



Path Delay – SONET/SDH Network Emulator

Delay and Impairment Emulation for OC-3/STM-1 (155Mbps)—OC192/STM-64 (10Gbps)

Key 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
- Multi protocol support (SONET, SDH, Fibre Channel and Ethernet)

Applications

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

Ordering Information

Maui-b, Hawaii-b

Rack mountable chassis – bi-directional emulation with hardware blades
Maui supports to 2.6Gbps, Hawaii to 11.3Gbps

PD192

OC-192/STM-64 Path Delay Network Emulator

PD48

OC-48/STM-16 Path Delay Network Emulator

PD312

OC-3 & OC12 /STM-1 & STM-4 Path Delay Network Emulator

SW1

1 year Software Maintenance Agreement

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



Overview

Anue Systems' Path Delay 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.

Highlights

- 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
- Multi protocol support (Ethernet, SONET/SDH and Fibre Channel)
- Easy GUI and scripting support for automating tests
- Transparent to all higher layer protocols above SONET/SDH

Primary Applications

- Evaluate of Next Generation SONET/SDH technologies such as VCAT or Virtual Concatenation by emulating differential delays which occur over diversely routed members of a VC Group through a network
- Dynamic Differential Delay/Network Jitter testing on a per path basis, by generating delays that increase or decrease over time
- Validate Signal Fail and Degrade alarm threshold algorithms on a per path basis or for the entire SONET/SDH frame
- Facilitate automatic protection switch testing under the presence of persistent bit errors, LOS or LOF
- Test average time to achieve GFP framing and staying in sync under high BER
- Real World Interop and Customer Proof of Concept testing



Features

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
- 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:
 - 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
- Programmable Path Delays
 - Differential delay value programmable from 0-320ms
 - 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
 - On individual path or over the entire frame

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 & control via RJ45 Fast Ethernet
- Web-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

Specifications

Optics

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

Chassis

- Rack Mountable
- Regulatory Compliance
 - CE Mark, FCC Part 15 Class A, Canadian ICES-003
 - EMC: EN55022:2002, EN55024:2002, FCC/ANSI C63.4:2000, EN61000-3-2:2000, EN61000-3-3:2001
- Input Voltage 100-240 VAC auto-switching, Power Supply Frequency 50-60Hz
- Power supply UL, CSA, TUV, CE, FCC Class B Certified
- Operating temp: 0 to 30°C
- Size (inches): 2U bi-directional chassis=17.3Wx12Lx 3.5H
- Weight: 2U chassis = 6.0 kg (13lb, 3oz)

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