XCELLON-FLEX™ 10GE LOAD MODULE

THE NEXT STANDARD IN HIGH-DENSITY 10GE TESTING

The advancement of high-density, high-performance network switches, routers, aggregation devices, network appliances, and servers has accelerated since the standardization of 10GE. Ixia has consistently kept pace with the testing demands of network equipment manufacturers (NEMs), service providers, enterprises, and governments by continually-increasing port density and protocol scalability.

Xcellon™ is Ixia's high-density architecture to test next-generation networks and devices. Wired and wireless networks are converging over IP, and service providers must ensure quality delivery of the bandwidth-hungry, media-rich services that their customers demand. Cloud computing and data center convergence are changing the dynamics of business IT, while security threats are becoming more sophisticated by the day. All of these developments point to the need for more capable and scalable test solutions.

The Xcellon architecture features aggregation of multi-core CPUs and massive memory to meet testing needs for ultra-high scale and performance. This architecture delivers up to several times the protocol emulation of its nearest competitor and breaks the Terabit barrier for 10GE test solutions.

HIGHLIGHTS

- Compatible with XM2, XG12™, XGS2-SD, XGS2-HS, XGS12-SD, and XGS12-HS chassis

- High density 10GE test solution: 16x10GE SFP+ ports per single-slot module

- Industry's highest L2/3 protocol scale and performance using Ixia's unique resource aggregation over one or more of the 10GE ports

- Supports 10GE multimode and single mode fiber and passive copper media

- Data center ready – data center bridging with OpenFlow, VXLAN, LDP/DCBX, FCoE, priority-based flow control (PFC, IEEE802.1Qbb) protocol

Xcellon-Flex 10GE 16-port, single-slot SFP+ load module

The Xcellon-Flex 10GE product line consists of two models: the Accelerated Performance load module and the Full Emulation load module. Both use multi-core CPUs and substantial amounts of high-speed memory, providing flexible processing power to meet the challenges of testing today's and tomorrow's ultra-high-scale network equipment. New levels of protocol emulation scale are achieved through a technology called aggregation, first introduced in Ixia's load modules in 2007. Xcellon-Flex offers an expanded, flexible aggregation that combines the CPU power and memory of multiple ports. These resources can be aggregated behind one or more ports dynamically, on a single load module, as test requirements change.

The Accelerated Performance load module is ideal for layer 2-7 performance testing, providing ultra-high-scale session and protocol emulation per port. The Full Emulation load module is well suited for layer 2-3 mid-range protocol emulation and scale capacity testing for switches and routers. Both models set new standards in the industry, eclipsing the performance of their nearest competitors.

Together, Ixia's IxNetwork and Xcellon-Flex load modules support a comprehensive portfolio of routing and service emulations for next-generation networks, including:

- Access: DHCPv4/v6, PPPoX/L2TP, ANCP, IPv6 Autoconfiguration, DHCPv4/v6 over EoGRE, IGMP/MLD, IPTV One-time (IGMP / MLD Join / Leave latency on AP model only)

- Authentication: 802.1x, WebAuth, EAPoUDP, Cisco NAC

- Carrier Ethernet: Link OAM, CFM/Y.1731, PBB/PBB_TE, E-LMI, 1588v2 (PTP on the AP model only), ESMC, TWAMP

- Data Center / SDN: PFC, FCoE /FIP, LLDP/DCBX, VNTAG/VNIC, VEPA, FabricPath, TRILL, SPBM, OpenFlow, VXLAN, Segment Routing ISIS

- Routing / Switching: BGP4/BGP4+, OSPFv2/OSPFv3, ISISv4/v6, RIP/RIPng, EIGRP/EIGRPv6, PIM-SM/SSM, BFD, STP/RSTP/MSTP/PVST+/RPVST+, LACP, PoLACP, LISP (LISP is on AP model only)

- MPLS: RSVP-TE/P2MP, LDP/MLDP, L3 MPLS VPN/6VPE, LDP L2VPN (PWE/VPLS), BGP VPLS, Multicast VPN Rosen Draft, NG Multicast VPN, EVPN/PBB-EVPN, MPLS OAM, MPLS-TP

KEY FEATURES

- Industry's best-in-class high performance 10GE port density test solution
    - o First 10GE test solution to break the terabit barrier in a single chassis
    - o First test solution to offer CPU and memory aggregation at 10Gbps on multiple ports on a single load module
    - o Industry's highest-scaling protocol emulation
    - o High port density
    - o 30% more energy efficient that existing 10GE test solutions
- Data center ready with a full complement of protocols
- Flexible CPU and memory aggregation for high-scale protocol emulation performance on multiple 10GE ports:
    - o Up to several times the control plane protocol performance of its nearest competitor

- The IxNetwork test application that provides:
    - Service modeling at Internet scale
    - Rapid isolation of service violations
    - TrueView™ convergence time measurement
    - Carrier-class scaling
    - Complete end-to-end test automation provides complete GUI-based test automation capabilities that support conditional test execution, device interaction via telnet, SNMP and SYSLOG, and integrated statistics polling
    - Basic and advanced traffic wizards, with 'Quick Flow Groups' that provide advanced traffic generation and analysis tools, making it easy to configure complex scenarios
    - Easy-to-use protocol wizards that quickly and precisely build complex network topologies
    - Dynamic traffic control per flow group, with the ability to change rate and frame size on the fly
    - Advanced measurements including four latency modes, delay variation (jitter), inter-arrival time, sequence checking, misdirected packets, packet loss duration, and Rx rates
    - Real-time statistics viewer with summary level, group level, per-flow statistics and sophisticated results filtering and sorting powered by Flow Detective™
    - Multi-field ingress tracking to concurrently-track flows based on QoS, source/destination address, MPLS labels, VLAN IDs, and many other common protocol fields
    - Egress tracking providing a unique ingress/egress results view that compares sent traffic with received traffic, so as to accurately verify DUT packet field modifications; QoS remarking is easily verified
    - IxNetwork statistics viewer, a powerful tool for viewing and analyzing real-time results and generating test reports
    - Automated QuickTests for industry-standard test methodologies, including RFC 2544
    - Easy one-click TCL, HLTAPI, or HLPAPI automation using ScriptGen, with complete API support – providing complete automation of IxNetwork functions
    - For more information on IxNetwork, please visit the IxNetwork product portal at http://www.ixiacom.com/products/ixnetwork
- The IxLoad test application that provides:
    - Designed to run on Ixia's load module and chassis test platforms to transmit and receive control and data plane traffic with the device under test
    - A scalable solution for stateful testing with protocol support for: HTTP, SSL, FTP/TFTP, email (SMTP, POP3, IMAP), IPv4, IPv6, VLAN, ER
    - For more information on IxLoad, please visit the IxLoad product portal at http://www.ixiacom.com/products/ixload

SPECIFICATIONS

FEATURE	L2-7 ACCELERATED PERFORMANCE	L2-3 FULL EMULATION
Load module models	FlexAP10G16S	FlexFE10G16S
Number of ports per module	16	
Chassis slots per module	1	
Maximum ports per chassis	• XGS12-SD rackmount: 192-ports 10GE SFP+ • XGS12-HS rackmount: 192-ports 10GE SFP+ • XG12-HP rackmount: 192-ports 10GE SFP+ • XGS2-SD 3U: 32-ports 10GE SFP+ • XGS2-HS 3U: 32-ports 10GE SFP+ • XM2 desktop: 16-ports 10GE SFP+[i]	
10GE interface protocols	10GE LAN-R family	
Data center protocols	PFC, FCoE /FIP, LLDP/DCBX, VNTAG/VNIC, VEPA, FabricPath, TRILL, SPBM, OpenFlow, VXLAN, Segment Routing ISIS	
PFC support	• 1 queue at 9KB • 8 queues at 2.5KB	• 1 queue at 9KB • 2 queues at 2.5KB
Multi-core processors	Yes	
Aggregation capability	Yes	No
Per-port capture buffer	256MB	64MB
SFP+ media support (See ordering information)	• 10GBASE-SR/SW • 10GBASE/LR/LW • 10GBASE-CR	
Layer 2-3 routing protocol emulation	Yes	
Layer 4-7 application traffic testing	Yes, with support for: HTTP, SSL, FTP/TFTP, email (SMTP, POP3, IMAP), IPv4, IPv6, VLAN, ER	No

FEATURE	L2-7 ACCELERATED PERFORMANCE	L2-3 FULL EMULATION
Number of transmit flows per port (sequential values)	Billions	
Number of transmit flows per port (arbitrary values)	1 million	128K
Trackable receive flows	1 million	64K
Number of stream definitions per port	512i	256
	In packet stream (sequential) or advanced stream (interleaved) mode, each stream definition can generate millions of unique traffic flows	
Table UDF	1 million entries	256K
	Comprehensive packet editing function for emulating large numbers of sophisticated flows. Entries of up to 256 bytes, using lists of values can be specified and placed at designated offsets within a stream. Each list consists of an offset, a size, and a list of values in a table format.	
Packet flow statistics	Track 1 million flows	Track 64K flows
Transmit engine	Wire-speed packet generation with timestamps, sequence numbers, data integrity signature, and packet group signatures	
Receive engine	Wire-speed packet filtering, capturing, real-time latency and inter-arrival time for each packet group, data integrity, and sequence checking	
User defined field features	Fixed, increment, or decrement by user-defined step, value lists, range 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	
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, 6 user-defined stats (UDS), capture trigger (UDS 3), capture filter (UDS 4), 8 QoS counters, data integrity frames, data integrity errors, sequence checking frames, sequence checking errors, ARP, and ping requests and replies	

FEATURE	L2-7 ACCELERATED PERFORMANCE	L2-3 FULL EMULATION
Error generation	CRC (good/bad/none), undersize, oversize	
Link fault signaling	Link state indicator for: No Fault, Local Fault, and Remote Fault. For negative tests the port can be set so Remote Faults will not be sent as a response to Local Faults and idles will not be forced as a response to Remote Faults.	
Latency measurements	20ns resolution in packet timestamp	
Intrinsic Latency Compensation	Removes inherent latency error from the 10GE port electronics	
Transmit line clock adjustment	Ability to adjust the parts per million (ppm) line frequency over a range of: LAN mode: -100 to +100 ppm	
IPv4, IPv6, UDP, TCP	Hardware checksum generation and verification	
Frame length controls	Fixed, random, weighted random, or increment by user-defined step	
Operating temp. range	41°F to 86°F (5°C to 30°C), ambient air temperature	

APPLICATION SUPPORT OVERVIEW

Xcellon-Flex Accelerated Performance and Full Emulation Load Modules
• **IxExplorer:** Layer 2-3 wire-speed traffic generation, capture, and analysis.
• **IxNetwork:** Provides wire-rate traffic generation with service modeling that builds realistic, dynamically-controllable data-plane traffic. IxNetwork offers the industry's best test solution for functional and performance testing by using comprehensive emulation for routing, switching, MPLS, IP multicast, broadband, authentication, Carrier Ethernet, and data center Ethernet protocols
• **IxLoad:** A scalable solution for testing converged multiplay services, application delivery platforms, and security devices and systems. IxLoad emulates data, voice, and video subscribers and associated protocols to ensure quality of experience (QoE).[ii]
• **Tcl API:** Custom user script development for layer 2-7 testing.

PRODUCT ORDERING INFORMATION

944-1060 FlexAP10G16S

Xcellon FlexAP10G16S 10 Gigabit Ethernet LAN Load Module, L2-7 Accelerated Performance, a 1-slot module with 16-ports of SFP+ interfaces; The load module is compatible with the XGS12-SD 12-slot, standard performance rack mount chassis bundle (940-0011), XGS12-HS 12-slot, high-speed performance rackmount chassis bundle (940-0006), XG12 12-slot, rackmount chassis (940-0005), XGS2-SD 2-slot, 3RU standard performance chassis bundle (940-0010), XGS2-HS 2-slot, 3RU high-speed performance chassis bundle (940-0012) and the XM2 desktop chassis (941-0023); REQUIRES: One or more SFP+ transceiver options: 10GBASE-SR/SW (948-0013), or 10GBASE-LR/LW (948-0014)

944-1061 FlexFE10G16S

Xcellon FlexFE10G16S 10 Gigabit Ethernet LAN Load Module, L2-3 Full Emulation Performance, a 1-slot module with 16-ports of SFP+ interfaces; The load module is compatible with the XGS12-SD 12-slot, standard performance rack mount chassis bundle (940-0011), XGS12-HS 12-slot, high-speed performance rackmount chassis bundle (940-0006), XG12 12-slot, rackmount chassis (940-0005), XGS2-SD 2-slot, 3RU standard performance chassis bundle (940-0010), XGS2-HS 2-slot, 3RU high-speed performance chassis bundle (940-0012) and the XM2 desktop chassis (941-0023); REQUIRES: One or more SFP+ transceiver options: 10GBASE-SR/SW (948-0013), or 10GBASE-LR/LW (948-0014)

XCELLON-FLEX SFP+ TRANSCEIVER AND CABLE OPTIONS

Select one or more of the SFP+ optical transceiver options:

- **948-0013** SFP+10GBASE-SR/SW, Accessory, SFP+ Transceiver for 10 Gigabit Ethernet LAN/WAN load modules with pluggable SFP+ interface, 850nm

- **948-0014** SFP+10GBASE-LR/LW, Accessory, SFP+ Transceiver for 10 Gigabit Ethernet LAN/WAN load modules with pluggable SFP+ interface, 1310nm

- **948-0016** SFP+10GSFP+Cu, Accessory, Passive, copper Direct Attach Cable Assembly for 10 Gigabit Ethernet LAN/WAN load modules with pluggable SFP+ interface, 3 meter length.

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[i] In the Data Center Bridging mode, the number of transmit streams is reduced by one-half, to 256 streams.
[ii] The IxLoad application is not supported on the Xcellon-Flex Full Emulation (FE) model (944-1061).