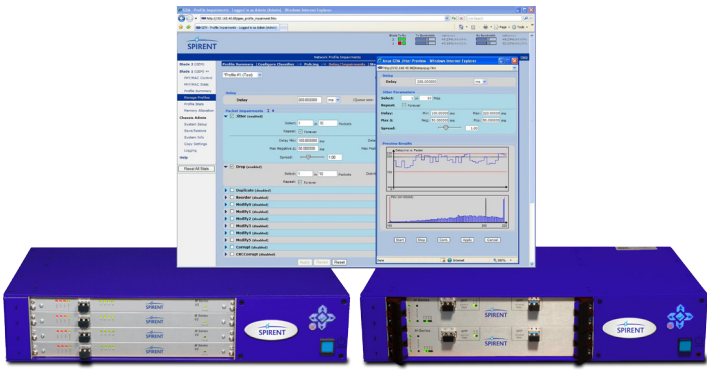
SPIRENT FIBRE CHANNEL NETWORK EMULATORS

FC/FC124/FC8/FC10/FC10F

Spirent Communications' Fibre Channel Network Emulators are precision test instruments for 1, 2, 4, 8 or 10 Gigabit Fibre Channel testing. These emulators allow users to accurately simulate delays and impairments occurring over live production Fibre Channel networks to validate and evaluate new hardware or software products and technologies in a controlled lab environment.

APPLICATIONS

- SLA Emulation
- Corporate LAN/WAN Emulation
- Interoperability Testing
- Customer Proof of Concept
- Software Application Performance Testing
- Server Consolidation/Migration
- Storage Extension
- Business Continuity
- Disaster Recovery



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 impairment profiles
- Field programmable architecture protects investment
- Multiprotocol support (SONET, SDH, Fibre Channel and Ethernet). Grow easily as needs change.

KEY FEATURES

- Hardware-based architecture provides maximum precision and accuracy
- True 100% line rate support for 1, 2, 4, 8 and 10 Gig Fibre Channel
- Supports all standard Fibre Channel frame formats
- Precisely emulates delays that occur over Fibre Channel networks
- Stresses systems with controlled bit errors and random frame drops
- Cost effective alternative to test beds built with fiber spools and optical amplifiers
- Dynamically increase impairments to test failure recovery mechanisms
- Multiprotocol support (Ethernet, SONET/SDH, OTN, CPRI and Fibre Channel)
- Easy GUI and scripting support for automating tests
- Transparent to any higher layer protocols above Fibre Channel

TECHNICAL SPECIFICATIONS

Delay

- Emulates delay occurring during transmission of 1, 2, 4, 8 and 10 Gigabit Fibre Channel data through a network
- Fully transparent operation: delayed output is logically identical to input signal
- No modification of transmitted code words
- Inter frame gap (idle fill characters) unchanged
- Delay is adjustable up to 250ms (50,000km) in each direction with the standard configuration
- Minimum programmable incremental delay equals 1 bit (941ps at 1.0625Gbps, 470ps at 2.125Gbps rate, 235ns at 4.25Gbps rate, 118ps at 8.5Gbps rate and 95ps at 10.51875Gbps rate)
- Minimum delay through system is 1.6us at 1.0625Gbps, 950ns at 2.125Gbps, 600ns at 4.25 Gbps, 500ns at 8.5Gbps and 250ns at 10.51875Gbps rate
- Delay "Doubler" and "Quadrupler" are available to extend the maximum delay capability

BER

- Capable of injecting bit-errors at 10^{-17} to 10^{-3} bit error rates
  - 1 bit to 64k bit error burst—invert, PRBS, all ones or all zeroes
  - Error injection can be fixed/periodic or random; random distribution sequences include Poisson, Uniform or Gaussian
  - Errors injected into both frames and inter-frame gap

Frame Drop

- Generates Frame Drop—from every frame to one in every 64,000 frames
  - Allows dropped frames to be replaced with idles or repeats of the last word
  - Frame drop rate can be fixed/periodic or random; random distribution sequences include Poisson, Uniform or Gaussian

Impairments

- Emulates loss of signal, loss of frame under user or program control

Statistics/Alarms

- Alarms for Loss of Signal (LOS), Loss of Lock (LOL)

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

Options

- 850nm, 1310nm, 1550nm or other ITU-T wavelength XFP and SFP optical transceiver(s) are available

Optics

- Fibre Channel Emulators provide support for 1.0625Gbps, 2.125Gbps, 4.250Gbps, 8.5Gbps, 10.51875Gbps and 11.3168Gbps (1x,2x, 4x, 8x, 10x Fibre Channel) Data Rates
- 850nm hot-pluggable SFP Transceiver MSA compliant (SM and MM 1310nm and SM 1550nm optics available) with LC connectors for interfaces up to 4.250Gbps
  - Average Launch Power: -9 to -2.5dBm (850nm)
  - Center Wavelength is 830 to 860nm
  - Maximum Receiver Sensitivity is -15dBm
- 1310nm hot-pluggable XFP Transceiver MSA compliant (Single Mode 1550nm optics available) with LC connectors for 8 and 10Gig interfaces.
- Supports distances of up to 10km on 9/125um optical fiber at 1310nm, and 550m on 50/125um fiber at 850nm
- Launch Power: -6.0 to -1.0dBm (1310nm)
- Center Wavelength is 1290nm to 1360nm
- Receiver Sensitivity is -13.4dBm to 0.5dBm
- 850nm, 1310nm, 1550nm or other ITU-T wavelength XFP and SFP optical transceiver(s) are available

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 previous page for options

Software/Emulator Load

AS2-FC10-B — Bi-directional 10 Gigabit Fibre Channel at 10.5188Gbps

AS2-FC10F- B — Bi-directional 10 Gigabit Fibre Channel with FEC at 11.3168Gbps

AS2-FC8-B — Bi-directional 8 Gigabit Fibre Channel at 8.5Gbps

AS2-FC124-B — Bi-directional 1, 2 and 4 Gigabit Fibre Channel at 1.0625/2.125/4.25Gbps

AS2-FC-B — Bi-directional 1 and 2 Gigabit Fibre Channel at 1.0625/2.125 Gbps

Maintenance

First year SW Maintenance included with all software

Note: Up to 7 emulator loads including Gigabit Ethernet and SONET/SDH may be combined onto one platform. Contact your Spirent representative for details.

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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