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High Density dX2 100 GbE, 40 GbE, and 10 GbE Tri-Speed Test Module

The dX2 modules come in both a 100 GbE only or a tri-speed 100 GbE, 2x40 GbE and 8x10 GbE variant. The Spirent dX2 100 GbE test modules deliver a high density solution with the lowest total cost of ownership. It supports CFP2 optical modules which use a smaller form factor, use less power, and cost significantly less than CFP optics.

The module also supports smart power control and fast boot to reduce test time and eliminate wasted power. With the combination of processing and the deep real-time analysis that Spirent is known for, these modules deliver enhanced realism with scale and performance. The Spirent dX2-100 GbE module can also be purchased with optional CFP2 to CFP4 or CFP2 to QSFP28 adapters as referenced in the ordering information section.

An upgrade is also available from the 100G only version to the tri-speed module. The modules also support RS-FEC, Auto-Negotiation and associated PMD's such as SR10,CR4, SR4, LR4, Active Optical Cables and various Direct Access Copper cable lengths for the supported form factors CFP2, CFP4 and QSFP28.

Solutions overview

The Spirent dX2-100G-P4 CFP2 form factor module is the ONLY tri-speed 100, 40 and 10 GbE module in the industry that also supports CFP4 and QSFP28 (via adapters). This flexibility enables testing of industry latest 100 GbE optical and copper technologies all from a single module. No other module in the market offers this type of power and versatility. It supports CFP2 optical modules which use a smaller form factor, use less power, and cost significantly less than CFP optics. This highest density solution also supports smart power control and fast boot to reduce test time and eliminate wasted power for the lowest total cost of ownership.

With the combination of processing and the deep real-time analysis that Spirent is known for, these modules deliver enhanced realism with scale and performance. The Spirent dX2-100 GbE module can also be purchased with optional CFP2 to CFP4 or CFP2 to QSFP28 or CFP2 to CPAK adapters as referenced in the ordering information section, Spirent is the only test equipment vendor to support the CPAK adapter. The 100 G and 40 G speeds support real-time loss (and advance sequencing) along with jitter. The modules also support RS-FEC, Auto-Negotiation and associated PMD's such as SR10,CR4, SR4, LR4, Active Optical Cables and various Direct Access Copper cable lengths for the supported form factors CFP2, CFP4 and QSFP28. An upgrade is also available from the 100 G only version to the tri-speed module.

Applications

- **Data center ToR and EoR switches and fabrics**: Validate forwarding performance, latency, MAC capacity and functional capabilities of ultra high-scale, next-generation SPB and TRILL enabled multi-terabit cloud data center fabrics

- **Terabit routers**: Test 100 GbE core routers with high-scale, multi-protocol topologies

- **Data center fabrics**: Validate the forwarding performance and functional capabilities of ultra-high-scale, next-generation multi-terabit fabrics

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Features & benefits

Testing 100 GbE 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 dynamic topology changes and fail-overs. The Spirent dX2 100 GbE module's processing and real-time cause/effect analysis enables testing of highlyscaled terabit networks and devices.

- Tri-speed modules are upgradeable and support 100 GbE, 40 GbE and 10GbE operation from each port adding flexibility and cost savings for users needing highdensity test solutions at multiple port speeds

- Spirent combined with Intel Inside® maximizes performance and scale of emulated topologies and stateful application traffic

- Enables scalability to meet the requirements of IP/Ethernet mobile networks while maintaining enhanced realism and performance

- Allows for benchmarking, Mobile Broadband and Application Experience

- Available test packages and integrated configuration wizards simplify and accelerate configuration, ultra-high scale mobility, mobile backhaul,

Productivity

- Intelligent Results™

  - When creating test beds at the scale that Spirent 100 GbE can achieve, the amount of data that is produced is astronomical. An advanced and highly efficient distributed database processes billons of realtime 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 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

- Powerful 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

Extensive, flexible reporting—Real-time statistics for critical variables across all protocols. SNMP statistics can be gathered from the components under test and correlated with statistics from Spirent.

Flexible load specifications—Flexibility to specify load variables such as user sessions, new user sessions per second, transactions, transactions per second, connections or connections per second.

Requirements

- Spirent Chassis and Controller (see table)

- Windows-based workstation with 10/100/1000 Mbps Ethernet NIC; mouse and color monitor required for GUI operation

- Linux or Windows-based workstation for Tcl automation for complete GUI requirement

Technical specifications	
Spirent 100 GbE test module	
Optical transceiver	CFP2 MSA optical
Optional modes	100 GbE
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 100 GbE port
User interface	Windows-based GUI and Tcl API
Max port per chassis	Forty-eight 100 GbE ports SPT-N11U, eight 100 GbE ports SPT-N4U
Layer 1	
Layer 1 features	■ Adjustable PPM
	■ Internal or external clock
Layer 2/3 generator and analyzer	
Number of streams	8191 transmit and 16383 trackable receive streams; stream fields can be varied to create billions of flows
Frame transmit modes	Port based (rate per port), stream based (rate per stream), burst, timed
Min/max frame size (w/CRC)	60 to 16,004 (Data plane)
Min/max Tx rates	1 packet per 3.43 seconds to 101% of line rate
Real-time Tx stream adjustments	Change rate and frame length settings without stopping the generator or analyzer for truly interactive, cause and effect analysis
Per-stream statistics in real-time	■ Tx and Rx frame counts and rates
	■ Tx and Rx L1 byte counts and rates
	■ Out of sequence errors
	■ FCS errors and rate
	■ Min, Max and Average Latency (16383 streams)
Per-port statistics analyzed in real-time	■ Tx and Rx frame counts and rates
	■ Tx and Rx L1 byte counts and rates
	■ Out of sequence errors
	■ PRBS errors
	■ FCS errors and rate
Transmit timestamp resolution	2.5 ns Tx timestamp resolution with intra-chassis and inter-chassis synchronization
Supported encapsulations	■ Layer 2: Ethernet II, 802.1Q, 802.1ad, FCoE
	■ Layer 3/4: IPv4, IPv6, TDP, UDP
Supported Tx signature capability	Fully compatible with Spirent hardware; contains sequence number and highly accurate timestamp
Layer 4-7 application and security	
IP version supported	IPv4 and IPv6
Encapsulation protocols	802.1Q and 802.1 Q-in-Q
Transport protocols	TCP, UDP
Data protocols	HTTP, SIP and FTP, Unicast/Multicast RTSP and RAW TCP
Authentification	802.1x
Voice protocol	SIP
Voice quality measurement	MOS R-factor
Video protocol	MDI measurements along with additional statistics to detect picture quality

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.

Technical specifications (continued)

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
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, 802.1ag CFM, Y.1731, PBB, PBB-TE, Link OAM ■ Mobile Backhaul: MPLS-TP 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 chassis support	
		SPT-N11U	SPT-N4U
Upgrade DX2-100GO-P4 to DX2-100G-P4	UPG-DX2-100G-P4	X	X
4-Port 100 GbE (100 GbE operation only)	DX2-100GO-P4		
4-Port 100 GbE (tri-speed module)**	DX2-100G-P4		

Accessories

Description	Part number
Optical Transceiver CFP2 100GBASE-LR4 1310NM-SMF	ACC-6083A
Optical Transceiver CFP2 100GBASE-SR10 850NM-MMF	ACC-6084A
Optical transceiver QSFP28 100GBASE-SR4 MMF 850NM (requires ACC-6094A)	ACC-6095A
Adapter CFP2 to CFP4	ACC-6091A
Adapter CFP2 to QSFP28	ACC-6094A
Cable 2 X 40G MPO Breakout (DX2-100G-P4 Only)	ACC-1025
Cable 8 X 10G MPO-LC Fanout (DX2-100G-P4 Only)	ACC-1026
COPPER DAC QSFP28 100GBASE-CR4 1M	ACC-1034A
COPPER DAC QSFP28 100GBASE-CR4 3M	ACC-1035A
COPPER DAC QSFP28 100GBASE-CR4 5M	ACC-1038A
CVR-CFP2-CPAK10 (SR10 CFP2 to CPAK adapter order direct from Cisco)	74-102215-01
CVR-CFP2-CPAK4 (LR4 CFP2 to CPAK adapter order direct from Cisco)	74-102214-01
CPAK-100G-SR10 Transceiver (order direct from Cisco)	800-41495-01
CPAK-100G-LR4_A0 Transceiver (order direct from Cisco)	800-39910-06

Spirent chassis

Description	Part number
Spirent N11U Chassis and Controller with 110V AC Power Supply	SPT-N11U-110
Spirent N11U Chassis and Controller with 220V AC Power Supply	SPT-N11U-220
Spirent N4U Chassis and Controller with 110V AC Power Supply	SPT-N4U-110
Spirent N4U Chassis and Controller with 220V AC Power Supply	SPT-N4U-220

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