ParaScope MTS

Handheld multi-functional, multi-technology test platform for Ethernet, IP, SONET/SDH/PDH, OTN & Fibre Channel

Enable just what you need now…it's an easy upgrade later

Key ParaScope MTS Benefits:

- Unmatchable market performance
  - Dual port enables performing two tests simultaneously.
  - Test up to 32-Multistreams, each with customizable traffic profiles.
  - Powerful Packet Flooding. Flood nearly any field of a packet including MAC, VLAN and MPLS with Layer 3 & 4 payload options.
  - Dual port Packet Capture and Analysis utilizing WireShark engine and powerful filters and triggers.
  - Unparalleled physical layer testing on all optical transport methods and line rates.
- Software license controlled features for upgrades or maintaining test standards as they are defined, then certified.
  - Instant (DIY) remote/field upgradable; via a software-only license key.
  - Never lose a test capability/feature due to lost, forgotten, or damaged hardware modules.
- Bluetooth support to easily offload test results or transfer test configurations.
- Customizable platform *avoids technology obsolescence*. ParaScope MTS is upgradeable for your future testing whenever your test requirements, testing demands or test budget changes. Just add ports, features, and software options etc. in the future. Truly a "pay as you grow" handheld test platform.

Key Features

Ethernet

- 1GE, 10G and combo solutions
- RFC2544 (Delay, Jitter)
- Bit Error Testing (BERT)
- Y.1564 EtherSAM Service Testing
- Ethernet OAM (802.1ag & Y.1731)
- SyncE & IEEE 1588v2
- 32 Multi-stream Traffic Generation
- Packet Capture/Decode
- Real Time Traffic Monitoring
- Packet Flooding/Generation
- Wireless LAN/VoIP/WiFi
- IPv6/IPv4

SONET/SDH

- STM-1/4/16/64
- OC-3/12/48/192
- Bit Error Testing (BERT)
- All Mappings
- Tx Overhead Byte Sequence Generation and Analysis
- Unframed Physical Layer Testing
- Service Disruption Measurement
- Rx Overhead Byte Capture
- Realtime Single and Multi-Channel Monitoring

PDH

- T1/E1/T3/E3
- G.821/826 Bit Error Testing
- Alarm Generation & Detection

OTN

- OTU1 /2/3/4
- TCM with Error/Alarm Detection
- FEC Analysis and Generation
- Real Time Traffic Monitoring

Fibre Channel

- 1x/ 2x/ 4x/10x

General

- Bright touch screen with smart navigation
- Quick-boot
- 8 hour battery stand-by, 4 hour test time

Ethernet & IP

Ethernet Standard Features:

- Throughput Test (Single Stream, Multi-stream (4)
- Packet Filtering (MAC, IP, VLAN, Protocol)
- In-Service Traffic Monitoring (Non-Intrusive Mode)
- In-Service Traffic monitoring (Pass-Thru with dual ports)
- Service Disruption Measurement and Services Activation Test
- MPLS (stacking up to 3 MPLS's)
- VLAN, Q-in-Q (up to 3 VLAN's)
- **(ET-5)** Loopback Mode (L1-L4, auto, filtered)
- **(ET-6)** Throughput Testing (single stream, 4 multi-streams)
- **(ET-7)** RFC2544 (up to 4 multi-streams)
- **(ET-11)** L1/Unframed BERT (Cable BERT-RJ45, Unframed BERT-SFP Optic). Error injection.
- **(ET-12)** Network Discovery
- **(ET-13)** 100 FX/LX (Optic)
- **(ET-14)** Y.1564(EtherSAM)
- **(ET-17)** IPv6/IPv4
- **(ET-18)** EtherOAM Y.1731 (available 3rd Qtr 2013)
- **(ET-19)** Asymmetric Testing (available 3rd Qtr 2013)
- **(ET-21)** Web Browser and HTTP Testing(available 3rd Qtr 2013)
- IP Tools (Ping, DHCP, Trace Route)
- Cable Diagnostics
- Remote Control via VNC
- Report Generation (PDF, CSV and TXT)
- Save files as PDF or MS-Excel/Text format

Ethernet SW Options:

- **(ET-1)** Single 1GB
- **(ET-2)** Dual 1GB port
- **(ET-3)** Single 10GB port
- **(ET-4)** Dual1GB port and Single 10GB port
- **(ET-8)** Packet Capture and Decode via WireShark
- **(ET-9)** Throughput Testing (32 multi-streams)
- **(ET-10)** Packet Flooding – MAC/VLAN/IP/User Defined Field
- **(ET-15)** PBB/PBB-TE(MAC-in-MAC)
- **(ET-16)** SyncE/1588
- **(ET-20)** One-Way Delay Measurement using 1588 or GPS (available 3rd Qtr 2013)
- **(ET-22)** CLI Interface
- **(WA-1)** 10GbE WAN PHY
- **(WA-2)** WLAN 802.11 a/b/g testing
- **(PT-1)** IPTV Quality Metrics (available 3rd Qtr 2013)
- **(PT-2)** IPTV Decode (available 3rd Qtr 2013)
- **(VO-1)** VoIP Quality Metrics (available 3rd Qtr 2013)
- **(VO-2)** VoIP Signaling and Vocoding (available 3rd Qtr 2013)

Ethernet IP Applications

- Troubleshoots Ethernet/IP networks, captures and analyzes packets, and identifies network problems.
- Tests Carrier Ethernet transport to verify class of service (CoS), Triple-Play Service, and Ethernet circuit transparency.
- Supports Packet Transport Network (PTN) testing with MPLS-TP traffic generation and QoS analysis, along with simultaneous verification of OAM Label 13 or 14 operations.
- Confirms higher-layer Ethernet data applications and services at 10Mbps to 1Gbps rates with Ipv4 and IPv6
- Tests Layer 1-4 Ethernet/IP SLAs with RFC 2544 for up to 3 VLAN tags, Q-in-Q, and MPLS encapsulation.
- Verifies automatically SLA compliance according to Y.1564, including different traffic profiles per service, and KPI compliance for all committed services concurrently.

Ethernet IP Testing Lifecycle

Installation

- RFC2544, including frame delay variation, asymmetric rates, and concurrent results to reduce overall test time.
- Y.1564 EtherSAM automated SLA validation including bandwidth profiles and KPI compliance for quickly verifying multiple services.
- Carrier Ethernet testing with PBB, MPLS, MPLS-TP, VLAN and Q-in-Q.

Troubleshooting

- Line rate packet capture up to 10Gbps.
- Packet decoding with integrated WireShark.

Carrier Ethernet Installation Testing

For years, Ethernet/IP has been transported throughout carrier networks encapsulated in other data-link layer technologies that evolved into a carrier-grade technology because of operations, administration, and maintenance (OAM) standards such as ITU-T Y.1731, IEEE 802.1ag, and 802.3ah. Ethernet now possesses many of the characteristics that made SONET/SDH the transport technology of choice; end-to-end circuit transparency, redundancy, and full-featured OAM for circuit-based performance management and alarming. The ParaScope MTS delivers a much-needed tool set for provisioning and troubleshooting Ethernet networks that substantially improves installation and troubleshooting times, thereby granting error-free operation and a significant reduction in operating expense.

RFC2544 Testing

The ParaScope MTS delivers all the Carrier Ethernet testing needed to qualify Ethernet-based transport networks. RFC2544 is the defacto industry standard for Ethernet circuit installation. In addition to supporting Ethernet throughput or committed information rate (CIR), frame delay (FD) or latency, frame loss (FLR), and back-to-back burst testing as called out in the RFC, ParaScope MTS also tests for packet jitter and frame delay variation (FDV) to ensure the circuit is ready to transport time-sensitive services such as IPTV and VoIP. Using a pair of test sets and Asymmetric RFC testing, users can validate Ethernet Virtual Circuits (EVCs) with different upstream and downstream CIRs, or they can test sequentially in both directions to ensure that key performance indicators (KPIs) are met across any connection type.

ITU-T Y.1564 EtherSAM Service Activation Testing

Y.1564 EtherSAM allows for fast and easy verification of SLAs for differentiated services including validation of different bandwidth profiles like committed information rate (CIR), extended information rate (EIR) and maximum bandwidth. Pass / Fail results for KPIs including CIR, frame delay (FD), frame delay variation (FDV or packet jitter) and frame loss rate (FLR) are provided independently for up to 16 services. Out of sequence frames and available seconds are reported per Y.1564.

Verifying CoS with Multiple Streams

Multi-stream testing generates several streams of traffic at the Ethernet, IP, and TCP/UDP layers (Layers 2-4) to emulate various types of traffic with the appropriate CoS mappings so that users can assess the impact of traffic prioritization on the overall network architecture while confirming proper network element queuing, policing, and shaping. Up to 32 individually configured streams enable generation and analysis of per stream key parameters such as VLAN ID and priority, TOS/DSCP marking, packet size (64-10,000 bytes), source/destination IP and MAC address, and source/destination TCP/UDP ports. Users can configure constant, burst or ramp traffic to simulate near real-world traffic before actually delivering a service. This level of testing confirms the network design as well as drastically reduces post-installation troubleshooting.

BER and Latency Testing

The ParaScope MTS supports optical Layer 1 (L1) BER testing for stress testing the underlying physical transport link. A standard 2^23 pattern is used to obtain key QoS measurements including bit error rates, pattern sync, latency, line coding, and signal/power levels. Error injection is supported.

Ethernet OAM, VLAN, Q-inQ, MPLS and PBB Tunneling Technologies

Ethernet tagging and encapsulation is commonly used to improve the scalability of Ethernet networks by isolating customer traffic and, in the case of provider backbone bridging (PBB), minimizing the number of MAC addresses that equipment must learn. Regardless of the encapsulation and tagging used, the ParaScope MTS tests CoS to confirm KPIs such as CIR, FD, FDV, and FLR. Support for virtual local area network (VLAN) tags, Q-in-Q VLAN tags, PBB (also known as MAC-in-MAC) and multi-protocol label switching (MPLS), the ParaScope MTS allows testing at any part of the Metro network.

Ethernet Timing Synchronization Verification using 1588v2 PTP and G.826x SyncE

Critical network timing and frequency synchronization testing enables service providers to analyze emerging 1588v2 PTP and Synchronous Ethernet (SyncE) protocols greatly reducing expenses for mobile backhaul and LTE by eliminating the need for TDM/GPS. Wireless backhaul providers can now verify whether Ethernet links can transfer PTP protocols by connecting to a PTP master and measuring critical packet parameters such as PDV with simultaneous network traffic loading. SyncE testing recovers the timing of an incoming Ethernet interface for the tester's transmitter. Capturing and decoding the 1588v2 PTP and Ethernet Synchronization Messaging Channel (ESMC) messages allows operators to verify and troubleshoot proper configuration and operation of synchronization networks.

Carrier Ethernet Fault Isolation

In the ever-changing Ethernet and IP world, providers must quickly, cost-efficiently, and reliably troubleshoot problems at all layers of the stack. The ParaScope MTS provides powerful line-rate packet capture at Ethernet speeds up to 1GigE without dropping a single packet. When troubleshooting problems occur intermittently or inconsistently, it supports multiple traffic filters and triggers, including 16-byte pattern identification, to isolate the exact problem and minimize the amount of information gathered.

The ParaScope MTS natively supports WireShark for on-instrument packet decode. Additionally, users can save the captured traffic in a standard pcap file format and export it via USB or FTP through the management port for further analysis.

SONET/SDH/PDH

The ParaScope MTS performs BER testing on all line interfaces in end-to-end or loopback applications, inserts errors and alarms to verify NE conformance and connectivity, and measures BERs from DS1 (1.5M)/E1 (2.048M) rates to OC-192/STM-64.

Mappings

SONET/SDH mappings include all intermediate mappings down to VC-4/VC-3 in addition to BERT payload with multiple PRBS choices.

SONET/SDH/PDH Overhead Byte Manipulation and Analysis

Using the overhead byte manipulation and analysis capability, users can modify K1 and K2 bytes to test automatic protection switching (APS) to specify and identify user-configurable path trace messages and payloads. The path overhead (POH) capture feature facilitates troubleshooting end-to-end problems. The ParaScope MTS supports manual capture, capture on alarm, and capture based on user-defined triggers.

Physical Layer Testing

Perform physical layer testing to verify dark fiber and line continuity across all optical transport methods and line rates. Support for unframed STM-1/4/16/64, Fiber Channel 1x/2x/4x/10x, OTN OTU-1/2/1E/2E/1F/2F, 1.250G(1GE), 10.313(10GE) and 3.1G (CPRI).

Service Disruption Measurements

The ParaScope MTS measures the protection switch times of SONET/SDH rings and their effects on tributaries. By measuring various error and alarm conditions on the tributaries, providers can verify that their transport network is providing adequate redundancy to guarantee SLAs.

Multi-Channel View

Drill down to view the path hierarchy in its entirety on one screen with automatic detection of payload type (concatenated or non-concatenated) for SONET (48x STS-1 and 28x VT 2/1.5) and SDH (48x AU-3 and 28x TU12/TU11).

Line Through Mode

Connecting the test unit in-line provides not only monitoring capabilities but also the possibility of injecting errors. This provides for an effective tool in-service disruption testing.

SDH/PDH Alarm/Error Generation

Generate Alarms for:

LOS, LOF, OOF,RS-TIM, MS-AIS, MS-RDI, AU-LOP, AU-AIS, TU-LOP, TU-AIS, HP-UNEQ, HP-PLM, HP-TIM, HP-RDI,HP-SRDI, HP-CRDI, HP-PRDI, HP-TC-UNEQ, HP-TC-LOMF, HP-TC-AIS, HP-TC-RDI, HP-TC-ODI, LP-UNEQ, LP-PLM, LP-TIM, LP-RFI, LP-RDI, LP-SRDI, LP-CRDI, LP-PRDI, LP-TC-UNEQ, LP-TC-LOMF, LP-TC-AIS, LP-TC-RDI, LP-TC-ODI

Generate Errors for:

FAS, B_1, B_2,B_3, MS-REI, BIT,HP-REI, HP-TC-IEC, HP-TC-REI, HP-TC-OEI, LP-BIP, LP-REI, LP-TC-IEC, LP-TC-REI, LP-TC-OEI

SONET/SDH Options:

- **(SO-1)** OC-3/12/48 (STM 1/4/16)
- **(SO-2)** OC-192 (STM-64)
- **(SO-3)** OC-3/12/48/192 (STM 1/4/16/64)
- **(SO-4)** Unframed Line Rate (Requires SO-1, 2 or 3)
- **(SO-5)** Multi-Channel View (Requires SO-1, 2 or 3)
- **(SO-6)** Signal Delay emulator (injection of signal delay in unframed line rates; Requires SO-4)

PDH Options:

- **(PD-1)**E1/T1 (DS1)
- **(PD-2)** E3/T3 (DS3)
- **(PD-3)** E1/T1, E3/T3

OTN

OTN is the next generation network designed to combine and accelerate the benefits of SDH/SONET with the bandwidth expandability of DWDM (Dense wavelength division multiplexing). Test end-to-end connectivity by transmitting and receiving OTN signals with the ability to insert and analyze errors and alarms in network troubleshooting and equipment verification applications.

TCM with Error/Alarm detection

Verify network element interoperability with the TCM bytes; Count, current rate and average rate for each error, SDT (Service disruption Time) measurements and RTD (Round Trip Delay) measurements. Verify OTN alarms and errors with injection capabilities such as loss of frame (LOF), alarm indication signal (AIS), and backward defect indication (BDI).

FEC Testing

Transmit and analyze correctable and uncorrectable FEC errors to verify a network element's ability to correct conditions through the use of FEC enabled signals. Correctable and uncorrectable FEC error positions are accumulated and monitored through a graphical hierarchy window, which allows users to easily recognize the position of the FEC error.

Features programmable FEC error generation functions that allows the user to define a detailed position for correctable FEC errors and uncorrectable FEC errors.

Line Through Mode

Connecting the test unit in-line provides not only monitoring capabilities but also the possibility of injecting errors. This provides for an effective tool in service-disruption testing.

OTN Options:

- **(OT-1)**OTU-1 (2.66G/STM-16)Requires SO-1
- **(OT-2)** OTU-2 (10.7G/STM-64)Requires SO-2
- **(OT-3)** OTU-3 (2.66G&10.7G/STM-16 & STM-64) Requires SO-3
- **(OT-4**) OTU-4 (10G Ethernet over OTU-2 [OUT-1e/2e] available 3rd Qtr 2013)

Fibre Channel

The ParaScope MTS tests 1x, 2x, 4x and 10x Gbps Fibre Channel (FC). Users can manipulate various fields of the FC frames to emulate end customer traffic and perform BER measurements on L1 and L2 circuits. The ParaScope MTS supports buffer crediting capability, which lets providers verify the effect of delay on the link throughput and test the ability of the link to obtain the optimum buffer credit values. The ParaScope MTS also allows users to turn up storage area networks (SANs), producing reliable throughput, packet loss, RTD, and burstability results with consistent test methodology.

Fiber Channel Options:

- **(FC-1)** Fiber Channel 1x/2x
- **(FC-2)** Fiber Channel 4x
- **(FC-3)** Fiber Channel 1x/2x/4x
- **(FC-4)** Fiber Channel 10x (Available 4th Qtr 2013)
- **(FC-5)**Fiber Channel 1x/2x/4x/10x (10x Available 4th Qtr 2013)

Platform Specifications

Hardware Specifications:

- **Ports:**
  - (2) SFPs (1000BASE-SX/LX/ZX, 100-FX/LX/SX), Supports 1310nm, 1550nm and 850nm, Transceiver sold separately.
  - (2) 10/100/1000Base-T (RJ45)
  - (1) XFP, Supports 1310nm, 1550nm and 850nm, Transceivers sold separately.
  - (1) BNC connector (Tx/Rx) 34-45M
  - (1) Bantam(Tx/Rx) : 1.5M - 2M
  - (1) SMA(Tx) : Tx Reference Clock Out
  - (1) SMA: External clock input 1.544 -2.048 Mbps / 1.544m, 2.048 m, 10M / Any clock speed
  - (1) GPS Signal input
  - (1) HDMI output
  - (1) 3.5mm headset audio jack and mic support.

- **Dimensions:**
  - Size: 172.5 (W) x 227 (H) x 58.5 (D) mm
  - Weight: 1.3 kg with Battery, Battery (0.3 kg)

- **Operating Temp:** 0℃~40℃
- **Storage Temp:** -20℃~ to +70℃
- **Display:** 5.7 Color TFT-LCD Touch Screen
- **User Interface:** Touch Screen & Keypad
- **Humidity:** 10% ~ 90%
- **Power:**
  - AC adaptor: 100V~240 V(50Hz/60Hz)
  - Removable/Rechargeable Lithium-Ion Battery
  - Battery life: 3 hours typical, 8 hour in standby mode
- **Memory:**
  - 16GByte internal Flash memory included
- **Country of Origin:** **USA**
- **Optional SFPs:**

1310nm single mode – minimum sensitivity -20dB, output power -9 to -3 dB

- **Optional XFPs:**

1310nm single mode – minimum sensitivity -14dB, output power -6 to -1 dB
1550nm single mode – minimum sensitivity -16dB, output power -1 to 2 dB