TELEDYNE LECROY
Everywhereyoulook™

Voyager™ M480x
USB Protocol Analyzer System

Key Features

- **Capture / Analyze USB 3.2 / USB4 including PD and SBU traffic** - See end-to-end host, hub, and device operation.
- **Integrated analyzer / exerciser** - Multifunction system with optional support for USB 3.2 / USB4 traffic generation (Gen 4 Exerciser available in future release)
- **USB Type-C and PD analyzer** - Capture Type-C and Power Delivery 3.2 (EPR) protocol messages and state changes
- **CATC Trace Analysis Software** - Expand / Collapse transport layer for faster interpretation of USB traffic
- **Non-intrusive probing** - Proven analog front-end architecture to provide a true picture of power-on link training
- **Up to 32GB Recording Memory** - Capture long recording sessions for analysis and problem solving
- **Hide / Show Traffic by HopID** - HopID Filtering makes it easy to focus the analysis on specific paths/functions
- **Detects numerous USB4 Link and Protocol errors** - Critical link and timing errors are detected and labeled
- **External Trigger In / Out** - Use the Voyager to identify any packet and toggle a scope or logic analyzer (via SMA connectors; future enhancement)
- **Cascade Multiple Analyzers** - Synchronize recordings across multiple analyzers including legacy USB 3.x Voyager systems
- **Gbe or USB 3.0 Upload** - Gbe provide fast access to captured data

Teledyne LeCroy's Voyager M480x is the first protocol analyzer for testing next-generation USB4 80Gb/s systems. The new platform leverages Teledyne LeCroy's cutting-edge probe technology to support Gen 4 (PAM3) signaling as well as USB4 Gen 3, Gen 2, Thunderbolt™, and legacy USB 3.2 speeds. Based on the legendary Voyager platform, the M480x captures symmetric link operation and tunneled DisplayPort 2.1 with complete decoding of USB4 protocol. The Voyager M480x is the new flagship solution designed for functional verification, qualification, and compliance testing to address the entire USB4 development lifecycle.

Unmatched Accuracy

The Voyager M480x features the industry's highest fidelity probe technology and provides unmatched reliability when testing devices at the full USB4 Gen 4x2 (80Gb/s). Testing of USB4 Gen 3x2 (40Gb/s), USB 3.2 Gen 2x2 (20Gb/s) and Gen 2x1 (10Gb/s) speeds are also fully supported. Designed to sit inline between host and device router, the M480x will non-intrusively record all USB Type-C signaling including USB4 / Thunderbolt 4, Thunderbolt 5, side-band and PD 3.2 (EPR up to 50V) messages. Hot plug any combination of USB4 host and dock device and the Voyager system will follow the speed negotiation handshake and lock at the specified rate.

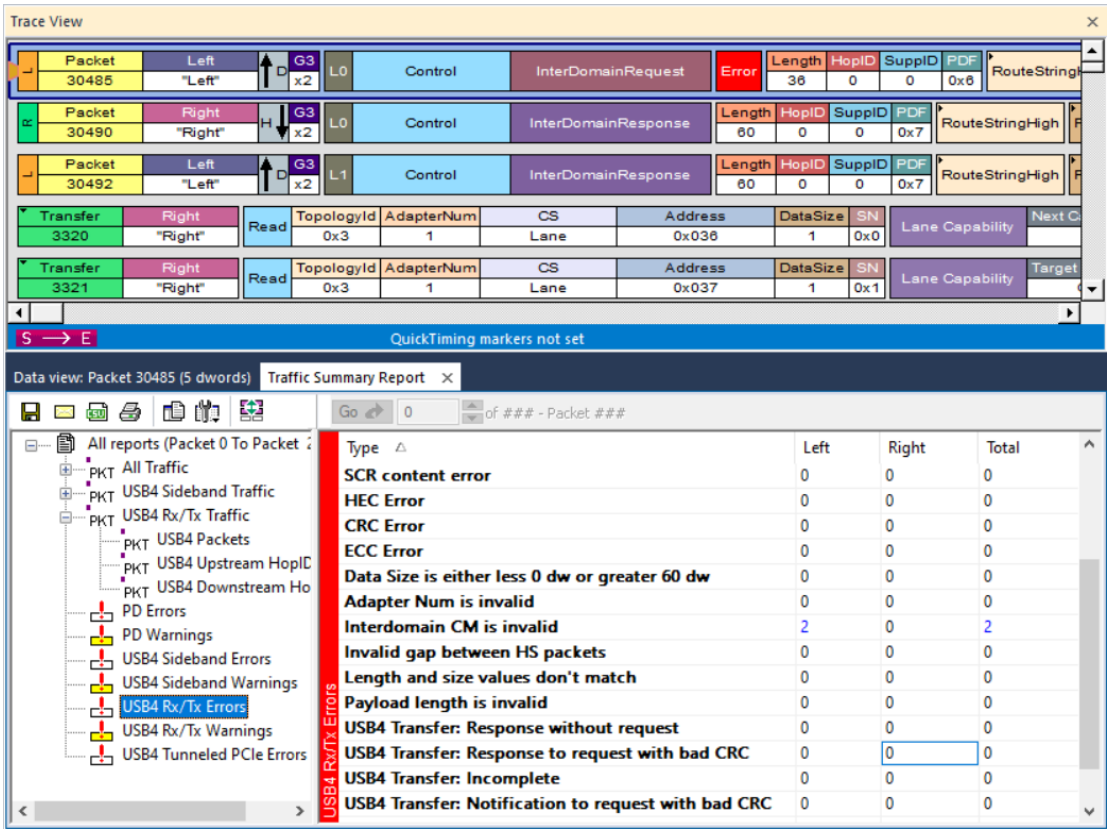
Analysis Software

The Voyager utilizes the legendary CATC Trace - the industry's de facto standard display and shows all packets labeled and interleaved in a single DP view. Traffic from the logical USB4 and side-band channels can be individually filtered, searched or exported from the trace. The Transfer level can be expanded and collapsed to show the logical layer including all ordered sets and control packets. While in line, the analyzer will record and display all register reads and writes to provide an unambiguous picture of the router and path configuration process. To simplify analysis tasks, the Hop ID window allows precise hiding of extraneous traffic using Hop ID and Protocol Defined Function (PDF).

Protocol Decoding

All the logical link sub-states are recorded and displayed including SLOS patterns, training sequences and DESKEW ordered sets. For Gen T links, the new header, framing and packet structure changes are fully supported. During path configuration, all register Read Request / Response transactions are grouped to simplify debug of router enumeration. SBU register transactions are parsed to automatically assign protocols to Hop IDs. PD Messages are also captured and decoded.

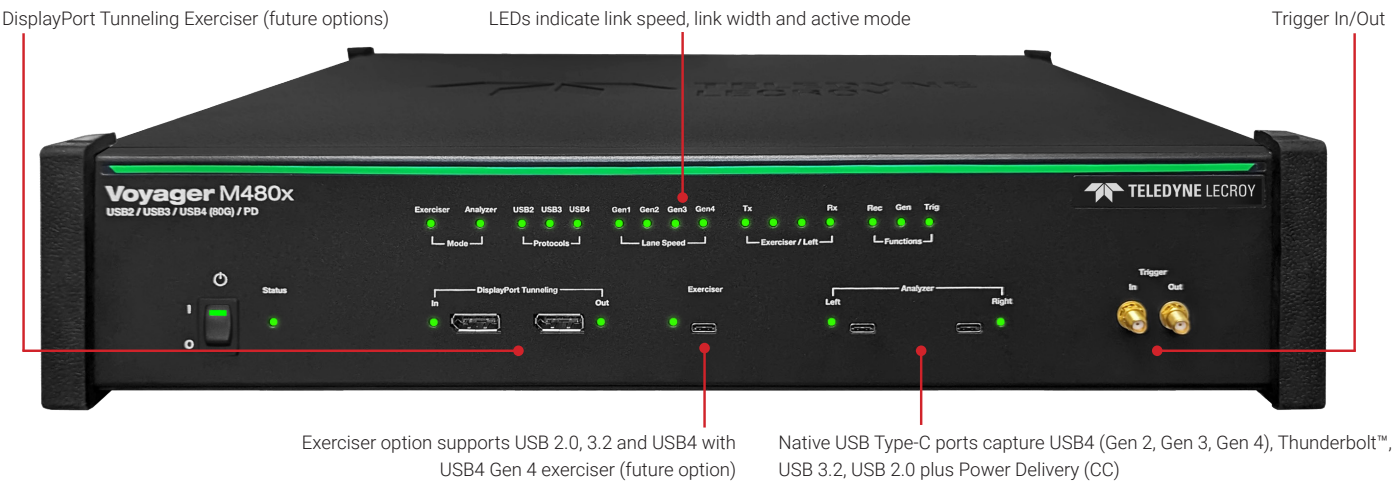
USB4 tunneled traffic can be exported to Teledyne LeCroy's full-featured PCIe Suite, Video Protocol Suite, or USB Suite for more detailed decoding and analysis of encapsulated protocols. This decoding of tunneled transactions provides a coherent view of the underlying PCIe, USB or DP application traffic within the USB4 fabric.

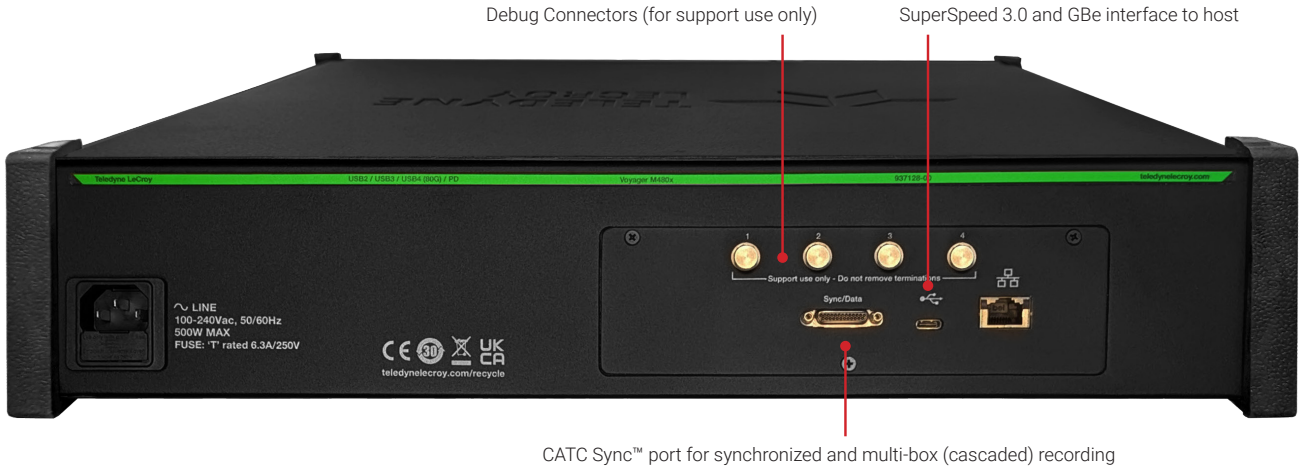


Traffic summary reports show protocol metrics which are hyperlinked to the actual bus events

Flexible Hardware

The front-end of the Voyager analyzer features USB4 certified connectors that support the full 80Gb/s data rate for loss-less capture of traffic from all active links simultaneously. The Voyager M480x platform is available with up to 32GB of recording memory plus USB 3.0 and Gigabit Ethernet links for uploading recorded traffic to the host PC. Field upgradeable firmware ensures future support for new features or changes to the USB specification. Economical USB4 Gen 3 (40 Gb/s aggregate) configurations will be available allowing field-upgrade to Gen 4 analysis. The Voyager is compatible with Gen 3 active and passive cable environments (Gen 4 Active cables: TBD).



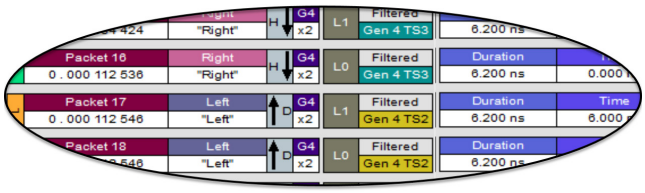


Error Detection

The Voyager M480x can detect real USB 3.2, USB4 and PD protocol errors. At the lower layers, training sequences, SCR content and CRC errors are automatically verified and flagged. Control Packet Timing is checked along with many of the USB4 logical layer timing requirements. Dozens of checks are reported for PD, USB 3.2 and USB4 protocol including occupying reserved fields, invalid frame size, and correctable bit-errors.

Find the Issues Fast

The Voyager software provides many mechanisms to measure and report on USB and PD protocol. With the Traffic Summary display, users can evaluate statistical reports at a glance or navigate to individual events. Users may select packets or link commands then jump to each occurrence with a single keystroke. Higher-level events are also tracked and reported at the logical USB4 transport layer.



Measure and Verify VBUS and CC Voltages with Power Tracker

The Voyager M480x Power Tracker option monitors and displays VBus power and current graphically in a time-line format. The voltages are synchronized to trace events allowing users to verify power state transitions at the protocol and electrical layers. Separate power graphs are provided for CC and VCONN making it easy to debug logical Type-C state transitions.

Specifications

Protocols Supported	USB4 ver 2.0, USB4 ver 1.0, Thunderbolt™ 3, Thunderbolt 4, Thunderbolt 5, USB 3.2, Side-Band signals and CC (PD) messages
Host Hardware Requirements	Intel Pentium 4 or AMD Duron with USB 2.0 interface, 1GB RAM (8GB RAM recommended)
System Requirements	64-bit versions of Microsoft Windows® 11, Windows 10, Windows Server 2016, and Windows Server 2019; 2 GB of RAM; Storage with at least 2 GB of free space for the installation of the software and additional space for recorded data; display with resolution of at least 1024x768 with at least 16-bit color depth; USB 2.0 port and/or 100/1000baseT Ethernet. For optimal performance, please refer to our recommended configuration in the product documentation.
Memory Size	32GB
Signal Rate Supported	1.2Mb/s – 25.6Gb/s
Data Bus Interface	Full duplex differential (USB 3.2) Symmetric operation (USB4 Gen 4) Side-band channel PD 3.2 (EPR) CC Messages
Front Panel Connectors	Analyzer – one (1) USB 3.2 / USB4 recording channel with left/right Type-C Connectors ; (DisplayPort alt-mode: Not Supported) Exerciser - one (1) USB 3.2 / USB4 generation channel with Type-C Connectors DP Tunneling – one (1) DisplayPort full-size Tx connector and one (1) DisplayPort full-size Rx connector (future option)
Front Panel Indicators	Platform LEDs: Power, Status Function LEDs : Rec, Gen, Trig Protocol LEDs: USB2, USB3, USB4 Active Mode LEDs : Exerciser, Analyzer Lane LEDs : 1 or 2 Lane Speed LEDs : Gen 1, Gen 2, Gen 3, Gen 4
Dimensions (W x H x L)	(W x H x L) 457 x 97 x 435 mm (18”W x 3.83”H x 17.14”L)
Weight	7.42kg (16.35lb)
Environmental	Operating Temperature: 0°C to 55°C (32°F to 131°F) Non-Operating Temperature: -20°C to 80°C (-4°F to 176°F) Humidity: Operating 10% to 90% RH (non-condensing)
External Trigger IN/OUT	SMA connectors
Warranty	12 Month Hardware Warranty

Ordering Information

Product Description	Product Code
Voyager M480x USB4 80Gb/s Gen 4 Analyzer System	USB-T0P4-V10-X
Voyager M480x USB4 80Gb/s Gen 4 Analyzer / Exerciser System	USB-TZP4-V10-X
Voyager M480x USB4 40Gb/s Gen 3 Analyzer System	USB-T0A4-V10-X
Voyager M480x USB4 40Gb/s Gen 3 Analyzer Exerciser System	USB-TZA4-V10-X
Voyager M480x USB4 80Gb/s Gen 4 Exerciser option	USB-TZA4-V10-A
Voyager M480x Power Tracker option	USB-AC04-V01-A

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