Tektronix®

PRISM

Comprehensive tool set for Operations and Engineering
4K • HDR • WCG • IP • SDI

PRISM is an ideal solution for monitoring SDI/IP hybrid environments including master control rooms, production studios, OB trucks, and signal contribution/distribution centers. The base unit comes with a broad range of connectivity solutions. It is enabled for both SDI and multiple IP standards to address the needs of production and editing. It is also easy to scale it up to address high-end technical QC and engineering. PRISM is designed to be future proof and provide investment protection for end users.

PRISM - One tool with a common platform, a common UI, and a scalable feature set that removes the need for compromise, eases facility design, and reduces staff training and interchange.

- Specifically designed for IP (ST 2210 and ST 2022-6) and SD/HD/3G/6G/12G SDI environments. Connect any signal in the facility and lock to PTP or Black Burst references for Timing analysis
- Comprehensive support for 4K/HDR/WCG production through software upgrades and simple upgrades to 25G in IP environments when needed
- A base unit with features to meet the operational needs of live production and broadcast editing, plus a full set of software options that allow the instrument to scale to high-end engineering requirements
- A full API, NMOS/SDP support, a variety of form factors, extended display options, and a high-quality speaker option means that PRISM can be easily integrated into any operational or engineering environment

Using PRISM in your workflow

Production

A tool for making quick and accurate decisions on set

Modern productions enhanced with High Dynamic Range (HDR) and Wide Color Gamut (WCG) technologies mean there are less opportunities to *fix content in Post*. Production teams must get it right at acquisition to avoid a costly reshoot. Lighting engineers, cinematographers, and directors need tools that enable quick scene creation, camera setup, and editing decisions to minimize the time on set. PRISM is equipped for the job with patented STOP displays to setup cameras and show highlights, CIE Charts, and automated transfer functions/color space conversion to measure and adjust HDR and WCG quickly and easily. Tools that help you get it right first time lead to quick decisions and clean and objective communication across the whole creative team.

Live production

A tool for ensuring the content that leaves the truck is high quality regardless of format

Live production is all about one shot to get live action, high value content captured and delivered in the highest possible quality, in multiple formats for delivery to viewers in multiple ways. Increasingly, live production teams are required to deliver both 4K/HDR/WCG and HD/SDR/BT.709 content simultaneously. Ensuring that both feeds have a consistent look and are high quality is a real challenge.

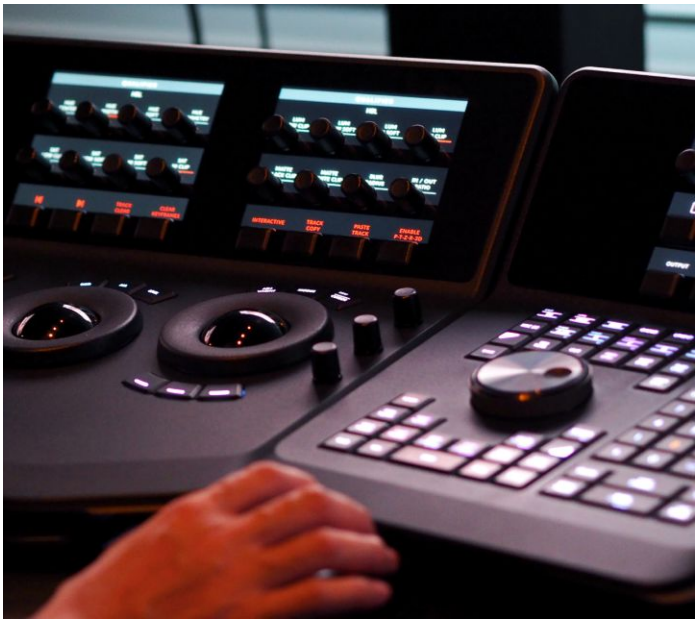
PRISM provides the tools required to handle live production. For traditional productions there are expected tools including waveform, vector and diamond displays. For 4K/HDR/WCG, PRISM introduces new and innovative displays like the decade nits scale in the STOP display. STOP display makes setting the black, white, and gray levels and controlling the specular highlights easy. PRISM also provides CIE charts and vector with automatic color space adjustment for color management.

Post production

A tool for objective quality assessment, enabling consistent and efficient workflows

Post production workflows are challenged with creating great looking and sounding content as quickly and efficiently as possible. Increasingly, creatives are required to master content for multiple end points, ranging from SD/SDR/709 for DVD to 4K/PQ/2020 for VOD, while maintaining artistic integrity and a consistent look.

PRISM can simplify the work to create, grade, and QC the content in a single workflow regardless of the mastering format. There is support for a wide range of HDR standards, 4K formats, and tools allowing objective ways to measure and manage composition, luminance, color, audio and standards. PRISM is equipped with Waveform, Vector, and Diamond displays and with the addition of integrated transfer/color space conversion, editors can extend the use of these familiar tools for HDR/WCG editing. PRISM also specifically supports an innovative tool set for the unique challenges in multiple formats like STOP display and CIE chart, which maximize the degree of creativity.

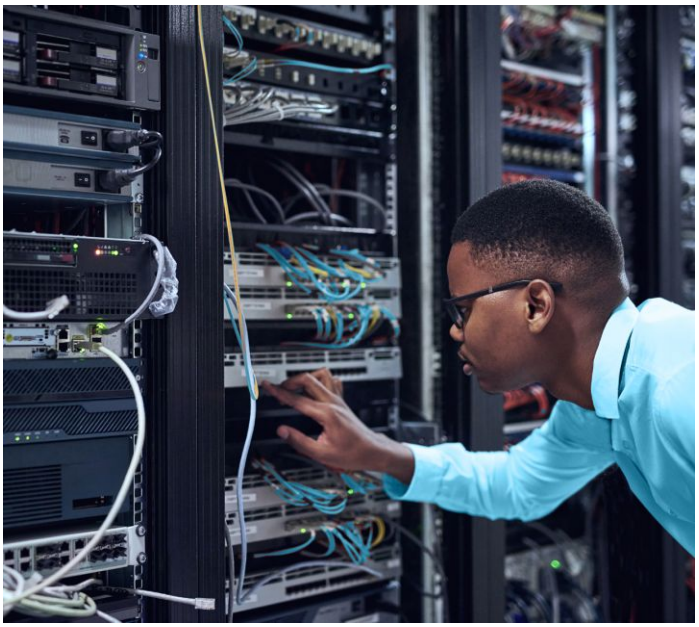


Broadcast engineering and R&D

A tool with trusted Tektronix measurements for both SDI and IP technology

Broadcast and R&D engineers are faced with a level of change and technology transition never seen before. They need tools that enable them to see and solve network or design issues quickly and effectively, whether they are working in an SDI or IP environment. As standards change engineers require tools that will evolve as the standards evolve, a range of options that allow them to configure the instrument to meet their needs, and a comprehensive set of tests and measurements they can trust.

PRISM connects to almost any signal in the facility or laboratory such as; SD/HD/3G/6G/12G-SDI, ST 2110-20/30/40, ST 2022-6, ST2022-7, ST 2059 (PTP), and NMOS IS-04 and IS-05. Coupled with the connectivity is a comprehensive set of displays and measurements that are designed to provide information they need to find and solve problems. The instrument provides IP Statistics, PTP Timing analysis, Video and Audio session displays, Black Burst to SDI timing, and 12G-SDI Eye pattern measurement. PRISM also provides specialized measurements such as ST 2110-21 buffer analysis to understand what happens to the system under different traffic flow situations. Generator functionality provides a series of known good test patterns for testing in ST 2110 or SDI formats. A full API allows PRISM to be connected to control systems for remote monitoring applications.



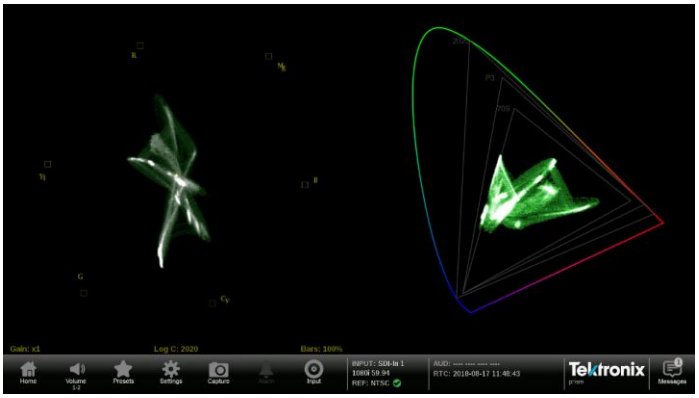
Innovative feature set for HDR/WCG content creation

- CIE chart display
- Stop display (stop, nits)
- Transfer function / color space conversion
- Diamond / Lightning display

Adjust color in consistent way

The Vector display has been used to adjust picture color since the analog composite era. However, using Vector displays where there are multiple formats with different RGB/YCbCr matrices, different color primaries, and/or different gamma curve requires a lot of subjective interpretations. This problem affects operators who need to master a program in a variety of formats.

The CIE display provides a trace based on x, y color coordinates, so that a single color is always placed on the correct location regardless of video format. This means operators can create/evaluate color in consistent and objective ways regardless of the video format they are working with. This also means that color monitoring for SD/SDR/709 mastering for DVD and 4K/HDR/2020 mastering for VOD can be done using the same workflow.



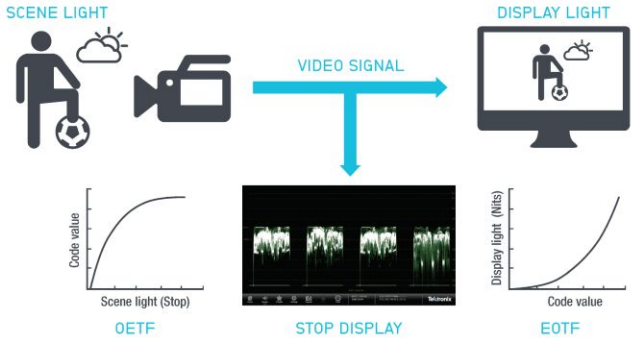
Vector and CIE chart display

Simplify camera setup in complex HDR productions

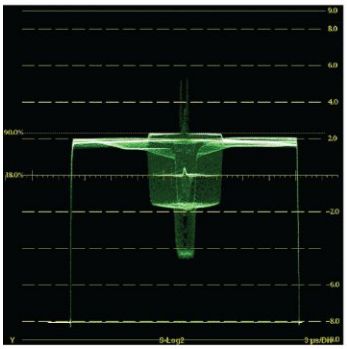
One of the challenges in creating HDR content is the need to understand the new reference white/grey levels required for each transfer function used in HDR content acquisition. This requires the camera operator to adjust the camera exposure accordingly for the specific OETF.

The Tektronix patented Stop Display application allows operators to adjust camera exposure in a consistent manner without worrying about the transfer function (OETF) of a camera. The Stop Display reverses the OETF to convert the video signal from the camera to linear scene light using an internal integrated look up table and then represents the light level as a log2 (stops) waveform with over 16 stops of range in one display.

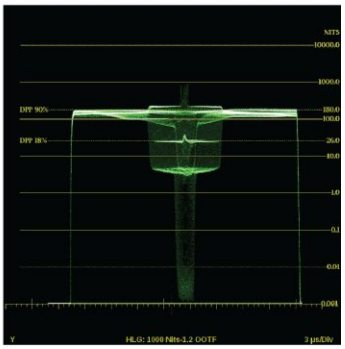
The vertical axis on the Stop Display can be in either "Stops" referring to scene light or "Nits" referring to display light. The reference levels in the graticule are consistent regardless of which transfer function is selected.



Reference object with specular highlight, 90% white, 18% gray, black, and light trap.



Slog2 OETF, Stop graticule.

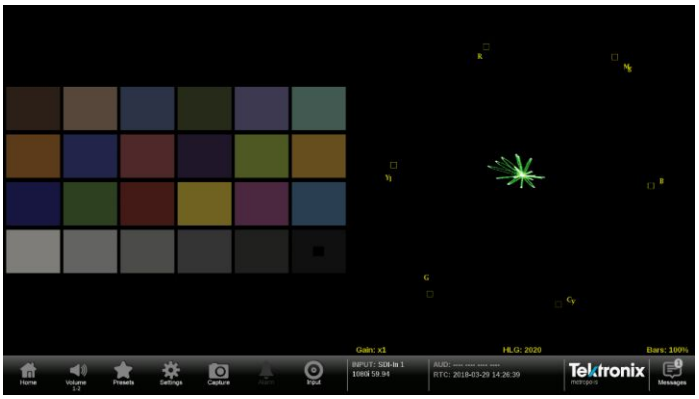


ITU. BT2100 HLG Reference EOTF, Decade nits graticule.

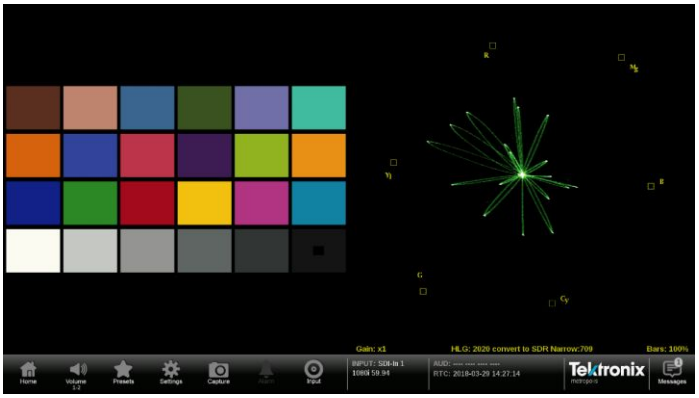
Balance colors in HDR/WCG without changing your workflow

ITU-R BT.2020 color and many custom camera color primaries have a wider color coverage than the traditional ITU-R BT.709 color gamut. Because of differences in both color primaries and gamma, the trace presentation in a typical color difference vector display is different from the familiar BT.709 vector display, which forces the camera operators to interpret the colors differently depending on the color format used.

The integrated transfer function/color space converter converts a HDR/WCG signal to an SDR/709 gamut signal. This allows camera operators to confidently monitor the color of the scene they are shooting and allows colorists to use familiar displays to check mid tones in HDR/WCG content creation. It also ensures a consistent look between content in simultaneous SDR/HDR content creation. This feature is available in the Waveform, Vector, Diamond, and Picture applications.



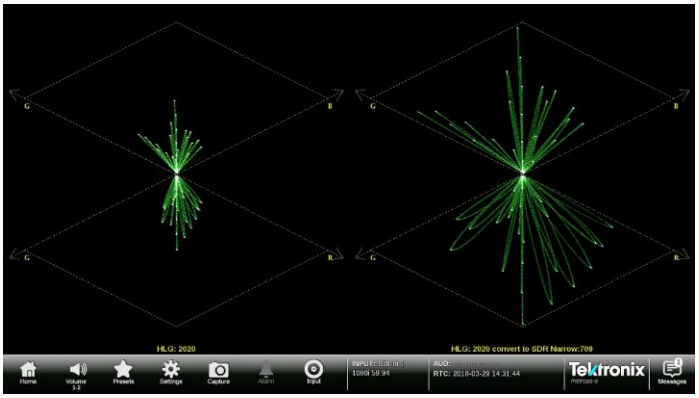
Macbeth chart in HLG/RP2020; Picture display and Vector display with no conversion applied.



Macbeth chart in HLG/RP2020; Picture display and Vector display with the conversion applied.

Simplify gamut monitoring and camera setup with Tektronix-patented displays

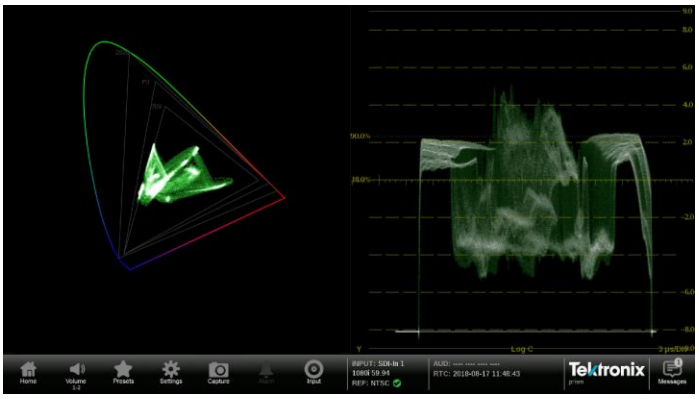
The Tektronix-patented Diamond and Split Diamond displays simplify the process of identifying and correcting RGB gamut errors in digital video signals. Since the Diamond display has the traces on G/R and G/B planes, the trace position moves linearly as a response to RGB adjustment by the color editor. This allows editors to quickly identify and correct gamut issues. With the integrated transfer function/color space converter, the operator can check 709 color gamut error of WCG signals. During camera setup, the operator can quickly adjust BW balance by monitoring linearity in the center of the display.



Left: Macbeth chart in HLG/RP2020; Diamond display without conversion. Right: Macbeth chart in HLG/RP2020; Diamond display with conversion.

Customize your display to quickly see exactly what you want

A combination of Full/Quad/Vertical extended tile configuration provides more flexibility in how an operator views the application displays. As a vertical extended tile, the 9 inch, 16:9 display panel can show the Vector display in an equivalent size to a 6.5 inch, 4:3 display panel. This provides a practical single-box solution with the Waveform and Vector displays shown side-by-side for camera shading applications.



CIE Chart and Stop Display in vertical extended tiles.

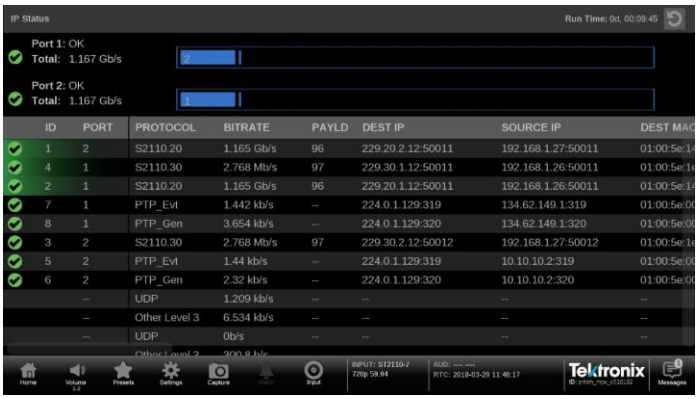
Rich feature sets for IP Engineering

- IP Status
- IP Session / Graphs
- PTP Session / Graphs
- SMPTE2110-21 buffer modeling
- PTP Timing, Stream timing
- PIT Histogram
- Event log
- SMPTE2022-7 monitoring
- IP Generator
- IP Capture

Identify the streams in a 10G Ethernet link to set up the system properly

Engineers designing and evaluating a hybrid IP/SDI broadcast system face challenges in determining the status of the system they are building. While an SDI coax system typically carries one signal, a 10G Ethernet link can carry multiple streams and it can be difficult to determine what content is carried on each of the streams within a IP based broadcast system.

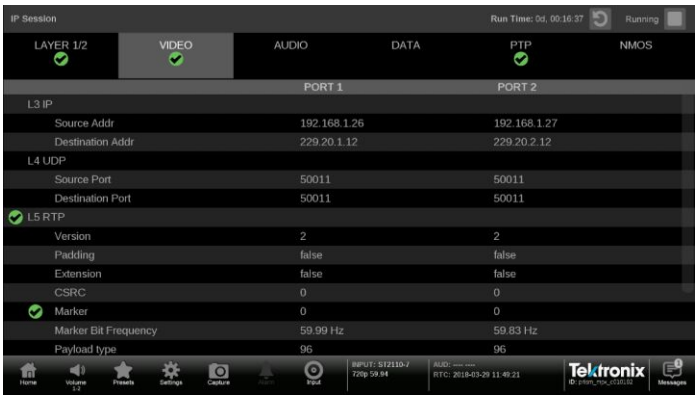
PRISM offers a range of tools to quickly identify the streams in the 10G Ethernet link and the content in each stream. The IP Status application shows the protocol, source IP address and port number, destination IP address and port number, Source MAC, Destination MAC, PTP Domain, RTP Seq Error, RTP Clock Freq, and RTP Marker Freq of all streams available in an incoming 10G Ethernet link.



IP Status application showing all streams in a 10G Ethernet link.

An engineer can view further details using the Video/Audio/Data tabs in the IP Session application, which shows the RTP header information in the selected ST2022-6 or ST2110-20/30/40 streams, including High Bit Rate Media header information for ST2022-6 stream with Green/Red LED error status. The status LED on an application tab indicates the aggregated error status for the monitored items under that tab.

An engineer can determine the number of streams available on the link as well as the quality level of each stream. The selected stream can be decoded to the Picture and Audio applications to let the engineer verify the content in the stream. The selected ST2022- 6 or ST 2110-20/30 stream can also be output through the AUX output with IP/SDI conversion for an extensive monitoring solution.



IP Session application showing the RTP header information in an ST2022-7 configuration.

Monitor and verify PTP system setup to ensure genlock of equipment in the facility

In a hybrid IP/SDI broadcast system, a variety of reference signals may be used to synchronize equipment within the facility. Traditionally, black burst (BB) or tri-level sync (TLS) references have been used for this purpose. For IP networks, PTP (IEEE1588/SMPTE ST 2059) is used for system synchronization.

PTP uses a series of protocols and message interchanges to create accurate synchronization, higher system robustness and further flexibility in the system integration. For example, the Best Master Clock Algorithm (BMCA) is used to determine the Grandmaster. Another example is the communication model to choose the message transport model to convey the time stamps. However, those mechanisms work as designed only when engineers have set up the system correctly.

In the IP Status application, PRISM displays the PTP traffic with Domain information available in the 10G Ethernet link to let users quickly check for the presence of PTP messages. The PTP tab in the IP Session application provides the lock status, including the phase lag to the Grandmaster, and interpretation of the PTP metadata within the Announce Message. The PTP metadata includes the Master ID, PTP time in UTC and master characteristics (clock quality, priority, etc.) to let engineers ensure the settings of the PTP system are correct.

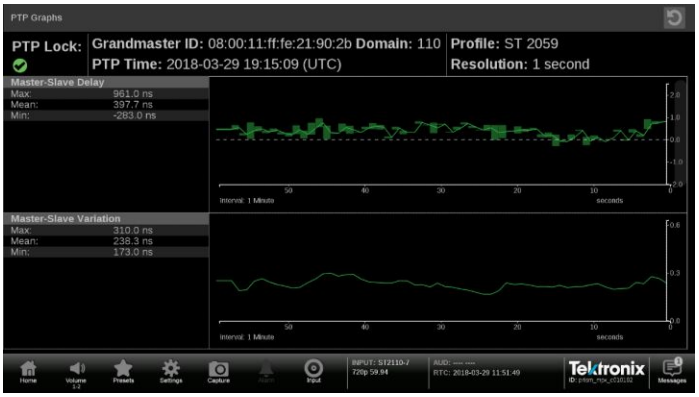
IP Session application showing the PTP lock status and PTP information.

In the PTP Graphs application, PRISM plots the network delay, network delay variation, and Master/Slave phase lag. The network delay and network delay variation plots are available for both signal directions on the network, Master to Slave (Tms) and Slave to Master (Tsm). The network delay values are calculated directly from the PTP message time stamps, while the variation numbers are calculated from the delay as per RFC1889. The phase lag is the filtered difference Tsm-Tms, and is used to adjust the local PTP clock. Therefore, as PRISM locks to the PTP master unit, it will adjust to minimize the phase lag and make Tsm and Tms equal.

The PTP graphs show the effects of both network delay and adjustments to the slave unit timing. However, since the contribution from the adjustment is low after establishing a lock to the PTP master unit, the PTP network delay becomes dominant in the graphs.

In the ideal PTP system, Tms/Tsm network delay should be constant and identical. The variations in real applications, however, may impact the PTP lock process in the slave unit and could cause a PTP unlock situation if they are excessive.

The PTP graphs allow the detection of adverse network conditions, such as too much traffic on the PTP ports.



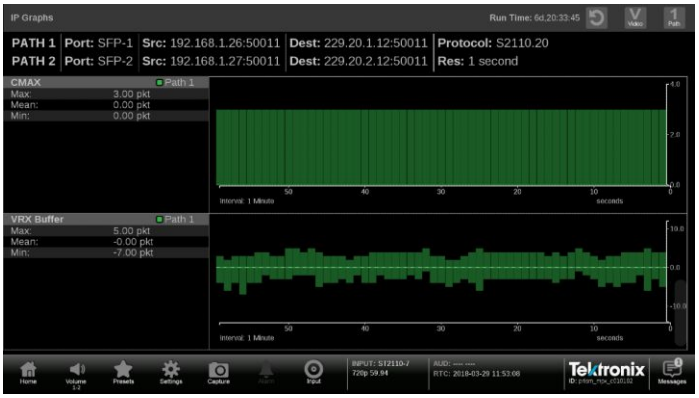
Master-Slave Delay and Master-Slave Variation graphs.

Use ST2110-21 Buffer modeling to ensure standards compliance in senders

ST2110-21 specifies a timing model for ST2110-10 video RTP streams with the following parametric models:

- A network compatibility model to regulate the burst characteristics of senders, which promotes the compatibility with the switches
- A virtual receiver buffer model to ensure there is no buffer overflow/ underflow in the receiver that could cause the packet loss and picture quality degradation

The IP Graphs display provides a trend graph with both types of modeling to help engineers properly setup the packet delivery timing in the RTP packet sender.

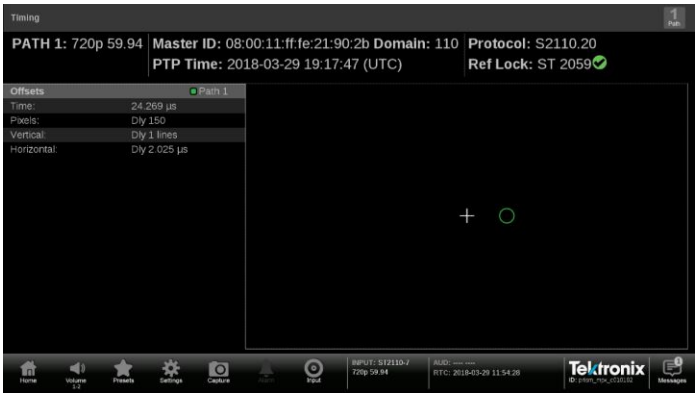


CMAX / VRX Buffer trend graph

Validate system timing in IP and SDI

The importance of timing adjustment in an IP broadcast facility is unchanged. As the alignment mechanism uses the timestamp in the streams, correct time stamping at the source device is important. The variance of transmission time at the mixing point, such as a production switcher, needs to be less than the buffer size chosen for the minimum latency.

The Tektronix-patented Timing application makes facility timing easy through a simple graphical representation, which shows the relative timing of the SMPTE 2022-6 stream and the PTP reference on an X-Y axis and visualizes the one-dimensional time delay in terms of the picture parameters. This allows timing adjustment in units of lines and microseconds.



ST2110-20 timing against the PTP reference.

Since ST 2022-6 streams are complete SDI signals encapsulated in IP, the timing measurement treats these IP signals as if they were SDI. Therefore, the timing system detects the start of the IP frame, and then extrapolates to the 0h point of the encapsulated SDI. Then using PTP as the reference, the ideal alignment point for that frame rate is calculated based on the PTP epoch. Finally, the offset between the ST 2022-6 signal and the ideal alignment is displayed. The display shows both the absolute time and the time parsed into lines or horizontal delay as time and pixels.

One use for the Timing application is to measure the delay in a gateway and network. If a properly timed SDI signal is applied to a gateway, then the timing measurement on the resulting IP flow will display the combined latency in the gateway and the network. Another use is to measure multiple signals and compare the relative timing.

In the ST2110 system, the timing of received packets of each element is critical because they have to be presented to the viewers in a time-aligned manner based on the time stamp. The Timing application displays the timing of the Video stream against PTP and the Stream Timing application shows the timing of the Video, Audio and Data as it was received relative to the embedded RTP time stamps. It also shows the relative delay between Audio/Video and the Data/Video, which is the amount of delay needed to re-align the two essence types. Video engineers use this information to make sure the packets of all the elements are received within the tolerance of the receiving buffer. They can then align the timing of each stream based on the time stamp in RTP packet header.

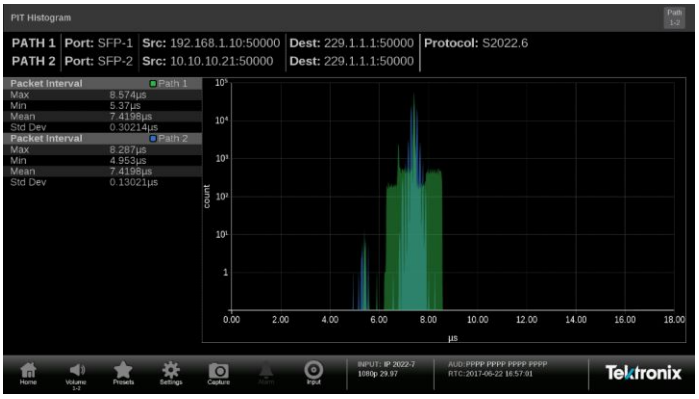
ST2110-20 timing against PTP and packet latency trend graph.

In a hybrid SDI/IP broadcast facility, there are instruments that accept either analog reference signal or PTP. Therefore, the system must prepare both analog signal and PTP as reference system, and it is important for engineers to ensure that they are locked. The Timing application in PRISM offers relative timing measurement of BB/TLS or input SDI signal against PTP reference and helps engineers to quickly setup a robust reference system required in a hybrid broadcast facility.

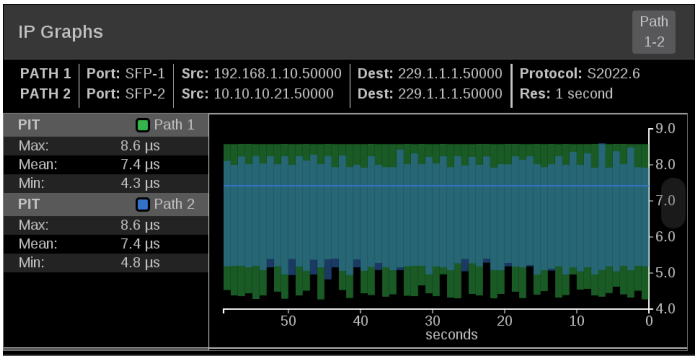
Monitor the service quality of the network to ensure robust performance

The asynchronous nature of an IP system can produce a wide variety of bandwidth usage; in extreme cases this can result in the loss of packets. Therefore, it is important to be able to monitor the network traffic and engineers need tools to evaluate packet loss.

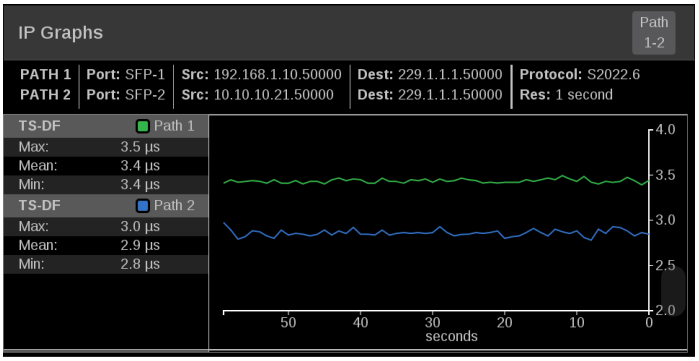
PRISM provides a Packet Interval Time (PIT) histogram and trend graph for ST2110 and ST2022-6 streams. It also provides the trend graph of Time Stamped Delay Factor (TS-DF) standardized in EBU-TECH 3337 for the ST2022-6 stream to help engineers determine how the packet interarrival time from a sender is affected in the system. These measurements can help engineers determine the root cause when packet loss has occurred.



PIT Histogram application for monitoring the range of PIT variance.



PIT trend graph for monitoring the trend of PIT variance over time.

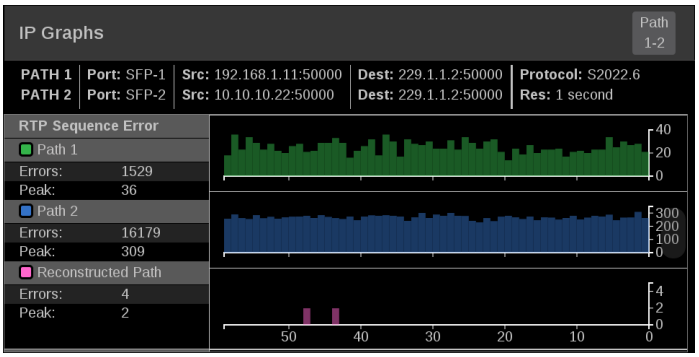


TS-DF trend graph for monitoring the trend of TS-DF variance over time (ST2022-6).

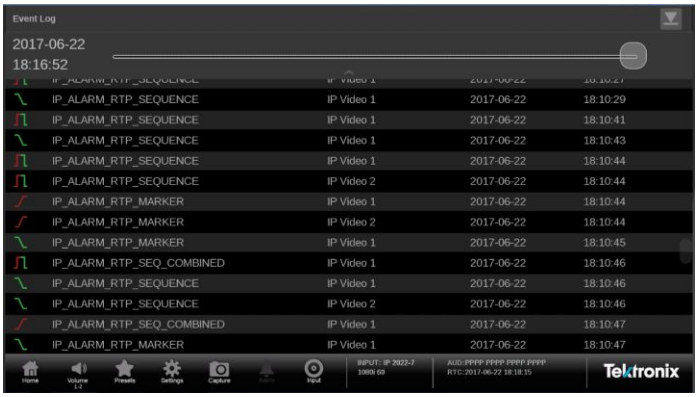
Debug a hybrid IP/SDI broadcast system to isolate the root cause

Engineers debugging a hybrid IP/SDI system first need to isolate the root cause of the error to find whether the error is in the IP layer or in the content layer. Details of the error can then be determined by examining the identified layer. PRISM offers error detection feature sets in both the IP and content layers using the Event Log application.

The graphical displays show the error trend correlated to historical data. In these displays, the errors detected in both IP and content layers are time correlated, which allows the engineer to verify the error is in the IP or content layer. For example, if an error is detected in the content layer but not in the IP layer, then the error may have happened before the content was wrapped by the IP headers.



RTP Sequence Error incident graph for monitoring the errors detected over time.



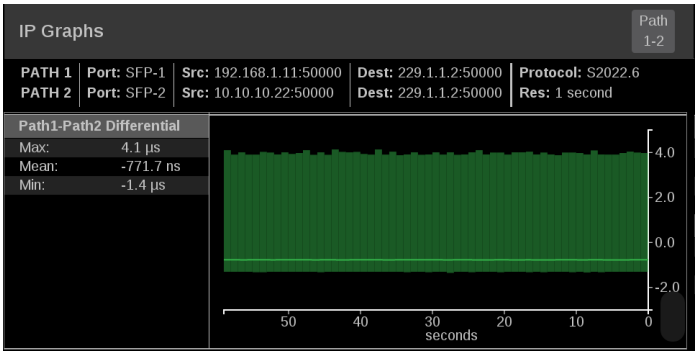
Event Log application for checking the details of error events.

Monitor redundant paths in the network to ensure that the primary and back up are operational

For broadcasters that are committed to their clients, ensuring 24/7 quality broadcasting is a minimum requirement. SMPTE 2022-7 was standardized to build and operate a redundant IP system for broadcasters. PRISM provides broadcast engineers a monitoring solution to properly setup the redundant ST2110 system.

When an input configured with SMPTE 2022-7 enabled is selected, the difference in the receive time of datagrams on path number 1 and 2 is monitored to help engineers determine the signal path and buffer setting in the receiver. PRISM also offers packet header interpretation and error detection for the two paths simultaneously.

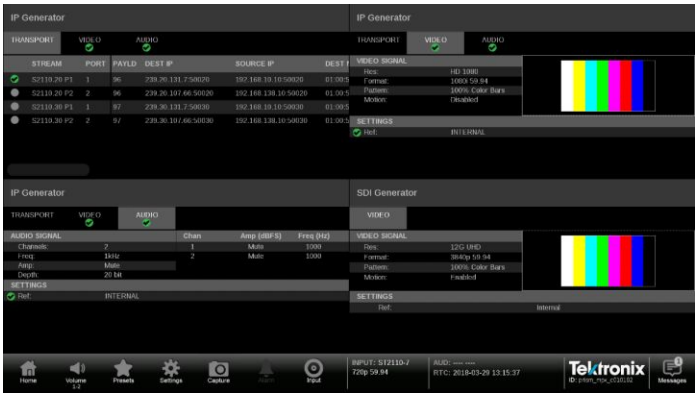
The reconstructed output stream is fed to the content layer applications, such as Picture and Waveform, and to the AUX output.



Path 1 – Path 2 Delay graph. A positive number indicates that Path 2 arrived first and a negative number indicates that Path 1 arrived first.

Use a known good signal to check the receiver devices and the signal path

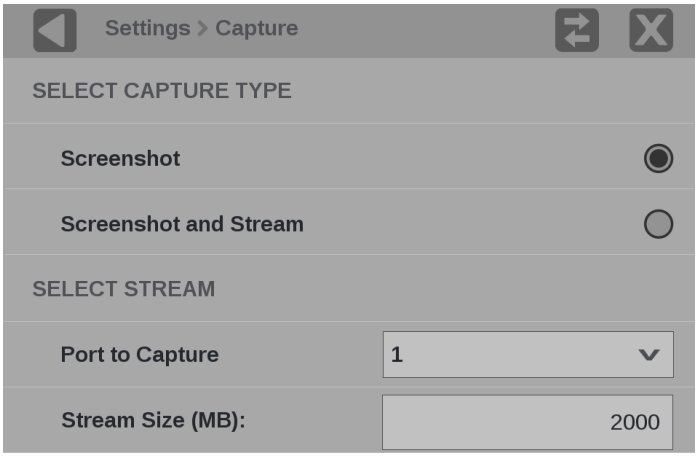
Finding a known good signal in the broadcast facility for a quick test can be time consuming. PRISM provides ST2110-20/-30 with ST2022-7 and 12G-SDI test signals that can be used to quickly check the receiver device and the signal path in complex IP/SDI facilities.



IP Generator and SDI Generator application displays.

Capture problem streams for offline analysis

When engineers require detailed analysis with an offline tool, the IP capture feature in PRISM allows them to quickly access the stream they need to analyze. The 2 GB capture capability can create a pcap file of up to 1.6 seconds at 10 Gbps.



Capture settings menu.

Familiar feature set for Broadcast Engineering

- Picture, Waveform, Vector, Audio bar, Video Session
- Timing measurement
- Eye / Jitter measurement

Monitor the quality of content with familiar feature sets

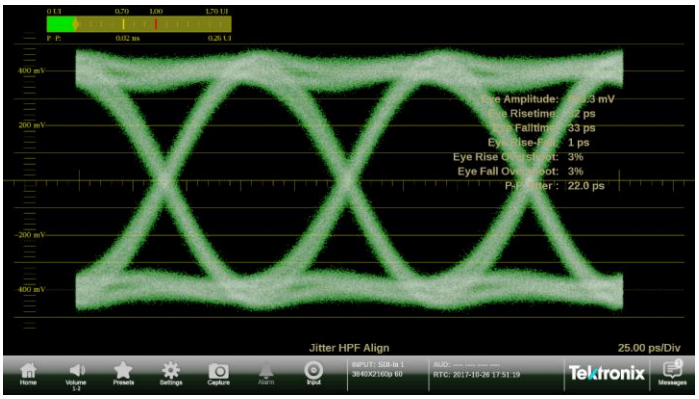
In any broadcasting system, ensuring the quality of Video and Audio is the most important task for broadcast engineers. The Picture, Waveform, Audio and Video Session applications are available for engineers who need the familiar feature sets to instantly check the quality of content.

Picture, Waveform, Audio, and Video Session applications provide content conformance monitoring tools.

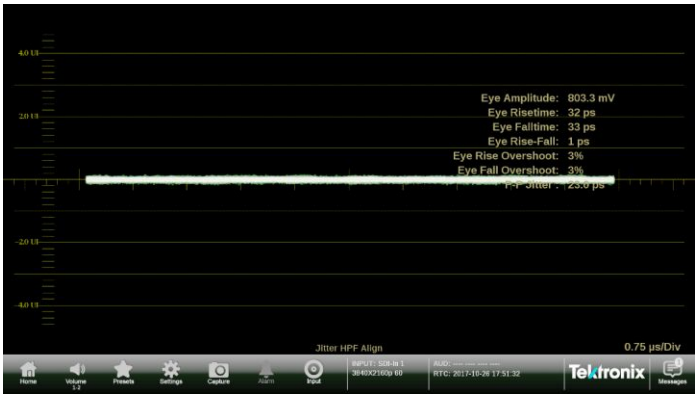
Measure the integrity of the SDI infrastructure up to 12G

In an SDI video system, checking SDI signal quality and integrity is one of the most important tasks before starting to shoot a show. PRISM has unique capabilities such as providing various jitter filters from 10 Hz to 100 kHz for SD/HD/3G/12G-SDI signals.

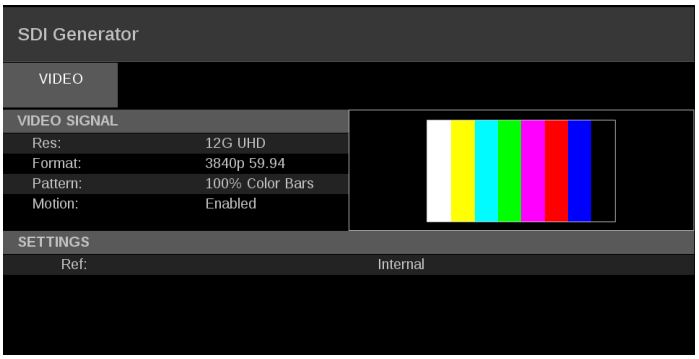
In addition, PRISM can also perform automated eye amplitude, automated rise/fall time, and automated overshoot/undershoot measurements. These capabilities, along with the integrated SDI signal generation feature, help broadcasters and network operators detect and diagnose signal quality problems quickly and efficiently.



12G-SDI Eye pattern display with Automatic measurements



12G-SDI Jitter display

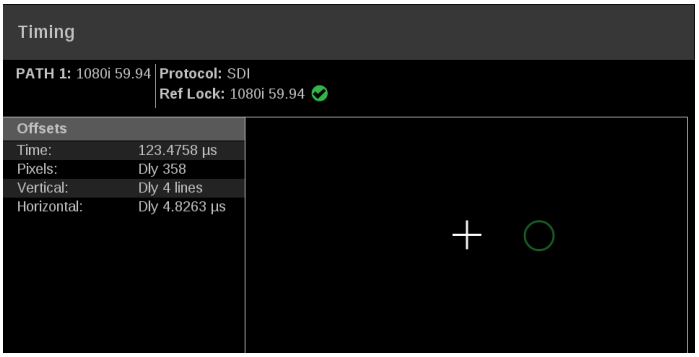


Integrated SDI signal generator

Ensure the SDI is in-sync and aligned

Audio/Video synchronization is an important challenge in the processing of video signals. The Tektronix-patented SMPTE RP168 compliant Timing display makes facility timing easy through a simple graphical representation which shows the relative timing of the input SDI signal and the reference signal (or a saved offset reference) on an X-Y axis.

With quad link connection for 4K format transmission, it is important to ensure that four SDI links are time aligned at reception. The timing display provides Quad interlink timing measurement to ensure the time alignment difference between links is compliant to the standard and no quality degradation in picture presentation.

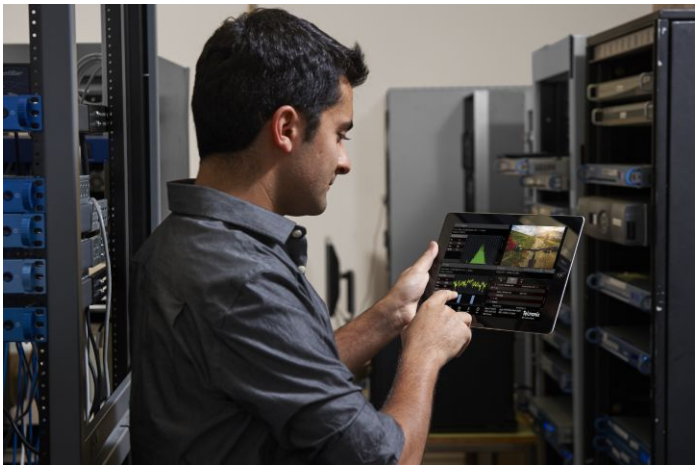


Easy integration into a wide range of environments

- Web control
- API
- NMOS/SDP
- Dual display module
- AUX output

Operate PRISM remotely to provide immediate facility assistance

Within a hybrid IP/SDI facility, there are a wide variety of tasks an engineer needs to perform to troubleshoot issues and to quickly provide assistance to operators to ensure deadlines are met and facilities remain on air. The remote-control feature in PRISM allows the engineer to remotely access the unit with a Web browser application running on a PC or tablet computer. This allows the engineer to immediately provide assistance by starting to diagnose the problem from their desk, minimizing down time, and helping to isolate the cause of the problem.

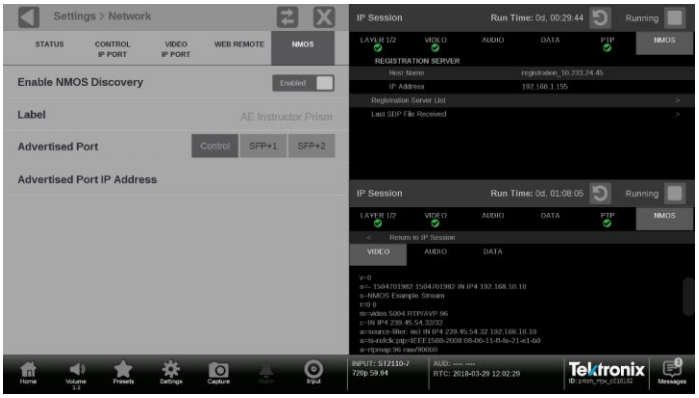


Remote monitoring using a Web browser.

Control PRISM from system management software using NMOS/SDP and API

Operators in SDI facilities have used SDI router control panels to select the SDI source to monitor on a waveform monitor. In an SDI/IP hybrid facility, the system integrators need to provide similar capability for the operators. This requires system management software to discover and register the endpoint equipment and send commands, so they can subscribe to streams through IGMP V3.

The NMOS/SDP and API allows system integrators to build an IP system with PRISM being managed by system management software. The software discovers, registers, configures inputs, and selects the active input for monitoring.



NMOS setup menu and Registration Server/SDP Reader display.

Example API commands

Function	Mode
/api/configureInput	GET
/api/configureInput	POST
/api/activeInput	GET
/api/activeInput	POST
/api/help	GET

Configure PRISM for desktop, rackmount, or console to suit every use case

PRISM offers two platform options: 3RU half-rack width (MPI2) and 1RU full rack width (MPX2) to allow the instrument to be easily integrated into different environments. Use with touchscreen or KVM depending on application or operator's preference.

Extend PRISM display to maximize screen area in a confined space

PRISM provides innovative and unique accessories to save space and cost. Dual display accessories can be used to save space and remove the need for a second instrument in shader/video engineer positions.

MPI2-10 and MPI2-RACK-MD

Build an audio/video monitoring set in 4RU

The MPX2 can be fitted with high quality integrated speakers and quick audio channel selection to provide audio monitoring and waveform monitoring in a single instrument. Combining with extended display, customers can create fully integrated audio/video monitoring suit in 4RU.

MPX2-10 and MPX2-DUALDSP

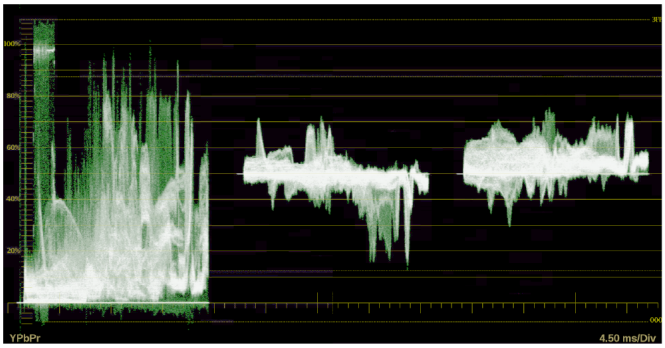
Use AUX SDI Output as gateway for local reference picture monitor

In a IP broadcast system, PRISM can be used as a gateway to drive SDI reference picture monitor. AUX output follows a selected input signal regardless of IP or SDI and includes embedded audio. It simplifies the control system and minimize the number of cables and IP ports.

Standard application tool set

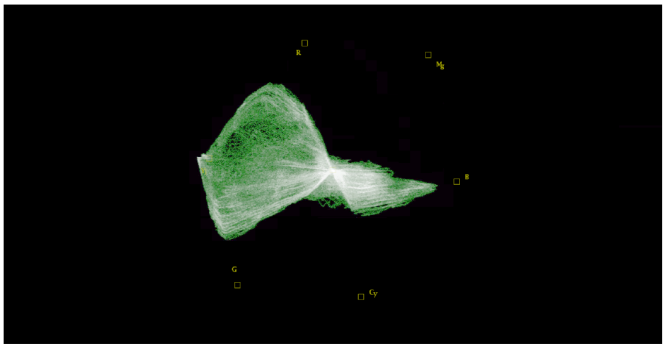
Picture

- SD / HD / 3G / 6G / 12G-SDI, ST2022-6, ST2110-20
- Checking composition, level, and color at production
- Transfer function / color space conversion (MP2-PROD)



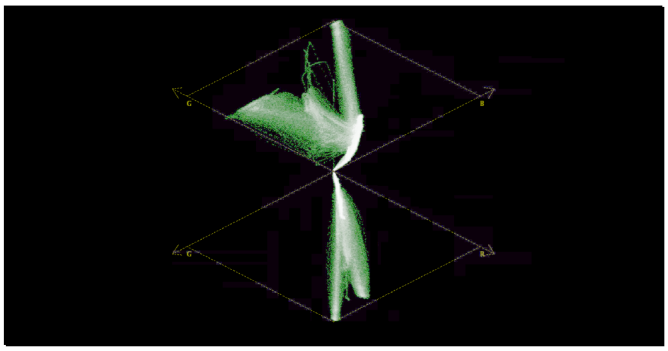
Waveform

- YCbCr, YRGB, RGB, Y Only mode
- mv, %, reflectance %, Code Value, Nits, Stop graticules
- Transfer function / color space conversion (MP2-PROD)



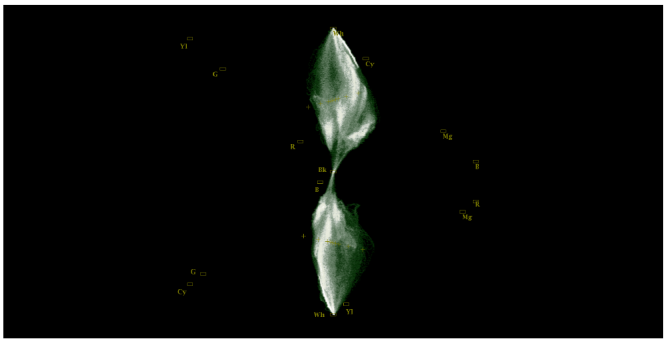
Vector

- XY trace with Cb/Cr component
- I axis for skin tone adjustment, white / black balancing
- Transfer function / color space conversion (MP2-PROD)



Diamond

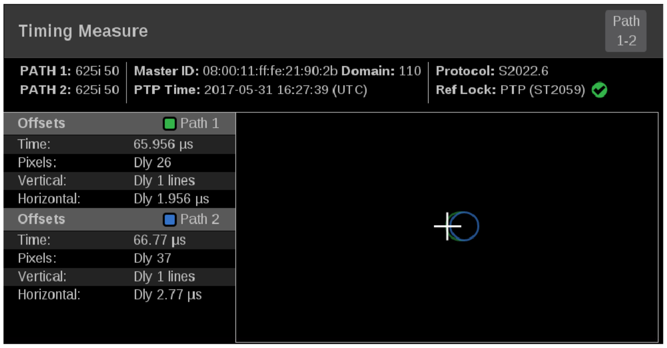
- Gamut error monitoring and white balance
- Transfer function / color space conversion (MP2-PROD)



Lightning

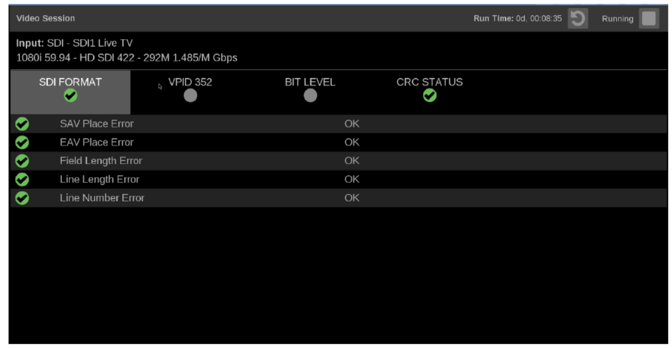
- XY trace with Y, Cb / Cr component
- White / black balancing
- Transfer function / color space conversion (MP2-PROD)

Standard application tool set



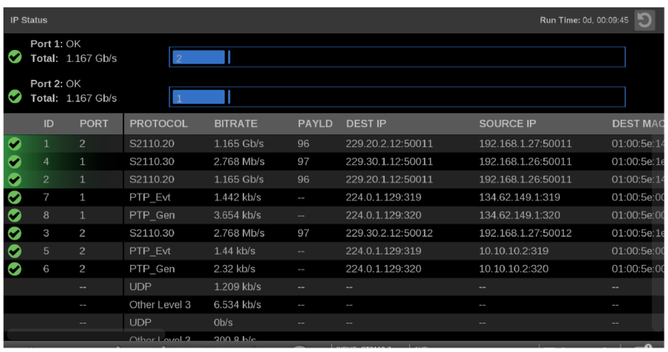
Timing

- Timing measurement of SDI vs BB / TLS
- Quad interlink timing - Quad HD, 3G (MP2-FMT-4K)



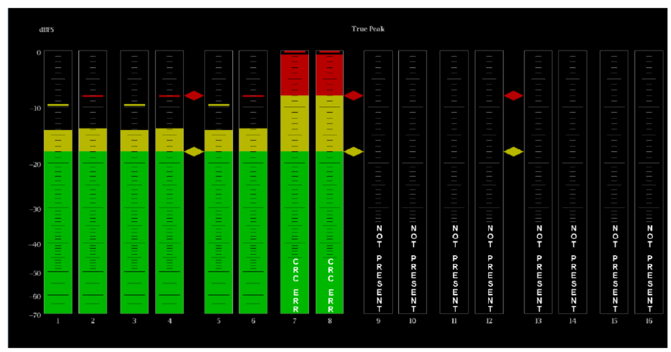
Video Session

- SD / HD / 3G / 6G / 12G-SDI, ST2022-6
- VPID, Bit Activity, CRC Error detection



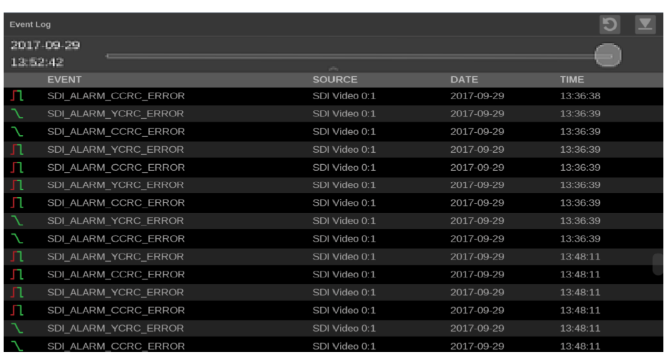
IP Status

- List the streams and communications in 10GE cables
- Simultaneously monitoring two ports for ST2022-7
- Error detection, Protocol, Bit rate, IP Address / Port and more



Audio

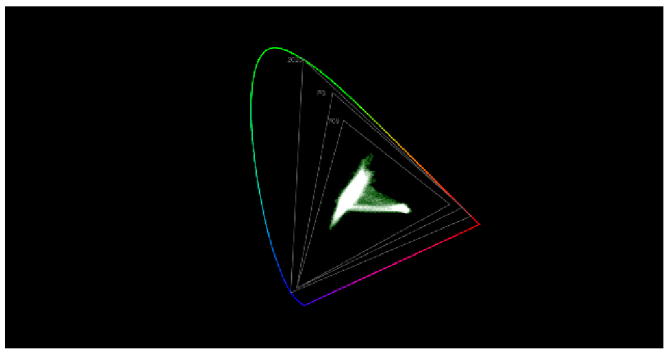
- SDI Embedded, ST2022-6 and ST2110-30 (AES67)
- Up to 16 channel audio, peak level meter



Event Log

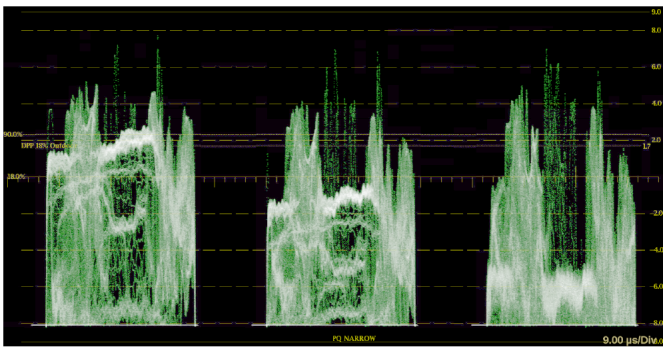
- Event / Error log with the source and time information

Optional application tool set for production (MP2-PROD)



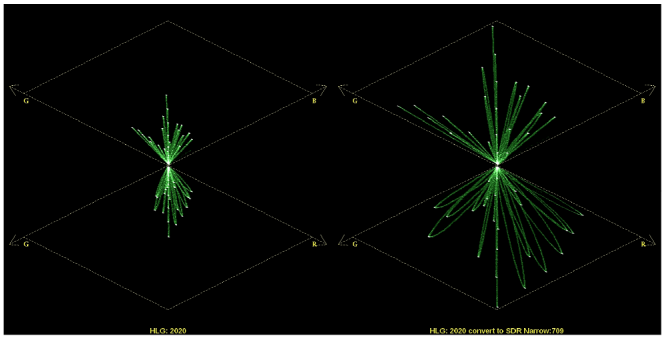
CIE Chart

- XY trace in x, y color space
- BT.709, BT.2020, and P3 triangle graticule



Stop Display

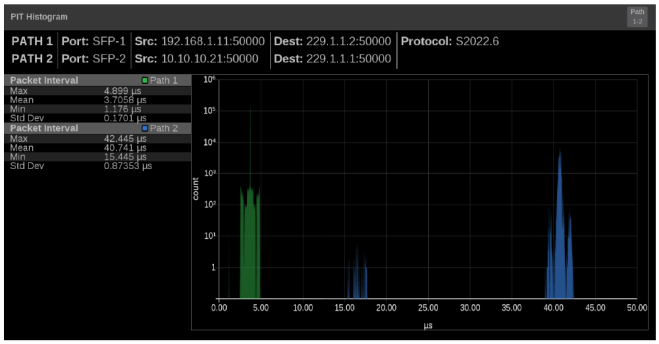
- Stop and decade Nits graticule
- Balance cameras with different gamma
- Compare SDR and HDR feeds



Transfer function / Color space conversion

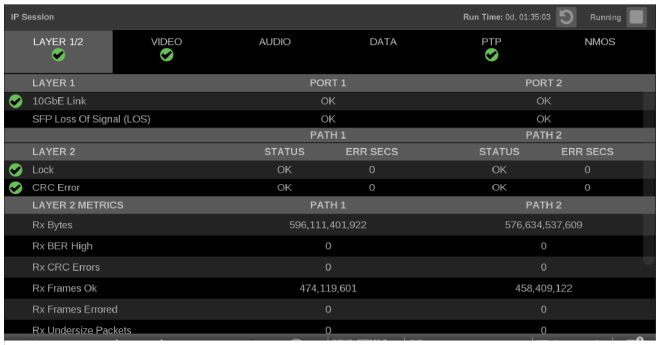
- Convert input signal to SDR / 709
- Familiar SDR / 709 tool for HDR / WCG monitoring
- In Picture, Waveform, Vector, Diamond, and Lightning displays

Optional application tool set for IP Engineering (MP2-IP-MEAS)



PIT Histogram

- ST2022-6, ST2022-7, ST2110-20 / 30 / 40
- Simultaneously monitoring two ports for ST2022-7
- Balance the packet loss probability and the system latency

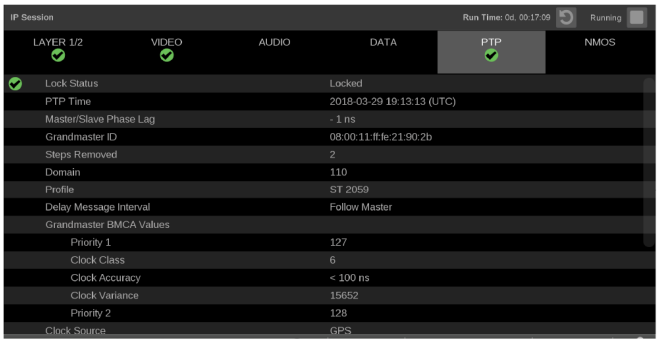


IP Session: Layer 1/2

- Layer 1, Layer 2 session display
- Simultaneously monitoring two ports for ST2022-7
- Link / SFP information, Rx Bytes, CRC Errors, Frame count

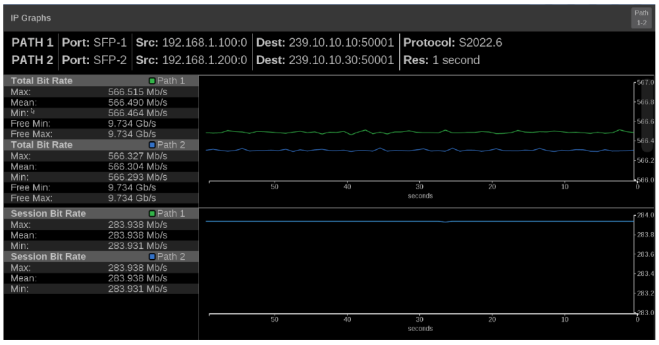
IP Session: Video

- IP / UDP / RTP layer session display
- Simultaneously monitoring two ports for ST2022-7
- Error detection, HBRMT (ST2022-6) decoding



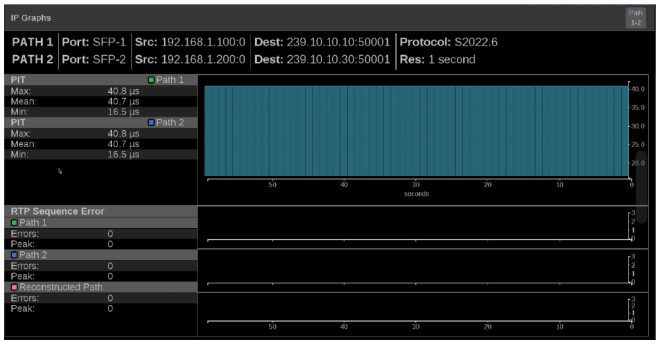
IP Session: PTP

- PTP lock status and session display
- PTP time, Master / Slave phase lag, Grandmaster ID
- Interpretation of Announce Message



IP Graphs : Bit rate

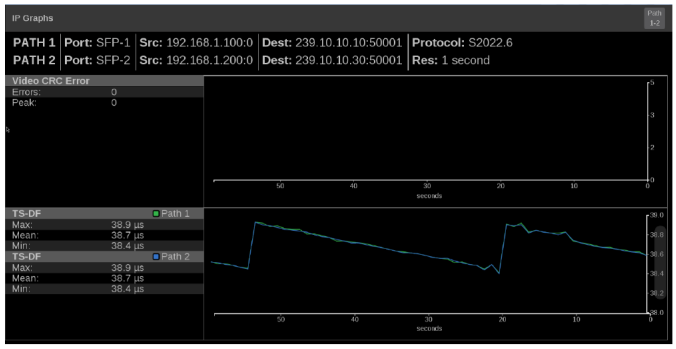
- Total bit rate, Session bit rate
- Max / Mean / Min value in the selected time window
- Simultaneously monitoring two ports for ST2022-7



IP Graphs: PIT

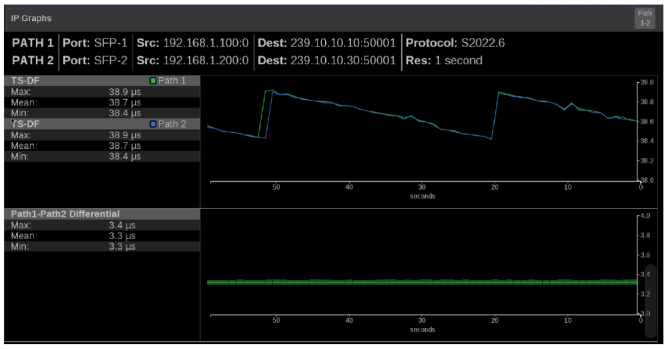
- Detect intermittent packet loss in the trend graph
- Time correlated trend graphs for root cause isolation
- Two paths and reconstructed path monitoring for ST2022-7

Optional application tool set for IP Engineering (MP2-IP-MEAS)



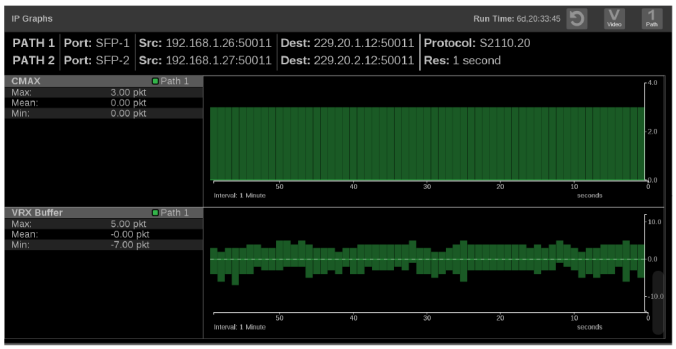
IP Graphs: CRC Error and TS-DF

- Time correlated trend graphs for root cause isolation
- TS-DF standardized in EBU-TECH 3337
- Video CRC detection in ST2022-6



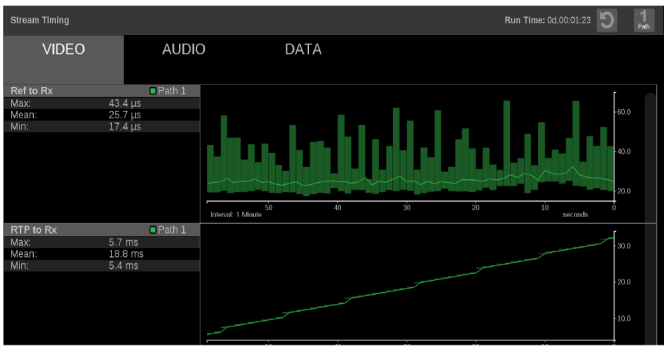
IP Graphs: Path1-2 Differential

- Packet arrival time difference in ST2022-7
- Ensure the proper packet reconstruction



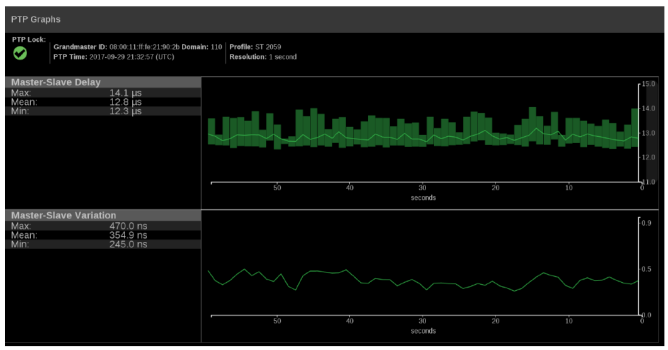
IP Graphs: CMAX, VRX Buffer

- SMPTE 2110-21 modeling
- CMAX: Network compatibility model
- VRX: Virtual Receiver buffer model



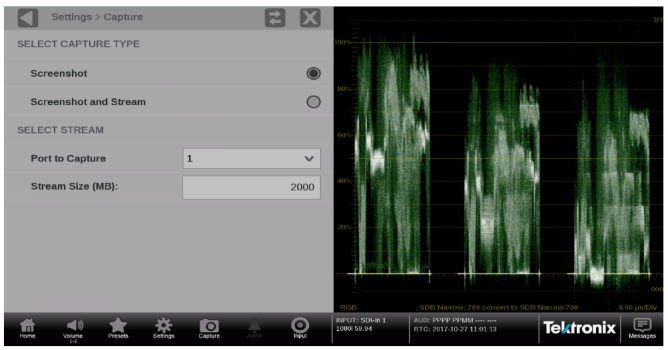
Stream Timing

- SMPTE 2110-20 video stream timing against PTP
- Video / Audio / Data packet latency
- Video / Audio, Video / Data timing difference



PTP Graph

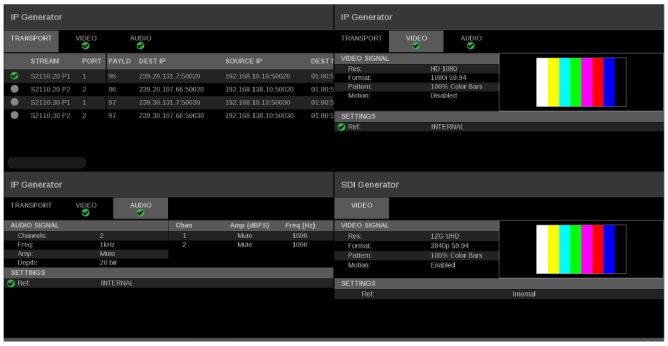
- Master / Slave Delay, Delay variance and Phase lag
- Ensure proper PTP system setting
- Detect intermittent PTP locking issue



IP Stream Capture

- IP stream capture for offline analysis

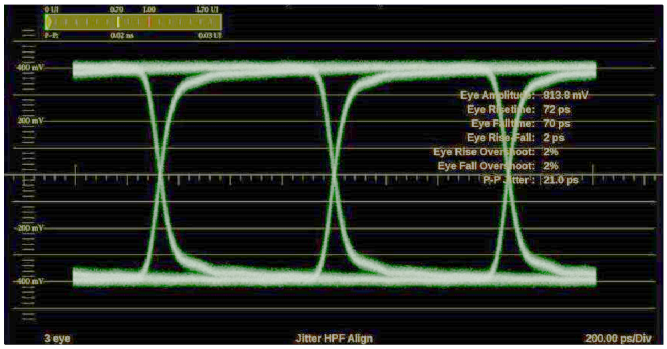
Optional application tool set for Engineering (MP2-GEN)



Generators

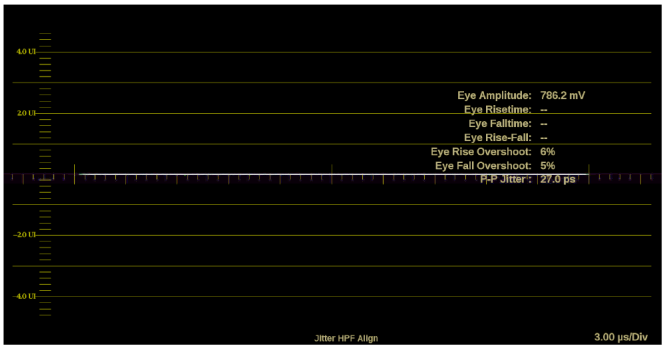
- ST2110-20 / 30 locking to PTP and 12G-SDI
- Basic test patterns

Optional application tool set for Engineering (Option PHY)



Eye Display

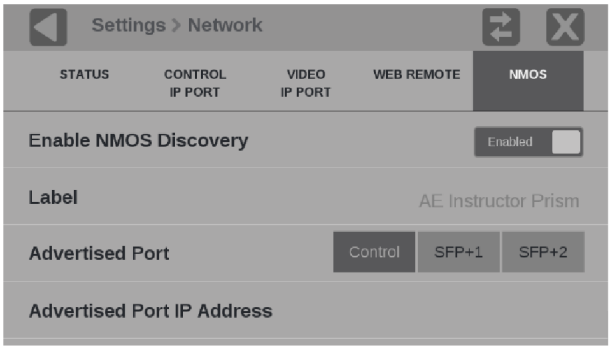
- SD / HD / 3G / 6G / 12G-SDI (MP2-FMT-4K for 6G / 12G)
- Automatic parameter measurements
- Characterize the SDI output of source instrument



Jitter Display

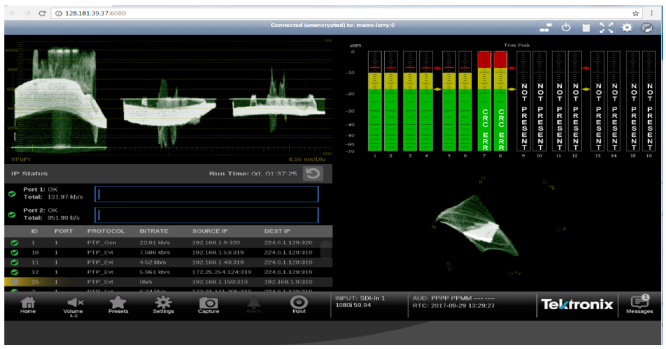
- SD / HD / 3G / 6G / 12G-SDI (MP2-FMT-4K for 6G / 12G)
- Measures more than 1UI jitter
- Characterize the SDI output of source instrument

System setup and usability



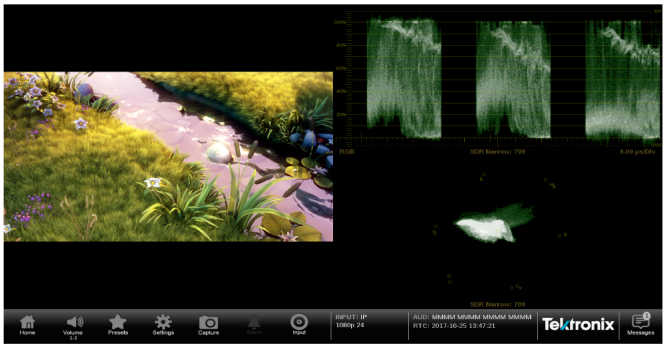
NMOS / API

- Discovery and Registration
- Compliant to AMWA NMOS IS-04 / 05
- Control PRISM from system management software



Remote VNC

- Support VNC Client software
- Manage multiple PRISM units from remote location



Fullscreen, 2, 3 and 4 tile display

- Flexible tile configuration
- Configure the display to best fit to your application

Application selection menu

- Quick access to applications with a customizable application selection menu

Touchscreen / Mouse

- Intuitive / quick operation
- Easy navigation
- Higher flexibility in user interaction

Dual Display module

- Larger display area
- Installation for shallow depth rack
- MPI2-RACK-MD for MPI2-10, MPX2-DUALDSP for MPX2-10

Supported formats

Supported SDI formats

Link	Format	Sample Structure		Bits	Frame/field rate	Option
SD-SDI	525i	4:2:2	YCbCr	10b	59.94	Base instrument
	625i	4:2:2	YCbCr	10b	50	Base instrument
HD-SDI	1920x1080	4:2:2	YCbCr	10b	50/59.94/60i	Base instrument
	1280x720	4:2:2	YCbCr	10b	50/59.94/60p	Base instrument
3G-SDI Level A	1920x1080	4:2:2	YCbCr	10b	50/59.94/60p	Base instrument
3G-SDI Level B	1920x1080	4:2:2	YCbCr	10b	50/59.94/60p	Base instrument
Quad Link 3G-SDI Level A, Square Division	3840x2160	4:2:2	YCbCr	10b	50/59.94/60p	MP2-FMT-4K
Quad Link 3G-SDI Level B, Square Division	3840x2160	4:2:2	YCbCr	10b	50/59.94/60p	MP2-FMT-4K
Quad Link 3G-SDI Level A, Two Sample Interleave	3840x2160	4:2:2	YCbCr	10b	50/59.94/60p	MP2-FMT-4K
Quad Link 3G-SDI Level B, Two Sample Interleave	3840x2160	4:2:2	YCbCr	10b	50/59.94/60p	MP2-FMT-4K
12G-SDI [1]	3840x2160	4:2:2	YCbCr	10b	50/59.94/60p	MP2-FMT-4K

Supported video formats in SMPTE 2022-6 streams

Link	Format	Sample Structure		Bits	Frame/field rate	Option
SD-SDI	525i	4:2:2	YCbCr	10b	59.94	Base instrument
	625i	4:2:2	YCbCr	10b	50	Base instrument
HD-SDI	1920x1080	4:2:2	YCbCr	10b	50/59.94/60i	Base instrument
	1280x720	4:2:2	YCbCr	10b	50/59.94/60p	Base instrument
3G-SDI Level A	1920x1080	4:2:2	YCbCr	10b	50/59.94/60p	Base instrument
3G-SDI Level B	1920x1080	4:2:2	YCbCr	10b	50/59.94/60p	Base instrument

Supported video formats in SMPTE 2110-20 streams

Link	Format	Sample Structure		Bits	Frame/field rate	Option
ST2110-20	1920x1080	4:2:2	YCbCr	10b	50/59.94/60i	Base instrument
	1280x720	4:2:2	YCbCr	10b	50/59.94/60p	Base instrument
	1920x1080	4:2:2	YCbCr	10b	50/59.94/60p	Base instrument
	525i	4:2:2	YCbCr	10b	59.94i	Base instrument
	625i	4:2:2	YCbCr	10b	50i	Base instrument

1 12G-SDI support is available in SDI 1 and SDI 3 inputs.

Receiver conformance level in SMPTE 2110-30 streams

Conformance level	Description
Conformance level B [2]	Reception of 48 KHz streams with 1 to 8 channels at packet times of 1 ms or 1 to 8 channels at packet times of 125 µs

Specifications

All specifications are guaranteed unless noted otherwise. All specifications apply to all models unless noted otherwise.

MPI2-10 power characteristics

Power consumption

Typical	100 W
Maximum	200 W
Voltage range	100 to 240 VAC ±10%, 50/60 Hz

MPI2-10 physical characteristics

Dimensions

Height (at bezel)	13.34 cm (5.25 in.)
Width (at bezel)	21.91 cm (8.625 in.)
Depth	30.48 cm (12.00 in.)
Weight (net)	3.4 kg (7.45 lbs.)

MPX2-10 power characteristics

Power consumption

Typical	100 W
Maximum	200 W
Voltage range	100 to 240 VAC ±10%, 50/60 Hz

MPX2-10 physical characteristics

Dimensions

Height	4.45 cm (1.75 in.)
Width	48.26 cm (19.00 in.)
Depth	45.72 cm (18.00 in.)
Weight (net)	3.9 kg (8.7 lbs.)

2 Also supports reception of 48 KHz with 1 to 16 channels at packet times of 125 µs

Ordering information

Models

MPI2-10	PRISM Media platform, MPI2-10; 3RU half rack with integrated 9 inch HD display and touch panel; 4 SDI BNC Inputs with SD/HD/3G formats; 2 SFP+ sockets for ST2022-6/7, ST2110, PTP in 10GE
MPX2-10	PRISM Media platform, MPX2-10; 1RU full rack; 4 SDI BNC Inputs with SD/HD/3G formats; 2 SFP+ sockets for ST2022-6/7, ST2110, PTP in 10GE

Options

Hardware options

PHY	Add SDI Physical Layer Measurement Package (includes automated measurement of 12G/6G/3G/HD/SDI Eye pattern parameters and jitter parameters; jitter waveform display). MP2-FMT-4K license required for 12G/6G-SDI support
MPX2 RACK	Add rackmount slides and rails kit for MPX2
MPX2 SPKR	Add integrated stereo speaker set, No field upgrade kit is available

Software options

MP2-IP-MEAS	Add node locked license for IP Measurement feature sets: includes IP/PTP Graph, IP/PTP Session, PIT Histogram, Timing, Stream Timing and Stream capture applications; Node Locked
MP2-FMT-4K	Add node locked license for 4K formats, enable 6G/12G-SDI; Node Locked
MP2-PROD	Add node locked license for Production feature sets: includes Stop, HDR/WCG Conversion, and CIE applications/feature sets; Node Locked
MP2-GEN	Add node locked license for SDI/IP signal generator; includes IP/SDI Generator application; Node Locked
MP2-EXTNDSP	Add node locked license for enabling extended desk top; Node Locked

PowerPlugOptions

Opt. A0	North America power plug (115 V, 60 Hz)
Opt. A1	Universal Euro power plug (220 V, 50 Hz)
Opt. A2	United Kingdom power plug (240 V, 50 Hz)
Opt. A3	Australia power plug (240 V, 50 Hz)
Opt. A4	North America power plug (240 V, 50 Hz)
Opt. A5	Switzerland power plug (220 V, 50 Hz)
Opt. A6	Japan power plug (100 V, 50/60 Hz)
Opt. A10	China power plug (50 Hz)
Opt. A11	India power plug (50 Hz)
Opt. A12	Brazil power plug (60 Hz)
Opt. A99	No power cord

Service Options

Opt. C3	Calibration Service 3 Years
Opt. C5	Calibration Service 5 Years
Opt. D1	Calibration Data Report
Opt. D3	Calibration Data Report 3 Years (with Opt. C3)
Opt. D5	Calibration Data Report 5 Years (with Opt. C5)
Opt. G3	Complete Care 3 Years (includes loaner, scheduled calibration, and more)
Opt. G5	Complete Care 5 Years (includes loaner, scheduled calibration, and more)
Opt. R3	Repair Service 3 Years (including warranty)
Opt. R5	Repair Service 5 Years (including warranty)

Post purchase upgrades

MPI2-10-UP

Opt. PHY	Add SDI Physical Layer Measurement Package (incl. automated measurement of 12G/6G/3G/HD/SDI Eye pattern parameters and jitter parameters; jitter waveform display). MP2-FMT-4K license required for 12G/6G-SDI support
Opt. 25GE	25GE module field upgrade kit, includes MP2-25GE License [3]
Opt. 25GE-PHY	Physical measurement package for 25GE module field upgrade kit (requires MPI2-10-UP 25GE) [3]

MPX2-10-UP

Opt. PHY	Add SDI Physical Layer Measurement Package (incl. automated measurement of 12G/6G/3G/HD/SDI Eye pattern parameters and jitter parameters; jitter waveform display). MP2-FMT-4K license required for 12G/6G-SDI support
Opt. 25GE	25GE module field upgrade kit, includes MP2-25GE License [3]
Opt. 25GE-PHY	SDI Physical measurement package for 25GE module field upgrade kit (requires MPX2-10-UP 25GE) [3]

MPI2 rear panel with 25GE module installed [3]

Warranty

Standard product warranty: 1 year; Long-term product support: 5 years

3 25GE upgrade kit will be available in the future release

Recommended accessories

MPI2-PTBL	Portable cabinet with handle, feet, Tile bail and protective front cover

MPI-RACK-MM	19 inch, 3RU dual rack cabinet for one MPI unit or two MPI units in a side-by-side installation, includes front panel USB/headphone connectors for each MPI unit
MPI-RACK-MW	19 inch, 3RU dual rack cabinet for one MPI unit or one MPI unit in a side-by-side installation with a WFM52x0, WFM7200, WFM8x00 instrument, includes front panel USB/headphone connectors for one MPI unit
MPI2-RACK-MD	19 inch, 3RU Rack Cabinet with display and touch panel, USB/Headphone connector on rack ear
MPX2-DUALDSP	19 inch, 3RU Dual display unit with touch panel, USB/Headphone connector on rack ear
MP-SFP	
Opt. 3GTO	SD/HD/3G Optical (1310 nm) SDI SFP transmitter module (to be installed into SDI SFP+ cage for optical SDI loop through output)
Opt. 3GTD	SD/HD/3G DIN SDI SFP transmitter module (to be installed into SDI SFP+ cage for SDI loop through output with DIN coaxial connector)
Opt. 3GTH	SD/HD/3G HDBNC SDI SFP transmitter module (to be installed into SDI SFP+ cage for SDI loop through output with HDBNC coaxial connector)
Opt. 10GESR	10G Ethernet short range (850 nm) transceiver module (to be installed into 10GbE SFP+ cage); requires Option MPI-IP-STD
Opt. 10GELR	10G Ethernet long range (1310 nm) transceiver module (to be installed into 10GbE SFP+ cage); requires Option MPI-IP-STD
MP-CBL	
Opt. RACK-MD	PRISM A cable kit for MPI2-RACK-MD, 0.5 M DisplayPort male to DisplayPort male cable and 0.5 M USB 3.0 A male to B male cable
Opt. DUALDSP	PRISM A cable kit for MPX2-DUALDSP, Two sets of 2 M DisplayPort male to DisplayPort male cable and 2 M USB 3.0 A male to B male cable
Opt. HDBNC-BNC	PRISM Coaxial adapter cables from high-density male BNC connector to standard female BNC connector (a set of 3 cables, 75 Ω, 0.5 M long)

Post purchase upgrade for MPI and MPX

MPI-UP

Opt. PHY	Add SDI Physical Layer Measurement Package (incl. automated measurement of 12G/6G/3G/HD/SDI Eye pattern parameters and jitter parameters; jitter waveform display). MP-FMT-4K license required for 12G/6G-SDI support
Opt. 25GE	25GE module field upgrade kit, includes MP2-25GE License [4]
Opt. 25GE-PHY	SDI Physical measurement package for 25GE module field upgrade kit (requires MPI-UP 25GE) [4]

MPX-UP

Opt. PHY	Add SDI Physical Layer Measurement Package (incl. automated measurement of 12G/6G/3G/HD/SDI Eye pattern parameters and jitter parameters; jitter waveform display). MP2-FMT-4K license required for 12G/6G-SDI support
Opt. 25GE	25GE module field upgrade kit, includes MP2-25GE License [4]
Opt. 25GE-PHY	SDI Physical measurement package for 25GE module field upgrade kit (requires MPX-UP 25GE) [4]

MPI2-10 with MPI2-PTBL front and rear panels

MPX2-10 front and rear panels

4 25GE upgrade kit will be available in the future release.

MPI2-RACK-MD (MPI2-10 in left slot)

MPX2-DUALDSP

CE

Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.

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For Further Information. Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit www.tek.com.

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