

# Spirent fX2 100 GbE Module

High Performance & Scalability for High-Speed Ethernet Test

The Spirent fX2 100 GbE Ethernet test module with Cloud Core processing enables performance and scalability testing of high-speed Ethernet networks. Targeting testing of high-density multi-terabit routers and high-speed Ethernet cloud infrastructure, the fX2 ensures dataplane QoS performance over realistic routing and cloud infrastructure topologies. With four 100 GbE CFP2 ports per module, the fX2 100 GbE delivers the most comprehensive set of features and performance at a very competitive price.

## Solution overview

The Spirent fX2 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 fX2 100 GbE Ethernet modules are available in a 4-port 100GbE CFP2 configuration. With the combination of Cloud Core processing and the deep real-time analysis that Spirent is known for, these modules deliver on realistic testing of complex multiprotocol topologies. Spirent also offers other CFP2 modules to address different levels of emulation performance requirements.

The fX2 offers the ONLY industry module supporting three form factors in the same module, CFP2, CFP4 and QSFP28 using optional adapters listed in ordering information section. 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.

## Applications

- **High Scale Terabit Routers**—100 GbE 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, high-density 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



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## 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 fail-overs. The Spirent fX2 100 GbE 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 Layer 1-7 performance software platform. Cloud Core optimizes testing tasks across parallel processes, pooling processes across multiple 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 core networks.

- Spirent 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 fX 2100 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

### Technical specifications

#### Spirent 100 GbE test modules

<b>Optical Transceiver</b>	CFP2 MSA Optical
<b>Operational Modes</b>	100 GbE
<b>Timing</b>	<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, GPS, or CDMA timing source</li><li>■ 1588v2</li></ul>
<b>Port CPU</b>	Stackable multi-core CPU
<b>User Reservation</b>	100GbE per port
<b>User Interface</b>	Windows-based GUI and Tcl API
<b>Max Ports per Chassis</b>	48 100GbE ports SPT-N11U, eight 100GbE ports SPT-N4U

#### Layer 1

<b>Layer 1 Features</b>	1 MDIO register access with CFP2 optics 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

## Technical specifications (continued)

### Layer 2/3 generator and analyzer (continued)

<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
<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>
<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
<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>
<b>Capture Memory</b>	1MB

### Layer 4-7 applications and security

<b>IP Version Supported</b>	
<b>Encapsulation Protocols</b>	802.1Q and 802.1 Q-in-Q
<b>Transport Protocols</b>	TCP, UDP
<b>Data Protocols</b>	HTTP, SIP and FTP, Unicast/Multicast RTSP and RAW TCP
<b>Authentication Protocols</b>	802.1x
<b>Voice Protocols</b>	SIP
<b>Voice Quality Measurement</b>	MOS R-factor
<b>Video Protocols</b>	RTSP/RTP, Multicast Streaming, IGMPv2, IGMPv3 and MLDv2
<b>Video Quality Measurement</b>	MDI measurements along with additional statistics to detect picture quality
<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>
<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</li> </ul>
<b>Layer 4-7 Applications and Security</b>	<ul style="list-style-type: none"> <li>TCP,UDP</li> <li>HTTP, SIP and FTP, Unicast/Multicast RSTP and RAW TCP</li> <li>801.1x</li> <li>SIP</li> <li>MOS R factor</li> <li>RSTP/RTP, MulticastStreaming, IGMPv2, IGMPv3,and MLDv2</li> <li>MDI measurement along with additional statistics to detect picture quality</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.

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### Ordering information

Description	Spirent N-11U chassis support	Spirent N-4U chassis support	Part number
4-port 100 GbE (100 GbE only)	X	X	FX2-100GO-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