



## 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
- Full 100% line rate support
- Allows for dynamically changing impairment profiles
- Field programmable architecture protects investment
- Multi protocol support (SONET, SDH, Fibre Channel and Ethernet)

## Applications

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

## Ordering Information

### CKL-2U

Rack mountable chassis – uni- or bi-directional emulation support

### M1, H10

Network Emulator Hardware Blade  
M1 supports to 2.6Gbps, H10 to 11.3Gbps

### FC10

10 Gigabit Fibre Channel Network Emulator

### FC10F

10 Gigabit Fibre Channel Network Emulator for 10G FC with FEC at 11.3168Gbps

### FC8

8 Gigabit Fibre Channel Network Emulator

### FC124

Fibre Channel 1, 2 and 4 Gigabit Network Emulator

### FC

Fibre Channel 1 and 2 Gigabit Network Emulator

### SW1

1 year Software Maintenance Agreement

Note: up to 7 emulator loads including Gigabit Ethernet and SONET/SDH may be combined onto one platform. Contact Anue for details.

## Fibre Channel Network Emulators

### *Delay and Impairment Emulation for 1, 2, 4, 8 and 10 Gigabit Fibre Channel*



## Overview

Fibre Channel Network Emulators are precision test instruments for 1, 2, 4, 8 or 10 Gigabit Fibre Channel testing. The Emulators allow users to accurately simulate the delays and impairments that occur over live production Fibre Channel Networks for validating and evaluating new hardware or software products and technologies in a controlled lab environment.

## Highlights

- 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
- Multi protocol 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.

## Primary Applications

- Performance testing of Critical Applications over Fibre Channel interconnected SANs
- Validate of Disaster Recovery and Storage Extension Solutions
- Evaluate of Data Center Migration plans safely
- Real world Interop and Customer Proof of Concept testing



## Features

### Delay

- Emulate 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 250 ms (50,000km) in each direction with 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 10.51875 Gbps 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 10.51875 Gbps rate
- Delay “Doubler” and “Quadrupler” are available to extend maximum delay capability

### BER

- Capable of injecting bit-errors at 10<sup>-1</sup> to 10<sup>-10</sup> 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

*Note: Drop is not supported in 8 & 10Gbps modules*

### Impairments

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

### User Interface

- Remote monitoring & control via RJ45 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



### Statistics/Alarms

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

### Options

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

## Specifications

### Optics

- Fibre Channel Emulators provide support for 1.0625 Gbps, 2.125 Gbps, 4.250 Gbps, 8.5 Gbps, 10.51875 Gbps and 11.3168 Gbps (1x,2x, 4x, 8x, 10x Fibre Channel) Data Rates
- 850 nm hot-pluggable SFP Transceiver MSA compliant (SM and MM 1310 nm and SM 1550 nm optics available) with LC connectors for interfaces up to 4.250 Gbps
  - Average Launch Power: -9 to -2.5 dBm (850nm)
  - Center Wavelength is 830 to 860 nm
  - Maximum Receiver Sensitivity is -15 dBm
- 1310 nm hot-pluggable XFP Transceiver MSA compliant (Single Mode 1550nm optics available) with LC connectors for 8 and 10Gig interfaces.
- Supports distances of up to 10 km on 9/125um optical fiber at 1310nm, and 550 m on 50/125um fiber at 850nm
- Launch Power: -6.0 to -1.0 dBm (1310nm)
- Center Wavelength is 1290nm to 1360nm
- Receiver Sensitivity is -13.4 dBm to 0.5 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 in inches: 2U bi-directional chassis = 17.3W x 12L x 3.5H
- Weight: 2U chassis = 6.0 kg (13lb, 3oz)