SPIRENT ETHERNET NETWORK EMULATORS

ETHERNET OPERATIONS, ADMINISTRATION AND MAINTENANCE (EOAM) TESTING

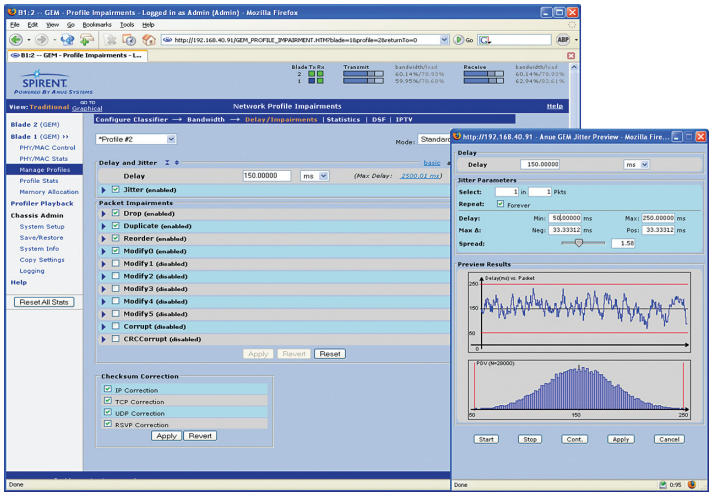
GEM & XGEM ETHERNET NETWORK IMPAIRMENT EMULATORS

Once strictly a LAN technology, Ethernet is now found in access, metro-area and wide-area networks because of its simplicity, range of bandwidth support and multi-point capability. Ethernet OAM (Operations, Administration and Maintenance) provides connection fault management and performance monitoring, capabilities required for carrier-grade application of Ethernet services.

APPLICATIONS

- Carrier Ethernet
- Ethernet Services
- Ethernet in the first mile
- Access Aggregation

Compatible with ITU-T Y.1731, ITU-T G.8031, IEEE 802.3ah, IEEE 802.1ab, IEEE 802.1ag, Metro Ethernet Forum



Spirent Communications' Ethernet Network Emulators are essential tools for making EOAM and carrier-class Ethernet services a reality. Spirent Network Emulators emulate real-world conditions—enabling users to accurately create the delays and impairments that occur over live production 10/100 Mbps, 1Gbps and 10Gbps Ethernet Networks for validating and evaluating new products and technologies.

The promise of EOAM is accompanied by significant challenges for those who develop, design and implement the solutions:

- Standards in flux require rapid development and regression testing
- Real-world network conditions must be duplicated in the lab to test with reproducible, relevant and efficient methodologies
- Providers and equipment manufacturers must stage field issues in the test lab for swift troubleshooting and reliable problem resolution
- Test engineers need to emulate the delay and impairment characteristics of the network with precision to verify error, alarm and performance monitoring features

GEM & XGEM ETHERNET NETWORK IMPAIRMENT EMULATORS

BENEFITS

- **Hardware-based architecture—**Provides maximum accuracy and repeatability with 100% line rate (up to 11.3Gbps) support even with minimum size frames.
- **Precisely emulate delays and impairments that occur over Ethernet networks—**Enables validation, performance and interop testing of systems under real world conditions, with precise and reproducible results. Precise, user-configurable delay injection allows testing of ITU-T Y.1731 performance monitoring metrics (Frame Delay and Frame Delay Variation). Precise, user-configurable frame drop allows testing of ITU-T Y.1731 performance monitoring metrics (Frame Loss Ratio).
- **Define up to 16 Network Profiles per interface—**Improve Proof of Concept testing and customer demonstrations with separate delay, bandwidth and impairments for emulating different classes of service or multiple paths through a network.
- **Dynamic Impairments—**Change multiple impairments simultaneously without data loss or test restart and perform realistic problem replication for troubleshooting. Dynamic filtering enables targeted dropping of Connectivity Check (CC) frames, emulating link failure to test Alarm Indication Signal (AIS) notification and upper-layer alarm suppression.
- **Standards-based Network Impairment Models per TIA-921 and ITU-T G.1050 MEF-18/G.8621—**Provides quick and easy test set up for accurate and repeatable testing against models based on industry standards.
- Powerful filtering for selective or focused impairments. Filtering on any data in the PDU for impairment or modification facilitates functional tests and validating features. User-defined filters facilitate sophisticated negative protocol testing by targeting any OAM PDU for impairment or modification using MAC/IP address, VLAN, OAM Level and Type, Version, Op Code and other fields.
- Physical-layer bit-error injection facilitates performance testing.
- Easy GUI and Tcl scripting support for automating tests.
- Support for all proprietary and standard L3—L7 protocols including IPv6.
- Multi-protocol support (SONET, SDH, OTN, Fibre Channel, CPRI and Ethernet) on the same chassis; grow easily as needs change and protect your investment.
- **Jumbo frame support—**Infinite size (12K bytes for reorder and duplication).

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

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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

- SFP (10/100/1Gig)
- XFP (10Gig)

Software/Emulator Load

- GEM (10/100/1GigE), XGEM (10GigE)
- 1, 4, 8, or 16 Profiles

Maintenance

- First year SW Maintenance included

Options

- **AS-CAPPLAY—**Provides the ability to capture and replay up to 1G of traffic at full line rate
- **AS-NETPLAY—**Provides custom impairment table creation and playback capabilities with extreme resolution
- **AS-MEF-18—**Provides MEF-18/G.8621 Network Impairment Models
- **AS-PROPLAY—**Enables automatic replay of impairment condition data (captured from ICMP pings using “Profiler”) through the GEM Emulator
- **AS-IPTV—**Provides the ability to selectively impair I, P and/or B Frames over H.262 or H.264 streams
- **AS-TIA-921—**Provides TIA-921/ITU-T G.1050 Network Impairment Models
- **AS-DSF—**Dynamically search through entire TCP/UDP payload for a user-defined string pattern to trigger impairments. Up to 8 strings each up to 8 bytes can be defined within each GEM network profile.
- **AS-DSX—**Provides extended delay at less than full line rate; max delay bank is up to 12sec or 6x the standard delay

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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