NOVUS™ QSFP28 HIGH-DENSITY 100/50/40/25/10GE LOAD MODULE FAMILY

EVOLVE YOUR HIGH-SPEED MULTI-RATE ETHERNET TESTING

HIGH-DENSITY 100/50/40/25/10GE QSFP28 WITH MULTI-RATE ETHERNET CAPABILITY IS HERE TO STAY!

Bandwidth requirements for enterprises, cloud service providers, and global data centers are growing rapidly, surpassing the bandwidth that today's 10GE and 40GE interface speeds can provide. Cloud service providers and Hyper-scale data centers are deploying high-density 100GE, 50GE and 25GE networking infrastructure solutions to meet these demands.

Network equipment manufacturers (NEMs) are rapidly increasing port densities and delivering highly flexible multi-rate switch/routing ports to capture market share. These products are designed to support 100/50/40/25/10GE on a single port. The new requirements to remain competitive involve previously unheard levels of complexity.

To capitalize on today's innovation, NEMs need native QSFP28 test and measurement systems to deliver higher-density 100GE products with multi-rate Ethernet speed capabilities. At the same time, they must ensure support for legacy 40GE/10GE as their customers transition to 100GE/50GE/25GE. As data centers, cloud service providers, and large enterprises implement this same high-density network equipment in their own networks, they too need the same type of test solution to verify performance and functionality prior to deployment.

Novus, Novus-M, and Novus-R are Ixia's next-generation architecture and test solutions that satisfy the test needs of both high-density, multi-rate switch/router makers and the organizations implementing the network equipment. Supporting 8 native QSFP28 100GE ports, 8 40GE ports, up to 16 50GE ports, up to 32-ports of 25GE, and up to 32-ports of 10GE per load module. Novus, Novus-M, and Novus-R enable interoperability and functional testing and routing protocol emulation, as well as high-port count performance testing.

HIGHLIGHTS

- Enable affordable, high-density 5-speed 100/50/40/25/10GE testing

- Validate 100GE, 40GE, 25GE, and 10GE over copper, multimode and single-mode fiber media

- Validate 50GE over copper DAC and multimode fiber AOC media

- Leverage excellent interoperability, functional, and performance test platform for the new 100GBASE-SR4, 100GBASE-CR4, 50GBASE-CR, 25GBASE-CR, 25GBASE-SR, with auto-negotiation, FEC, and link training

- Generate broad range of traffic and analysis with full L2/3 protocol coverage

Novus native QSFP28 8-ports, 100/50/40/25/10GE 1-slot load module

As complex multi-rate test requirements have emerged for testing 100GE, 50GE, 40GE, 25GE, and 10GE on the same physical port, Novus native QSFP28 100GE interfaces with 50GE and 25GE speeds and fan-out and/or point-to-point cable support provides a more efficient and flexible set of 100/50/40/25/10GE test use cases.

Novus QSFP28 load modules are available in three different models:

- **NOVUS100GE8Q28+FAN:** A full-featured model that is an 8-port, 100GE, 50GE, 40GE, 25GE, and 10GE load module designed for enterprise and data center switch and router testing.

- **NOVUS-M100GE8Q28+FAN:** A mid-range scale and performance model that is an 8-port, 100GE, 50GE, 40GE, 25GE, and 10GE load module designed for small/medium enterprise switch and router testing.

- **NOVUS-R100GE8Q28+FAN:** A reduced feature model that is an 8-port, 100GE, 50GE, 40GE, 25GE, and 10GE load module designed for high-density switch testing. Novus-R scales down the L2/3 feature set and increases affordability to make the build-out of high-port-count 100GE test beds achievable at a lower cost.

MODEL	PERFORMANCE LEVEL	USAGE
NOVUS100GE8Q28+FAN	Full Featured	Enterprise and Data Center switch and router testing
NOVUS-M100GE8Q28+FAN	Mid-Range Featured	Small/medium enterprise switch and router protocol testing
NOVUS-R100GE8Q28+FAN	Reduced Featured	Affordable high-density switch testing

KEY FEATURES

Novus, Novus-M, and Novus-R provide these key features:

- Multi-vendor interoperability of 100GE, 50GE, 40GE, 25GE, and 10GE testing between different speeds that run over these optics and media: Pluggable optical transceivers, Active Optical Cables (AOC), and passive copper Direct Attach Cable (DAC) media

- L2/3 protocol emulation to validate performance and scalability of L2/3 routing/switching and data center test cases using Ixia's IxNetwork application

- Line-rate hardware packet capture and decode tools to detect and de-bug data transmission errors

- An excellent test platform for full line rate 100Gb/s to evaluate the new 100GE and new multi-rate ASIC designs, FPGAs, and hardware switch fabrics that use the 2x50 or 4x25Gb/s electrical interface with NRZ encoding

- Benchmark the data plane and protocol emulation performance and scale of ultra-high-density 100/50/40/25/10GE-capable network equipment; use industry-standard RFC benchmark tests in large test beds with hundreds of ports in a single test

- Support for advanced features such as: Ethernet Forward Error Correction both RS-FEC and FC_FEC, auto-negotiation, and link training on 100GE, 50GE, and 25GE speeds

- 100GE speed support for multimode 100GBASE-SR4 and single-mode 100GBASE-LR4
- 50GE speed support (requires purchase of the 50GE load module speed option):
  - Support for independent 50GE physical fan-out cable configurations including 1x50GE and 2x50GE per port support on passive copper DAC media
  - Up to 2x50GE links per port over single point-to-point 100GE DAC media
  - Up to 2x50GE links per port over single point-to-point 100GE AOC multimode fiber media
- 25GE speed support (requires purchase of the 25GE load module speed option):
  - Support for independent 25GE physical fan-out cable configurations per port including 1x25GE, 2x25GE, 3x25GE, and 4x25GE support on fiber and copper media
  - Up to 4x25GE links per port over single point-to-point 100GE cable media (MT-MT, AOC, or DAC media)
- 40GE & 10GE speed support (requires purchase of the 40/10GE load module speed option):
  - Support for independent 40GE physical cable configuration for 1x40GE per port support on passive copper DAC media
  - Up to 1x40GE link per port over single point-to-point 100GE DAC media
- Up to 1x40GE link per port over single point-to-point 100GE AOC multimode fiber mediaApplication support including: IxExplorer, IxNetwork, and the related Tcl and automation APIs

SPECIFICATIONS

PRODUCT DESCRIPTION	NOVUS 100GE8Q28+FAN 100/50/40/25/10GE	NOVUS-R100GE8Q28+FAN 100/50/40/25/10GE[i]	NOVUS-M100GE8Q28+FAN 100/50/40/25/10GE[j]
Part Number	944-1140	944-1147	944-1156
Hardware Load Module Specifications			
Slot / Number of Ports	A 1-slot load module with: • 8x100GE native QSFP28 ports • 16x50GE ports via fan-out media; requires 50GE speed option • 8x40GE ports via fan-out media; requires 40/10GE speed option • 32x25GE ports via fan-out media; requires 25GE speed option • 32x10GE ports via fan-out media; requires 40/10GE speed option		
Physical Interfaces	8-ports of native QSFP28		

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Supported Port Speeds	100GE/port: 100GE-capable fiber and passive copper cable media 2x50GE/port: 50GE-capable passive copper (DAC) for point-point and fan-out cables, and multimode fiber point-to-point AOC media 40GE/port: 40GE-capable passive copper (DAC) for point-point and fan-out cables, and multimode fiber point-to-point AOC media 4x25GE/port: 25GE-capable fiber and passive copper point-point and fan-out cable media 4x10GE/port: 10GE-capable fiber and passive copper point-point and fan-out cable media		
Number of users	• Up to 8-users per load module		
CPU and Memory	Multicore processor with 2GB of CPU memory per port for 100GE & 40GE, 1GB of RAM for each of the 2x50GE fan-outs, and shared across the 4x25GE & 4x10GE fan-outs		
IEEE Interface Protocols	- IEEE 802.3 100GBASE-R LAN - IEEE P802.3bj - IEEE P802.3bm - IEEE P802.3by - IEEE 802.3ba - IEEE 802.3ae		
25G/50G Consortium specification	25GE and 50GE speed support compatible with version 1.6 of the specification		
Advanced Layer 1 Support	100GE: - Auto-negotiation (AN), Clause 73 for passive copper DAC - Link training for 100GE copper cable media, Clause 73 - Ethernet Forward Error Correction RS-FEC, Clause 91 - FEC statistics: - RS-FEC Corrected and Uncorrected Codeword Counts - Ability to independently turn ON or OFF AN with Link training, or FEC, or to allow IEEE defaults to automatically manage the interoperability		

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	50GE:
	
	• Auto-negotiation (AN), Clause 73 for passive copper DAC. Compatible with 25G/50G Consortium v 1.6 (uses 25G CID)
	
	• Link Training (LT) for 50GE copper DAC media (Clause 93, 110); note: Clause 72 link training patterns are not supported
	
	• Ethernet Forward Error Correction:
	
	    • FC-FEC, Clause 74 for BASE-R PHYs
	
	    • RS-FEC, Clause 91 for 50GBASE-R PHYs
	
	    • FEC statistics:
	       o RS-FEC Corrected and Uncorrected Codeword Count
	       o FC-FEC Corrected and Uncorrected Block Count
	       o FC-FEC Corrected Error Bits
	
	• Ability to independently turn ON or OFF AN with Link training, or FEC, or to allow IEEE defaults to automatically manage the interoperability
	
	• Independent fan-out ports with physical fan-out media for up to 2x50GE per QSFP28 port
	
	40GE:
	
	• Auto-negotiation (AN), Clause 73 for passive copper DAC
	
	• Link training for copper cable media, Clause 73
	
	25GE:
	
	• Auto-negotiation (AN), Clause 73 for passive copper DAC. Compatible with 25G/50G Consortium v 1.6 (uses 25G CID)
	
	• Link Training (LT) for 25GE copper DAC media (Clause 93, 110); note: Clause 72 link training patterns are not supported
	
	• Ethernet Forward Error Correction:
	
	    • FC-FEC, Clause 74 for BASE-R PHYs
	
	    • RS-FEC, Clause 108 for 25GBASE-R PHYs
	
	    • FEC statistics:
	       o RS-FEC corrected and uncorrected codeword count
	       o FC-FEC corrected and uncorrected block count
	       o FC-FEC corrected error bits
	
	• FC-FEC corrected error bits Ability to independently turn ON or OFF AN with Link training, or FEC, or to allow IEEE defaults to automatically manage the interoperability		

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	• Independent fan-out ports with physical fan-out media for up to 4x25GE per QSFP28 port 10GE: • Independent fan-out ports with physical fan-out media for up to 4x10GE per port		
Transceiver Support	• 100GBASE-SR4 and 4x25GBASE-SR QSFP28 for multimode fiber o Pluggable transceiver o 10GE speed support requires a fan-out cable o 25GE speed support requires a point-to-point or a fan-out cable o 40GE speed support requires a point-to-point cable • 100GBASE-LR4 QSFP28 for single-mode fiber o Pluggable transceiver o 40GE speed support requires a point-to-point cable • 40GBASE-PLR4 QSFP+ for single-mode fiber o Pluggable transceiver o 10GE speed support requires a fan-out cable		
Cable Media	• 100GBASE-SR4 multimode fiber Active Optical Cable (AOC) and MT-MT 12-fiber point-to-point cables for QSFP28 • 100GBASE-CR4, passive, copper Direct Attached Cable (DAC) up to 5 meters in length; note: requires RS-FEC to be enabled • 50GBASE-CR2 passive, copper Direct Attached Cable (DAC) QSFP28-to-2xQSFP28 fan-out media, up to 3 meters in length; note: requires BASE-R FEC Clause 74 or RS-FEC Clause 91 to be enabled • 50GBASE-SR2 multimode fiber Active Optical Cable (AOC) media, 850nm, 3-meter length • 25GBASE-SR multimode fiber Optical Cable (AOC) and MT-MT 12-fiber point-to-point cable for QSFP28, 3-meter length is available • 25GBASE-SR multimode fiber MT-to-4xLC fan-out cable for QSFP28, 3 meter and 5 meter lengths are available • 25GBASE-CR passive, copper Direct Attached Cable (DAC) point-point, up to 5 meters in length; note: requires BASE-R FEC Clause 74 or RS-FEC Clause 91 to be enabled		

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	• 25GBASE-CR passive, copper Direct Attached Cable (DAC) QSFP28-to-4xSFP28 fan-out media, up to 5 meters in length; note: requires BASE-R FEC Clause 74 or RS-FEC Clause 91 to be enabled		
Load Module Dimensions	• 17.3" (L) x 1.3" (W) x 12.0" (H) • 440mm (L) x 33mm (W) x 305mm (H)		
Load Module Weights	• Module only: 11.8 lbs. (5.35 kg) • Shipping: 18.6 lbs. (8.44 kg)		
Temperature	• Operating: 41°F to 95°F (5°C to 35°C) • Storage: 41°F to 122°F (5°C to 50°C)		
Humidity	• Operating: 0% to 85%, non-condensing • Storage: 0% to 85%, non-condensing		
Chassis Capacity: Maximum Number of Cards and Ports per Chassis Model			
12 slot rack-mount chassis (XGS12-SD/HSL/HS[ii])	12 load modules per chassis: • 96-ports of 100GE • 192-ports of 50GE • 96-ports of 40GE • 384-ports of 25GE • 384-ports of 10GE		
2-slot rack-mount chassis (XGS2-SD/HSL/HS)	2 load modules per chassis: • 16-ports of 100GE • 32-ports of 50GE • 16-ports of 40GE • 64-ports of 25GE • 64-ports of 10GE		
Transmit Feature Specifications			
Transmit Engine	Wire-speed packet generation with timestamps, sequence numbers, data integrity signature, and packet group signatures		

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Max. Streams per Port	100GE: 32, 50GE: 16, 40GE: 32, 25GE: 16, 10GE: 16		
Max. Streams per Port in Data Center Ethernet	100GE: 32, 50GE: 16, 40GE: 32, 25GE: 16, 10GE: 16		
Stream Controls	Rate and frame size change on the fly, sequential and advanced stream scheduler		
Minimum Frame Size	• 60 bytes at full line rate • 49 bytes at less than full line rate		
Maximum Frame Size	14,000 bytes		
Maximum Fame Size in Data Center Ethernet	9,216 bytes		
Priority Flow Control	• 8 line-rate-capable queues, each supporting up to 2,500-byte frame lengths • 1 queue supporting up to 9,216-byte frame lengths		
Frame Length Controls	Fixed, increment by user-defined step, weighted pairs, uniform, repeatable random, IMIX, and Quad Gaussian		
User Defined Fields (UDF):	Fixed, increment or decrement by user-defined step, sequence, value list, and random configurations; up to ten, 32-bit-wide UDFs are available		
Value Lists (Max.)	1M / UDF	32K / UDF	
Sequence (Max.)	100GE: 8K/UDF, 50GE: 4K/UDF, 40GE: 8K/UDF, 25GE: 2K/UDF, 10GE: 2K/UDF		
Error Generation	Generate good CRC or force bad CRC, undersize and oversize standard Ethernet frame lengths, and bad checksum		

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Hardware Checksum Generation	Checksum generation and verification for IPv4, IP over IP, ICMP/GRE/TCP/UDP, L2TP, GTP		
Link Fault Signaling	Reports, no fault, remote fault, and local fault port statistics; 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		
Latency Measurement Resolution	2.5 nanoseconds		
Intrinsic Latency Compensation	Removes inherent latency error from the 100GE port electronics		
Transmit Line Clock Adjustment	Ability to adjust the parts-per-million line frequency over a range of -100 ppm to +100 ppm across all ports on the load module.		

Receive Feature Specifications

Receive Engine	Wire-speed packet filtering, capturing, real-time latency, and inter-arrival time for each packet group, with data integrity, sequence and advanced sequence checking capability
Trackable Receive Flows per Port	

	100GE	50GE	40GE	25GE	10GE
Limited Statistics Mode	32K	15K	32K	8K	8K
Full Statistics Mode	4K	4K	4K	2K	2k

Minimum Frame Size	• 60 bytes at full line rate • 64 bytes at full line rate into the capture buffer • 49 bytes at less than full line rate
Filters (User-Defined Statistics, UDS)	2 SA/DA pattern matchers, 2x16-byte user-definable patterns with offsets capability for start of: frame, IP, or protocol; up to 6 UDS counters are available

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Hardware Capture Buffer	There are two 512MB hardware capture buffers on the card; user can select which port and/or resource group each capture buffer may be assigned for capture purposes. For the 50GE, 25GE. and 10GE ports, only one capture buffer may be assigned to a single Resource Group (i.e., 2x50GE mode, 4x25GE mode, 4x10GE mode).	There are two 1MB hardware capture buffers on the card; user can select which port and/or resource group each capture buffer may be assigned for capture purposes. For the 50GE, 25GE, and 10GE ports, only one capture buffer may be assigned to a single Resource Group (i.e., 2x50GE mode, 4x25GE mode, 4x10GE mode).	
Statistics and Rates	Link state, line speed, frames sent, valid frames received, bytes sent/received, fragments, undersize, oversize, CRC errors, VLAN tagged frames, 6 user-defined stats, capture trigger (UDS 3), capture filter (UDS 4), 8 QoS counters, data integrity frames, data integrity errors, sequence and advanced sequence checking frames, sequence checking errors, ARP, and PING requests and replies, FEC statistics: RS-FEC Corrected and Uncorrected Block Counts, FEC Corrected Error Bits, FEC Sync		
Latency / Jitter Measurements	Cut-through, store & forward, forwarding delay, up to 16 time bins latency/jitter, MEF jitter, and inter-arrival time		
Receive-side PCS Lanes Port Statistics Counters	PCS Sync Errors, Illegal Codes, Remote Faults, Local Faults, Illegal Ordered Set, Illegal Idle, Illegal SOF, Out Of Order SOF, Out Of Order EOF, Out Of Order Data, Out Of Order Ordered Set		
100GE Physical Coding Sublayer (PCS) Receive-Side Statistics and Indicators	IEEE 802.3ba-compliant PCS transmit and receive side test capabilities include: Per PCS lane, receive lanes statistics - PCS Sync Header and Lane Marker Lock, Lane Marker mapping, Relative lane deskew up to 104 microseconds for 100GE, Sync Header and PCS Lane Marker Error counters, indicators for Loss of Synch Header and Lane Marker, and BIP8 errors		
Layer 2-3 Protocol Support			
Routing and Switching	BGP4/BGP4+, OSPFv2/v3, ISISv4/v6, EIGRP/EIGRPv6, RIP/RIPng, BFD, IGMP/MLD, PIM-SM/SSM, STP/RSTP/MSTP, PVST+/RPVST+, Link Aggregation (LACP), LISP		
Software Defined Network	OpenFlow, Segment Routing, BGP Link State (BGP-LS), PCEP, VXLAN, EVPN VXLAN, OVSDB, GENEVE, BGP FlowSpec, BGP SR TE Policy		

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MPLS	RSVP-TE P2P/P2MP, LDP/LDPv6/mLDP, LDP L2VPN (PWE/VPLS), BGP VPLS/VPWS, L3VPN/6VPE, 6PE, BGP RFC3107, MPLS-TP, MPLS OAM, EVPN/PBB-EVPN, Multicast VPN Rosen Draft, NG Multicast VPN		
Broadband and Authentication	PPPoX/L2TPv2, DHCPv4/DHCPv6, ANCP, IPv6 Autoconfiguration (SLAAC), IGMP/MLD, 802.1x		
Industrial Ethernet	Link OAM (IEEE 802.3ah), CFM/Y.1731, PBB/PBB-TE, ELMI, Sync-E ESMC, IEEE 1588v2 (PTP)		
Data Center Ethernet	DCBX/LLDP, FCoE/FIP, PFC (IEEE 802.1Qbb), TRILL, Cisco FabricPath, SPBM, VEPA		

APPLICATION SUPPORT

NOVUS100GE8Q28+FAN, NOVUS-R100GE8Q28+FAN, NOVUS-M100GE8Q28+FAN 100/50/40/25/10GE
• **IxExplorer:** Layer 2-3 wire-speed traffic generation and analysis with HSE PCS Lanes Rx-side testing. Note: Not all Ixia loads modules support Layer 1 BERT and/or the complete set of Tx PCS Lanes test capabilities.   • **IxNetwork:** 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.   • **Tcl API:** Custom user script development for Layer 1-3 testing.

ORDERING INFORMATION

LOAD MODULE

944-1140

NOVUS100GE8Q28+FAN, 8-port, QSFP28 100GE full scale and performance, load module, 1-slot with 8-ports with the native QSFP28 physical interface, L2-3 support with complete protocol coverage, and full scale and performance protocol emulation for routing, switching and access protocols. 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), XGS2-SD 2-slot, 3RU standard performance chassis bundle (940-0010), XGS2-HS 2-slot, 3RU high-speed performance chassis bundle (940-0012), XGS2-HSL 2-slot, 3RU high-speed performance chassis bundle (940-0014), and XGS12-HSL 12-slot, high-speed performance rackmount chassis bundle (940-0016).

944-1147

NOVUS-R100GE8Q28+FAN, 8-port, QSFP28 100GE reduced scale and performance load module, 1-slot with 8-ports with the native QSFP28 physical interface, L2-3 support with complete protocol coverage, and reduced scale and performance protocol emulation for routing, switching and access protocols. 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), XGS2-HSL 2-slot, 3RU high-speed performance chassis bundle (940-0014), and XGS12-HSL 12-slot, high-speed performance rackmount chassis bundle (940-0016).

944-1156

NOVUS-M100GE8Q28+FAN, 8-port, QSFP28 100GE mid-range scale and performance, load module, 1-slot with 8-ports with the native QSFP28 physical interface, L2-3 support with complete protocol coverage, and mid-range scale and performance protocol emulation for routing, switching and access protocols. 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), XGS2-HSL 2-slot, 3RU high-speed performance chassis bundle (940-0014), and XGS12-HSL 12-slot, high-speed performance rackmount chassis bundle (940-0016).

SPEED OPTIONS – 50GE, 25GE, 40/10GE

905-1011

NOVUS 2x50GE FAN-OUT OPTION for a factory installed 2x50GE fan-out option for new purchases of the NOVUS100GE8Q28+FAN, 8-port, QSFP28 100GE (944-1140), NOVUS-M100GE8Q28+FAN (944-1156), or the NOVUS-R100GE8Q28+FAN 8-port, QSFP28 100GE reduced (944-1147) load modules. Note: This option is REQUIRED ON NEW PURCHASES to enable the 2x50GE speed on the NOVUS100GE8Q28+FAN, NOVUS-M100GE8Q28+FAN and NOVUS-R100GE8Q28+FAN load modules.

905-1012

NOVUS 2x50GE FAN-OUT-UPG FIELD UPGRADE Option purchase of the 50GE fan-out option for the NOVUS100GE8Q28+FAN, 8-port, QSFP28 100GE (944-1140) or the NOVUS-R100GE8Q28+FAN 8-port, NOVUS-M100GE8Q28+FAN (944-1156), or the QSFP28 100GE reduced (944-1147) load modules. Note: This option is REQUIRED ON FIELD UPGRADE PURCHASES to enable the 2x50GE speed on the NOVUS100GE8Q28+FAN, NOVUS-M100GE8Q28+FAN, or the NOVUS-R100GE8Q28+FAN 8-port, QSFP28 100GE reduced (944-1147) load modules. Note: For the 2x50GE upgrade purchase please provide the serial number of the desired load module to install the option on at the time of order placement.

905-1007

NOVUS 25GE FAN-OUT OPTION for a factory installed 25GE fan-out option for new purchases of the NOVUS100GE8Q28+FAN (944-1140), NOVUS-M100GE8Q28+FAN (944-1156) or the NOVUS-R100GEQSFP28+FAN (944-1147), 8-port, QSFP28 100GE load modules. Note: This option is REQUIRED ON NEW PURCHASES to enable the 25GE speed on the NOVUS100GE8Q28+FAN, NOVUS-M100GE8Q28+FAN, or the NOVUS-R100GEQSFP28+FAN 8-port, QSFP28 100GE load modules.

905-1008

NOVUS 25GE FAN-OUT-UPG FIELD UPGRADE Option purchase of the 25GE fan-out option for the NOVUS100GE8Q28+FAN (944-1140), NOVUS-M100GE8Q28+FAN (944-1156) or the NOVUS-R100GE8Q28+FAN (944-1147) QSFP28 8x100GE load modules. Note: This option is REQUIRED ON FIELD UPGRADE PURCHASES to enable the 25GE speed on the NOVUS100GE8Q28+FAN, NOVUS-M100GE8Q28+FAN or the NOVUS-R100GE8Q28+FAN 8-port, QSFP28 100GE load modules. Note: For the 25GE upgrade purchase please provide the serial number of the desired load module to install the option on at the time of order placement.

905-1025

NOVUS 1x40GE/4x10GE FAN-OUT OPTION for a factory installed 1x40GE/4x10GE fan-out option for new purchases of the NOVUS100GE8Q28+FAN, 8-port, QSFP28 100GE (944-1140), NOVUS-M100GE8Q28+FAN (944-1156), or the NOVUS-R100GE8Q28+FAN 8-port, QSFP28 100GE reduced (944-1147) load modules. Note: This option is REQUIRED ON NEW PURCHASES to enable the 1x40GE/4x10GE speed on the NOVUS100GE8Q28+FAN, NOVUS-M100GE8Q28+FAN and NOVUS-R100GE8Q28+FAN load modules.

905-1026

NOVUS 1x40GE/4x10GE FAN-OUT-UPG FIELD UPGRADE Option purchase of the 1x40GE/4x10GE fan-out option for the NOVUS100GE8Q28+FAN, 8-port, QSFP28 100GE (944-1140) or the NOVUS-R100GE8Q28+FAN 8-port, NOVUS-M100GE8Q28+FAN (944-1156), or the QSFP28 100GE reduced (944-1147) load modules. Note: This option is REQUIRED ON FIELD UPGRADE PURCHASES to enable the 1x40GE/4x10GE speed on the NOVUS100GE8Q28+FAN, NOVUS-M100GE8Q28+FAN, or the NOVUS-R100GE8Q28+FAN 8-port, QSFP28 100GE reduced (944-1147) load modules. Note: For the 1x40GE/4x10GE upgrade purchase please provide the serial number of the desired load module to install the option on at the time of order placement.

PERFORMANCE UPGRADE

905-1013

NOVUS-R-UPG FIELD UPGRADE for the Novus-R QSFP28 8x100GE reduced load module (944-1147) to enhance the data plane feature set and to add full support for all IxNetwork L23 protocol emulations equal to that of the full featured Novus QSFP28 8x100GE load module (944-1140). Note: For the Novus-R upgrade purchase please provide the serial number of the desired load module to install the upgrade on at the time of order placement.

CABLES & TRANSCEIVERS

QSFP28-SR4-XCVR

QSFP28 100GBASE-SR4 100GE pluggable optical transceiver, MMF (multimode), 850nm, 100m reach. Compatible with the Xcellon-Multis XM100GE4QSFP28+ENH 100-Gigabit Ethernet, Enhanced load module (944-1117), the NOVUS-M100GE8Q28+FAN (944-1156), NOVUS-R100GE8Q28+FAN (944-1147) and the NOVUS100GE8Q28+FAN, 8-port, QSFP28 100GE load module (944-1140.

Note 1: This transceiver supports both 25GE speed (XM-4x25GE 905-1004 and UPG-XM-4x25GE 905-1005), and the 50GE speed (XM-1x50GE 905-1009 and UPG-XM-1x50GE) capability options on the Multis XM100GE4QSFP28+ENH load module.

Note 2: This transceiver supports the 25GE speed (NOVUS 25GE FAN-OUT Option 905-1007, and the NOVUS 25GE FAN-OUT-UPG FIELD UPGRADE Option 905-1008), and 50GE speed (NOVUS 2x50GE FAN-OUT option 905-1011, and NOVUS 2x50GE FAN-OUT-UPG FIELD UPGRADE Option 905-1012) on the NOVUS100GE8Q28+FAN load module.

Note 3: This transceiver supports 1x40GE and 4x10GE speeds (NOVUS 1x40GE/4x10GE FAN-OUT OPTION 905-1025 and the NOVUS 1x40GE/4x10GE FAN-OUT-UPG FIELD UPGRADE 905-1026) on the NOVUS100GE8Q28+FAN load module.

Note 4: Physical fan-out for 25GE and 10GE speeds support fan-out cable 942-0067 and 942-0068.

QSFP28-LR4-XCVR

QSFP28 100GBASE-LR4 100GE pluggable optical transceiver, SMF (single mode fiber), 1310nm, 10km reach. Compatible with the Xcellon-Multis XM100GE4QSFP28+ENH 100-Gigabit Ethernet, Enhanced load module (944-1117), the NOVUS-M100GE8Q28+FAN (944-1156), NOVUS-R100GE8Q28+FAN (944-1147) and NOVUS100GE8Q28+FAN, 8-port, QSFP28 100GE load module (944-1140).

942-0067

MT-to-4x10GE LC fan-out, MMF, 3-meter cable for 10GE and 25GE fan-out. 4x10GE fan-out per port REQUIRES a QSFP 40GBASE-SR4, pluggable, transceiver, 850nm, MMF (948-0031). This cable and transceiver are compatible with the following load modules: Xcellon-Multis XM10/40GE12QSFP+FAN 40-Gigabit Ethernet QSFP load module (944-1105), and the Xcellon-Multis XM10/40GE6QSFP+FAN 40-Gigabit Ethernet QSFP load module (944-1109).

4x25GE fan-out per port REQUIRES a 100GBASE-SR4 QSFP28 100GBASE-SR4 100GE pluggable transceiver, 850nm, MMF (QSFP28-SR4-XCVR). This cable and transceiver are compatible with the following load modules: NOVUS-M100GE8Q28+FAN (944-1156), NOVUS-R100GE8Q28+FAN (944-1147), NOVUS100GE8Q28+FAN, 8-port, QSFP28 100GE load module (944-1140), and the Xcellon-Multis XM100GE4QSFP28+ENH 100GE QSFP28, 4-port enhanced load module (944-1117).

942-0068

MT-to-4x10GE LC fan-out, MMF, 5-meter cable for 10GE and 25GE fan-out. For 4x10GE fan-out per port it REQUIRES a QSFP 40GBASE-SR4, pluggable, transceiver, 850nm, MMF (948-0031). This cable and transceiver are compatible with the following load modules: Xcellon-Multis XM10/40GE12QSFP+FAN 40-Gigabit Ethernet QSFP load module (944-1105), and the Xcellon-Multis XM10/40GE6QSFP+FAN 40-Gigabit Ethernet QSFP load module (944-1109).

For 4x25GE fan-out per port it REQUIRES a 100GBASE-SR4 QSFP28 100GBASE-SR4 100GE pluggable transceiver, 850nm, MMF (QSFP28-SR4-XCVR). This cable and transceiver are compatible with the following load modules: NOVUS-M100GE8Q28+FAN (944-1156), NOVUS-R100GE8Q28+FAN (944-1147), NOVUS100GE8Q28+FAN, 8-port, QSFP28 100GE load module (944-1140), and the Xcellon-Multis XM100GE4QSFP28+ENH 100GE QSFP28, 4-port enhanced load module (944-1117). This cable may also be used with the NTO 5200 and 7300 series Net Tool Optimizer network packet brokers.

942-0088

QSFP28 passive, copper, Direct Attach Cable (DAC), 3-meter length for Xcellon-Multis XM100GE4QSFP28+ENH 100GE load module (944-1117), the NOVUS-M100GE8Q28+FAN (944-1156), NOVUS-R100GE8Q28+FAN (944-1147) and the NOVUS100GE8Q28+FAN, 8-port, QSFP28 100GE load module (944-1140).

942-0092

QSFP28 Active Optical Cable (AOC), multimode fiber, 850nm, 3-meter length. Compatible with the Xcellon-Multis XM100GE4QSFP28+ENH 100-Gigabit Ethernet, Enhanced load module (944-1117), NOVUS100GE8Q28+FAN, 8-port, QSFP28 100GE (944-1140), NOVUS-M100GE8Q28+FAN (944-1156), NOVUS100GE8Q28+FAN (944-1147), and the CloudStorm 2-port, QSFP28 100GE (944-1231 and 944-1232) load modules.

942-0093

QSFP28-to-2x50GE QSFP28 Direct Attach Cable (DAC) passive copper, fan-out, 3-meter length. This cable supports the 50GE options for the following Xcellon-Multis and Novus QSFP28 load modules: Xcellon-Multis QSFP28 XM100GE4QSFP28+ENH 100GE (944-1117), NOVUS100GE8Q28+FAN QSFP28 100GE (944-1140), NOVUS-M100GE8Q28+FAN (944-1156) and the NOVUS-R100GEQSFP28+FAN QSFP28 100GE (944-1147). NOTE: The load modules REQUIRE the specific 50GE fan-out speed option to be enabled to use this cable. For the Xcellon-Multis QSFP28 load module it only supports the 1x50GE per port speed options both FACTORY INSTALLED (905-1009) and FIELD UPGRADE (905-1010). For the Novus family of QSFP28 100GE load modules, NOVUS100GE8Q28+FAN (944-1140), NOVUS-M100GE8Q28+FAN (944-1156), NOVUS-R100GEQSFP28+FAN (944-1147), they support the 2x50GE per port speed options both the NOVUS 2x50GE FAN-OUT FACTORY INSTALLED (905-1011) and the NOVUS 2x50GE FAN-OUT-UPG FIELD UPGRADE (905-1012) options.

942-0094

QSFP28-to-4x25GE SFP28 Direct Attach Cable (DAC) passive copper, fan-out, 3-meter length. This cable is compatible with these load modules: Xcellon-Multis QSFP28 XM100GE4QSFP28+ENH 100GE load module (944-1117), NOVUS100GE8Q28+FAN QSFP28 100GE load module (944-1140), and the NOVUS-R100GEQSFP28+FAN QSFP28 100GE load module (944-1147) NOTE: The load modules must have the 25GE fan-out speed option enabled to use this cable. REQUIRES: 905-1004 XM-4x25GE, the 4x25GE FACTORY INSTALLED option for NEW purchases of Xcellon-Multis QSFP28 XM100GE4QSFP28+ENH 100GE load module (944-1117), or the 905-1005 UPG-XM-4x25GE Field Upgrade Option for existing Xcellon-Multis QSFP28 XM100GE4QSFP28+ENH 100GE load module (944-1117), OR 905-1007 NOVUS 25GE FAN-OUT OPTION for NEW purchases of NOVUS100GE8Q28+FAN (944-1140), or NOVUS-R100GEQSFP28+FAN (944-1147), or the 905-1008 NOVUS 25GE FAN-OUT-UPG FIELD UPGRADE Option for existing NOVUS100GE8Q28+FAN (944-1140), or NOVUS-R100GEQSFP28+FAN (944-1147) load modules

QSFP+-PLR4-XCVR

QSFP+ 40GBASE-PLR4 40GE pluggable optical transceiver, SMF (singlemode), 1310nm, 10 km reach. Compatible with 4x10GE speed for the NOVUS 100GE8Q28+FAN (944-1140), NOVUS-R100GE8Q28+FAN (944-1147), NOVUS- M100GE8Q28+FAN (944-1156), XM10/40GE12QSFP+FAN (944-1105) and XM10/40GE6QSFP+FAN (944-1109) load modules with 40GE/10GE or 10GE fan-out option enabled. Can also be used with XMR10GE32SFP+FAN 10G Ethernet (947-5053) and XMR10GE16SFP+FAN 10GE (947-5054) load module bundles with 40GE speed option enabled.

QSFP+-PLR4-CBL

MT-to-4x10GE LC fan-out, SMF, 3-meter cable for 10GE fan-out. REQUIRES QSFP+ 40GE PLR4, pluggable, transceiver, 1310nm, SMF (QSFP+-PLR4-XCVR). Cables and transceiver are compatible with the following load modules: Compatible with the XM10/40GE12QSFP+FAN (944-1105) and XM10/40GE6QSFP+FAN (944-1109) load modules with 10GE fan-out option enabled. Can also be used with XMR10GE32SFP+FAN 10G Ethernet (947-5053) and XMR10GE16SFP+FAN 10GE (947-5054) load module bundles.

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[i] The NOVUS-R100GE8Q28+FAN reduced feature, L2/3 load module has lower protocol emulation scale when compared to the NOVUS-M100GE8Q28+FAN with medium-range protocol emulation scale, and the NOVUS100GE8Q28+FAN full feature load module with high protocol emulation scale. The reduced feature and medium feature load modules are designed for applications that do not require high levels of L2/3 protocol emulation scale. Protocol emulation scale specifications are available upon request.

[ii] With the initial release of XGS12-HS chassis and for certain combinations of Ixia load module configurations there may be instances where only 2 or 3 Novus, Novus-M, or Novus-R 8x100GE QSFP28 load modules may be supported in a chassis along with a full chassis of different types of Ixia cards. If there are concerns, please consult the version 8.03EA software applications release notes, and/or contact Ixia Support.