SPIRENT TESTCENTER

HYPERMETRICS CV 2/8-PORT 10 GIGABIT ETHERNET TEST MODULE

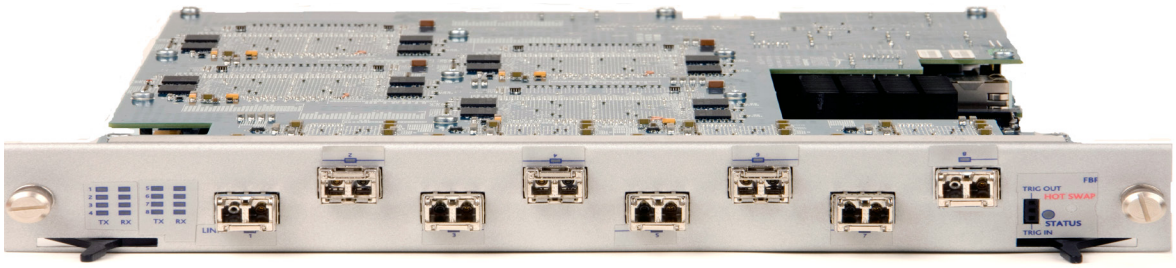
The Spirent TestCenter 10GbE HyperMetrics™ test module introduces a new paradigm in network testing. The HyperMetrics architecture uses leading-edge multi-core processing, allocating CPU resources on demand, to create enhanced realism with the scalability and performance required to test tomorrow's networks. This architecture sustains test equipment value by providing the coverage of three test modules in one.

SOLUTION OVERVIEW

The HyperMetrics 2- and 8-port 10GbE test modules combine Spirent TestCenter's network emulation and application traffic with its industry-leading Layer 2-3 traffic generation and analysis. These modules deliver the highest performance per dollar Layer 2-7 test solution available, ideal for functional, performance and conformance testing of service provider and enterprise networks. Reduced power consumption and the ability to use a single module throughout the test lifecycle results in lower purchasing and operational expenses.

APPLICATIONS

- *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
- *Device Benchmarking*—test using IETF RFC 2544, RFC 2889 and RFC 3918 methodologies with easy test setup using dynamically bound traffic and automated wizards
- *Carrier Ethernet*—verify services whether delivered via VPLS, Layer 2 Pseudowires, bridged Ethernet, packet transport protocols or combinations of these technologies
- *Service Provider Routers*—verify Layer 3, multicast and video services delivered via BGP/MPLS VPN, multicast routing or mVPN
- *Subscriber Emulation*—emulate thousands of access subscribers using different services across multiple ports under normal or exceptional traffic conditions
- *Low Port-Scale Testing*—perform functional, conformance and performance testing at lower port counts using the value priced 2-port 10GbE test module



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FEATURES & BENEFITS

Traditional test module design fixes CPU resources to specific ports. These one-dimensional architectures necessitate three hardware designs to achieve the usage goals of high port scalability, virtual network emulation and high-capacity application traffic. HyperMetrics' architecture relegates these design limitations to the past.

- High-density 8-port and value-priced 2-port 10GbE test modules
  - High-density form factor supports 480 ports per rack, the industry's smallest footprint and greenest 10GbE solution, enabling tests of extreme densities while reducing lab operating costs and simplifying test system operation
  - Low-density form factor is value-priced for development testing at lower port counts, or performance testing of smaller edge devices with 10GbE uplinks
- Support for the latest Data Center Ethernet and Converged Enhanced Ethernet capabilities allows you to accurately evaluate 802.1Qbb Priority Flow Control, 802.1Qaz Priority Groups and ETS traffic shaping system performance under stressful lab-controlled scenarios by changing per priority traffic rates in real time*
- HyperMetrics multi-core processing architecture
  - *Enhanced realism with scalability and performance*—HyperMetrics scales in three dimensions: Ports, network emulation and application traffic
  - *Complete Test Coverage*—generate stateful multi-play traffic over emulated network topologies
  - *Dynamic Multi-core Processing*—CPU resources can be allocated across the ports to meet the scale, performance and functionality required
  - *Future-Proof Design*—delivers the performance needed today, and the investment protection for testing tomorrow's network

Productivity[2]

- Intelligent Results™
  - The most accurate and comprehensive set of real-time results to validate tests and identify problems, giving engineers the insight they need to eliminate customer found defects
  - Delivers more results, the tightest correlation, and more information when bugs are found, to provide more coverage in a single pass than can be done in multiple passes with other test tools
  - Interesting Streams uses real-time results data mining to validate test cases and identify issues quicker
- NoCode™ Automation with Command Sequencer and GUI to Script
  - Visual programming 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
- Converged Topology Emulation™ (CTE)*
  - Test protocol stacking by accurately emulating multiple network devices
  - Collapses physical test topologies into a single test tool providing more test coverage and determinism using fewer network elements

*Check with your Spirent representative for availability

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TECHNICAL SPECIFICATIONS	
Spirent TestCenter HyperMetrics 10 Gigabit Ethernet Test Modules	
Ports per module	2 ports – CV-10G-S2 8 ports (96 per chassis; 480 per rack) – CV-10G-S8
Optical transceiver	SFP+, 10GBASE-SR/SW or 10GBASE-LR/LW
Operational modes	LAN/WAN, with DIC support
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	Per port
User Interface	Windows-based GUI and Tcl API
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

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Layer 2/3 Generator and Analyzer (Continued from Page 3)	
Measurement timestamp resolution	10 ns with intra-chassis and inter-chassis synchronization
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
Analyzer real-time stream identifiers and filters	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	64MB
Protocol Emulations	
Enterprise and data center switch protocol support*	• 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 • Stateful L4-7: HTTP, SIP and FTP
Service Provider protocol support*	• 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, 802.1ag CFM, Y.1731, PBB, PBB-TE, Link OAM • Stateful L4-7: HTTP, SIP and FTP, Unicast/Multicast RTSP and RAW TCP • Mobile Backhaul: 1588v2 and Synchronous Ethernet as supported protocols

* Protocol emulation requires optional base packages. Please contact your Spirent sales representative for a complete list of supported protocols.

ORDERING INFORMATION	
Description	**Part Number**
Spirent TestCenter HyperMetrics CV 2-port 10-Gigabit Ethernet Test Module	CV-10G-S2
Spirent TestCenter HyperMetrics CV 8-port 10-Gigabit Ethernet Test Module	CV-10G-S8
Spirent TestCenter Chassis	
Spirent TestCenter 2U Chassis (with high-speed fans) and Controller - Includes a CHS-2000A-HS chassis, CTL-2002A controller and the Spirent TestCenter system software (licenses sold separately) and documentation	SPT-2000A-HS
Spirent 9U Chassis and Controller - Includes a CHS-9000A chassis, CTL-9002A controller and Spirent TestCenter system software (licenses sold separately) and documentation	SPT-9000A

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/gs or contact your Spirent sales representative.

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