

# Network Emulator II™ — Fibre Channel

## Fibre Channel Emulation

### Problem: Knowing How Fibre Channel Networks Will Behave Under Worst-Case Conditions

Today's Fibre Channel networks are complex and require testing that reflects the conditions found in a real world network. The only way to bring this real world realism into the testing lab is to add network emulation to the test environment.

### Solution: 16, 8, 4, and 2 Gigabit Fibre Channel Delay and Impairment Emulation

Ixia's Network Emulator II is a precision test instrument for 16, 8, 4, and 2 Gigabit Fibre Channel testing. The device allows users to accurately emulate the delays and impairments that occur over live production Fibre Channel networks to validate and evaluate performance of new hardware or software products and technologies in a controlled lab environment.

### Highlights

- Enables validation, performance, and interoperability testing of systems under real-world conditions, with reproducible results
- 16G Fibre Channel
- Provides realistic problem replication for troubleshooting
- Improves proof of concept (PoC) testing and customer demonstration



## Key Features

- Industry's first 16 Gigabit Fibre Channel emulator
- True 100% line rate support for 16G, 8G, 4G, and 2G Fibre Channel
- Single hardware platform for all Fibre Channel speeds 16/8/4/2G
- Field-programmable gate array (FPGA) hardware-based architecture provides maximum precision and accuracy
- Precisely emulates delays that occur over Fibre Channel networks
- 8 base-speed ports or 4 high-speed ports
- Dynamically increase impairments to test failure recovery mechanisms
- Transparent to any higher-layer protocols above Fibre Channel
- Test automation via RESTful Web application programming interface (API), allowing control by tool command language (TCL) and other languages
- Provides realistic problem replication for troubleshooting

## Primary Use Cases

- Performance testing of critical applications over Fibre Channel
- Validate disaster recovery and storage extension solutions
- Interconnected SANs
- Evaluate data center migration plans safely
- Real-world interoperability and customer proof-of-concept (POC) testing

## Applications

- Business continuity
- Disaster recovery
- Server consolidation and migration
- Storage extension
- Software application performance testing
- Interoperability testing
- Customer PoC
- SLA emulation
- Corporate LAN/WAN emulation

## Network Emulator Fibre Channel Specifications

Feature	Details																												
<b>Ports</b>	<ul style="list-style-type: none"> <li>• 8 FPGA ports total, divided into two banks</li> <li>• 4 high-speed-capable ports (16G &amp; 8G) (Ports pairs A &amp; C)</li> <li>• 8 base-speed-capable ports (4G &amp; 2G)</li> <li>• Base-speed 4G and 2G may be mixed within a single bank</li> <li>• License only what is needed, allowing for efficient cost</li> </ul> <p>Note: Each line to be impaired requires 2 ports</p>																												
<b>Delay</b>	<ul style="list-style-type: none"> <li>• Emulate delay occurring during transmission of 16G, 8G, 4G, 2G Fibre Channel data through a network</li> <li>• Fully transparent pass-through operation: delayed output is logically identical to input signal</li> <li>• No modification of transmitted code words</li> <li>• Inter-frame gap (idle fill characters) unchanged</li> <li>• Timing transparency: Tx clock of partner port is identical to Rx clock of source port</li> </ul> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr style="background-color: #800000; color: white;"> <th></th> <th>16G</th> <th>8G</th> <th>4G</th> <th>2G</th> </tr> </thead> <tbody> <tr> <td>Max Delay</td> <td>1s</td> <td>1s</td> <td>1s</td> <td>1s</td> </tr> <tr> <td>Minimum Configurable Delay</td> <td>10µs</td> <td>10µs</td> <td>10µs</td> <td>10µs</td> </tr> <tr> <td>Maximum Intrinsic Delay Without Impairments On</td> <td>.6µs</td> <td>.6µs</td> <td>1µs</td> <td>2µs</td> </tr> <tr> <td>Resolution (Min Delay Increment)</td> <td>4.7ns</td> <td>9.4ns</td> <td>18.8ns</td> <td>37.6ns</td> </tr> </tbody> </table> <p>Note: Delay specifications subject to change</p>					16G	8G	4G	2G	Max Delay	1s	1s	1s	1s	Minimum Configurable Delay	10µs	10µs	10µs	10µs	Maximum Intrinsic Delay Without Impairments On	.6µs	.6µs	1µs	2µs	Resolution (Min Delay Increment)	4.7ns	9.4ns	18.8ns	37.6ns
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<b>BER</b>	<ul style="list-style-type: none"> <li>• Capable of injecting bit-errors at rates <math>10^{-3}</math> to <math>5 \times 10^{-17}</math>, which allow errors from one in every 1000 bits to once every several years</li> <li>• Error distributions of periodic, uniform, Gaussian, and Poisson</li> <li>• 1-bit to 64K-bit error burst – invert, PRBS, all ones, or all zeros</li> <li>• Bit errors can be injected into packets and control data</li> </ul>																												
<b>Frame Drop</b>	<ul style="list-style-type: none"> <li>• Generates Frame Drop – from every frame to one in every 65,535 frames</li> <li>• Allows dropped frames to be replaced with idles</li> <li>• Distribution sequences include Periodic, Poisson, Uniform, or Gaussian</li> <li>• User-configurable by specification of burst length and interval</li> </ul>																												

Feature	Details
<b>Impairments</b>	<ul style="list-style-type: none"> <li>• Emulate loss of signal, loss of frame under user, or program control</li> </ul>
<b>User Interface</b>	<ul style="list-style-type: none"> <li>• Remote monitoring and control via RJ45 Ethernet</li> <li>• Intuitive and interactive web graphical user interface (GUI)</li> <li>• RESTful API allows test automation</li> <li>• The following browsers and versions are supported <ul style="list-style-type: none"> <li>◦ Internet Explorer 9 or newer</li> <li>◦ Mozilla Firefox 24 or newer</li> </ul> </li> </ul>
<b>Chassis</b>	<ul style="list-style-type: none"> <li>• 1U rack mountable</li> <li>• Dimensions: 1U, 1.73 x 17.3 x 10 inches</li> <li>• Thermal <ul style="list-style-type: none"> <li>◦ Operating temperature: 0°C to 40°C</li> <li>◦ Operating humidity: 10% to 85% (RH), non-condensing</li> <li>◦ Storage temperature: -40°C to 70°C</li> <li>◦ Storage humidity: 5% to 95% (RH), non-condensing</li> </ul> </li> <li>• Input power (internal AC/DC converter) <ul style="list-style-type: none"> <li>◦ Input voltage: 100-240VAC</li> <li>◦ Input frequency: 47-63Hz</li> </ul> </li> <li>• Max. power consumption: 175W</li> </ul>
<b>Statistics</b>	<ul style="list-style-type: none"> <li>• Rx/Tx Frames</li> <li>• Rx/Tx Bytes</li> <li>• Rx/Tx CRC Errors</li> <li>• Dropped Frames/Bytes</li> <li>• BER Bits Selected</li> <li>• BER Bits Changed</li> </ul>

## Product Ordering Information

Part Number	Description
<b>946-0070</b>	NETWORK EMULATOR II: Rack mountable 1U 8 port emulator
<b>930-2720</b>	NETWORK EMULATOR II: FIBRE CHANNEL 16/8/4/2 NETWORK EMULATOR Software Bundle and 4 high Speed and 8 Base Speed Port Licenses
<b>930-2721</b>	NETWORK EMULATOR II: FIBRE CHANNEL 16/8/4/2 NETWORK EMULATOR Software Bundle and 2 high Speed and 4 Base Speed Port Licenses
<b>930-2722</b>	NETWORK EMULATOR II: FIBRE CHANNEL 16/8/4/2 NETWORK EMULATOR Software Bundle and 2 high Speed and 4 Base Speed Port License Upgrade

Fibre Channel Transceivers	16G	8G	4G	2G	Mode/nm
<b>958-0046</b>	✓	✓	✓		Multi/850
<b>948-0021</b>		✓	✓	✓	Single/1310
<b>948-0020</b>		✓	✓	✓	Multi/850

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