

# dX2 Quint-speed 16-port Modules

## BASE-T Solution Overview 10/5/2.5/1G and 100M

In order to take advantage of later-generation Wi-Fi technologies such as IEEE-802.11ac Wave 2, the supporting wired-Ethernet links between access point and switch need to be capable of speeds up to 2.5 or 5 Gbit/s. NBASE-T seeks to use these speeds while leveraging existing network infrastructure.

Additionally, today's enterprise and datacenter servers and switches require diversity—they must be able to support multiple speeds to accommodate various end-user applications and advancements in hardware performance.

Spirent DX2 BASE-T test modules were developed to address these specific industry needs. They deliver both high density and several multi-speed options to address latest market requirements.

The test modules support 16 copper RJ45 ports with support for up to 5 different speeds from a single module: 10GbE, 5GbE, 2.5GbE, 1GbE and 100M. They require less power than comparable products available today and support smart power control and fast boot up to help reduce test time and conserve energy.

### Physical Layer Impairments

Because Cat5e cabling is unshielded twisted pair, at higher speeds it is highly susceptible to physical layer impairments, or noise, which can cause device performance degradation, packet loss, and link failure. The device performance measured in an idealized noise-free test environment is unlikely to be achieved in the real world.

To ensure that a device will perform to expectations when deployed in the real world, test conditions need to closely match those scenarios. Standards organizations such as the IEEE and NBASE-T Alliance have recognized this.

However, testing in a real deployment environment will yield inconsistent results because the levels and types of noise will vary from location to location or even within a single location at different times of day.

Instead, testing must be done using a repeatable, adjustable, controlled noise source.

To address this need, Spirent offers its C1-NG-1000 BASE-T Noise Generator, which addresses Physical Layer noise testing related to NEXT/FEXT crosstalk, impulse, and RFI, and supports IEEE-802.3bz ACNR, Downshift, and "6 around 1" NEXT/FEXT modeling test cases.

By combining the processing power and deep real-time analysis Spirent is known for, the DX2-10GQ-C16 test modules paired with the C1-NG-1000 BASE-T Noise Generator help deliver enhanced realism with scalability and performance.

**Spirent high density**—Spirent BASE-T test modules deliver an industry-leading 16 ports per module and combine Spirent's TestCenter's world-class network emulation and traffic generation.

**Enhanced realism**—With scalability and performance in three dimensions: ports, network emulation, application traffic, as well as precision adjustable physical layer impairments.

**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.



## Features

- High-density 16-port value-priced GbE test modules
- The modules support line rate Layer 2-3 test traffic and 100M/1/2.5/5/10G Copper Ethernet interfaces
- Spirent combined with Intel Inside® maximizes performance and scale of emulated topologies
- NBASE-T and IEEE 802.3bz compliant
- Supports NBASE-T Downshifting

## Benefits

- Complete Test Coverage—Generate stateful multi-play traffic over emulated network topologies
- Orchestrate high scale test beds
- Lowest cost of ownership

## Productivity

### 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

### Technical Specifications

#### dx2 Quint-speed 16-port Modules

Maximum support	Speed	Maximum ports per slot	Maximum ports per STP-N12U chassis	Maximum ports per SPT-N4U chassis
DX2-10GQ-C16	10G/5G/2.5G/1G/100M	16	192	32
DX2-5GD-C16	5 G/2.5 G	16	192	32
DX2-2.5GO-C16	2.5 G	16	192	32
Operational modes	10G, 5G, 2.5G, 1G, 100M			
Port CPU	Stackable multi-core CPU			
User reservation	Per port group, 4 ports per port group, selectable speed per port			
PPM adjust	+/-100ppm, adjustable per port group			
User interface	Windows-based GUI and Tcl API			
Line clocking and packet time-stamping Spirent modules get their transmit line clocking and time-stamping from the control modules on the SPT-N12U and SPT-N4U	<p>Stratum-3 rated oscillator is the default time source. Transmit line clock is at the precise nominal Ethernet rate <math>\pm &lt; 1</math> PPM on initial shipment. Accurate to <math>\pm 4.6</math> PPM 15 years of operation</p> <ul style="list-style-type: none"> <li>• Frame time-stamp resolution of 2.5ns</li> <li>• GPS and CDMA-based external time sources are supported</li> <li>• IEEE 1588v2 and NTP packet-based external time sources are supported</li> <li>• TIA/EIA-95B-based external time sources are supported</li> </ul>			
Inter-module and inter-chassis time synchronization	<p>Modules in the same chassis are phased-locked to the timing source of the control module. For more modules in separate chassis:</p> <ul style="list-style-type: none"> <li>• Spirent-patented self-calibrating inter-chassis timing chain using dedicated port on chassis control module delivers precise synchronization <math>\pm 20</math>ns</li> <li>• Synchronization via external GPS or CDMA network</li> <li>• Using IEEE 1588 or NTP packet-based approaches</li> <li>• With TIS/EIA-95B timing inputs</li> </ul>			

### Electro-Mechanical Specifications

Module weight	2.45 kg, 5.375 lbs.
Module predicted MTBF	72,956 hours. Hours of continuous operation
Operating temperature range	Supported for 59° to 95° F (15° to 35° C) ambient temperature. 20% to 80% relative humidity.
Max power draw per module	Maximum of 201W per slot.

## Technical Specifications (cont'd)

### Spirent TestCenter Layer 2-3 generator and analyzer

Number of streams	8191 transmit and 8191 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
Min/max Tx rates	1 packet per 3.43 seconds to 103% 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 analyzed in real time	<p>Tx and Rx frame counts and rates</p> <ul style="list-style-type: none"> <li>• Tx and Rx Layer 1 byte counts and rates</li> <li>• Out of sequence errors</li> <li>• FCS errors and rate</li> <li>• Min, Max and Average Latency (2047 streams)</li> <li>• Dropped/In-Order/Reordered/Duplicate/Late and Jitter measurements</li> </ul>
Per-port statistics analyzed in real time	<p>Tx and Rx frame counts and rates</p> <ul style="list-style-type: none"> <li>• Tx and Rx Layer 1 byte counts and rates</li> <li>• Out of sequence errors</li> <li>• PRBS errors</li> <li>• FCS errors and rate</li> </ul>
Transmit timestamp resolution	2.5 ns Tx timestamp resolution with intra-chassis and inter-chassis synchronization
Supported encapsulations	<ul style="list-style-type: none"> <li>• Layer 2: Ethernet II, 802.1Q, 802.1ad, FCoE</li> <li>• Layer 3/4: IPv4, IPv6, TDP, UDP</li> </ul>
Supported Tx signature capability	Fully compatible with Spirent hardware; contains sequence number and highly accurate timestamp
Capture buffer size	8 MB per port
Capture buffer controls— Spirent TestCenter's unique capture capability allows maximum effectiveness when debugging hard to find hardware or protocol problems.	Several modes of operation that include: Store slices or full-frames; store signature or all frames; store tx/rx control plane with data plane; real-time mode for control plane traffic; wrap or stop buffer at end. Filtering, starting and stopping capture contains the following pre-defined events: FCS, PRBS, user-defined frame length, and test signature present. Each event can be independently set to ignore, include or exclude.
Latency modes	Benchmark tests support LIFO, LILO, FIFO or FILO latency calculation methods.
Route Insertion Table (RIT) Entries per port	7692 4-byte entries for dynamic label or random IP/MAC address assignments
RIT or List VFD Entries per stream	8 RIT insertions per stream and 4 VFD insertions per stream

## 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 scripting
- Mac-, Linux- or Windows-based workstation for Rest API support

Ordering Information				
Part Number	Description	Spirent Application		
		Spirent TestCenter	Avalanche Commander	Landslide
<b>Test Modules</b>				
DX2-10GQ-C16	SPIRENT DX2 16-PORT QUINT speed 10G/5G/2.5G/1G/100M copper	X		
DX2-5GD-C16	SPIRENT DX2 16-PORT Dual speed 5G/2.5G copper	X		
DX2-2.5GO-C16	SPIRENT DX2 16-PORT 2.5GbE copper	X		
<b>Related Products</b>				
C1-KIT-11-NG	Spirent BASE-T Noise Generator and ACC-6240 BASE-T Noise Injector			
<b>Spirent Chassis</b>				
SPT-N12U-110	Spirent N12U chassis and controller with 110VAC power supplies			
SPT-N12U-220	Spirent N12U chassis and controller with 220VAC power supplies			
SPT-N4U-110	Spirent N4U chassis and controller with 110VAC power supplies			
SPT-N4U-220	Spirent N4U chassis and controller with 220VAC power supplies			

### About Spirent Communications

Spirent Communications (LSE: SPT) is a global leader with deep expertise and decades of experience in testing, assurance, analytics and security, serving developers, service providers, and enterprise networks. We help bring clarity to increasingly complex technological and business challenges. Spirent’s customers have made a promise to their customers to deliver superior performance. Spirent assures that those promises are fulfilled. For more information visit: [www.spirent.com](http://www.spirent.com)

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