D2 1.6T 4-port Appliance

OSFP Test Module 1.6T/800G/400G/200G/100G

As High-Speed Ethernet technologies continue to advance, Service Providers and Hyperscale data centers are rapidly transitioning to multi-rate infrastructures to support exponential growth in bandwidth demands. This evolution is driving the need for high-density, versatile test solutions that can keep pace with increasingly complex network environments. To ensure reliable performance and scalability, customers require flexible test equipment capable of validating next-generation routers and data center fabrics across a broad range of speeds, protocols, and configurations.

The D2 4-port 1.6T appliance is purpose-built to meet these evolving demands, delivering up to 9.6 Tbps of test traffic. D2 appliance supports 1x1600G, 2x800G, 4x400G, and 8x200G in 224Gbps PAM4 mode in compliance with IEEE 802.3dj 1.6TBASE-R, and 1x800G, 2x400G, 4x200G and 8x100G in 112Gbps PAM4 mode in compliance with IEEE 802.3ck and 802.3df 800GBASE-R to help validate these deployments.

Additionally, the D2 appliance supports Auto Negotiation and Link Training (AN/LT) in compliance with IEEE 802.3dj and IEEE 802.3df for all the supported speed modes.

D2 1.6T 4-Port Appliance

Features

- Industry's first high density OSFP 1.6T test platform
- Each port supports the following speeds:
- 224G: 1x1.6T, 2x800G, 4x400G, 8x200G
- 112G Capable*: 1x800G, 2x400G, 4x200G, and 8x100G PAM4
- Support for Ethernet (RS-FEC), Auto Negotiation (AN) and Link Training (LT) per IEEE 802.3dj
- Out of the box support for AI infrastructure high-scale testing use cases
- Protocol testing for L2/3, Routing / Switching and data center applications

Benefits

- Highest port density for 100G to 1.6T High-speed Ethernet testing
- Provides large testing capacity for a variety of services
- Extensive Layer-1 debug tools and features for RS-FEC performance and interconnect monitoring
- Assess the resiliency and performance of AI infrastructures with high scale, real-world AI workloads and test scenarios
- Support of optical transceivers, Active Optical Cable (AOC), passive copper cable (DAC), and active electrical copper cable (AEC)

Applications

- **Cloud Computing/Streaming Services—**Validate data plane QoS on thousands of flows at line rate and test complex routing, data center, and access protocols on switches and routers.
- **Data Center ToR and EoR Switches and Fabrics—**Validate forwarding performance, latency, MAC capacity and functional capabilities of ultra-high-scale, multi-terabit cloud data center fabrics.
- **AI Data Center—**Validate performance and robustness of AI data center infrastructures by emulating high-scale AI workloads with RoCEv2 and CCL support.
- **Terabit Routers—**Test the latest generation of core routers with high-scale, multiprotocol topologies.

Productivity

- Accurate Results – Purpose-built hardware delivers repeatable test execution and precise statistics
- User definable Health Indicator views provide real-time health monitoring and error isolation capability that allows engineers to accurately and quickly pinpoint errors, even in the most complex test configurations. Customizable Time Series charts, overlaid with Events, provide correlation between real-time metrics and system events, allowing rapid debugging of problems and accelerating development
- High performance database underneath a modern web UI processes billions of real-time results to validate tests, identify problems, and provide customizable reports
- Delivers more results with tight correlation, and more information to find those obscure bugs. With more coverage and more information, VIAVI answers questions faster, and in a single test run, where multiple runs are necessary with other test tools
- Interesting streams use real-time results data mining to dynamically filter through mountains of data and display the results that matter
- Powerful automation with Command Sequencer (Visual Programming) and GUI to Script empowers the test operator to:
  - Construct sophisticated, stressful, automated test cases without programming experience
  - Combine numerous individual test cases into a single run to save regression test time
  - Develop a catalog of broad automated test cases in a fraction of the time
  - Export automated test cases to run from a command line for headless test execution that can be integrated with any automated regression system

Technical Specifications

D2 1.6T Appliance	
MSA Interface	OSFP1600
Line Clocking And Packet Time-Stamping	Stratum-3 rated oscillator is the default time source. Transmit line clock is at the precise nominal Ethernet rate ± < 1 PPM on initial shipment. Accurate to ± 4.6 PPM 15 years of operation. • Frame time-stamp resolution of 2.5ns • GPS and CDMA-based external time sources are supported • IEEE 1588v2 and NTP packet-based external time sources are supported • TIA/EIA-95B-based external time sources are supported
Appliance Time Synchronization	Appliance features • VIAVI-patented self-calibrating inter-chassis timing chain using dedicated port on appliance • Appliance delivers precise synchronization ± 20ns • Ability to daisy chain up to 255 appliances for large density testing • Synchronization via external GPS or CDMA network • Using IEEE 1588 or NTP packet-based approaches • With TIS/EIA-95B timing inputs
Operating Temperature Range	Supported for 41° to 86° F (5° to 30° C) ambient temperature. 20% to 80% relative humidity
Max Power Draw	Maximum 3100W at 180-240 VAC
Product Dimensions	30.5"D x 17.1"W x 3.5"H (43.4 cm x 8.9 cm x 77.47 cm)
Product Weight	Unit installed weight: 53 lb. (24.0 kg)

Technical Specifications

VIAVI TestCenter Layer 2–3 Generator and Analyzer	
Number of Streams	Default Mode: • Stats/Streams (Tx/Rx): 1.6T: (4K/32K) 800G (4K/32K), 400G (16K/32K), 200G (8K/16K)
Number of Paths / Raw Streamblocks	127 (1.6T/800G), 255 (400G/200G)
Frame Transmit Modes	Port based (rate per port), stream based (rate per stream), burst, timed, random frame size with unique seed
Min/max Frame Size (w/CRC)	64 / 16383 bytes (Note: Initial release min frame size of 320 for 1.6T; all other speeds 64 bytes)
Min/max Tx Rates	1 packet per 1.37 seconds to 101% of line rate
Real-time Tx Stream Adjustments	Change rate and frame length settings without stopping the generator or analyzer for truly interactive, cause and effect analysis
Per-stream Statistics Analyzed In Real Time	Tx and Rx frame counts and rates • Tx and Rx Layer 1 byte counts and rates • FCS errors and rates • Min, Max, and Average Latency (32K streams) • Real Time Dropped Frame count • Advance Sequence Tracking: Duplicate, reordered, late, and inordered
Flow Control	Support Priority Flow Control
Per-Port Statistics Analyzed In Real Time	Tx and Rx frame counts and rates • Tx and Rx Layer 1 byte counts and rates • PRBS errors • FCS errors and rates
Transmit Timestamp Resolution	1600G: 2.5 ns Tx timestamp resolution with intra-chassis and inter-chassis synchronization
Supported Encapsulations	• Layer 2: Ethernet II, 802.1Q, 802.1ad • Layer 3/4: IPv4, IPv6, TCP, UDP
Supported Tx Signature Capability	Fully compatible with VIAVI hardware; contains sequence number & highly accurate timestamp
Capture Buffer Size	1.28 MB per port (Max)

Technical Specifications

VIAVI TestCenter Layer 2–3 Generator and Analyzer (cont'd)	
Capture Buffer Controls—VIAVI Testcenter's Unique Capture Capability Allows Maximum Effectiveness When Debugging Hard To Find Hardware Or Protocol Problems	• Several modes of operation include: Filter by protocol fields, Filter by byte offset and range; store full-frames; store full frame with signature; store Tx/Rx control plane with data plane; real- time mode for control plane traffic; wrap or stop buffer at end • User defined pattern definitions can logically combine 8 filters of up to 32 total bytes • Patterns can be applied to start, filter (quality), or stop capture • In addition to user-patterns, filtering, starting, and stopping capture contains the following pre-defined events: FCS, IPv4 checksum, and TCP/UDP/IGMP checksum; undersize, oversize, jumbo, and user-defined frame length; IPv4, and IPv6 packets; test signature present and test stream ID match. Each event can be independently set to ignore, include or exclude. • Support UDC (user-defined counters), Capture byte offset mode, and Capture pattern matching
Latency Modes	Benchmark tests support LIFO, LILO, FIFO or FILO latency calculation methods
Route Insertion Table (RIT) Entries Per Port	• 128K (1.6T, 800G/400G/200G), 4-byte entries for dynamic label or random IP/MAC address assignments
RIT or List VFD Entries Per Stream	• 8 RIT insertions per stream (1.6T/800G/400G/200G) • 4 VFD insertions per stream for all supported speeds

Technical Specifications

Layer 1 Functionality	
OSFP Interconnects	CR8, SR8, LR8, FR8, DR8 at multi-rate (1.6T/800G/400G/200G)

Media support and FEC options	• RS (544,514) FEC supported for all PAM4 speed modes
	• Other supports vary by speed modes
	   — 224 Gbps PAM4 mode
	      • Optical Transceivers
	         — 1x1.6T: 1.6TBASE-SR8, 1.6TBASE-DR8, 1.6TBASE-FR8
	         — 2x800G: 1.6TBASE-SR8, 1.6TBASE-DR8, 1.6TBASE-FR8,1.6TBASE-2FR4
	         — 4x400G: 1.6TBASE-SR8, 1.6TBASE-DR8, 1.6TBASE-FR8,1.6TBASE-2FR4
	         — 8x200G: 1.6TBASE-SR8, 1.6TBASE-DR8, 1.6TBASE-FR8,1.6TBASE-2FR4
	      — Copper Cable*
	         • 1x1.6T/2x800G/4x400G/8x200G: 1.6TBASE-CR8
	      — 112 Gbps PAM4 mode
	         • Optical Transceiver
	            — 1x800G: 800GBASE-SR8, 800GBASE-DR8, and 800GBASE-FR8
	            — 2x400G: 800GBASE-SR8, 800GBASE-2FR4, 400GBASE-DR4, 400GBASE-FR4
	            — 4x200G: 800GBASE-SR8
	            — 8x100G: 800GBASE-SR8
	      — Copper Cable*
	         — 1x800G/2x400G/4x200G/8x100G: 800GBASE-CR8
	*COPPER CABLE TYPES LISTED ABOVE INCLUDE DIRECT ATTACHED COPPER CABLE (DAC), ACTIVE ELECTRICAL CABLE (AEC), AND BREAKOUT CABLE.

Auto-Negotiation /Link Training (AN/LT)(IEEE 802.3 Compliant)	• AN/LT support • 224G: 1x1.6T, 2x800G, 4x400G, 8x200G • 112G:1x800G, 2x400G, 4x200G, 8x100G
Layer-1 Debug Tools & Features	Pre/Post FEC Codeword statistics, Tx Emphasis settings, Rx Eye view, FEC Counters, PRBS Gen/Check, Front-end L1 Summary Status, Xcvr MDIO access, PCS monitoring

Ordering Information

Part Number	Description
Base Package	
D2-800-OSFP-4-3100A	D2 4-Port OSFP 1.6T/800G/400G/200G/100G Bundle
D2-800-OSFP-4-1600A	D2 4-Port OSFP 1600G Only Bundle
D2-1600-OSFP-4-3000A	D2 4-Port OSFP 1.6T/800G/400G/200G Bundle
Hardware Upgrades (available as add-on after purchase of initial base package bundle)	
HWO-D2-800-OSFP-4-100G	100G 112G/56G PAM4 HW Speed Option for D2-1600-OSFP-4-T1S
HWO-D2-800-OSFP-4-200G	200G 112G/56G PAM4 HW Speed Option for D2-1600-OSFP-4-T1S
HWO-D2-800-OSFP-4-400G	400G 112G/56G PAM4 HW Speed Option for D2-1600-OSFP-4-T1S
HWO-D2-800-OSFP-4-800G	800G 112G/56G PAM4 HW Speed Option for D2-1600-OSFP-4-T1S
HWO-D2-800-OSFP-4-1600G	1600G 112G/56G PAM4 HW Speed Option for D2-1600-OSFP-4-T1S
HWO-D2-800-OSFP-4-PORT	D2-800-OSFP-4 Single Port Enablement

* 112G capabilities will be available as a future software option

Requirements

• Windows-based workstation with 10/100/1000 Mbps Ethernet NIC;
mouse and color monitor required for GUI operation

• Linux- or Windows-based workstation for automation scripting

• Mac-, Linux, or Windows-based workstation for Rest API support

• Optional software licenses are available for a wide variety of protocol and feature support, please contact
your VIAVI sales representative for more information

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Contact Us: +1 844 GO VIAVI | (+1 844 468 4284). To reach the VIAVI office nearest you, visit viavisolutions.com/contact

d2-1.6t4port-ds-hse-nse-ae
30194660 900 1125

viavisolutions.com