

# Spirent mX2 100 GbE Module

## High Performance & Scalability for High-Speed Ethernet Test

The Spirent mX2 100 GbE test module with Cloud Core processing enables maximum performance and scale over high-speed Ethernet. Targeting testing of high-density multi-terabit routers and high-scale cloud infrastructure, ensures dataplane QoS with high performance traffic and verifies the scalability of routing, access, application and security protocols. With four 100 GbE CFP2 ports per module, the 100 GbE delivers the highest density high-speed Ethernet test solution per rack unit.

### Applications

- **High Scale 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 cloud data center fabrics
- **High Capacity Multiservice Routers**—Validate IP throughput and Any G mobility with millions of subscribers and per-port line-rate data with minimum-sized packets and detailed per mobile statistics.

### Solution overview

The Spirent mX2 100 GbE test module delivers 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. The Spirent 100 GbE CFP2 Ethernet modules are available in three levels of performance:



- mX2 for the highest available emulation performance,
- fX2 mid-level emulation performance and a
- dX2 cost effective version.

They are available in 4-port 100 GbE variants. With the combination of Cloud Core processing and the deep real-time analysis that Spirent is known for, these modules deliver enhanced realism with scale and performance. The mx2 module offers the ONLY industry module supporting three form factor adapters supporting CFP2, CFP4 and QSFP28 all with a single module lowering the total cost of ownership. No other module in the industry offers such versatility. 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.

### Features & benefits

Testing 100 GbE 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 dynamic topology changes and fail-overs. The Spirent mX2 100 GbE module's Cloud Core processing and real-time cause/effect analysis enables testing highly-scaled terabit networks and devices. Cloud Core is based on several patent pending technologies designed to add elastic computing to the Spirent Layer 2-7 performance software platform. Cloud Core optimizes testing tasks across parallel processes, pooling processes across multiple X86 processor cores and threads. Test 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 mobile networks



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## Spirent mX2 100 GbE test modules

- Spirent Cloud Core combined with Intel® Inside maximizes performance and scale of emulated topologies and stateful application traffic
- Enables to scaling to meet the requirements of IP/Ethernet mobile networks while maintaining enhanced realism and performance
- Benchmark Cloud Data Centers, Mobile Broadband and Application Experience
- Available test packages and integrated configuration wizards simplify and accelerate configuration, ultra-high scale mobility, mobile backhaul, routing, access and application test cases

## Productivity

- Intelligent Results™
- When creating test beds at the scale that Spirent mX2 100 GbE can achieve, the amount of data that is produced is astronomical. An advanced and highly-efficient distributed database processes billions 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 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

**Authentic testing**—Avalanche for Spirent emulates actual user transactions and provides control over TCP/IP stack characteristics such as maximum segment size, delayed ACKs, IP fragmentation and TCP time-out behavior. Avalanche for Spirent can emulate browsers, decompress gzips, encode URLs and apply realistic user level attributes.

**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.

### Technical specifications

#### Spirent mX2 100 GbE test module

Optical transceiver	CFP2 MSA Optical
Operational modes	100 GbE
Timing	<ul style="list-style-type: none"><li>■ Common tx clock synchronized to chassis-based source, adjustable by <math>\pm 100</math> ppm; optionally synchronized to GPS or CDMA timing source for inter-chassis synchronization</li><li>■ Highly accurate module timestamp for clock synchronized to chassis; inter-chassis timestamp clock synchronized via direct cable, or GPS or CDMA timing source</li><li>■ 1588v2</li></ul>
Port CPU	Stackable multi-core CPU
User reservation	100GbE per port
User interface	Windows-based GUI and Tcl API
Max ports per chassis	Forty eight 100GbE ports SPT-N11U, eight 100 GbE ports SPT-N4U

## Technical specifications (continued)

### Layer 1

<b>Layer 1 features</b>	MDIO register access with CFP2 optics support Adjustable PPM, internal or external clock
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### Layer 2/3 generator and analyzer

<b>Number of streams</b>	16383 transmit and 16383 trackable receive streams; stream fields can be varied to create billions of flows
<b>Frame transmit modes</b>	Port based (rate per port), stream based (rate per stream), burst, timed
<b>Min/max frame size (w/CRC)</b>	60 to 8192
<b>Min/max Tx rates</b>	5 packet per seconds to 101% of line rate
<b>Real-time Tx stream adjustments</b>	Change rate and frame length settings without stopping the generator or analyzer for truly interactive, cause and effect analysis
<b>Advanced per-stream statistics Available in real-time</b>	Over 40 measurements tracked in real-time for each received stream including: <ul style="list-style-type: none"> <li>▪ Advanced sequencing: In-order, lost, reordered, late and duplicate</li> <li>▪ Latency: Avg, min, max and short-term avg; first/last frame arrival timestamp</li> <li>▪ Latency modes: LIFO (forwarding delay per RFC 4689), LIFO (store and forward devices per RFC 1242) and FIFO (bit forwarding devices per RFC 1242)</li> <li>▪ Data integrity: IP checksum, TCP/UDP checksum, frame CRC, embedded CRC and PRBS bit errors</li> </ul>

<b>Measurement timestamp resolution</b>	2.5ns generator/analyzer
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<b>Supported encapsulations</b>	<ul style="list-style-type: none"> <li>▪ Layer 2: 802.3, Ethernet II, 802.1Q, 802.1ad, 802.1ah, 802.1Qay, FCoE, PPP</li> <li>▪ Layer 3/4: IPv4, IPv6, TDP, LDP</li> <li>▪ Tunneled: GRE, L2TP, MPLS, PWE3</li> </ul>
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<b>Advanced per-stream statistics Available in real-time</b>	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
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<b>Capture triggers/filters</b>	Oversize, jumbo, undersize, CRC error, checksum error, sequence number error, PRBS bit error <ul style="list-style-type: none"> <li>▪ Trigger, oversize, jumbo, undersize, CRC error, checksum error, sequence number error, PRBS error</li> </ul>
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<b>Capture memory</b>	8MB
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### Layer 4-7 applications and security

#### IP version supported

<b>Encapsulation protocols</b>	802.1Q and 802.1 Q-in-Q
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<b>Transport protocols</b>	TCP, UDP
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<b>Data protocols</b>	HTTP, SIP and FTP, Unicast/Multicast RTSP and RAW TCP
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<b>Authentication protocols</b>	802.1x
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<b>Voice protocols</b>	SIP
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<b>Voice quality measurement</b>	MOS R-factor
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<b>Video protocols</b>	RTSP/RTP, Multicast Streaming, IGMPv2, IGMPv3 and MLDv2
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<b>Video quality measurement</b>	MDI measurements along with additional statistics to detect picture quality
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<b>Protocol emulations enterprise and data center switch protocol support</b>	Routing, multicast and bridging: All major IPv4 and IPv6 unicast and multicast routing protocols, IGMPv1/v2/v3, MLDv1/v2, LACP, STP, RSTP and MSTP <ul style="list-style-type: none"> <li>▪ Data center: DCBX, FCoE, FIP, 802.1Qbb</li> </ul>
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<b>Service provider</b>	<ul style="list-style-type: none"> <li>▪ 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)</li> <li>▪ Access: ANCP, PPPoE, DHCP, L2TP, IGMPv1/v2/v3, MLDv1/v2, DHCPv6 and PPPoEv6</li> <li>▪ Carrier Ethernet and bridging: LACP, STP, RSTP and MSTP, 802.1ag CFM, Y.1731, PBB, PBB-TE, Link OAM</li> <li>▪ Mobile Backhaul: MPLS-TP as supported protocols</li> </ul>
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## 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](http://www.spirent.com) or contact your Spirent sales representative.

Ordering information			
Description	Spirent N-11U chassis support	Spirent N-4U chassis support	Part number
4-port 100 GbE (100 GbE only)	X	X	MX2-100GO-P4
Accessories			
Optical Transceiver CFP2 100GBASE-LR4 1310NM-SMF			ACC-6083A
Optical Transceiver CFP2 100GBASE-SR10 850NM-MMF			ACC-6084A
Adapter CFP2 to CFP4			ACC-6091A
Adapter CFP2 to QSFP28			ACC-6094A
Spirent chassis			
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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