SPIRENT Communications

Spirent Network Impairment Emulators
VALIDATING FCOE SOLUTIONS

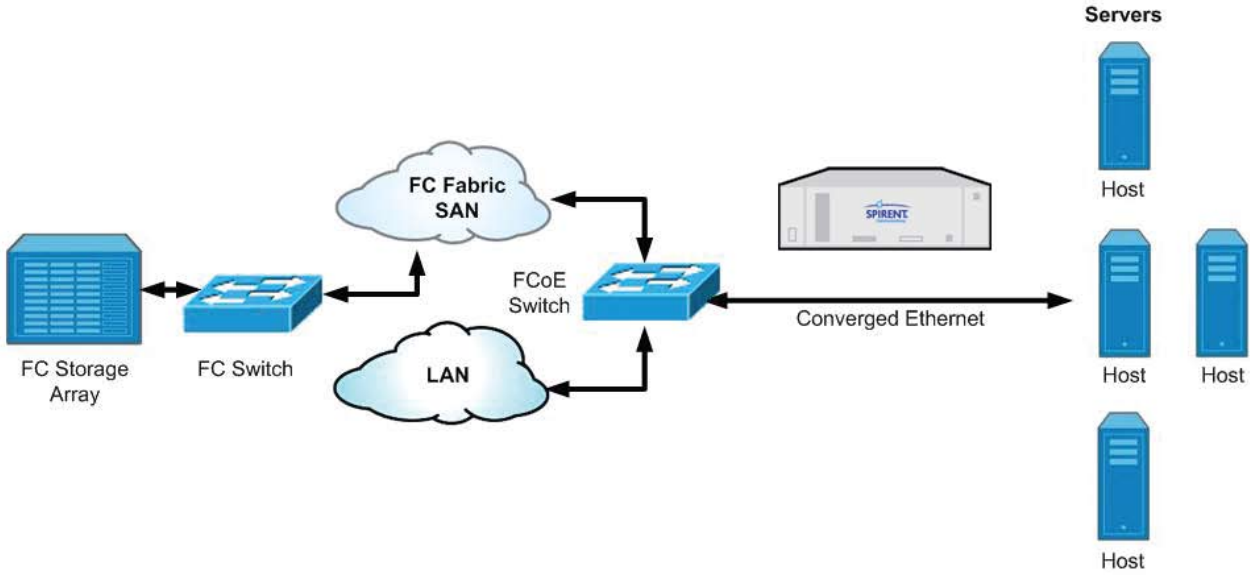
Spirent Network Impairment Emulators enable users to validate and evaluate new products and technologies by accurately emulating the delays and impairments that occur over live, or production, Ethernet networks.

APPLICATIONS

- Characterize Fibre Channel throughput in the presence of converged traffic and Ethernet impairments
- Validate Fibre Channel over Ethernet implementations with full line rate 10Gb/s Ethernet network emulation
- Characterize the performance of new technologies required to support Fibre Channel transport over Ethernet
- Verification of QoS enforcement in the presence of congestion
- Stress the addressing scheme (SPMA or FPMA) by corrupting or modifying MAC addresses
- Verify proper support for IEEE 802.3x PAUSE and priority-based flow control

The imperative to achieve time-to-market (TTM) advantage in the highly competitive Fibre Channel over Ethernet market creates significant challenges for companies that design and develop FCoE products. FCoE equipment manufacturers and service providers need to be able to:

- Duplicate real-world network conditions dynamically in a consistently reproducible and controlled environment
- Flexibility to test standards-based or proprietary implementations while standards are not finalized
- Test FCoE links at full-line rate 10Gb/s full-duplex for comprehensive testing and validation of products
- Rapidly reproduce field issues in the test lab for swift troubleshooting and fast problem resolution



Spirent's 10G Ethernet network emulator (XGEM) offers users a proven solution to these challenges - providing the flexibility and repeatability needed to ensure performance issues can be readily tested and issues quickly addressed throughout the development or deployment process. Specifically, the Spirent XGEM Network Impairment Emulator platform provides users with the ability to:

- Perform testing at full line-rate 10 Gb/s
- Target specific packets for impairment based on Ethertype, FCoE, FIP, FC or other header fields
- Filter on any data in the PDU for impairment or modification to facilitate functional testing and feature validation
- Analyze bidirectional responses to corrupted or dropped packets
- Validate proper enforcement of Fibre Channel lifetime requirements
- Ensure Fibre Channel lifetime requirements are not enforced on IP traffic
- Verify priority-based flow control, congestion management and enhanced transmission selection capabilities
- Validate support for Jumbo packets of 2.5KBytes and larger
- Utilize the programmable filter library to provide bandwidth statistics per application type
- Capture incoming packets at 10Gig line rate for analysis – including bidirectional time correlation – based on filters and triggers

FEATURES

- Hardware-based architecture provides maximum accuracy and repeatability
- 100% line rate (up to 11.3Gbps) capable even with minimum size frames
- Precisely emulate delays and impairments that occur over Ethernet networks including:
  - Static and Variable Delay (Packet Jitter)
  - Packet Corruption, Drop, Reorder, Duplication, Modification
  - 10-bit domain line bit errors, LOS, comma aligner bit rotation
- Define up to 16 network profiles per interface with separate delay, bandwidth and impairments for emulating different classes of service or multiple paths through a network
- Ability to dynamically change impairment profile without data loss or test restart
- Standards-based Network Impairment Models per TIA-921 and ITU-T G.1050 MEF-18/G.8621
- Allows for changing multiple impairments simultaneously
- Powerful filtering for selective or focused impairments
- Easy GUI and Tcl scripting support for automating tests
- Support for all proprietary and standard L3 – L7 protocols including IPv6
- Jumbo frame support – infinite size (12K bytes for reorder and duplication)
- Multi-protocol support (SONET, SDH, OTN, Fibre Channel, CPRI, and Ethernet) on the same chassis; grow easily as needs change

BENEFITS

- Reduce risk and time to market by validating performance under real world conditions with precise and reproducible results prior to first customer shipment
- Realistic problem replication for troubleshooting
- Improves Proof of Concept testing and customer demonstrations
- Dynamically changing impairment profiles
- Easy configuration with standards-based models
- Field programmable architecture protects investment
- Multi protocol support (Ethernet, SONET/SDH, OTN, CPRI and Fibre Channel)

TECHNICAL SPECIFICATIONS

Network Profiles

- Support for up to 16 distinct network profiles emulating 16 “network clouds” per blade
- Define bandwidth, delay and impairments for each profile
- Each profile can be defined by any combination of VLAN tag, MPLS label, MAC or IP address TCP/UDP port or any value up to 2000 bytes deep within the Ethernet frame

Delay

- Emulates static or variable delay occurring during transmission of Ethernet data through a network
- Introduce frame or packet delay variation (jitter)
- Optional delay extenders are available for extra delay

Impairment Highlights

- Fixed and random impairment distributions
- Single or bursty
- Random and filtered or targeted impairments
- Chain multiple impairments simultaneously
- Loss of Signal, Loss of Frame Synchronization
- PCS, MAC, and higher layer bit errors, CRC Corruption
- Frame/Packet Drop, Reorder, Duplication Modification
- Bandwidth control or Policing per Metro Ethernet Forum
- Bandwidth Shaping
- Available Impairments depend on configuration

Statistics/Alarms

- Provides real time stats on the input such as running disparity errors, code group errors, IPG errors, idle errors, bandwidth statistics and more
- Provides stats for impairments introduced at output port
- Indicates alarms for Loss of Signal (LOS), Loss of Lock (LOL), Loss of Frame sync (LOF), Code group errors, running disparity errors

User Interface

- Remote monitoring and control via RJ-45 Fast Ethernet
  - Easy to use GUI (HTML)
  - Powerful TCL-based API enables full automated testing
- Front panel status control

ORDERING INFORMATION

Chassis

- **CKL-2U –** Rack-mountable chassis with support for 2 H10 blades

Modules

- **H10 –** "Hawaii" Network Emulator Hardware Module supports up to 11.3Gbps

Interfaces

- XFP (10Gig)

Software/Emulator Load

- XGEM (10GigE)
- 1 or 4 Profiles

Maintenance SW1

- 1-year software and hardware maintenance agreement included

Options

- **AS-XCAPPLAY –** Provides the ability to capture and replay up to 1G of traffic at full line rate

SPIRENT 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.spirentcom.com/gs or contact your Spirent sales representative.

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