Overview

The AX/4000 Broadband WAN Emulator simulates a communications link for testing hardware and software performance at OC-3c and OC-12c rates. This option reproduces defined error conditions and supports stress testing and performance optimization for the device under test (DUT) in a controlled lab environment.

Configuration

The simulated link can be configured to include impairments such as errors, delays, and dropout events. Impairments are applied to the Layer 1 SONET payload but not the overhead. The payload impairments can be applied across IP, ATM, and Frame Relay technologies.

Many different types of hardware configurations are possible to create a wide variety of testing scenarios. A basic hardware configuration uses an AX/4000 WAN Emulator to apply impairments to traffic received from a switch and then to route the traffic to the device under test to evaluate performance in a non-ideal environment.

Another hardware configuration uses one AX/4000 chassis with two generator modules to generate errored traffic to the DUT. In this case, one module creates the traffic and one is enabled as a WAN emulator to apply impairments to the traffic before it is transmitted to the DUT. This type of simulation can be used to perform repeatable DUT measurements with user-defined traffic source conditions in a non-ideal environment.

In either case, the WAN Emulator can simulate real-world link conditions, such as delays created when switching to a backup link and errors introduced into the data stream during times of severe weather conditions, such as extreme storms or solar flare-ups.

A bi-directional WAN Emulator configuration might be used to test two pieces of WAN equipment, such as two edge routers. Traffic from the first DUT could be errored through the first WAN Emulator to the second DUT. Return traffic from DUT 2 to DUT 1 can be impaired with the second Broadband WAN Emulator. In this case, testing characterizes how the routers contend with differing errored or delayed traffic in each direction.

Another test scenario is injecting errors in a data stream to evaluate how applications in a distributed environment perform when data link delays and errors are introduced. The dropout impairment might be used to simulate a catastrophic event, such as when a link goes down.

Several WAN Emulators can be connected in series to further increase delays.

System Requirements

The WAN Emulator works with the AX/4000 mAX generator module and is offered in uni-directional or bi-directional packages, or as a technology license upgrade to an existing mAX generator or mAX generator/analyzer.
Specifications

System Requirements
- Requires one AX/4000 chassis, generator module, and port interface, plus the WAN Emulator technology license (P/N 401600)

Chassis Supported
- 16-slot mainframe chassis
- 4-slot portable chassis

Port Interfaces Supported
- AX/4000 mAX IP PoS/ATM/FR OC-12c/OC-3c/STM-4c/STM-1 Single Mode Interface (P/N 401382)
- AX/4000 mAX IP PoS/ATM/FR OC-12c/OC-3c/STM-4c/STM-1 Multimode Interface (P/N 401383)
- AX/4000 mAX IP PoS/ATM/FR OC-3c Single Mode Interface (P/N 401384)
- AX/4000 mAX IP Pos/ATM/FR OC-3c Multimode Interface (P/N 401385)

Generator Modules Supported
- AX/4000 mAX 1 Gbps Generator/Analyzer Test Module (P/N 401400H)

Delay
- 896 millisecond at OC-3c speeds with 16 MB standard memory (6.58 microsecond increments)
- 3.584 seconds at OC-3c speeds with 64 MB optional memory (6.58 microsecond increments)
- 224 milliseconds at OC-12c speeds with 16 MB standard memory (1.65 microsecond increments)
- 896 milliseconds at OC-12c speeds with 64 MB optional memory (1.65 microsecond increments)

Bit Error Injection
- Random bit error injection from (1 x 10^-4) to (1 x 10^-12) errors per bit

_dropout
- Mode-Manual, random, periodic
- Rate in bytes per second, millisecond, and microsecond
- Duration-Fixed or random in bytes, seconds, milliseconds, or microseconds
- Specify replacement byte value (replacement byte applies to 4 consecutive bytes)

Configurations
- Uni-directional per port
- Bi-directional support (2 port configuration)
- Test automation: Supports Tcl/C Library functions

Options
- 1 Gbps Generator/Analyzer Test Module (P/N 401400H)

Contact Spirent Communications for a current list of Technology Licenses available to support generation and analysis of IP, ATM, and Frame Relay.

Ordering Information
AX/4000 Broadband WAN Emulator (P/N 401600)

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