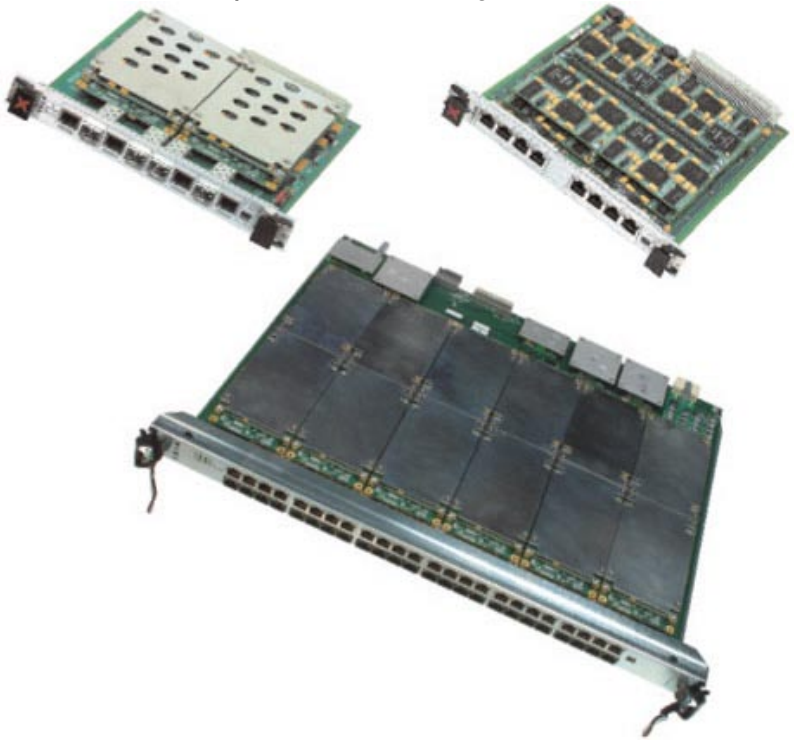
TXS 10/100 Mbps & Gigabit Ethernet Load Modules

Ixia's TXS family of Ethernet Load Modules offer complete Layer 2-7 network and application testing functionality in a single platform. Wire-speed Layer 2-3 traffic generation and analysis is supported, along with high-performance, scalable routing/bridging protocol emulation and true Layer 4-7 session emulation. The TXS family offers the highest port density solution in the industry for auto-negotiable 10/100/1000 Mbps Ethernet over copper, as well as Gigabit Ethernet over fiber - up to 240 Gigabit Ethernet test ports on a single chassis.

Every port on a TXS Load Module contains a powerful RISC processor running Linux and a full, testing-optimized TCP/IP stack. This architecture provides unprecedented performance and flexibility for testing routers, switches, broadband and wireless access devices, web servers, secure gateways, firewalls, and many other networking and content-aware devices.



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Specifications

Load Module	LM100TXS8 LM100TX8	LM1000STXS4 LM1000STX4 LM1000STXS2 LM1000STX2 LM1000STXS4-256	OLM1000STXS24 OLM1000STX24
Connector Type	RJ45	RJ45 or SFP	RJ45 or SFP
Number of Ports per Module	8	4	24
Maximum Ports per Chassis	128	64	240
Signal Rate	10/100 Mbps	10/100/1000 Mbps	10/100/1000 Mbps
Capture Buffer (per port)	6 MB	8 MB	
Number of Packet Streams (sequential)	256	256	
Number of Advanced Streams (interleaved)	128	256	
Transmit Engine	Built-in FPGA logic for wire-speed packet generation with timestamps, sequence numbers, data integrity signature, and packet group signatures		
Receive Engine	Built-in FPGA logic for wire-speed packet filtering, capturing, real-time latency for each packet group, data integrity, and sequence checking		
User Defined	Fixed, increment or decrement by user-defined step, value lists, range		

Field Features	lists, cascade, random, and chained		
Filters	48-bit source/destination address, 2x128-bit user-definable pattern and offset, frame length range, CRC error, data integrity error, sequence checking error (small, big, reverse)		
Data Field (per stream)	Fixed, increment (Byte/Word), decrement (Byte/Word), random, repeating, user-specified up to 13K bytes		
Statistics and Rates: Counter Size: 64-Bits	Link State, Line Speed, Frames Sent, Valid Frames Received, Bytes Sent/Received, Fragments, Undersize, Oversize, CRC Errors, VLAN Tagged Frames, User-Defined Stat 1, User- Defined Stat 2, Capture Trigger (UDS 3), Capture filter (UDS 4), User-Defined Stat 5, User-Defined Stat 6, 8 QoS counters, Data Integrity Frames, Data Integrity Errors, Sequence Checking Frames, Sequence Checking Errors, ARP, and Ping requests and replies		
Error Generation	CRC (Good/Bad/None), Undersize, Oversize		
Packet Flows Statistics	Real-time statistics to track up to 128K packet flows with throughput and latency measurements		
Latency Measurements	20 ns resolution		
IPv4, UDP, TCP	Hardware checksum generation		
Frame Length Controls	Fixed, random, or increment by user-defined step, random, weighted random		
Applications	**LM100TXS8**	**LM1000STXS4 LM1000STXS2 LM1000STXS4-256**	**OLM1000STXS24**
	IxExplorer: Layer 2-3 wire-speed traffic generation and analysis IxScriptMate: Automated test environment for Layer 2-3 data	IxNetwork: integrated Layer 2-3 data/control plane performance and functional testing. Routing/bridging emulation includes: BGP4/4+, OSPFv2/v3, IS-ISv4/v6, RIP/RIPng, RSVP-TE, LDP, L2 MPLS VPNs, L3 MPLS VPNs, VPLS, IGMPv1/v2/v3, MLDv1/v2, PIM-SMv4/v6, STP, RSTP, and MSTP	

	and control plane testing IxRouter: IPv4/v6 routing/bridging emulation, including routing, MPLS, multicast, and Spanning Tree. IxChariot®: Emulated application performance testing over Layer 4	IxExplorer: Layer 2-3 wire-speed traffic generation and analysis IxScriptMate: Automated test environment for Layer 2-3 data and control plane testing IxLoad: Layer 4-7 performance testing IxChariot®: Emulated application performance testing over Layer 4 IxAccess: Broadband access performance testing, including PPPoX and L2TPv2/v3 IxVPN: Performance verification of IPSec devices and networks IxAuthenticate: 802.1x authentication performance testing

Flexible Packet Generation

Traffic is generated in real-time by intelligent logic implemented in FPGAs on each Ixia port. Data is generated on each port by defining up to 256 streams. Within each stream, millions of packets can be configured with completely customizable characteristics for every packet header field. Encapsulations are availavle for VLANs, QinQ, MPLS, GRE, and others. Customizable payload contents can also be defined. Frame size can be fixed, vary according to a pattern, or be randomly assigned across a weighted range.

Real-Time Latency

Packets representing different traffic profiles can be associated with Packet Group Identifiers (PGIDs). The receiving port measures the minimum, maximum, and average latency in real-time for each packet belonging to different groups. Measurable latencies include:

- Instantaneous Latency and inter-arrival time where each packet is associated with one group ID
- Latency Bins, where PGIDs can be associated with a latency range
- Latency Over Time, where multiple PGIDs can be placed in "Time Buckets" with fixed durations
- First and Last Timestamps, where each PGID can store the timestamps of first and last received packets

Transmit Scheduler

There are two modes of transmission available - Packet Streams and Advanced Stream Scheduler:

Packet Streams

The packet streams transmit engine allows generation of up to 256 unique streams on each port. Multiple streams can be defined in sequence containing multiple packets with custom characteristics. After transmission of all packets in the first stream, control is passed to the next defined stream in the sequence. After reaching the last stream in the sequence, transmission may either cease or control may be passed on to any other stream in the sequence. Therefore, multiple streams are cycled through, representing different traffic profiles to simulate real world traffic.

Advanced Stream Scheduler

Up to 256 (128 on TXS8) unique streams can be interleaved per port, each having its own packet characteristics and rate. For example, presume that Port 1 is made up of three streams. If Stream 1 is defined with IP packets at 20% of line utilization, Stream 2 is defined with TCP packets at 50% of line utilization, and Stream 3 is defined with MPLS packets at 30% of line utilization, data on Port 1 will be transmitted at an aggregate utilization of 100% with interleaved IP, TCP, and MPLS packets.

Extensive Statistics

- Real-Time 64-bit counts and frame rates
- Spreadsheet format for convenient manipulation of statistics counters
- Eight Quality of Service counters (supporting 802.1p, and IPv4 TOS measurements)
- Up to six user-defined statistics are available that use a trigger condition
- Extended statistics for ARP, ICMP, and PHCP
- TX stream statistics for transmit frame count and rate
- External file logging for statistics and alerts
- Audible and visual alerts with user-definable thresholds

Data Capture

Each 10/100 Mbps port is equipped with 6 MB of capture memory while the 10/100/1000 Mbps Copper and Gigabit Fiber ports are equipped with 8 MB of capture memory, both of

which can store tens of thousands of packets in real-time. The capture buffer can be configured to store packets based on user-defined trigger and filter conditions. Decodes for IPv4, IPv6, UDP, ARP, BGP-4, IS-IS, OSPF, TCP, DHCP, IPX, RIP, IGMP, CISCO ISL, VLAN, and MPLS are provided.

Routing/Bridging Protocol Emulation

Ixia's Gigabit TXS Load Modules support Ixia's routing/bridging protocol emulation suites via the IxNetwork application. The 10/100 TXS8 load module supports routing/bridging protocol emulation via the IxRouter application. Support includes IPv4/IPv6 routing (BGP-4, OSPF, IS-IS, and RIP), MPLS (RSVPTE, LDP, L2 MPLS VPNs, L3 MPLS VPNs, and VPLS), multicast (IGMP, MLD, and PIM-SM), and bridging (STP, RSTP, MSTP). Highly scalable scenarios can be created emulating up to thousands of routers advertising millions of routes per test port. Up to wire speed Layer 2/3 traffic can be automatically created to target routes and MPLS LSPs.

Data Integrity

As packets traverse through routers and the IP header contents are changed, the CRC value is recalculated by the router. To validate router performance, the data integrity function allows packet payload contents to be verified with a unique CRC that is independent of the packet CRC. This ensures that the payload is not disturbed as the router changes header fields.

Sequence Checking

Sequence numbers can be inserted at a user-defined offset in the payload of each transmitted packet. Upon receipt of the packets through the Device Under Test (DUT), out-ofsequence errors are reported in real time at wire-speed rates. The user can define a sequence error threshold to distinguish between small versus big errors, and the receiving port can measure the amount of small, big, reversed, and total errors.

Tcl API

Ixia's TXS Load Modules are supported by a full Tcl Application Programming Interface (API). This API allows users to develop custom scripts, and integrate the modules into automated test environments.

Custom Applications

The Linux Software Development Kit (SDK) allows existing Linux applications to be compiled and run on TXS ports. Additionally, users can develop their own custom applications and integrate them into the Ixia test environment.

Product Ordering Information

LM1000STXS4-256
4-Port Dual-PHY (RJ45 and SFP) 10/100/1000 Mbps Ethernet Load Module (does not include SFP transceivers); Full features - supports routing protocols, Linux SDK, and L4-L7 Applications. Installed with 256 MB of processor memory

LM1000STXS4
4-Port Dual-PHY (RJ45 and SFP) 10/100/1000 Mbps Ethernet Load Module (does not include SFP transceivers); Full features - Supports routing protocols, Linux SDK, and L4-L7 Applications

LM1000STX4
4-Port Dual-PHY (RJ45 and SFP) 10/100/1000 Mbps Ethernet Load Module (does not include SFP transceivers); Reduced features. No support for routing protocols, Linux SDK, and L4-L7 Applications

LM1000STXS2
2-Port Dual-PHY (RJ45 and SFP) 10/100/1000 Mbps Ethernet Load Module (does not include SFP transceivers); Full features - supports routing protocols, Linux SDK, and L4-L7 Applications

LM1000STX2
2-Port Dual-PHY (RJ45 and SFP) 10/100/1000 Mbps Ethernet Load Module (does not include SFP transceivers); Reduced features - no support for routing protocols, LinuxSDK, and L4-L7 Applications

OLM1000STXS24
24-port, 10/100/1000 Ethernet, Dual PHY (RJ45 and SFP) Load Module for Optixia XL10, CPU per port; Full Features. (Does not include SFP transceivers)

OLM1000STX24
24-Port, 10/100/1000 Ethernet, Dual-PHY (RJ45 and SFP) Load Module for Optixia XL10 (Does not include SFP transceivers); Reduced features - no support for routing protocols, Linux

SDK, and L4-L7 Applications

LM100TXS8
8-port 10/100 Mbps Ethernet Load Module, Copper, CPU per port, full features

LM100TX8
8-Port 10/100Mbps Ethernet Load Module, Copper; Reduced features - no support for routing protocols, Linux SDK, and L4-L7 Applications

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