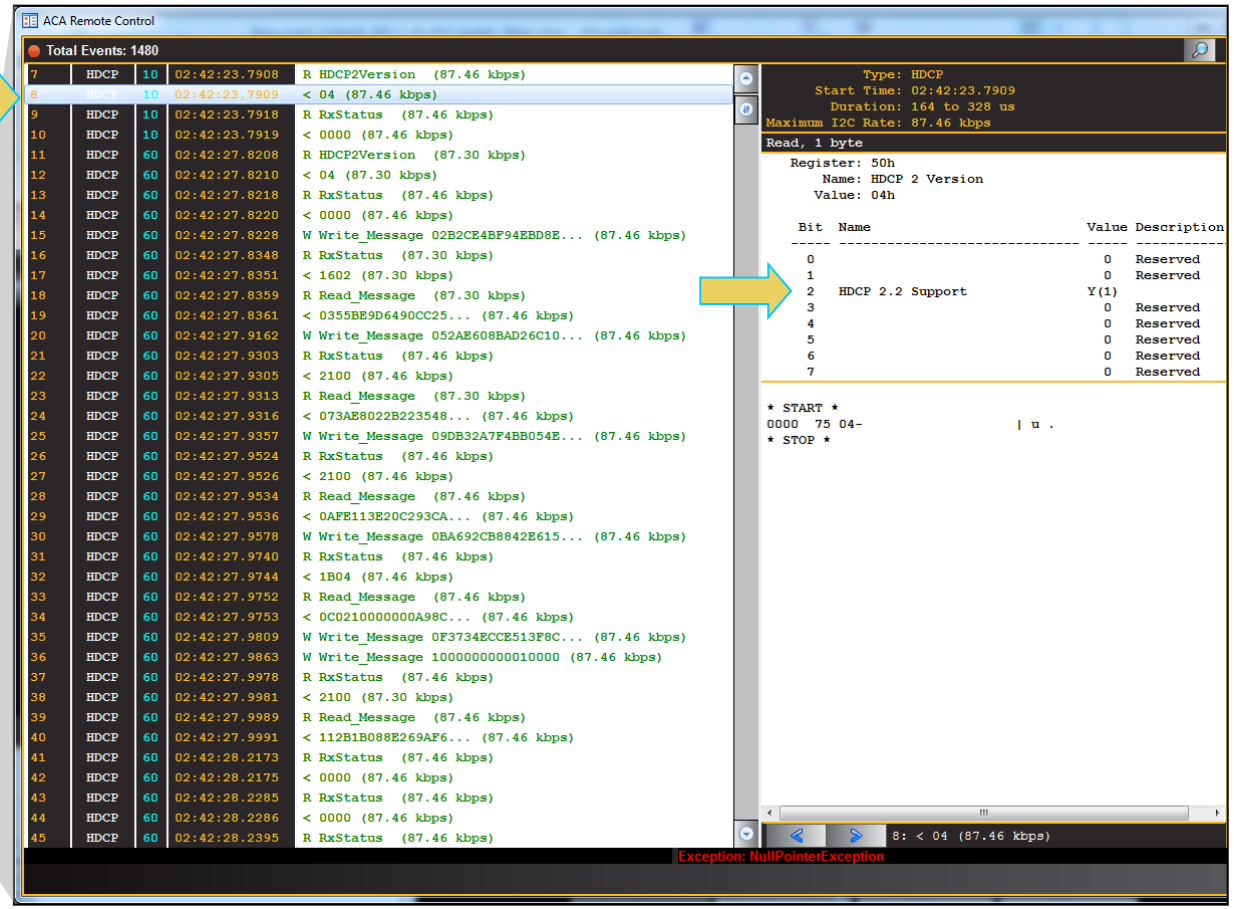




980 18G Protocol Analyzer module for HDMI Testing – Aux Channel Monitoring

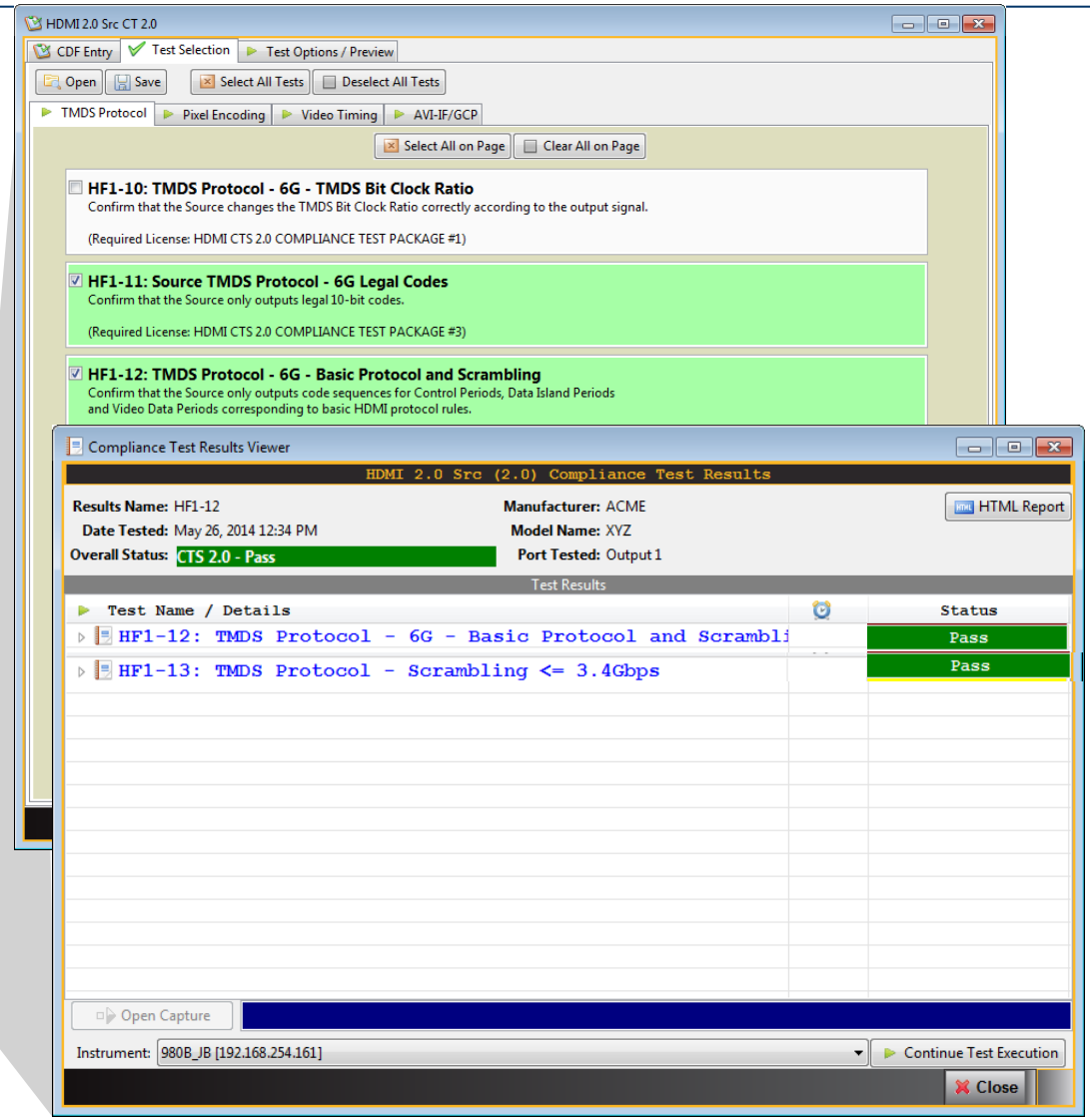
- HDMI Source Analysis – Real Time Analysis (auxiliary data) including HDCP 2.2 authentication transactions.
  - View EDID exchange data in real time.
  - View HDCP 2.2 authentication transactions in real time.
  - View details of each transaction.
  - Disseminate traces to subject matter experts.





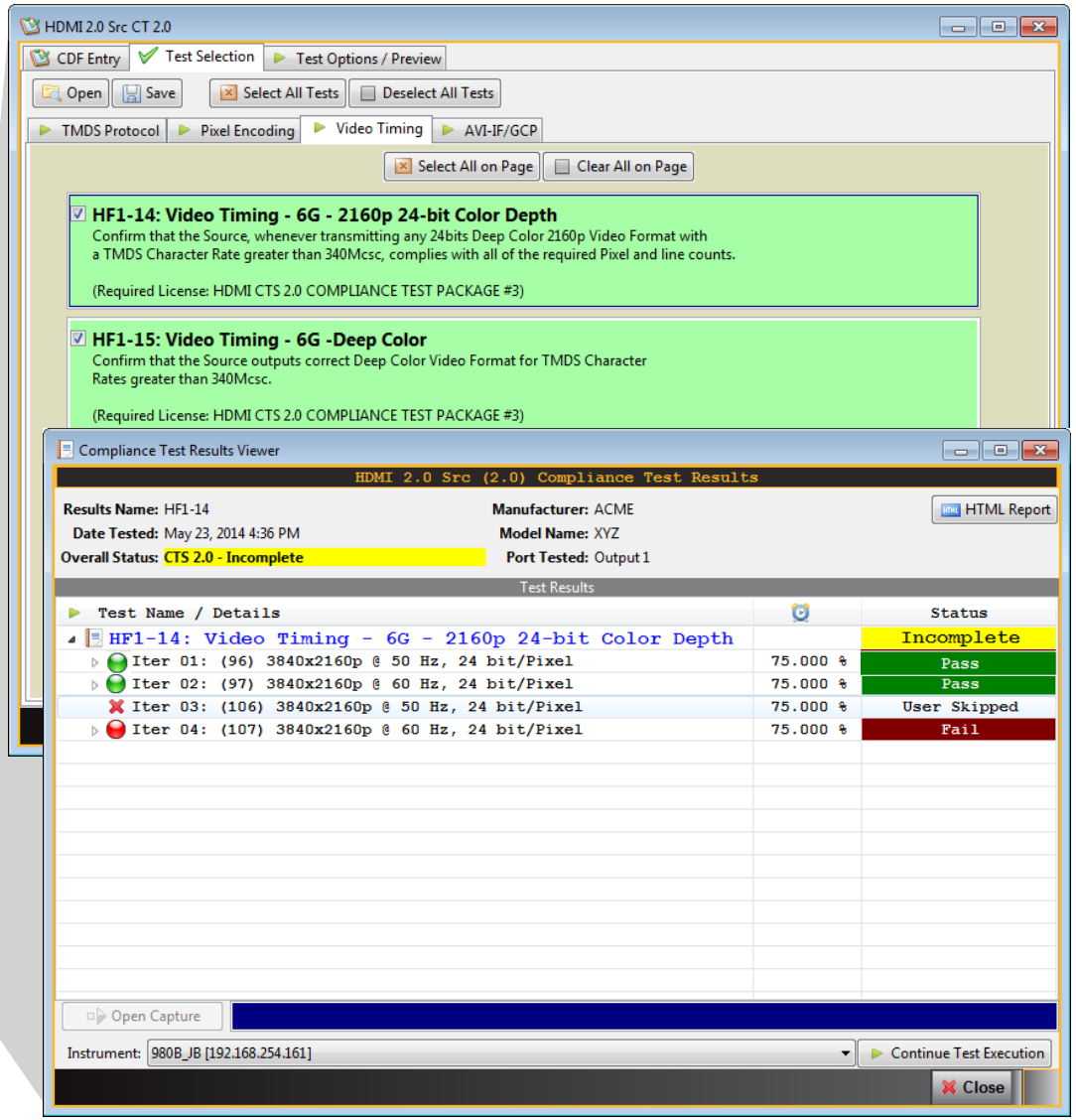
980 18G Protocol Analyzer module for HDMI Testing – HDMI 2.0 Source Compliance

- Run HDMI 2.0 Compliance tests for 4K UHD resolutions running at 18Gbps
  - Pre-test or self-test your HDMI 2.0 sink device to reduce costs and meet product time to market requirements.
  - View detailed results, identify root cause of failures.
  - Disseminate results to subject matter experts.
  - Test sections covered:
    - **7.2 TMDS Protocol, 7.3 Pixel Encoding, 7.4 Timing, 7.5 Audio, 7.7 HDMI AVI IF, 7.12 HDMI HDR IF, 9.7 Repeater Output.**



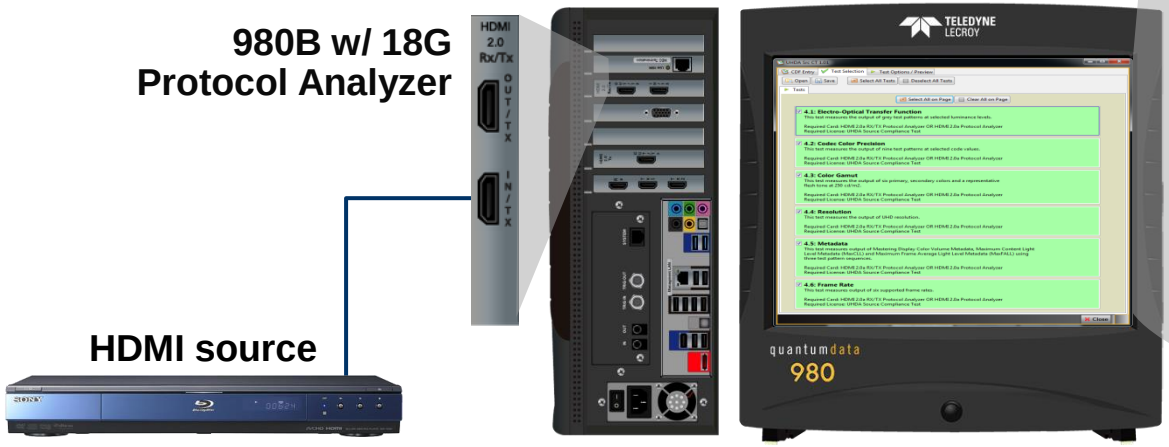
980 18G Protocol Analyzer for HDMI Testing – HDMI 2.0 Source Compliance

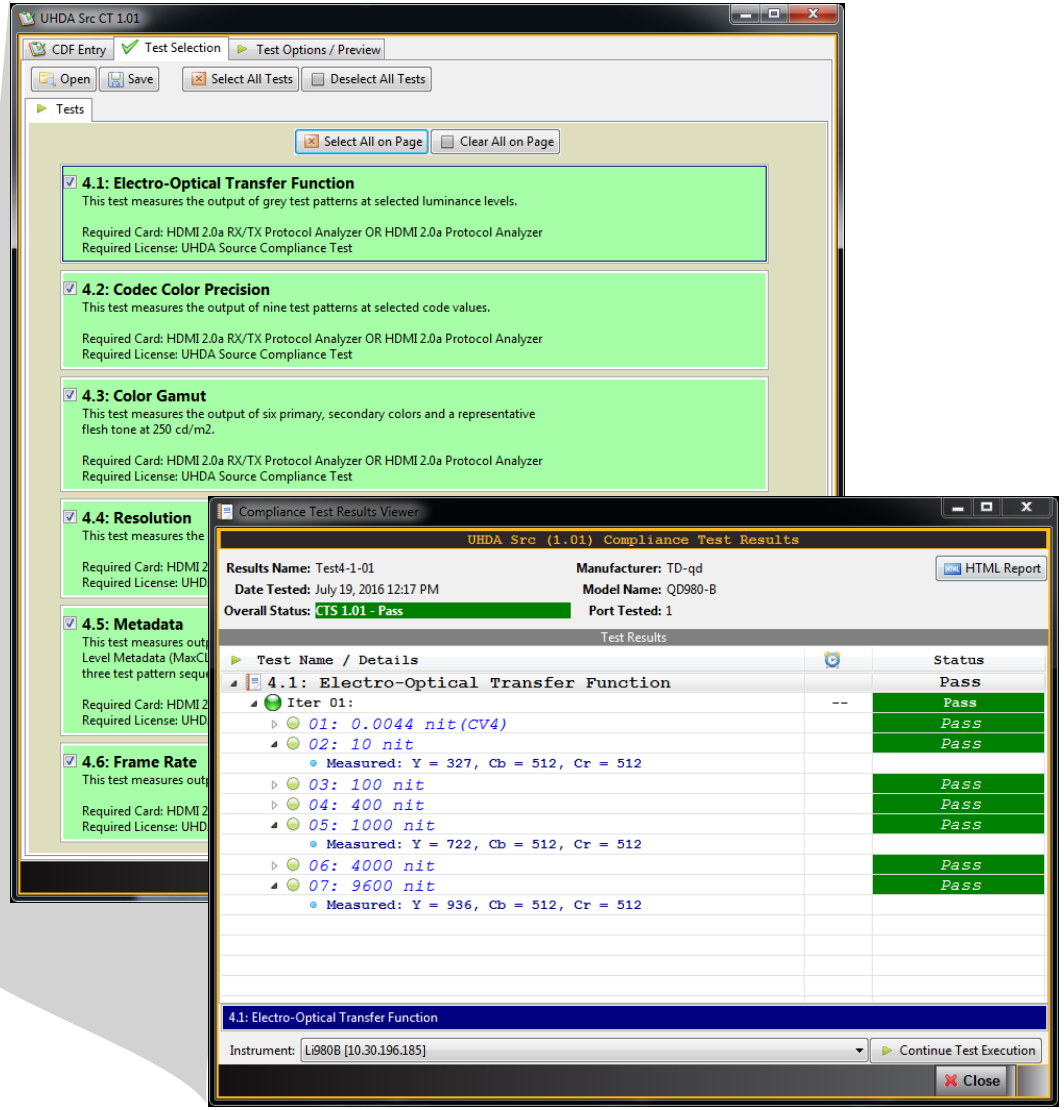
- Run HDMI 2.0 Compliance tests for 4K UHD resolutions running at 18Gbps
  - Pre-test or self-test your HDMI 2.0 source device to reduce cost and meet product time to market requirements.
  - View detailed results, identify root cause of failures.
  - Disseminate results to subject matter experts.
  - Test sections covered:
    - **7.2 TMDS Protocol, 7.3 Pixel Encoding, 7.4 Timing, 7.5 Audio, 7.7 HDMI AVI IF, 7.12 HDMI HDR IF, 9.7 Repeater Output.**



980 18G Protocol Analyzer for HDMI Testing – UHDA Source Compliance

- Run Ultra HD Source Compliance tests for UHD Alliance Compliance
  - Pre-test or self-test your UHD source device to reduce cost and meet product time to market requirements.
  - View detailed results, identify root cause of failures.
  - Disseminate results to subject matter experts.
  - Test sections covered:
    - **4.1 Electro-optical Transfer, 4.2 Codec color Precision, 4.3 Color Gamut, 4.4 Resolution, 4.5 metadata, 4.6 Frame Rate.**



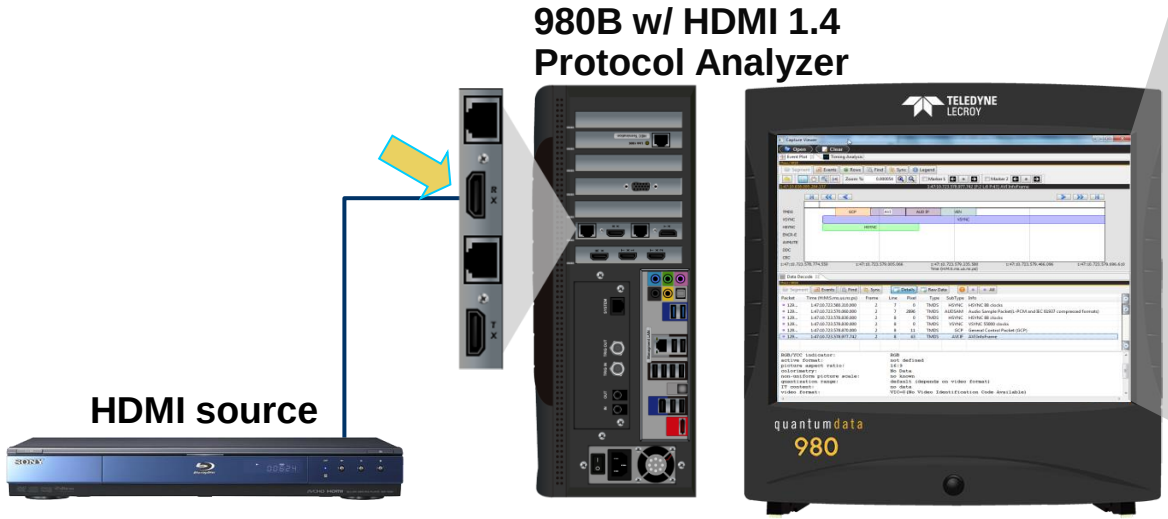


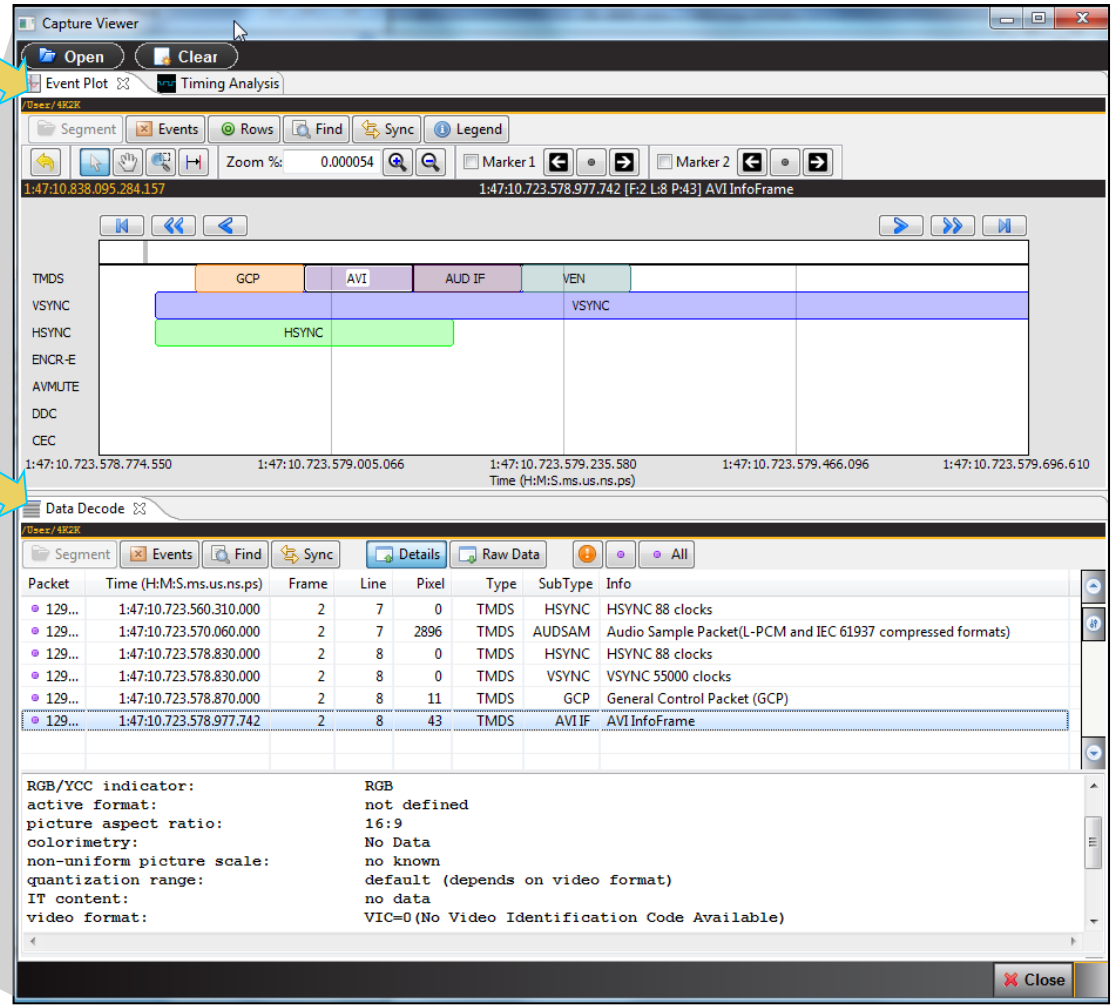
Applications

HDMI 1.4 Protocol Analyzer module

980 HDMI 1.4 Protocol Analyzer Module - Capture/Store

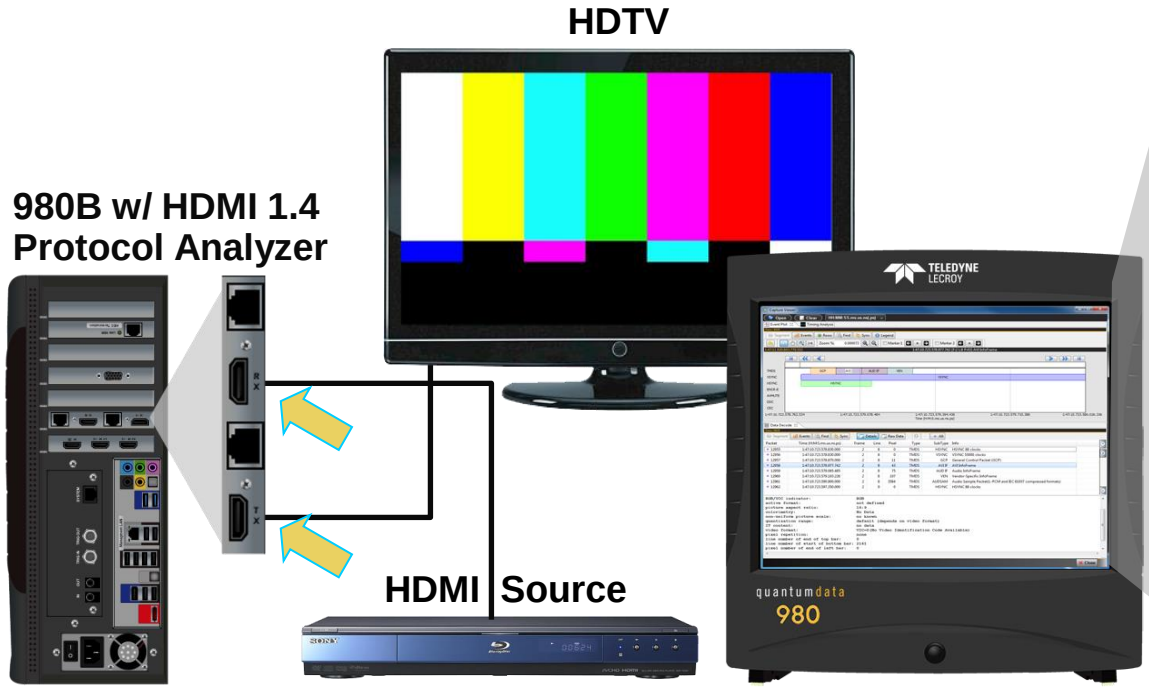
- HDMI Source Analysis (Metadata)
  - Discover root cause of interoperability issues.
  - Set triggers to capture specific sets of data.
  - Analyze HDMI & MHL metadata, timing, auxiliary data including HDMI 2.0 4K UHD video streams.
  - View data in graphical timeline (Event Plot) or table form (Data Decode).
  - View precise time stamps for all data.
  - Verify data island packets values.
  - Locate data through filtering and search utilities.

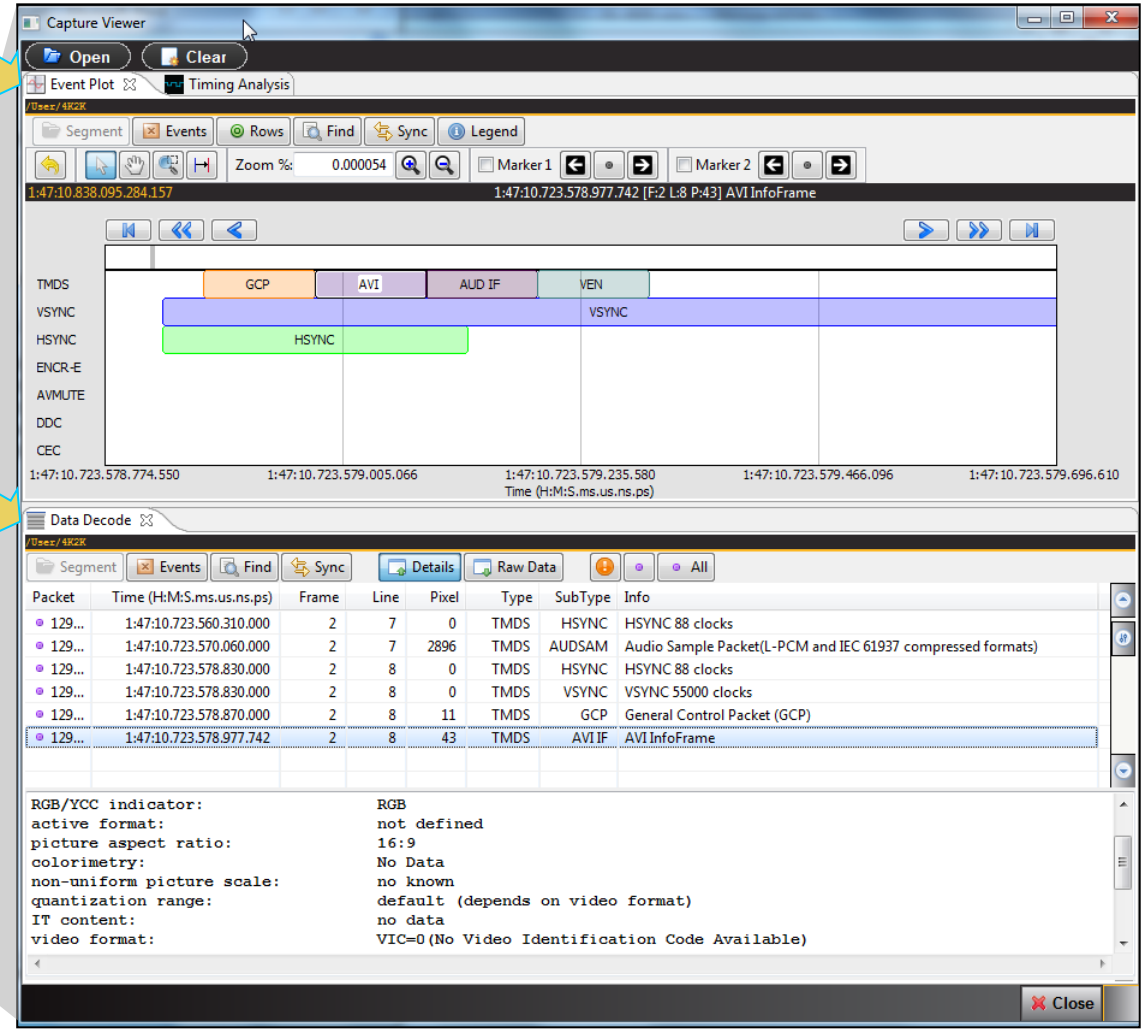




980 HDMI 1.4 Protocol Analyzer Module - Encrypted Analyzer

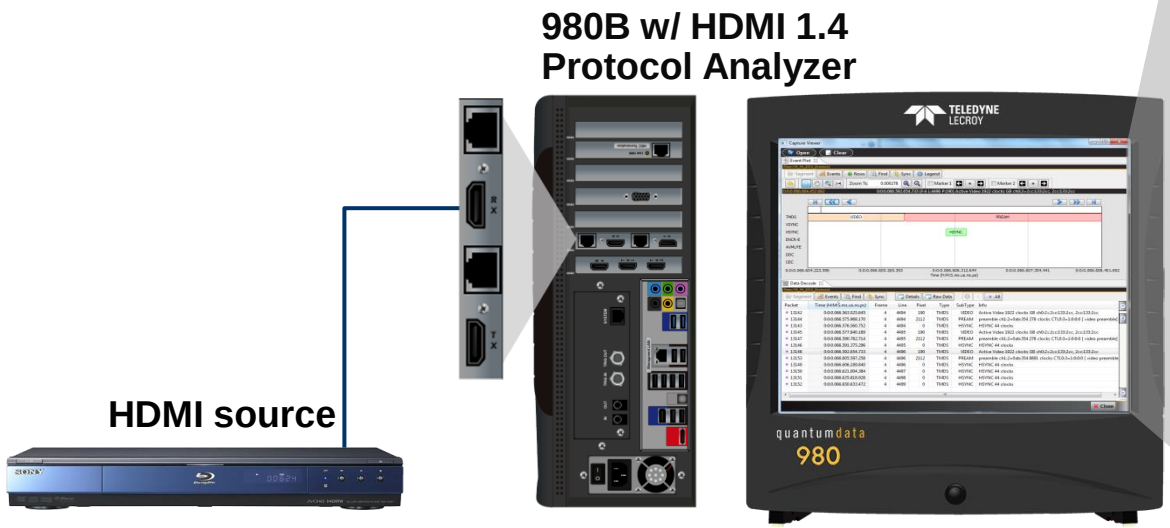
- HDMI Source Analysis
  - Monitor HDCP 1.4 encrypted HDMI stream passively between source and sink.
  - View all video, audio and metadata in graphical timeline (Event Plot) or table form (Data Decode).
  - View real time data (not shown).

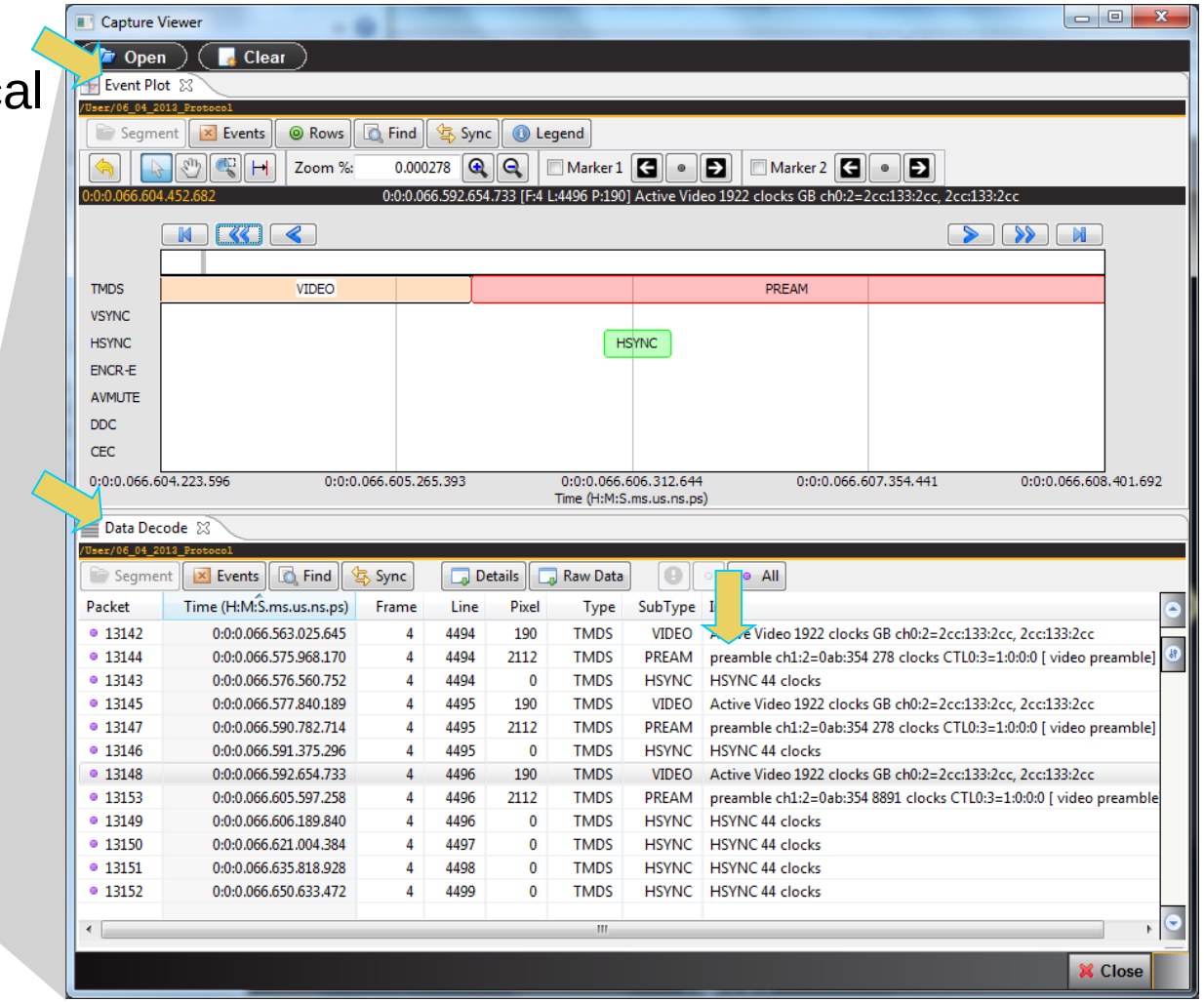




980 HDMI 1.4 Protocol Analyzer Module - Protocol Data

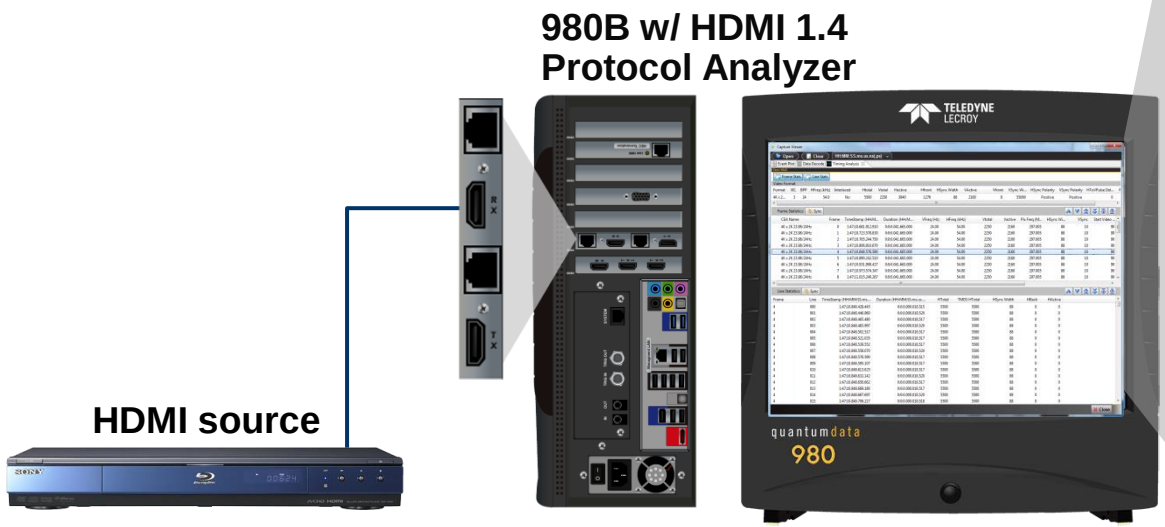
- HDMI Source Analysis – Protocol Data
  - Capture and store TMDS protocol data.
  - View preamble and guard band data in graphical timeline (Event Plot) or table form (Data Decode).
  - Verify the results of Protocol Compliance test.
  - Identify protocol interoperability issues.
  - View precise time stamps for all data.

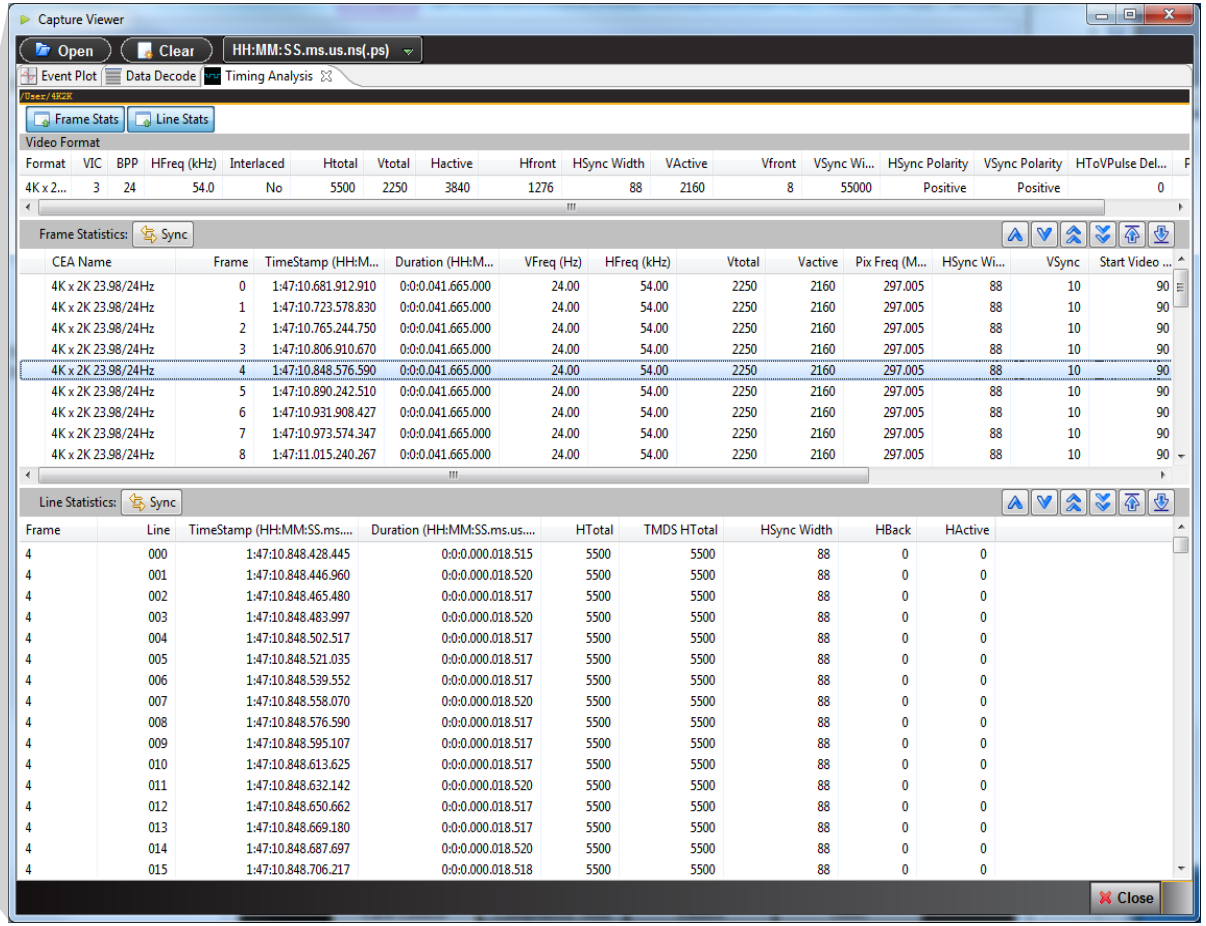




980 HDMI 1.4 Protocol Analyzer Module - Timing Analysis

- HDMI Source Analysis – Timing Analysis
  - View summary timing for multiple frames.
  - View frame timing parameters.
  - View line timing parameters.
  - Identify timing errors.





Format	VIC	BPP	HFreq (kHz)	Interlaced	Htotal	Vtotal	Hactive	Hfront	HSync Width	VActive	Vfront	VSync Wi...	HSync Polarity	VSync Polarity	HToVPulse Del...
4K x 2...	3	24	54.0	No	5500	2250	3840	1276	88	2160	8	55000	Positive	Positive	0

CEA Name	Frame	TimeStamp (HH:M...	Duration (HH:M...	VFreq (Hz)	HFreq (kHz)	Vtotal	Vactive	Pix Freq (M...	HSync Wi...	VSync	Start Video ...
4K x 2K 23.98/24Hz	0	1:47:10.681.912.910	0:0:0.041.665.000	24.00	54.00	2250	2160	297.005	88	10	90
4K x 2K 23.98/24Hz	1	1:47:10.723.578.830	0:0:0.041.665.000	24.00	54.00	2250	2160	297.005	88	10	90
4K x 2K 23.98/24Hz	2	1:47:10.765.244.750	0:0:0.041.665.000	24.00	54.00	2250	2160	297.005	88	10	90
4K x 2K 23.98/24Hz	3	1:47:10.806.910.670	0:0:0.041.665.000	24.00	54.00	2250	2160	297.005	88	10	90
4K x 2K 23.98/24Hz	4	1:47:10.848.576.590	0:0:0.041.665.000	24.00	54.00	2250	2160	297.005	88	10	90
4K x 2K 23.98/24Hz	5	1:47:10.890.242.510	0:0:0.041.665.000	24.00	54.00	2250	2160	297.005	88	10	90
4K x 2K 23.98/24Hz	6	1:47:10.931.908.427	0:0:0.041.665.000	24.00	54.00	2250	2160	297.005	88	10	90
4K x 2K 23.98/24Hz	7	1:47:10.973.574.347	0:0:0.041.665.000	24.00	54.00	2250	2160	297.005	88	10	90
4K x 2K 23.98/24Hz	8	1:47:11.015.240.267	0:0:0.041.665.000	24.00	54.00	2250	2160	297.005	88	10	90

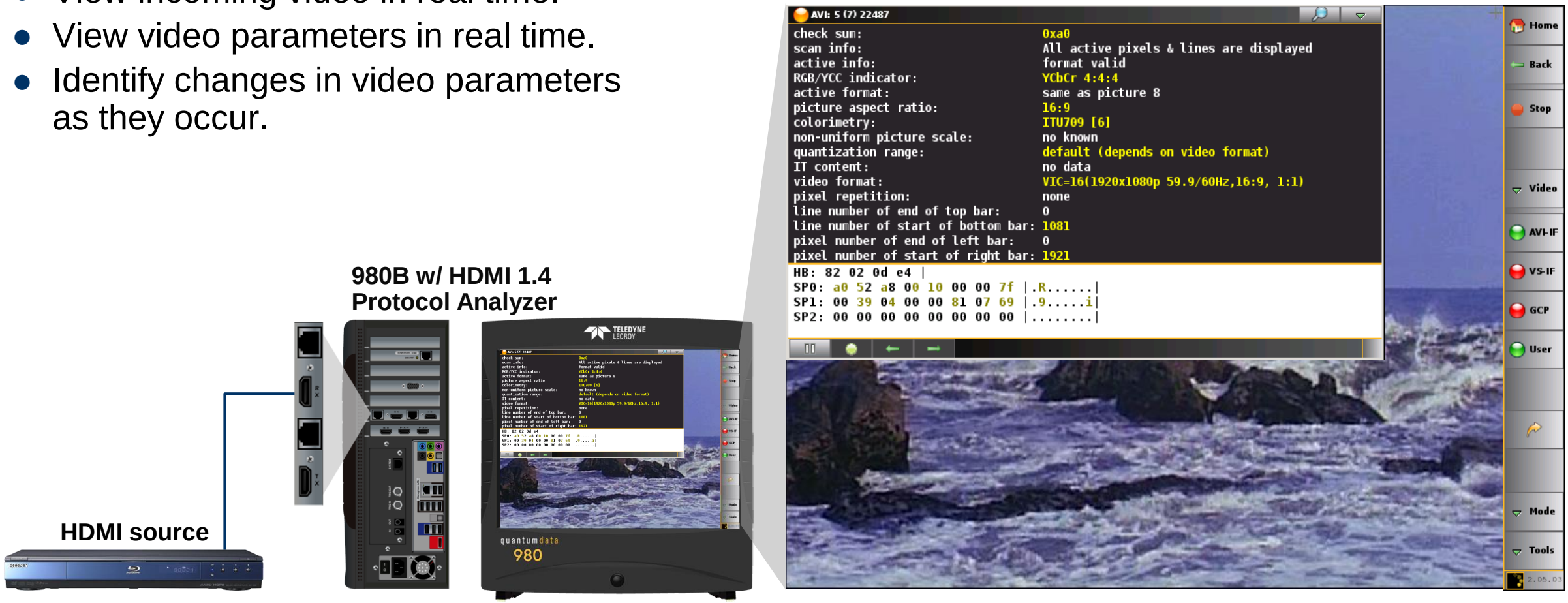
Frame	Line	TimeStamp (HH:MM:SS.ms....	Duration (HH:MM:SS.ms.us....	HTotal	TMDS HTotal	HSync Width	HBack	HActive
4	000	1:47:10.848.428.445	0:0:0.000.018.515	5500	5500	88	0	0
4	001	1:47:10.848.446.960	0:0:0.000.018.520	5500	5500	88	0	0
4	002	1:47:10.848.465.480	0:0:0.000.018.517	5500	5500	88	0	0
4	003	1:47:10.848.483.997	0:0:0.000.018.520	5500	5500	88	0	0
4	004	1:47:10.848.502.517	0:0:0.000.018.517	5500	5500	88	0	0
4	005	1:47:10.848.521.035	0:0:0.000.018.517	5500	5500	88	0	0
4	006	1:47:10.848.539.552	0:0:0.000.018.517	5500	5500	88	0	0
4	007	1:47:10.848.558.070	0:0:0.000.018.520	5500	5500	88	0	0
4	008	1:47:10.848.576.590	0:0:0.000.018.517	5500	5500	88	0	0
4	009	1:47:10.848.595.107	0:0:0.000.018.517	5500	5500	88	0	0
4	010	1:47:10.848.613.625	0:0:0.000.018.517	5500	5500	88	0	0
4	011	1:47:10.848.632.142	0:0:0.000.018.520	5500	5500	88	0	0
4	012	1:47:10.848.650.662	0:0:0.000.018.517	5500	5500	88	0	0
4	013	1:47:10.848.669.180	0:0:0.000.018.517	5500	5500	88	0	0
4	014	1:47:10.848.687.697	0:0:0.000.018.520	5500	5500	88	0	0
4	015	1:47:10.848.706.217	0:0:0.000.018.518	5500	5500	88	0	0

980 HDMI 1.4 Protocol Analyzer Module - Video Analysis

- HDMI Source Analysis – Video Analysis
  - View video frame thumbnails.
  - View pixel values for any frame.

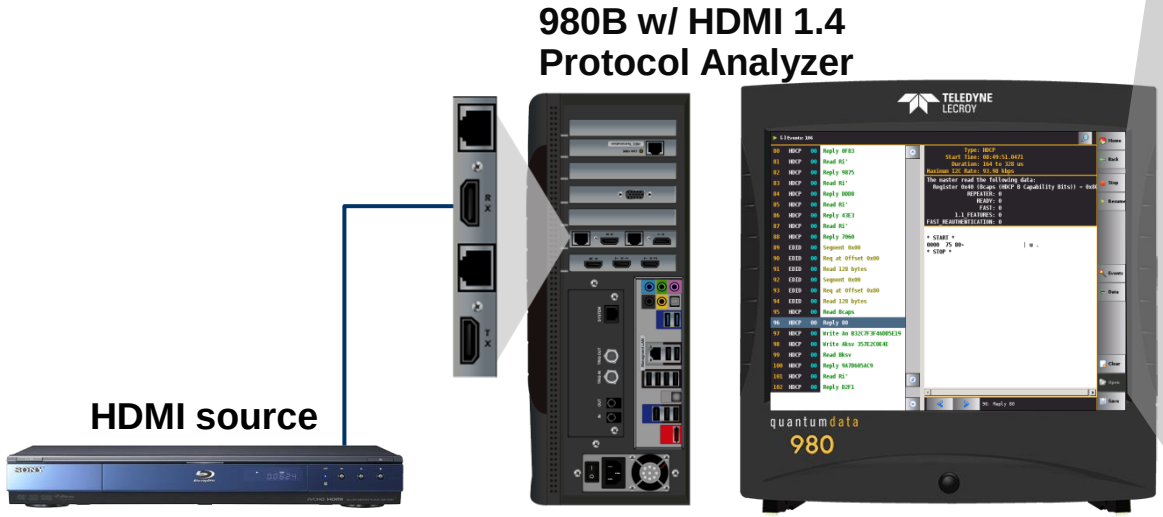
980 HDMI 1.4 Protocol Analyzer Module - Real Time Video

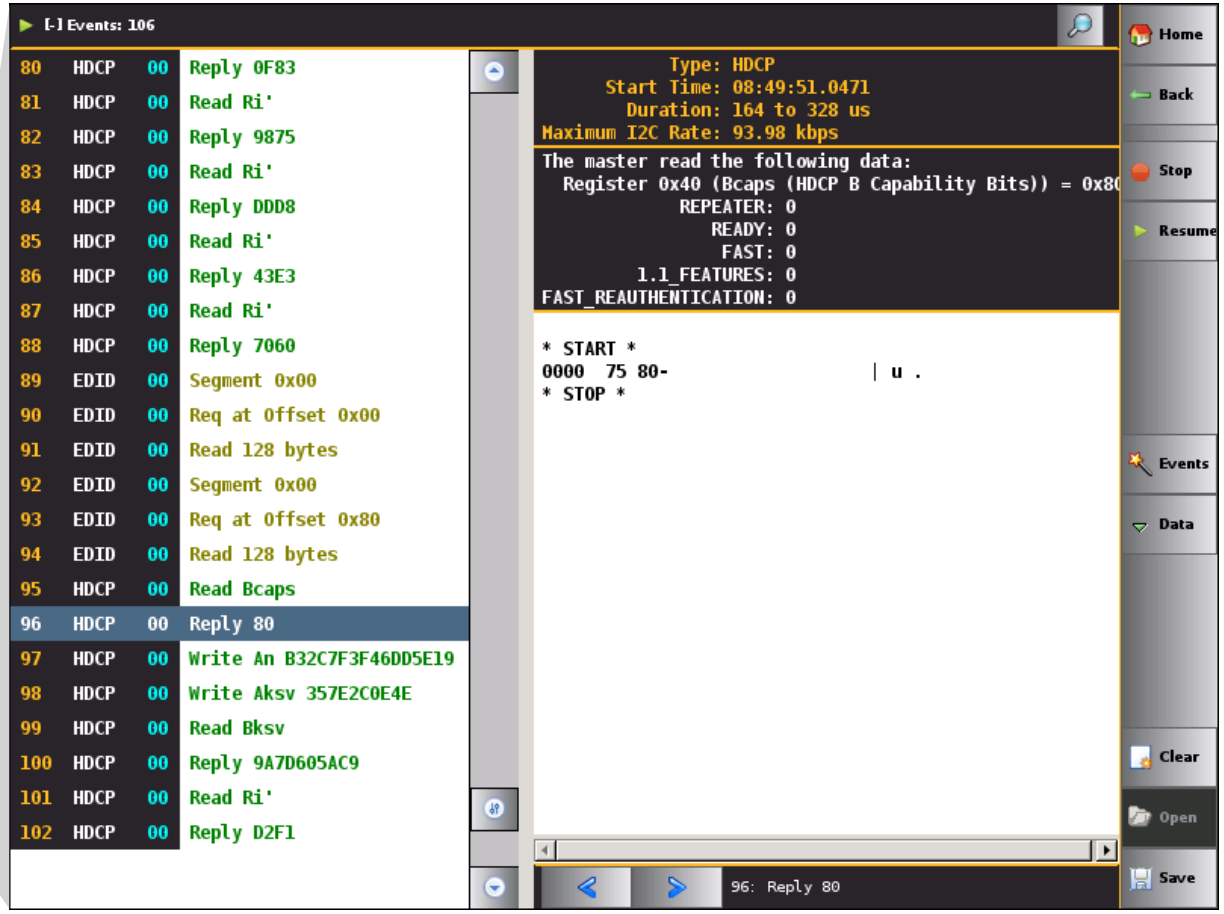
- HDMI Source Analysis – Real Time Analysis (video and metadata)
  - View incoming video in real time.
  - View video parameters in real time.
  - Identify changes in video parameters as they occur.



980 HDMI 1.4 Protocol Analyzer Module - Real Time

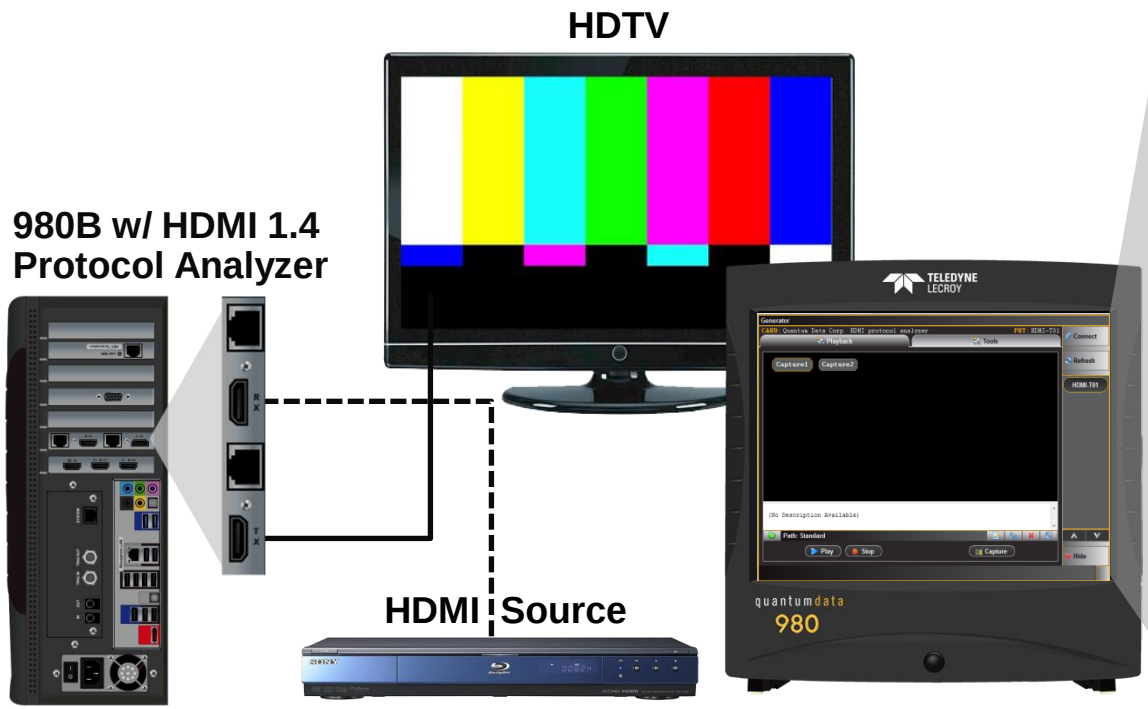
- HDMI Source Analysis – Real Time Analysis (auxiliary data)
  - View EDID exchange data in real time.
  - View HDCP authentication transactions in real time.
  - View details of each transaction and view register contents.

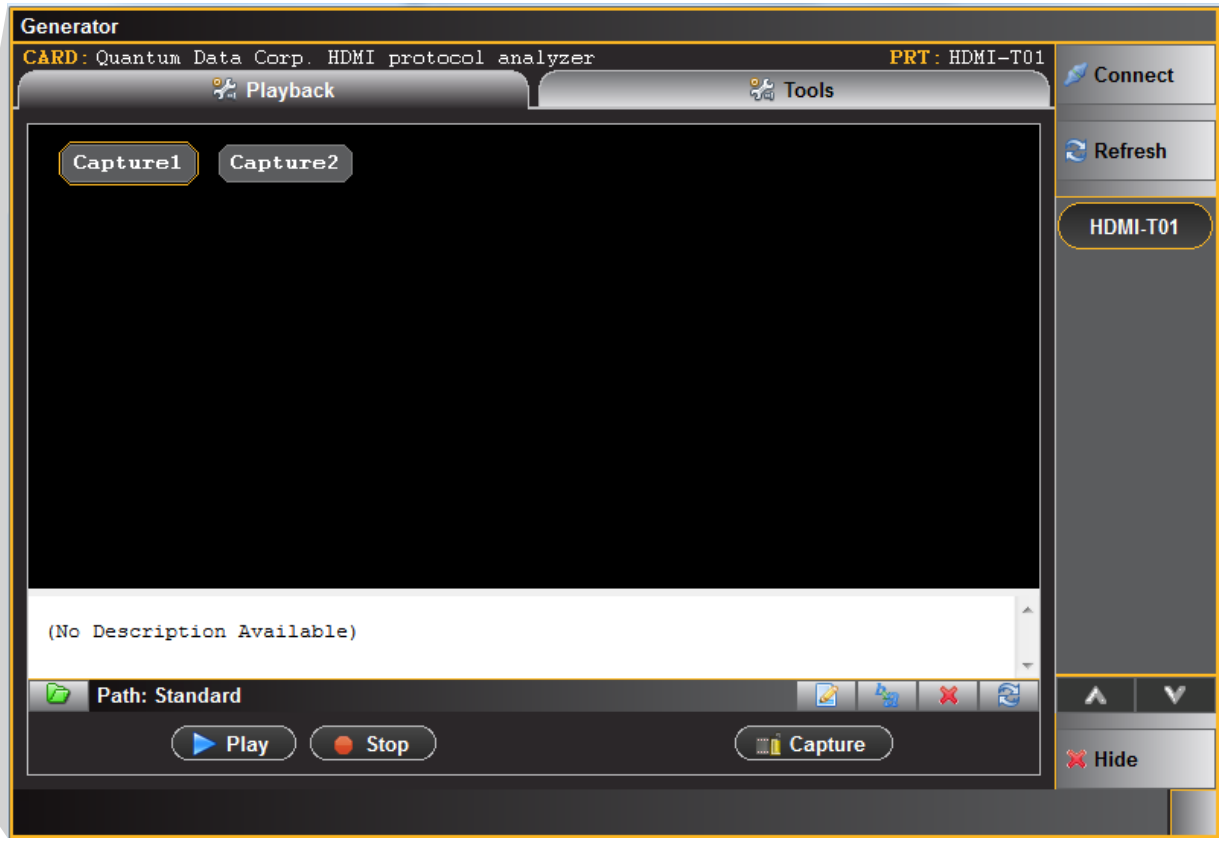




980 HDMI 1.4 Protocol Analyzer Module - Playback

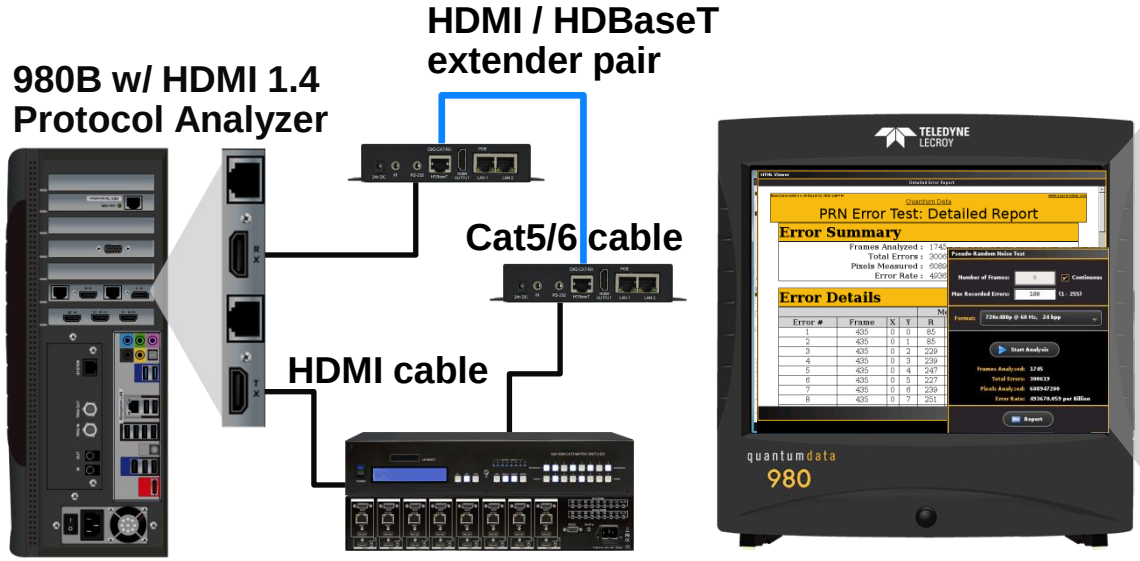
- HDMI Sink Video Test
  - Playback a previously captured file to test a sink device.
  - Utility enables you to capture from a source with interoperability problems to help identify root cause.

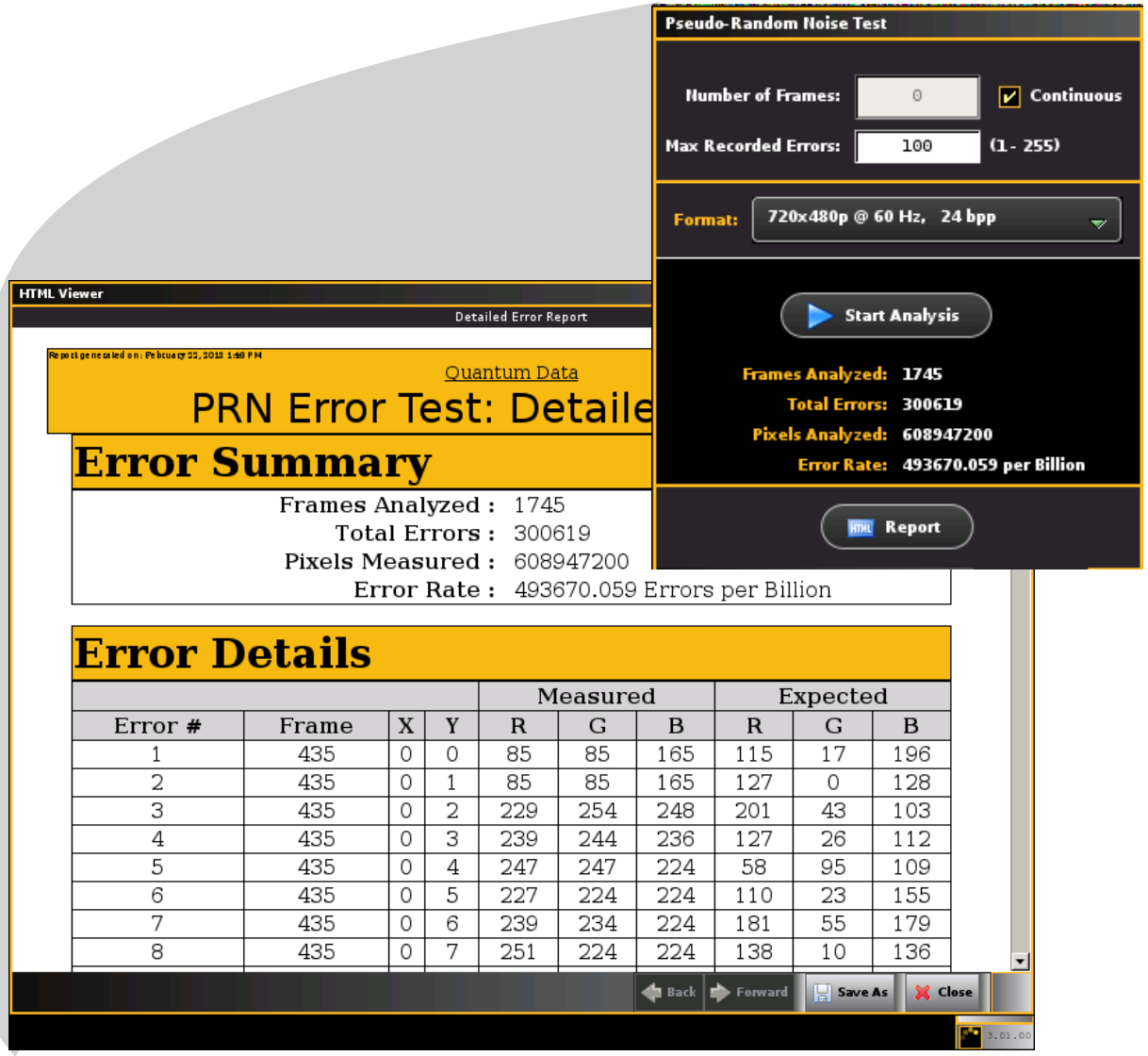




980 HDMI 1.4 Protocol Analyzer Module - Cable/Link Test

- HDMI Cable or Link Test
  - Test HDMI cables or HDMI distribution networks for pixel errors.
  - Real time results show frames tested, pixels tested, pixel errors and pixel error rate.
  - HTML report shows which pixels were in error and expected values and measured values.

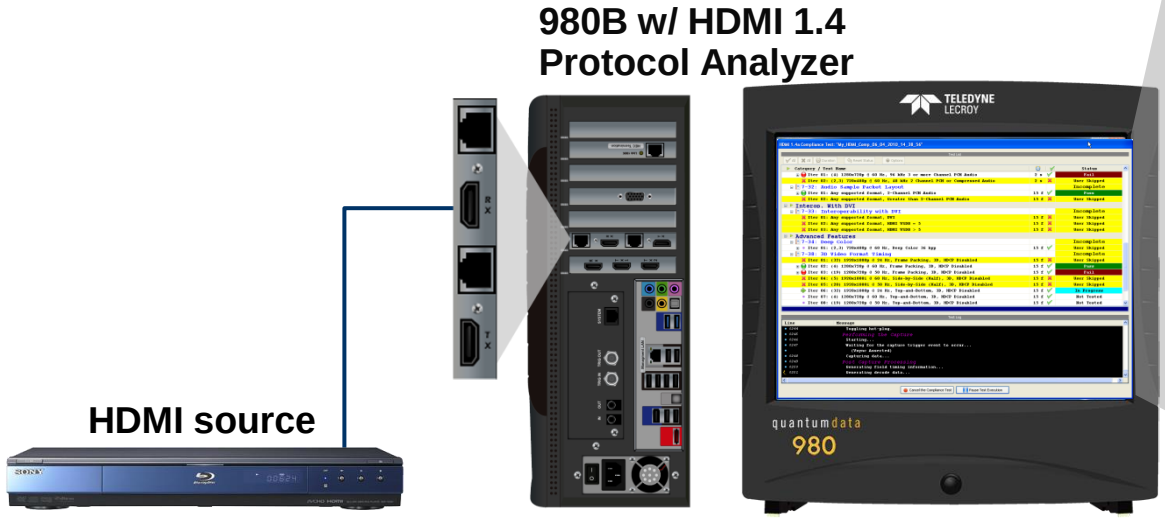


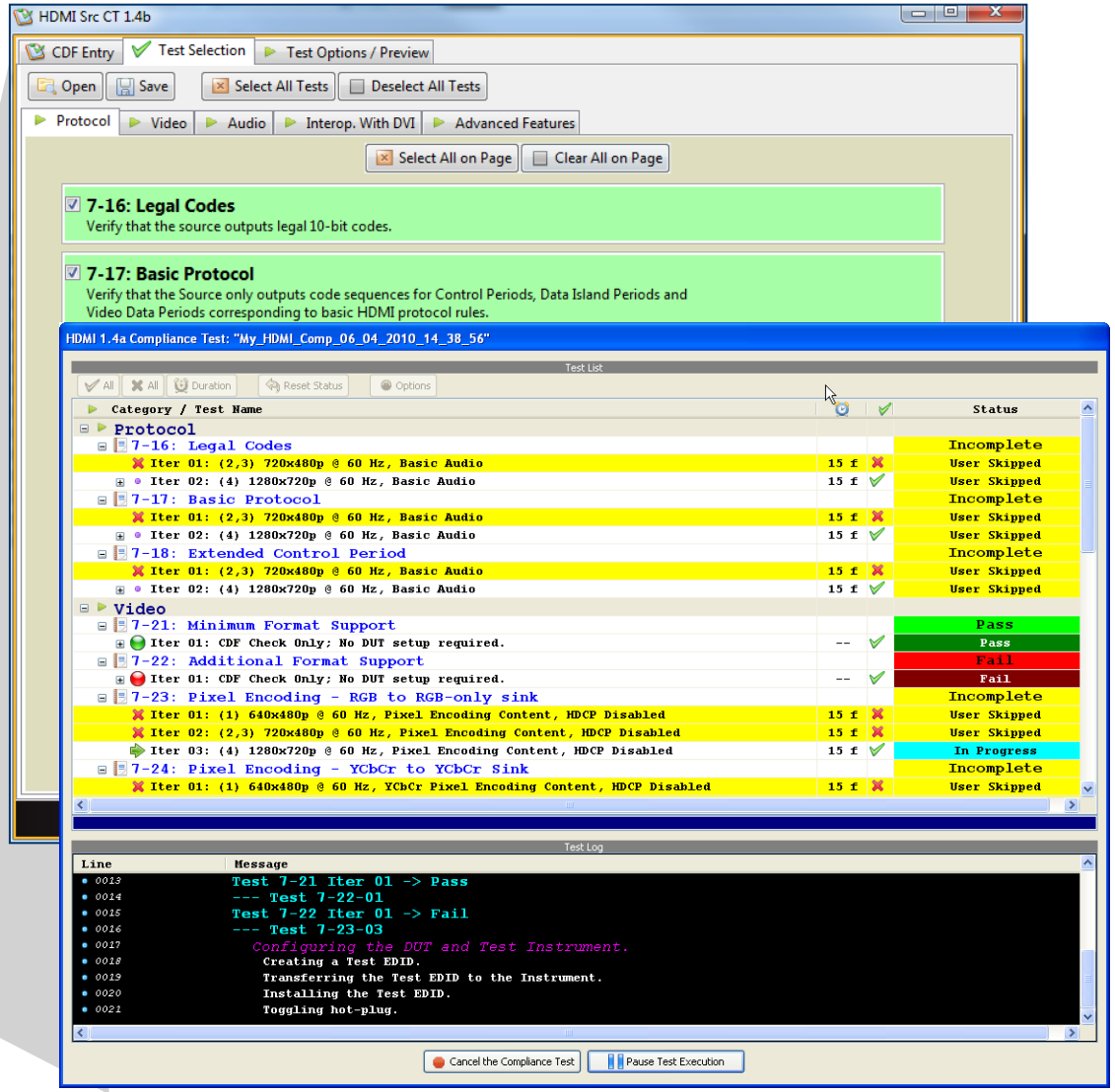


				Measured			Expected		
Error #	Frame	X	Y	R	G	B	R	G	B
1	435	0	0	85	85	165	115	17	196
2	435	0	1	85	85	165	127	0	128
3	435	0	2	229	254	248	201	43	103
4	435	0	3	239	244	236	127	26	112
5	435	0	4	247	247	224	58	95	109
6	435	0	5	227	224	224	110	23	155
7	435	0	6	239	234	224	181	55	179
8	435	0	7	251	224	224	138	10	136

980 HDMI 1.4 Protocol Analyzer – HDMI 1.4 Source Compliance

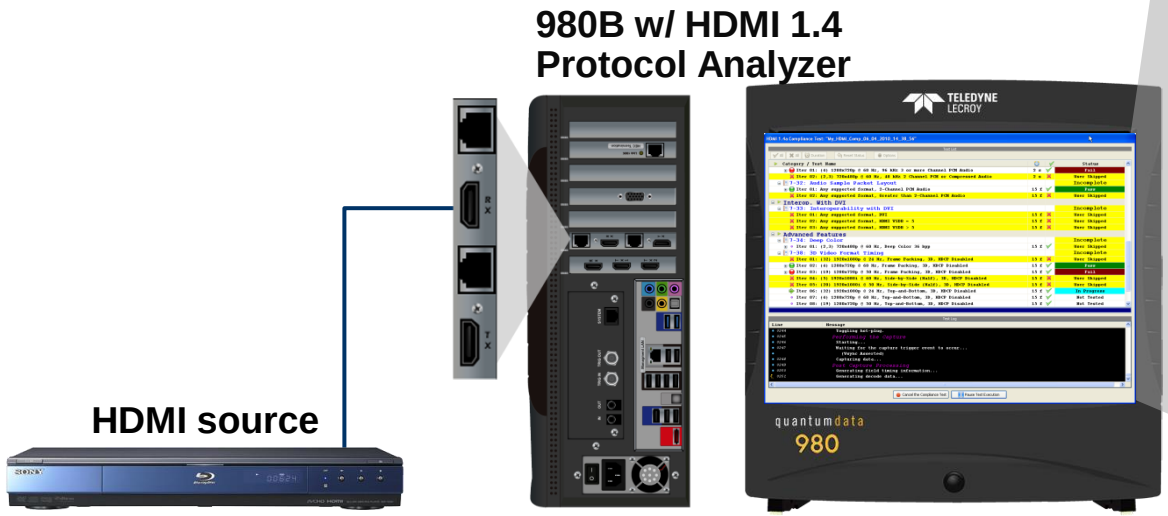
- Run HDMI 1.4 source compliance tests
  - Pre-test your HDMI 1.4 source device.
  - Self-test your HDMI 1.4 source device to reduce costs and meet product time to market requirements.
  - View details to determine root cause of failures.
  - Test sections covered:
    - **7.4 Protocol; 7.5 Video; 7.6 Audio; 7.7 DVI; 7.8 Advanced Features**

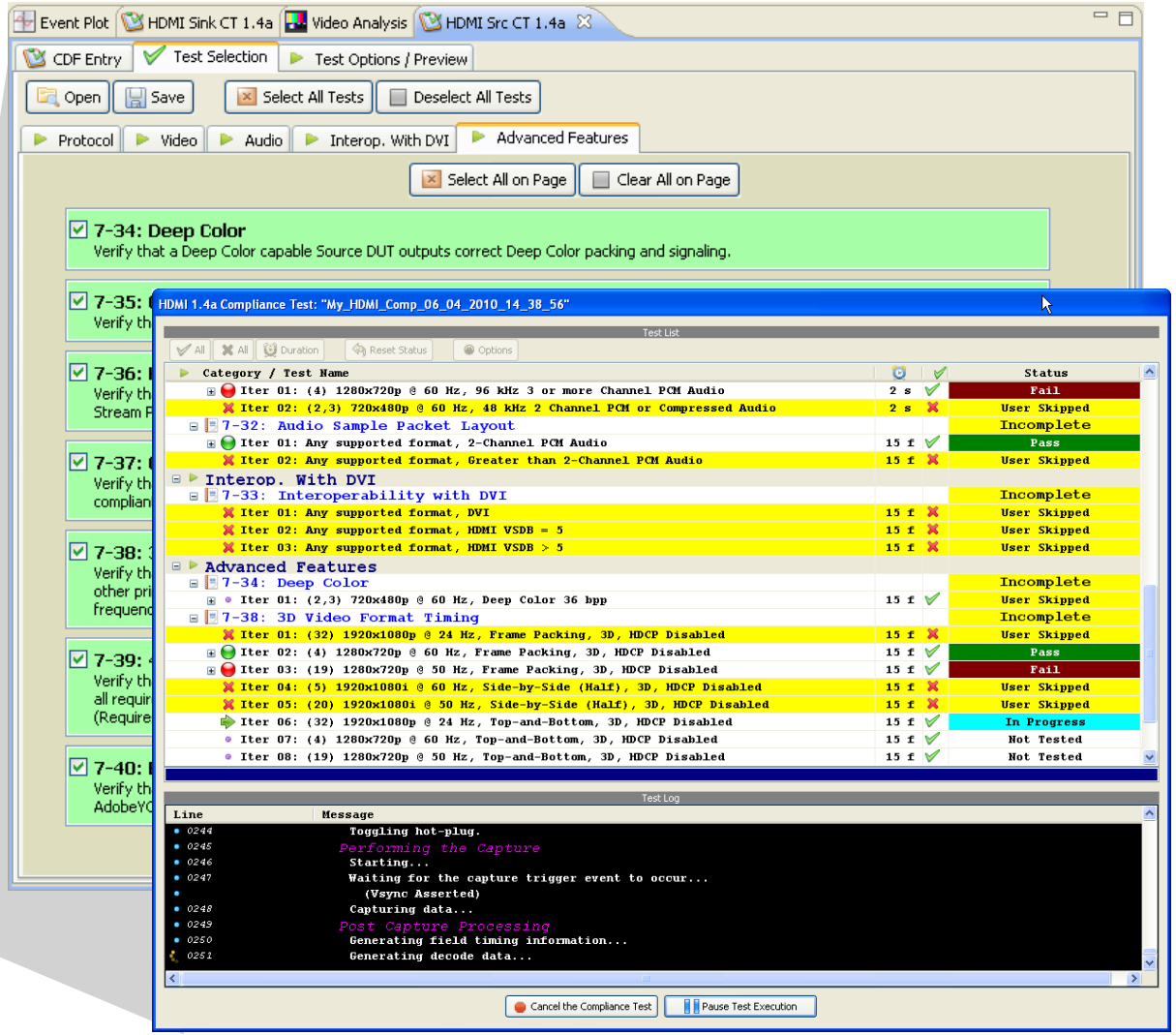




980 HDMI 1.4 Protocol Analyzer – HDMI 1.4 Source Compliance

- Run HDMI 1.4 source compliance tests
  - Pre-test or self-test your HDMI 1.4 source device to reduce costs and meet product time to market requirements.
  - View details to determine root cause of failures.
  - Disseminate results to subject matter experts.
  - Test sections covered:
    - **7.4 Protocol; 7.5 Video; 7.6 Audio; 7.7 DVI; 7.8 Advanced Features**

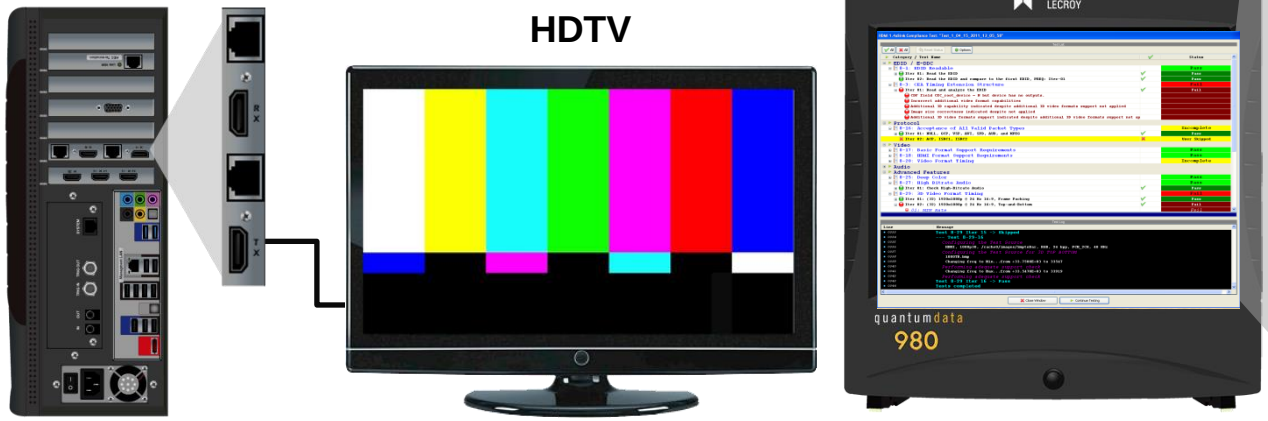


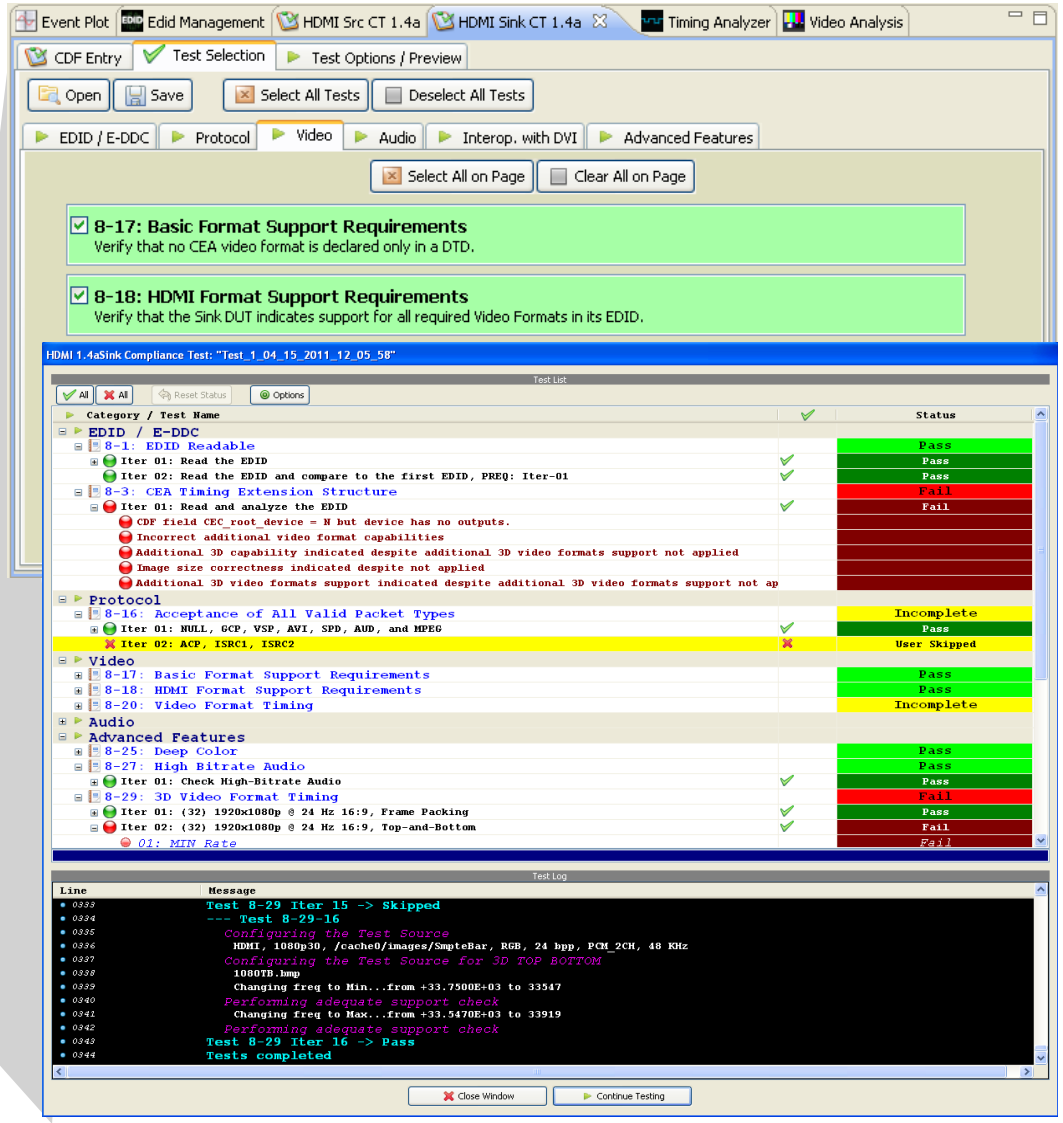


980 HDMI 1.4 Protocol Analyzer – HDMI 1.4 Sink Compliance

- Run HDMI 1.4 sink compliance tests
  - Pre-test or self-test your HDMI 1.4 sink device to reduce costs and meet product time to market requirements.
  - View details to determine root cause of failures.
  - Disseminate results to subject matter experts.
  - Test sections covered:
    - **8.4 Protocol; 8.5 Video; 8.6 Audio; 8.7 DVI; 8.8 Advanced Features**

980B w/ HDMI 1.4 Protocol Analyzer

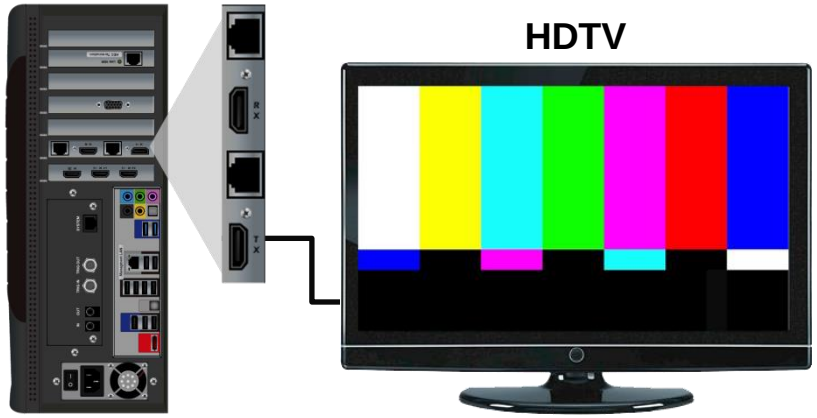




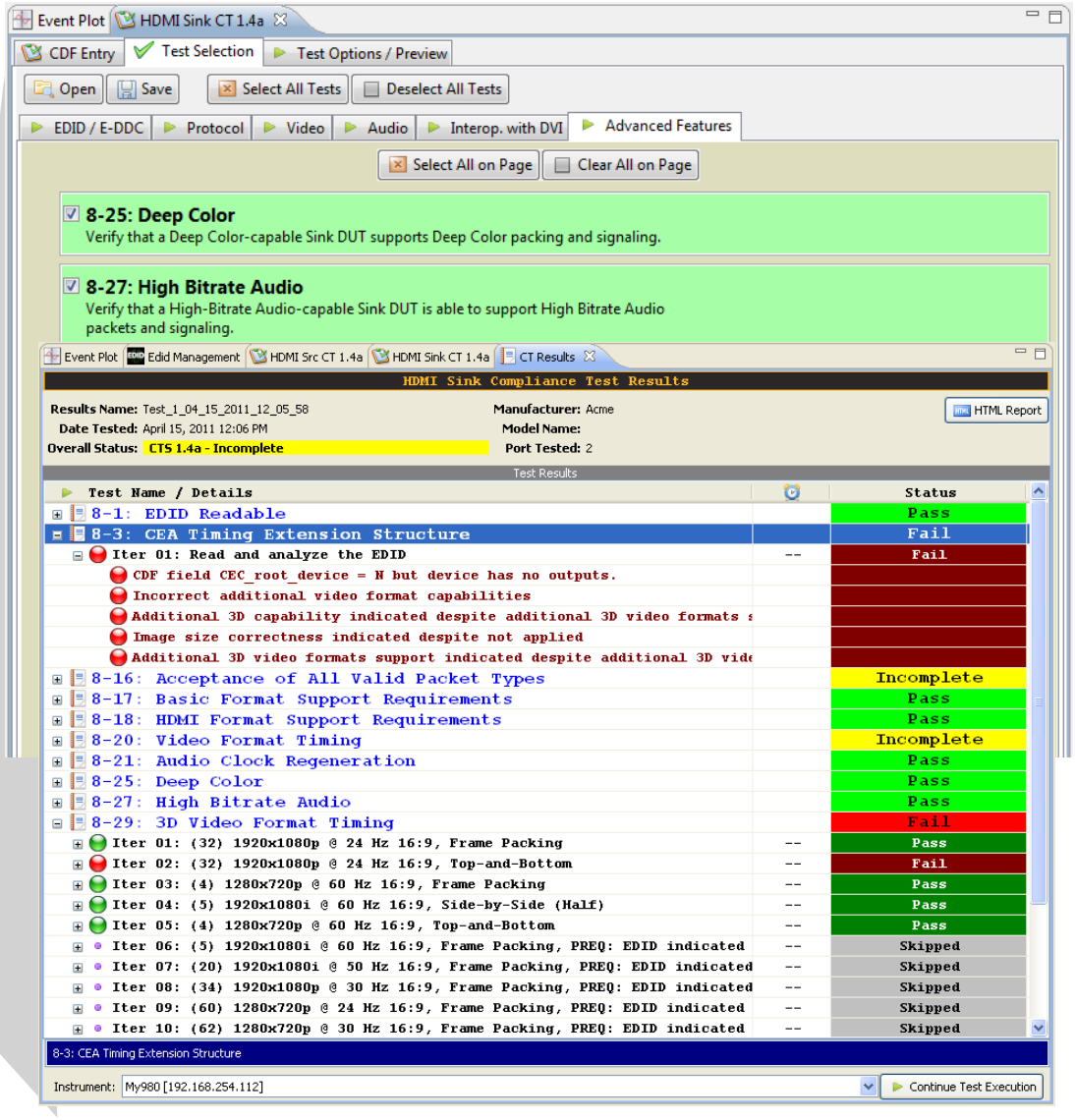
980 HDMI 1.4 Protocol Analyzer – HDMI 1.4 Sink Compliance

- Run HDMI 1.4 sink compliance tests
  - Pre-test or self-test your HDMI 1.4 sink device to reduce costs and meet product time to market requirements.
  - View details to determine root cause of failures.
  - Disseminate results to subject matter experts.
  - Test sections covered:
    - **8.4 Protocol; 8.5 Video; 8.6 Audio; 8.7 DVI; 8.8 Advanced Features**

980B w/ HDMI 1.4 Protocol Analyzer

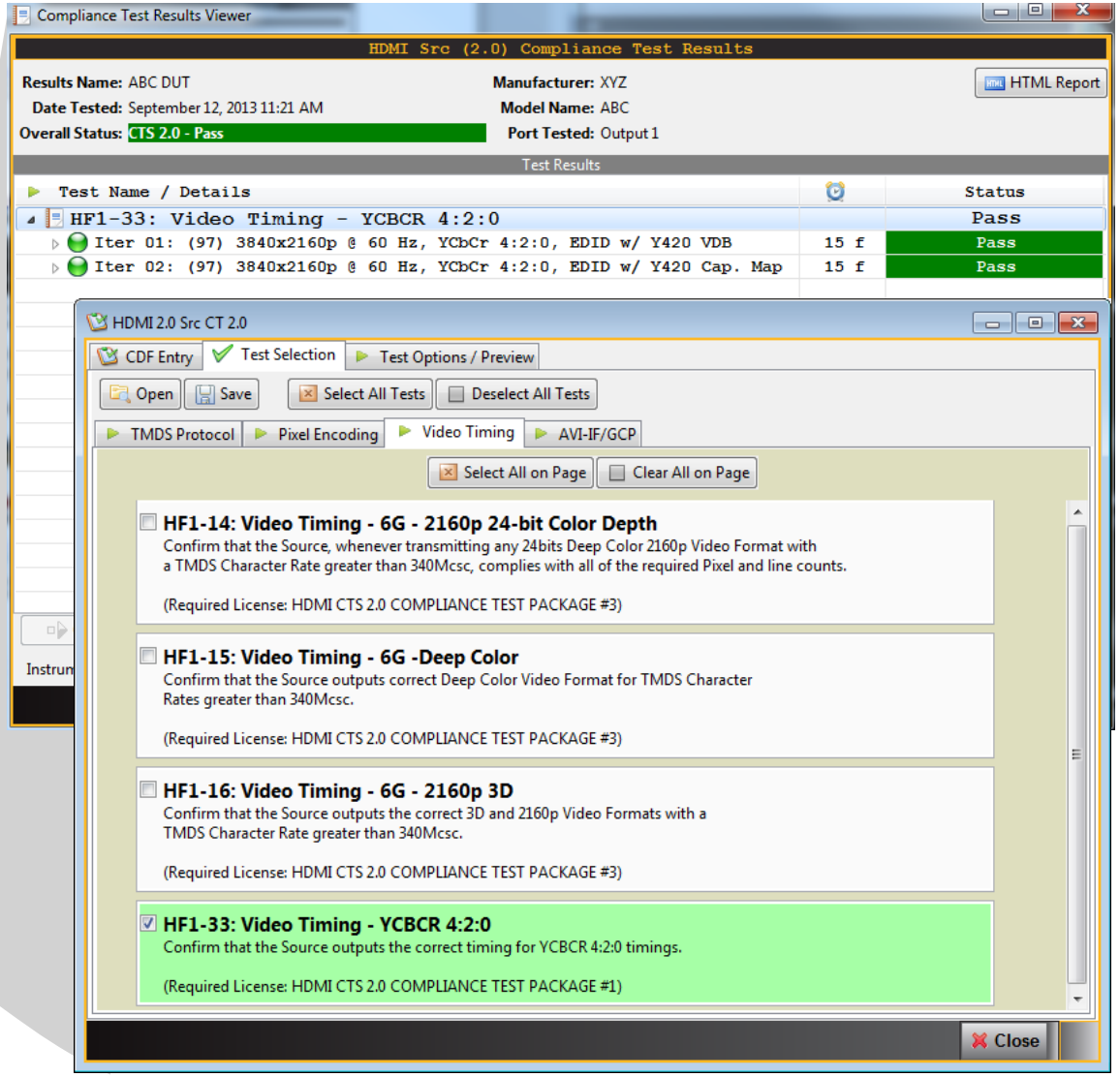


HDTV



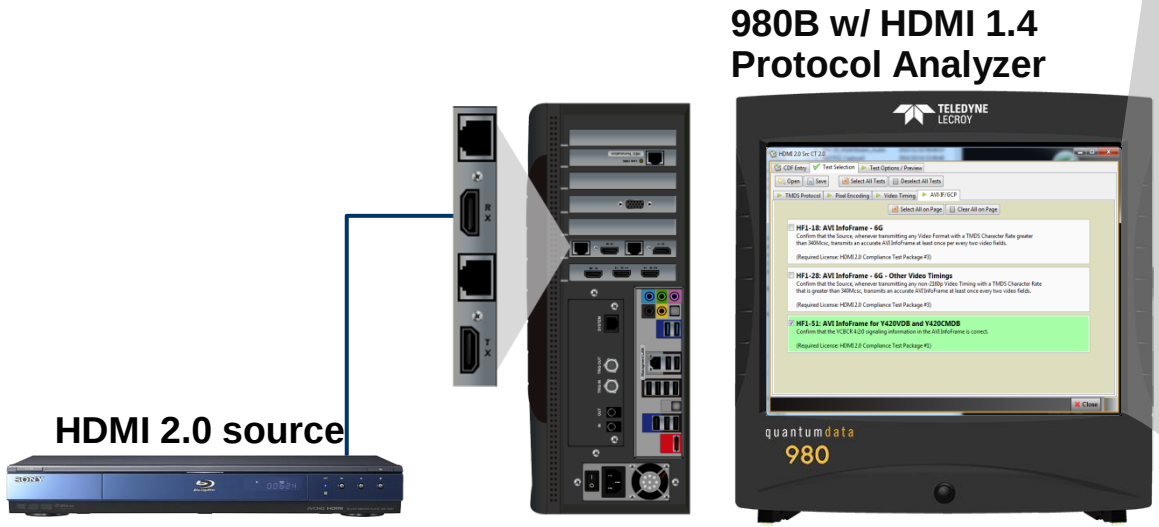
980 HDMI 1.4 Protocol Analyzer – HDMI 2.0 Source Compliance

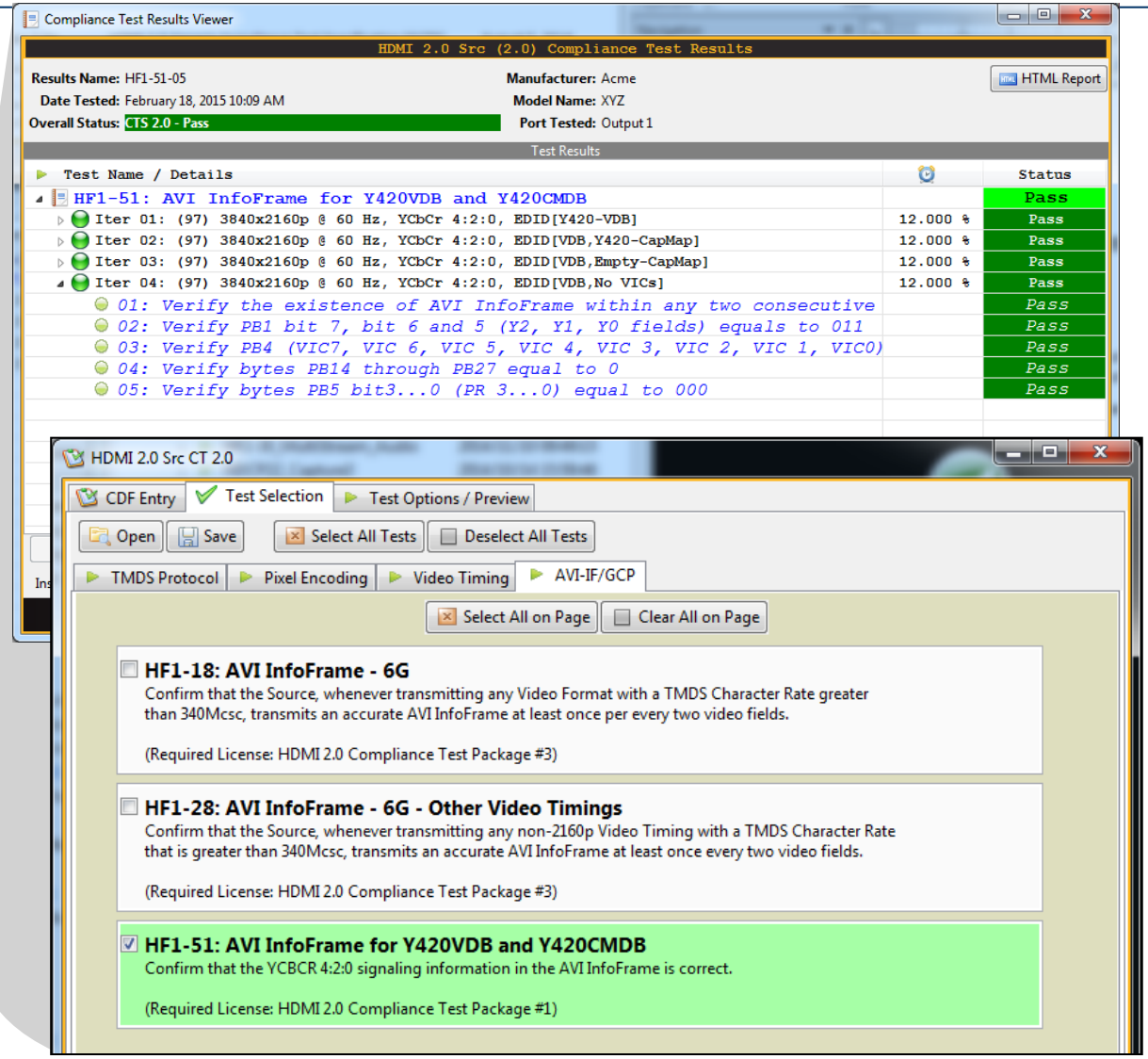
- Run HDMI 2.0 Compliance tests
  - Pre-test or self-test your HDMI 2.0 source device to reduce costs and meet product time to market requirements.
  - View details to determine root cause of failures.
  - Disseminate results to subject matter experts.
  - Test sections covered:
    - **Pixel Encoding, Video Timing, InfoFrame.**



980 HDMI 1.4 Protocol Analyzer – HDMI 2.0 Source Compliance

- Run HDMI 2.0 Compliance tests
  - Pre-test or self-test your HDMI 2.0 source device to reduce costs and meet product time to market requirements.
  - View details to determine root cause of failures.
  - Disseminate results to subject matter experts.
  - Test sections covered:
    - **Pixel Encoding, Video Timing, InfoFrame.**



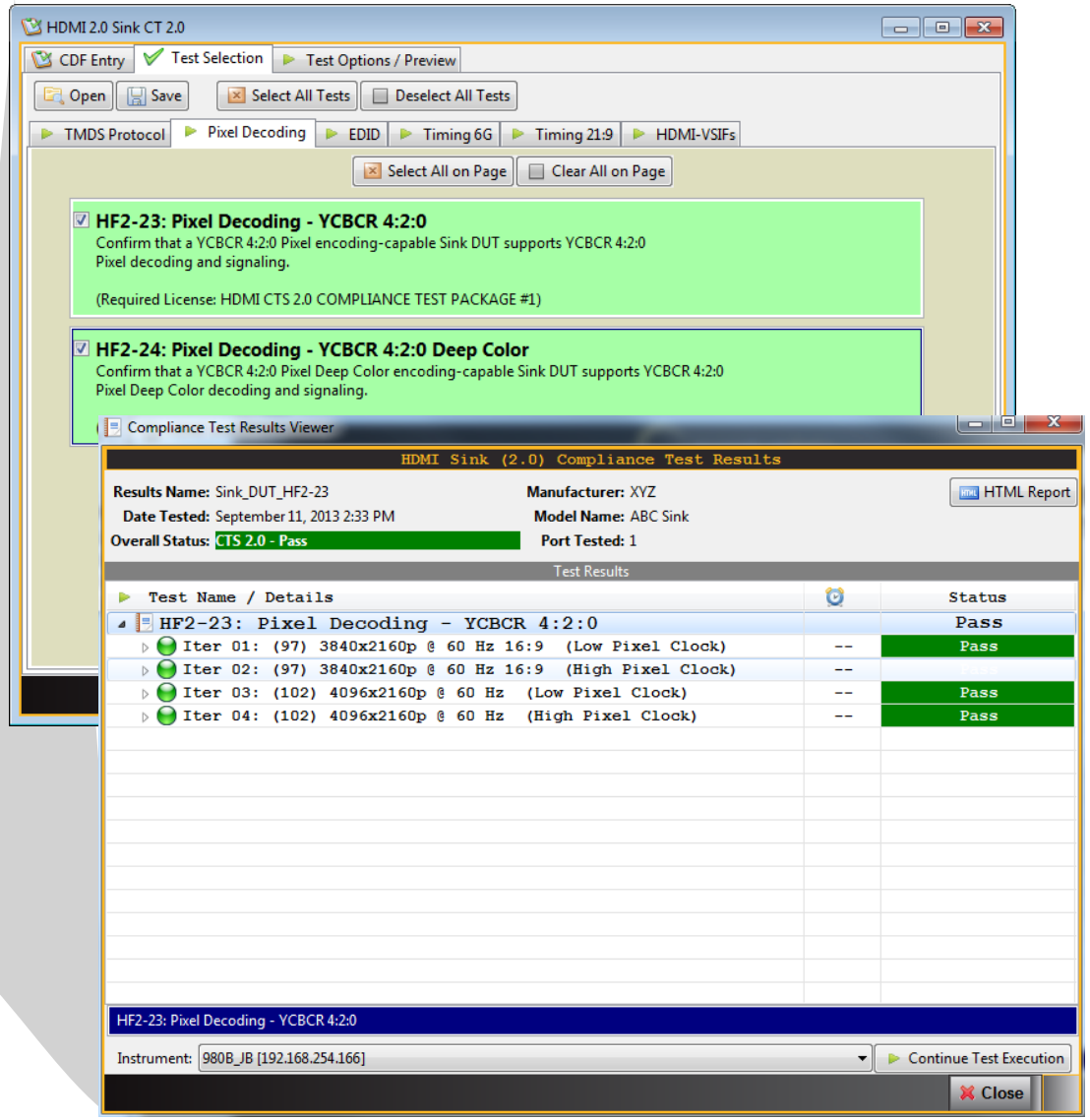


980 HDMI 1.4 Protocol Analyzer – HDMI 2.0 Sink Compliance

- Run HDMI 2.0 4:2:0 Sink Compliance tests for 4K UHD resolutions
  - Pre-test or self-test your HDMI 2.0 sink device to reduce costs and meet product time to market requirements.
  - View details to determine root cause of failures.
  - Disseminate results to subject matter experts.
  - Test sections covered:
    - **EDID, EDID Read Request and more.**

980B w/ HDMI 1.4 Protocol Analyzer

UHDTV

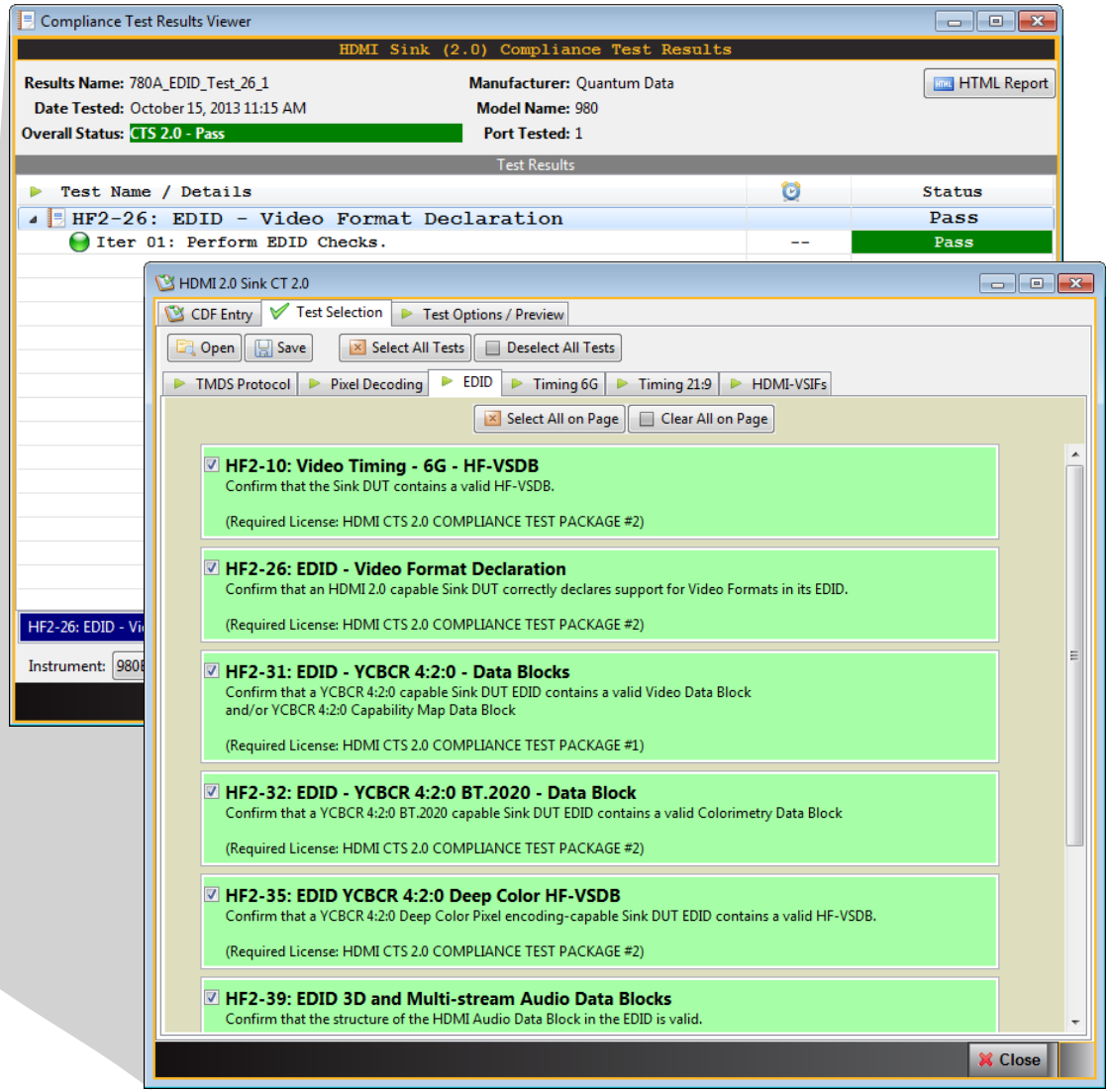


980 HDMI 1.4 Protocol Analyzer – HDMI 2.0 Sink Compliance

- Run HDMI 2.0 EDID Sink Compliance tests for 4K UHD resolutions
  - Pre-test or self-test your HDMI 2.0 sink device to reduce costs and meet product time to market requirements.
  - View details to determine root cause of failures.
  - Disseminate results to subject matter experts.
  - Test sections covered:
    - **EDID, EDID Read Request and more.**

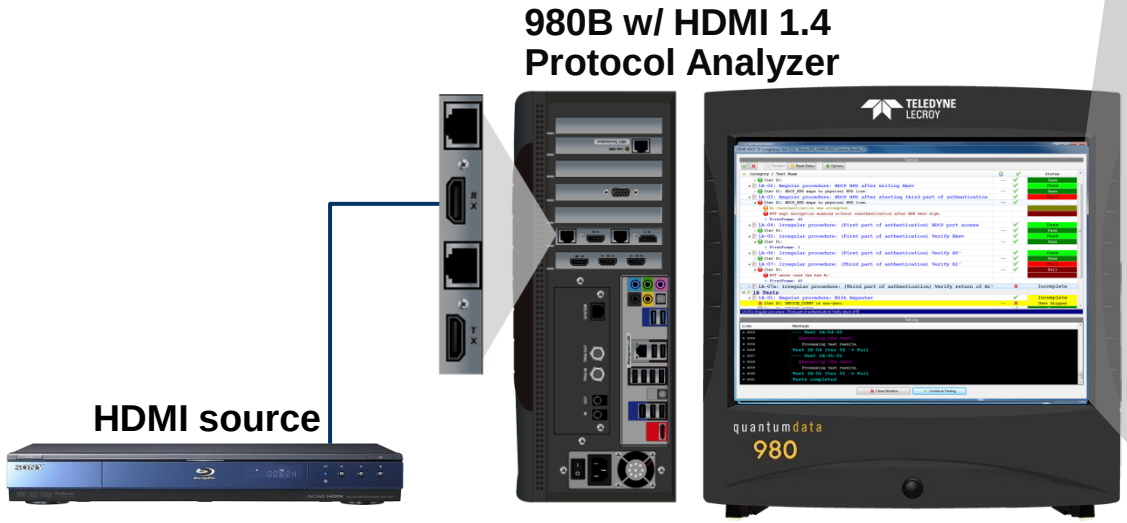
980B w/ HDMI 1.4 Protocol Analyzer

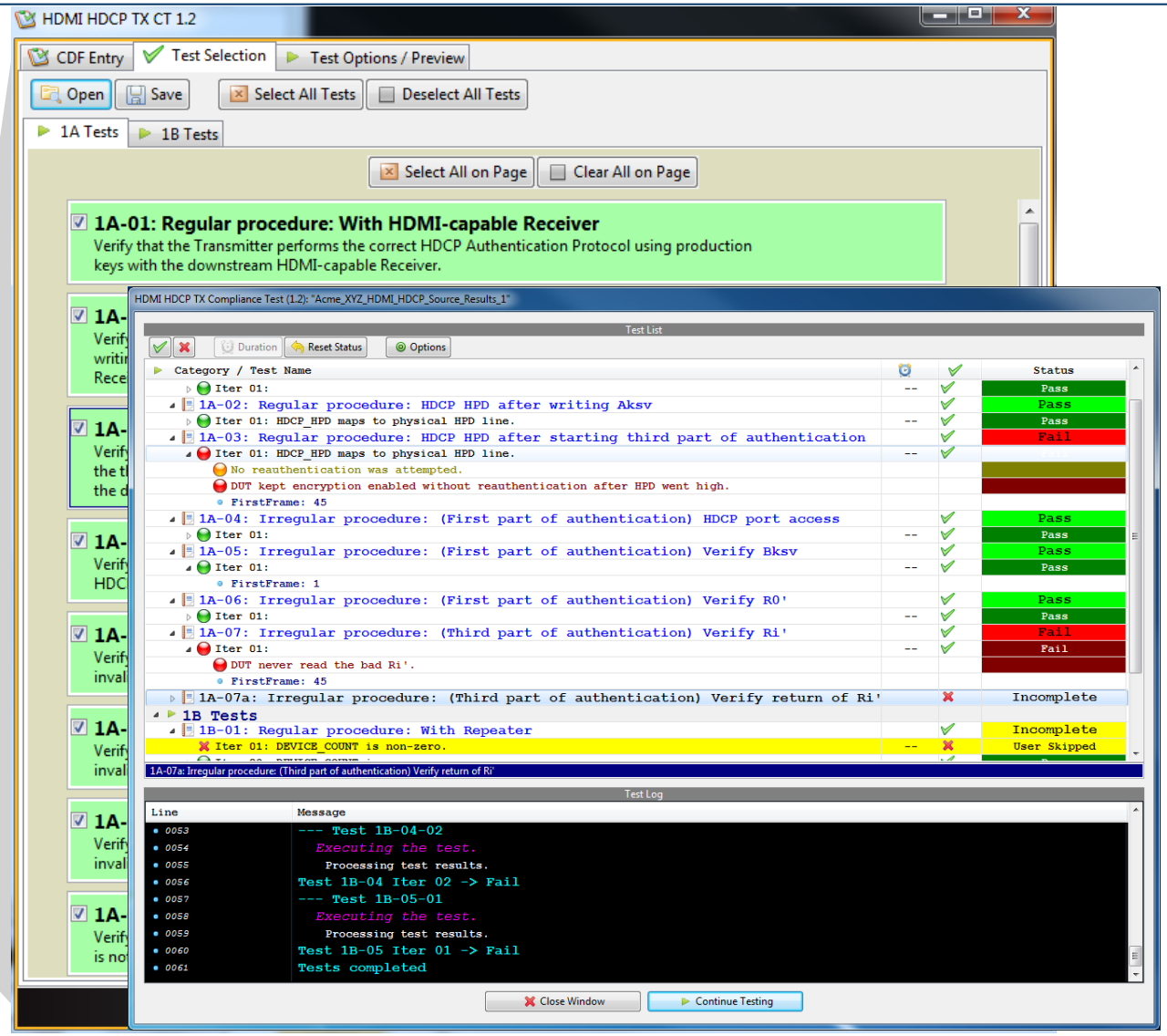
UHDTV



980 HDMI 1.4 Protocol Analyzer – HDCP 1.4 Source Compliance

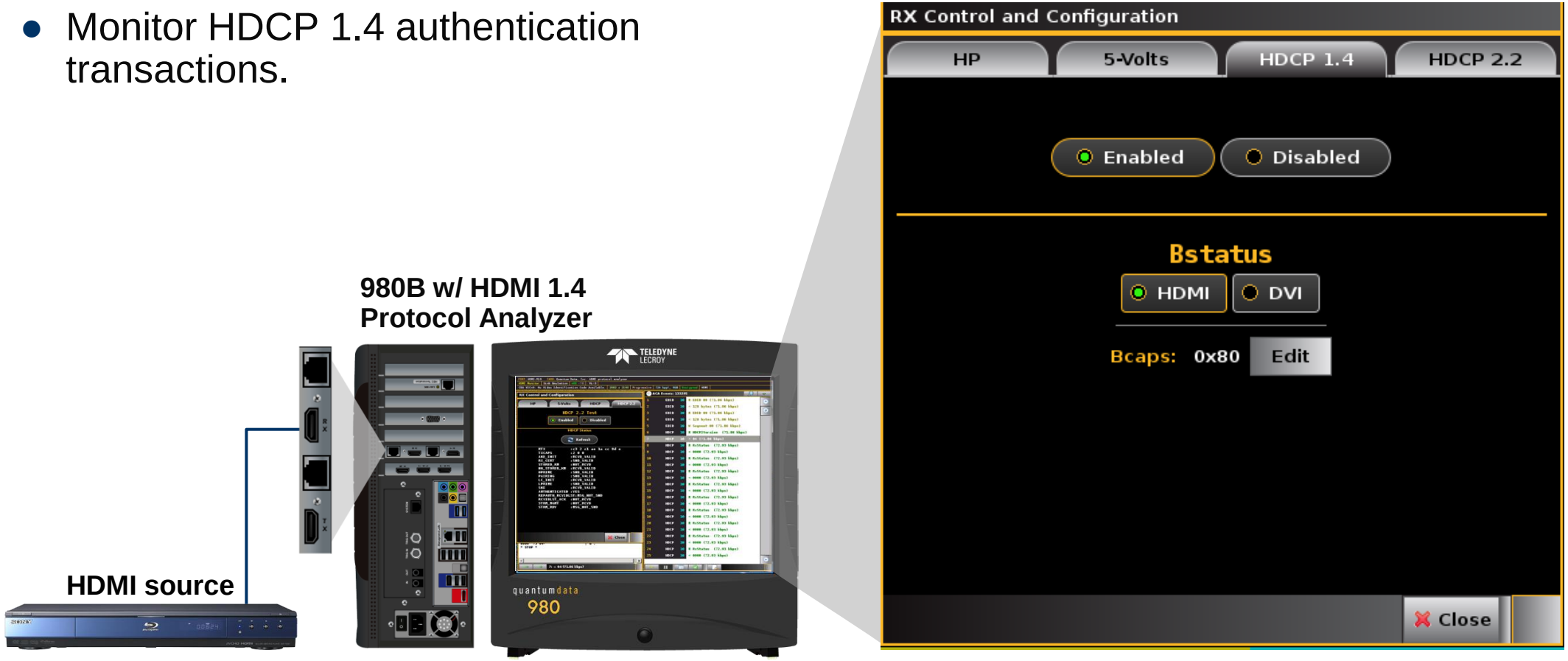
- Run HDMI-HDCP 1.4 Compliance Tests on HDMI sources.
  - Pre-test or self test your HDMI source.
  - View detailed results and root cause of any failures.
  - Disseminate results to subject matter experts.
  - All sections covered.





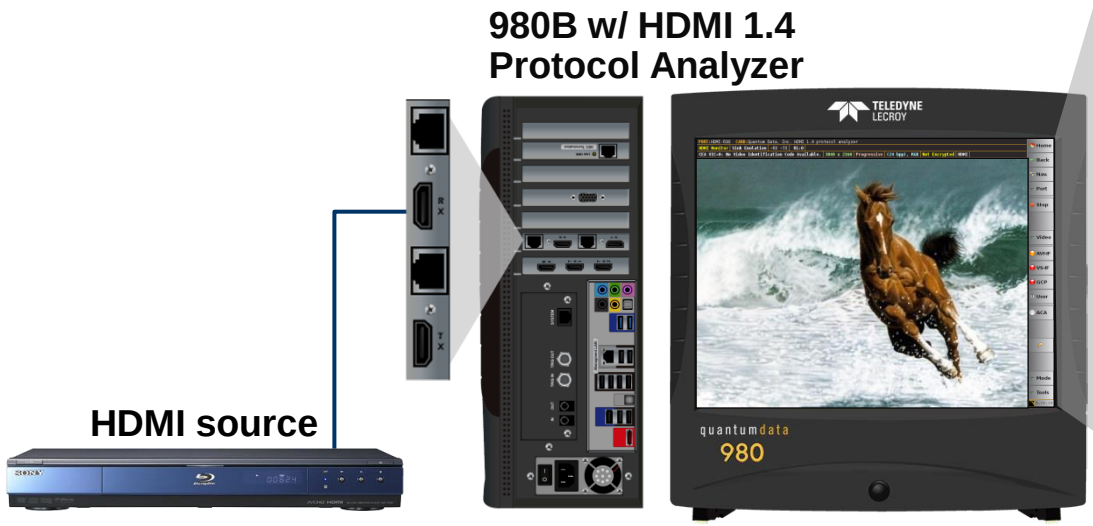
980 HDMI 1.4 Protocol Analyzer – HDCP 1.4 Source Functional Test

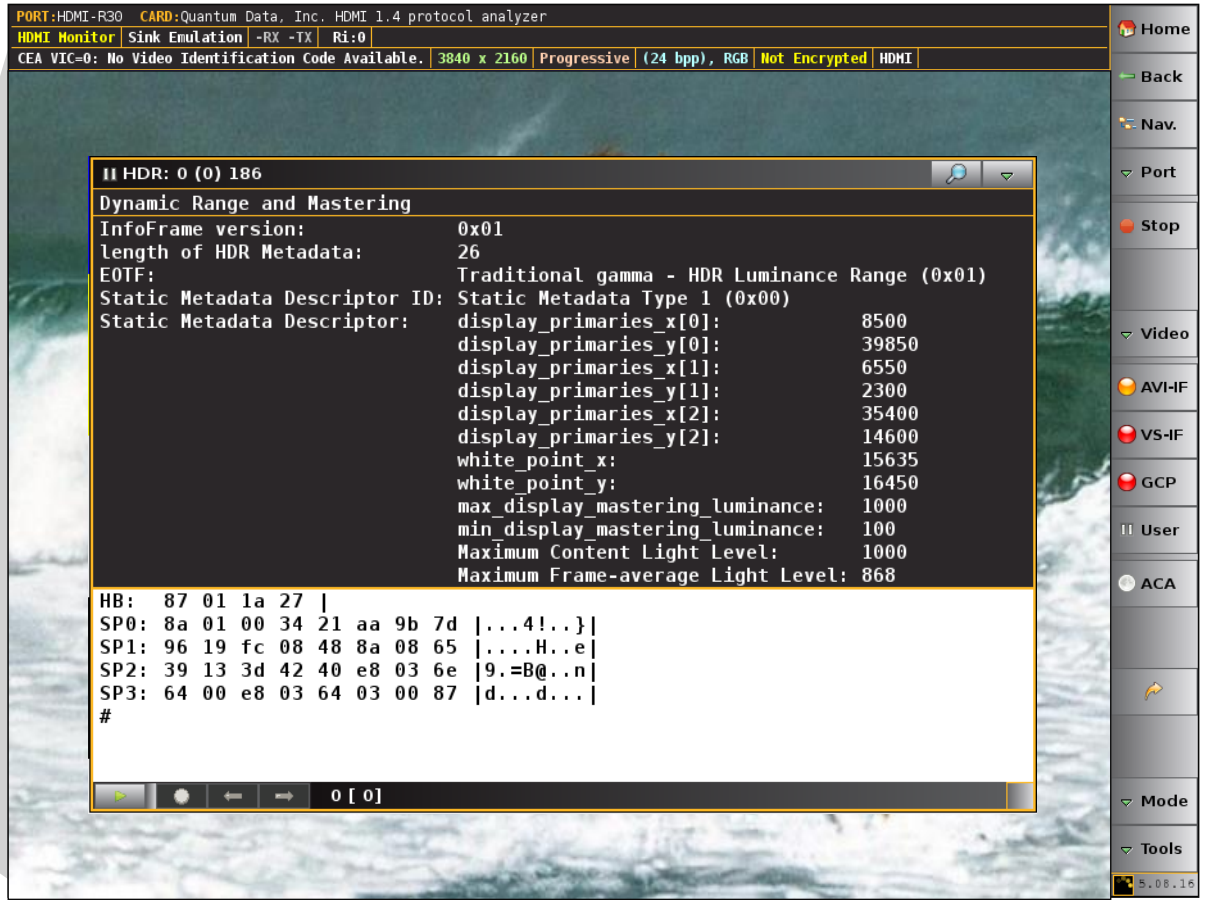
- Run HDCP 1.4 functional tests on HDMI source devices.
  - View pass/fail results for authentication.
  - Monitor HDCP 1.4 authentication transactions.



980 HDMI 1.4 Protocol Analyzer – HDR Source Functional Test

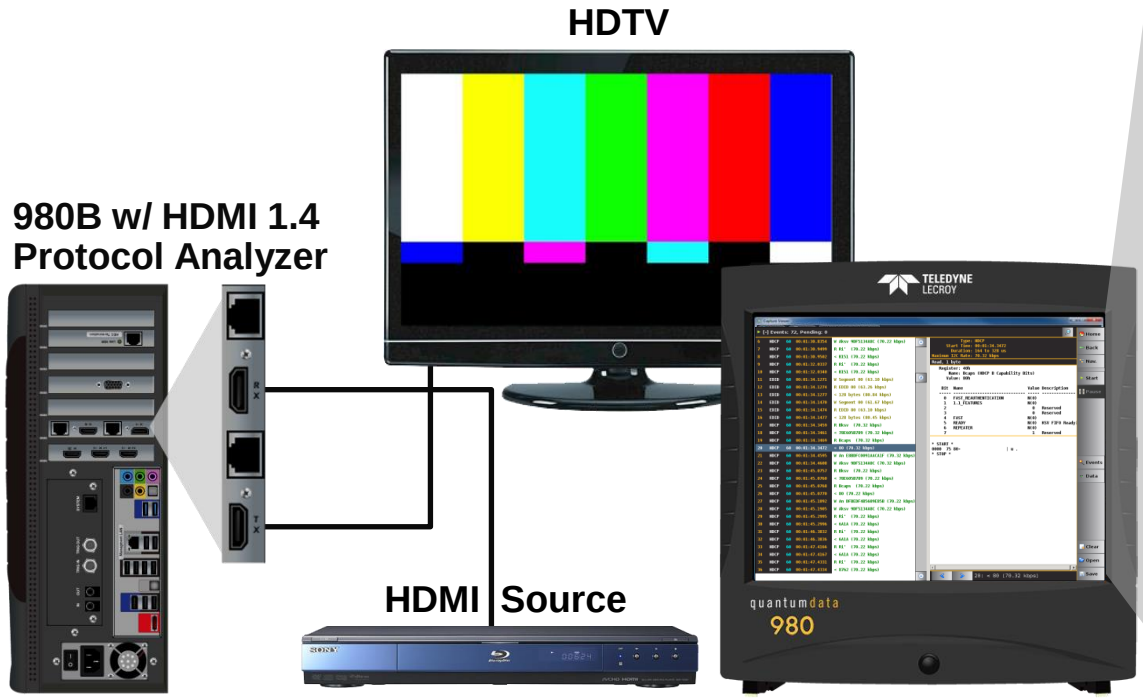
- View High Dynamic Range InfoFrame from incoming source in Real Time mode.
  - Verify High Dynamic Range InfoFrame values.

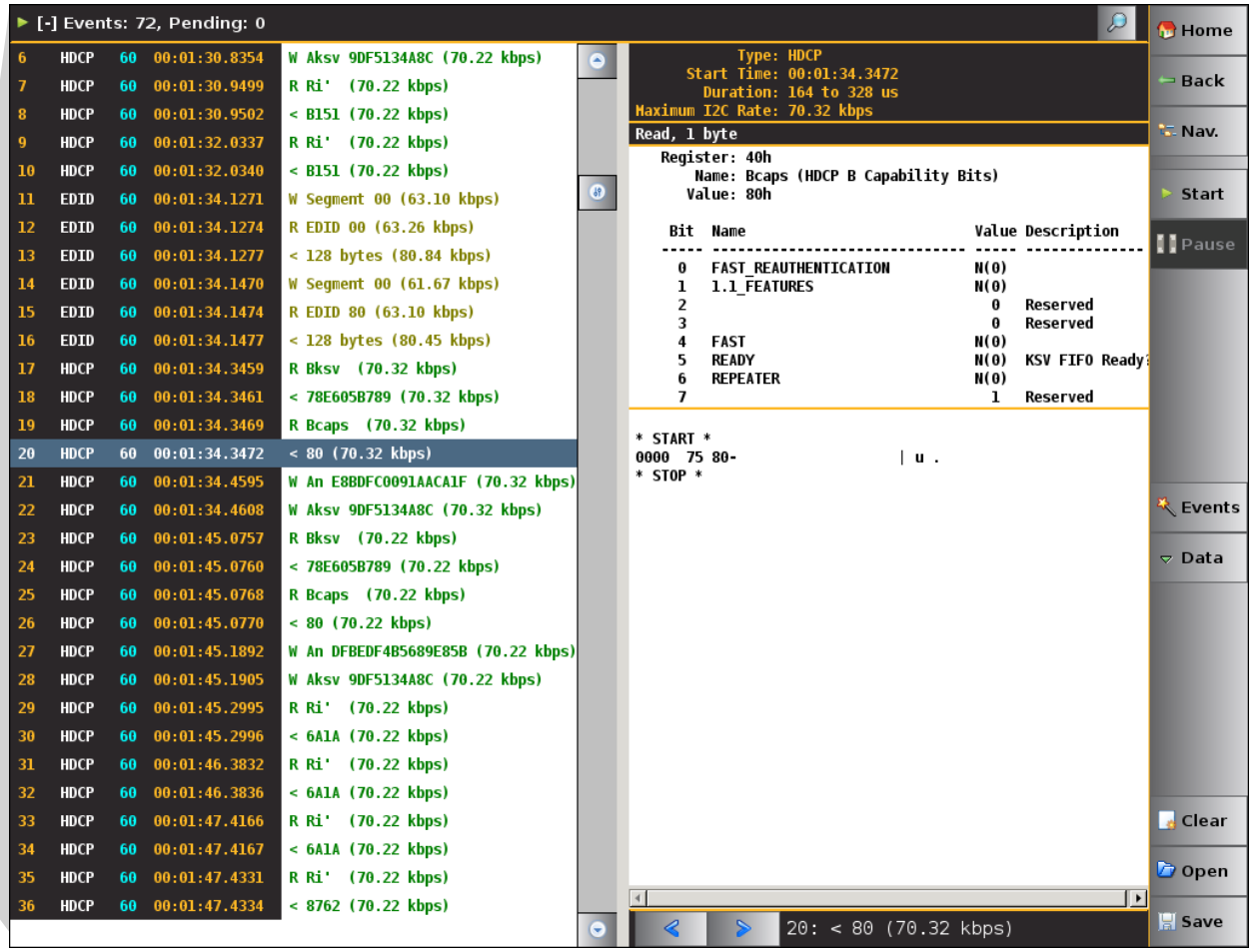




980 HDMI 1.4 Protocol Analyzer – HDCP Passive Monitoring

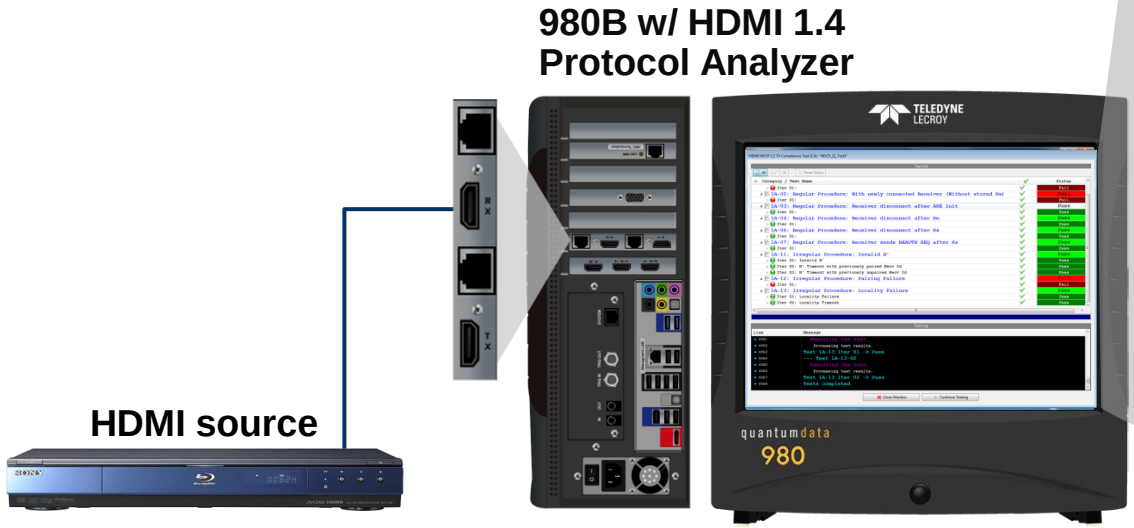
- Passively monitor HDCP transactions between an HDMI source and sink.
  - Investigate root cause of HDCP authentication failures.

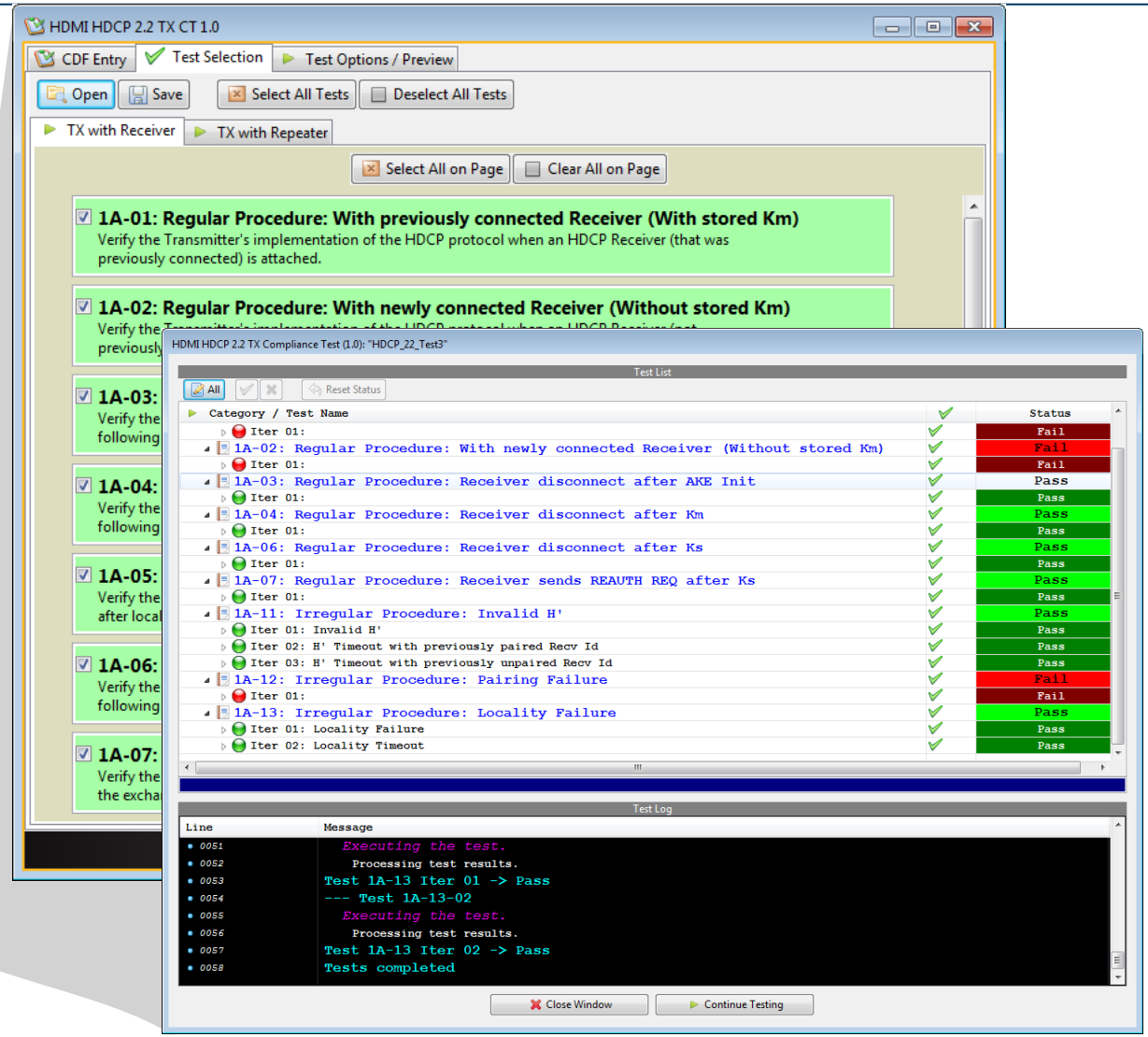




980 HDMI 1.4 Protocol Analyzer – HDCP 2.2 Source Compliance

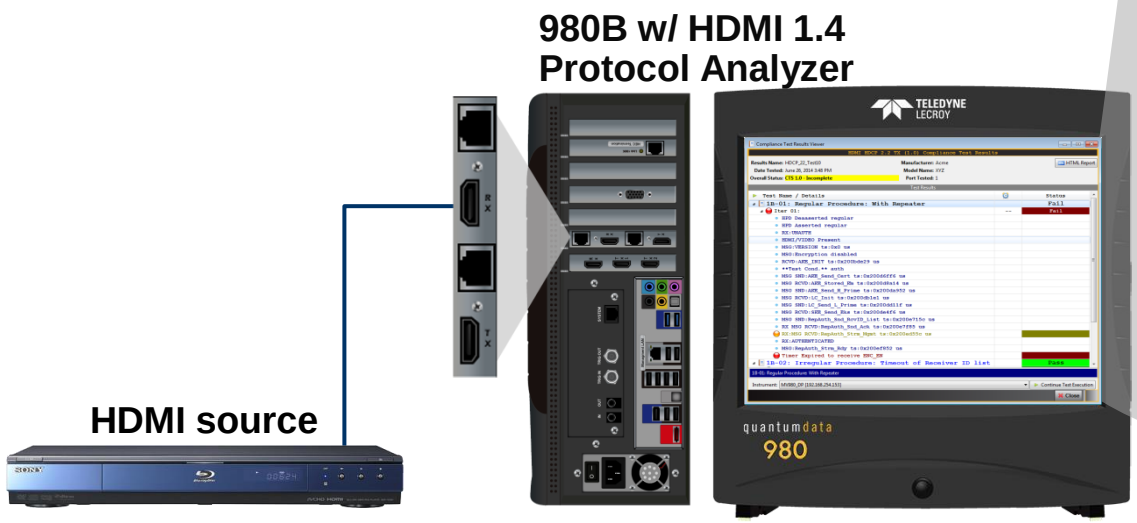
- Run HDMI-HDCP 2.2 Compliance tests on HDMI 4K UHD sources
  - Pre-test or self-test your HDMI-HDCP 2.2 source device to reduce costs and meet product time to market requirements.
  - View details of test results and identify root cause of HDCP failure.
  - Disseminate results to subject matter experts.

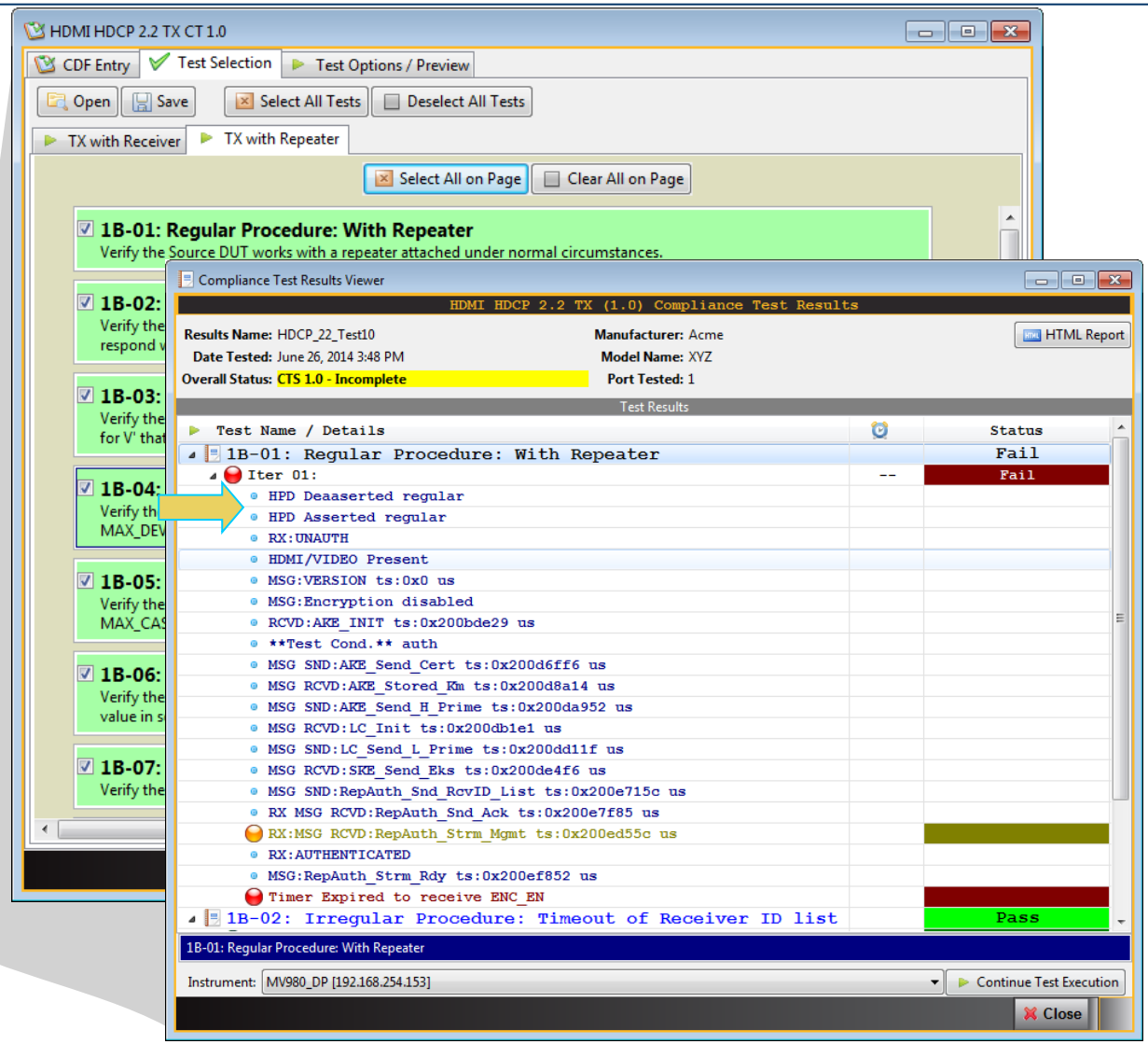




980 HDMI 1.4 Protocol Analyzer – HDCP 2.2 Source Compliance

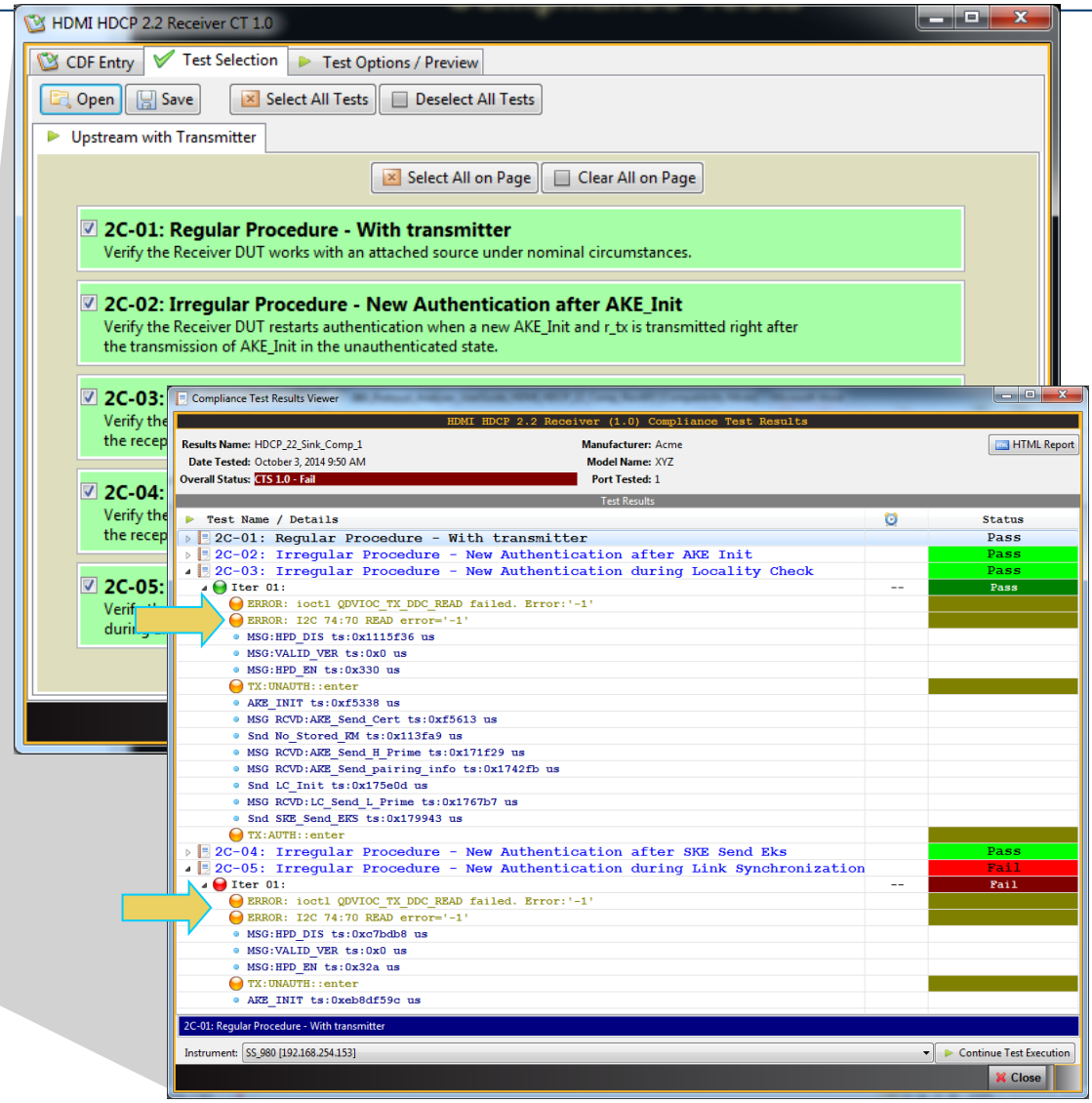
- Run HDMI-HDCP 2.2 Compliance tests on HDMI 4K UHD sources
  - Pre-test or self-test your HDMI-HDCP 2.2 source device to reduce costs and meet product time to market requirements.
  - View details of test results and identify root cause of HDCP failure.
  - Disseminate results to subject matter experts.





980 HDMI 1.4 Protocol Analyzer – HDCP 2.2 Sink Compliance

- Run HDMI-HDCP 2.2 Compliance tests on HDMI 4K UHD sinks
  - Pre-test or self-test your HDMI-HDCP 2.2 sink device to reduce costs and meet product time to market requirements.
  - View details of test results and identify root cause of HDCP failure.
  - Disseminate results to subject matter experts.

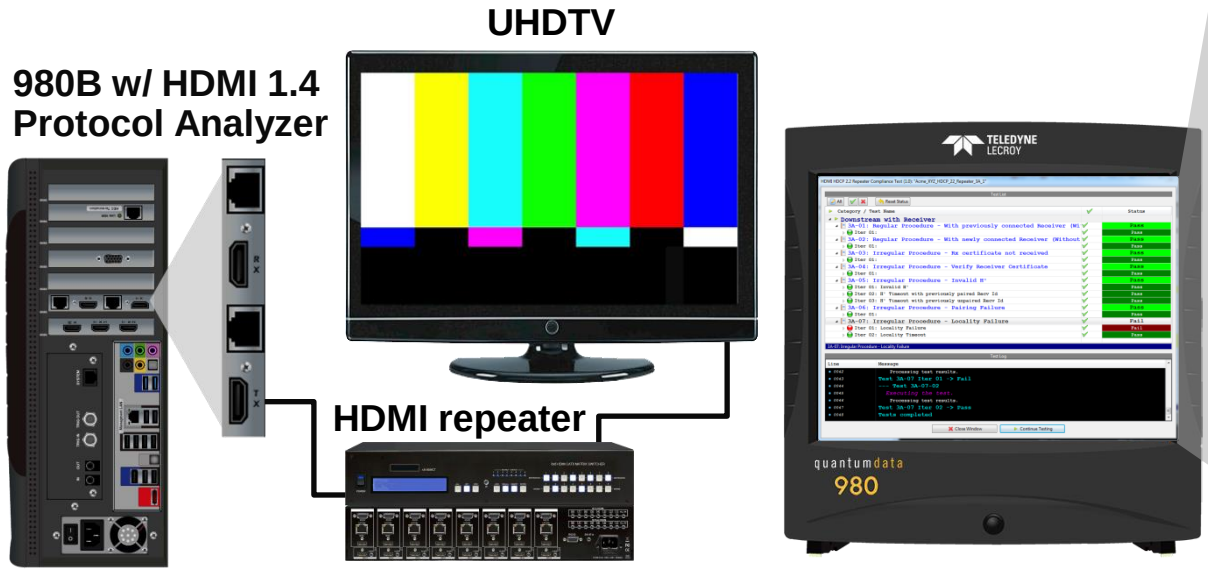


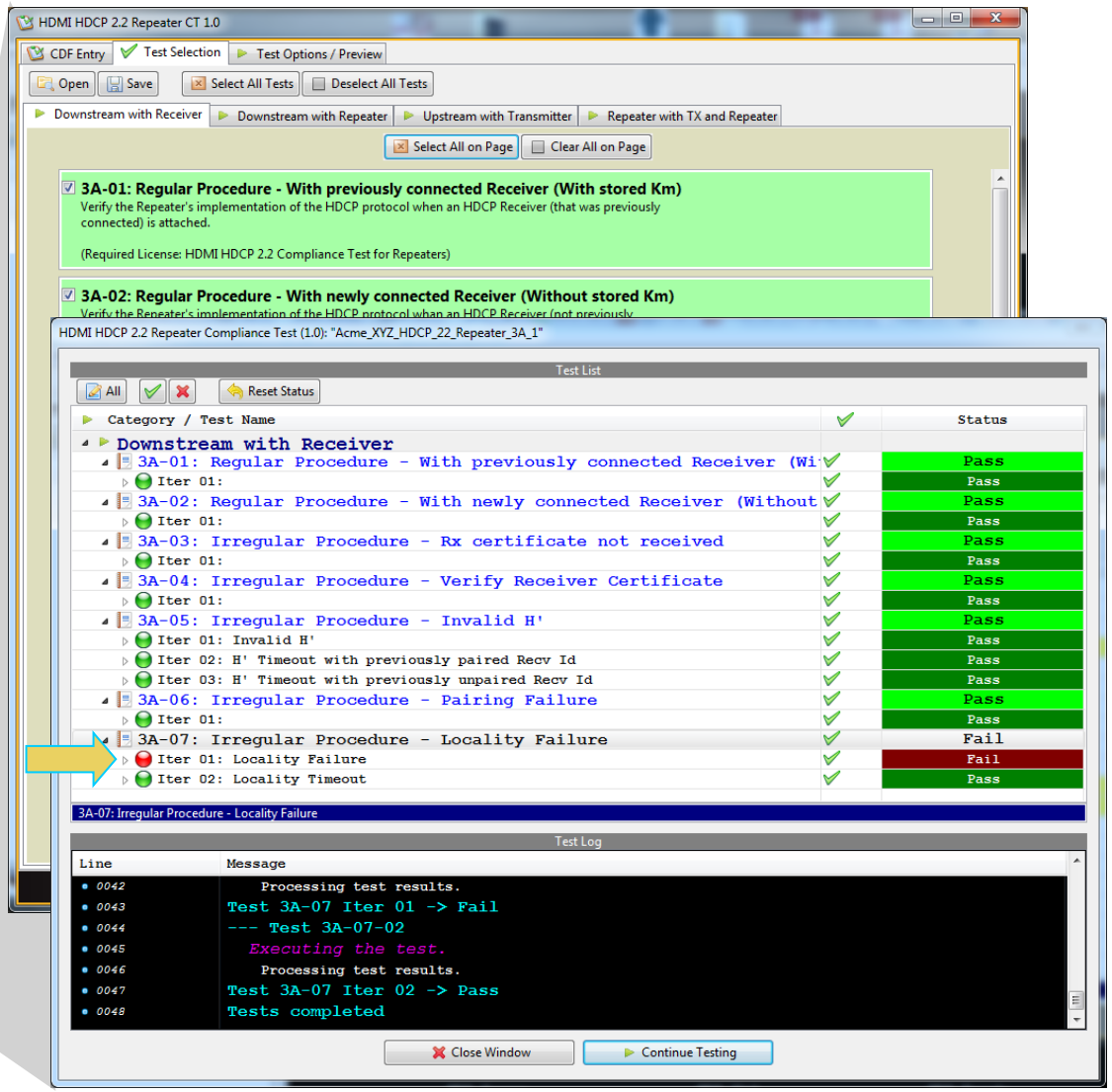
980B w/ HDMI 1.4 Protocol Analyzer

UHDTV

980 HDMI 1.4 Protocol Analyzer – HDCP 2.2 Repeater Compliance

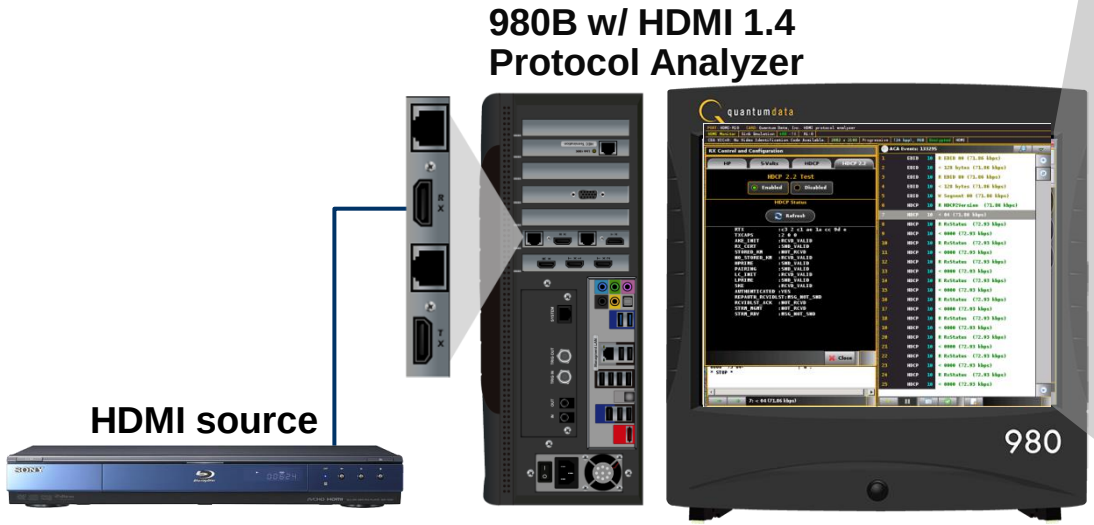
- Run HDMI-HDCP 2.2 Compliance tests on HDMI 4K UHD repeaters
  - Pre-test or self-test your HDMI-HDCP 2.2 repeater device to reduce costs and meet product time to market requirements.
  - View details of test results and identify root cause of HDCP failure.
  - Disseminate results to subject matter experts.

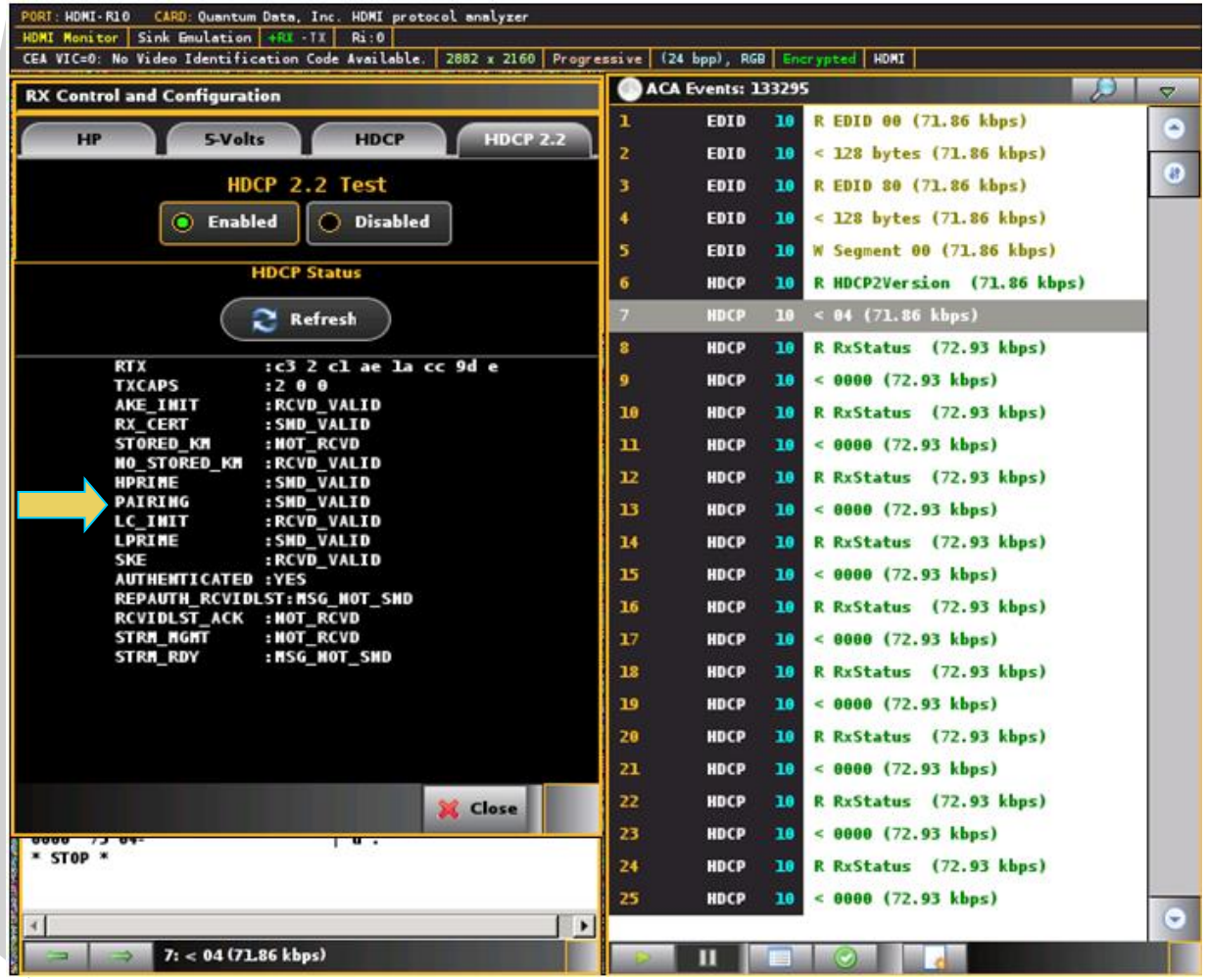




980 HDMI 1.4 Protocol Analyzer – HDCP 2.2 Source Functional Test

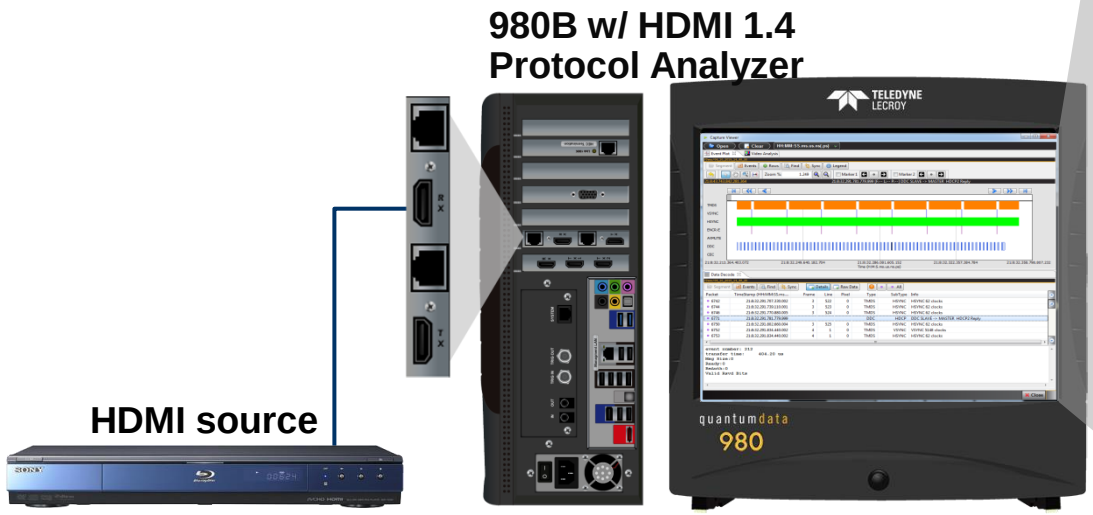
- Run HDCP 2.2 functional tests on HDMI UHD 4K source devices.
  - View pass/fail results for authentication.
  - Monitor HDCP 2.2 authentication transactions.

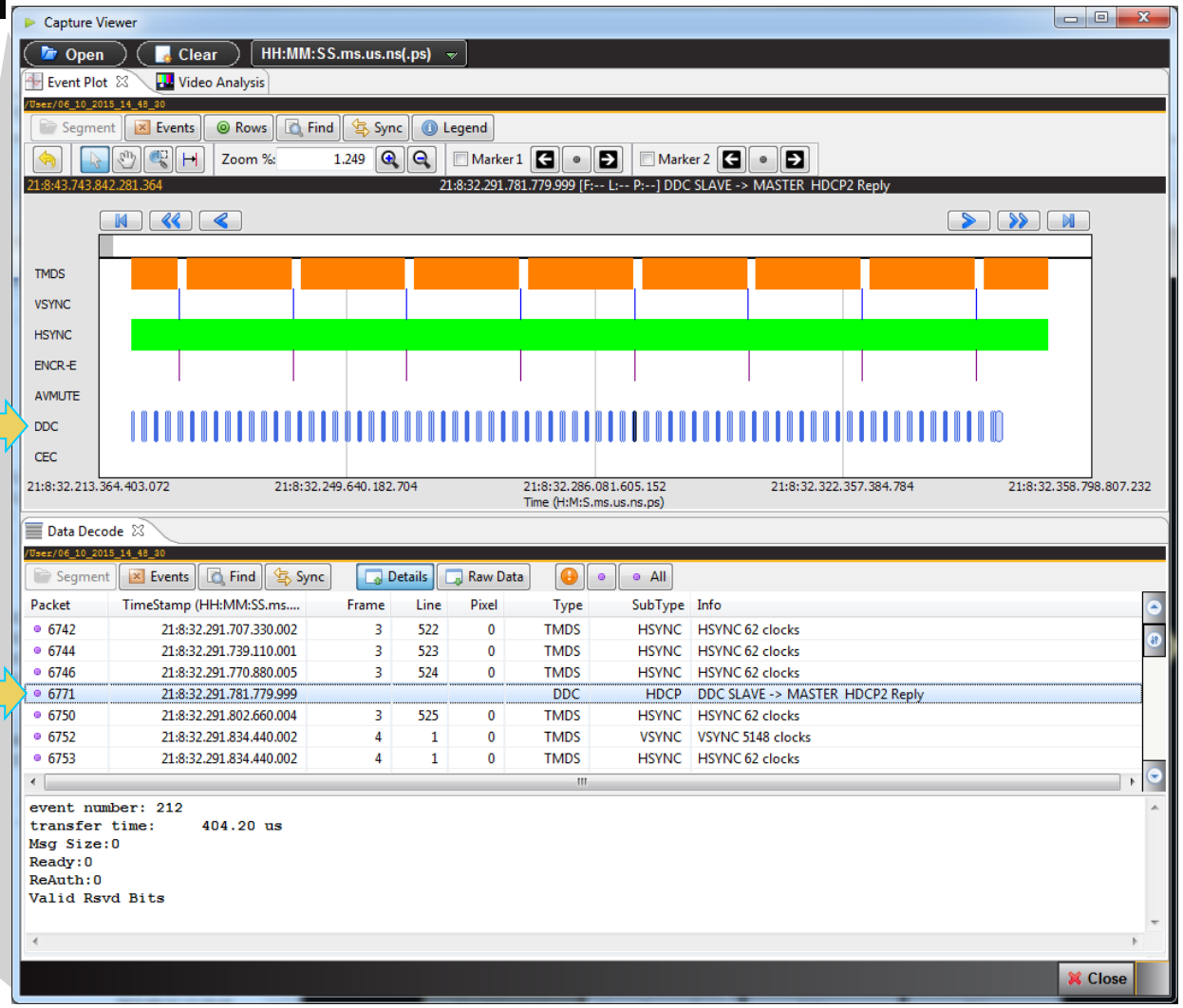




980 HDMI 1.4 Protocol Analyzer – HDCP 2.2 Source Functional Test

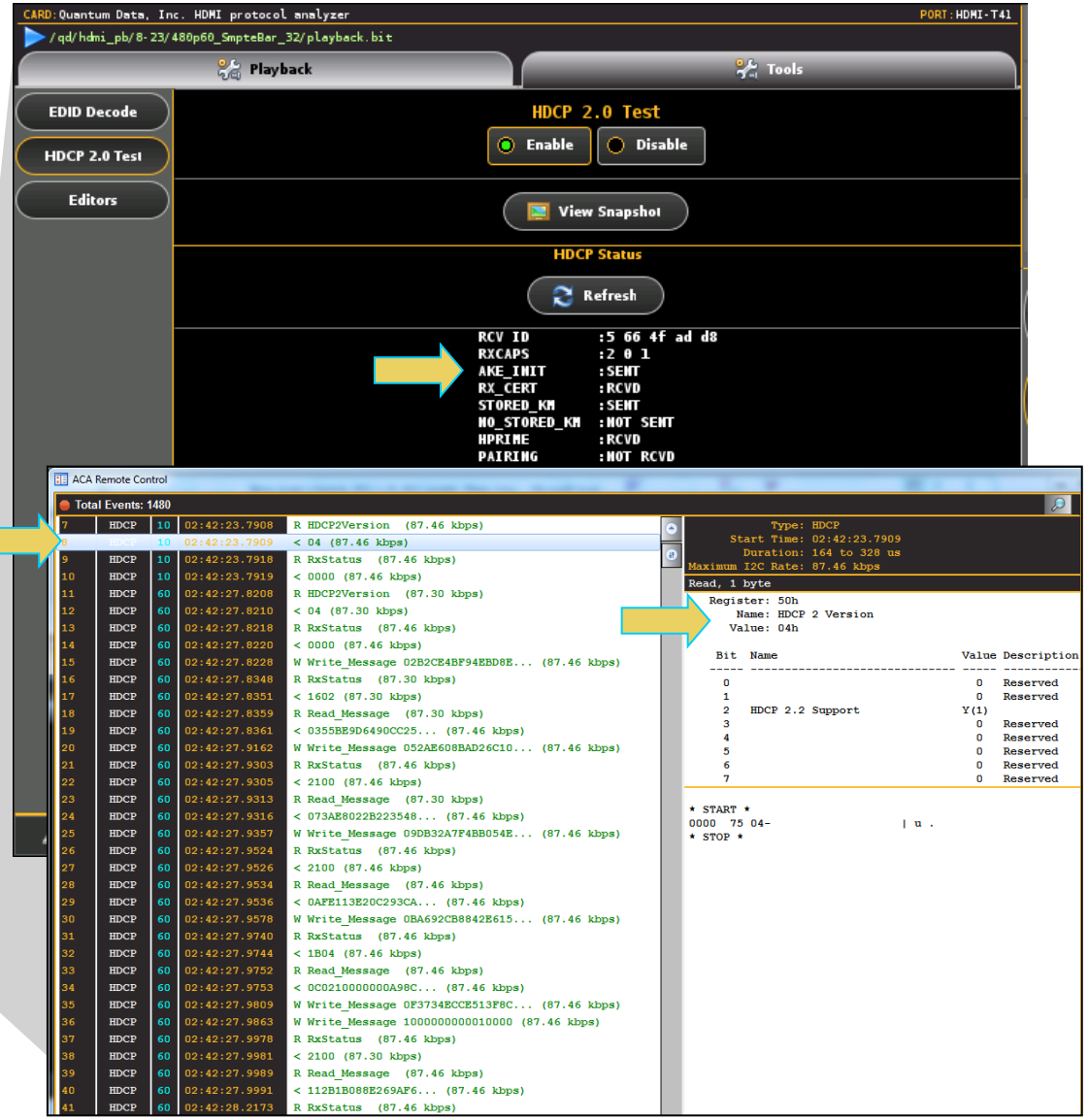
- Run HDCP 2.2 functional tests on HDMI UHD 4K source devices.
  - Capture HDCP 2.2 authentication trans-actions and view encryption enable pulse.
  - Disseminate captured data to colleagues at other locations.





980 HDMI 1.4 Protocol Analyzer – HDCP 2.2 Sink Function Test

- Run HDCP 2.2 functional tests on HDMI UHD 4K sink devices.
  - View pass/fail results for authentication.
  - Monitor HDCP 2.2 authentication transactions (not shown).



Applications

DisplayPort Video Generator / Analyzer modules

980 DisplayPort Video Generator / Analyzer – Video Format Test

- DisplayPort Video Test of an DP monitor, display or sink device.
  - Select between extensive library of VESA and CEA video timing formats.
  - Run video tests with DP HBR3 formats at link rates up to HBR3 (8.1Gb/s) on four (4) lanes.
  - Run video tests with DP 1.2 formats at link rates up to HBR2 (5.4Gb/s) on four (4) lanes.

980B w/ DP Video Generator

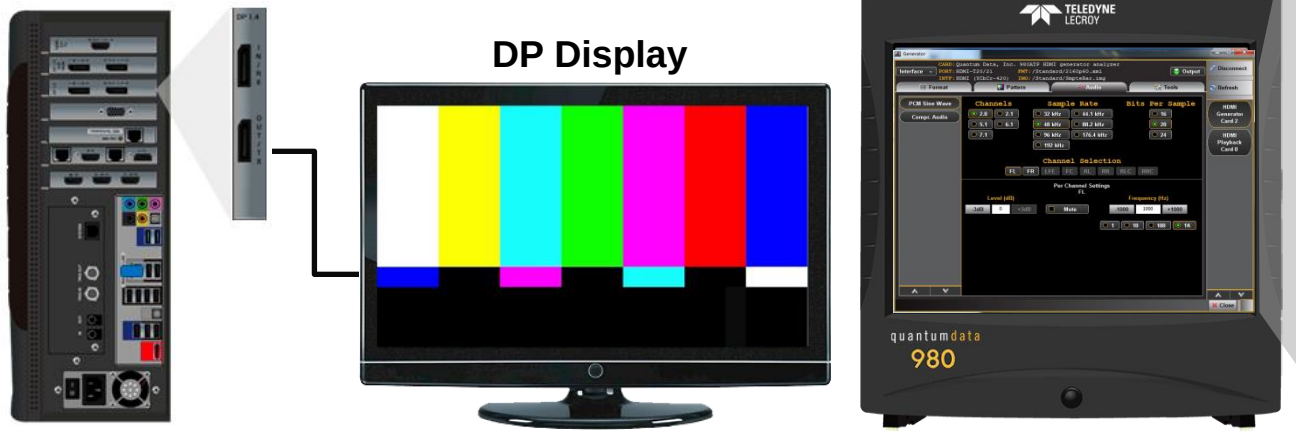
DP Display

980 DisplayPort Video Generator / Analyzer – Video Pattern Testing

- Pattern Testing of a DisplayPort monitor, display or sink device
  - Verify proper rendering on a display.
  - Use extensive test pattern library.

980 DisplayPort Video Generator / Analyzer – Audio Test

- DisplayPort Video Test of a DP audio rendering device
  - Run LPCM uncompressed formats with programmable audio parameters.

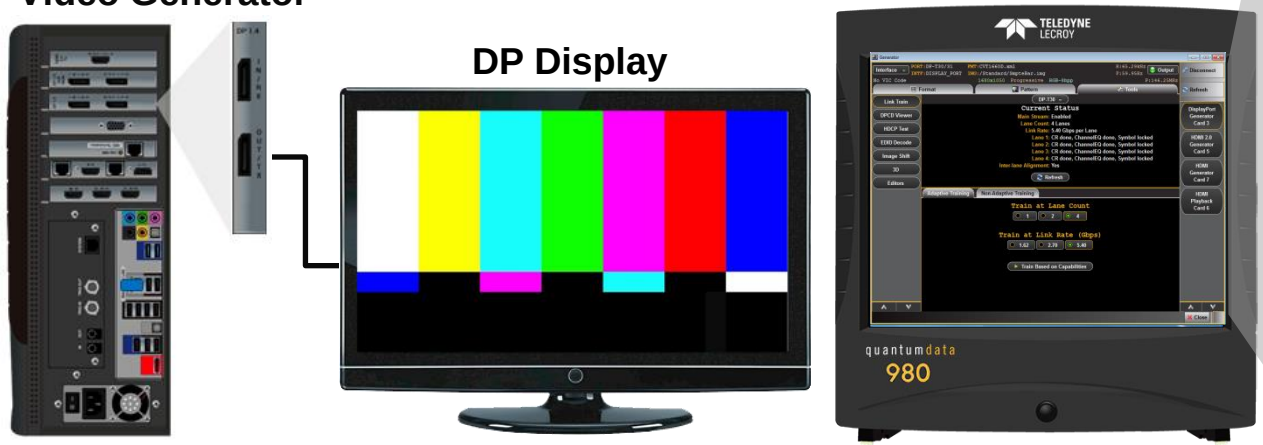


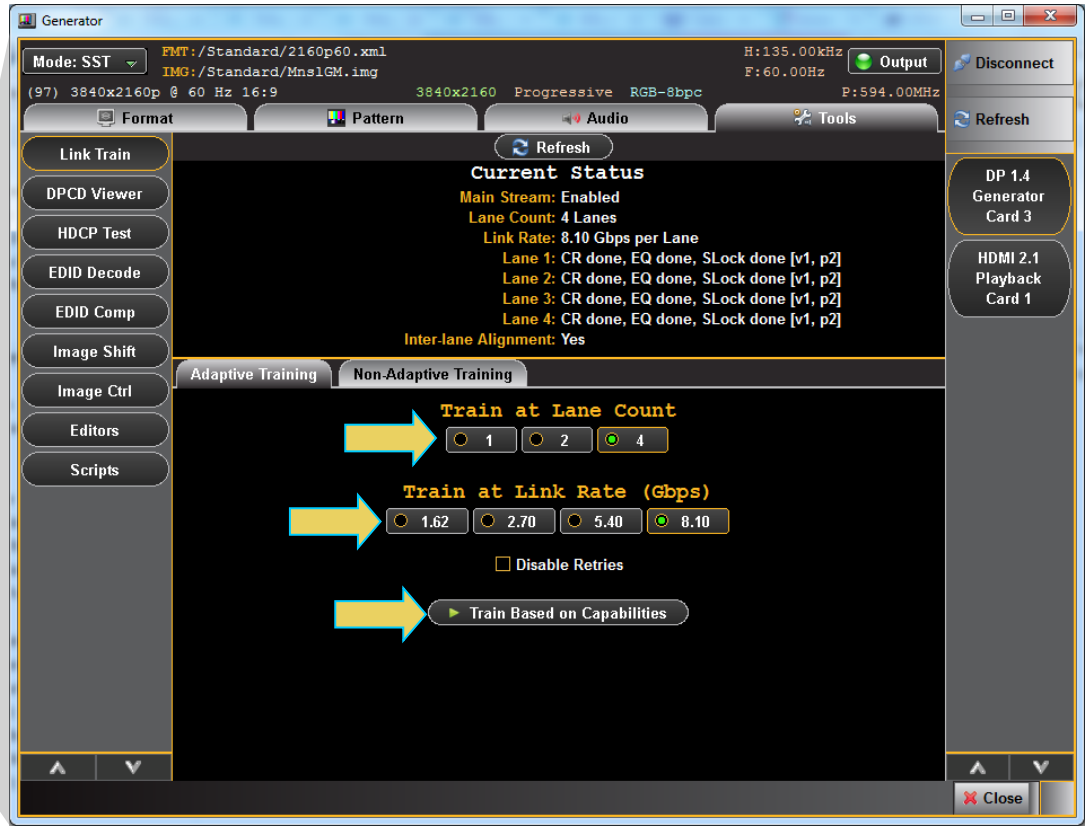
980 DisplayPort Video Generator / Analyzer – Link Train Test

- DisplayPort Link Training test of an DP monitor, display or sink device
  - Provides current status of link training on top panel.
  - Control settings on lower panel.

980 DisplayPort Video Generator / Analyzer – Link Train Test

- DisplayPort Link Training test of an DP monitor, display or sink device
  - Select Adaptive (automatic) link training.
  - Set limits on source lane count and link rate capabilities (e.g. 4 lanes at 8.1Gbps).



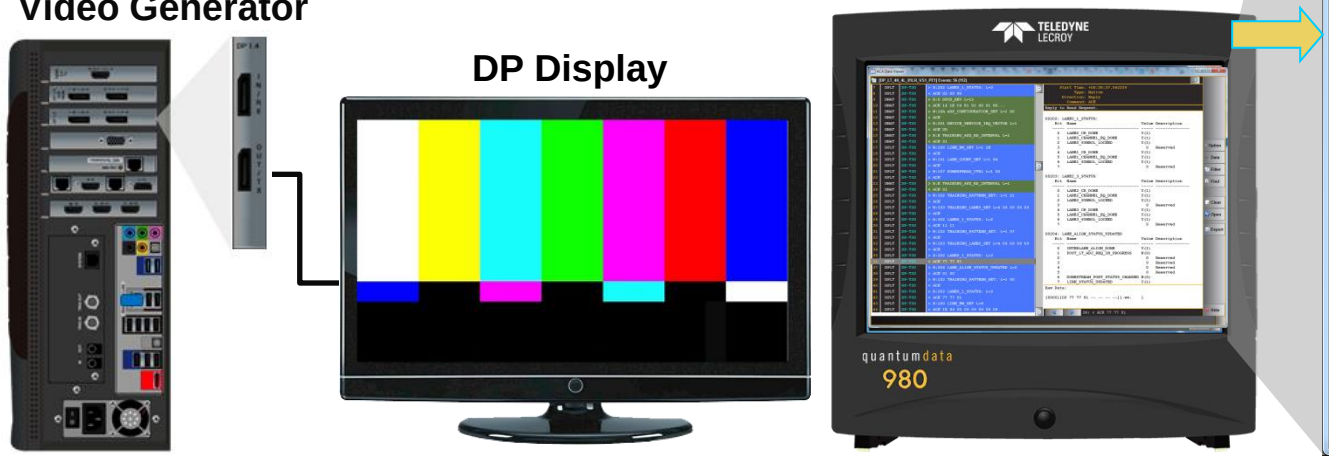


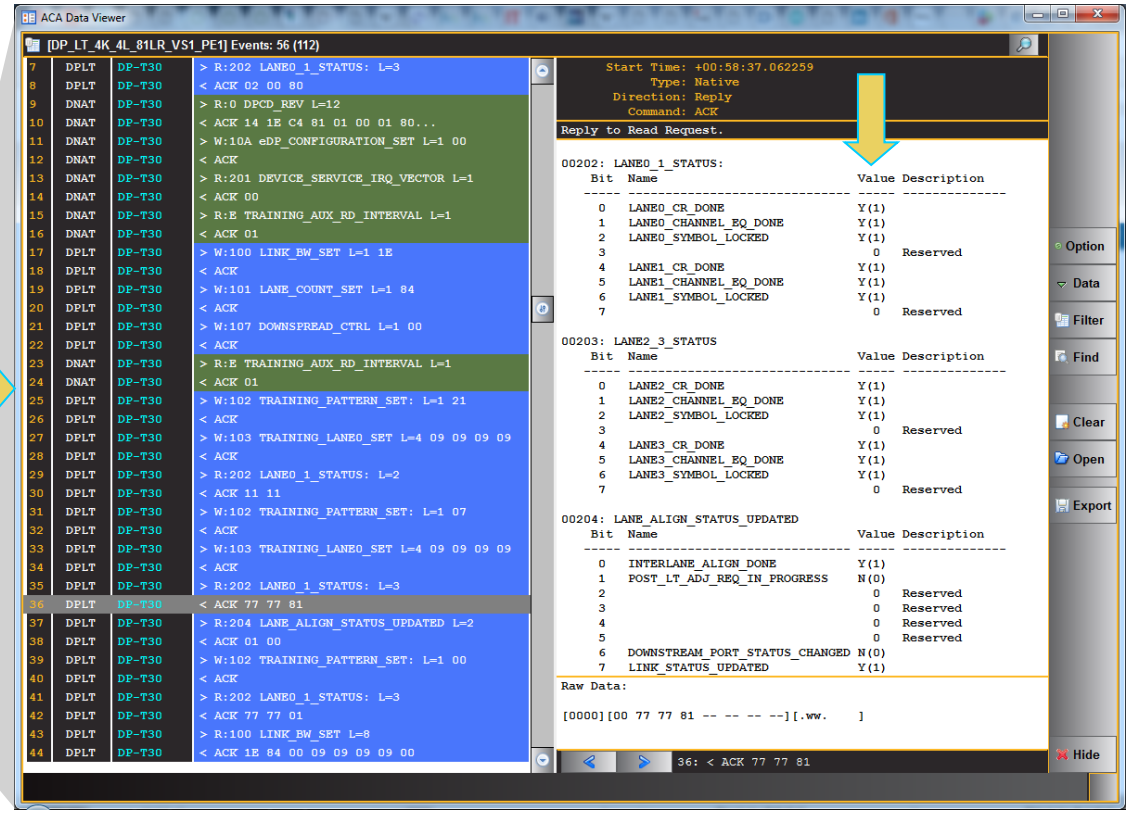
980 DisplayPort Video Generator / Analyzer – Link Train Test

- DisplayPort Link Training test of an DP monitor, display or sink device
  - Select Non-Adaptive (user control).
  - Enables precise control over lane count and link rate. Force link training at 8.1Gbps for example.

980 DisplayPort Video Generator / Analyzer – Link Train Test

- Monitor and view DisplayPort Link Training transactions in real time with Auxiliary Channel Analyzer (ACA).
  - View timestamps of each transaction.
  - View details of each transaction.
  - Disseminate traces to subject matter experts.



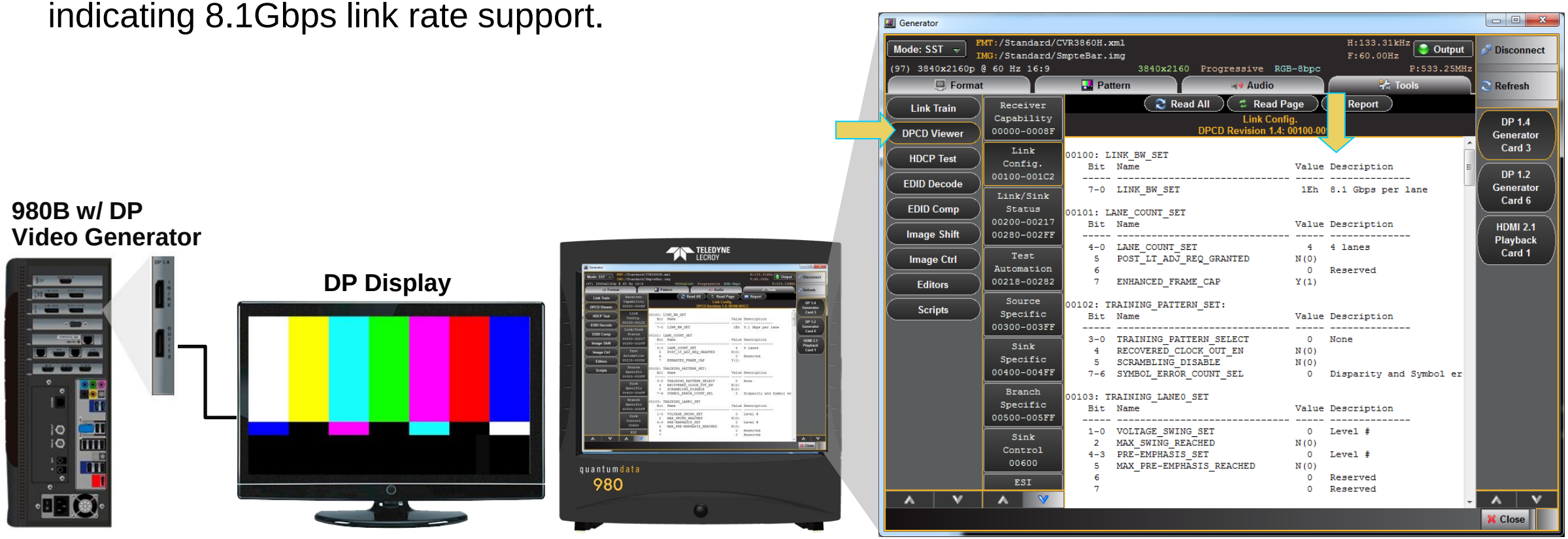


980 DisplayPort Video Generator / Analyzer – EDID Test

- DisplayPort EDID verification test of a DP monitor, display or sink device
  - View the entire EDID in human readable text.
  - Check for checksum and header errors.

980 DisplayPort Video Generator / Analyzer – DPCD Test

- DisplayPort DPCD verification test of an DP monitor, display or sink device
  - View display's DPCD registers in human readable text.
  - Example shows Receiver Capabilities indicating 8.1Gbps link rate support.



980 DisplayPort Video Generator / Analyzer – HDCP Test

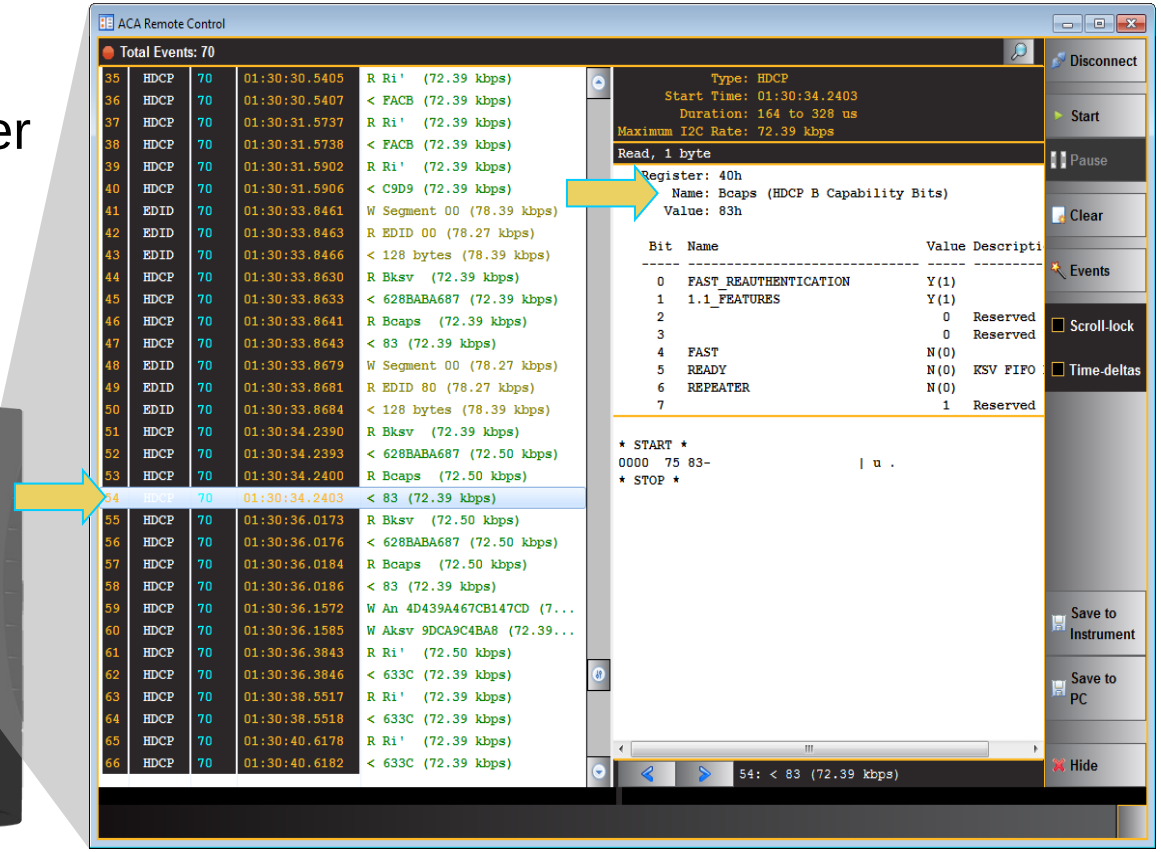
- HDCP verification test of a DisplayPort monitor, display or sink device
  - Verify HDCP authentication.
  - View results on connected display.

980 DisplayPort Video Generator / Analyzer – HDCP Test

- HDCP verification with a DisplayPort monitor, display or sink device
  - Verify HDCP versions 1.3 and 2.2 authentication transactions on Auxiliary Channel Analyzer (ACA) utility.
  - Identify cause of HDCP interoperability problems.
  - Save results and disseminate to colleagues at other locations.

980B w/ DP Video Generator

DP Display

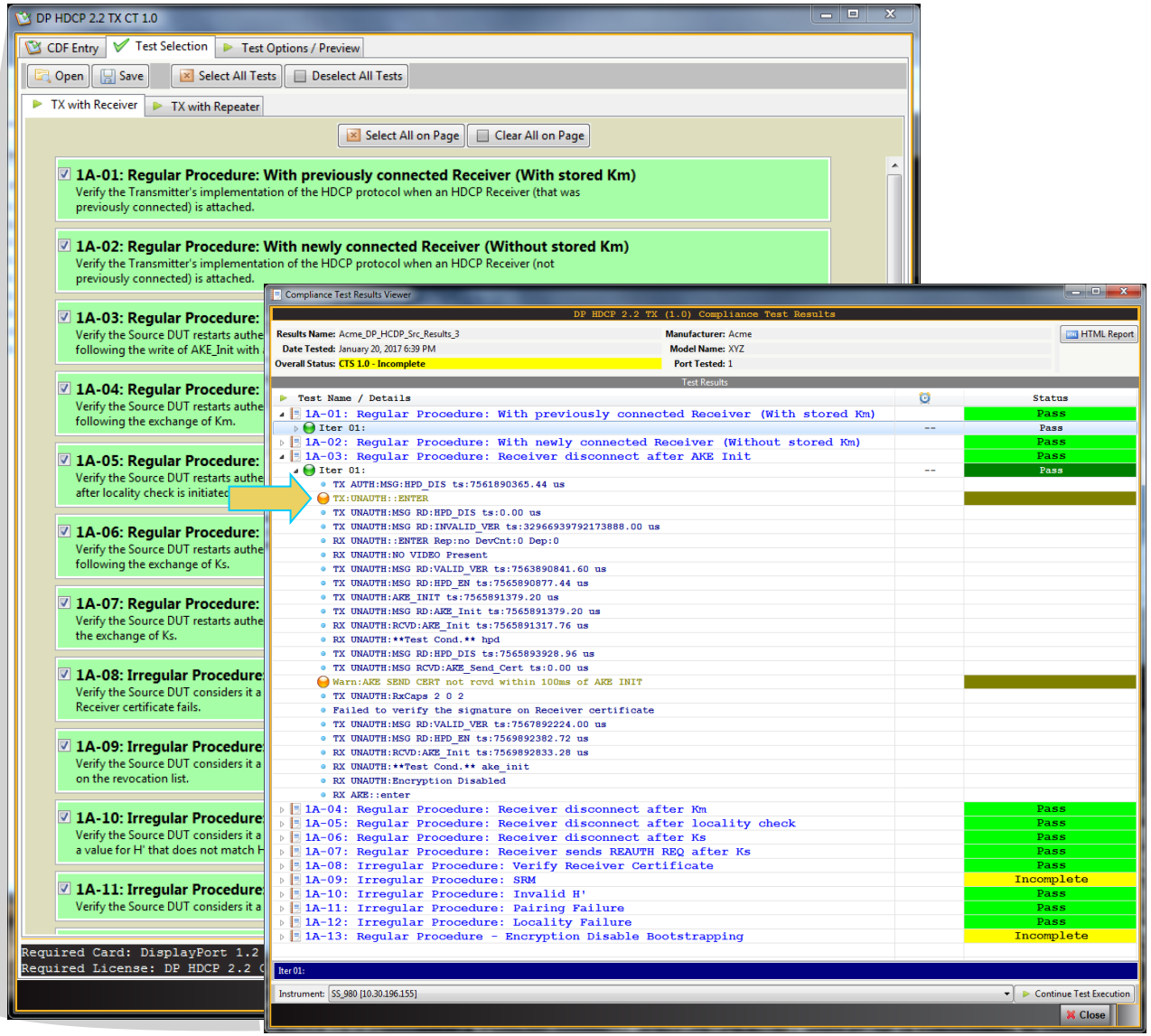


980 DisplayPort Generator / Analyzer – HDCP 2.2 Source Compliance

- Run DP-HDCP 2.2 Compliance tests on next-gen DP sources
  - Pre-test or self-test your DisplayPort HDCP 2.2 source device to reduce costs and meet product time to market requirements.
  - View details of test results and identify root cause of HDCP failure.
  - Link to aux channel traces to view failures from test results screen.
  - Disseminate results to subject matter experts.

980B w/ DP Video Generator / Analyzer

DP source

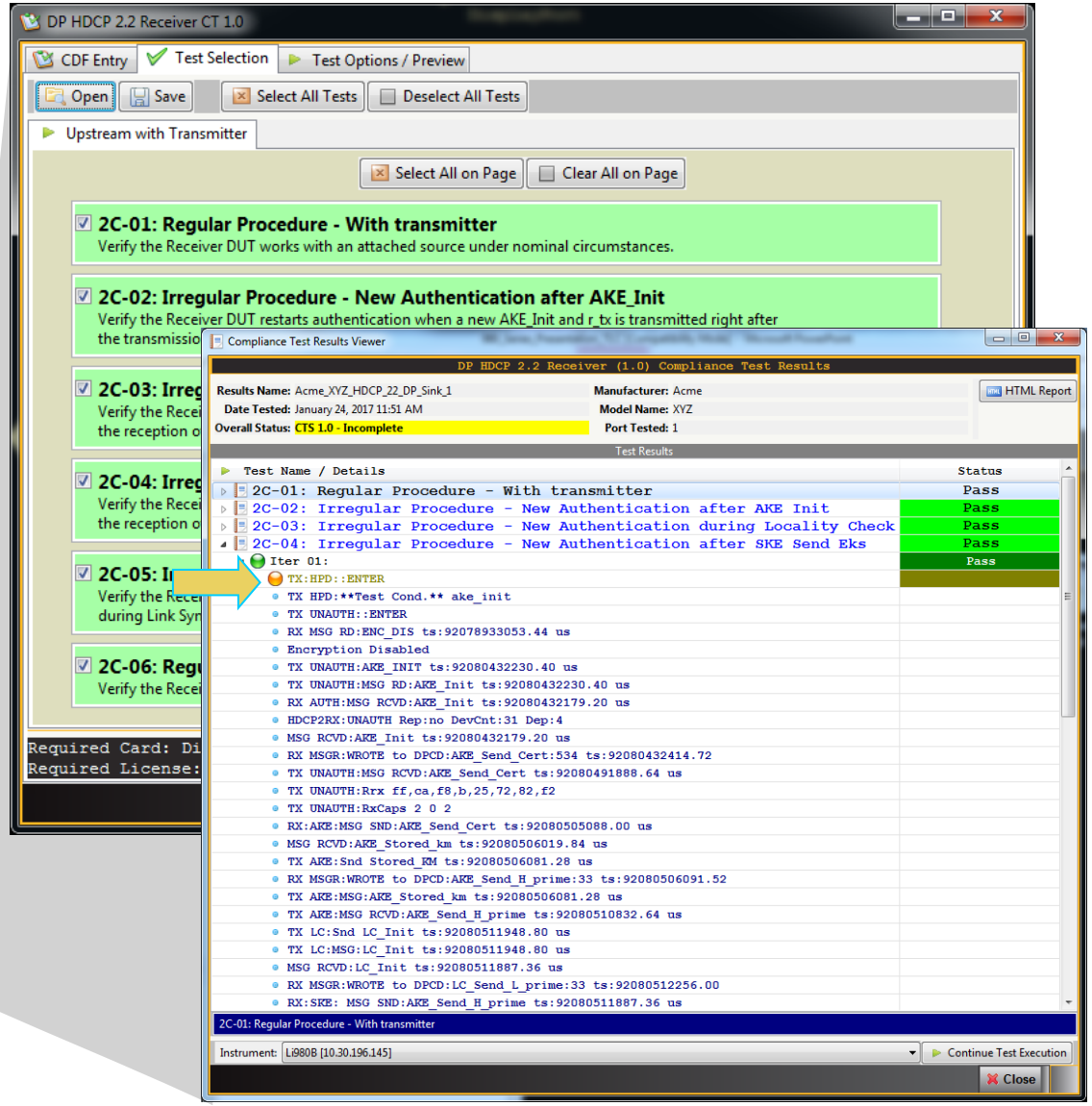


980 DisplayPort Generator / Analyzer – HDCP 2.2 Sink Compliance

- Run DisplayPort HDCP 2.2 Compliance tests on next gen displays
  - Pre-test or self-test your DP-HDCP 2.2 sink device to reduce costs and meet product time to market requirements.
  - View details of test results and identify root cause of HDCP failure.
  - Link to aux channel traces to view failures from test results screen.
  - Disseminate results to subject matter experts.

980B w/ DP Video Generator

DP Display

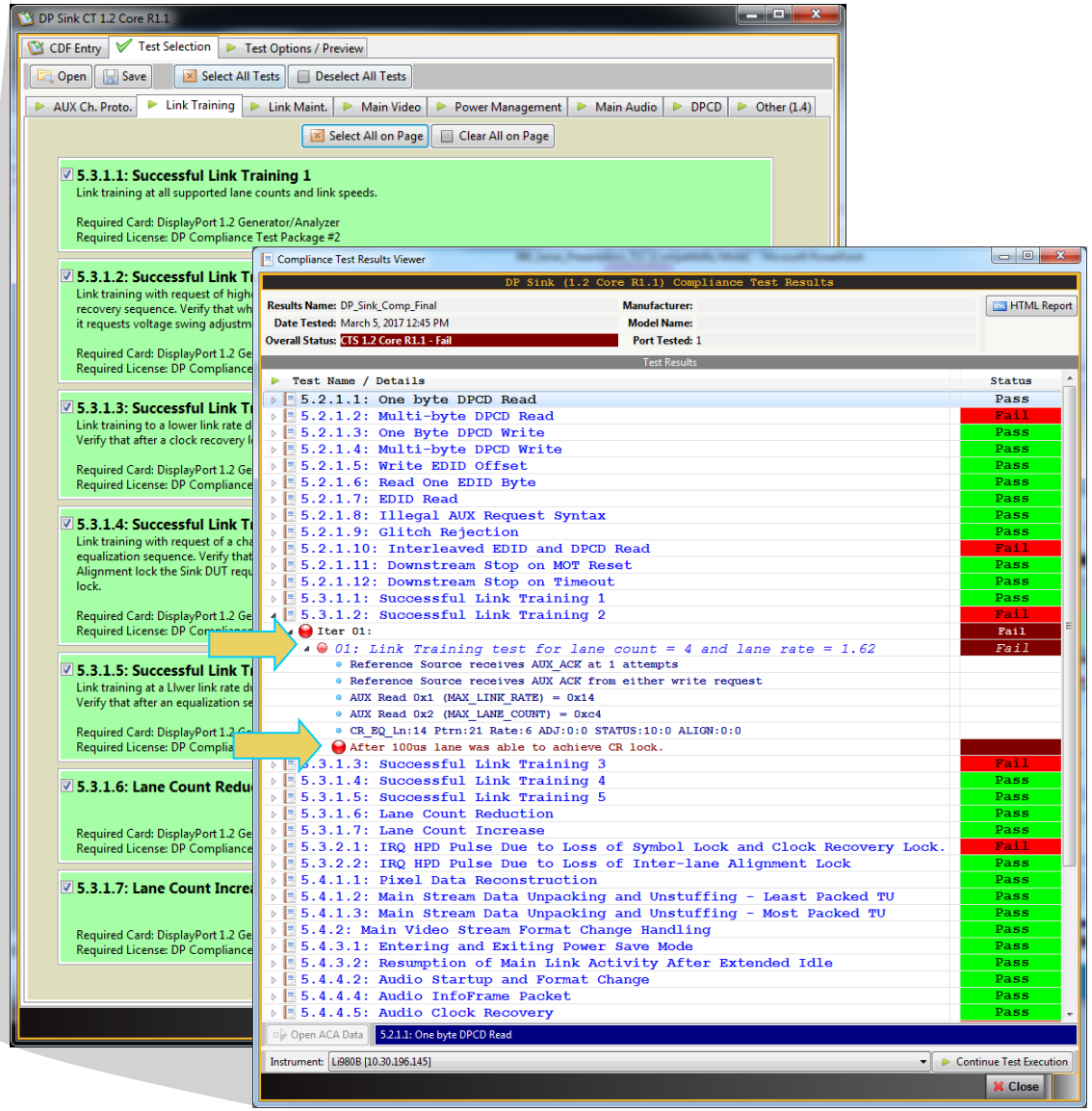


980 DisplayPort Generator / Analyzer – Link Layer 1.2 Sink Compliance

- Run DP 1.2 Link Layer Compliance tests on next gen sinks (displays)
  - Pre-test or self-test your DP 2.2 sink device to reduce costs and meet product time to market requirements.
  - View details of test results and identify root cause of link layer failure.
  - Link to aux channel traces to view failures from test results screen.
  - Disseminate results to subject matter experts.

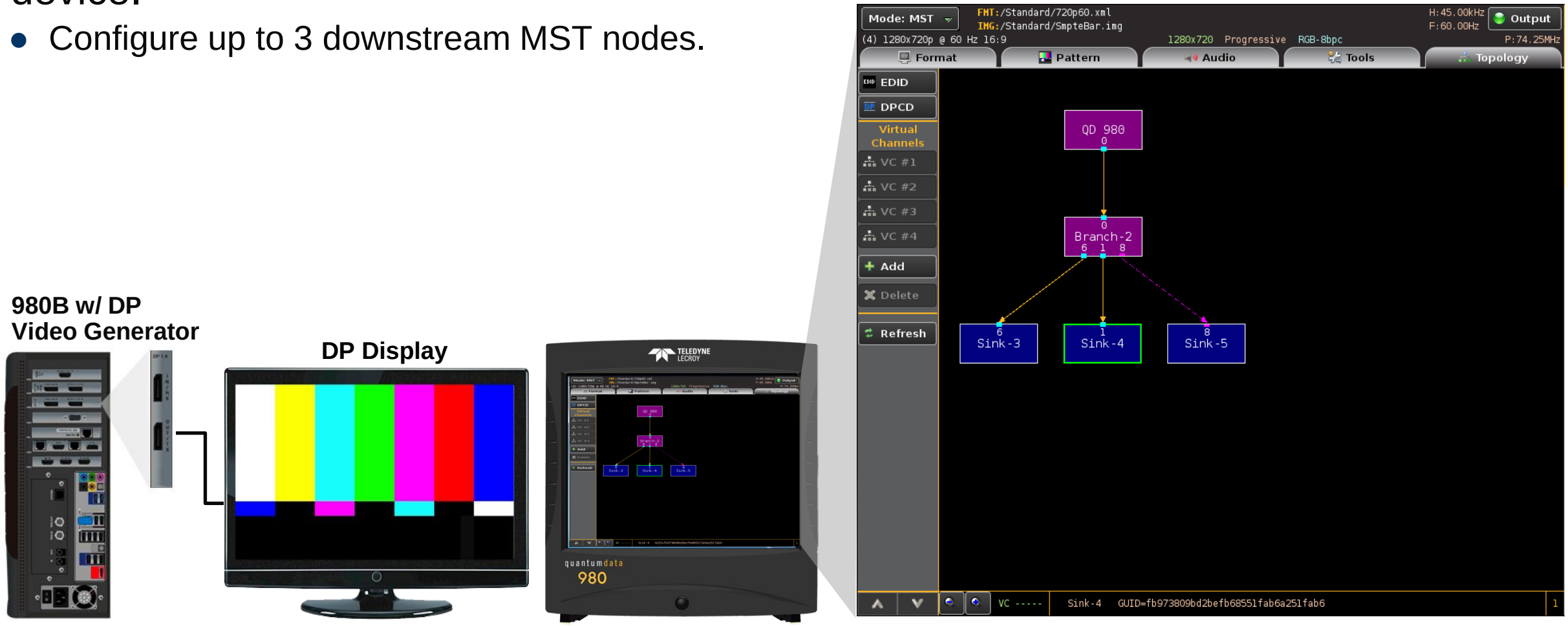
980B w/ DP Video Generator

DP Display



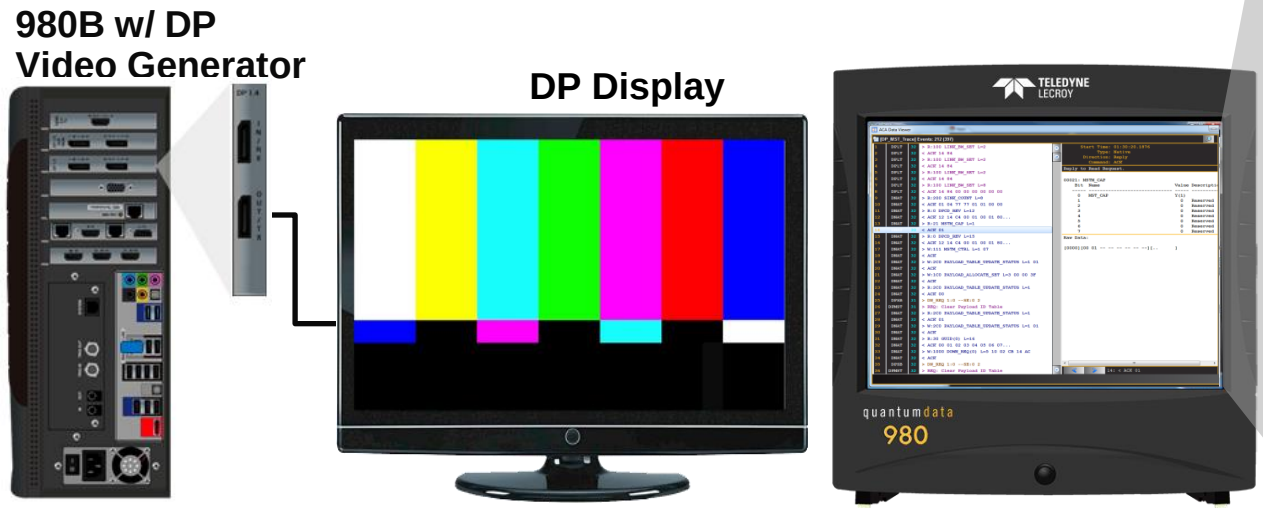
980 DisplayPort Video Generator / Analyzer – Multi-Stream Transport

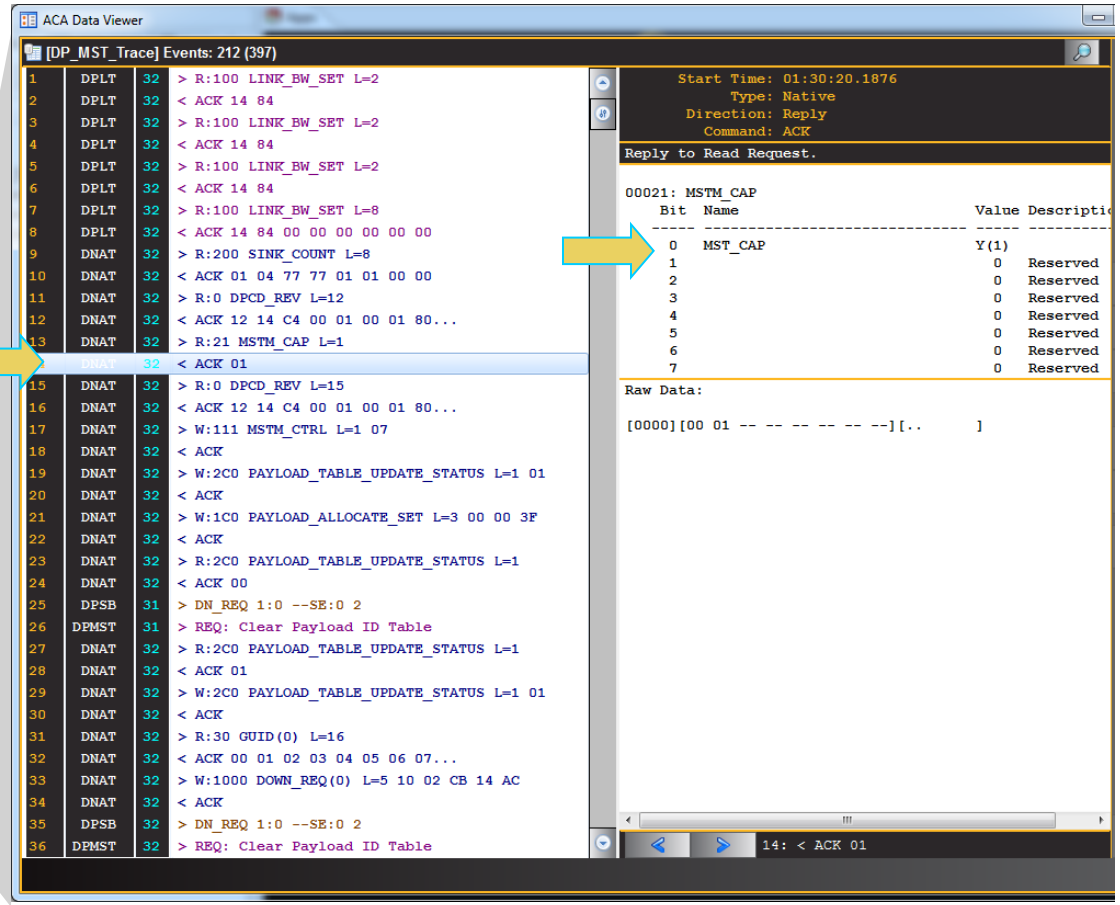
- Emulate a DisplayPort Multi-Stream Transport (MST) source to test an MST display or branch device.
  - Configure up to 3 downstream MST nodes.



980 DisplayPort Video Generator / Analyzer – Multi-Stream Transport

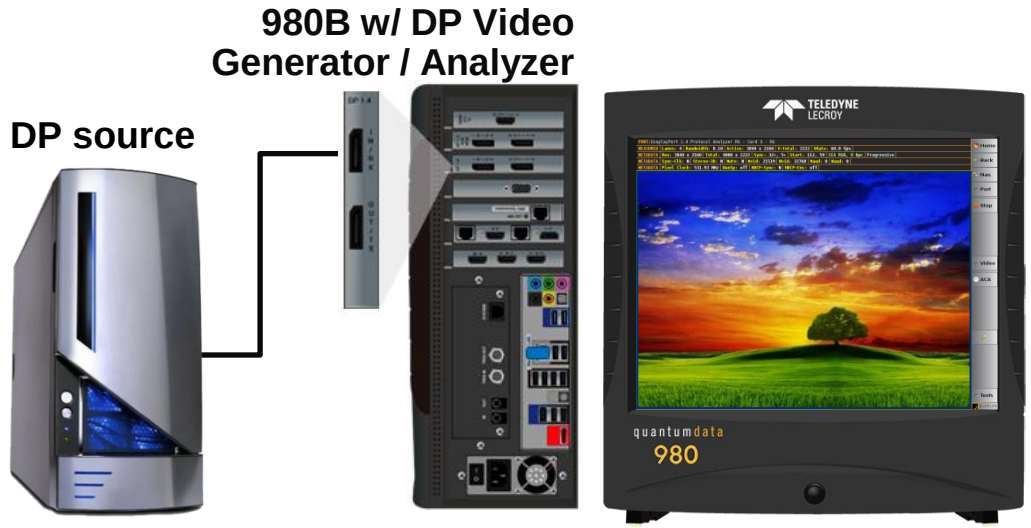
- Emulate a DisplayPort Multi-Stream Transport (MST) source to test an MST display or branch device.
  - Use Auxiliary Channel Analyzer (ACA) to verify MST negotiation with an MST-capable sink.
  - Save results and disseminate to colleagues at other locations.





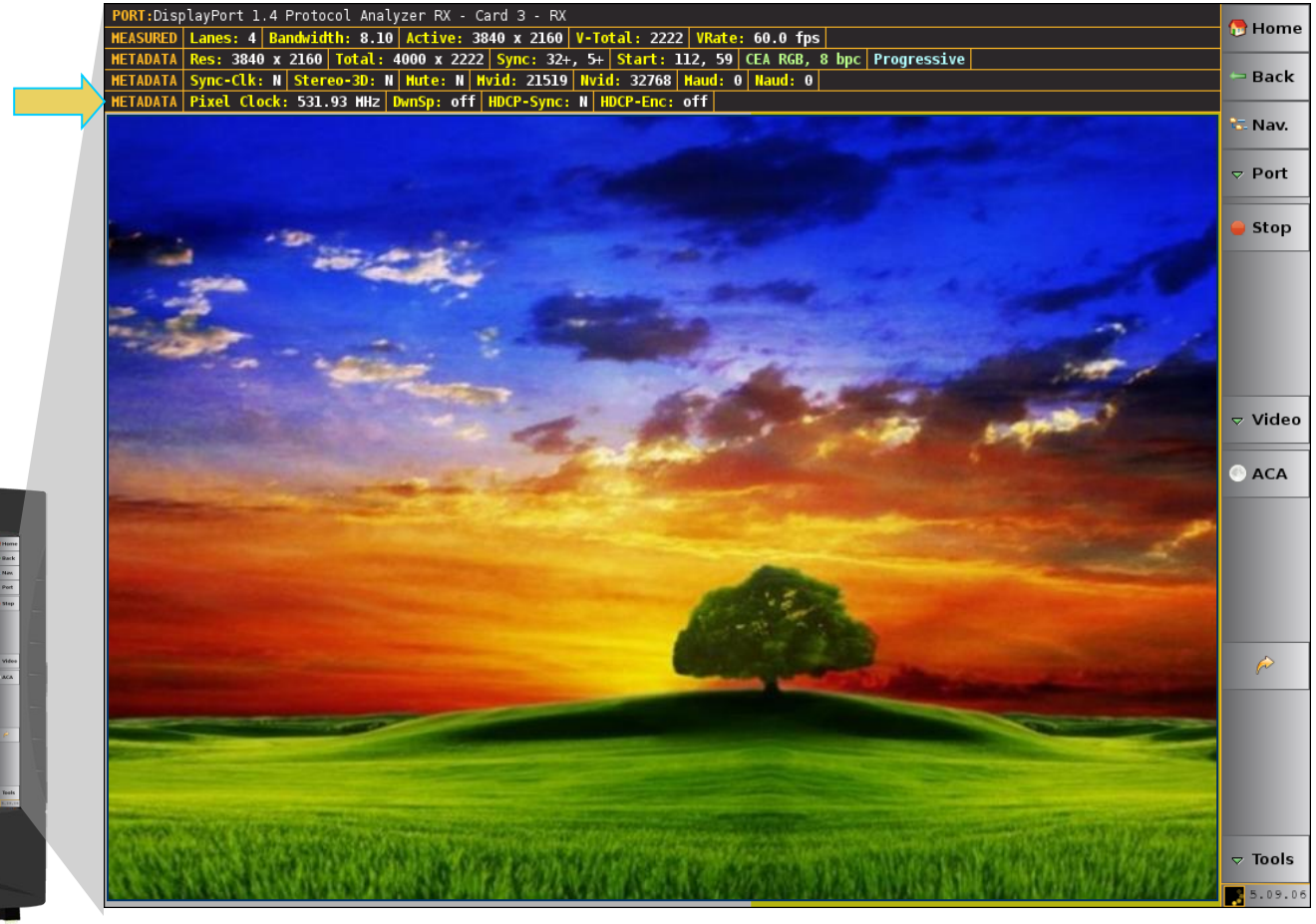
980 DisplayPort Video Generator / Analyzer – Sink Emulation

- View summary of incoming video from a DisplayPort HBR3 source running at 8.1Gbps link rate.
  - Emulate any EDID to test source response.
  - Emulate DPCD and edit DPCD registers.
  - Emulate Multi-Stream Transport (MST) branch or display device.



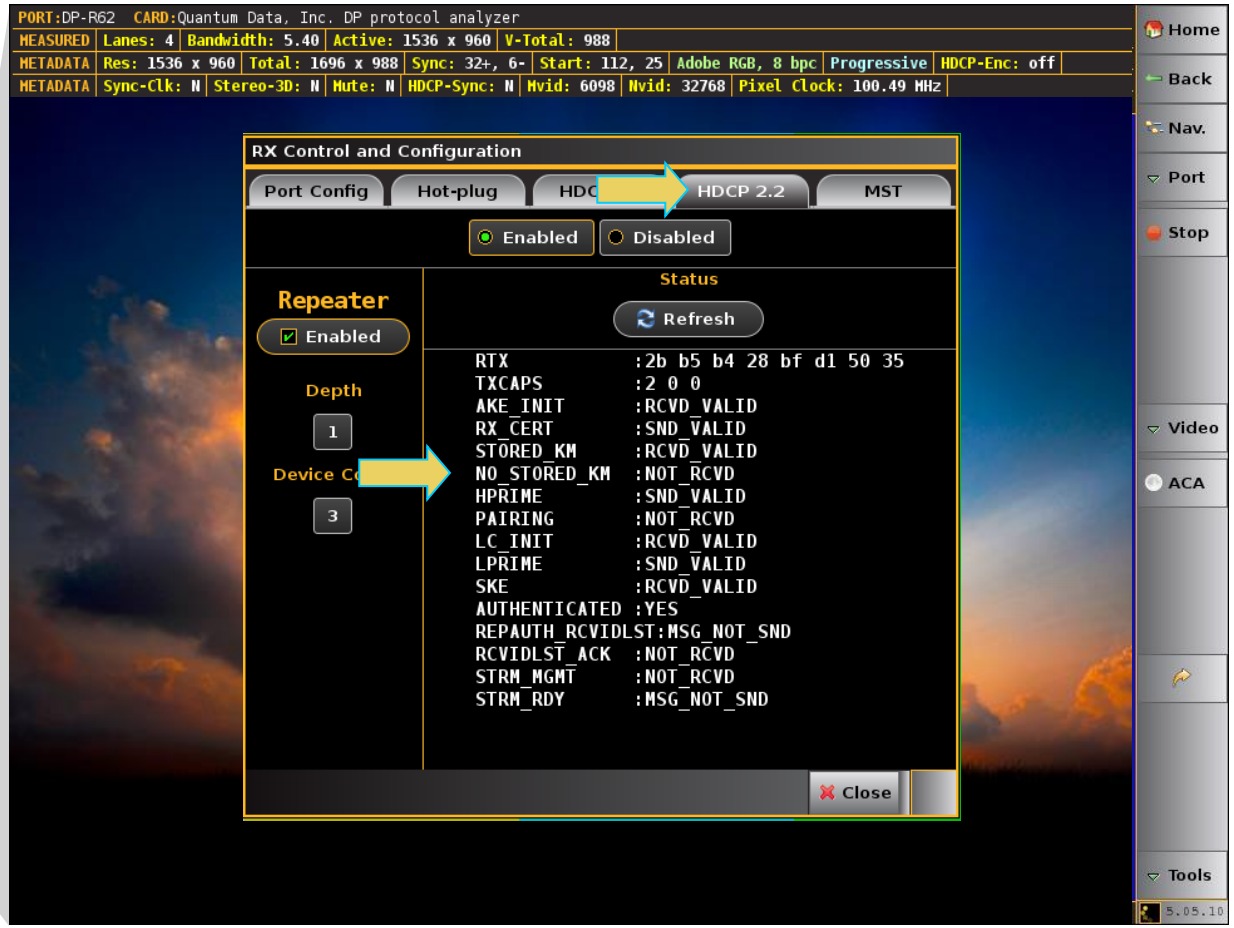
980 DisplayPort Video Generator / Analyzer – Source Real Time View

- View summary of incoming video from a DisplayPort HBR3 source running at 8.1Gbps link rate.
  - View video image and video, audio and metadata on upper status bar.
  - View content of HDCP encrypted video.



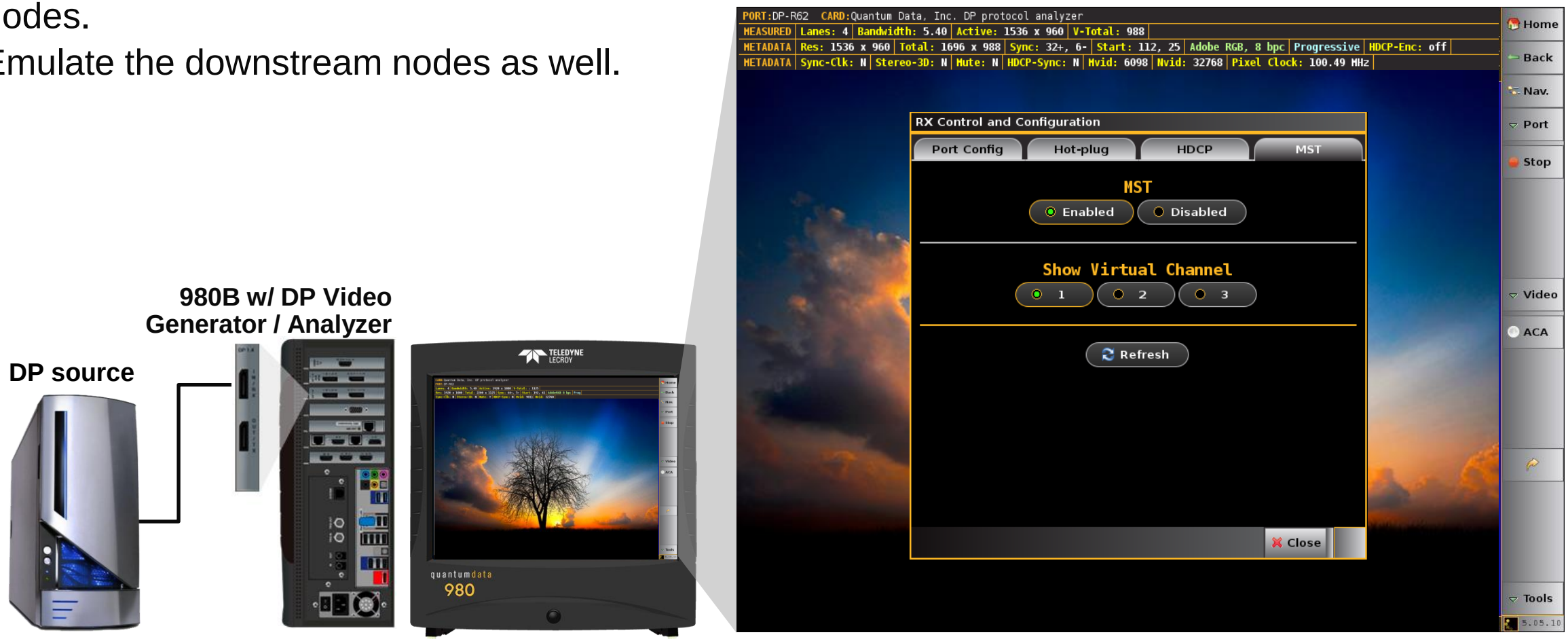
980 DisplayPort Video Generator / Analyzer – Source HDCP Test

- View summary of link training transactions from a DisplayPort source
  - Configure analyzer for HDCP version 1.3 or HDCP 2.2 emulation.
  - View summary of HDCP transactions.



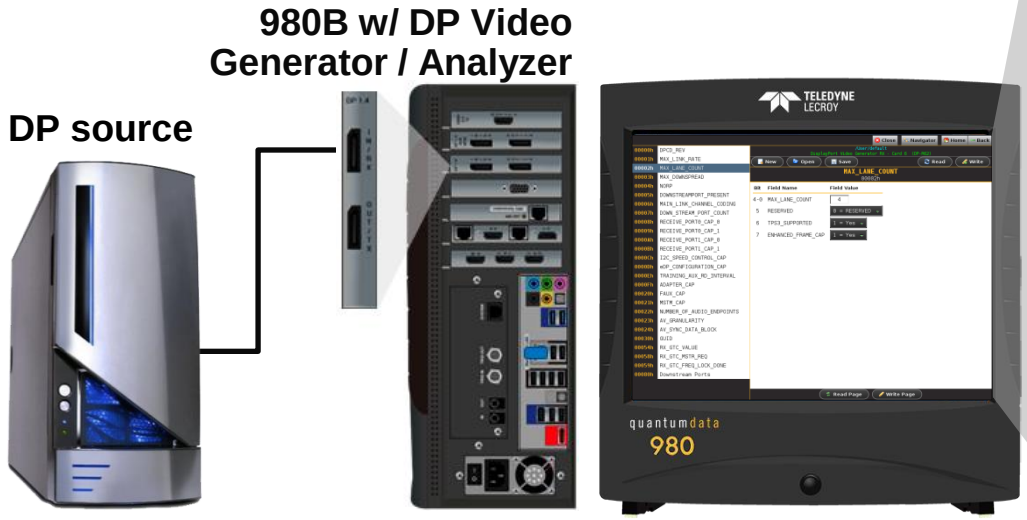
980 DisplayPort Video Generator / Analyzer – Source MST Test

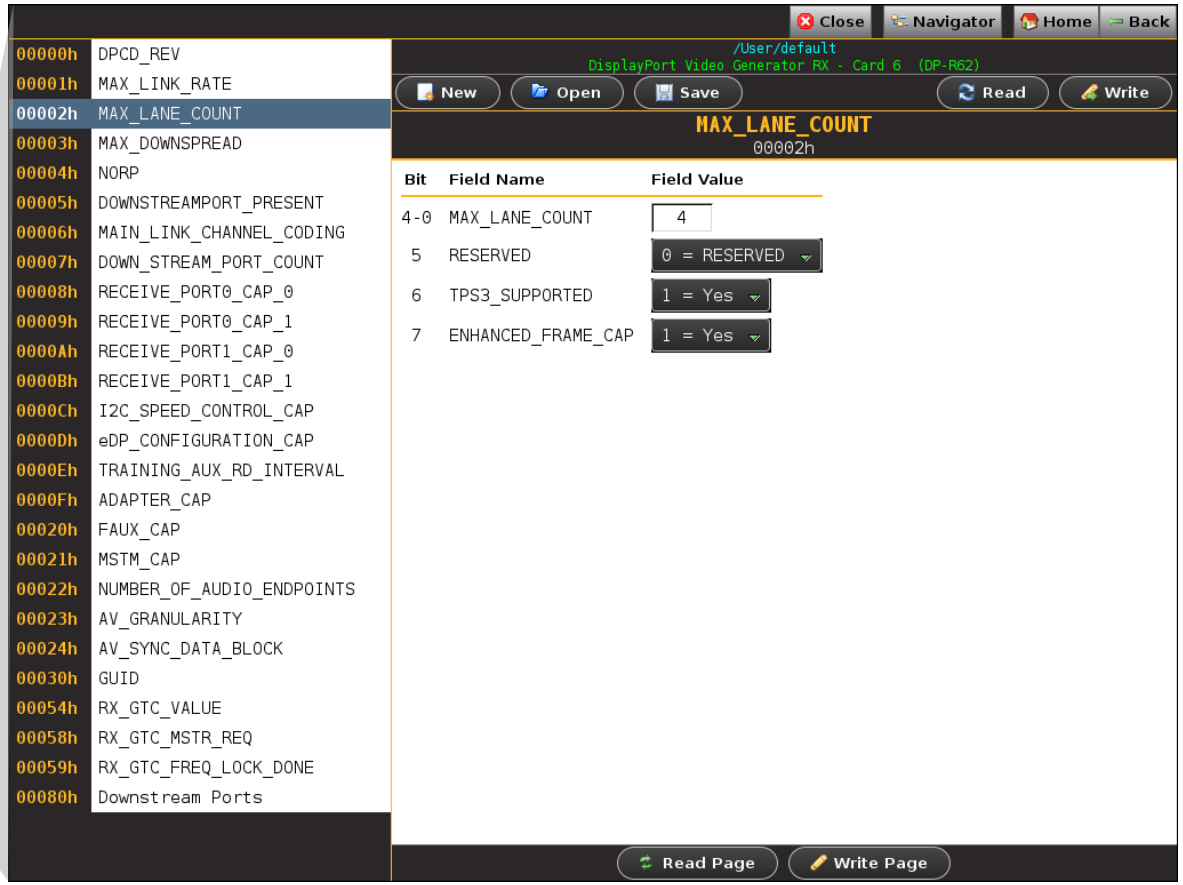
- Emulate an MST branch device to test an MST-capable DisplayPort source.
  - Configure number of downstream display nodes.
  - Emulate the downstream nodes as well.



980 DisplayPort Video Generator / Analyzer – DPCD Emulation

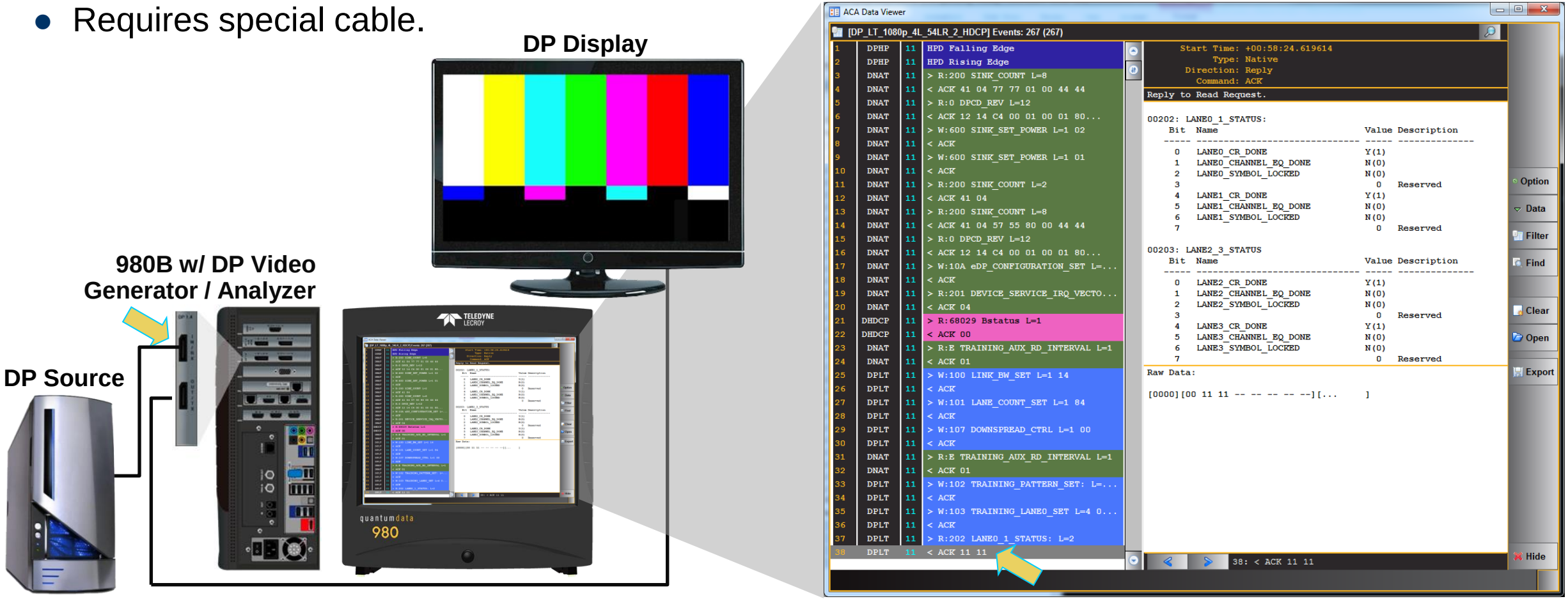
- Emulate the EDID and DPCD of DisplayPort monitor or sink operating up to 8.1Gbps link rates (HBR3).
  - Use the EDID Editor and the DPCD Editor (shown) to emulate DisplayPort display devices to test a source's response.
  - Save EDID and DPCD configurations for reuse and retesting.





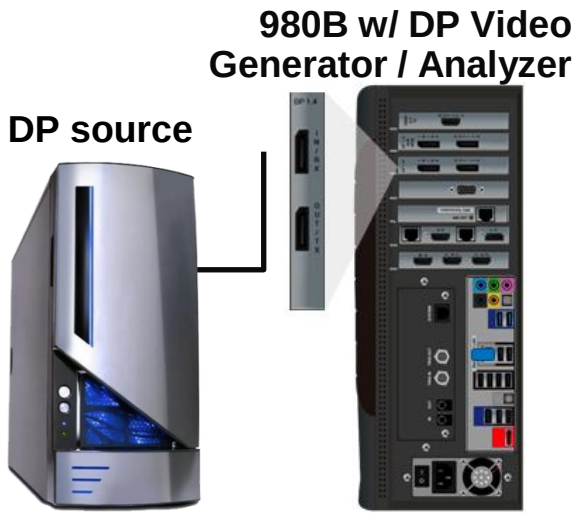
980 DisplayPort 1.4 Module – ACA Passive Monitoring

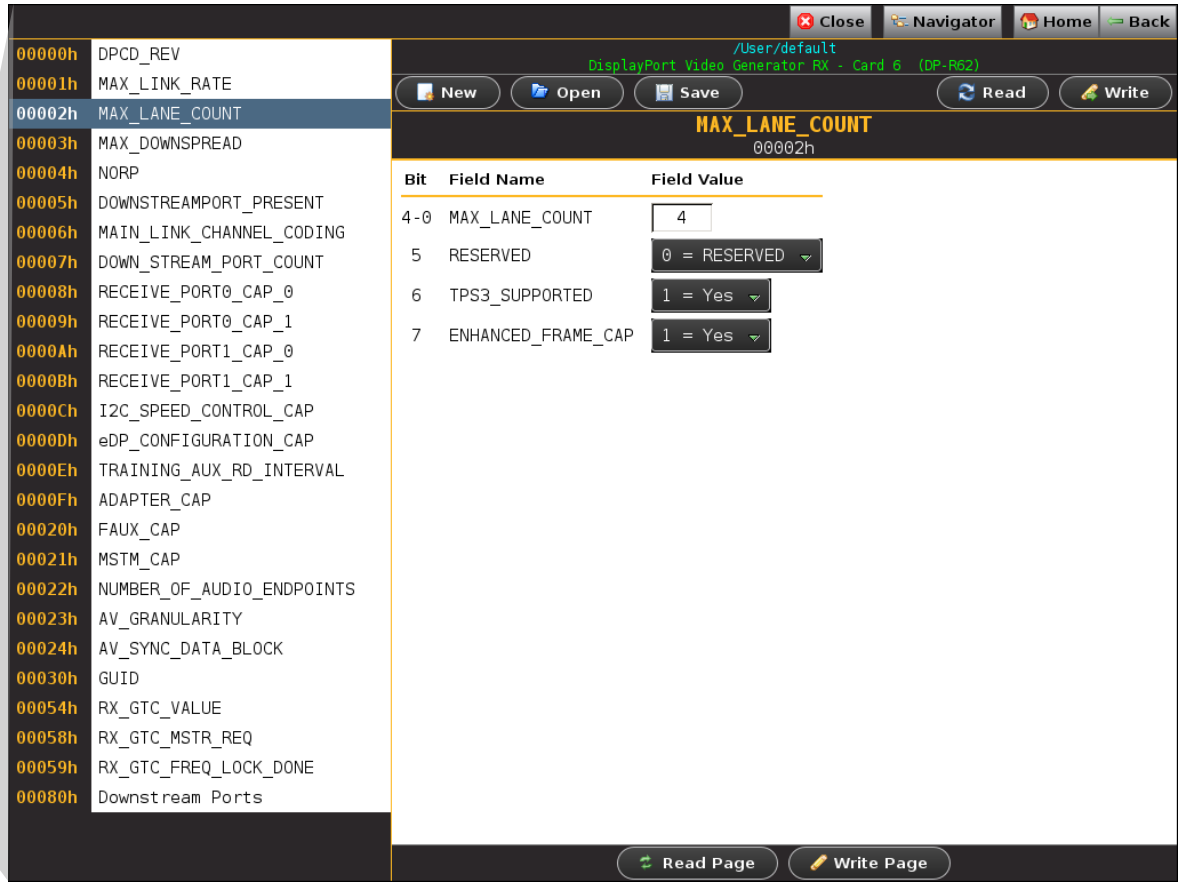
- DP Passive Monitoring of the ACA
  - Monitor HDCP and Link Training transactions between a DP source and display.
  - Requires special cable.



980 DisplayPort Video Generator / Analyzer – Passive Monitoring

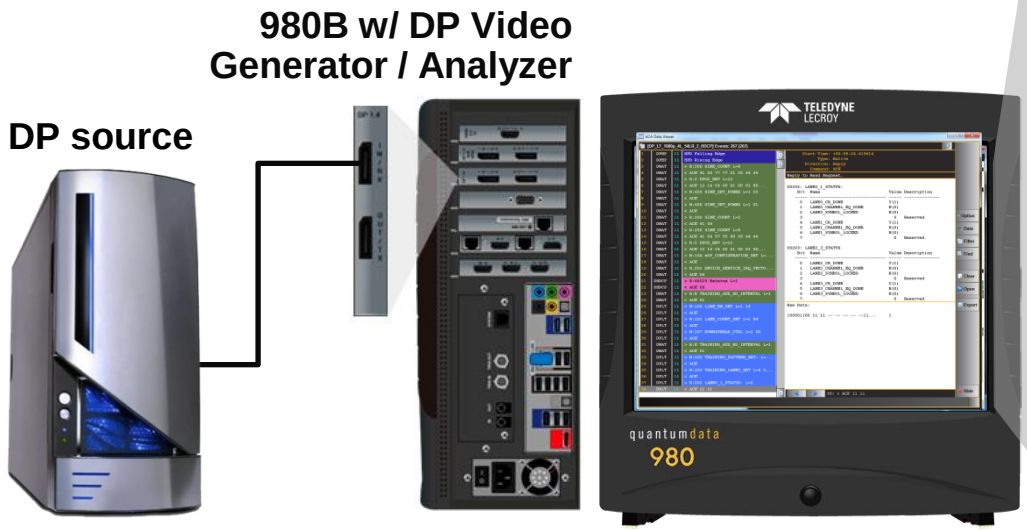
- Emulate the EDID and DPCD of DisplayPort monitor or sink operating up to 8.1Gbps link rates (HBR3).
  - Use the EDID Editor and the DPCD Editor (shown) to emulate DisplayPort display devices to test a source's response.
  - Save EDID and DPCD configurations for reuse and retesting.

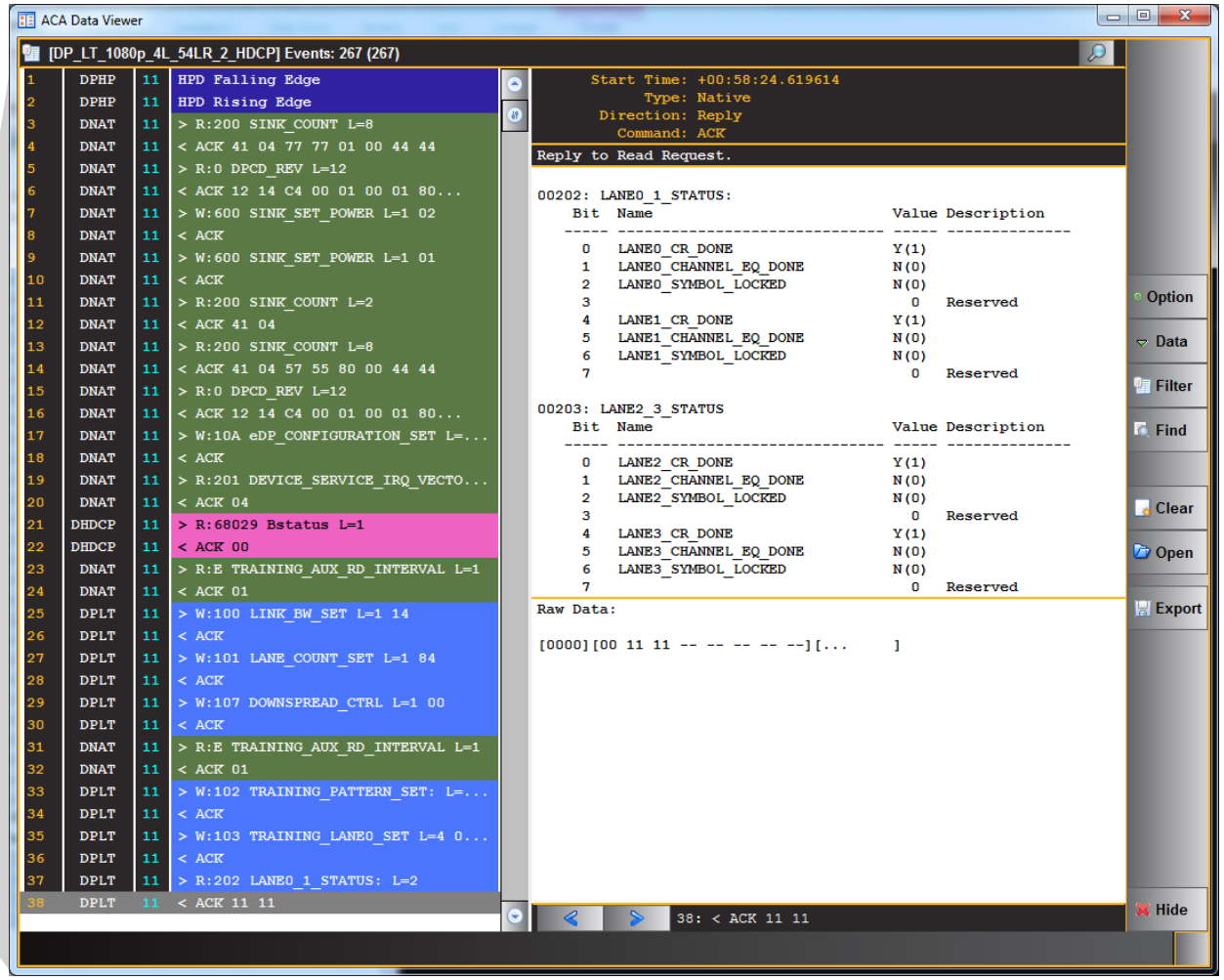




980 DisplayPort Video Generator / Analyzer – Source Aux Channel Test

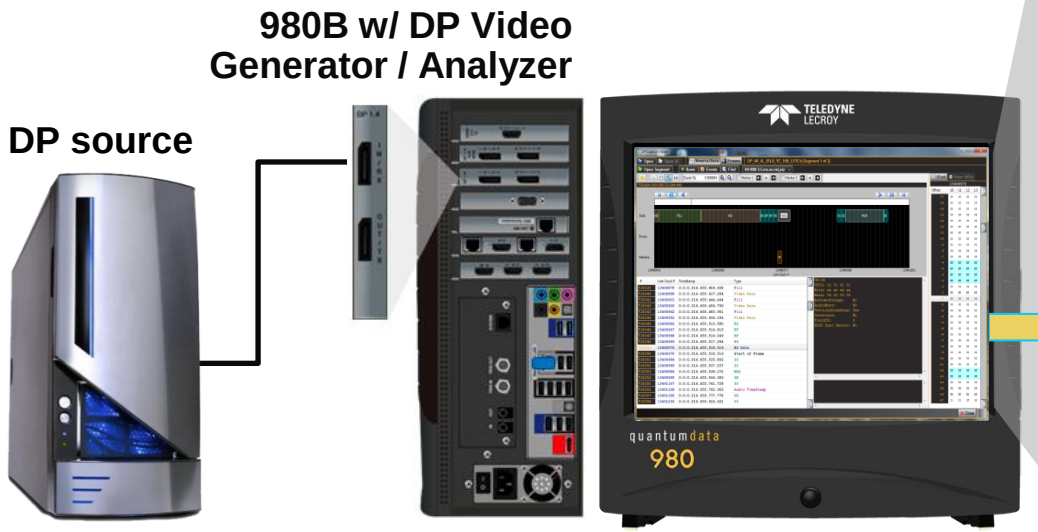
- Monitor aux channel transactions with a DisplayPort source
  - Monitor link training transactions.
  - Monitor EDID exchanges and HDCP transactions.
  - Save results and disseminate to colleagues at other locations.

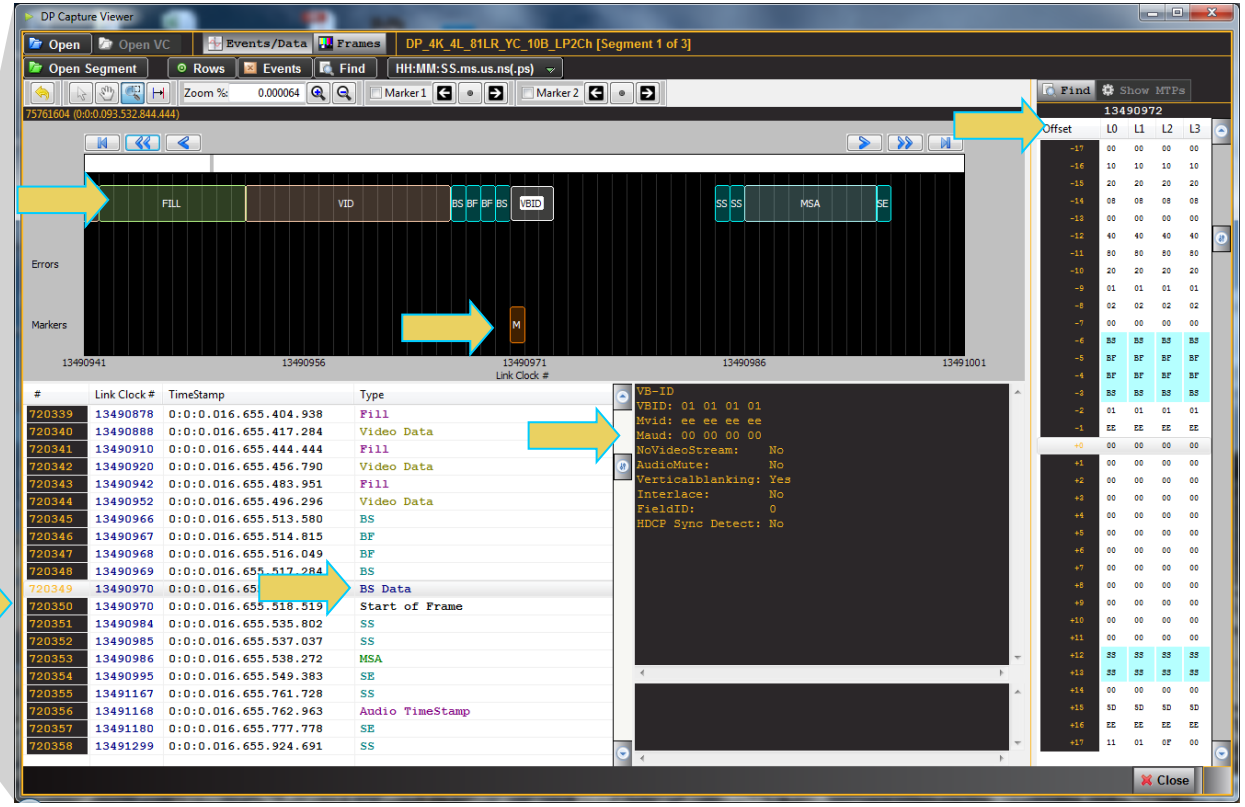




980 DisplayPort Video Generator / Analyzer – Capture Data Analysis

- Capture and store DisplayPort mainstream and secondary data.
  - View main stream data on graphical view (Event Plot) and table view (Data Decode).
  - View each link symbol event.
  - View protocol symbol elements, mainstream attributes, secondary data stream.
  - Protocol errors are indicated.



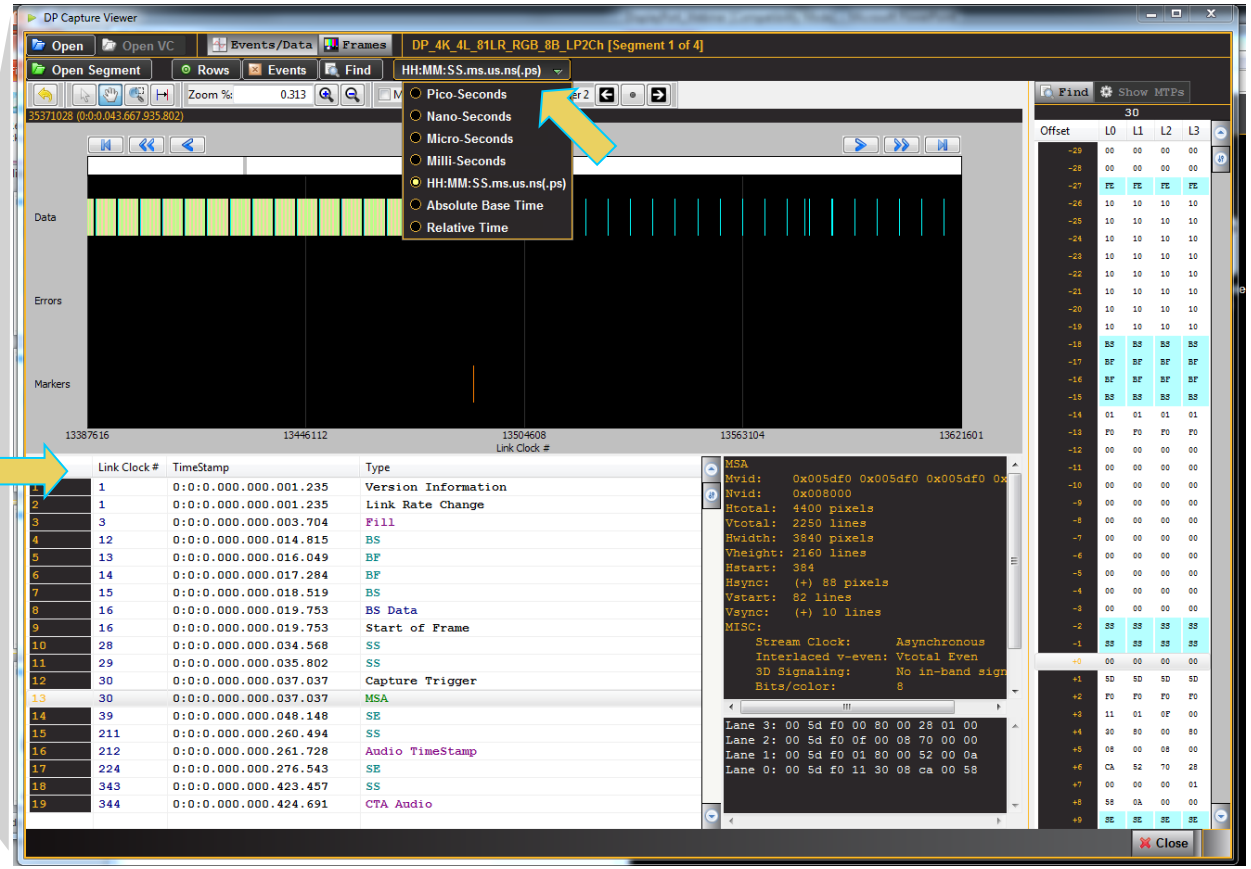


980 DP Video Generator / Analyzer – Capture Data Analysis

- Capture and store mainstream and secondary data.
  - View data elements in tabular form.
  - View details of any data element in raw hex or human readable text.
  - Select the timestamp format to view each record.
  - Disseminate captures to subject matter experts for further analysis.

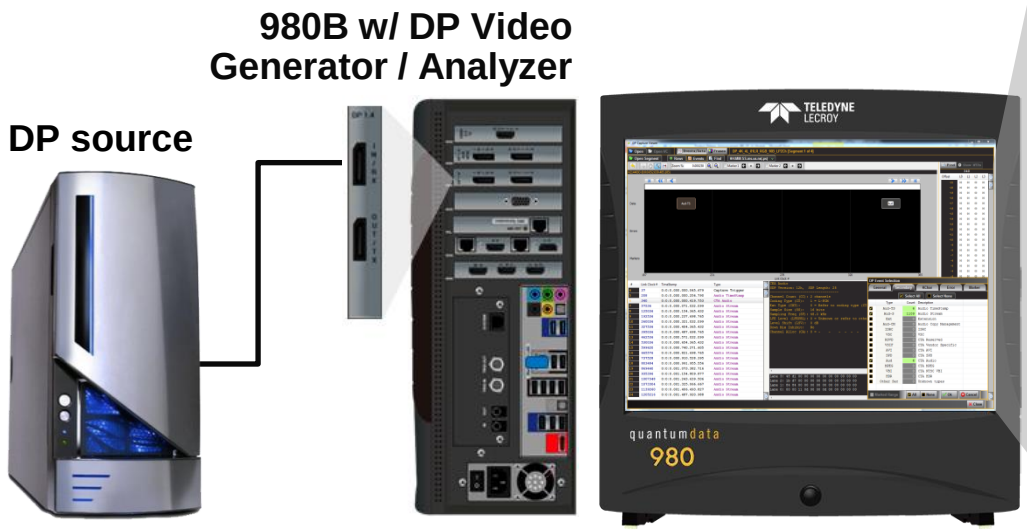
980B w/ DP Video Generator / Analyzer

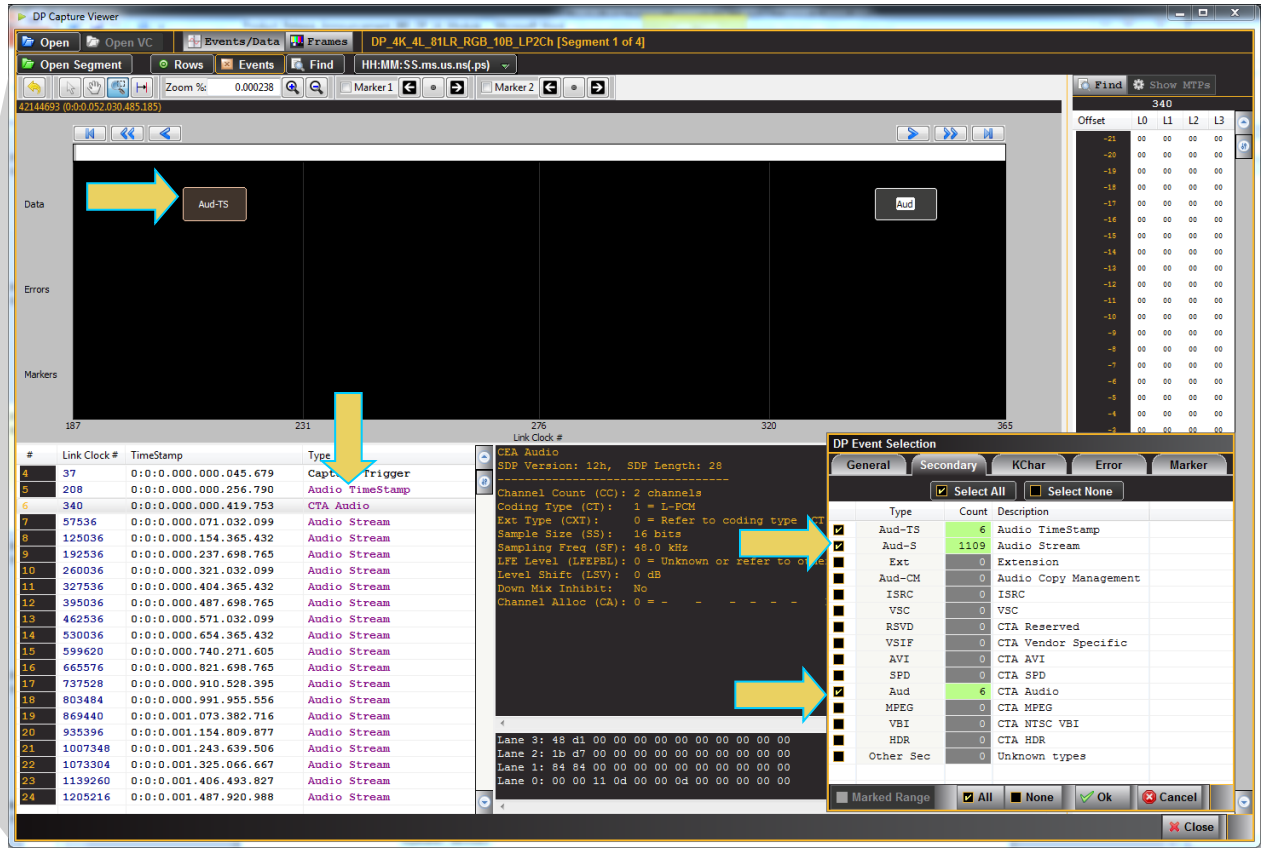
DP source



980 DisplayPort Video Generator / Analyzer – Capture Data Analysis

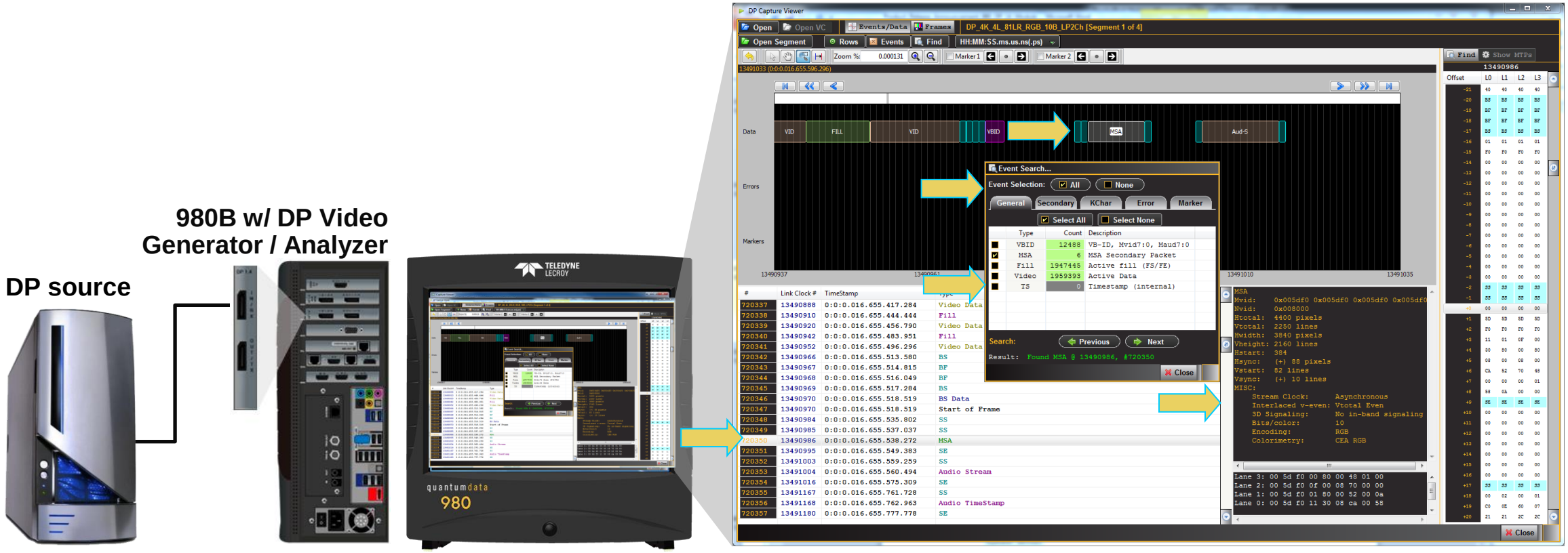
- Capture and store DisplayPort mainstream and secondary data.
  - Filter view to show only data elements of interest (example view only secondary data packets such as audio-related packets).





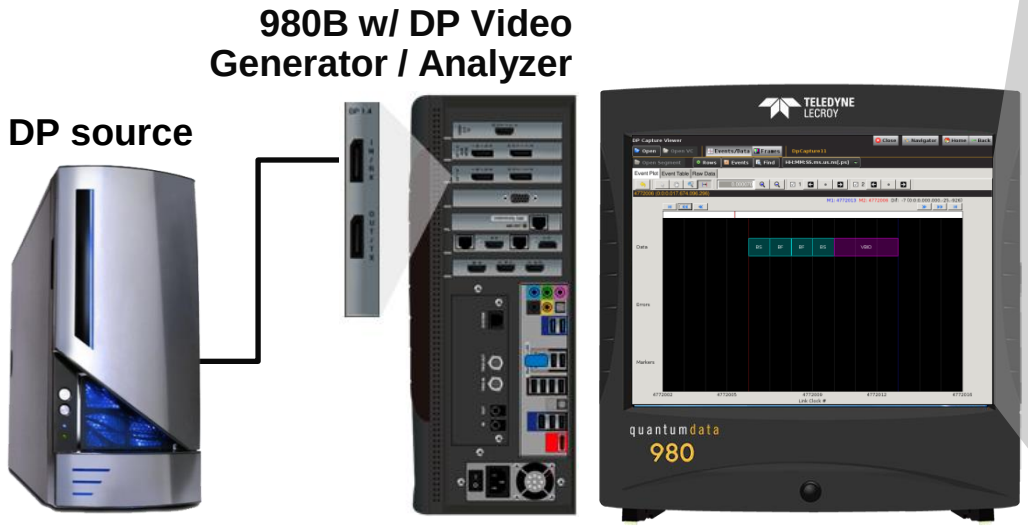
980 DisplayPort Video Generator / Analyzer – Capture Data Analysis

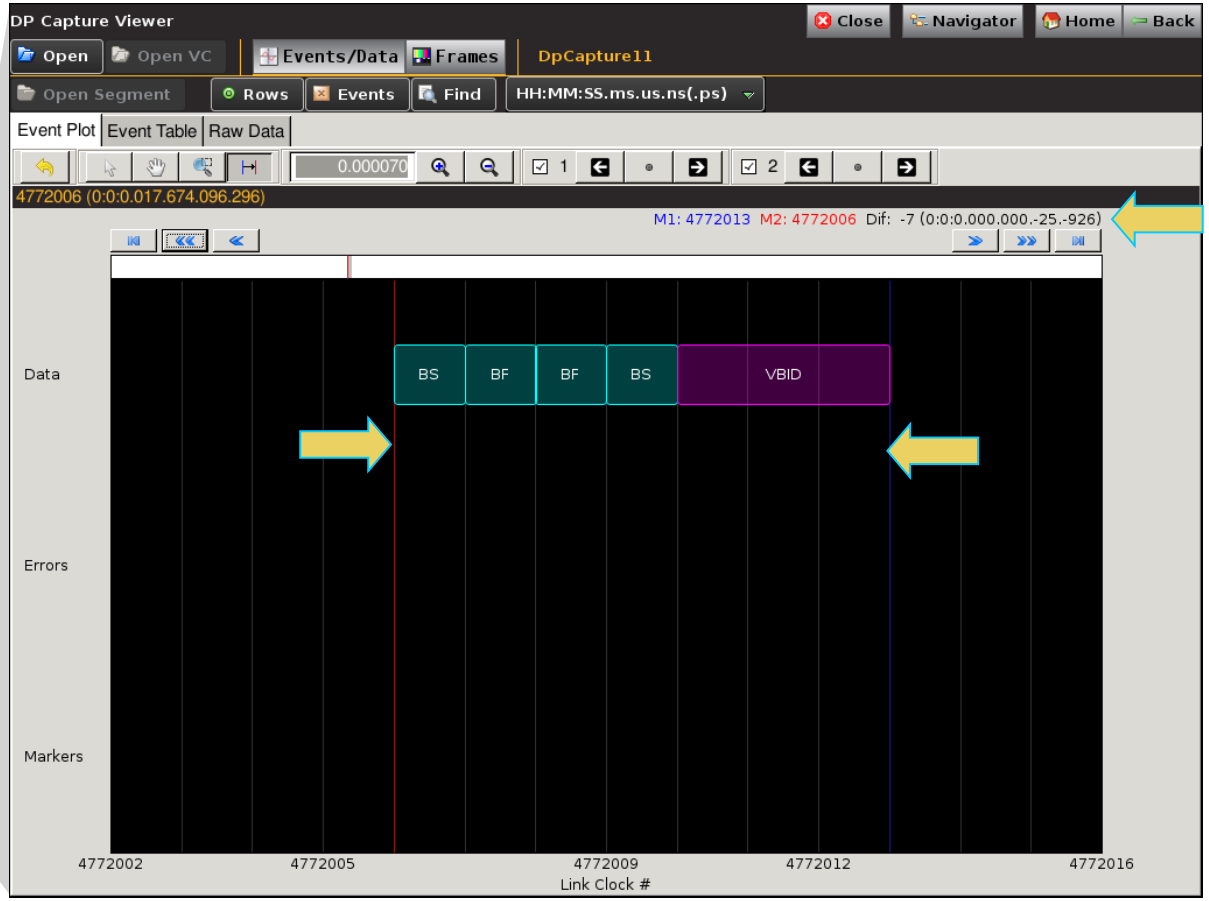
- Capture and store DisplayPort mainstream and secondary data.
  - Search for specific data types such as MSA packet data.



980 DisplayPort Video Generator / Analyzer – Capture Data Analysis

- Capture and store DisplayPort mainstream and secondary data.
  - View details of data element alignment.
  - Measure timing between elements or groups of data elements.



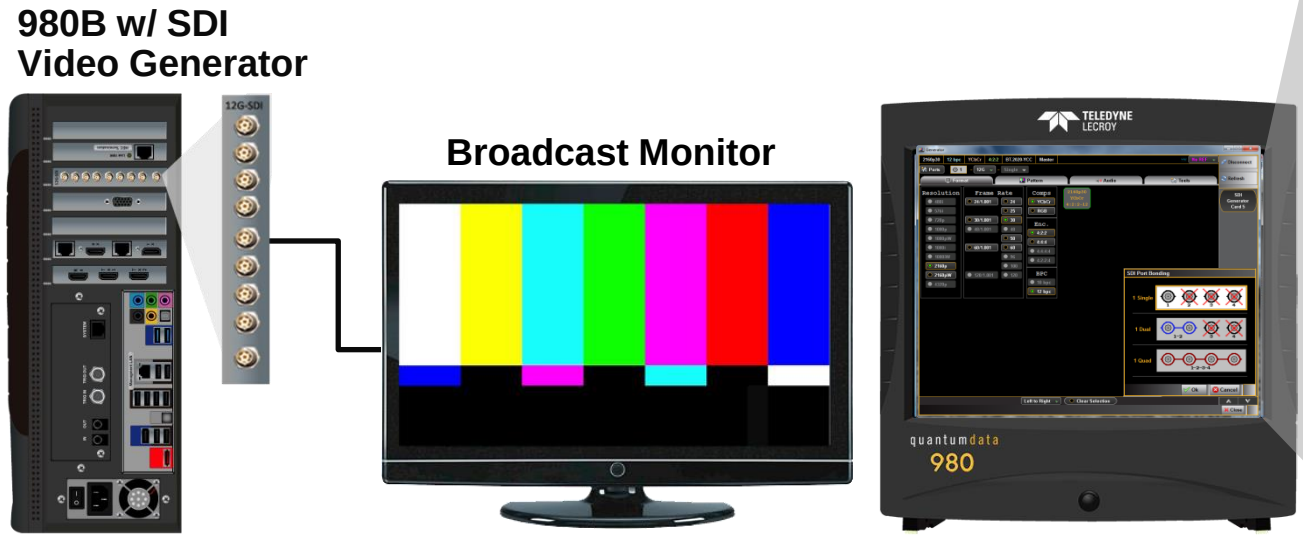


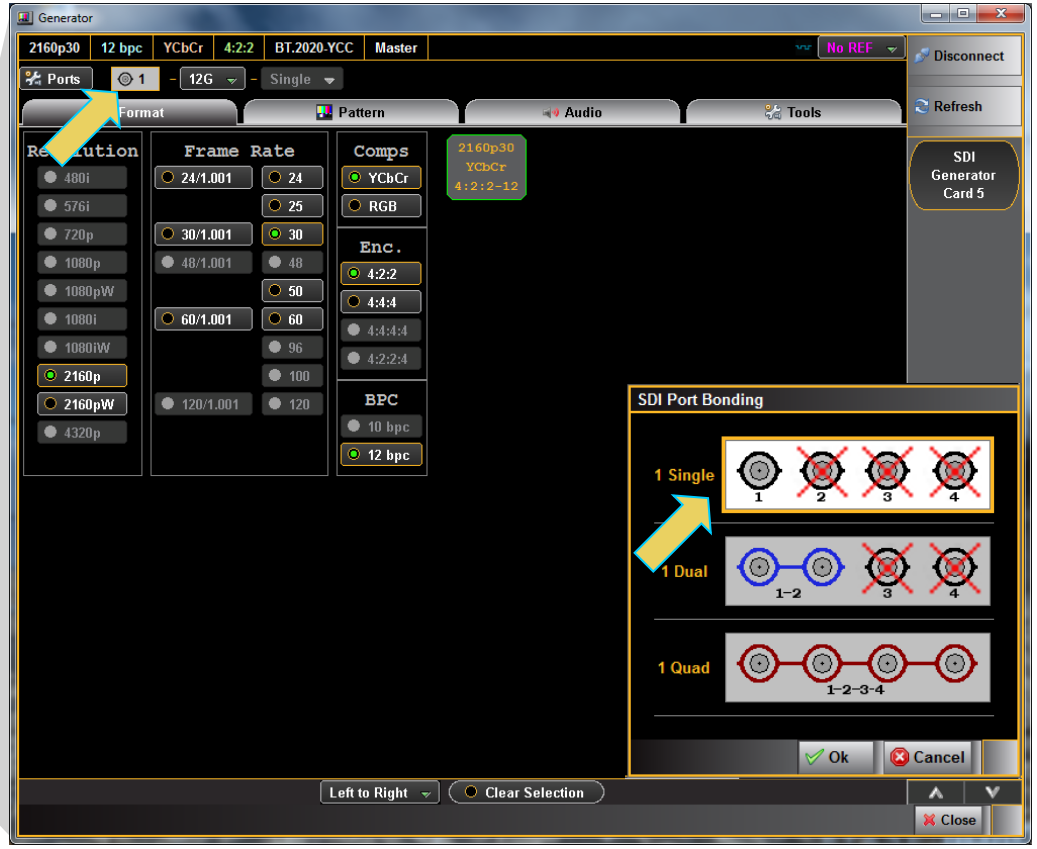
Applications

SDI Video Generator module

980 SDI Video Generator module – Single Link Video Test

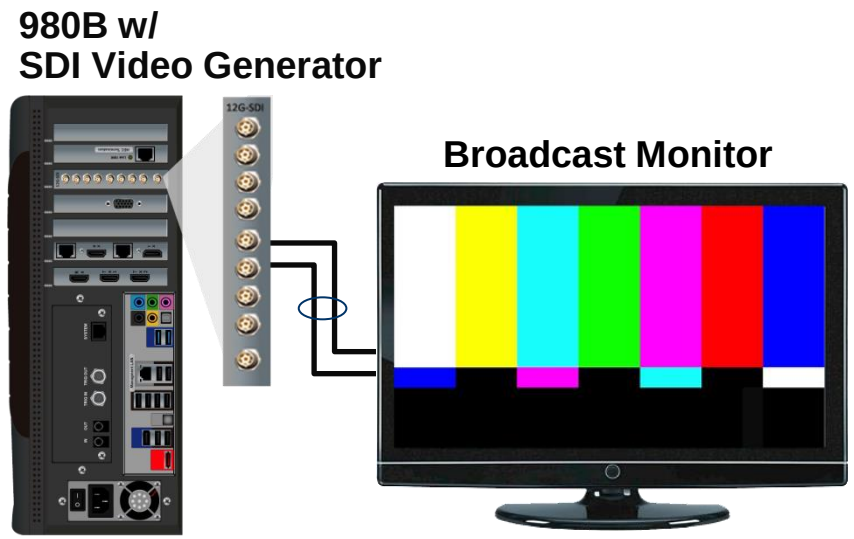
- 12G-SDI Video Test of a broadcast monitor.
  - Supports a 12G-SDI-capable Tx port for testing next gen broadcast monitors.
  - Run video tests with SDI, HD-SDI, 3G-SDI and 12G-SDI formats at frame rates up to 120Hz.
  - Use extensive test pattern library.

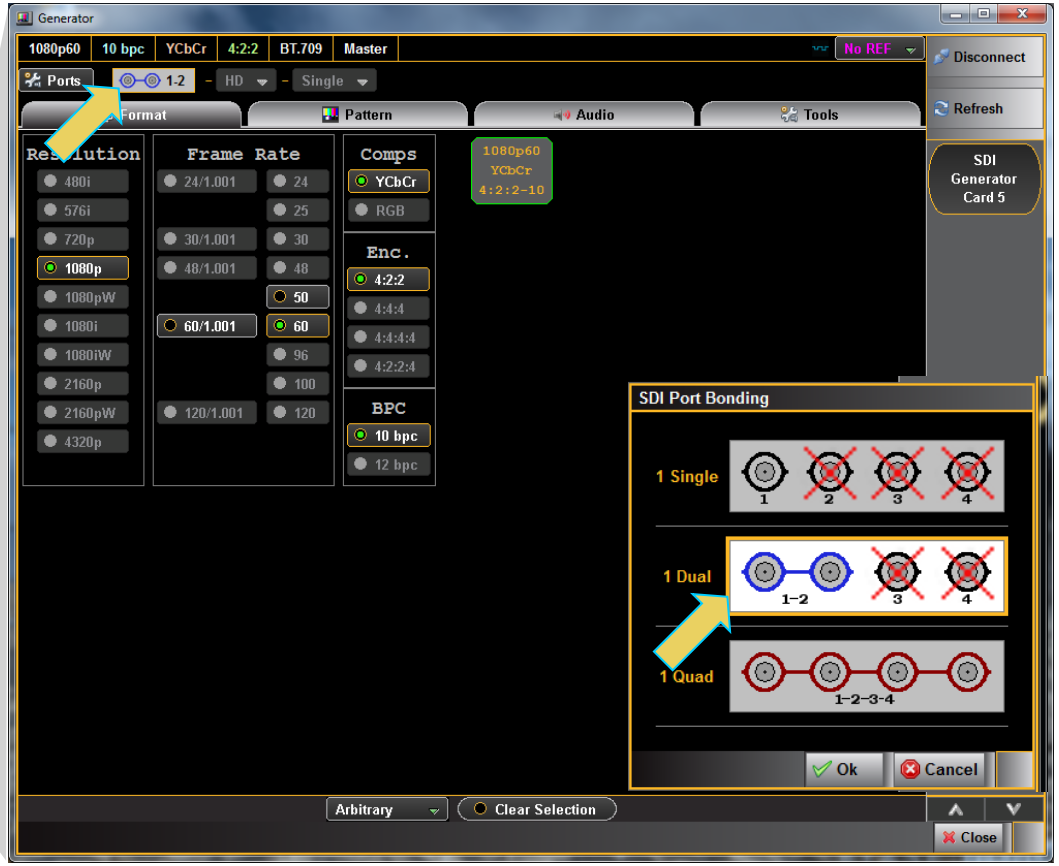




980 SDI Video Generator module – Dual Link Video Test

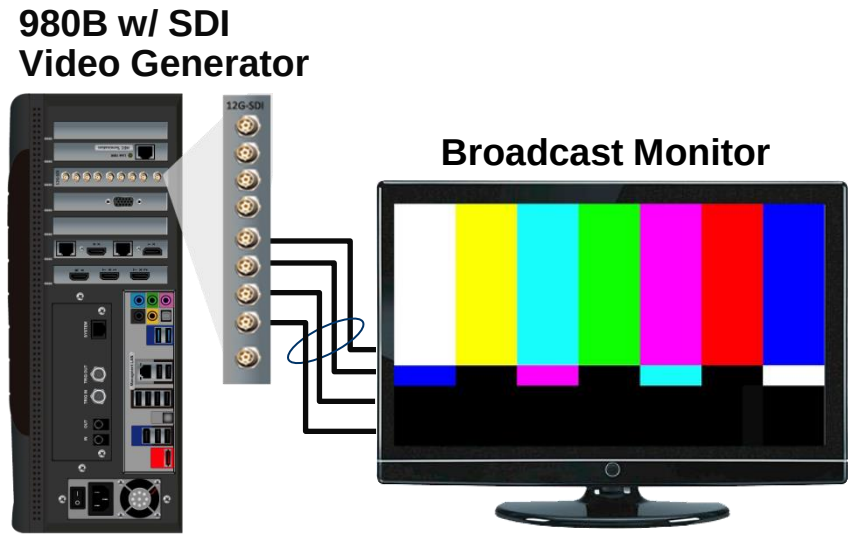
- Dual link HD-SDI Video Test of a broadcast monitor.
  - Run video tests with dual link HD-SDI.
  - Select two of the SDI Tx ports.
  - Use extensive test pattern library.

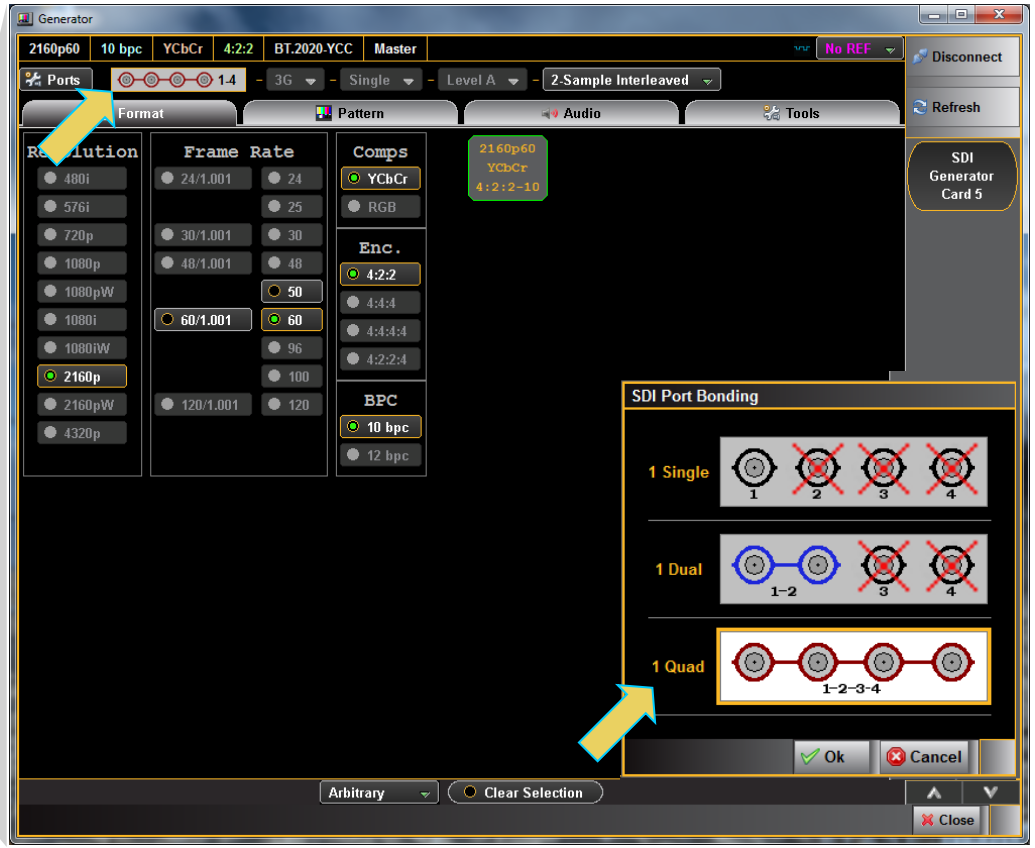




980 SDI Video Generator module – Quad Link Video Test

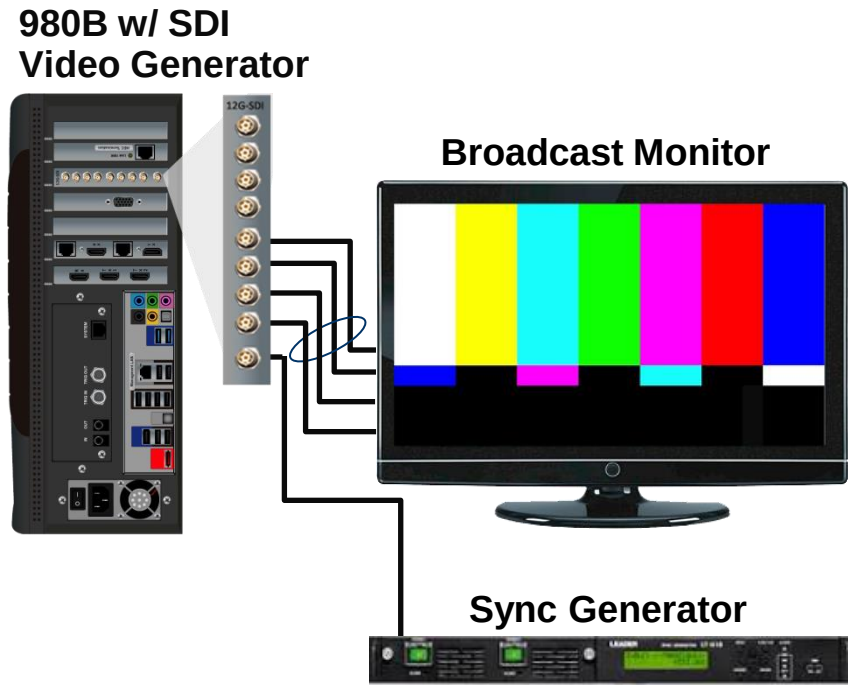
- Quad link 3G-SDI Video Test of a broadcast monitor.
  - Run video tests with quad link 3G-SDI.
  - Select the four SDI Tx ports.
  - Use extensive test pattern library.

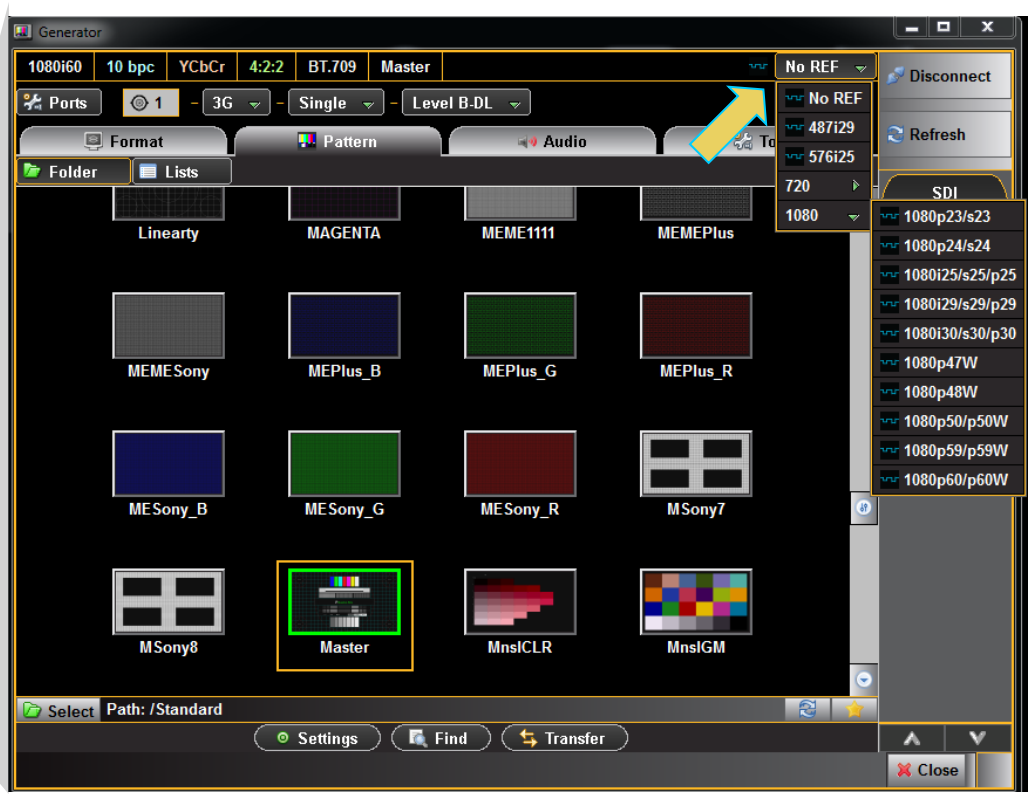




980 SDI Video Generator module – Genlock

- Use Gen-Lock to sync SDI outputs to house sync.
  - Use analog Black Burst (bi-level 480p) format for SD resolutions.
  - Use Tri-Level gen-lock format for HD resolutions.
  - Module runs off internal clock when no gen-lock sync signal is detected.

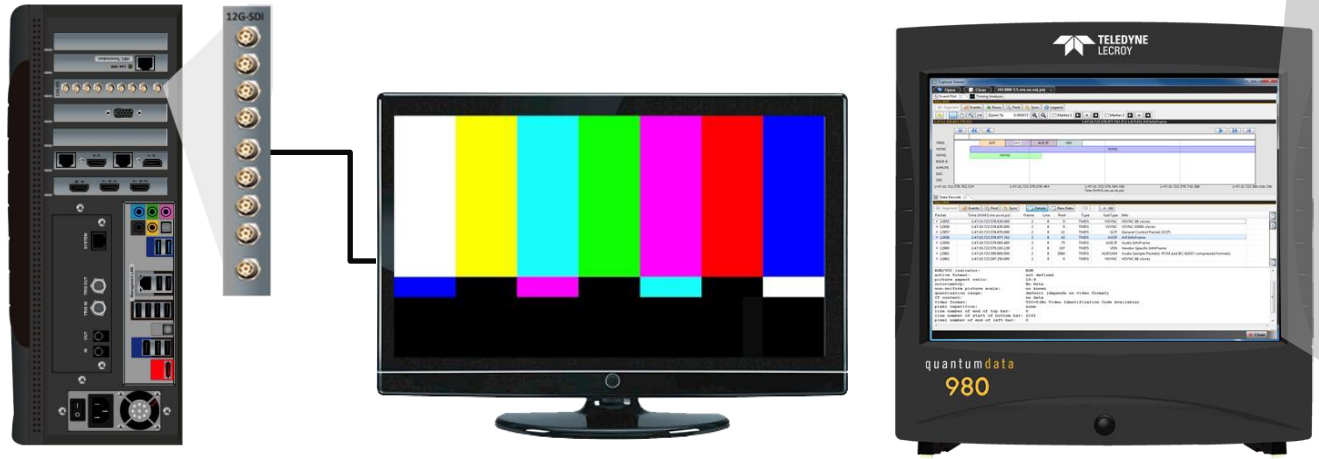


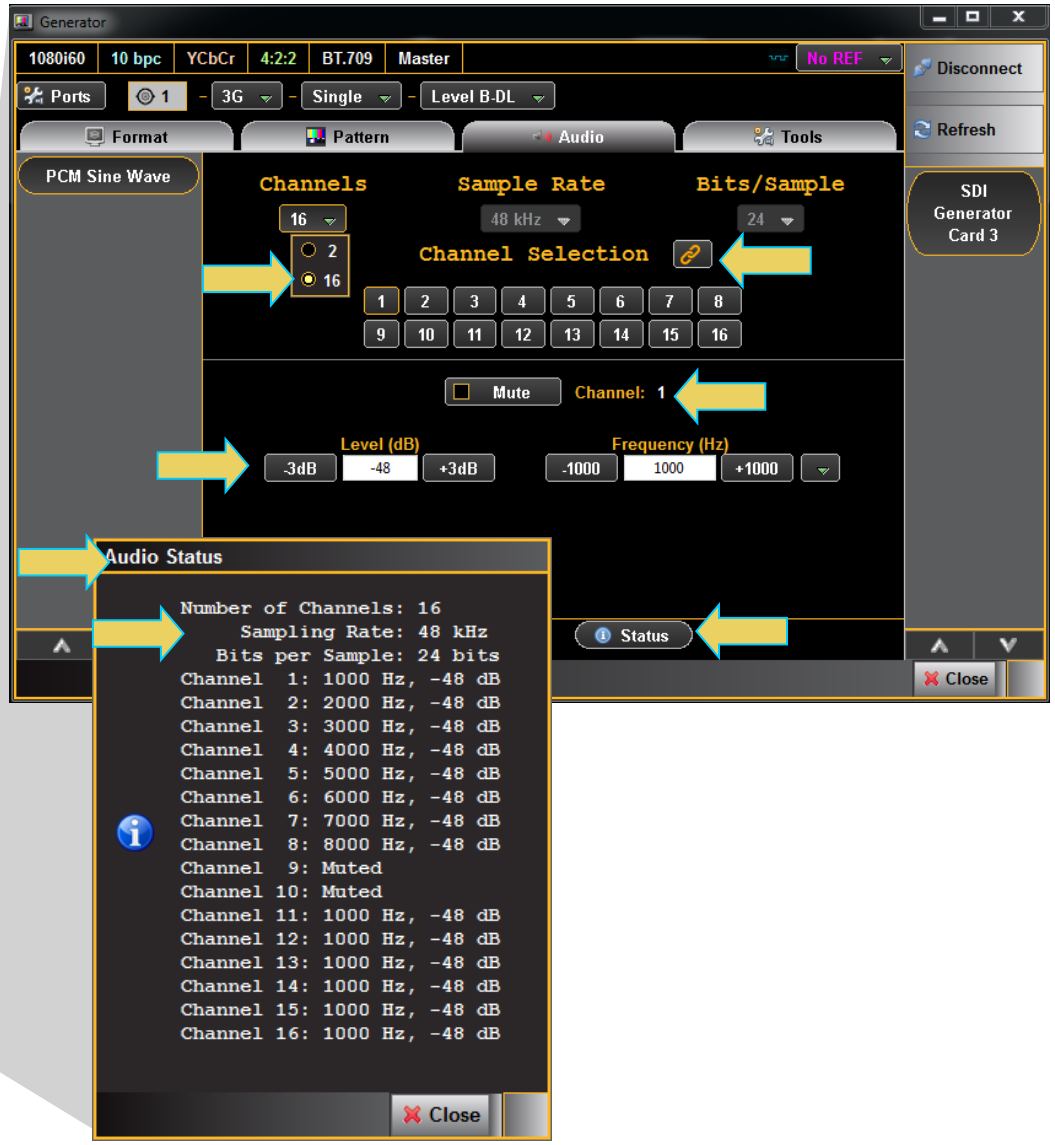


980 SDI Video Generator module – Audio Test

- SDI Audio Test of a broadcast monitor or audio device.
  - Linear PCM uncompressed audio tones.
  - You can quickly configure all channels or a subset of the channels by linking them together.
  - Mute channels individually.
  - Set amplitude and sine wave frequency independently per channel.
  - View status of all channels.

980B w/ SDI Video Generator

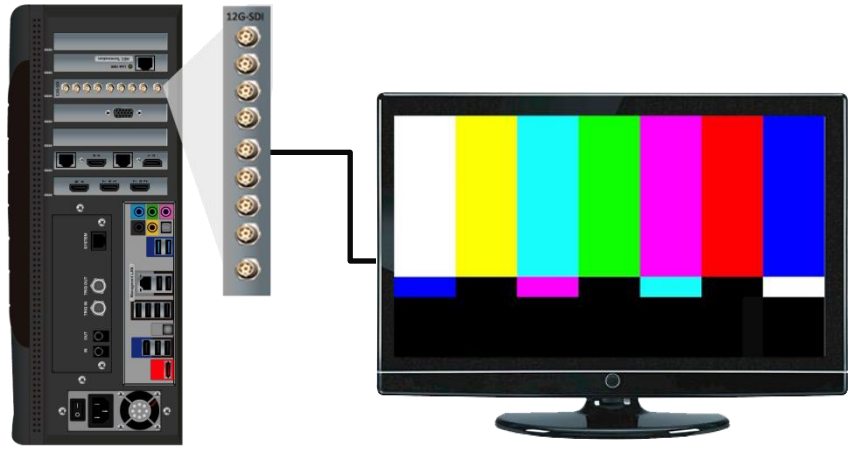


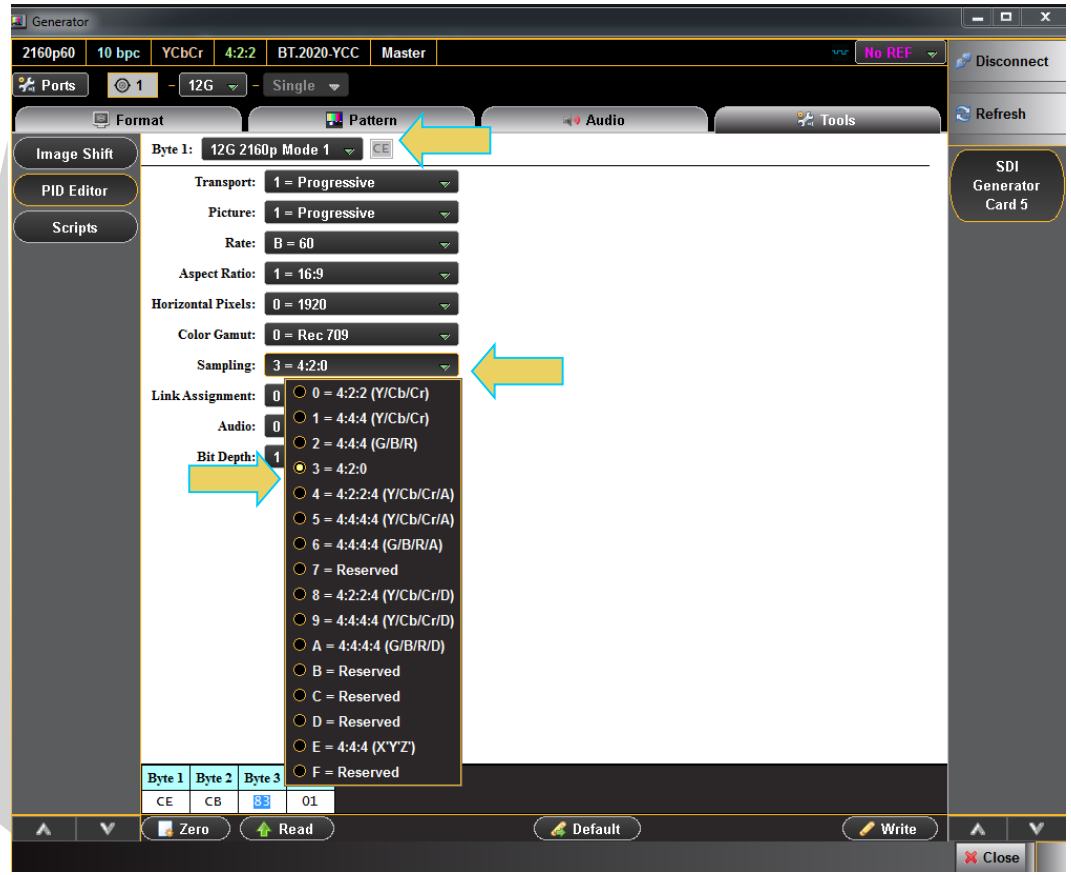


980 SDI Video Generator module – Payload ID Editor

- Configure Payloads for transmission out the SDI output stream.
  - Read values from format.
  - Overwrite values to test a display's response to valid or invalid values.

980B w/ SDI Video Generator



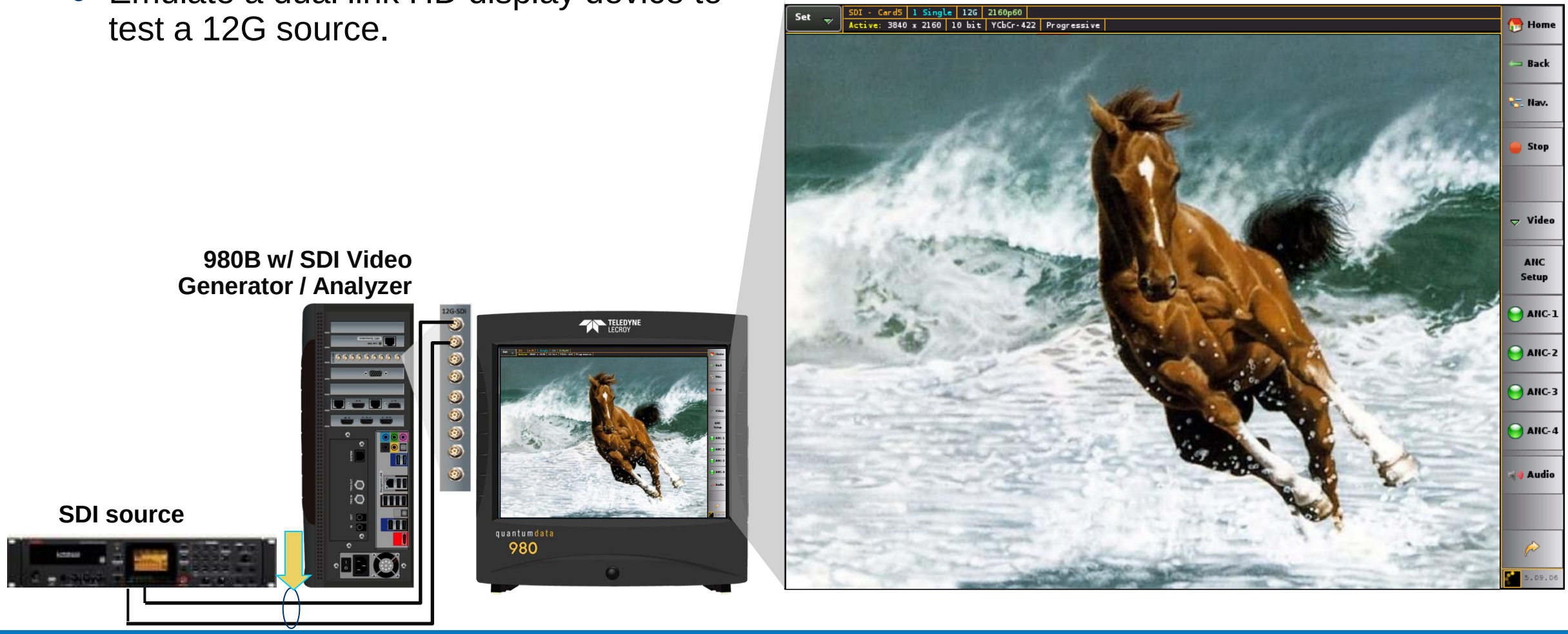


980 SDI Generator / Analyzer – Source Video Test (Single Link)

- Run basic functional test on SDI source
  - Emulate a 12G-SDI single link display device to test a 12G source.

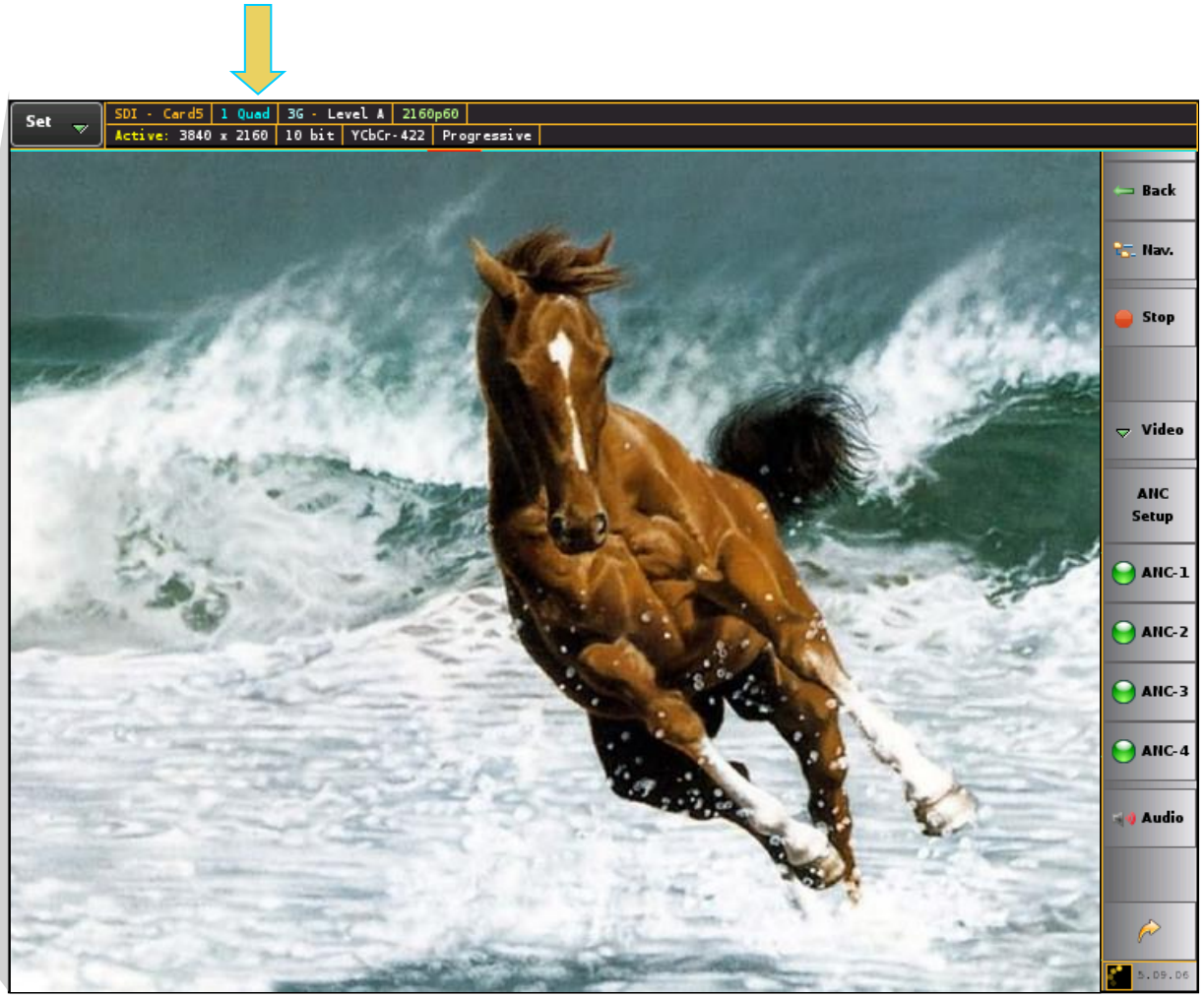
980 SDI Generator / Analyzer – Source Video Test (HD Dual Link)

- Run basic functional test on a dual link HD-SDI source
  - Emulate a dual link HD display device to test a 12G source.



980 SDI Generator / Analyzer – Source Video Test (Quad Link 3G-SDI)

- Run basic functional test on Quad-Link 3G-SDI source
  - Emulate a 3G-SDI quad link display device to test a quad 3G-SDI source.

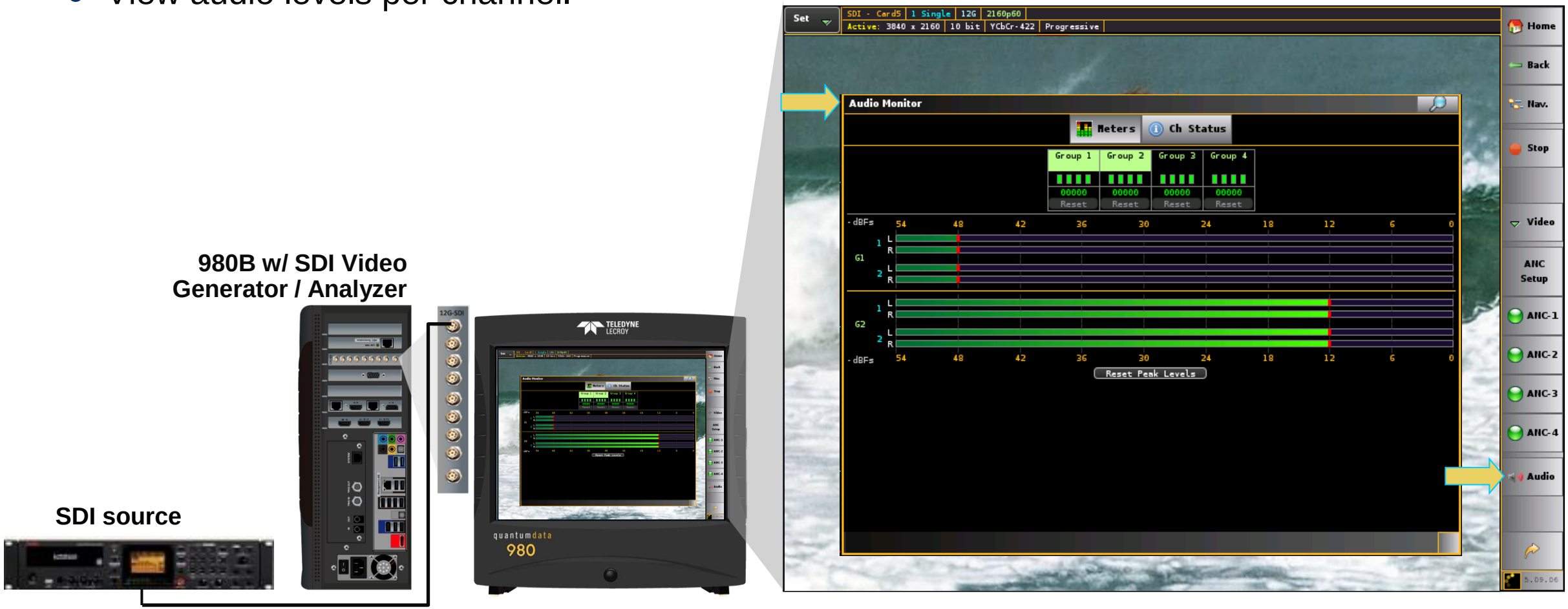


980 SDI Generator / Analyzer – Source Video Test

- Run basic functional test on SDI source
  - View video image and video parameters on upper status bar.

980 SDI Generator / Analyzer – Source Audio Monitoring

- Run basic functional test on SDI source
  - Monitor incoming LPCM audio on up to 16 channels.
  - View audio levels per channel.

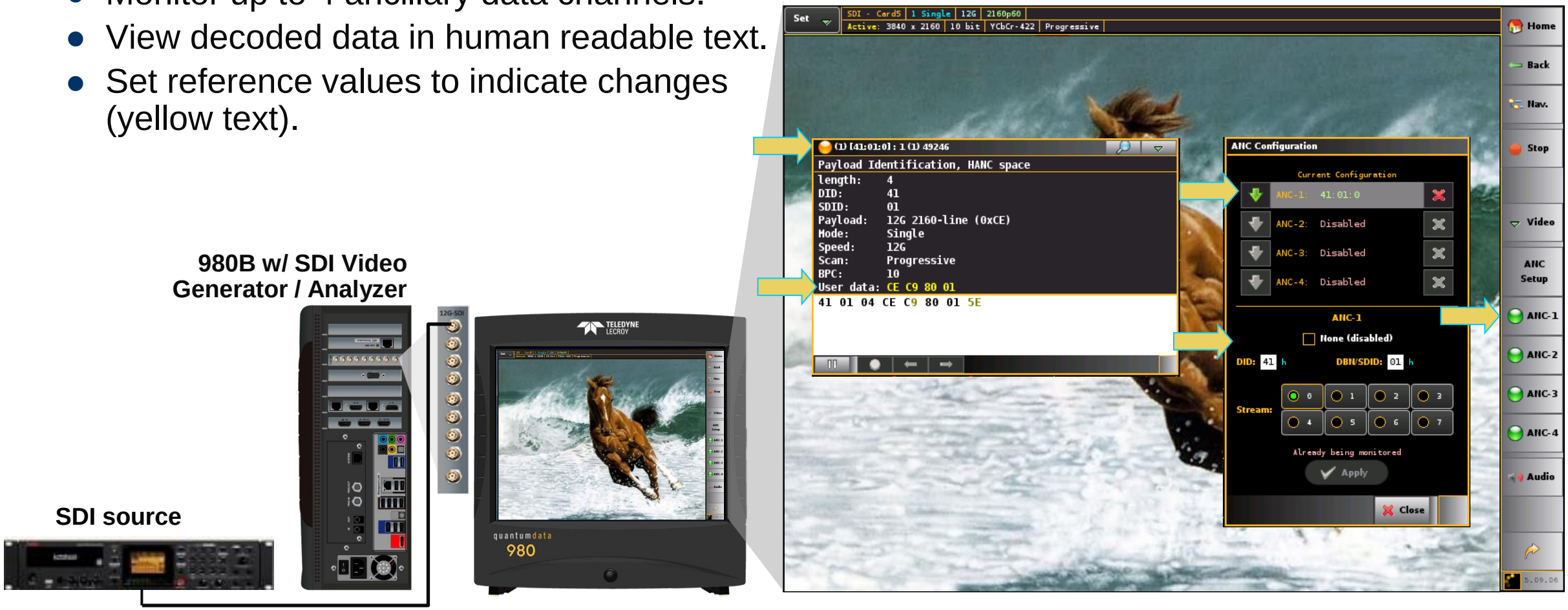


980 SDI Generator / Analyzer – Source Audio Monitoring

- Run basic functional test on SDI source
  - Monitor incoming LPCM audio on up to 16 channels.
  - View audio levels per channel.

980 SDI Generator / Analyzer – Viewing Ancillary Data

- View incoming Ancillary data from an SDI source
  - Monitor up to 4 ancillary data channels.
  - View decoded data in human readable text.
  - Set reference values to indicate changes (yellow text).

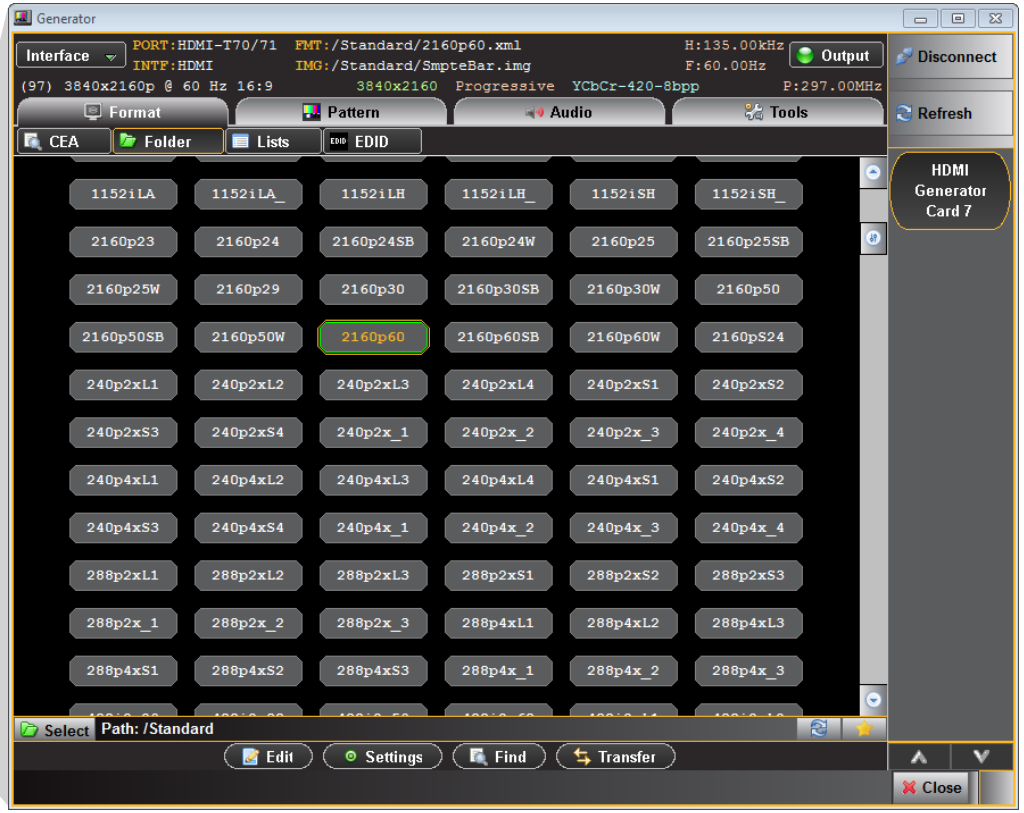


Applications

HDMI 1.4 Video Generator / Analyzer module

980 HDMI Video Generator / Analyzer module – Video Test

- HDMI Video Test of an HDMI 1.4 sink device
  - Run video tests including advanced features such as deep color and 3D.
  - Supports formats up to 300MHz pixel rates.
  - Use extensive format and test pattern library.



980 HDMI Video Generator / Analyzer module – Video Test

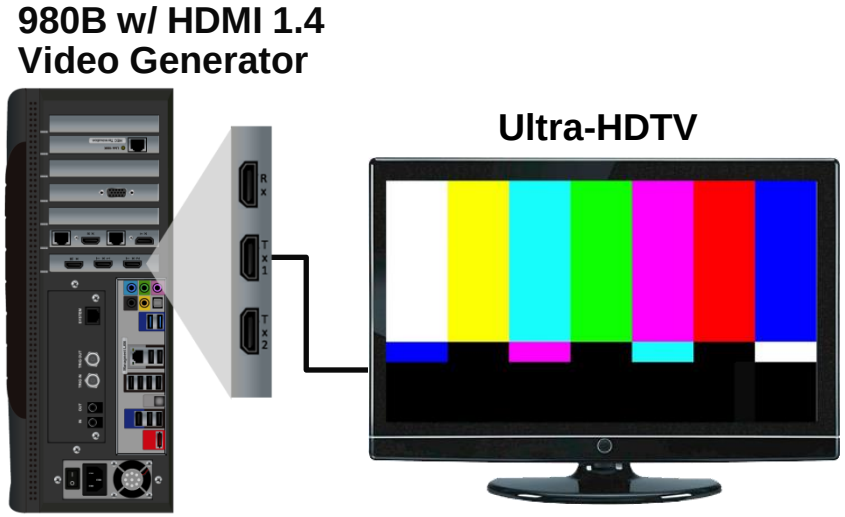
- HDMI Video Test of an HDMI 1.4 sink device
  - Use filtering system to select format.

980 HDMI Video Generator / Analyzer module – Video Test

- HDMI Video Test of an HDMI 2.0 sink device
  - Run video tests including advanced features such as deep color and 3D.
  - Use extensive format and test pattern library.
  - Test HDMI 2.0 4K ultra high definition TVs at 50/60Hz using HDMI 2.0 4:2:0 pixel encoding.

980 HDMI Video Generator / Analyzer module – Video Test

- HDMI Deep Color Video Test of an HDMI 2.0 sink device
  - Run video tests including advanced features such as deep color and 3D.



980 HDMI Video Generator / Analyzer module – Video Test

- HDMI 3D Video Test of an HDMI 2.0 sink device
  - Run video tests including advanced features such as deep color and 3D.

980 HDMI Video Generator / Analyzer module – Audio Test

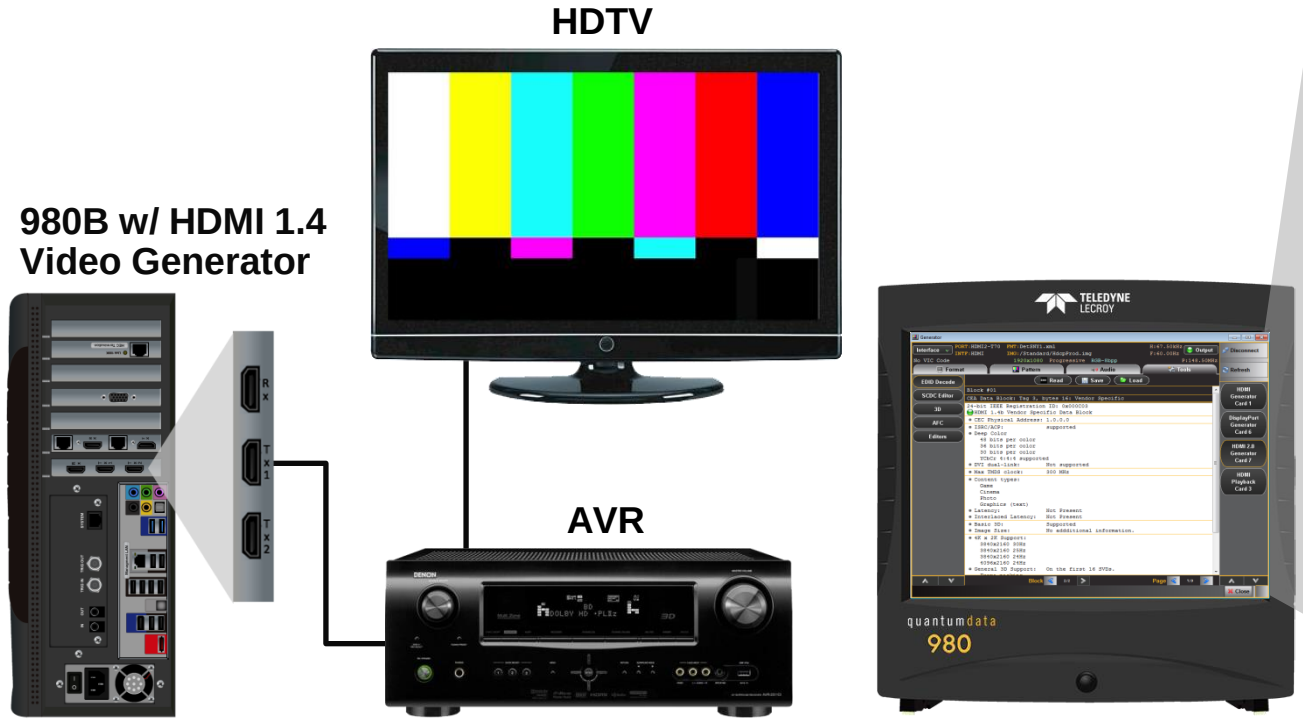
- HDMI Video Test of an HDMI audio rendering device
  - Run LPCM uncompressed formats with programmable audio parameters.

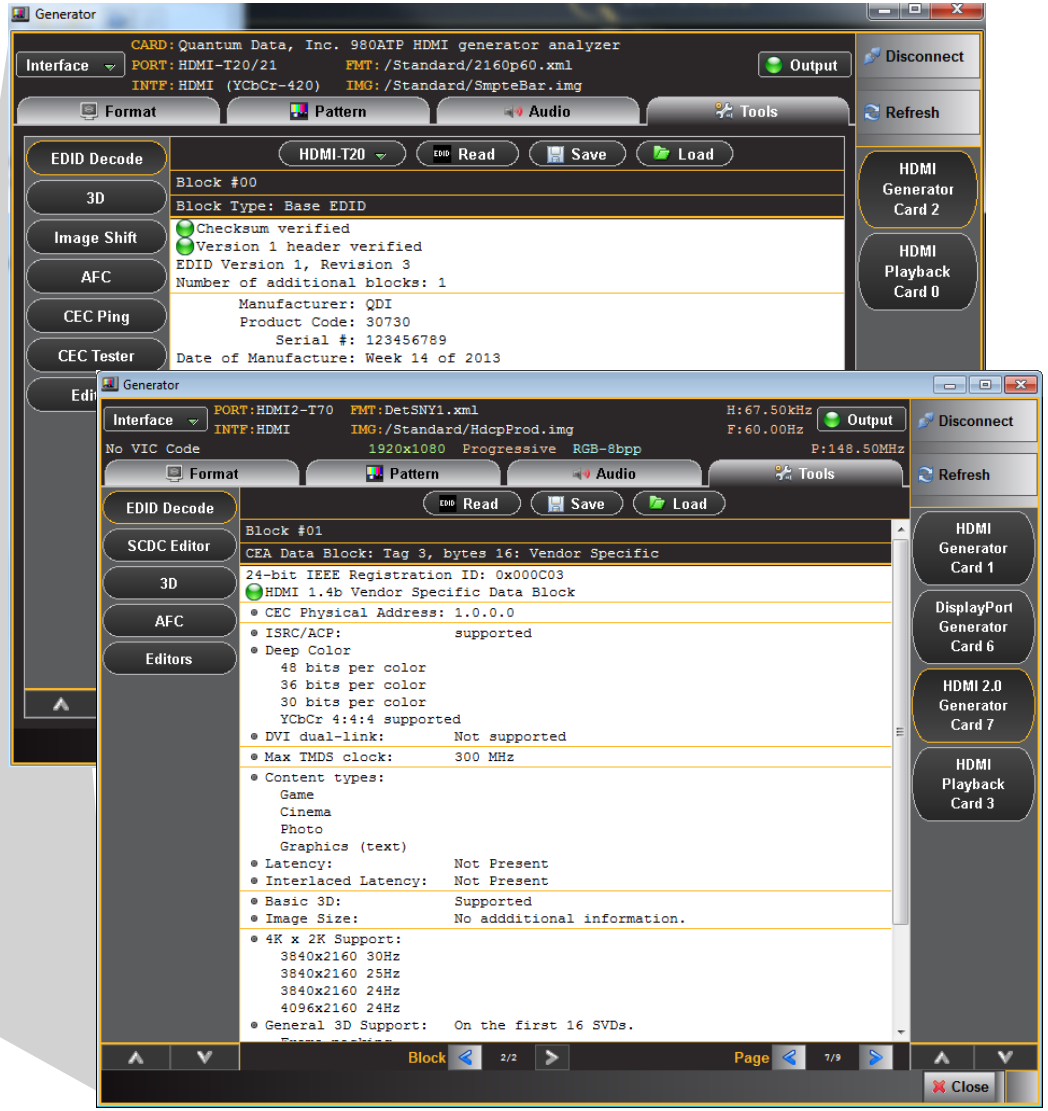
980 HDMI Video Generator / Analyzer module – Audio Test

- HDMI Video Test of an HDMI audio rendering device
  - Select from a variety of Dolby and DTS compressed audio clips.

980 HDMI Video Generator / Analyzer module – EDID Test

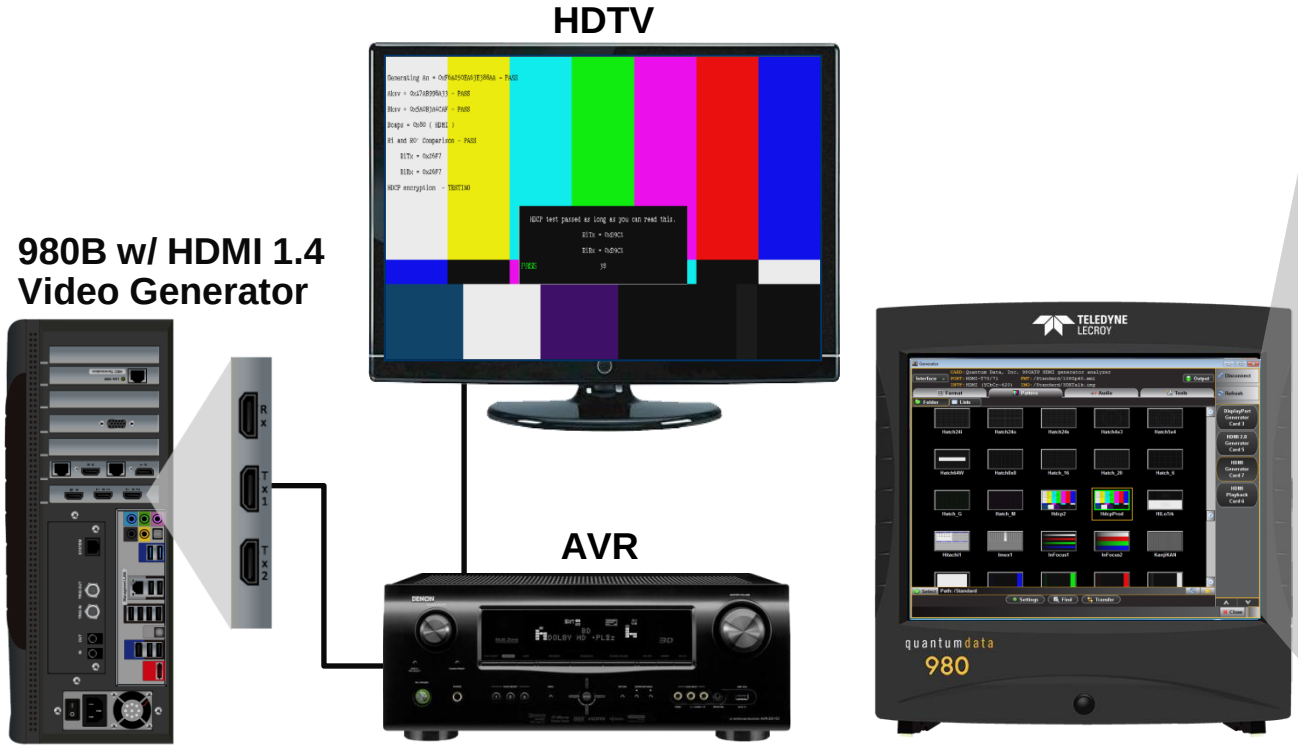
- HDMI EDID verification test of an HDMI sink device
  - View the entire EDID in human readable text.
  - Check for checksum and header errors.

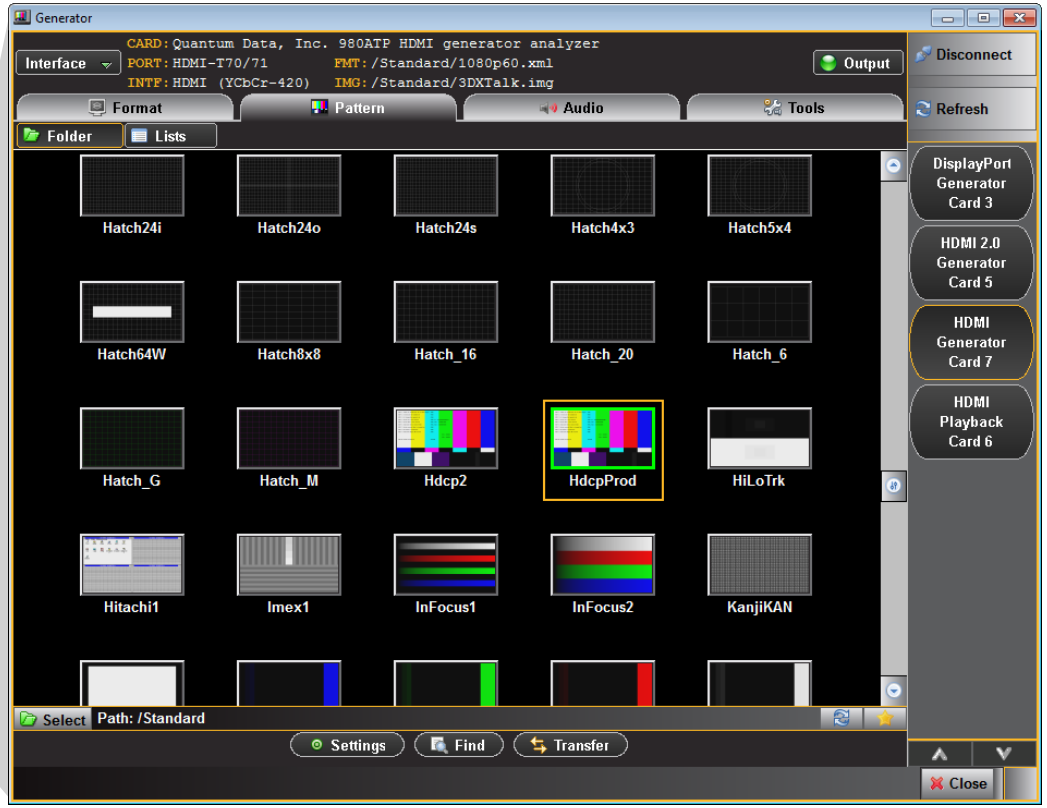




980 HDMI Video Generator / Analyzer module – HDCP 1.4 Test

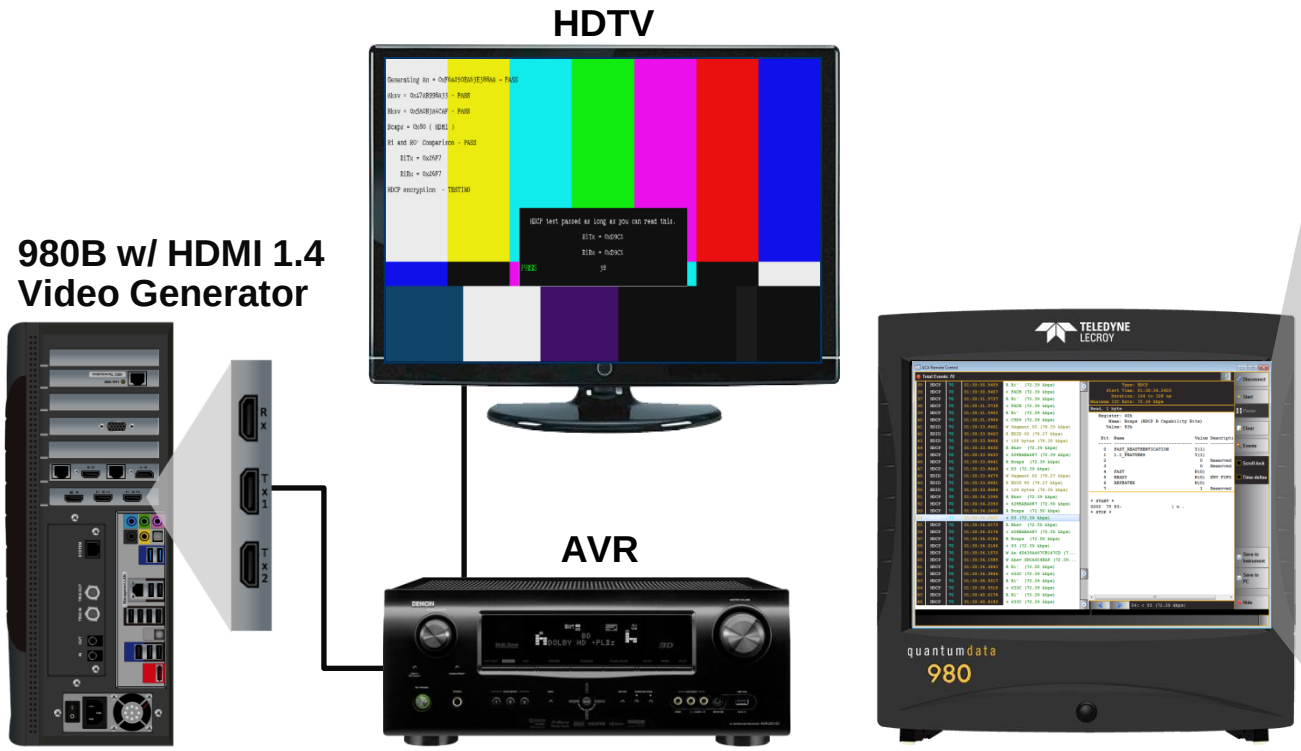
- HDCP 1.4 verification test of an HDMI sink device
  - Verify HDCP authentication.
  - View results on connected display.

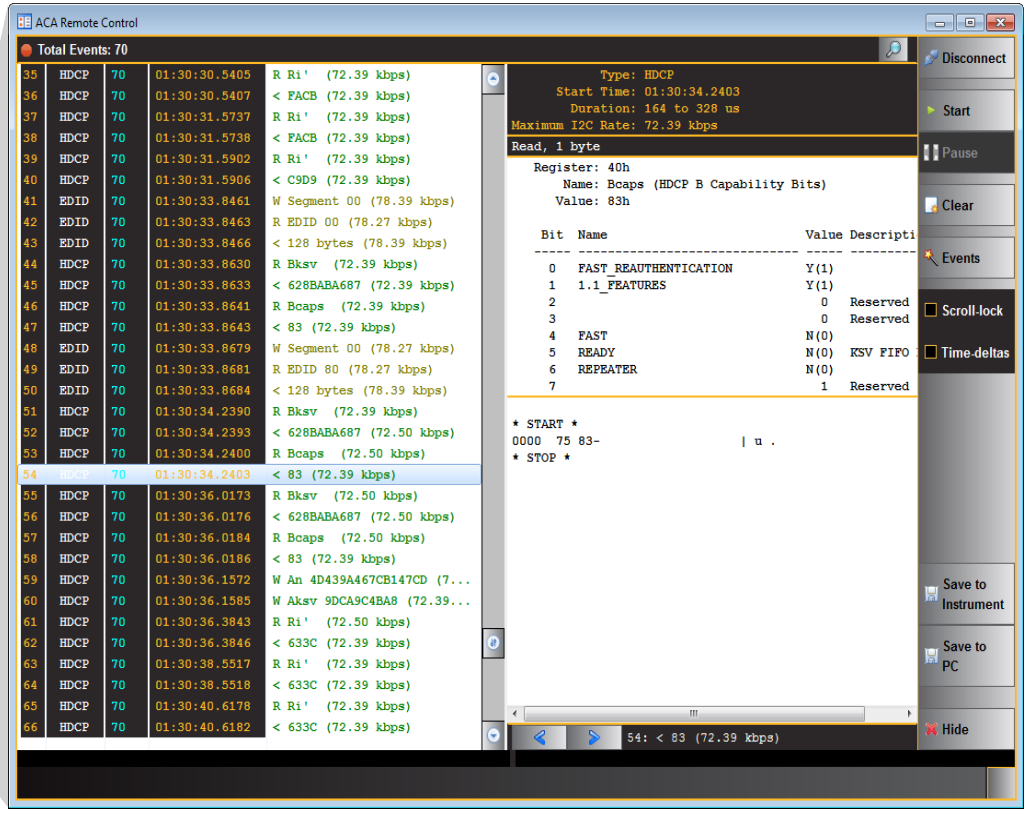




980 HDMI Video Generator / Analyzer module – HDCP Test

- HDCP verification with an HDMI sink device
  - Verify HDCP authentication transactions on Auxiliary Channel Analyzer (ACA) utility.
  - Save results and disseminate to colleagues at other locations.





980 HDMI Video Generator / Analyzer module – CEC Test

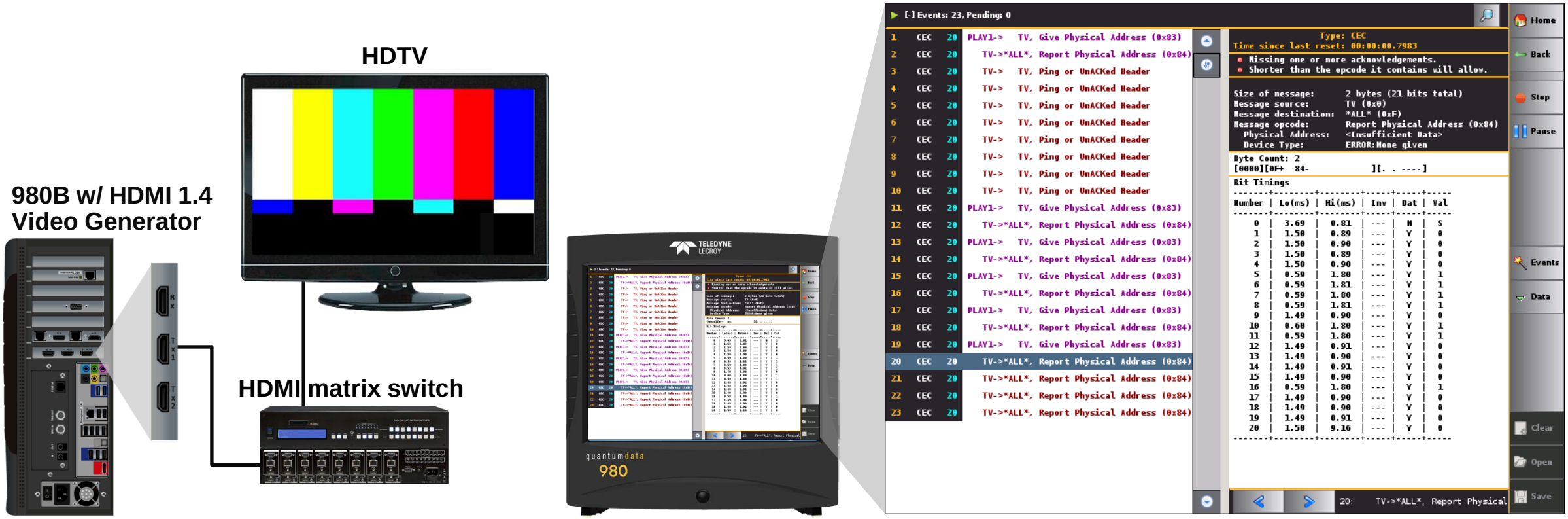
- CEC message verification with an HDMI device
  - Verify CEC messaging with CEC Tester utility.
  - Select any message from dialog box, choose parameters.
  - View results in dialog box.

980 HDMI Video Generator / Analyzer module – CEC Test

- CEC message verification with an HDMI device
  - Modify timing and send corrupt bits using CEC Tester utility.
  - Run robustness (“irregular” tests on acknowledgement and arbitration.

980 HDMI Video Generator / Analyzer module – CEC Test

- CEC message verification with an HDMI device
  - View CEC messaging on Auxiliary Channel Analyzer utility.



980 HDMI Video Generator / Analyzer module – Source Test

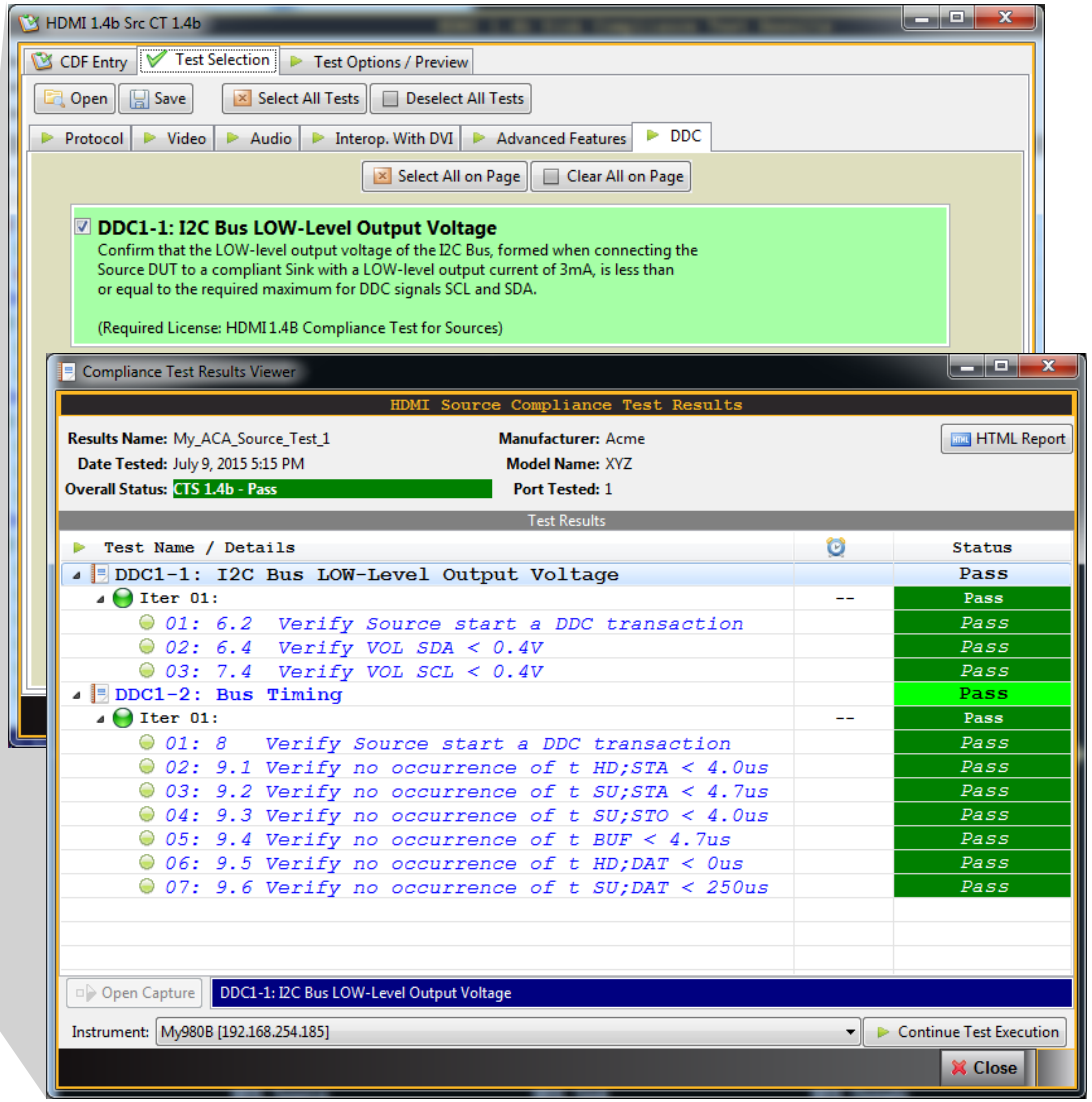
- Run basic functional test on HDMI source
  - View video image and video parameters on upper status bar.
  - View image content of HDCP encrypted video stream.
  - Emulate any EDID to test source response.

Applications

Phy & Protocol Aux Channel Analyzer module

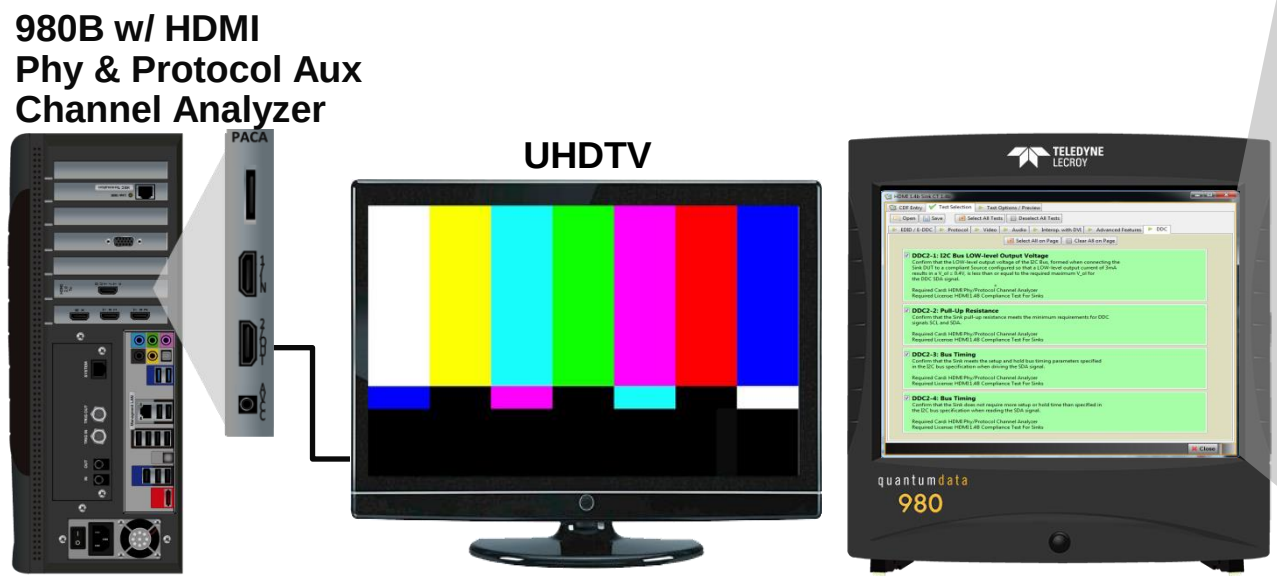
980 HDMI Protocol Aux Chan Analyzer – HDMI 1.4 DDC Compliance

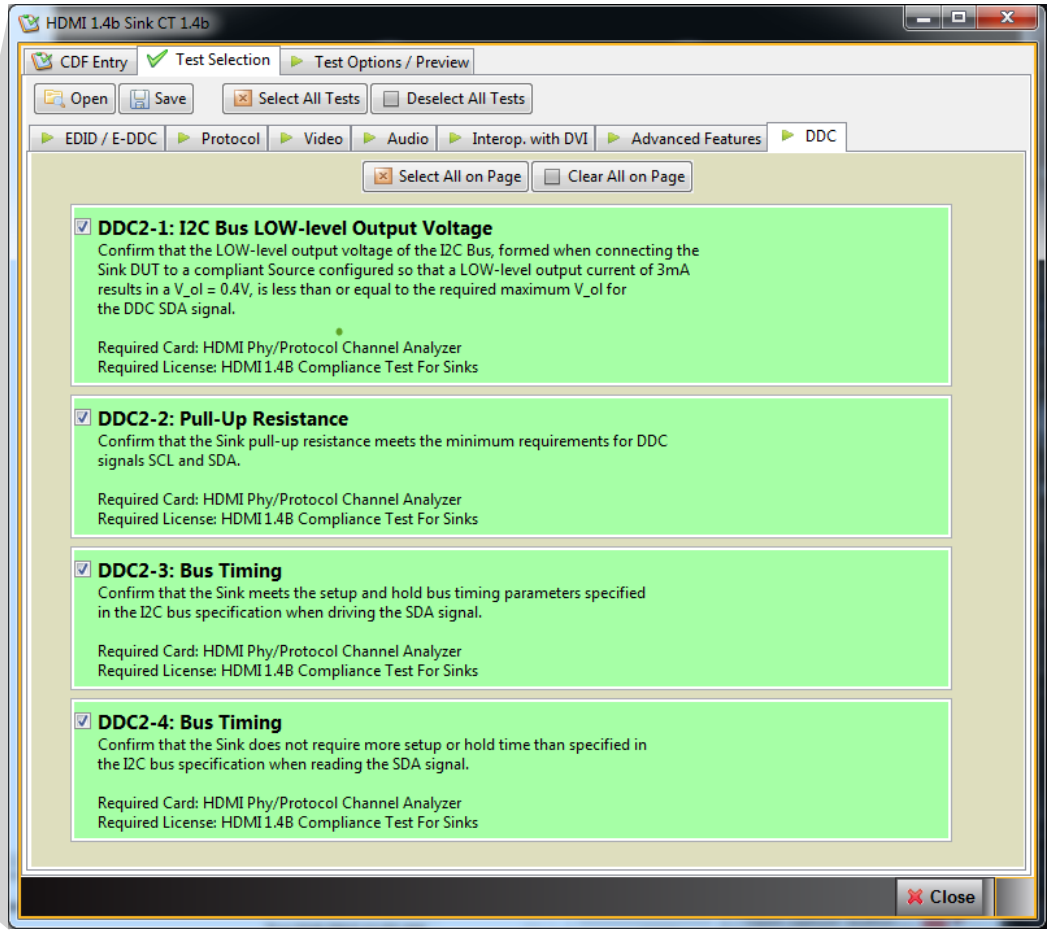
- Run HDMI DDC Compliance tests for 1.4 Sources in accordance with DDC Clarification
  - Pre-test your HDMI 1.4 source device.
  - Self-test your HDMI 1.4 source device to reduce cost and meet product time to market requirements.
  - View detailed results and identify root cause of any failures.
  - Disseminate results for colleagues and subject matter experts.



980 HDMI Protocol Aux Chan Analyzer – HDMI 1.4 DDC Compliance

- Run HDMI DDC Compliance tests for 1.4 Sinks in accordance with DDC Clarification
  - Pre-test your HDMI 1.4 sink device.
  - Self-test your HDMI 1.4 sink device to reduce cost and meet product time to market requirements.
  - Select tests you wish to run, save test selection configurations for reuse.





980 HDMI Protocol Aux Chan Analyzer – HDMI 1.4 DDC Compliance

- Run HDMI DDC Compliance tests for 1.4 Sinks in accordance with DDC Clarification
  - Pre-test your HDMI 1.4 sink device.
  - Self-test your HDMI 1.4 sink device to reduce cost and meet product time to market requirements.
  - View detailed results, identify root cause of failures.
  - Disseminate results for colleagues and subject matter experts.

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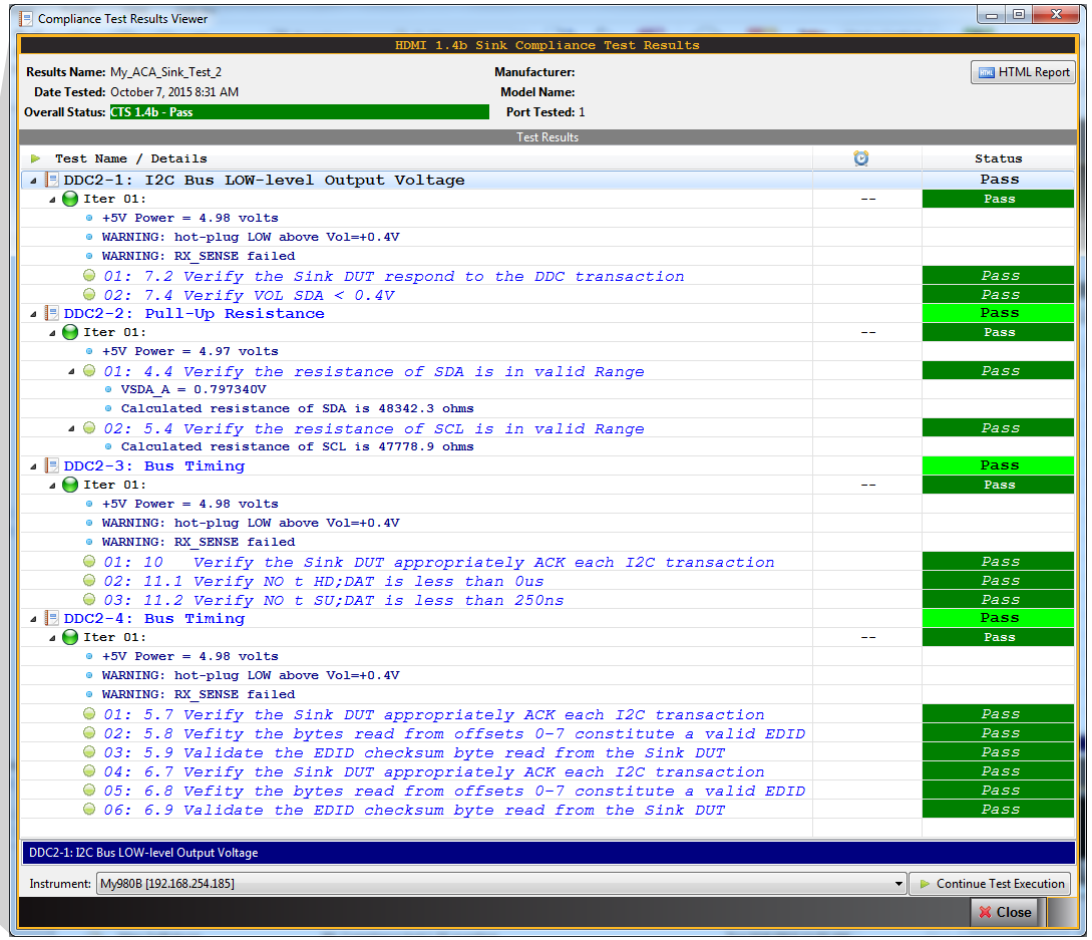
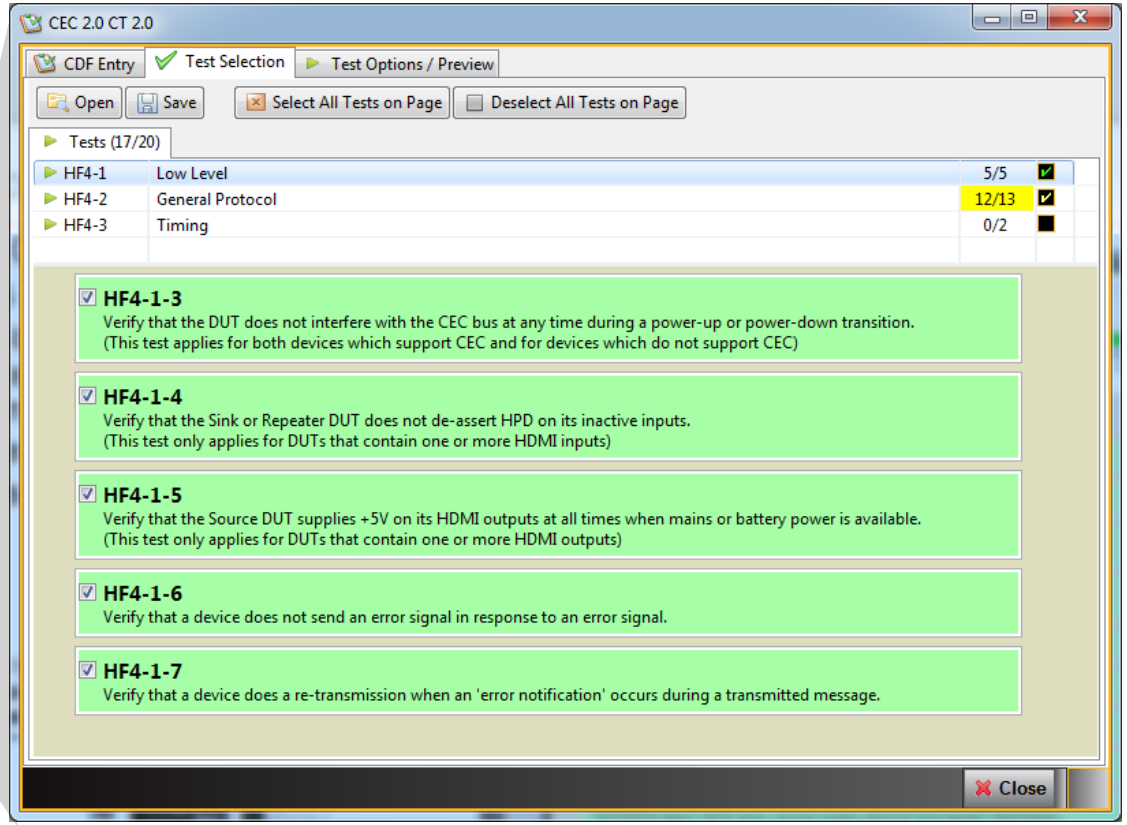


980 Phy & Protocol Aux Chan Analyzer – HDMI 2.0 CEC Compliance

- Run HDMI 2.0 CEC Compliance tests for Sources, Sinks or Repeater devices
  - Pre-test or self-test your HDMI 2.0 CEC-capable device to reduce cost and meet product time to market requirements.
  - View detailed results, identify root cause of failures.
  - Disseminate results for colleagues and subject matter experts.



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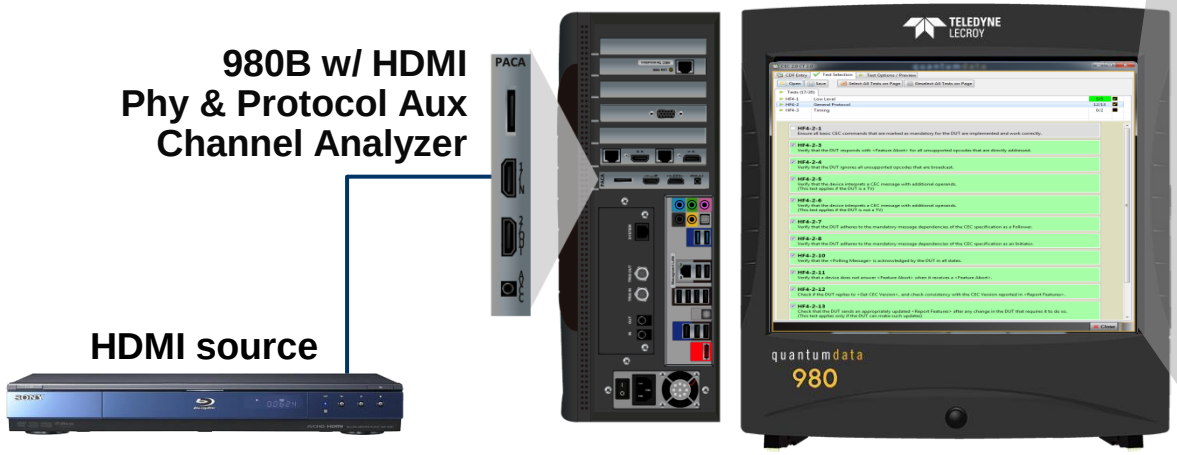

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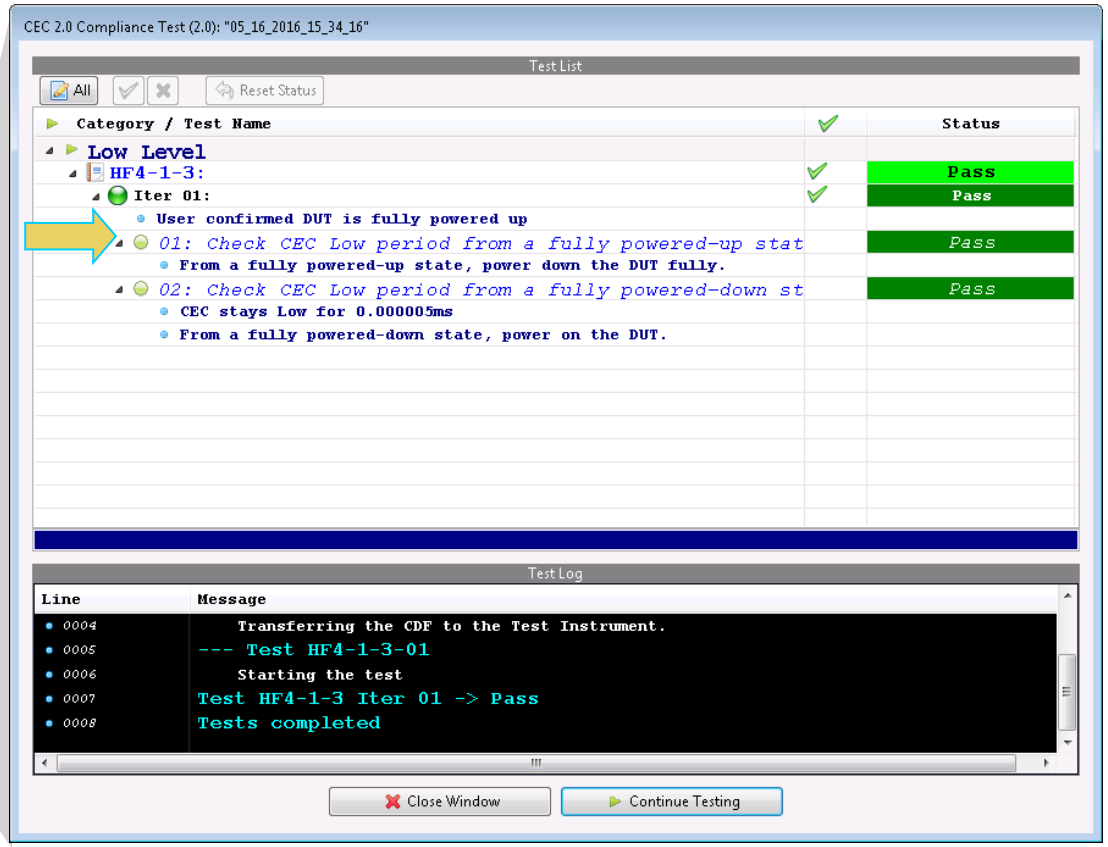

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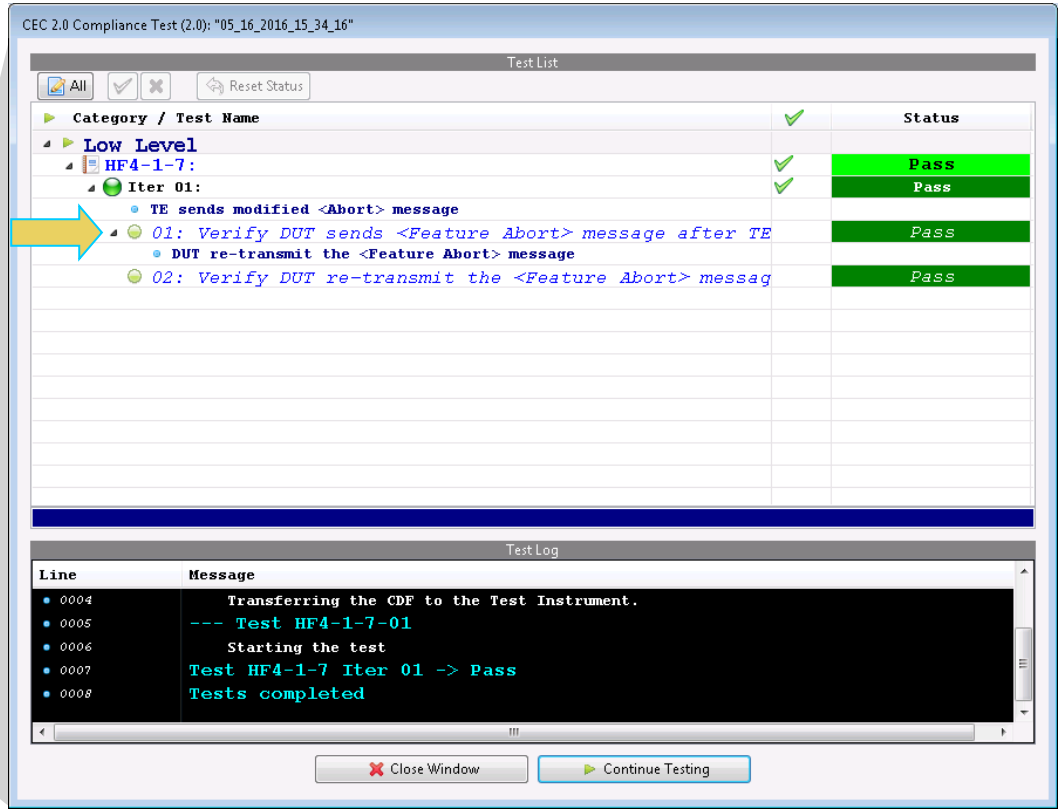
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