

Xcellon-Flex™ Combo 10/40GBE Accelerated Performance Load Module

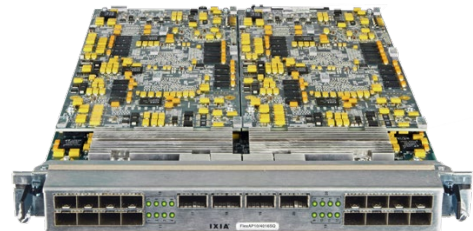
The advancement of high-density, high-performance network switches, routers, aggregation devices, network appliances, and servers has accelerated since the standardization of speeds from 10GE to 100GE. Ixia has consistently kept pace with the testing demands of network equipment manufacturers (NEMs), service providers, enterprises, and governments by continually increasing port speed, density, and protocol scalability.

Xcellon™ is Ixia's high-density architecture for testing 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 several times the protocol emulation of its nearest competitor and breaks the terabit barrier for 10GE test solutions.

Highlights

- Compatible with XM2, XG12, XGS12-SD, and XGS2-SD chassis
- High density 10GbE and 40GbE test solution: 16x10GbE SFP+ ports and 4x40GbE QSFP ports per single-slot module
- First 10GbE and 40GbE test solution to break the terabit barrier with a single chassis
- Industry's highest L2/3 protocol scale and performance using Ixia's unique resource aggregation over one or more of the 10GbE ports
- Switches between 10GbE or 40GbE modes of operation as test plans demand
- Data center ready – data center bridging with OpenFlow, VXLAN, LDP/DCBX, FCoE, priority-based flow control (PFC, IEEE802.1Qbb) protocol



Xcellon-Flex Accelerated Performance: 16-ports of 10GE SFP+ and 4-ports of 40GE QSFP+ in a single slot load module

The Xcellon-Flex Combo is the first load module in the test industry to offer both 10GE SFP+ and 40GE QSFP ports in a single chassis slot. With 16x10GE ports and 4x40GE ports per module, it beats the competition in terms of port density and flexibility. Using aggregation technology to combine CPU power and memory, it provides ultra-high networking protocol scalability: up to several times the performance of its nearest competitor. Processor resources and memory can be aggregated dynamically across groups of 4x10GE ports, creating up to 4 super-ports per module with maximum protocol scalability.

Additionally, Xcellon-Flex is the only 40GE test product to offer L4-7 application support at high scale. Used in conjunction with Ixia's test applications IxNetwork™ and IxLoad™, Xcellon-Flex is best-in-class for high-performance, L2-7 testing at 10/40GE speeds.

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

- **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 10GE ports only)
- **Data Center/SDN:** PFC, FCoE /FIP, LLDP/DCBX, VNTAG/VNIC, VEPA, FabricPath, TRILL, SPBM, OpenFlow, VXLAN, Segment Routing ISIS
- **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
- **Access:** DHCPv4/v6, PPPoX/L2TP, ANCP, IPv6 Autoconfiguration, DHCPv4/v6 over EoGRE, IGMP/MLD, IPTV One-time (IGMP/MLD Join/Leave latency)
- **Carrier Ethernet:** Link OAM, CFM/Y.1731, PBB/PBB_TE, E-LMI, 1588v2 (PTP), ESMC, TWAMP
- **Authentication:** 802.1x, WebAuth, EAPoUDP, Cisco NAC

Key Features

- Compatible with XM2, XG12™, XGS12-SD, and XGS2-SDchassis
- Highest-density 10GE and 40GE test solution: 16x10GE ports and 4x40GE ports per module
- First 10GE and 40GE test solution to break the terabit barrier with a single rack mount chassis
- Aggregation, for ultra-high protocol scale and performance, is supported on multiple 10GE ports on a single load module
- Industry's highest L2/3 protocol emulation at 10GE and 40GE
- Industry's first 40GE test module with high-scaling L4-7 test capability
- Data center ready – data center bridging with LLDP/DCBX, FCoE, and priority-based flow control (PFC, IEEE802.1Qbb), OpenFlow, VXLAN protocol support
- Flexible CPU and memory aggregation, both card level and per resource group techniques, for high-scale protocol emulation performance
- Switches between 10GE or 40GE modes of operation as test plans demand
- Support for 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 graphical user interface (GUI)-based test automation capabilities that support conditional test execution, device interaction via telnet 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, and per-flow statistics, as well as 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 and many more
- Easy one-click TCL, HLTAPI, or HLPAPI automation using ScriptGen, with complete API support – providing complete automation of IxNetwork functions
- Support for the IxLoad application-layer test software:
 - Resource Group Aggregation for L4-7 protocols;
 - HTTP, SSL, FTP, TFTP, SMTP POP3, and IMAP

For more information on IxNetwork, please visit the IxNetwork product portal at:

www.ixiacom.com/products/ixnetwork

For more information on IxLoad, please visit the IxLoad product portal at:

www.ixiacom.com/products/ixload

Load Module Specifications

Feature	Xcellon-Flex Combo 10/40GE Accelerated Performance
Load module model	FlexAP1040SQ
Number of ports per load module	16 ports of SFP+ 10GE and 4-ports of QSFP 40GE
Chassis slots per module	1
Maximum ports per chassis	<ul style="list-style-type: none"> • XGS12-SD: 192-ports 10GE SFP+ and 48-ports 40GE QSFP • XG12 Rackmount (6000W): 192-ports 10GE SFP+ and 48-ports 40GE QSFP • XGS2-SD 3U: 32-ports 10GE SFP+ and 8-ports 40GE QSFP+ • XM2 Desktop: 16-ports 10GE SFP+ and 4-ports 40GE QSFPⁱ
SFP+ optical transceivers (see ordering information)	<ul style="list-style-type: none"> • 10GBASE-SR/SW • 10GBASE-LR/LW
QSFP optical transceiver (see ordering information)	40GBASE-SR4
Multi-core processor technology	Yes
Interface protocols	<ul style="list-style-type: none"> • IEEE802.3ae 10GE LAN • IEEE802.3ba 40GBASE-R LAN
Data center protocols (see optional upgrades for DCBX, FCoE, FCF)	FCoE /FIP, LLDP/DCBX, VNTAG/VNIC, VEPA, FabricPath, TRILL, SPBM, OpenFlow, VXLAN, Segment Routing ISIS
Layer 2-3 routing protocol emulation support	Yes
Layer 4-7 application traffic testing support	Yes
Aggregation capability	Yes (for 10GE ports)
Capture buffer per port	256MB (10GE) 1GB (40GE)
Transmit engine	Wire-speed packet generation with timestamps, sequence numbers, data integrity signature, and packet group signatures
Stream definitions per port	512 ⁱⁱ
Number of transmit flows per port (sequential values)	Billions

Feature	Xcellon-Flex Combo 10/40GE Accelerated Performance
Number of transmit flows per port (PGID)	1 million
Table UDF	1 million entries
User defined field features	Fixed, increment, or decrement by user-defined step, value lists, range lists (10GE only), cascade, random, and chained
Data field per stream	Fixed, increment (byte/word), decrement (byte/word), random, repeating, user-specified
Frame length controls	Fixed, random, weighted random, or increment by user-defined step
Error generation	<ul style="list-style-type: none"> • 10GE: CRC (good/bad/none), undersize, oversize • 40GE: CRC (good/bad), undersize, oversize
IPv4, IPv6, UDP, TCP checksum	Hardware checksum generation and verification
Receive engine	Wire-speed packet filtering, capturing, real-time latency, and inter-arrival time for each packet group, data integrity, and sequence checking
Trackable receive flows	1 million
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)
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
Flow control	IEEE802.03x PAUSE frame control IEEE802.1Qbb (PFC)
Latency measurements	<ul style="list-style-type: none"> • 10GE: 20ns resolution in packet timestamp • 40GE: 2.5ns resolution in packet timestamp
Link fault signaling at 10GE	Link state indicator for: No Fault, Local Fault, and Remote Fault
Link fault signaling at 40GE	Generate local and remote faults with controls for the number of faults and order of faults, plus the ability to select the option to have the transmit port ignore link faults from a remote link partner

Feature	Xcellon-Flex Combo 10/40GE Accelerated Performance
Intrinsic latency adjustment	Ability to remove inherent latency from 10GE/40GE port electronics when used with MSA-compliant 10GE/40GE transceivers
40GE physical coding sublayer (PCS) test features:	IEEE 802.3ba-compliant PCS transmit and receive side test capabilities
Per PCS lane, transmit lane mapping	Supports all combination of PCS lane mapping: Default, Increment, Decrement, Random, and Custom
Per PCS lane, skew insertion capability	User-selectable from zero up to 3 microseconds of PCS Lane skew insertion on the transmit side
Per PCS lane, lane marker, or lane marker and payload error injections	User-selectable ability to inject errors into the PCS Lane Marker and simultaneously into PCS Lane Marker and Payload fields. This includes the ability to inject sync bit errors into the Lane Marker and Payload. User can control the PCS lane, number or errors, and period count; and manage the repetition of the injected errors.
Per PCS lane, receive lanes statistics	PCS Sync Header and Lane Marker Lock, Lane Marker mapping, Relative lane deskew up to 52 microseconds, Sync Header and PCS Lane Marker Error counters, indicators for Loss of Synch Header and Lane Marker, BIP8 errors
Transmit line clock adjustment (10GE and 40GE)	Ability to adjust the parts per million (ppm) line frequency over a range of -100 to +100 ppm
Operating temp. range	41°F to 86°F (5°C to 30°C), ambient air temperature
Load module dimensions	<ul style="list-style-type: none"> • 16.90" (L) x 12.00" (W) x 1.28" (H) • 429mm (L) x 305mm (W) x 33mm (H)
Weight	<ul style="list-style-type: none"> • Module only: 11.75 lbs (5.34 kg) • Shipping: 14.05 lbs (6.38 kg)

Application Support

Xcellon-Flex Combo 10/40GE Accelerated Performance Load Module

- IxExplorer™: layers 1, 2, and 3 wire-speed traffic generation, capture, and analysis.
- IxExplorer Tcl API: custom user script development for layer 1-3 testing.
- 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, MPLS, VPLS, high-availability, IP multicast, switching, carrier Ethernet, broadband, and DCB protocols.
- IxNetwork Tcl API: custom user script development for layer 2-7 testing.
- 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).

Product Ordering Information

944-1062 - FlexAP10/4016SQ 10GE and 40GE Load Module

Xcellon-FlexAP10/4016SQ 10/40 Gigabit Ethernet Accelerated Performance Load Module, 16-Ports of 10GE SFP+ interfaces and 4-ports of QSFP 40GE interfaces with full performance L2-7 support. The load module is compatible with the XGS12-SD 12-slot, standard performance rack mount chassis bundle (940-0011), XGS2-SD 2-slot, 3RU standard performance chassis bundle (940-0010), ; REQUIRES: One or more SFP+ transceiver options: 10GBASE-SR/SW (948-0013), or 10GBASE-LR/LW (948-0014) and 40GE QSFP+ transceiver options: 40GBASE-SR4 (948-0031), or 40GBASE-LR4 (948-0032)

Xcellon-Flex SFP+ 10GE transceiver 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

Xcellon-Flex QSFP 40GE transceiver and cable option:

948-0031

QSFP+ 40GE, 40GBASE-SR4 optical transceiver, pluggable, MMF, 850nm. This transceiver is compatible with the following Ixia load modules and CFP-to-QSFP interface adapters: Xcellon-Multis XM10/40GE12QSFP+FAN 40-Gigabit Ethernet QSFP load module (944-1105), Xcellon-Multis XM10/40GE6QSFP+FAN 40-Gigabit Ethernet QSFP load module (944-1109), Xcellon Flex10G/40GSQ 10/40 Gigabit Ethernet Accelerated Performance load module (944-1062), Xcellon-FlexFE40G4Q 40 Gigabit Ethernet Full Emulation load module (944-1065), HSE40GEQSFP1-01, 40-Gigabit Ethernet load module (944-0092). CFP-to-QSFP+ Interface Adapter, 1-port (948-0022), and the CFP-to-QSFP Dual Interface Adapter, 2-port (948-0023).

948-0032

QSFP+ 40GE, 40GBASE-LR4, optical transceiver, pluggable, SMF, 1310nm. This is compatible with the following Ixia load modules: Xcellon-FlexAP10/4016SQ 10/40 Gigabit Ethernet Accelerated Performance load module (944-1062), Xcellon-FlexFE40G4Q 40 Gigabit Ethernet Full Emulation load module (944-1065), Xcellon-Multis XM10/40GE12QSFP+FAN 40-Gigabit Ethernet QSFP load module (944-1105), and Xcellon-Multis XM10/40GE6QSFP+FAN 40-Gigabit Ethernet QSFP (944-1109).

942-0041

MT 12-Fiber Multimode cable for 40GBASE-SR4 optical transceivers with MT Flat F-F connectors, 850nm, 3-meter length.

ⁱ The XM2 portable chassis (941-0023) supports up to 1 FlexAP1040SQ load module. No other load module may be installed in the XM2 portable chassis when a FlexAP1040SQ load module is installed.

ⁱⁱ In the Data Center Bridging mode, the number of transmit streams per port is reduced by one-half to 256 streams for 10GbE and 40GbE ports.

Learn more at: www.keysight.com

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus

