mX2 Dual-speed 8- and 12-port Modules

SFP+ Test Modules 10/1G

The VIAVI mX2 10/1G test module for TestCenter architecture with high performing multi-core CPUs intelligently distributes processing resources across ports. This enables superior scale testing involving multiple protocols running simultaneously on the same port—perfect for testing converged devices such as PE routers and mobile gateways. With deep real-time analysis that VIAVI TestCenter is known for, the mX2 delivers enhanced realism with scale and performance.

The VIAVI mX2 module is available in several port count and speed variations to match your test needs and budget. Dual speed modules are available for 10/1G operation from a single port.

Applications

- **High Density Core Routers**—Tests the throughput, control plane scale, and route capacity of next-gen high density core routers
- **Mobile Gateways**—Validates IP throughput and Any G mobility with millions of subscribers per port, line-rate data with minimum sized packets and detailed per mobile statistics
- **Cloud Infrastructure & Applications**—Ensures security devices, IDS/IPS, load balancers and applications meet their performance, availability, security and scale requirements
- **High Scale Edge & Aggregation Routers**—Test convergence, reliability and scalability of complex, multi-protocol topologies with unprecedented scale and realism

Key Benefits

The VIAVI mX2 10G/1G Ethernet test modules support the highest performing and most realistic Layer 2-7 control and user plane capabilities for validating systems at their limits.

A single module is capable of generating and analyzing line rate stateful and stateless traffic from all ports simultaneously with high-scale routing, access, mobile and enterprise application traffic.

With up to 144 10G ports in a single VIAVI chassis, the mX2 is the highest density test module in the industry in its class and scales to 1.44 Tbps of stateful data performance, 9 million mobile subscribers, and 1.6 million BGP sessions.

Features & Benefits

Performance and flexibility

- Line rate traffic with realism for stress-testing the most complex converged IP systems such as service provider MPLS networks, cloud-scale data centers, and 4G/LTE mobile networks
- VIAVI's CPU and FPGA-based Layer 2-3 architecture are combined to provide the highest density Layer 2-7 architectures test module in its class
- Multi-speed modules can be software switched to run at 10/1G
- Available test packages with integrated configuration wizards simplify and accelerate applicable test packages with integrated wizards simplify configuration of ultra-high scale mobility, mobile backhaul, routing, access and application test cases

Technical Specifications

mX2 Dual-speed 8- and 12-port Modules				
Maximum Port Density	Speed	Maximum Ports per Slot	Maximum Ports per STP-N12U Chassis	Maximum Ports Per SPT-N4U Chassis
mX2-10G-S12 supports dual speed 10/1G	10/1G	12	144	24

Media Support (See accessory table below for part numbers)	• 10G Direct Attach Copper Cable • 10GBASE-SR • 10GBASE-LR • 1000BASE-T (SFP+ interface modules only)
Line clocking and packet time stamping—MX2 modules get their transmit line clocking and time-stamping from the control modules on the SPT-N12U and SPT-N4U.	• 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 over 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
Inter-module and Inter-chassis Time Synchronization	Modules in the same chassis are phase-locked to the timing source of the control module. For modules in separate chassis: • VIAVI-patented self-calibrating inter-chassis timing chain using dedicated port on chassis control module delivers precise synchronization +/- 20ns • Synchronized via external GPS or CDMA network • Using IEEE 1588 or NTP packet-based approaches • With TIA/EIA-95B timing inputs
User Reservation	Per 10G or 10/1G port
Module Weight	Q3 and S12 versions: 3.219 kg. S8 versions: 3.145 kg. S4 versions: 3.066 kg
Module Predicted MTBF	Q3 versions = 49,523 hours, hours of continuous operation
Operating Temperature Range	All mX2 modules are supported for 59° to 95° F (15° to 35° C) ambient temperature. 20% to 80% relative humidity
Max Power Draw Per Module	420W per slot

Technical Specifications

VIAVI TestCenter Layer 2-3 Traffic Generation	
Transmit Streams Per Port (arbitrary values)	64K
Stream Block Definitions Per Port	512 stream block definitions each capable of generating multiple streams
Frame Templates Per Port	256 unique frame templates can be transmitted from each port
Transmit Statistics Per Port	Nearly 50 transmit stats per port reported in real time. Stats include L1, L2 and L3+ counters and rates and include counts for frames generated with CRC errors and checksum errors.
Transmit Statistics Per Stream	Tx Frame count and rate—all Tx statistics accurate even with random frame sizes and rates.
Error and Fault Generation	Link Fault Signaling and streamblock FCS error and IP checksum errors
Variable Field Definition (VFD) per Port	256 VFD indices per port
VFDs per Stream	6 VFDs per stream
Route Insertion Table (RIT) Entries per port	8M 4-byte entries for dynamic label or random IP/MAC address assignments
RIT or List VFD Entries per Stream	8 RIT insertions or List VFD insertions per stream
Frame Length Range	100% line rate for frames of 58-16383 bytes. Sub-line rate for frames from 33-57 bytes.
Frame Length Controls	Fixed, increment, decrement, random, automatic based on user frame, IMIX w/ weighting for 4 nodes
Frame Rate Minimum and Maximum at Wire Rate	1 every 3.43s to 102% of line rate
Scheduler Mode Support	• Port-Based—Traffic scheduling handled at the port level • Rate-Based—Key parameters determined at the port level with division among the individual stream blocks • Priority-Based—Scheduling determined at the stream block level using user-assigned priorities. Precise scheduling of CBR and bursty traffic for QoS testing • Manual Mode—Manual control of stream sequence
Priority Flow Control	Generator supports up to 8 queues for responding to PFC Pause frames. Queue support can be integrated with DCBX emulation for automatic setup. PFC Pause frames can be sent manually for DUT response testing or triggered automatically based on configurable received traffic behavior.

Technical Specifications

VIAVI TestCenter Layer 2-3 Traffic Analysis	
Trackable Streams Per Port	128K
Statistics Per Stream	Over 40 real-time measurements per stream – includes standard frame and packet counters and rates and advanced sequence checking, RFC 4689 jitter, latency, FCS errors and checksum errors. • Advanced sequencing—In-order, lost, reordered, late and duplicate • Latency—Avg, min, max and short-term avg; first/last frame arrival timestamp • Data integrity—IP checksum, TCP/UDP checksum, frame CRC, embedded CRC and PRBS bit errors
Statistics Per Port	Over 50 transmit stats per port reported in real time. Stats include L1, L2 and L3+ counters and rates and include received FCS, checksum, and PRBS errors and rates. Also available are per-priority level PFC counters and six user-defined (pattern match) counters. Protocol port counters available for tracking key protocol message and state information for Routing and MPLS, Carrier Ethernet, GRE, ARP and PFC control plane.
User-defined Statistics Per Port	Six user-defined statistics (count and rate for each) specified by regular expression (using AND, OR and NOT) consisting of byte pattern and offset match and/or frame length range match.
Analyzer Real-Time Filtering—Identify, display and filter by user-configurable protocol field values and ranges.	Four 16-bit and one 32-bit analyzer filters available per-port for real-time stream analysis of test signature and non-test signature traffic. Filters can be placed over protocol fields with masks and ranges to isolate specific types of traffic and by quality of service values such as: transmit stream ID, IPv4/v6 SA/DA, MAC SA/DA, IP TOS/DiffServ, TCP/UDP port, VLAN ID, VLAN priority, MPLS label, MPLS exp plus more
Capture Buffer Size	256 MB per port

VIAVI TestCenter Layer 2-3 Traffic Analysis continued	
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 that include: Filter by protocol fields, filter by byte offset and range; store slices or full-frames; store signature or all frames; 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, PRBS, IPv4 checksum, TCP/UDP/IGMP checksum, and sequence errors; undersize, oversize, jumbo, and user-defined frame length; IPv4, IPv6, TCP, UDP and IGMP packets; test signature present and test stream ID match. Each event can be independently set to ignore, include or exclude.
Priority Flow Control	Per-priority measurements for Xon response time, PFC transmit time and post-PFC receive time.
Latency Modes	Benchmark tests support LIFO, LILO, FIFO or FILO latency calculation methods.
High-resolution sampling—High-resolution sampling and charting available for select port or stream-block counters. Allows detailed analysis of events happening at the millisecond level (e.g., fail-over and re-route performance analysis)	• Available on any receive port or streamblock frame/bit/byte counter or rate • 1000 samples available at intervals of 1-100ms • Sample trigger set by relational operator of user-defined value of sampled statistic • User-defined trigger location within buffer
Histograms	Port histograms

VIAVI TestCenter Protocol Emulation	
VIAVI TestCenter protocols available as separately licensed packages. Below is a sample list of supported protocols. Contact VIAVI for a full list of capabilities and packages.	
Enterprise and data center switch protocol support	• OpenFlow 1.3 / 1.0—OpenFlow switch (planned for 2015) and controller emulation and switch conformance testing • Routing, multicast and bridging—All major IPv4 and IPv6 unicast and multicast routing protocols, IGMPv1/v2/v3, MLDv1/v2, LACP, STP, RSTP and MSTP • Data center—DCBX, FCoE, FIP, 802.1Qbb • Stateful L4-7—HTTP, SIP and FTP
Service Provider Protocol Support	• SDN/NFV—PCE and Segment Routing • Routing and MPLS— All major IPv4 and IPv6 unicast and multicast routing protocols, RSVP-TE, LDP, VPLS-LDP, VPLS-BGP, BGP/MPLS-VPN, Fast Re-route, EVPN, mVPN, P2MP-TE, BFD, TWAMP and PWE3 (RFC4447) • Access—ANCP, PPPoE, DHCP, L2TP, IGMPv1/v2/v3, MLDv1/v2, DHCPv6 and PPPoEv6 • Carrier Ethernet and bridging: LACP, STP, RSTP and MSTP, 802.1ag CFM, Y.1731, PBB, PBB-TE, Link OAM • Stateful L4-7—HTTP, SIP and FTP, Unicast/Multicast RTSP and RAW TCP • Mobile Backhaul—MPLS-TP, 1588v2 and Synchronous Ethernet as supported protocols

Ordering Information

Part nu mber	Description	VIAVI Application VIAVI TestCenter
MX2-10G-S12	VIAVI mX2 10/1G SFP+ 12-ports	•
MX2-10G-S8	VIAVI mX2 10/1G SFP+ 8-ports	•
Accessories for SFP+ Interfaces		
ACC-6081A	Optical transceiver, SFP+ dual-rate, 10 G-1 G, 850NM, MMF	
ACC-6092A	Copper transceiver, SFP, 1000BASE-T RJ-45	
ACC-6082A	Optical transceiver SFP+ dual-rate, 10 G-1 G, 1310NM, SMF	
ACC-6050A	Optical transceiver SFP+ MSA, 10G, 10GBASE-SR, MMF	
ACC-6051A	Optical transceiver SFP+ MSA, 10G, 10GBASE-LR, SMF	
ACC-7001A	Copper transceiver 10GBASE-T SFP+, RJ45 connector, 30M	
ACC-7103A	Copper transceiver MULTIGIG SFP+, RJ-45, 30M NOTE: 100M/1G/2.5G*/5G*/10G (* 2.5G AND 5G OPERATIONS REQUIRE RELEVANT LICENSES)	
VIAVI Chassis		
SPT-N12U-110	VIAVI N12U chassis and controller with 110 V AC power supplies	
SPT-N12U-220	VIAVI N12U chassis and controller with 220 V AC power supplies	
SPT-N4U-110	VIAVI N4U chassis and controller with 110 V AC power supplies	
SPT-N4U-220	VIAVI N4U chassis and controller with 220 V AC power supplies	

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