TestPoint 1Gbps

Applications

- Validates FC links
- Tests Ethernet Transport
- Provides FC traffic blasting up to 4 Gbps

Compliance

- CSA Certificate of Compliance to CAN / CSA C22.2 No.60950-1 (2003) and ANSI / UL 60950-1 (2003) with CSA Mark for Canada and USA
- CSA CB Certificate of Compliance to EN60950-1, IEC 60950-1, and National Deviations with CE Marking
- Class 1 Laser Product in compliance with EN 60825, IEC 60825, and FDA / CDRH requirements

Highlights

Most comprehensive lower layer testing for Ethernet and Fibre Channel

- Controls two independent ports
- Test rates up to 4 G with one module: 1 / 2 / 4G Fibre Channel (FC), Optical Gigabit Ethernet (GigE), 10 / 100 / 1000BASE-T, 100BASE-FX
- Captures 8B / 10B PCS and MAC traffic
- Generates up to 4096 unique traffic streams in ExStreams mode (MAC / stacked VLAN, MPLS, IPv4, IPv6)
- Executes RFC 2544 test suite on both Ethernet and Fibre Channel
- Measures service disruption time
- Terminal and transparent monitor connectivity modes

The JDSU TestPoint 1Gbps Module provides two test ports for Ethernet from 10 Megabit to 1 Gigabit or 1 / 2 / 4 Gigabit Fibre Channel (FC) with a strong focus on lower-layer testing.

Licensed options control the available protocols and line rates. Both ports may be used concurrently with each being independently controlled. The test interface uses small form-factor pluggable (SFP) sockets which support optical and electrical connectivity options, and enable the convenience of changing wavelengths and protocols. Traffic generation of up to 128 streams is provided on all supported Ethernet rates in standard configuration. With the ExStreams option, up to 4096 streams can be generated and analyzed.

The TestPoint 1Gbps Module can be inserted into multiple scalable chassis options, including the highly compact TS-10 configuration. Up to sixteen 1Gbps modules can be inserted into the TS-170 for a total of 32 test ports in a single chassis.

Note: The TestPoint 1 Gbps is available as a module for multi-slot systems (TestPoint TS-30 and TS-170) or in a static, self-contained configuration (TestPoint TS-10). The term module is used in this document

INTERFACE SPECIFICATIONS

Optical / electrical SFP

Optical connector	LC	LC	LC
Wavelength	850 nm	1310 nm	1550 nm
Optical output power (Rx power read)	-9.5 to -2.5 dBm	Up to -3 dBm	-5 to 0 dBm
Optical overload (min)	0 dBm	0 dBm	0 dBm
Sensitivity (min)		-18 (4G); -21 (2G); -22 (1G) dBm	-23 dBm
Electrical connector	RJ45; supports full-duplex 10BASE-T, 100BASE-TX, 1000BASE-T		

Differential electrical SFP

Connector	
Impedance single-ended	50 Ohm
Cable length	14 inches
Type	SMA
Transmitter	
Minimum single-ended amplitude	265 mV
Maximum single-ended amplitude	800 mV
Receiver	
Sensitivity with PRBS23 @BER10^{-12} (single-ended peak-to-peak)	150 mV

Clock output

Output level	LVPECL signal, AC coupled
Connector	SMA / 50 Ohm

Management ports

10/100Base-T LAN (Ethernet)	via RJ45
Operator port	via RJ12 into RS-232 serial cable

LAN management port

Supports simple network time protocol (SNTP) configurable for static IP address or DHCP

OPTICAL

- Receive power measurement
- Transmit laser on / off
- SFP information display

LINE RATES

- 10 / 100 / 1000 Mbps (BASE-T)
- 125 Mbps (100BASE-FX)
- 1.0625 Gbps (1GFC)
- 1.25 Gbps (Optical GigE)
- 2.125 Gbps (2GFC)
- 4.25 Gbps (4GFC)

CLOCKING

- Internal (± 4.6 ppm accuracy)
- Recovered from line
- External via group controller: TS-30 / 170
- Clock rate variations : ± 110 ppm
- Clock output

LOGGING

- Event log
- Log injections

CONNECTIVITY

- Terminal: Source and sink traffic
- Transparent monitor: Transparently monitors and retransmits unaltered

APPLICATIONS

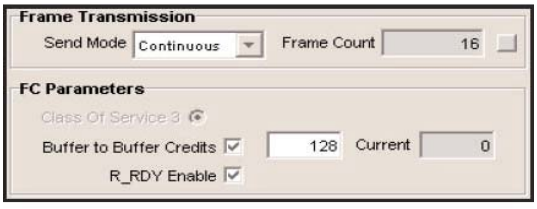
Description of the applications:

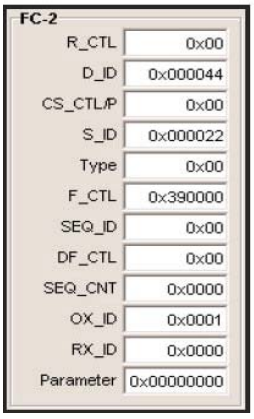
- Fibre Channel: 1 / 2 / 4GFC
- Ethernet: Optical GigE and / or 10 / 100 / 1000BASE-T and / or 100BASE-FX
- Applications are switchable between FC and Ethernet; however, both ports run either FC or Ethernet

FIBRE CHANNEL

- This covers 1 / 2 / 4GFC point-to-point.
- Used for BERT testing at the FC-1 and FC-2 layers. Applies to each port individually or both ports.

TRAFFIC SETTINGS





- Send mode: Continuous / burst of frames
- Frame size: Range of 12 to 4,104 bytes (multiple of 4, includes SOF & EOF). Size can be: Fixed / incrementing / decrementing / random / user sequence (up to 8)
- Transmission rate: Specified as bandwidth (%, Mbps, frames/s) / number of inter frame gap (IFG) bytes (fixed / random / sequence up to 8; range 8 to 65,535 bytes)
- FC-2 framing: User can set 24-byte header values
- Class support: Class 3
- Flow control: Manual buffer-to-buffer credit setting; range 1 to 4,095. Sending of R_RDY may be enabled / disabled.
- Frame payload: PRBS 23 or 31 / 16-byte sequence / pattern invert

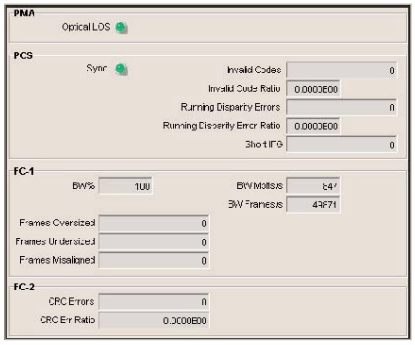
LINK INITIALIZATION

- Settings: Enable / disable. LF1 / LF2 state force
- Reporting: Active sate indicator / LF1 / LF2 / primitive sequence protocol error count / loss of sync count / Link Failure count

ERROR INJECTIONS

- PCS sublayer: LOS / running disparity error (single, rates) / 8B / 10B coding error (single, rates) / random bit corruption
- FC-1: Misaligned frames (non-multiple of 4 bytes size)
- FC-2: CRC (single, rates)

ERROR MONITORING



PCS sublayer: LOS / synchronization / running disparity errors / invalid 8B / 10B code groups / short IFGs (adjustable threshold)
FC-1: Frames oversized (>2148 bytes) / frames undersized (<36 bytes) / frames misaligned (non-multiple of 4 bytes)
FC-2: CRC errors

STATISTICS

FC-1: Bandwidth (%, Mbps, frames/s) / frame count / octet count / number of R_RDY

LATENCY AND SEQUENCING

Sequencing: Frame loss / out-of-order / duplicates. Can inject errors on transmit
Time stamping: Latency (min, max, avg over test period and 0.5 s window) / packet jitter

CAPTURES

Captures 8B / 10B codes
Triggers : Manual / sync loss / invalid 8B / 10B code group / running disparity error / code group pattern match (up to 6 bytes)
Trigger point: Start / middle / end
Display: Trigger point / 8B / 10B code group and decode (D / K codes and hex)
Size: 8,250,000
File type: Binary / ASCII

RFC 2544

As described under Ethernet

TEST REPORT

Contains FC settings, errors, and statistics

TEST PATTERNS

Transmits CJTPAT, CRPAT and CSPAT

ETHERNET

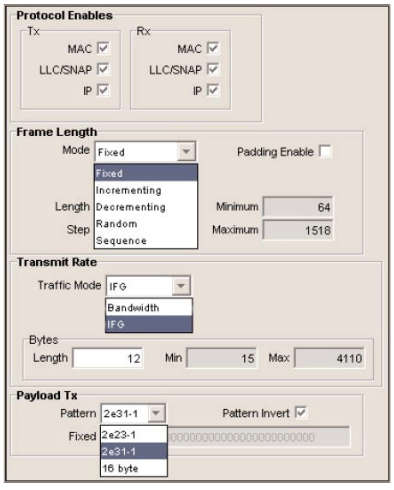
Description covers optical GigE 10 / 100 / 1000BASE-T, and 100BASE-FX, based on the SFP used. Applies to each port individually or both ports.

TRAFFIC SETTINGS

Three modes: Single stream, multiple streams (physical ports), and optional multiple streams (logical ports ExStreams)

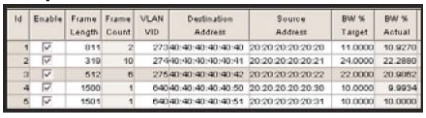
Single Stream

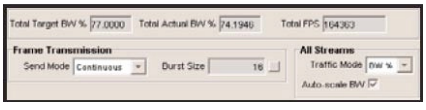
Used for BERT testing at PCS, MAC, single / stacked VLAN, and IPv4 layers.



Send mode: Continuous / burst of frames
Protocol support: MAC / single stacked VLAN / LLC / SNAP / IPv4. User can set header values. For destination / source MAC address and VLAN IDs, support of single / incrementing value over a range.
Frame size: Range of 19 to 65535 bytes. Size can be : Fixed incrementing / decrementing / random / user sequence (up to 8)
Transmission rate: Specified as bandwidth (%, Mbps, frames/s) or number of inter frame gap (IFG) bytes (fixed / random / sequence up to 8; range 8 to 16,777,215 bytes)
Frame payload: PRBS23, or 31 / 16-byte sequence / pattern invert

Multiple Streams



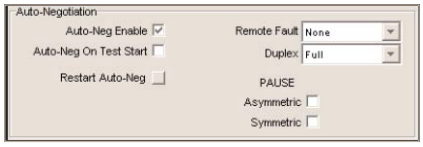


Used for traffic simulation and multi-protocol support
Maximum number of streams: 128 for physical ports / 4060 for logical ports (ExStreams)
Number of logical ports (ExStreams): User setting to 1, 2, 4, 8, 16 or 32. Per transmit port, up to 4096/[# of logical ports] streams can be defined. Each receive port can detect up to 4096 streams
Send mode: Continuous / burst of frames
Protocol support: MAC / single / stacked VLAN / MPLS / IP4 or IPv6./ TCP / UDP in the case of physical ports streaming. User can set header value per stream.
Frame size: Range of 27 to 9,600 bytes. Size is fixed with a stream.
Transmission rate: BW % / IFG size in bytes / [frame/s]. IFG does not apply to 10 / 100 / 1000BASE-T
Auto-scale BW: Scales bandwidth when total exceeds 100%
Frame payload: Fill byte / random / custom (user defined byte-by-byte)
Stream signature: Used for receive auto-detection

AUTO-NEGOTIATION

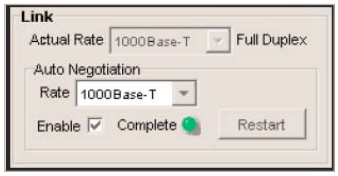
Different implementation for optical GigE and 10 / 100 / 1000 BASE-T; does not apply to 100BASE-FX.

Optical GigE



Settings: Enable / disable. Remote fault (offline, link failure, auto-neg error) / pause encoding / operation mode
Reporting: Auto-negotiation complete indicator. Remote fault (offline, link failure, auto-neg error)
Capture: Using 8B / 10B capture

10 / 100 / 1000BASE-T



Setting: Enable / disable. Full duplex only. Rate to negotiate / pause encoding
Reporting: Auto-negotiation complete indicator

CONTROL PLANE

Pause frames: Single / continuous with interval. Pause timer. Receiver throttles.
ARP:
ARP request sent for each unique destination IP address;
Timeout, Retry Period and Count support
ARP Reply sent on port MAC address match
Gateway and Subnet Mask Settings

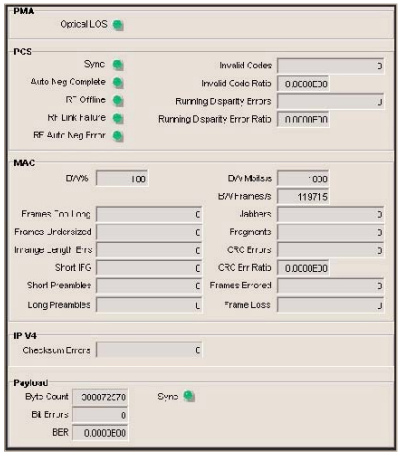
PING

Send mode: Continuous / packet count
Transmission period: 1,000 to 4,294,967,295 ms
Protocol support: IPv4 with no VLAN / single or stacked VLAN
Data size: 0 to 9554 bytes
Replies: Issued on port IP address match

ERROR INJECTIONS

PCS / PMA Sublayer: Optical GigE: LOS / running disparity error (single, rates) / [8B / 10B coding error (single, rates)] / random bit corruption (single, rates)
10BASE-FX: LOS / sync far end fault / invalid code
MAC sublayer: Short preamble (single stream) / long preambles (single stream) / CRC (single, rates in single stream; per stream in multiple streams)

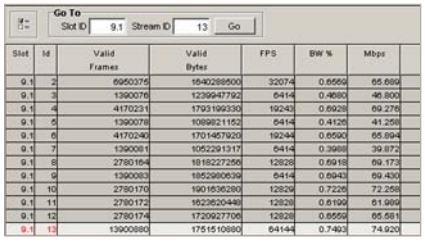
ERROR MONITORING



PCS / PMA sublayer: Optical GigE: LOS / PCS synchronization / running disparity errors / invalid 8B / 10B code groups
100BASE-FX: LOS / sync / far end fault / invalid codes
MAC sublayer: Frames too long (>jumbo) / jabbers / undersized / fragments / CRC errors / in-range length errors (802.3 frames) / short IFGs (adjustable threshold, does not apply to 10 / 100 / 1000BASE-T)
IPv4: Checksum errors (single stream)

STATISTICS

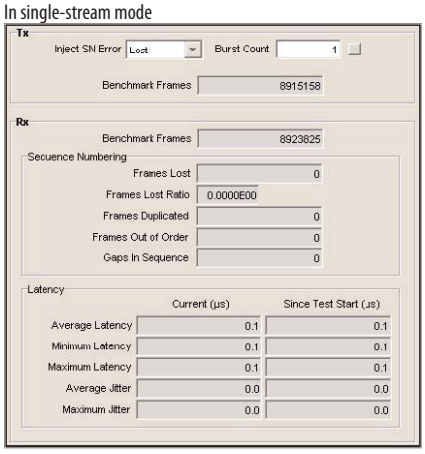
MAC: Bandwidth (%, Mbps, frames/s) / frame count / octet count / unicast frames / multicast frames / broadcast frames / [single / stacked VLAN tagged frames] / number of pause frames / ARP frames / MPLS tagged frames / frame length bins (including jumbo) / CRC counts (total and length bins) / short preamble count / long preamble count
MPLS : Frame count
IPv4: Packet count / ICMP packets
IPv6: Packet Count / ICMP packets
Per stream statistics: Valid frames / valid bytes / frame rate (fps) / BW in % / BW in Mbps / MAC CRC error count / frames lost (count / ratio) / frames duplicated / frames out of order



In logical ports multiple streams (ExStreams), a linked error summary is provided

LATENCY AND SEQUENCING

In single-stream mode



Sequencing: Frame loss / out-of-order / duplicates. Can inject errors on transmit
Time stamping: Latency (min, max, avg over test period and 0.5 s window) / packet jitter

FILTERS

MAC: 8 MAC / VLAN filters with accept / discard operation
Pattern filter: Up to 6 bytes with offset from start of frame

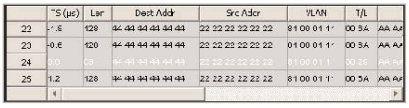
CAPTURES

Two modes: 8B / 10B PCS, and MAC level

PCS

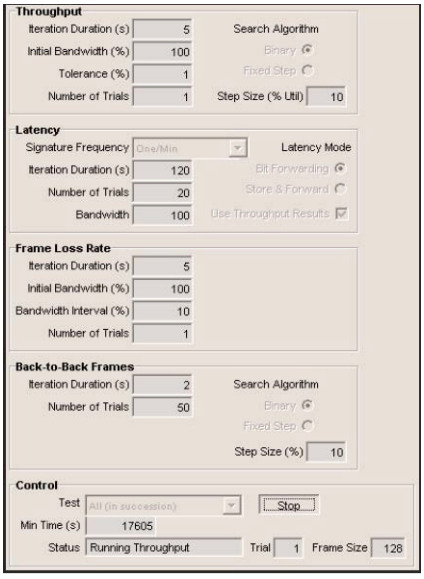
Triggers : Manual / PCS sync loss / invalid 8B / 10B code group / running disparity error / code group pattern match (up to 6 bytes)
Trigger point: Start / middle / end
Display: Trigger point / 8B / 10B code group and decode (D / K codes and hex)
Size: 8,250,000 code groups
File type: Binary / ASCII

MAC



Triggers: Manual / CRC error / undersized frame / frame too long / in-range length error
Trigger point: Start / middle / end
Filters: MAC filters / pattern filter
Display: Trigger point / time stamp / MAC layer decode
Size: 400,000 frames / 32.4 Mbytes / full frame or slicing (first 64 bytes)
File type: Binary (Snoop compatible with Wireshark)

RFC 2544



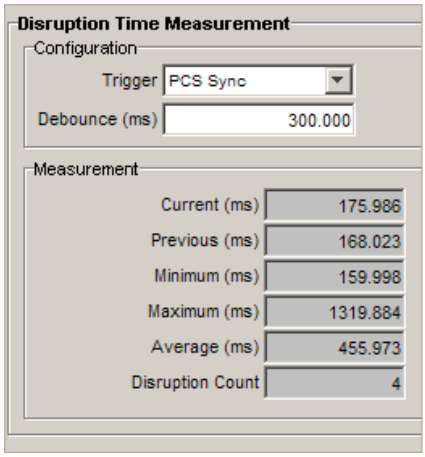
Provides throughput, latency, frame loss, and back-to-back measurements in single stream mode. Up to 10 frame sizes. Supports function to run all tests in succession. Logs results to file and generates graphics

TEST REPORT

Contains Ethernet settings, errors, and statistics

DISRUPTION TIME

Measurement: µs resolution
Statistics: Current / Previous / Minimum / Maximum / Average / Count
Event logging
Automatic re-triggering
Triggers: LOS (not applicable for 10/100/1000BASE-T) / PRBS Sync / PCS Sync



ORDERING INFORMATION

TS-30 / 170

1Gbps Module

N530-0134	1 Gbps Module — Dual port module supporting GigE / Ethernet & FC

Options

OPT 0134-10	Dual GigE / Ethernet
OPT 0134-11	Dual 1 / 2GFC
OPT 0134-33	Dual 4GFC
OPT 0134-14	Dual 1 / 2 / 4GFC
OPT 0134-16	ExStream Ethernet Multiple Streaming

SFP interfaces

OPT 0134-01	GigE / 1 / 2 G FC 1310 nm SFP optics
OPT 0134-02	GigE / 1 / 2 G FC 1550 nm SFP optics
OPT 0134-03	GigE / 1 / 2 G FC 850 nm SFP optics
OPT 0134-35	GigE / 1 / 2 / 4 G FC 850 nm SFP optics
OPT 0134-36	GigE / 1 / 2 / 4 G FC 1310 nm SFP optics
OPT 0134-04	10 / 100 / 1000 Electrical SFP
OPT 0134-08	100BASE-FX 1310 nm SFP optics
OPT 0134-38	Differential electrical SFP for 1 Gbps module

TS-10 1 Gbps configuration

N550-0224	TS-10 with 1 Gbps Configuration – Dual Port Module supporting GigE / Ethernet & FC

Options

OPT 0224-10	Dual GigE / Ethernet
OPT 0224-11	Dual 1 / 2GFC
OPT 0224-33	Dual 4GFC
OPT 0224-14	Dual 1 / 2 / 4GFC
OPT 0224-16	ExStream Ethernet Multiple Streaming

SFP interfaces

OPT 0224-01	GigE / 1 / 2 G FC 1310 nm SFP optics
OPT 0224-02	GigE / 1 / 2 G FC 1550 nm SFP optics
OPT 0224-03	GigE / 1 / 2 G FC 850 nm SFP optics
OPT 0224-35	GigE / 1 / 2 / 4 G FC 850 nm SFP optics
OPT 0224-36	GigE / 1 / 2 / 4 G FC 1310 nm SFP optics
OPT 0224-04	10 / 100 / 1000 Electrical SFP
OPT 0224-08	100BASE-FX 1310 nm SFP optics
OPT 0224-38	Differential electrical SFP for TS-10 1 Gbps

Accessories

OPT 022x-10	Wheeled hard travel case accepting TS-10 or TS-30 chassis

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