SPIRENT TESTCENTER

HIGH PERFORMANCE AND SCALABILITY FOR HIGH-SPEED ETHERNET TEST

HYPERMETRICS FX 40/100 GIGABIT TEST MODULES

The Spirent TestCenter™ HyperMetrics™ fX 40/100G Ethernet test module with Cloud Core™ processing enables performance and scalability testing of high-speed Ethernet networks. Targeting testing of multi-terabit routers and high-speed Ethernet cloud infrastructure, the HyperMetrics fX ensures dataplane QoS performance over realistic routing and cloud infrastructure topologies. With four 40G ports and two 100G ports per module, the HyperMetrics fX 40/100G delivers the most comprehensive set of features and performance at a very competitive price.

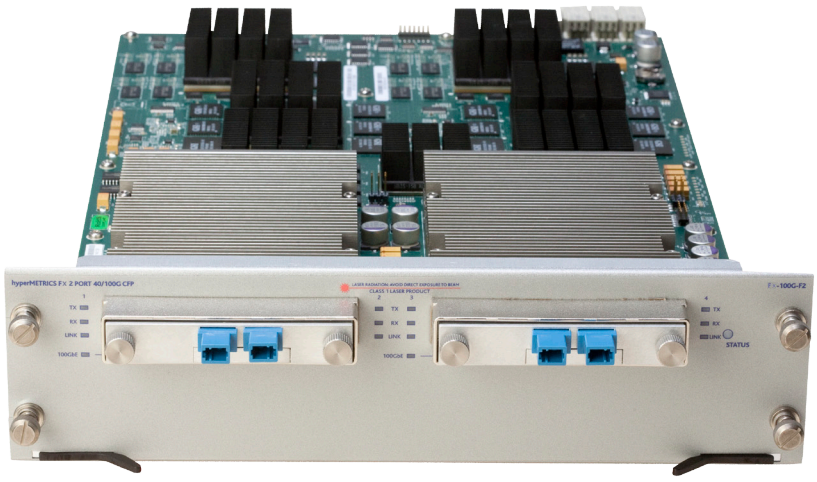
SOLUTION OVERVIEW

Spirent TestCenter HyperMetrics neXt modules use the most advanced Intel® processors designed for high performance computing. These processors are a fundamental building block of Spirent TestCenter Cloud Core processing, which intelligently distributes resources across ports. This architecture is the foundation of the HyperMetrics neXt family of test modules which support high performance scale on all ports.

The Spirent TestCenter HyperMetrics fX 40/100G Ethernet modules are available in 2-port 40G/1-port 100G, 4-port 40G/2-port 100G variants. Also available are versions that support only 100G operation and only 40G operation for those applications that do not require dual speed capability. With the combination of Cloud Core processing and the deep real-time analysis that Spirent TestCenter is known for, these modules deliver on realistic testing of complex multi-protocol topologies.

APPLICATIONS

- **High Scale Terabit Routers**—Test 40G and 100G Ethernet core routers with multi-protocol topologies and line rate traffic
- **Data Center Fabrics**—Validate the forwarding performance and functional capabilities of ultra high-scale, next-generation multi-terabit cloud data center fabrics
- **Enterprise Switches**—Validate forwarding performance and functional capabilities of large, next-generation enterprise campus and data center switches with ultra low-latency, high port density and FCoE capabilities



FEATURES & BENEFITS

Testing 40G or 100G Ethernet-enabled routers or data center switches requires a tester that can emulate multiple layers of network protocols and scale to perform real-time cause/effect analysis on millions of statistics while putting the system through realistic scenarios, such as fail-overs. The Spirent TestCenter HyperMetrics fX 40/100G module's Cloud Core processing and real-time cause/effect analysis enables testing terabit networks and devices.

Cloud Core is based on several patent-pending technologies designed to add elastic computing to the Spirent TestCenter's Layer 1-7 performance software platform. Cloud Core optimizes testing tasks across parallel processes, pooling processes across multiple processor cores and threads. Tests beds built on Cloud Core provide an exceptional combination of scalable performance and realism and are ideal for testing the most complex converged IP systems, such as cloud data centers and high-performance core networks.

- Spirent TestCenter Cloud Core combined with Intel Inside maximizes performance and scale of emulated topologies and stateful application traffic
- Available test packages and integrated configuration wizards simplify and accelerate configuration of data center, mobile backhaul, routing, access and application test cases

Productivity

- Intelligent Results™
  - When creating test beds at the scale that Spirent HyperMetrics fX 40/100G can achieve, the amount of data that is produced is astronomical. An advanced and highly efficient distributed database processes billons of real-time results to validate tests and identify problems, giving engineers the immediate feedback they need to debug problems and accelerate development.
  - Delivers more results with tight correlation, and more information to find those obscure bugs. With more coverage and more information, Spirent TestCenter answers questions faster and in a single test run where multiple runs are necessary with other test tools
  - Interesting streams uses real-time results data mining to dynamically filter through mountains of data and display the results that matter
- NoCode™ Automation with Command Sequencer (Visual Programming) and GUI to Script empowers the test operator to:

Construct sophisticated, stressful, automated test cases without programming experience

- Combine numerous individual test cases into a single run to save regression test time
- Develop a catalog of broad automated test cases in a fraction of the time
- Export automated test cases to run from a command line for headless test execution that can be integrated with any automated regression system

TECHNICAL SPECIFICATIONS	
Spirent TestCenter HyperMetrics neXt 40/100 Gigabit Ethernet Test Modules	
Optical transceiver	CFP MSA Optical. QSFP with ACC-6069A 2-Port QSFP to CFP adapter. CXP with ACC-6068A CXP to CFP adapter.
Operational modes	40 Gigabit Ethernet, 100 Gigabit Ethernet
Timing	Common tx clock synchronized to chassis-based source, adjustable by ±100 ppm; optionally synchronized to GPS or CDMA timing source for inter-chassis synchronization Highly accurate module timestamp for clock synchronized to chassis; inter-chassis timestamp clock synchronized via direct cable, or GPS or CDMA timing source
Port CPU	Stackable multi-core CPU
User reservation	100G per Port, 40G per Port Pair
Max Ports Per Chassis	12 100G Ports or 24 40G Ports
Layer 1	
Layer 1 Features	MDIO register access with CFP optics support; PMA PRBS test pattern generation and detection; PCS skew injection and measurement for each lane; PCS lane swapping and sweep detections; PCS lane alignment verification
	Adjustable PPM
	Internal or external clock
Layer 2/3 Generator and Analyzer	
Number of streams	16384 transmit and 65535 trackable receive streams; stream fields can be varied to create billions of flows
Frame transmit modes	Priority-based scheduler generates realistic traffic profiles per priority level, including mixed constant and bursty rate traffic to accurately simulate end user applications Modes include: Continuous, single-burst, multi-burst, timed-burst, continuous multi-burst
Min/max frame size (w/CRC)	58-16384
Min/max Tx rates	1 packet per 3.43 seconds to 101% of line rate
Real-time Tx stream adjustments	Change rate, frame length and priority settings without stopping the generator or analyzer for truly interactive cause and effect analysis
Advanced per-stream statistics available in real time	Over 40 measurements tracked in real-time for each received stream including: • Advanced sequencing: In-order, lost, reordered, late and duplicate • Latency: Avg, min, max and short-term avg; first/last frame arrival timestamp • Latency modes: LILO (forwarding delay per RFC 4689), LIFO (store and forward devices per RFC 1242) and FIFO (bit forwarding devices per RFC 1242) • Data integrity: IP checksum, TCP/UDP checksum, frame CRC, embedded CRC and PRBS bit errors • Histograms: Jitter, Inter-arrival, Latency, Sequence
Measurement timestamp resolution	2.5ns generator/analyzer
Supported encapsulations	• Layer 2: 802.3, Ethernet II, 802.1Q, 802.1ad, 802.1ah, 802.1Qay, FCoE, PPP • Layer 3/4: IPv4, IPv6, TDP, LDP • Tunneled: GRE, L2TP, MPLS, PWE3
Advanced per-stream statistics available in real time	Identify, display and filter by: Transmit stream ID, IPv4/v6 SA/DA, MAC SA/DA, IP TOS/DiffServ, TCP/UDP port, VLAN ID, VLAN priority, MPLS label, MPLS EXP plus more
Capture triggers/filters	• Oversize, jumbo, undersize, CRC error, checksum error, sequence number error, PRBS bit error • Trigger, oversize, jumbo, undersize, CRC error, checksum error, sequence number error, PRBS error
Capture memory	1 MB

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TECHNICAL SPECIFICATIONS	
Protocol Emulations	
Enterprise and data center switch	• Routing, multicast and bridging: All major IPv4 and IPv6 unicast and multicast routing protocols, IGMPv1/v2/v3, MLDv1/v2, LACP, STP, RSTP and MSTP • Data center: DCBX, FCoE, FIP, 802.1Qbb
Service Provider	• Routing and MPLS: All major IPv4 and IPv6 unicast and multicast routing protocols, RSVP-TE, LDP, VPLS-LDP, VPLS-BGP, BGP/MPLS-VPN, Fast Re-route, mVPN, P2MP-TE, BFD, TWAMP and PWE3 (RFC4447) • Access: ANCP, PPPoE, DHCP, L2TP, IGMPv1/v2/v3, MLDv1/v2, DHCPv6 and PPPoEv6 • Carrier Ethernet and bridging: LACP, STP, RSTP and MSTP
Layer 4-7 Applications and Security	• TCP,UDP • HTTP, SIP and FTP, Unicast/Multicast RSTP and RAW TCP • 801.1x • SIP • MOS R factor • RSTP/RTP, MulticastStreaming, IGMPv2, IGMPv3,and MLDv2 • MDI measurement along with additional statistics to detect picture quality

ORDERING INFORMATION	
Description	**Part Number**
1-Port 100G / 2-Port 40G (Ports per Module)	FX-100G-F1
2-Port 100G / 4-Port 40G (Ports per Module)	FX-100G-F2
1-Port 100G (100G operation only)	FX-100GO-F1
2-Port 100G (100G operation only)	FX-100GO-F2
2-Port 40G (40G operation only)	FX-40G-F1
4-Port 40G (40G operation only)	FX-40G-F2
Accessories	
Description	**Part Number**
Optical Transceiver CFP 100GBASE-LR10 155NM SMF	ACC-6067A
100G CXP to CFP Adapter	ACC-6068A
40G 2-Port QSFP to CFP Adapter	ACC-6069A
CFP-CFP 100G Passive Cable Assembly 3-meters	ACC-6079A

SPIRENT SERVICES

Spirent Global Services provides a variety of professional services, support services and education services—all focused on helping customers meet their complex testing and service assurance requirements. For more information, visit the Global Services website at www.spirent.com or contact your Spirent sales representative.

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