# Xena 10/40/100G

## Gigabit Ethernet Test Modules

Product Order Numbers

| | | |
|---|---|---|
| 100G | XenaCompact:<br>XenaBay: | **C1-M1CFP100**<br>**M1CFP100** |
| 40G | XenaCompact:<br>XenaBay: | **C1-M2CFP40**<br>**M2CFP40** |

**TOP FEATURES**

- Unique tri-speed feature
- Price/performance
- Ease of use
- Free software (incl. XenaManager GUI, XenaIntegrator, XenaScripting, Xena2544, Xena1564, Xena3918, and Xena2889)
- Free 12-month hardware warranty
- 36 months free software updates
- Free tech support product lifetime

Xena Networks offers the first "tri-speed" 10/40/100G test module for our XenaCompact and XenaBay chassis. This module delivers a breakthrough price/performance benchmark for BERT, load-stress, and functional testing of Ethernet equipment and network infrastructure.


## Features and Benefits

- Wire-speed hardware based traffic generation and analysis with full-line-rate Ethernet and IP packet generation at over 148 million packets per second
- Compatible with 10, 40 and 100G CFP-MSA compliant transceiver modules, and 100G CXP and 40G QSFP using MPO connectors
- For lab testing, pre-staging, field trials and early deployments, and applications where wire-speed testing, portability, and ease of use are required
- Stream-based layer 2-3 traffic load generation for millions of flows, and for assessing layer 2-3 performance of 10, 40 and 100 Gbit/s Ethernet equipment and services
- BERT functionality for verifying the integrity of 100 Gbit/s and 40 Gbit/s Ethernet running on WDM networks, at L2-3
- High-precision measurement of throughput, latency, loss, data integrity, inter-arrival time, sequence and mis-ordering errors
- Wire-speed traffic capture with programmable filter and trigger criteria, and export to industry standard tool WireShark
- Ability to adjust the parts per million Tx frequency over a range of +/-400 ppm
- Free software includes XenaManager GUI, XenaScripting, Xena2544, Xena1564 and RFC 2889 test suites
- Available for the XenaCompact chassis and as a 2-slot test module for the 12-slot XenaBay chassis for larger 40/100G port-counts

# Xena 10/40/100G

## Gigabit Ethernet Test Module

Xena Networks' unique 10/40/100G test modules are aimed at the rapidly increasing number of carriers, enterprises and research departments currently ramping up to deploy 40 and 100 Gigabit Ethernet.

They are available in two variants:

1. The **C1-M1CFP100** provides one 100 Gbps, two 40 Gbps test ports or eight 10 Gbps test ports
2. The **C1-M2CFP40** provides two 2 ports of 40-GigE 40GBASE-LR4/SR4, or eight ports of 10-GigE 10GBASE-SR

Like Xena's existing range of gigabit Ethernet test modules, the new tri-speed modules provide a comprehensive suite of test features for Layer 2 and Layer 3, including protocol testing, capture, histograms, service disruption measurements, multi-stream Ethernet generation & test and RFC 2544 and RFC 2889 benchmarking. This is augmented with 40/100G-specific features such as virtual lane swapping, skewing and PRBS testing.

The 10/40/100G Ethernet test module supports 10, 40 and 100 Gbps CFP MSA transceivers, as well as CFP compatible transceivers with CXP and QSFP MPO connector interfaces.

Full-line-rate testing of Layer 2-3 performance of 10, 40 and 100 Gbit/s Ethernet links is provided. The high precision, stream based, Layer 2-3 wire-speed traffic generation and analysis capabilities are suited for testing of network devices under deliberate error, stress, and random conditions. Packet formats can be defined per individual packet byte, and packet spacing, transmission rates, and bursts can be defined with byte and kbps accuracy.

Ethernet is increasingly carried across a variety of layer 1 media over longer distances, which creates a need for the characterization of Ethernet transport on a bit-per-bit basis. The bit-error-rate testing (BERT) function uses a pseudo-random binary sequence (PRBS) encapsulated into an Ethernet frame, making it possible to go from a frame-based error measurement to a bit-error-rate measurement. This provides the bit-per-bit error count accuracy required for the characterization and acceptance testing of physical-medium transport systems such as Ethernet-over-DWDM.

A free Windows GUI client called XenaManager is provided for test execution, and remote management of test equipment located in multiple locations. XenaScripting is an open TCP/IP based text API called lets users automate testing from any software environment, using TCP/Python/VB/Java wrappers to convert to/from the generic Xena TCP/IP scripting format.

The feature set of the 10/40/100G test modules is compatible with the feature set of Xena's other 10 Gbps and 10/100/1000M Ethernet test modules.

### XenaCompact Chassis

*Xena's 40/100G solutions are available for the XenaCompact chassis - a robust, transportable 1U chassis.*

### XenaBay Chassis

*Xena's 40/100G solutions can also be installed in our 12-slot 4U XenaBay chassis.*

### XenaManager GUI


*Every Xena solution includes free management software, free upgrades for 3 years, free tech support for the product lifetime and a free 12-month hardware warranty.*

# SPECIFICATIONS

| PORT LEVEL FEATURES | 100G | 40G |
|---|---|---|
| Product Order Numbers | XenaCompact: **C1-M1CFP100**<br>XenaBay: **M1CFP100** | XenaCompact: **C1-M2CFP40**<br>XenaBay: **M2CFP40** |
| Interface category | 100G, 40G, and 10G Ethernet | |
| Number of test ports (software configurable) | 1 x 100G / 2 x 40G / 8 x 10G | 2 x 40G / 8 x 10G |
| Interface options | • 1 x 100GBASE-LR4<br>• 1 x 40GBASE-LR4<br>• 1 x 100GBASE-SR10 [1]<br>• 2 x 40GBASE-SR4 [1]<br>• 8 x 10GBASE-SR [1] | • 1 x 40GBASE-LR4<br>• 2 x 40GBASE-SR4 [1]<br>• 8 x 10GBASE-SR [1] |
| Number of transceiver module cages | 1 x CFP | |
| Port statistics [2] | Link state, FCS errors, pause frames, ARP/PING, error injections, training packet<br>All traffic: RX and TX Mbit/s, packets/s, packets, bytes<br>Traffic w/o test payload: RX and TX Mbit/s, packets/s, packets, bytes | |
| Adjustable Inter Frame Gap (IFG) | Configurable from 16 to 56 bytes, default is 20B (12B IFG + 8B preamble) | |
| Transmit line rate adjustment | Ability to adjust the effective line rate by forcing idle gaps equivalent to -1000 ppm (increments of 10 ppm) | |
| Transmit line clock adjustment | From -400 to 400 ppm in steps of 0.001 ppm (shared across all ports) | |
| ARP/PING | Supported (configurable IP and MAC address per port) | |
| Field upgradeable | System is fully field upgradeable to product releases (FPGA images and Software) | |
| Tx disable | Enable/disable of optical laser or copper link | |
| IGMPv2 multicast join/leave | IGMPv2 continuous multicast join, with configurable repeat interval | |
| Histogram statistics [2] | Two real-time histograms per port. Each histogram can measure one of RX/TX packet length, IFG, or Latency distribution for all traffic, a specific stream, or a filter | |
| Loopback modes | • L1RX2TX (RX-to-TX, transmit byte-by-byte copy of the incoming packet)<br>• L2RX2TX (RX-to-TX, swap source and destination MAC addresses)<br>• L3RX2TX (RX-to-TX, swap source and destination MAC addresses and IP addresses)<br>• TXON2RX (TX-to-RX, packet is also transmitted from the port)<br>• TXOFF2RX (TX-to-RX, port's transmitter is idle) | |
| Oscillator characteristics | • Initial Accuracy is 3 ppm<br>• Frequency drift over 1st year: +/- 3 ppm (over 15 years: +/- 15 ppm)<br>• Temperature Stability: +/- 20 ppm (Total Stability is +/- 35 ppm) | |

| TRANSMIT ENGINES | |
|---|---|
| Number of transmit streams per port | 64 (wire-speed) |
| | Each stream can generate millions of traffic flows through the use of field modifiers |
| Test payload insertion per stream | Wire-speed packet generation with timestamps, sequence numbers, and data integrity signature optionally inserted into each packet. |
| Stream statistics [2] | TX Mbit/s, packets/s, packets, bytes, FCS error, Pause |
| Bandwidth profiles | Burst size and density can be specified. Uniform and bursty bandwidth profile streams can be interleaved |
| Field modifiers | 16-bit header field modifiers with inc, dec, or random mode. Each modifier has configurable bit-mask, repetition, min, max, and step parameters. 2 modifiers per stream |
| Packet length controls | Fixed, random, butterfly, and incrementing packet length distributions. Packet length from 56 to 9200 bytes |
| Packet payloads | Repeated user specified 1 to 18B pattern, a 8-bit incrementing pattern |
| Error generation | Undersize length (56B min) and oversize length (9200 max.) packet lengths, injection of sequence, misorder, payload integrity, and FCS errors |
| TX packet header support and RX autodecodes | Ethernet, Ethernet II, VLAN, ARP, IPv4, IPv6, UDP, TCP, LLC, SNAP, GTP, ICMP, RTP, RTCP, STP, MPLS, PBB, or fully specified by user |
| Packet scheduling modes | • Normal (stream interleaved mode). Standard scheduling mode, precise rates, minor variation in packet inter-frame gap.<br>• Strict Uniform. New scheduling mode, with 100% uniform packet inter-frame gap, minor deviation from configured rates<br>• Sequential packet scheduling (sequential stream scheduling). Streams are scheduled continuously in sequential order, with configurable number of packets per stream |

## RECEIVE ENGINE

| | |
|---|---|
| Number of traceable Rx streams per port | 480 (wire-speed) |
| Automatic detection of test payload for received packets | Real-time reporting of statistics and latency, loss, payload integrity, sequence error, and misorder error checking |
| Jitter measurement | Jitter (Packet Delay Variation) measurements compliant to MEF10 standard with 8 ns accuracy |
| Stream statistics [2)] | • RX Mbit/s, packets/s, packets, bytes.<br>• Loss, payload integrity errors, sequence errors, misorder errors<br>• Min latency, max latency, average latency<br>• Min jitter, max jitter, average jitter |
| Latency measurements accuracy | ±16 ns |
| Latency measurement resolution | 8 ns *(Latency measurements can calibrate and remove latency from transceiver modules)* |
| Number of filters: | • 4 x 64-bit user-definable match-term patterns with mask, and offset<br>• 4 x frame length comparator terms (longer, shorter)<br>• 4 x user-defined filters expressed from AND/OR'ing of the match and length terms. |
| Filter statistics [2)] | Per filter: RX Mbit/s, packets/s, packets, bytes. |

## CAPTURE

| | |
|---|---|
| Capture criteria | All traffic, stream, FCS errors, filter match, or traffic without test payloads |
| Capture start/stop triggers | Capture start and stop trigger: none, FCS error, filter match |
| Capture limit per packet | 16 – 9200 bytes |
| Wire-speed capture buffer per port | 256 kB |
| Low speed capture buffer per port (10Mbit/s speed) | 4096 packets (any size) |

## 100/40G FRAMED BERT AND PCS LAYERS

| | |
|---|---|
| Payload Test pattern | PRBS 2^31 |
| Error Injection | Manual single shot bit-errors or bursts, automatic continuous error injection |
| Frame size and header | Fixed size from 56 to 9200 bytes, any layer 2/3/4 frame header |
| Alarms | Pattern loss, bit-error rate threshold |
| Error analysis | bit-errors: seconds, count, rate<br>mismatch '0' / '1': seconds, count, rate<br>logging and analysis of bit-error event timing |
| PCS virtual lane configuration | User defined skew insertion per Tx virtual lane, and user defined virtual lane to SerDes mapping for testing of the Rx PCS virtual lane re-order function. |
| PCS virtual lane statistics | Relative virtual lane skew measurement (up to 2048 bits), sync header and PCS lane marker error counters, indicators for loss of sync header and lane marker, BIP8 errors |
| PCB Tx line clock adjustment (FCO) | Ability to adjust the parts per million (ppm) Tx frequency over a range of -400 to +400 ppm |

1) Requires Reflex Photonics CFP 100GBASE-SR10 Parallel Optical Module
2) Counter size: 64 bits

### PHYSICAL

1U XenaCompact
- W: 19″ (48.26 cm)
- H: 1.75″ (4.45 cm)
- D: 9.8″ (25 cm)
- Weight: 10 lbs (4.5 kg)

4U XenaBay
- W: 19″ (48.26 cm)
- H: 7″ (17.78 cm)
- D: 19.7″ (50 cm)
- Weight: 36.4 lbs (16.5 kg)

### ENVIRONMENTAL
- Operating Temperature: 10 to 35° C
- Storage Temperature: -40 to 70° C
- Humidity: 8% to 90% non-condensing

### POWER
- AC Voltage: 100-240V
- Frequency: 50-60Hz
- Max. Power: 30W for M1CFP100 (90W XenaCompact / 120W XenaBay)
- Max. Current: 0.8A with 120V supply, and 0.4A with 240V supply

### REGULATORY
FCC (US), CE (Europe)



*Xena Networks is an award-winning manufacturer of advanced Gigabit Ethernet test and measurement solutions.*

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