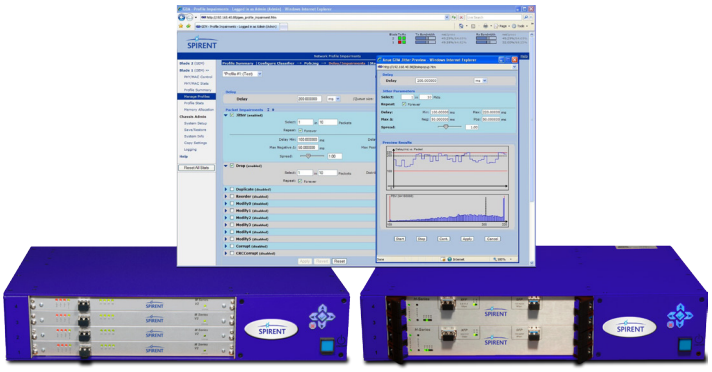
SPIRENT PATH DELAY NETWORK EMULATORS

SONET/SDH

Spirent Communications' PD Network Emulators are precision test instruments which allow users to accurately simulate path layer delays and impairments that occur over diversely routed SONET and SDH Networks. The PD 192 emulator load can also capture TOH and POH data from any SONET/SDH channel or path. The PD Network Emulator allows designers and testers to validate and evaluate next generation SONET/SDH products and technologies under real world conditions in a controlled lab environment.

APPLICATIONS

- Evaluation of Next Generation SONET/SDH technologies
- Interoperability Testing
- Customer Proof of Concept
- SLA Emulation
- Corporate LAN/WAN Emulation
- Dynamic Differential Delay/Network Jitter testing for VCAT verification



BENEFITS

- Enables validation, performance and interoperability testing of systems under real world conditions, with reproducible results
- Provides realistic problem replication for troubleshooting
- Improves Proof of Concept testing and customer demonstrations
- Allows for dynamically changing path delays and impairments
- Field programmable architecture protects investment
- Multiprotocol support (SONET, SDH, Fibre Channel and Ethernet). Grow easily as needs change.

KEY FEATURES

- Path layer delay and impairments up to 9.953Gbps
- Hardware based architecture provides maximum precision and accuracy
- Precisely emulates path delays that occur over SONET/SDH networks
- Stresses systems with controlled bit errors and dynamic differential delays
- Dynamically changing impairments tests failure recovery mechanisms
- Multiprotocol support (Ethernet, SONET/SDH and Fibre Channel)
- Easy GUI and scripting support for automating tests
- Transparent to all higher layer protocols above SONET/SDH

TECHNICAL SPECIFICATIONS

General

- Supports all valid sizes and combinations of contiguous concatenation
  - Fully supports Telcordia GR253/2000 Table 5.1 and ITU-T G.707 for payload concatenation
  - For example, the PD192 emulator can differentially delay 192 separate STS-1 paths, or 16 separate STS-12c paths, or a combination of 32 STS-3c paths plus 96 STS-1 paths, etc.
- All defined and reserved overhead bytes are conveyed transparently, except that
  - B1/B2 are recalculated, H1/H2/H3 are adjusted (SS bits are passed transparently)
- PD192 offers three capture buffers of up to 127 transitions of TOH/POH data from a SONET/SDH stream
  - Define three overhead byte values as trigger events

Delay

- Emulates path delays that occur in SONET/SDH networks
  - Individually delay each path contained in OC-3/STM-1, OC-12/STM-4, OC-48/ STM-16 signals or OC-192/STM-64 signals
- Received pointer adjustments are delayed by the same amount as the associated SPE data
- Delayed paths are reassembled back into an OC-3/STM-1, OC-12/STM-4, OC-48/STM-16 or OC-192/STM-64 signal which is logically identical to the original
- Supports all valid sizes and combinations of contiguous concatenation
- Programmable Path Delays
  - Differential delay value programmable from 0 to 320ms
  - Delay values programmable in 154.32ns increments (one SONET pointer position. This equals one byte for an STS-1 payload or 48 bytes for an STS-48c payload)
  - Path layer dynamically changed by forcing extra pointer increment or decrement operations under user/program control. Supports simultaneous and independent adjustment of all paths.
  - Minimum differential delay is 0ns
- Minimum absolute delay—approximately 50us

BER

- Capable of injecting bit errors at 10^{-15} to 10^{-2} bit error rates

Impairments

- Emulates AIS-P/UNEQ-P (w/optional C2 override) under user or program control for any or all path channels
- Emulates loss of signal, loss of frame and or squelch mode under user program control

User Interface

- Remote monitoring and control via RJ-45 Fast Ethernet
- HTML-based GUI
  - For intuitive/interactive remote control
- Front panel LCD display and controls for standalone operation
- Powerful Tcl-based scripting interface to enable automated lab testing
- User configurations can be saved and restored

Optics

- SONET emulators provide support for SONET OC-3/SDH STM-1 (155.52Mbps), OC12/SDH STM-4 (622.08Mbps), SONET OC-48/SDH STM-16 (2488.32Mbps) and OC-192/SDH STM-64 (9953.28Mbps) line rates
- 1310nm SFP (Small Form Factor Pluggable) transceiver optical module (optional single mode 1550 nm optics available) with LC connectors for interfaces up to 2488.32Mbps
  - Average Launch Power: -10 to -3dBm (1310nm)
  - Center Wavelength is 1266nm to 1360nm
  - Rx Center Wavelength 1266nm to 1580nm
  - Maximum Receiver Sensitivity is -3dBm to -20dBm
- 1310nm XFP MSA hot-pluggable XFP Transceiver MSA optical module (optional single mode 1550nm optics available) with LC connectors for the 9953.28Mbps interface
  - Average Launch Power: -6 to -1dBm (1310nm)
  - Center Wavelength is 1290nm to 1330nm
  - Rx Center Wavelength 1270nm to 1660nm
  - Maximum Receiver Sensitivity is +0.5 dBm to -13.4dBm

ORDERING INFORMATION

Platform

- **AS-Maui-B —**Rack mountable chassis with 2 x SFP ports and 2 X 10/100/1G Maui blades - up to 2.6Gbps
- **AS-Maui-Q —**Rack-mountable chassis with 4 x SFP ports and 4 x 10/100/1G Maui blades - up to 2.6Gbps
- **AS-Hawaii-B —**Rack-mountable chassis with 2 x SFP and 2 x XFP ports and 2 x 10/100/1G/10G Hawaii blades - up to 11.3 Gbps

Interfaces

See Optics above (prevous page)

Software/Emulator Load

PD312 - OC-3/OC-12 or STM-1/STM-4

PD48 - OC-48 or STM-16

PD192 - OC-192 or STM-64

Maintenance

First year SW Maintenance included

Note: up to 7 emulator loads including Gigabit Ethernet and Fibre Channel may be combined onto one platform

SPIRENT GLOBAL 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 Web site at www.spirent.com/gs or contact your Spirent sales representative.

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