VeEX™ MX300 Ethernet Transport Expert is the next generation of Core Transport and Carrier Ethernet field test equipment for Ethernet Networks carrying Voice, Data and Video.

**VePAL MX300**  
**10GbE LAN/WAN and Gigabit Ethernet and Fast Ethernet Test Set**

**Platform Highlights**
- Intuitive presentation of measurements with test graphics
- High resolution color touch-screen viewable in any lighting conditions fitted with protective cover
- Robust, handheld chassis packed with powerful and flexible features for demanding environments and test conditions
- Optimized for field engineers or technicians installing and maintaining Ethernet networks enabling triple play services
- Ethernet connection for back office applications, workforce management and triple play service verification
- User defined test profiles and thresholds enable fast, efficient and consistent turn-up of services
- USB memory stick and FTP upload support for test result storage/file transfer
- Maintain instrument software, manage test configurations, process measurement results and generate customer test reports using the included ReVeal™ PC software
- Extend field testing time using interchangeable LiIon battery packs. Greater battery autonomy provided in standby mode

**Key Features**
- 10GbE LAN and WAN
- One 10GbE LAN/WAN XFP port, two 1000Base-X SFP ports, and two 10/100/1000T RJ45 ports
- All-in-one 10 Gigabit Ethernet LAN/WAN, Gigabit Ethernet, Fast Ethernet, and Fibre Channel testing
- Ideal for the lab testing and field testing environments
- Throughput, latency, frame loss, and back-to-back measurements per the industry-standard RFC 2544 tests
- Unframed BER testing to validate error free fiber connections
- BER testing at layer 1, layer 2, and layer 3, with or without VLAN and MPLS tags
- Q-in-Q (VLAN stacking) capability, with up to three VLAN tags
- Multiple stream traffic generation and analysis for end-to-end QoS verification of multiple services
- MPLS stacking capability, with up to three MPLS labels
- 1.0625, 2.125, and 4.25 Gbps Fibre Channel BER testing with buffer-to-buffer credit support
- Intelligent device discovery mode; discover other MX300s on the network for quick and easy loopback control configuration
- Smart Loop mode for layer 1, layer 2, and layer 3
- Remote control capability through the ReVeal PC software
Product Features

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 10Gigabit 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.

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).

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.

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.

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

Multiple Streams Generation
Up to 10 traffic streams for 10GE LAN/WAN and 8 traffic streams for 10/100/1000Base-T and 1000Base-X 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.

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.

10GE Supported Modes
The 10GE interface supports both the 10GE LAN and 10GE WAN modes via a single XFP. All of the features available are supported in both modes. The tables below compare the LAN and WAN modes functionality and physical layer characteristics.

<table>
<thead>
<tr>
<th>10GE LAN</th>
<th>10GE WAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Rate</td>
<td>10.3 Gbps</td>
</tr>
<tr>
<td>Encapsulation</td>
<td>Similar to Gigabit Ethernet only 10 times faster STM64c:OC-192c with Ethernet payload</td>
</tr>
<tr>
<td>Performance Monitoring</td>
<td>Limited performance monitoring ability SDH/SONET performance monitoring ability</td>
</tr>
<tr>
<td>Compatibility</td>
<td>Not compatible with SDH/SONET networks Compatible with existing SDH/SONET networks</td>
</tr>
<tr>
<td>Transport Distance</td>
<td>Used mainly for short distance transport networks Used mainly for long distance transport networks</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>10-Gigabit Ethernet Interface</th>
<th>Data Rate</th>
<th>Wavelength</th>
<th>Fiber Interface</th>
<th>Transmission Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>10GE LAN</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10G BASE-SR</td>
<td>10.31 25 Gb/s</td>
<td>850nm</td>
<td>Multimode (50μm)</td>
<td>2 to 300m</td>
</tr>
<tr>
<td>10G BASE-LR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10G BASE-ER</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10GE WAN</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>10GBASE-SW</td>
<td>9.953 28 Gb/s</td>
<td>850nm</td>
<td>Multimode (50μm)</td>
<td>2 to 300m</td>
</tr>
<tr>
<td>10BASE-LW</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10BASE-EW</td>
<td></td>
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</tbody>
</table>
Applications

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.

10GE DWDM-based Service Testing Application

- Perform Layer 1 Unframed BERT to verify the physical layer
- Perform Layer 2 BERT/Throughput test with valid Ethernet frames to verify end-to-end transport
- Verify end-to-end QoS parameters: throughput, frame loss, round trip delay, frame arrival delay, frame delay variation (jitter), out-of-sequence frames

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.
Specifications

Electrical Ethernet Interfaces
Two 10/100/1000Base-T Ports
  RJ45 connector
  IEEE 802.3 compliant

Optical Ethernet Interfaces
One 10GE XFP Port, LC connector
Two 1000Base-X SFP Ports
  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
  Pass through
  Loopback

Traffic Generation
  IEEE 802.3 and Ethernet II (DIX) frames
  Configurable MAC, Ethernet Type, VLAN, MPLS, IP, and UDP header 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
  Up to 3 VLAN and MPLS tags may be added to each configurable traffic stream

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 2^20 -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

Fibre Channel Testing
  The Fibre Channel Test Suite option for the MX120 Metro Expert allows for the testing of 1.0625, 2.125, and 4.25 Gbps Fibre Channel point-to-point topology networks. Refer to the Fibre Channel Test Suite data sheet for more details.

Multiple Streams Throughput Testing
  Up to 10 traffic streams for 10GE LAN/WAN and 8 traffic streams for 10/100/1000Base-T and 10000Base-X 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

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, FCS/CRC, symbol, IP checksum, jabber frames, runt frames, undersize 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, out-of-sequence frames, frame delay variation

<table>
<thead>
<tr>
<th></th>
<th>XFP</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wavelength</td>
<td></td>
<td>850nm</td>
<td>1310nm</td>
</tr>
<tr>
<td>Optical Output Power (Rx power read)</td>
<td>-4 to -1.1 dBm</td>
<td>-6 to -1 dBm</td>
<td>-5 to -1 dBm</td>
</tr>
<tr>
<td>Optical Overload (min)</td>
<td>-1 dBm</td>
<td>0.5 dBm</td>
<td>-1 dBm</td>
</tr>
<tr>
<td>Sensitivity (min)</td>
<td>-11.1 dBm</td>
<td>-11 dBm</td>
<td>-14 dBm</td>
</tr>
</tbody>
</table>

10GbE XFP Interfaces

XFP Optical Connector

<table>
<thead>
<tr>
<th>Wavelength</th>
<th>LC</th>
<th>LC</th>
<th>LC</th>
</tr>
</thead>
<tbody>
<tr>
<td>850nm</td>
<td>1310nm</td>
<td>1550nm</td>
<td></td>
</tr>
<tr>
<td>-4 to -1.1 dBm</td>
<td>-6 to -1 dBm</td>
<td>-5 to -1 dBm</td>
<td></td>
</tr>
<tr>
<td>-11.1 dBm</td>
<td>-11 dBm</td>
<td>-14 dBm</td>
<td></td>
</tr>
</tbody>
</table>
**General Specifications**

Size: 210 x 100 x 55 mm (H x W x D)  
(8.25 x 3.75 x 2.25 in)

Weight: Less than 1 kg (less than 2.2 lbs)

Battery: LiIon smart battery 2400 mAh 10.8VDC

AC Adapter: Input: 100-240 VAC, 50-60 Hz  
Output: 15VDC, 3.5A

Operating Temperature: 0 C to 40  C (32  F to 104 F)-

Storage Temperature: -20  C to 70  C (-4  F to 158 F)

Humidity: 5% to 95% non-condensing

Display: 3.5” QVGA 320x240 full color touch screen

Ruggedness: Survives 1.5 m (5 ft) drop to concrete on all sides

Water-resistance: Water resistant - may be used in heavy rain

Interfaces: USB 2.0 Host and Client, RJ45  
10/100T Ethernet, Bluetooth 2.0 (optional)

Languages: Multiple languages can be supported

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**Ordering Information**

**Z03-00-004P** VePAL MX300, Portable Ethernet Test Set

**Hardware Options**

**Z66-00-011P** 10GE option. Single XFP interface (XFP optional). With 10GE LAN mode enabled, and Loopback Mode.

**Z66-00-012P** Two 10/100/1000Base-T and two 1000Base-X ports. All interfaces enabled and Dual Port testing enabled. (SFP optical modules must be ordered separately).

**10GE Software Options**

499-05-060 MX300 10GE WAN

499-05-066 MX300 10GE Layer 1 Unframed BERT

499-05-130 MX300 10GE Multiple Streams**

499-05-131 MX300 10GE MPLS

499-05-132 MX300 10GE Jitter**

499-05-133 MX300 10GE MAC Flooding**

499-05-134 MX300 10GE VLAN Flooding**

499-05-135 MX300 10GE Asymmetric Testing**

**10GE and 1GE Software Bundles**

Z33-00-003 MX300 10GE/1G Multiple Streams***

Z33-00-004 MX300 10GE/1G MPLS

Z33-00-005 MX300 10GE/1G Jitter***

Z33-00-006 MX300 10GE/1G MAC Flooding***

Z33-00-007 MX300 10GE/1G Asymmetric Testing***

Z33-00-008 MX300 10GE/1G VLAN Flooding***

Note: Purchasing any of the 10GE and 1GE software bundles enables the same option for the 10GE, 10/100/1000T, and 1000Base-X interfaces.

**10/100/1000T & 1000Base-X Software Options**

499-05-013 MX Multi Stream Test

499-05-014 MX MPLS Tags

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**10GE & 1G/2G FC 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

**1GE & 1G/2G/4G FC SFP Transceiver Options**

301-01-010G 850 nm (550m) SFP - 1GE, 1G/2G/4G FC

301-01-011G 1310 nm (4km) SFP - 1GE, 1G/2G/4G FC

301-01-012G 1310 nm (10km) SFP - 1GE, 1G/2G/4G FC

**10G XFP Transceiver Options**

499-05-001G Web Browser (requires advanced IP option)

499-05-002G NetWiz

499-05-003G Remote Control

499-05-008G IPTV Expert

499-05-128G Basic TCP/IP Throughput

G93-00-001G VoIP Expert, incl. VoIP Check

G88-00-001G WiFi Wiz, incl. USB WiFi Adapter

G88-00-001P VoIP Call Expert, incl. VoIP USB Adaptor & Earplug

**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

**Replacement Items**

A01-00-003G AC Adaptor

B02-06-001G Battery Pack

C01-00-003G Carrying Case

C03-00-001G Shoulder Strap

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)

Z77-00-001G Stylus with String (Pack of 5)

**Addtional Options**

Z88-00-001G Web Browser (requires advanced IP option)

Z88-00-002G NetWiz

Z88-00-003G Remote Control

Z88-00-008G IPTV Expert

Z88-00-101G Basic TCP/IP Throughput

Z33-00-001G VoIP Expert, incl. VoIP Check

Z88-00-001G WiFi Wiz, incl. USB WiFi Adapter

Z88-00-001P VoIP Call Expert, incl. VoIP USB Adaptor & Earplug

**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

**Replacement Items**

A01-00-003G AC Adaptor

B02-06-001G Battery Pack

C01-00-003G Carrying Case

C03-00-001G Shoulder Strap

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)

Z77-00-001G Stylus with String (Pack of 5)

**Check factory for availability**

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