



# MPX100

## Intelligent Ethernet Test Probe

**2008 Global Test & Measurement  
Emerging Company of the Year Award**

### Next Generation of Metro and Carrier Ethernet Testing System

VeEX™ MPX100 Metro Probe Expert system is the next generation of Metro and Carrier Ethernet test system for Ethernet Networks carrying Voice, Data and Video. The MPX100 probes are deployed at strategic network demarcations or customer locations where network service and performance assurance are critical. MPX100s are remote controlled via internet connection to the ReVeal MPX server to perform loopbacks, scheduled or on-demand point to point measurements, and in service monitoring. The MPX100 works with the VePAL MX100 and MX120 Handheld Ethernet Test Set for loopback control and on-demand point to point testing.

### Key Features

- All-in-one Ethernet, Gigabit Ethernet, and Fiber Channel testing
- Throughput, latency, frame loss, and back-to-back RFC 2544 measurements
- RFC 2544 Asymmetric mode for testing over asymmetric services like ADSL
- User defined thresholds for accurate SLA assurance
- Ethernet BER testing at layer 1, 2, 3, and 4, with or without VLAN and MPLS tags
- Fiber Channel FC-1 and FC-2 BERT with buffer-to-buffer credit and header configuration
- Multiple stream generation and analysis for QoS verification of multiple services
- Traffic Flooding feature for stress testing applications
- Q-in-Q VLAN stacking capability with up to three VLAN tags
- MPLS stacking capability with up to three MPLS labels
- Smart Loop mode for layer 1, 2, 3, and 4
- VLAN scan feature and traffic monitor for VLAN configuration verification and top bandwidth users visibility
- IEEE 802.3ah OAM device discovery and loopback control support
- Intelligent device discovery mode; discover other MPX100, MX100 and MX120 on the network for quick and easy loopback control or asymmetric mode control
- Remote control through dedicated 10/100-T Ethernet port
- RS232C supervisor port for MPX100 configuration

### ReVeal MPX Server

- Remote control of MPX100 for on-demand measurement, loopback control, and in-service monitoring
- Programmable scheduled measurement
- Test profiles and scripts for automated testing
- Test results saving for future analysis and customized reporting generation
- Simultaneous control of multiple MPX100s
- In-service monitoring with user programmable alarm thresholds
- Alarm detection and generation by sending emails to maintenance staff

## Product Features

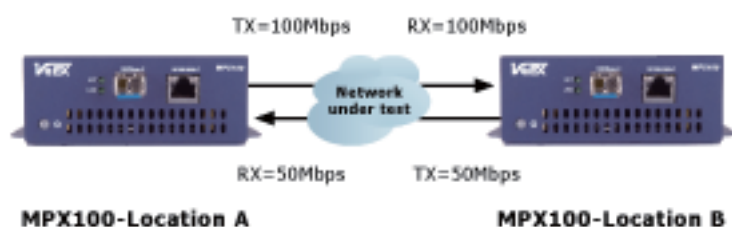
### Intelligent Network/Device Discovery

Easily discover and select another MX100 on the network under test for loopback testing applications. The local device will control the operation of the far end device, in either loopback or peer-to-peer mode (or symmetrical or asymmetrical traffic generation mode). This feature greatly simplifies field testing since there is no need for a second technician to be at the far end configuring the test partner device.

### RFC2544 Compliance Testing

Perform the RFC 2544 automated test suite at all recommended frame sizes including user configurable frame sizes and up to full line rate. The test suite can also be performed with the far end test partner in loopback mode or peer-to-peer mode – the latter allowing for symmetrical/asymmetrical testing. Thresholds may be configured for accurate SLA assurance and verification. The automated tests supported are throughput, latency, frame Loss, and back-to-back frames.

### RFC 2544 Asymmetric Mode



The RFC 2544 Asymmetric mode testing is a key feature when testing Ethernet services that are asymmetric in nature. An example of an asymmetric test scenario is testing Ethernet over WiMAX and DSL services where the downstream and upstream rates can be different. The MPX100 RFC2544 Asymmetric mode allows the user to configure different upstream and downstream rates for the RFC 2544 Throughput, Frame Loss, and Back-to-back frames tests.

### BERT

Layer 1, layer 2, and layer 3 BER testing is supported. The BER test can be configured to use either regular PRBS test patterns, stress patterns (specifically for Gigabit Ethernet) or user defined test patterns to simulate various conditions. All patterns are encapsulated into an Ethernet frame to verify bit-per-bit performance of an Ethernet circuit.

### Multiple Streams Generation

Up to 8 traffic streams can be independently configured with CoS (VLAN priority) and QoS (TOS/DSCP) prioritization. This traffic feature, simulates multiple service conditions (e.g. Triple Play), and facilitates end-to-end QoS performance verification.

### Q-in-Q

For Metro and Carrier Ethernet applications VLAN stacking or Q-in-Q is supported. This feature makes provision for carrier/service provider assigned VLAN, but also retains the VLAN of customer traffic.

### Delay and Jitter Measurements

Frame Delay and Frame Delay Variation - Jitter measurements are performed on the test traffic during BER Tests or Throughput Tests.

### Smart Loopbacks

Three modes are available for looping back test traffic; layer 1, layer 2, and layer 3 mode. At layer 1 all incoming traffic is looped back unaltered. For layer 2, all incoming unicast traffic is looped back with the MAC source and destination addresses swapped. For layer 3, all incoming unicast traffic is looped back with MAC and IP source and destination addresses swapped.

### VLAN Scan and Traffic Monitor

Scan up to 4k VLAN IDs for switch configuration verification. Verify which VLAN IDs are the top bandwidth users and monitor up to 8 live traffic streams (in terminated mode).

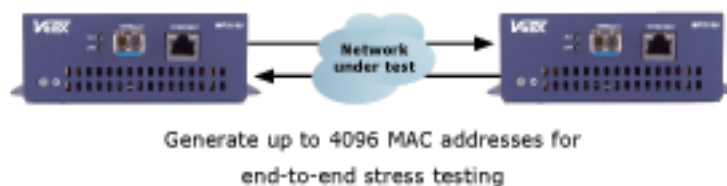
### IEEE 802.3ah OAM Support

Ethernet in the first mile (EFM) OAM discovery and loopback controls are supported. This feature allows for the discovery of IEEE 802.3ah OAM-enabled devices and the ability to loopback these devices.

### Fibre Channel Testing\*\*

The Fibre Channel Test Suite option for the MX100 Metro Expert allows for the testing of 1.0625 Gbps and 2.125 Gbps Fibre Channel point-to-point topology networks. Refer to the Fibre Channel Test Suite data sheet for more details.

### Traffic Flooding Application

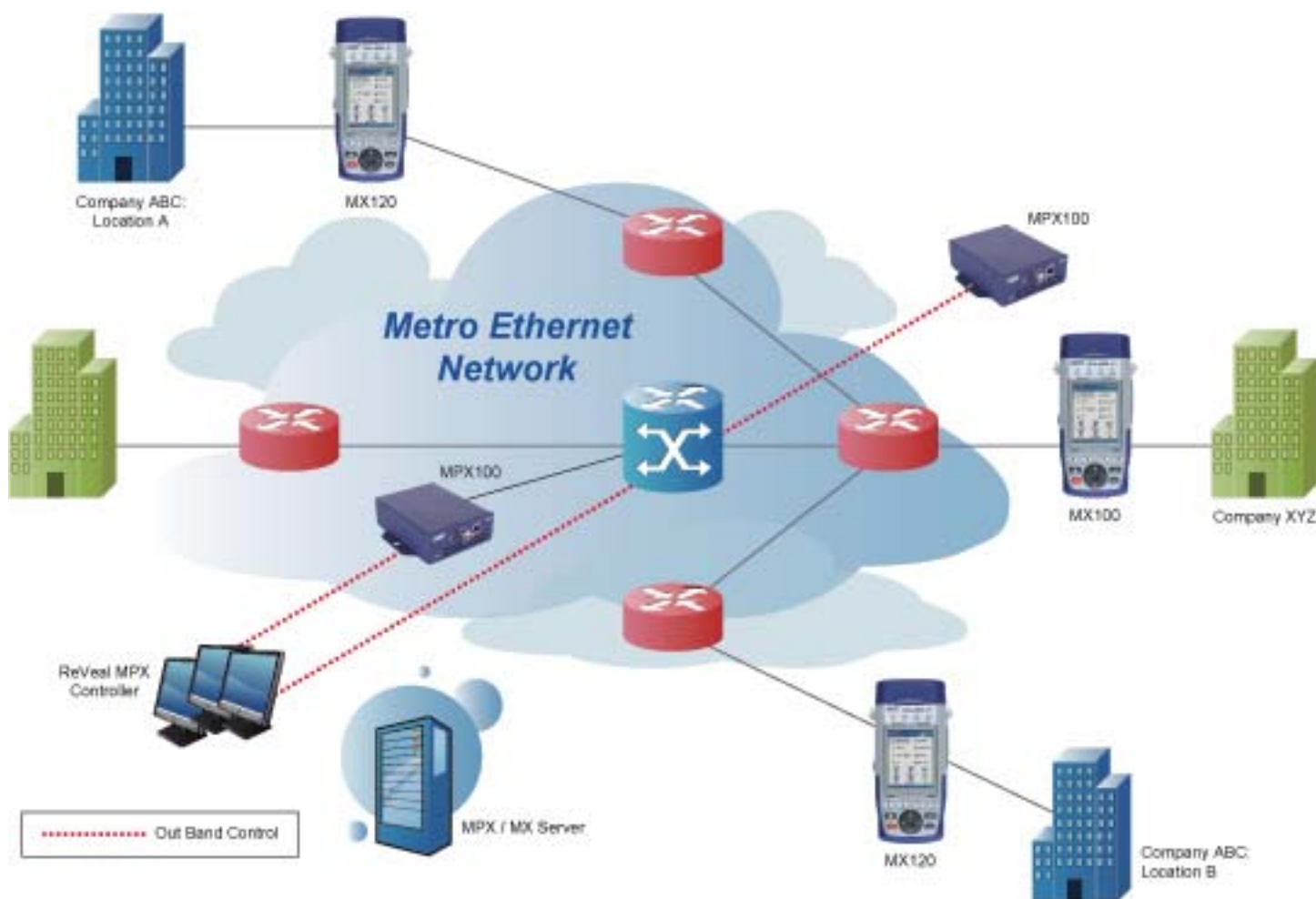


The Traffic Flooding feature allows the user to simulate several clients connected to a network or switch by generating up to 4096 MAC addresses. This feature allows for the verification of network/switch performance under stressed conditions. If the network cannot handle the number of clients simulated the end-to-end performance will be affected and noticed in the Ethernet frame statistics of the test sets and in the MAC table of the switches.

## Applications

### Carrier Ethernet Distributed Test System Application

When the MPX100 Intelligent Ethernet Probe solution is combined with the handheld MX100 and MX120 models, a complete end-to-end and distributed test solution becomes available 24/7/365 for on demand testing and troubleshooting. One or multiple MPX100s can be controlled from the same MPX Controller to test from one MPX in the network to another, or to test from the MPX100 to a MX100 or MX120 in the field.



### End-to-End Performance Testing

Irrespective of the Ethernet service being installed, it is always necessary to verify that the network can handle the allocated bandwidth required by the customer. Service Level Agreements (SLA) require Service Providers to measure network throughput and other performance characteristics to ensure that bandwidth associated with the types of service conform to customer expectations.

### BER Testing

One traffic stream is transmitted across the network under test. Bit-per-bit error checking is performed on the received traffic. Service disruption measurements as well as CRC error checking are also performed. The BER test can be performed with a physical loop (or plug) at the far end (for a layer 1 circuit), or a second test unit in Smart Loop mode or in Peer-to-Peer mode.

### RFC 2544

A single destination stream is configured with up to 9 different frame sizes for the four recommended tests: throughput, latency, frame loss, and back-to-back. Threshold values and maximum bandwidth settings are user configurable; this allows for fine SLA verification control. The RFC 2544 test suite can be performed with a second test unit at the far end in Smart Loop mode or Peer-to-Peer mode for asymmetric testing.

### Multiple Streams Generation–Throughput Test

Up to 8 independently configured streams with CoS (VLAN priority) and QoS (TOS/DSCP) settings may be configured for end-to-end QoS verification. Data rate, frame loss, delay, and CRC error checking are performed on each individual stream. The multiple stream throughput test may be performed with a second test unit at the far end in Smart Loop mode or Peer-to-Peer mode.

### Network Troubleshooting

Service providers constantly face the hard challenge of troubleshooting poor or unsatisfactory network performance. In these circumstances for example, the service provider must determine whether the poor performance is associated with its own or the customer network. Network monitoring tools like VLAN scan and traffic monitoring play an important role in this troubleshooting process.

### ReVeal MPX Server

- Test Profile
- Programmable Scheduled Test
- On-demand measurement
- Alarm Detection and Generation

# Specifications

## Electrical Ethernet Interfaces

Single 10/100/1000Base-T Port

RJ45 connector

IEEE 802.3 compliant

## Optical Ethernet Interfaces

Single 1000Base-X SFP Port

SFP, LC connector

### 1000Base-SX

Wavelength, 850nm

TX level: -9 to -3 dBm

RX level sensitivity: -20 dBm

Max reach: 550m

TX bit rate: 1.25 Gbps, 1.0625 Gbps, and 2.125 Gbps

RX bit rate: 1.25 Gbps, 1.0625 Gbps, and 2.125 Gbps

Jitter Compliance: IEEE 802.3

Ethernet Classification: IEEE 802.3

Eye Safety: Class 1

### 1000Base-LX

Wavelength, 1310nm

TX level: -9.5 to -3 dBm

RX sensitivity: -22 dBm

Max reach: 10 km

TX bit rate: 1.25 Gbps, 1.0625 Gbps, and 2.125 Gbps

RX bit rate: 1.25 Gbps, 1.0625 Gbps, and 2.125 Gbps

Jitter Compliance: IEEE 802.3

Ethernet Classification: IEEE 802.3

Eye Safety: Class 1

### 1000Base-ZX

Wavelength, 1550nm

TX level: 0 to +5 dBm

RX sensitivity: -22 dBm

Max reach: 80 km

TX bit rate: 1.25 Gbps, 1.0625 Gbps, and 2.125 Gbps

RX bit rate: 1.25 Gbps, 1.0625 Gbps, and 2.125 Gbps

Eye Safety: Class 1

## Ethernet Features

Auto Negotiation

Full and Half Duplex

Flow Control

## Modes of Operation

Terminated

Monitor

Loopback

## Traffic Generation

IEEE 802.3 and Ethernet II (DIX) frames

Configurable MAC, Ethernet Type, VLAN, MPLS, and IP fields

Constant, Ramp, and Burst traffic profiles with configurable bandwidth % utilization

Jumbo Frame Support

Fixed, multiple, and random frame size generation

Traffic prioritization via the VLAN priority field, MPLS CoS field and the IP TOS/DSCP fields

## RFC2544 Compliance Testing

Automated tests with configurable threshold values and maximum transmit bandwidth settings

Throughput, Latency, Frame Loss, and Back-to-back (or Burst) tests

Frame sizes: 64, 128, 256, 512, 1024, 1280, and 1518 Bytes including 2 user configurable frames

## Bit Error Rate Testing

Patterns: PRBS  $2^{31}-1$ , PRBS  $2^{23}-1$ , PRBS  $2^{15}-1$ , PRBS  $2^{11}-1$ , CRPAT (Layer 1 only), CSPAT (Layer 1 only), CRTPAT (Layer 1 only), Normal and inverted patterns

Error Injection: Bit, CRC, Symbol, IP Checksum

One configurable stream with one fixed frame size

## Traffic Filters

Up to eight traffic filters can be configured with MAC, VLAN, and IP fields for VLAN Scan/Monitor mode

## Multiple Streams Throughput Testing

Up to 8 independent traffic streams with configurable MAC, VLAN, MPLS, and IP fields including traffic prioritization via the VLAN tag priority field and the IP header TOS/DSCP field

% of bandwidth allocation is configurable for each stream

Different traffic profiles (constant, ramp, or bursty) may be configured for different streams

Different frame sizes are user configurable per stream

## VLAN and MPLS Tags

Up to 3 VLAN and MPLS tags may be added to each configurable traffic stream

## Smart Loop

Layer 1 loopback: loops back all incoming traffic

Layer 2 and Layer 3 loopback: loops back all incoming unicast traffic and drops all incoming multicast and broadcast traffic

## Key Measurements

Error Measurements: Bit, CRC, symbol, IP checksum, jabber frames, runt frames, collisions, late collisions

Alarm Detection: LOS, pattern loss, service disruption

Frame/Packet Statistics: Multicast, broadcast, unicast, pause frames, frame size distribution, bandwidth utilization, frame rate, line rate, data rate, frame loss, frame delay variation

## General Specifications

Size	110 x 140 x 45 mm (W x D x H) (4.25" x 5.5" x 1.75")
Weight	Less than 1 kg (less than 2.2 lbs)
AC Adapter	Input: 100-240 VAC, 50-60 Hz Output: 15VDC, 3.5A
Operating Temperature	-10°C to 50°C (14°F to 122°F)
Storage Temperature	-20°C to 70°C (-4°F to 158°F)
Humidity	5% to 95% non-condensing
Interfaces	RJ45, 10/100T Ethernet RS232C Supervisor Port

## Ordering Information

Z03-00-003P Intelligent Ethernet Test Probe

### Interfaces/Test Options

499-05-020	MPX100 1000Base-T (enable 1000T copper interface rate, no additional item required)
499-05-021	MPX100 1000Base-X (enable optical interface on chassis, requires separated SFP)
499-05-022	MPX100 Multi Stream Test
499-05-023	MPX100 MPLS Tags
499-05-024	MPX100 Jitter Measurements
499-05-026	MPX100 MAC Flooding
499-05-027	MPX100 Asymmetric Testing
499-05-029	Reveal MPX Server Package (Software only - the customer needs to provide their own server)
499-05-033	Reveal MPX Server Maintenance Contract (required per year after the first year)
499-05-094	MPX100 VLAN Flooding

### SFP Transceiver Options

301-01-001G	850 nm (550m) SFP - 1GE, 1G/2G FC
301-01-002G	1310 nm (10km) SFP - 1GE, 1G/2G FC
301-01-003G	1550 nm (80km) SFP - 1GE, 1G/2G FC

### Recommended Accessories

F05-00-001G	LC-LC-M Patch Cord
F05-00-002G	LC-LC-S Patch Cord
F05-00-003G	LC-SC-M Patch Cord
F05-00-004G	LC-SC-S Patch Cord
Z77-00-004G	Single Unit - Wall Mount Brackets
Z77-00-005G	Four Unit - Rack Mount Brackets

### Replacement Items

A01-00-002G	AC Adaptor (3-prong adaptor)
F02-00-001G	Ethernet Cable RJ45 to RJ45 2 m (6 ft)
F04-00-004G	Power Cord - US 2 m (6 ft)
F04-00-005G	Power Cord - EU 2 m (6 ft)
F04-00-006G	Power Cord - UK 2 m (6 ft)



VeEX Inc.  
2255, Martin Ave., Suite G,  
Santa Clara, CA 95050, USA  
Tel: +1.408.970.9090  
Fax: +1.408.970.9099  
www.veexinc.com  
customers@veexinc.com

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