

Gigabit Ethernet XMVDC LAN Services Modules



Ixia's Gigabit Ethernet XMVDC LAN Services Modules (LSMs) offer complete Layer 2-7 network and application testing functionality in a single test system. Each test port supports wire-speed Layer 2-3 traffic generation and analysis, high performance routing/bridging protocol emulation, and true Layer 4-7 application traffic generation and subscriber emulation. With 16 Dual-PHY ports per module, you can create ultra-high density test environments for auto-negotiable 10/100/1000 Mbps Ethernet over copper as well as Gigabit Fiber and 100Base-FX Ethernet over fiber. Up to 192 Gigabit Ethernet test ports are supported in a single 12-slot Ixia chassis.

The ability to test converged Ethernet networks in next-generation data centers, often referred to as data center bridging (DCB), requires the Ixia test system to support the fibre channel over Ethernet (FCoE) protocol and IEEE 802.1Qbb priority-based flow control (PFC). The XMVDC load modules include built-in support for FCoE and PFC. Additional protocols such as FIP and LLDP/DCBx support the testing of network devices that must receive and forward both Ethernet and FCoE traffic on the same port (especially when a fibre channel storage network is part of a DCB-capable data center). DCB is an extension of Ethernet that makes Ethernet a reliable transport link in a converged data center.



10/100/1000 Mbps Ethernet and Gigabit Fiber XMVDC Load Modules

Highlights

- Complete Layer 2-7 network and application testing functionality in a single test system
- Flexible Packet Generation
- Real-Time Latency
- Transmit Scheduler
- Extensive Statistics
- Data Capture
- Data Integrity
- Sequence and Duplicate Packet Checking
- Routing/Bridging Protocol Emulation
- Application Layer Performance Testing
- Tcl API

Each port on a 1GbE XMVDC 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, video servers, secure gateways, firewalls, and many other networking and application-aware devices.

Ixia's Gigabit Ethernet XMVDC LAN Services Modules are offered in 4, 8, 12, and 16 port full-performance configurations, providing scalability and affordability for a diverse range of test requirements.

Specifications

Feature	Details
Load module	<ul style="list-style-type: none"> • LSM1000XMVDC16-01 • LSM1000XMVDC12-01 • LSM1000XMVDC8-01 • LSM1000XMVDC4-01
Connector type	RJ45 or SFP
Maximum ports per chassis	<ul style="list-style-type: none"> • XGS12-SD: 192 • XGS12-HS: 192 • XG12: 192 • XGS2-SD: 32 • XGS2-HS: 32 • XM2 Desktop: 32
Connection speed	Auto-negotiable 10/100/1000 Mbps Ethernet over copper and gigabit fiber and 100Base-FX Ethernet over fiber
Port CPU/memory per port	800MHz /1GB
Number of ports per model	16/12/8/4
Layer 2-3 routing protocol and emulation	Yes
Layer 4–7 application traffic testing	Yes
Data center bridging with FCoE and PFC support	Yes
Capture buffer per port	64MB
Number of transmit flows per port (sequential values)	Billions
Number of transmit flows per port (arbitrary values)	98K

Feature	Details
Number of trackable receive flows per port	512K
Number of stream definitions per port	4096 ¹
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 for each packet group, data integrity, and sequence checking.
User defined field (UDF) features	Fixed, increment, or decrement by user-defined step, value lists, range lists, cascade, random, and chained.
Table UDF feature	Comprehensive packet editing function for emulating large numbers of sophisticated flows. Up to 98K table UDF entries are supported on the LSM1000XMVDC modules.
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-Bit)	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, PRBS BER, PRBS Errored Bits, and PRBS Bits Received, Sequence Checking Frames, Sequence Checking Errors, ARP, and Ping requests and replies.
Error generation	CRC (Good/Bad/None), Undersize, Oversize.
Packet flow statistics	Real-time statistics to track up to 128K packet flows on the LSM1000XMVDC 16/12/8/4 with throughput and latency measurements.
Latency measurements	20ns resolution
IPv4, IPv6, UDP, TCP	Hardware checksum generation
Frame length controls	Fixed, random, weighted random, or increment by user-defined step, random, weighted random.
Operating temperature range	41°F to 86°F (5°C to 30°C), ambient air ²

¹ixNetwork version 5.40EA or higher version is required to support 4096 streams per port.

Applications Support

Application	Details
Application - IxExplorer™	A full-featured layer 2-3 wire-speed Ethernet traffic generation and analysis test application with full support for stateless FCoE functional and scalability testing. The FCoE and FCoE Initialization Protocol (FIP) features allow testing of FCoE switches running both FCoE traffic and traditional Ethernet traffic. IxExplorer is included with the purchase of all Ixia chassis.
Application - IxLoad™	Provides a scalable solution for testing converged multiplay services and application delivery platforms. IxLoad emulates data, voice, and video subscribers and associated protocols for performance testing as well as the ability to generate malicious traffic to test for security.
Application - IxNetwork™	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.

Flexible Packet Generation

Each Ixia GE XMVDC test port is capable of generating precisely-controlled network traffic at up to wire speed using Ixia's IxExplorer test application. Millions of packet flows can be configured on each port with fully customizable packet header fields. Flexible header control is available for Ethernet, IPv4/v6, IPX, ARP, TCP, UDP, VLANs, QinQ, MPLS, GRE, and many others. Payload contents can also be customized with incrementing/decrementing, fixed, random, or user-defined information. Frame sizes can be fixed, varied according to a pattern, or randomly assigned across a weighted range. Rate control can be flexibly defined in frames per second, bits per second, percentage of line rate, or inter-packet gap time.

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 time stamps, where each PGID can store the timestamps of first and last received packets

²The maximum operating temperature for these load modules lowers the maximum operating temperature of the XM2 chassis (941-0023).

Transmit Scheduler

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

Packet Stream Scheduler

In Packet Stream Scheduler mode, the transmit engine allows configuration of up to 256 unique sequential stream groupings on each port. Multiple streams can be defined in sequence, each containing multiple packet flows defined by unique 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 network traffic.

Advanced Stream Scheduler

In Advanced Stream Scheduler mode, the transmission of stream groupings is interleaved per port. For example, assume a port is configured with three streams. If Stream 1 is defined with IP packets at 20% of line rate, Stream 2 is defined with TCP packets at 50% of line rate, and Stream 3 is defined with MPLS packets at 30% of line rate, data on the port will be transmitted at an aggregate utilization of 100% with interleaved IP, TCP, and MPLS packets.

Extensive Statistics

- Real-time 64-bit frame counts and rates
- Spreadsheet presentation format for convenient manipulation of statistics counters
- Eight quality of service counters (supporting 802.1p, DSCP, and IPv4 TOS measurements)
- Six user-defined statistics that use a trigger condition
- Extended statistics for ARP, ICMP, and DHCP
- PRBS statistics with Bit Error Ratio calculation
- Transmit stream statistics for frame counts and rate
- External logging to file for statistics and alerts
- Audible and visual alerts with user-definable thresholds

Data Capture

Each port is equipped with 64 MB of capture memory, capable of storing 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.

Data Integrity

As packets traverse through networks, IP header contents may change resulting in the recalculation of packet CRC values. To validate device performance, the data integrity function of Gigabit Ethernet XMVDC modules 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 device changes header fields.

Sequence and Duplicate Packet Checking

Sequence numbers can be inserted at a user-defined offset in the payload of each transmitted packet. Upon receipt of the packets by the device under test (DUT), out-of-sequence errors or duplicated packets 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 receive port can measure the amount of small, big, reversed, and total errors. Alternatively, the user can use the duplicate packet detection mode to observe that multiple packets with the same sequence number are received and analyzed.

Routing/Bridging Protocol Emulation

Ixia's Gigabit Ethernet XMVDC modules support performance and functionality testing using routing/bridging protocol emulation via the IxNetwork and IxAutomate applications. Protocols supported include: IEEE1588v2 precision time protocol (PTP), and routing/bridging emulation including RIP, RIPng, OSPFv2/v3, ISISv4/v6, EIGRP, EIGRPv6, BGP-4, BGP+, RSVP-TE, RSVP-TE P2MP, LDP, mLDP, PWE, L3 MPLS VPN, 6VPE, MPLS-TP, MPLS-OAM, 6PE, BGP auto-discovery with LDP FEC 129 Support, VPLS-LDP, VPLS-BGP, BFD, IGMPv1/v2/v3, MLDv1/v2, PIM-SM/SSM, PIM-BSR, multicast VPN, VPNv6, STP/RSTP, MSTP, PVST+/RPVST+, link aggregation (LACP), link OAM, CFM, service OAM, PBT/PBB-TE, ESMC, PTP, E-LMI, ANCP, PPPoX, DHCPv4 client/server, DHCPv6 client/server, L2TPv2, radius attributes for L2TP, 802.1x, WebAuth, Cisco NAC, PFC, FCoE/ FIP, LLDP/DCBX, and VNTAG/VIC.

IxNetwork offers the customization and flexibility to meet the wide range of requirements necessary for testing complex network topologies with thousands of network devices. Millions of routes and reachable hosts can be emulated. IxNetwork can customize millions of traffic flows to stress data plane performance. Powerful GUI wizards and grid controls allow you to create sophisticated traffic flows with ease. Its enhanced real-time analysis and statistics are capable of reporting comprehensive protocol status and detailed per-flow traffic performance metrics.

Application Layer Performance Testing

Ixia's Gigabit Ethernet XMVDC modules support performance testing of content-aware devices and networks via the IxLoad application. IxLoad creates real-world traffic scenarios at the TCP/UDP (Layer 4) and application (Layer 7) layers, emulating clients and servers for web (HTTP, SSL), P2P, FTP, email (SMTP, POP3, IMAP), streaming (RTP, RTSP), video (MPEG2, MPEG4, IGMP and RSTP), voice (SIP, H.323, H.248, SCCP and MGCP), and infrastructure services such as DNS, DHCP, LDAP, AAA, and Telnet. Security platforms can be tested with integrated L2/L3 authentication mechanisms such as 802.1x and NAC, as well generated malicious traffic to test for security. Each 1GbE XMVDC port can be independently configured to run different protocols and client/server scenarios.

Tcl API

Ixia's Gigabit Ethernet XMVDC modules are supported by a comprehensive Tcl application programming interface (API). This API allows users to develop custom scripts and integrate the modules into automated test environments.

Product Ordering Information

944-0095 LSM1000XMVDC4-01

LSM1000XMVDC4-01 Gigabit Ethernet Load Module, 4-Port Dual-PHY (RJ45 and SFP) 10/100/1000 Mbps; 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); 1GB Port CPU memory, full featured L2-L7 with FCoE enabled. Fiber Ports REQUIRE SFP transceivers, options include SFP-LX, SFP-SX, and SFP-CU.

944-0096 LSM1000XMVDC8-01

LSM1000XMVDC8-01 Gigabit Ethernet Load Module, 8-Port Dual-PHY (RJ45 and SFP) 10/100/1000 Mbps; 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); 1GB Port CPU memory, full featured L2-L7 with FCoE enabled. Fiber Ports REQUIRE SFP transceivers, options include SFP-LX, SFP-SX, and SFP-CU.

944-0097 LSM1000XMVDC12-01

LSM1000XMVDC12-01 Gigabit Ethernet Load Module, 12-Port Dual-PHY (RJ45 and SFP) 10/100/1000 Mbps; 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); 1GB Port CPU memory, full featured L2-L7 with FCoE enabled. Fiber Ports REQUIRE SFP transceivers, options include SFP-LX, SFP-SX, and SFP-CU.

944-0098 LSM1000XMVDC16-01

LSM1000XMVDC16-01 Gigabit Ethernet Load Module, 16-Port Dual-PHY (RJ45 and SFP) 10/100/1000 Mbps; 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); 1GB Port CPU memory, full featured L2-L7 with FCoE enabled. Fiber Ports REQUIRE SFP transceivers, options include SFP-LX, SFP-SX, and SFP-CU.

SFP-LX

SFP Transceiver - 1310nm LX

SFP-SX

SFP Transceiver - 850nm SX