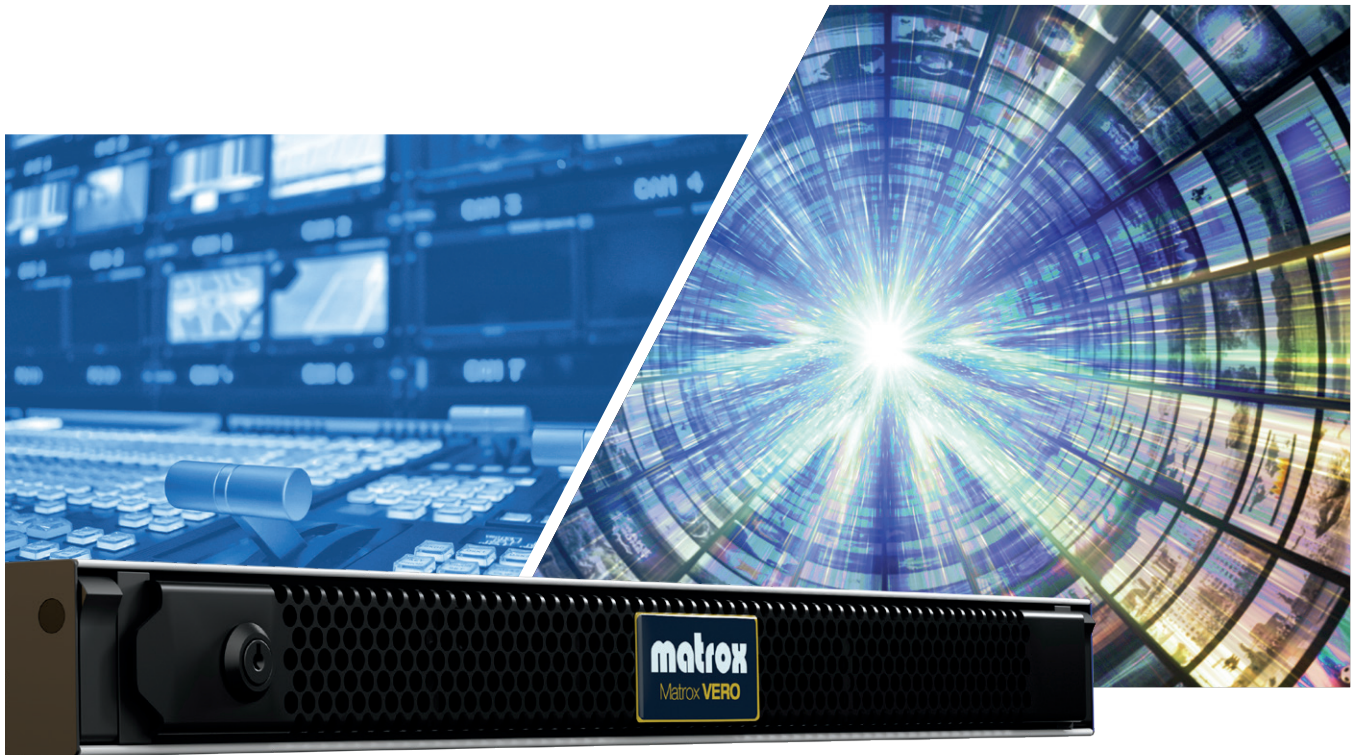# ST 2110 Signal Generator and Diagnostic Appliance


Matrox **VERO**

ST 2110 Signal Generator and Diagnostic Appliance

Matrox® VERO is an essential tool for broadcasters, system integrators, and manufacturers of ST 2110 devices and environments. Matrox VERO integrates the components required to allow users to confidently validate ST 2110 devices for compliance before deployment. Matrox VERO combines an adjustable signal generator, a PCAP recorder, and signal diagnostics integrating EBU LIST into a single appliance with an intuitive, web-based GUI.

matrox®

Adjustable Reference Sender

Matrox VERO provides an adjustable ST 2110 refence sender that allows users to test receiver compliance in ideal circumstances, as well as receiver resilience in worst-case scenarios. Packet timing can be set to simulate a variety of senders, including narrow, narrow linear, and wide. User-defined RTP timestamp offsets can simulate network delays and test a receiver's ability to adapt to them.
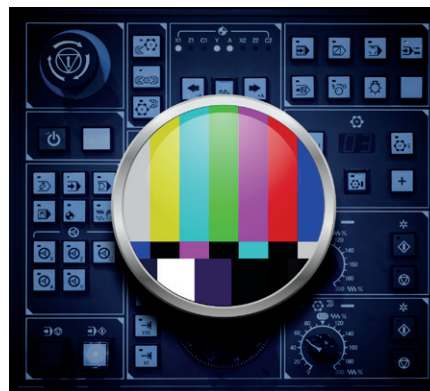
PCAP Recording

Diagnosing ST 2110 networks requires the ability to capture raw, high-bandwidth Ethernet traffic in PCAP format for analysis. Network traffic – especially when it contains UHD video flows – cannot be easily captured to disk as raw data without timing errors and severe packet loss. Using precise, hardware-based timestamping along with hardware-accelerated transfers, Matrox VERO can capture a perfect replica of network traffic in a PCAP file for ST 2110 diagnosis.

Convenient EBU LIST® Integration

Analyzing ST 2110 environments requires multiple tools. Matrox VERO provides all the necessary components required to successfully diagnose ST 2110 setups. Recognizing the contributions of the European Broadcasting Union Live IP Software Toolkit (EBU LIST®) – a widely respected and essential tool for diagnosis – Matrox VERO also comes with a pre-installed copy for user convenience and access.

HD/Full HD/UHD

Matrox VERO provides a full range of video resolution support, including HD, Full HD and UHD up to 60 FPS. Matrox VERO features two independent output channels, each capable of generating one video, up to four audio, and one ancillary data flows. Each of the two channels can also be dedicated to independent video resolutions and frame rates, which allows ST 2110 equipment manufacturers to verify multiple resolutions simultaneously, including support of ST 2022-7.

Fill & Key

Computer graphics are essential for broadcast applications. While key signals have traditionally been transported as video, ST 2110 provides a pixel group construction specifically dedicated to a key channel. In order to help test these graphic intensive workflows, Matrox VERO supports the generation of fill and key ST 2110 flows for HD and UHD.
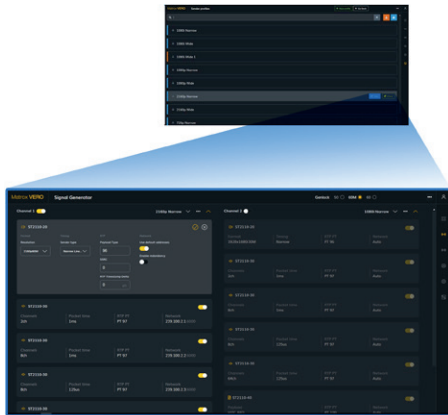
Simple Configuration

Matrox VERO comes with a number of predefined ST 2110 profiles, including all of the necessary video formats, and associated audio and ancillary data flows that are most commonly used in the broadcast industry. Matrox VERO also allows users to select from available preset parameters or customize profiles based on their own use cases. An unlimited number of unique profiles can be easily saved to the device, and each profile can be loaded instantly without the need to re-enter data.

Intuitive Web-based Interface

Matrox VERO is a web-based application with an easy to use interface. It is designed to work with any web browser without additional software installation requirements. By simply entering the IP address of the Matrox VERO device in their web browser's address bar, users can easily generate ST 2110 streams and operate diagnostic tools from anywhere on the network using any PC, tablet, or mobile device.
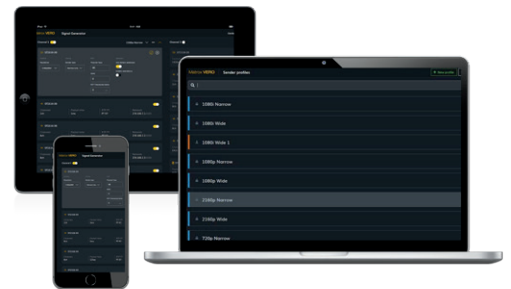
Matrox Vero connections

1. ST 2110 Media Redundant Interface
2. ST 2110 Media Primary Interface
3. Management Interface (1GbE)
4. Power Supply

Technical specifications

Connectivity

Network
- 2x SFP28 cages for ST 2110 interface
    - 10 GbE IEEE 802.3ae (10GBASE-SR/LR)
    - 25 GbE IEEE 802.3by (25GBASE-SR/CR/CR-S)
    - 25 GbE IEEE 802.3cc (25GBASE-LR)
- Dedicated RJ-45 management network interface (1GbE)

Supported media standards & specifications
- SMPTE ST 2110 (-10, -20, -21, -30, -31[1] and -40), ST 2022-7, and ST 2059-2
- AMWA NMOS IS-04 and IS-05

Control and management
- Web-based interface compatible with any browser, including mobile devices
- REST-based API for easy automation

Signal Generator

Video
- According to SMPTE ST 2110-20 and ST 2110-21
    - 3840x2160p @ 50, 59.94 and 60 Hz
    - 1920x1080p @ 23.98, 24, 25, 29.97, 30, 50, 59.94 and 60 Hz
    - 1920x1080i @ 25, 29.97M and 30
    - 1280x720p @ 50, 59.94 and 60 Hz
- ITU-R BT.709 and BT.2020

Audio
- According to SMPTE ST 2110-30
    - ST 2110-30 Classes A, B & C
    - 1 to 64 channels per flow
    - PCM 24bit @ 48 kHz
    - Packet times of 125 µs or 1ms

Ancillary data
- According to SMPTE ST 2110-40
    - ATC
    - AFD and bar data

PTP
- ST 2059-2 compliant
- Supported on each SFP for redundancy

Adjustable Parameters
- User presets for SMPTE ST 2110-21 sender types: N (Narrow), NL (Narrow Linear), W (Wide), or custom
- Custom packet timing for granular control of number of packets present in the Network Compatibility Model (up to and beyond CMAX) and Virtual Receiver Buffer Model (up to and beyond VRXFULL)
- User-controllable RTP timestamp offset per flow

Capture and Analysis

PCAP recording
- Aggregated capture throughput of up to 28Gbps with hardware-based timestamping
- Available on both ST 2110 interfaces (primary, redundant or both simultaneously)
- Input routing of sources through:
    - Manual settings (IGMP)
    - NMOS IS-05 control
    - SDN control
- Auto detection of ST 2110 flows on inputs

EBU Live IP Software Toolkit (LIST®)
- Open source ST 2110 analysis toolkit
- Deep packet inspection for ST 2110 specification compliance
- Pre-installed for convenience

Physical and Power

Product dimensions (depth x width x height)
- 22.73 x 18.97 x 1.68 in (57.75 x 48.2 x 4.28 cm)
- Rack-mountable 1RU

Product weight
- 27.38 lbs. (12.42 kg)

Operating conditions
- 10–35°C (50°F–95°F), 20% to 80% (non-condenscing)

Power supply
- AC Line voltage: 100-240 VAC
- AC Frequency: 50-60 Hz
- AC input current (low/high): 3.7A/ 7.4 A
- Wattage: 550 W

Warranty
- Two-year limited warranty

Ordering Information

- MTXVERO
    - Matrox VERO appliance with ST 2110 signal generator, PCAP capture, and stream analysis.
    - Includes racking kit and power cords (US, EUR, UK)
- MTXVERO-SP-1
    - 1 year service plan for Matrox VERO software support and release updates

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1. This feature will be available in a future release.

Matrox is a market leader in the 4K and HD digital video hardware and software fields, offering accelerated H.264 encoding, streaming, AV signal conversion, capture/playout servers, and CGs. Matrox's Emmy award-winning technology powers a range of multi-screen content creation and delivery platforms used by broadcasters, telcos, cable operators, post-production facilities, live event producers, videographers, and AV professionals worldwide. Founded in 1976, Matrox is a privately held company headquartered in Montreal, Canada.
For more information, visit **www.matrox.com/video**.

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