



VePAL TX130+

Handheld PDH, Datacom & Ethernet Test Set

PDH/DSn and Ethernet network testing simplified
VeEX® VePAL TX130+ and TX130E+ are rugged next generation portable field test solutions for PDH, DSn, Datacom, Ethernet and IP testing.

Platform Highlights

- Available in North American TX130+ (Bantam) and international TX130E+ (RJ48 and Datacom) versions
- 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 transporting legacy network
- Ethernet port and 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 support and FTP upload capability for test result storage and file transfer respectively
- Maintain instrument software, manage test configurations, process measurement results and generate customer test reports using included ReVeal™ PC software
- Perform remote testing and monitoring using the remote control option via standard Ethernet interface

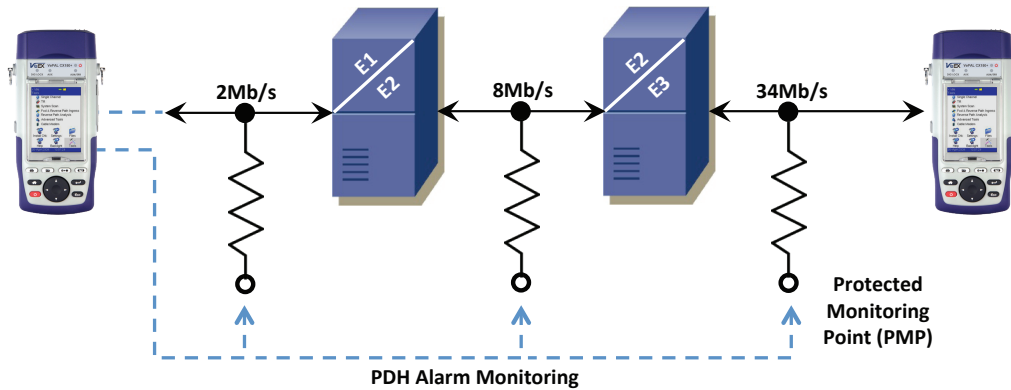
Key Features

- Supports E1, E2, E3, DS1 and DS3 bit rates
- Balanced Bantam (100Ω) or RJ48 (120Ω) for DS1 and E1
- Unbalanced BNC (75Ω) for E1, E3 and DS3
- Dual TX/RX for E1, DS1; dual RX for DS3
- Full Rate E1/DS1 and Fractional N, Nx64 kbps or Nx56 kbps testing
- Non-intrusive Pulse Shape Analysis at DS1, E1, E3 and DS3
- Level and Frequency measurements
- Auto Configuration of network type, bit rate, line coding framing, and test pattern
- Bit Error and Performance Analysis per ITU/Bellcore standards
- Error and Alarm Generation and Analysis
- Histogram and Event analysis for errors and alarms
- Transmit Frequency Offset to stress clock recovery circuits
- 64 kbps G.703 Codirectional interface and BERT
- TX130E+ offers Datacom interface testing for RS232, RS449 (422 and 423), X.21, V.35 and V.36 with Sync/async DTE/DCE modes
- 10/100/1000-T (100FX and 1000X with external media converter)
- Ethernet Testing for BERT, Throughput, Loopback and RFC2544
- Supports advanced IP testing; Ping, trace route, ARP Wiz, VoIP, IPTV, web browser, and FTP upload/download
- VF drop/insert via headset
- VF tone generation and measurement
- ISDN PRI (ANSI and ETSI) call set up and analysis
- Jitter measurement (E1, DS1, E3, DS3)
- Wander measurement (E1)
- R-Server support for test results upload, download and workforce management

Applications

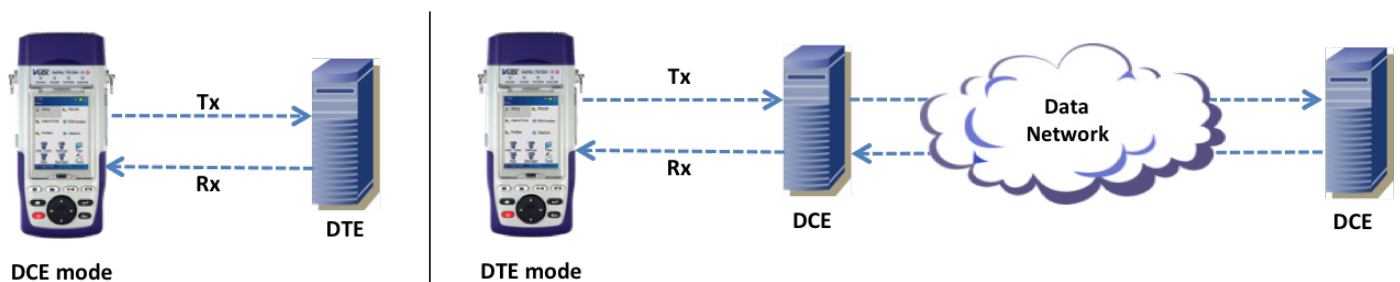
Transmission Testing

The TX130+ is perfectly suited for both in-service and out-of-service measurements on PDH/DSn networks. Out-of-service testing usually applies to the installation, commissioning and the “bringing into service” measurements needed to qualify a digital transmission link using industry standard test patterns and methods. In-service testing is an important, ongoing maintenance task - field technicians can monitor PCM signals for errors, alarms, level, frequency and pulse shape to prevent service degradation. The transmitter and receiver can be configured independently to perform MUX tests and round trip delay measurements are possible at various points across the network using any of the test interfaces.



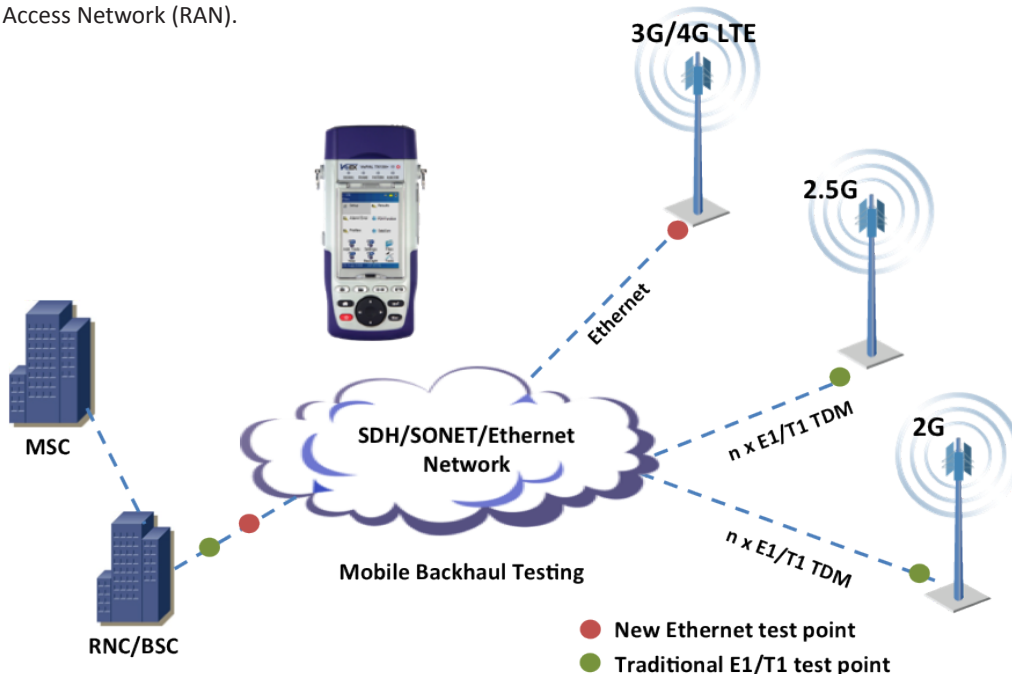
Datacom Testing (TX130E+)

The datacom option enables physical layer testing over both synchronous and asynchronous interfaces, while a stable frequency synthesizer allows the data rate to be set between 50 bps and 2.048 Mbps. Full DTE and DCE, Monitor and Emulation modes for X.21/V.11, V.24 (RS232), V.35, V.36 (RS449) interfaces is supported.



Mobile Backhaul Testing

Mobile operators confronted with the explosive growth of data-centric services driven by 3G and LTE Smartphone applications, are urgently upgrading and migrating traditional TDM backhaul networks to Ethernet/IP packet-based technologies. The TX130+ tester equipped with a hybrid of interfaces and applications is perfectly equipped to test both PDH and IP transport over copper and fiber backhaul connections across the Radio Access Network (RAN).

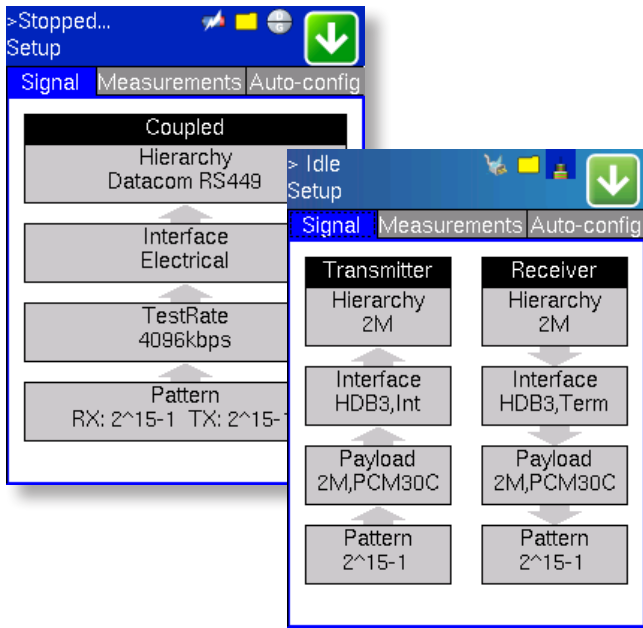


PDH & DSn Features

Quick and Easy Graphical Setup

Complex daily tasks are common in today's network environment, so technicians need a tester that is easy to configure and which doesn't require extensive product training beforehand.

The test interface, signal structure, and test pattern setups are structured logically ensuring quick and efficient configuration. An intuitive graphical menu and a list of shortcuts provides fast access to commonly used PDH and Datacom or DS3/DS1 test functions boosting productivity.

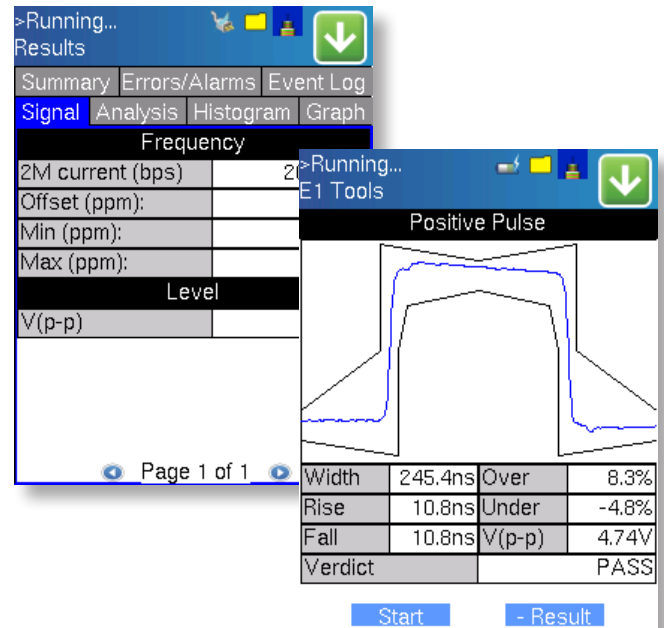


Physical Layer Testing

Prior to performing digital measurements, technicians should confirm analog parameters fall within prescribed limits.

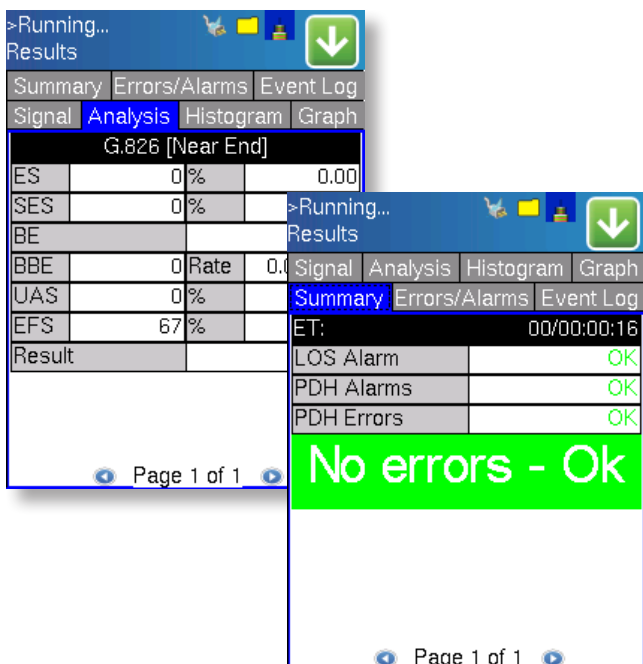
Clock tolerances for each signal hierarchy defined by ITU-T and ANSI recommendations can easily be verified.

Incorrect pulse shape is a result of excessive cable length, impedance mismatch, or poor transmitter design. The G.703 pulse mask option quickly identifies related E1, E3, T1 and T3 physical layer problems.



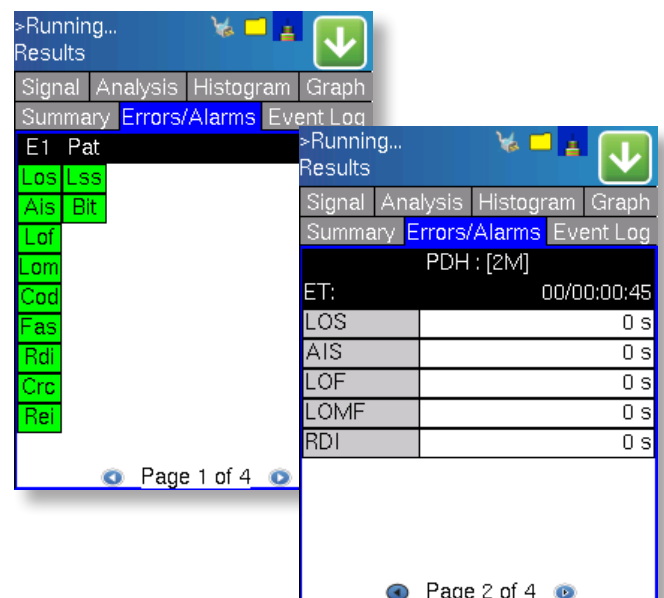
Performance Analysis Summary

The summary screen displays Pass/Fail criteria for each major parameter. A large color coded message informs or alerts the technician of the circuit's status. The Analysis tab reports test performance per ANSI, Bellcore or ITU-T recommendations.



Errors and Alarms

BER testing is commonly used to verify continuity across a digital link, to check for faults, and for performing acceptance tests. Equipped with an extensive range of test patterns including the ability to inject errors in the pattern, framing and alarm bits, the TX130+ quickly evaluates circuits and examines error responses. Anomalies (errors) and defects (alarms) are clearly displayed and recorded for each network segment, and are logged for further analysis.



Datacom Testing

Equipped with the datacom option, the TX130+ empowers field technicians to install, troubleshoot, and maintain datacom circuits operating over RS-232/V.24, RS-449/V.36, V.35, and X.21 interfaces. Using powerful Data Terminating Equipment (DTE) and Data Communications Equipment (DCE) emulation modes, technicians can quickly verify end-to-end connectivity, investigate clocking errors, and perform bidirectional monitoring.

Simple Setup

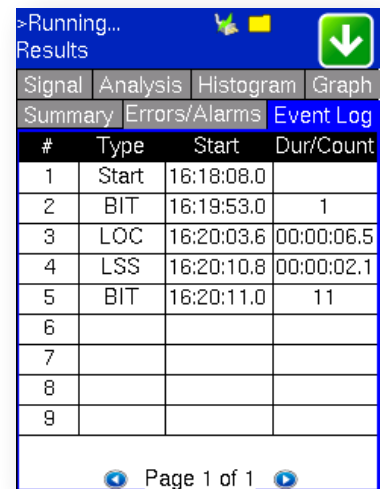
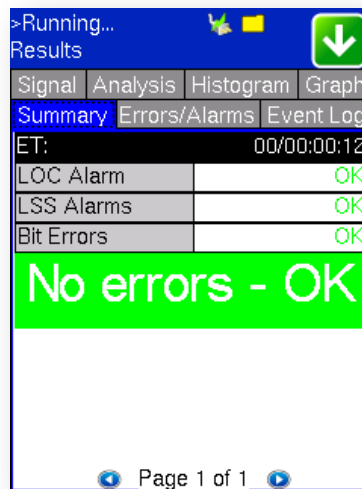
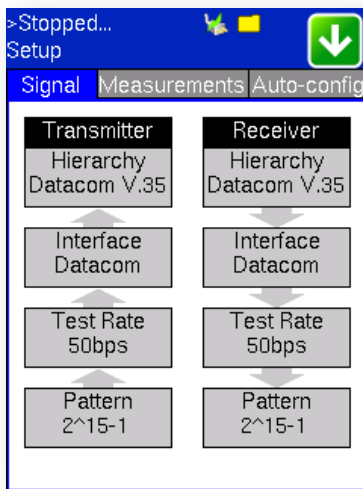
Datacom test interfaces may be configured in either DTE or DCE mode. An extensive range of test patterns are provided for BER testing and results can be defined according to ITU-T G.821 or G.826 test recommendations.

Intuitive Results

Summary and dedicated test result pages with Histogram functionality quickly pinpoint and display error conditions. The ability to inject errors and alarms allows the user to verify device operation and examine applicable error responses.

Event Logging

Problematic devices or links can be monitored over a period of time to isolate and capture intermittent faults. A time stamped record of events, errors and alarms provides a valuable insight to the frequency and duration of network anomalies.



Jitter and Wander

Data integrity in synchronous networks depends largely on the phase stability of clock and data signals. Per the ITU-T G.810 recommendation, the term Jitter is employed when the frequency of the unwanted phase modulation is greater than 10 Hz. When the frequencies are less than 10 Hz, the unwanted modulation is referred to as Wander. In SONET/SDH networks there is a great potential for the accumulation of jitter to degrade network performance, thus it is imperative that components and the network as a whole be tested and screened regularly for jitter to ensure that optimum levels of quality can be maintained.

Jitter Metrics

Output jitter performance mandated by ITU-T and Telcordia standards is evaluated by measuring the recovered clock of the incoming signal (E1, E3, DS1, DS3) traversing the network.

While the test duration is not defined in the mentioned standards, a measurement period time of 1 minute is recommended. Specified in unit intervals (UI), the maximum Peak-to-Peak Jitter is the most important parameter because Max values are indicative of performance, as these extremes generally cause errors. While jitter is defined as any phase variations above 10 Hz, the incoming signal must be filtered in order to measure jitter – the user is therefore able to select between Wide band and High band filters to adjust the measurement bandwidth as required.

Wander Metrics

Wander is measured against an external reference clock whereas jitter is normally measured with reference to the clock extracted from the incoming data signal. The wander external reference clock input accepts clock signals at 1.5 MHz and 2 MHz including signals with bit rates of 1.544 Mbps and 2.048 Mbps.

Measuring the input signal (E1) with reference to the external clock signal, the time interval error (TIE) is derived. Unlike jitter results which are reported in Unit Intervals, TIE values are given as absolute time values (ns). MTIE (Maximum Time Interval Error) results report the largest peak-to-peak TIE observed during the measurement period. TIE measurements can be exported for further MTIE and TDEV analysis.

ISDN Testing

The ISDN option provides key functionality necessary for testing and troubleshooting T1 or E1 Primary Rate connections. Operating in TE or NT modes, the unit is able to setup and receive ISDN calls with user-defined parameters including call control protocol, called number and related facilities.

Protocol functions feature detailed signaling statistics, message monitoring and decode, and complete result presentation. With these capabilities, analysis of international and national ISDN, and other access protocols is possible.

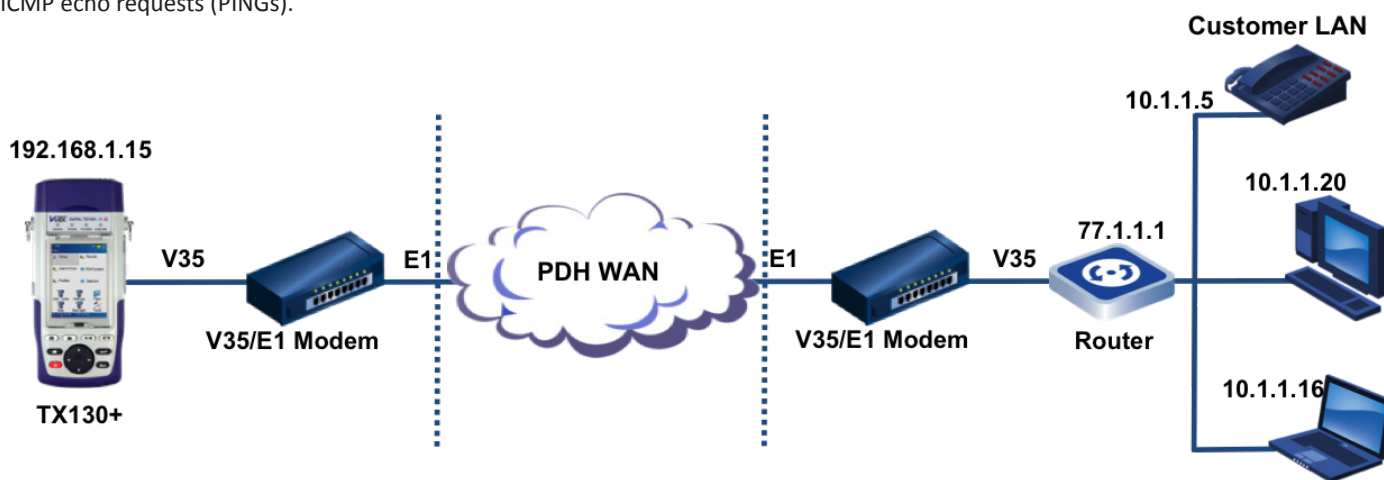
VF Testing

The Voice Frequency (VF) option is a basic diagnostic tool to install, verify and troubleshoot voice circuits. Digital to analog conversion tests are performed by inserting/measuring tones with user defined frequency and level on selected sub-rate channels.

A microphone/headset adaptor enables Talk/listen capability on a selected timeslot whilst a powerful function allows VF decoding at all DS3/DS1 and PDH rates.

Ping Test over WAN

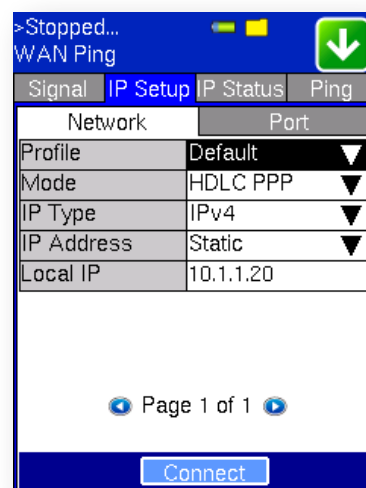
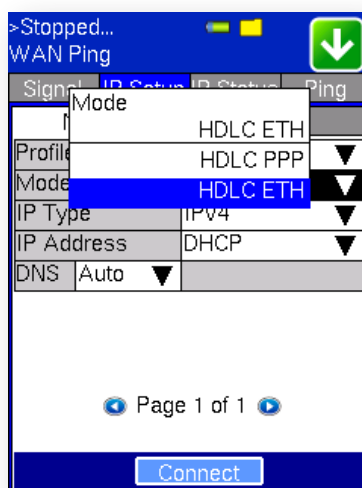
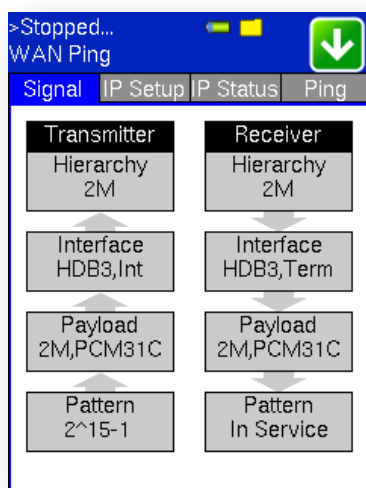
The Ping over WAN option verifies IP service across E1, DS1 or Datacom interfaces. The TX130+ can replace a customer router, modem, or Integrated Access Device (IAD) in order to check IP connectivity with a local or remote end point by transmitting and responding to ICMP echo requests (PINGs).



However before any layer 3 protocol can traverse the WAN using a dialup or dedicated leased line, it must be encapsulated by a data-link layer protocol. Depending on test application and interface, the technician can encapsulate the IP packets using either:

- PPP over HDLC
- Ethernet over HDLC

Both static and DHCP connection modes are supported, and the user can determine the IP address and number of Pings to send.



Ethernet Features

BERT

Layer 1, 2, 3, and Layer 4 BER testing is supported. The BER test can be configured to use regular PRBS test patterns, stress patterns or user defined test patterns to simulate various conditions. All patterns are encapsulated into an Ethernet frame to verify bit-per-bit performance of circuit under test.

Traffic		Delay		Rates	
Line Rate	100.00M	100.00M	100.00M	0	0
Framed Rate	98.70M	98.70M	98.70M	0	3
Data Rate	96.23M	96.23M	96.23M	0.00E+00	2.27E-04
Utilization	100.00%	89.9%	89.9%	0	0
# of Bytes	3.94E+08	3.94E+08	3.94E+08	0.00E+00	0.00E+00

One traffic stream is transmitted across the network under test and bit-per-bit error checking is then 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 or intelligent loopback device in Smart Loop mode or in Peer-to-Peer mode.

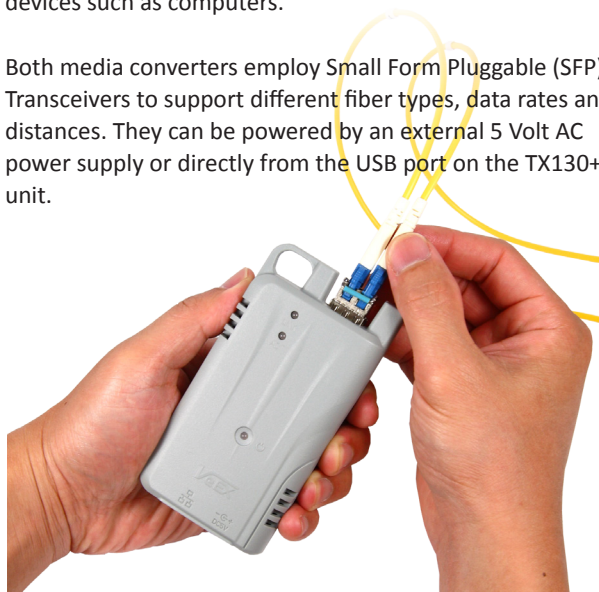
Media Converters

Optical interface testing using VeEX media converters

The MC100 is a rate-switching 10/100 UTP copper to 100BASE-FX fiber media converter providing cost-effective connectivity between the TX130+ and 100 Mbps legacy fiber based networks.

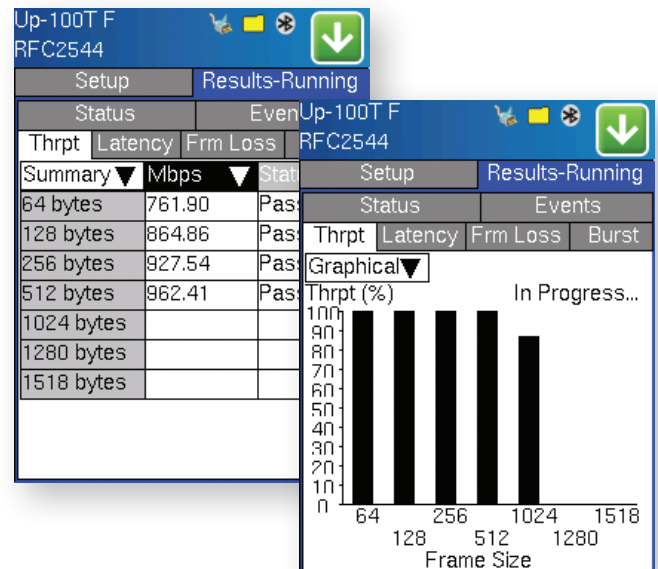
The MC1000 is a miniature 1000BASE-T UTP copper to 1000BASE-X fiber Gigabit Ethernet media converter supporting connectivity from Gigabit switches and other devices such as computers.

Both media converters employ Small Form Pluggable (SFP) Transceivers to support different fiber types, data rates and distances. They can be powered by an external 5 Volt AC power supply or directly from the USB port on the TX130+ unit.



RFC2544 Compliance Testing

Performs the RFC2544 automated test suite at all recommended frame sizes including user configurable frame sizes and up to full line rate. The test suite is performed with the far end test partner in loopback mode. Thresholds may be configured for accurate SLA assurance and verification. The automated tests supported are throughput, latency, frame loss, and back-to-back frames.

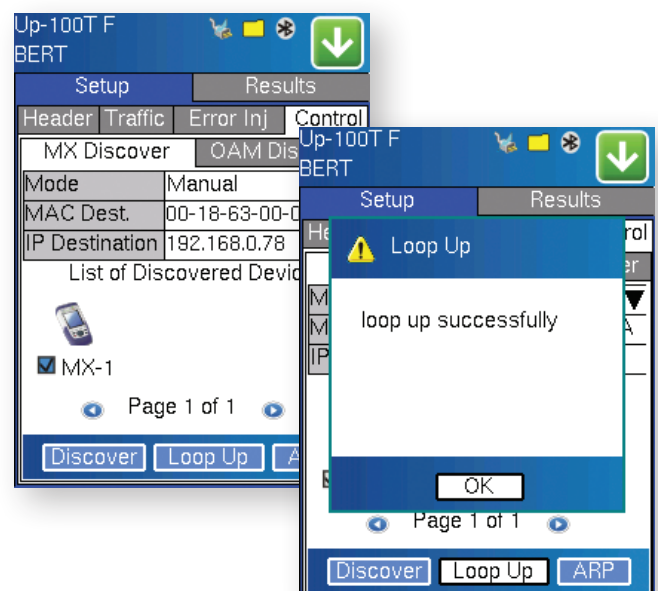


Throughput Test

A single traffic stream can be configured with CoS (VLAN priority) and QoS (TOS/DSCP) prioritization to facilitate end-to-end performance verification. The throughput test may be performed with a second test unit at the far end in Smart Loop mode or Peer-to-Peer mode.

Intelligent Network/Device Discovery

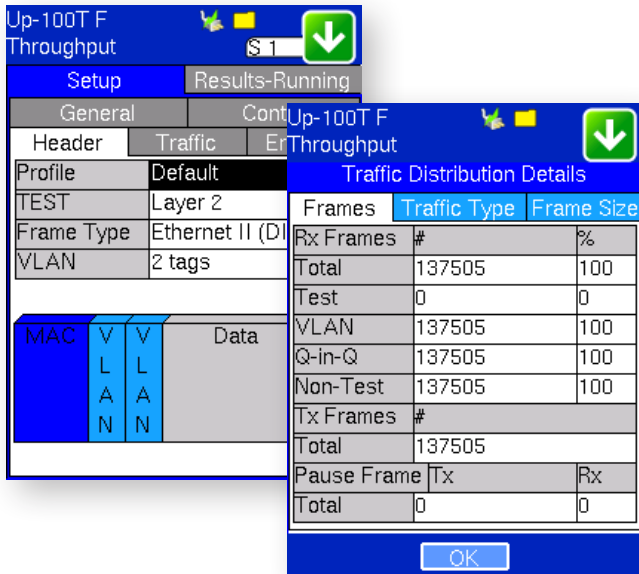
Easily discover and select another VeEX Ethernet tester or loopback device on the network under test for loopback testing applications. The local device will control the operation of the far end device, in either loopback or peer-to-peer mode. This feature greatly simplifies field testing since there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



Ethernet Features *cont'd*

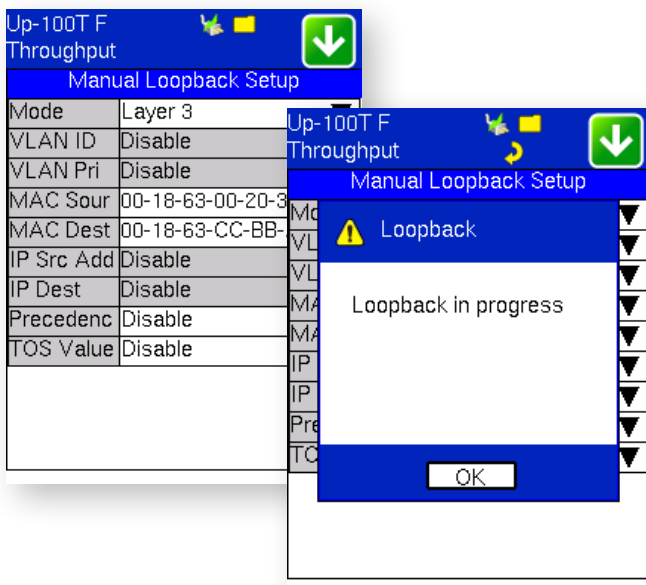
Q-in-Q (VLAN stacking)

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



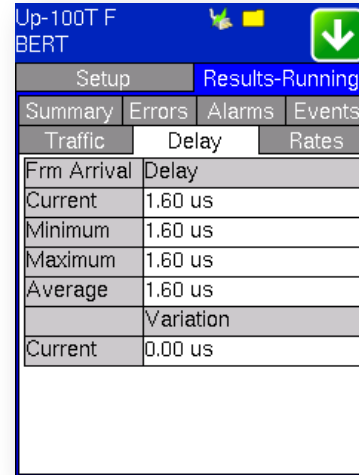
Smart Loopbacks

Four modes are available for looping back test traffic. 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 the MAC and IP source and destination addresses swapped, and for Layer 4, all incoming unicast traffic is looped back with the MAC, IP, and UDP/TCP ports swapped.



Delay and Jitter Measurements

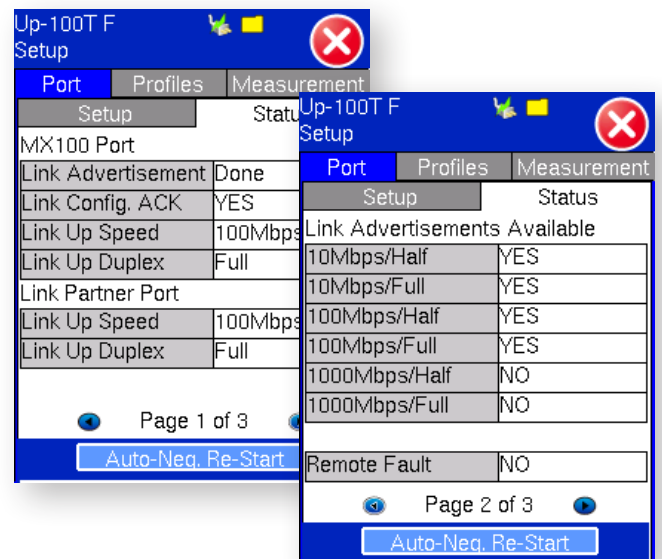
Frame delay and Jitter measurements are supported. Jitter measurements are based on RFC3393 which describes the industry recognized Inter Packet Delay Variation (IPDV) method. Jitter measurements are performed on the test traffic during BER tests or throughput tests and RFC2544.



Test Port Status

Auto-negotiation is a function that enables Fast Ethernet devices to automatically exchange information over a link about speed and duplex abilities. A common cause of performance issues on 10/100T Ethernet links occurs when one port on the link operates at half-duplex while the other port operates at full-duplex.

The port status feature of the TX130+ reports the auto-negotiation and link advertisement parameters of both test set and link partner, which helps to reduce many link performance-related support calls.



MPLS Measurements

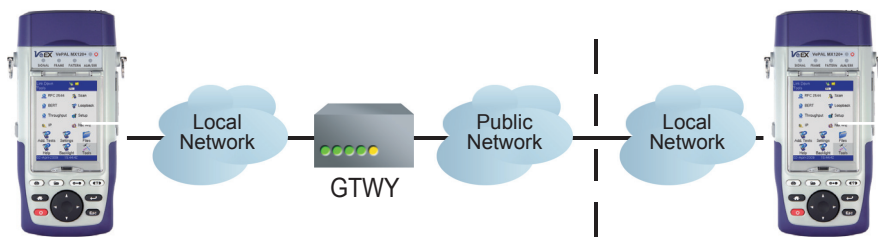
Multiple Protocol Label Switching (MPLS) is a technology that allows for a more efficient routing of Ethernet/IP packets via the use of MPLS routers in the network. MPLS labels reside between the MAC (Layer 2) and IP layers (Layer 3). Up to three MPLS tags can be configured in the traffic stream with user configurable Label, CoS, and TTL fields.

IP Testing

Used initially only for Local Area Network (LAN) connectivity within the enterprise, the Internet Protocol (IP) has quickly grown to be the de-facto standard for multi-service network transport.

For Telco and IT technicians, it's no longer enough to validate equipment at the physical interface or connection protocol level only, so IP testing has become a routine task during service installation and restoration.

The TX130+ supports an array of IP test functions over the 10/100/1000BaseT port including Ping, Trace Route and Triple Play measurement tasks. Web browsing, FTP throughput, VoIP and IPTV tests can be performed at various points in the network to ensure customer satisfaction.

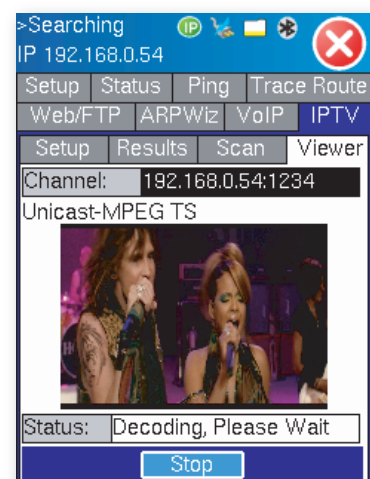
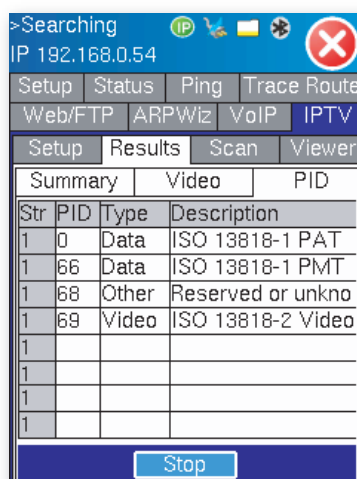
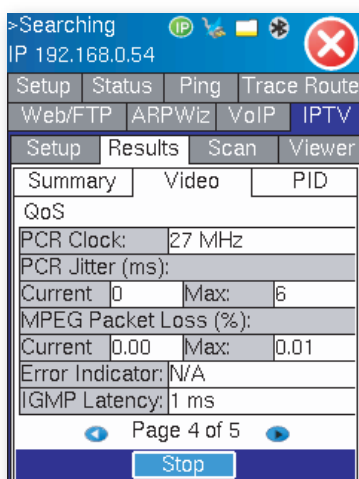


IPTV Service Verification

Facing the growing challenge from competition in the cable television and wireless mobile industries, traditional telco's are fast deploying IPTV to reduce customer churn in order to preserve revenues. As a consequence, technicians normally assigned to take care of leased line and datacom services are now being called upon to make IPTV measurements in order to reduce expensive truck rolls.

Although IPTV testing can be a complicated and daunting task, the TX130+ has been equipped with a good balance of user friendly functions needed to install and troubleshoot IP video service.

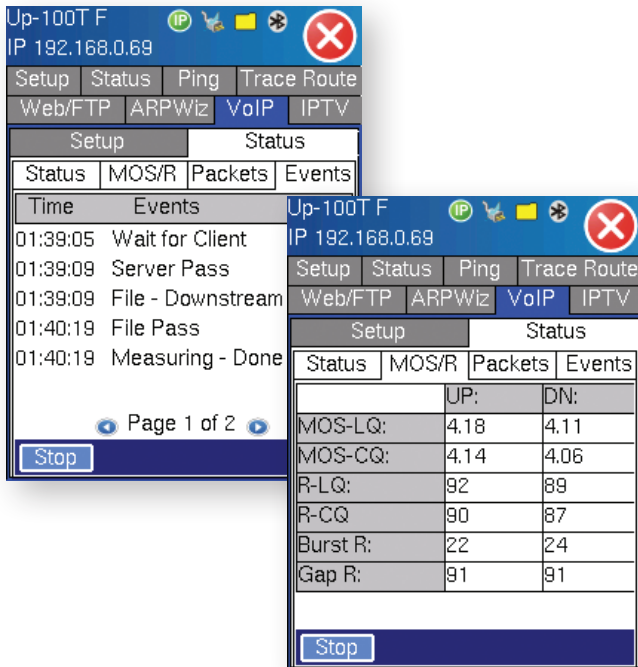
- Set-Top Box (STB) emulation offers registration, IGMP and RTSP signaling for Broadcast and Video on Demand (VOD) applications.
- Transport stream analysis encompasses data/video/audio bit rates and Program Identification (PID) mapping.
- Packet jitter and loss, IGMP latency (channel zapping), PCR and MDI statistics including a Viewer function provide valuable Quality of Service (QoS) and Quality of Experience (QoE) metrics.



VoIP Testing

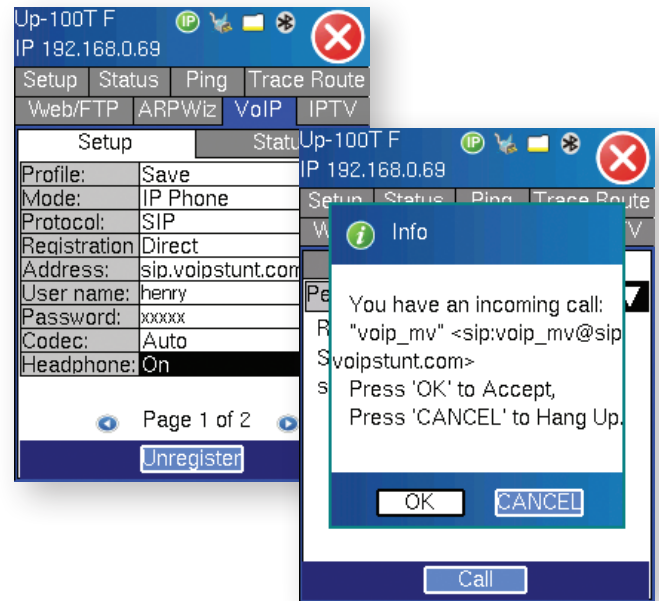
Take advantage of the three software options offering different test methods to verify and provision your VoIP network. Testing can be performed over any of the Ethernet test ports.

VoIP Check – Simulates a VoIP call to the nearest router and measures the round trip MOS score and related VoIP parameters.



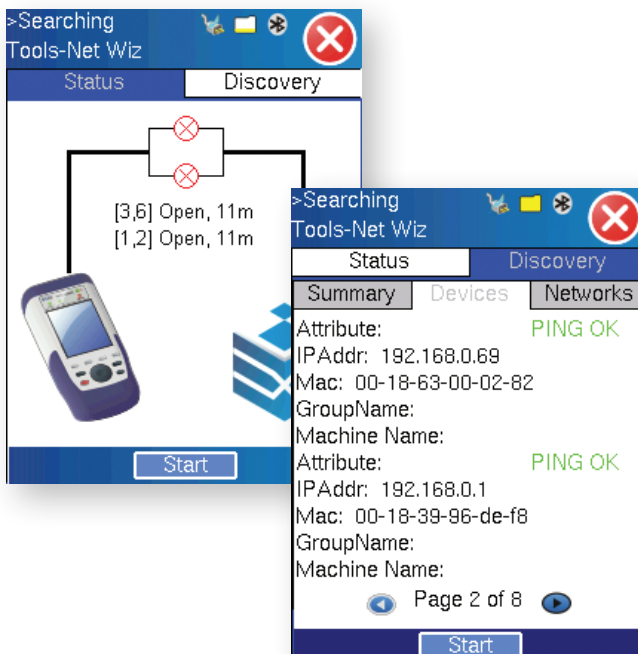
VoIP Expert – Generates industry standard wave files to verify MOS and R-Factor values of upstream and downstream paths and includes QoS measurements such as packet jitter, packet loss, and delay. Compatible with all VeEX testers including VX1000 VoIP server software.

VoIP Call Expert – Emulates an IP phone and can place and receive calls using SIP or H.323 protocols. Comprehensive Codec support and call destination options verify voice encoding and translation provisioning. Real-time evaluation of subjective voice quality is made possible using the Telchemy® test method.



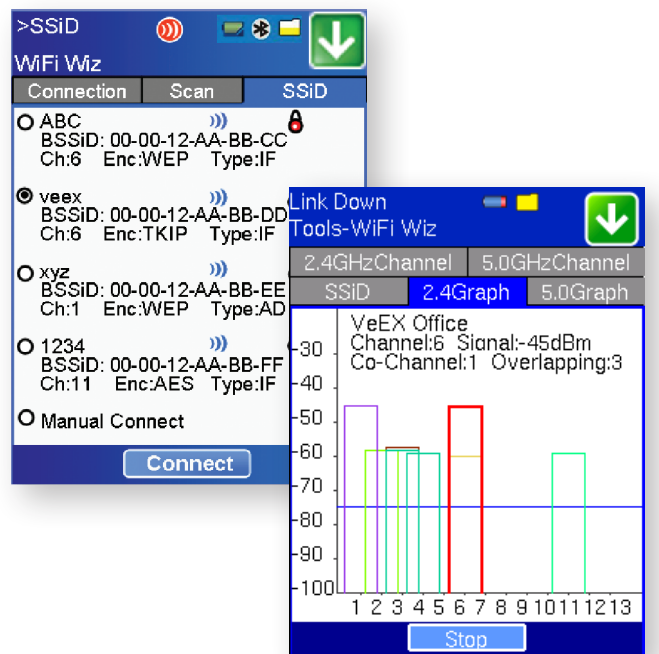
Net Wiz

Ethernet network installation is simplified using this basic, yet powerful feature. A built-in TDR identifies distance to short, distance to open, wire cross, and other anomalies associated with CAT-5 structured cabling. "Sniff" the network using the one-touch discovery feature. Identify routers, gateways, printers, PCs and other devices connected to the network within seconds.



WiFi Wiz

All VePAL products adopt a USB WiFi adaptor to make 802.11 a/b/g/n/ac wireless installations a simple task. Scan for available networks or perform signal strength and quality measurements to determine the best location for a new wireless access point. The IP Ping capability ensures the wireless network is properly installed and configured. A full suite of IP testing features is supported.



PDH and DS3/DS1

Electrical Interfaces

Dual RJ45 (TX130E+ only)

- 2.048 Mbps, HDB3 & AMI, 120Ω balanced
- 1.544 Mbps, AMI & B8ZS, 100Ω balanced (Optional)
- 64 kbps G.703 Codirectional, AMI, 120Ω Balanced (Optional)
- 3-pin 120Ω Banana converter cable (F02-00-009G) is available for E1 and Codirectional

Dual Bantam (TX130+ only)

- 2.048 Mbps, HDB3 & AMI, 100Ω balanced (Optional)
- 1.544 Mbps, AMI & B8ZS, 100Ω balanced
- 64 kbps G.703 Codirectional, AMI, 100Ω Balanced (Optional)

BNC (75Ω unbalanced) Rates and Line code

- 2.048 Mbps, HDB3 & AMI
- 8.448 Mbps, HDB3 (Optional)
- 34.368 Mbps, HDB3 (Optional)
- 44.736 Mbps, B3ZS (Optional)

Compliant to ITU-T G.703, G.823, G.824, G.772 and ANSI T1.102 recommendations where applicable

Clock recovery (pulling range) per ITU-T G.703

Receiver Sensitivity

2.048 Mbps (E1)

- Terminate: ≤ 6 dB (cable loss only)
- Monitor (PMP): ≤ 26 dB (20 dB resistive, 6 dB cable loss)
- Bridge: ≤ 6 dB (cable loss only)

8.448 Mbps (E2)

- Terminate: ≤ 6 dB (cable loss only)
- Monitor (PMP): ≤ 26 dB (20 dB resistive, 6 dB cable loss)

34.368 Mbps (E3)

- Terminate: ≤ 12 dB (cable loss only)
- Monitor (PMP): ≤ 26 dB (20 dB resistive, 6 dB cable loss)

Optional

1.544 Mbps (DS1)

- Terminate: ≤ 26 dB (cable loss only) at 0 dBdsx Tx
- Monitor (PMP): ≤ 26 dB (20 dB resistive, 6 dB cable loss)
- Bridge mode: ≤ 6 dB (cable loss only)

44.736 Mbps (DS3)

- Terminate: ≤ 10 dB (cable loss only)
- Monitor (PMP): ≤ 26 dB (20 dB resistive, 6 dB cable loss)

Clock Synchronization

Internal: ± 3.5 ppm stability per ITU-T G.812

Recovered: from the incoming signal

External reference via RX2 balanced and AUX RX unbalanced

- Signal: 1.544 Mbps, 2.048 Mbps

External reference via RX2 unbalanced

- Signal: 1.544 MHz, 2.048 MHz

Tx Frequency Offset

- Up to 50 ppm in steps of 0.1 ppm for DS1, E2, E3, and DS3
- Up to 25,000 ppm in steps of 0.1 ppm for E1 interface

Functions

Operating Modes

Terminate, Monitor, Bridge (DS1 & E1)

Signal Structure

2.048 Mbps (E1)

- Unframed or Framed with/without CRC per ITU-T G.704 (PCM30, PCM30C, PCM31, PCM31C)
- Test signal in N/M x 64 kbps, N x 56 kbps where N=1 to 30/31

Optional

1.544 Mbps (DS1)

- Unframed or Framed SF (D4), ESF per ANSI and Telcordia standards where applicable

- Test signal in N x 64 kbps, N x 56 kbps where N=1 to 24

8.448 Mbps (E2)

- Unframed or Framed per ITU-T G.742

34.368 Mbps (E3)

- Unframed or Framed according to ITU-T G.751

44.736 Mbps (DS3)

- Unframed or Framed M13 and C-Bit Parity

Patterns

The following test patterns can be generated

- PRBS: 2¹¹-1, 2¹⁵-1, 2²⁰-1, 2²³-1, 2³¹-1: normal or inverted
- Fixed: 0000, 1111, 1010, 1000 and 1100
- 10 User programmable words up to 32 bits each

Errors

Insertion

- 2.048 Mbps (E1): Code, FAS, CRC, EBIT, Bit errors

Optional

- 1.544 Mbps (DS1): Code, FAS, Bit, Frame, CRC
- 8.448 Mbps (E2): Code, FAS, 2M FAS, 2M, Bit errors
- 34.368 Mbps (E3): Code, FAS, 2M FAS, 2M, Bit errors
- 44.736 Mbps (DS3): Code, FAS, MFAS, P/C-Parity, Bit errors
- Single or continuous rate (1 x 10⁻³ to 5 x 10⁻⁹)

Measurement

- 2.048 Mbps (E1): Code, FAS, CRC, EBIT and Bit errors
- 8.448 Mbps (E2): Code, FAS, Bit errors
- 34.368 Mbps (E3): Code, FAS, Bit errors

Optional

- 1.544 Mbps (DS1): Code, FAS, Bit, Frame, CRC
- 44.736 Mbps (DS3): Code, FAS, MFAS, P/C-Parity, Bit error

Alarms

Generation

- 2.048 Mbps (E1): LOS, AIS, LOF, RDI
- Mode: Static (Enable/Disable)

Optional

- 1.544 Mbps (DS1): AIS, yellow, idle, LOS, LOF
- 8.448 Mbps (E2): LOS, AIS, LOF, RDI, 2M LOF, 2M RDI
- 34.368 Mbps (E3): LOS, AIS, LOF, RDI, 2M LOF, 2M RDI
- 44.736 Mbps (DS3): LOS, LOF, OOF, AIS, Parity
- Continuous or timed

Measurement

- 2.048 Mbps (E1): LOS, AIS, LOF, LOMF, RDI and LSS
- 8.448 Mbps (E2): LOS, AIS, LOF, RDI and LSS
- 34.368 Mbps (E3): LOS, AIS, LOF, RDI and LSS

Optional (DS1, DS3): LOS, AIS, LOF, OOF, yellow, idle, Parity and LSS (where applicable)

SSM QL

- E1 Sa bits clock quality encoding and decoding
- Selectable Sa bits for SSM monitoring and generation

Measurement Functions

Test Results

Error count, ES, %ES, SES, %SES, UAS, %UAS, EFS, %EFS, AS, %AS, and rate for all events: errors, alarms and pointer events

Performance Analysis

Measurements according to:

- ITU-T G.821: ES, EFS, SES and UAS with HRP 1% to 100%
- ITU-T G.826: EB, BBE, ES, EFS, SES, UAS; HRP of 1% to 100%
- In Service Measurement (ISM) using FAS, CRC, Code (DS1 or E1)
- Out of Service measurement (OOS) using bit errors (TSE)
- ITU-T M.2100: ES, EFS, SES, UAS with HRP 1% to 100%
- User defined thresholds for Maintenance (MTCE) and Bringing into Service (BIS) objectives, including In-service measurements on both near and far ends of path using TSE

Pulse Mask Analysis (Optional)

PDH (E1/E3)

- Bit rates: 2.048 Mbps (E1) and 34.368 Mbps (E3)
- Conformance Mask: ITU-T G.703

DS1/DS3

- Bit rates: 1.544 Mbps (DS1) and 44.736 Mbps (DS3)
- Conformance Masks: ITU-T G.703, ANSI T1.102, T1.403, T1.404 where applicable

Mode: Non-Intrusive

Display: Pulse shape with Conformance mask verification

Parameters: Width, Rise/Fall time, Overshoot/Undershoot

VF Measurement (Optional)

VF drop/insert via Headset

ABCD bits monitor & transmit in selected timeslot channel

Programmable ABCD states for IDLE, SEIZE, USER for E1 and ON-Hook, OFF-Hook, WINK, USER for DS1

Tone generation: 1Hz, 1 dB resolution

- Frequency (Hz): 50 to 3950 Hz
- Level (dBm): +3 to -60 dBmV

ISDN PRI Testing (Optional)

NT and TE emulation

Place/receive voice and data calls

D-channel monitor with full decode: Layer 2 (Q.921) & Layer 3 (Q.931)

Protocols

- DS1: National ISDN, AT&T, Nortel DMS
- E1: ETSI (Euro - ISDN)

Via Headset for B-channel talk/listen

Supports multirate N x 64k data call

Supplementary Services Test: Automatically tests the provisioning of the following supplementary services: CLIP, CLIR, COLP, CFU, CFB, CFNR, SUB, MSN, DDI, HOLD, UUS, TP, AOC-S, AOCD, AOCE, MCID, CUG

Jitter Measurement (Optional)

Test rates: DS1, DS3, E1, E3

Range: Per ITU-T O.171

PASS/FAIL Threshold: Per ITU-T G.823

Wander Measurement (Optional)

Fully compliant to ITU-T O.171 and O.172

Test Interfaces: E1 (2M)

Reference Clock

- Clock Source: 2 Mbps (or 1.5 Mbps) signal or 2 MHz (or 1.5 MHz), 64 kbps Co-directional

Parameters

- Real Time Measurements
- Time Interval Error (TIE), Maximum TIE (MTIE) per O.171

Long-term TIE log and direct export to USB Memory for further MTIE and TDEV Analysis (optional)

- Includes Wander Analysis PC Software

Other Functions

Auto Configuration: Auto detection of line coding, framing, test pattern

Frequency Measurement (Unit/Resolution): Hz & ppm/1 Hz

Round Trip Delay (Range/Resolution): 1 μ S to 10 seconds/ 1 μ s or 1 U.I.

Event Logging: Date and time stamped events in tabular format

Histograms: Display of Errors and Alarms versus time

LED Indicators: Fixed LEDs for signal and error/alarm

E1 APS (Triggers): AIS, LOS, LOF

G.703 64k Codirectional Testing Option

Interfaces

- RJ48 (120 Ω) , Bantam (100 Ω)
- Available RJ48 to 3-pin Banana converter

Transmit Clock

- Internal, External, Received
- Frequency offset generation to \pm 150.00 ppm

Measurements

- Bit, Code, LOS, AIS, pattern loss (LSS) with Histogram and Bar Graph representation
- G.821 performance evaluation
- Signal level, data rate and offset
- Time-stamped Events Log
- Round-trip Delay

Error and Alarm Generation

- Bit, Code, LOS, AIS

DSn Functions (TX130+ only)



Besides bantam DS1 interfaces, the North American version offers application-oriented DS1 and DS3 streamlined GUI that is shared among other TX-Series test set.

DS1 and DS3 Auto-Monitor

Quickly auto-configures to the received signal and runs a health check. Provides a summary screen with all alarm indications, frequency, signal level, BPV/code errors, FBE, clock slips Histogram and bar graph representation of errors and alarms Channelized DS3 support with selectable DS1 channel status

DS1 Loopback Commands

Enhanced DS1 Loopback command generation enable users to singlehandedly test DS1 links by activating automated loopbacks in the desired network elements.

In-band:

- CSU, NIU FAC1, NIU FC2 ESF Facility Data Link (FDL) Control
- Line and payload HDSL Abbreviated (short)
- From Network (CO) or CPE
- NLOC, NDU1, NDU2, NREM

HDSL Long (In-band)

- From Network (CO) or CPE
- 2-wire and 4-wire
- HTU-C, H4R1, H4R2, H4R3, HTU-R
- Arm, Query Loop, Time-out override, Loopback Query, Loop Up, Loops down, Disarm commands
- Detailed confirmation messages

User Defined codes

- Programmable codes up to 16 bits
- Programmable time out

Ethernet

DS1 Multi-BERT™

Bring into service and troubleshoot DS1 links quickly by automatically generating different test patterns in a sequential BER test. Since certain test patterns can help identify and test for specific problems or behaviors, the test sequence can be customized with specific test patterns and timings to target specific test scenarios, like checking for proper line coding settings, framing, or clock recovery.

- Sequential BER testing with up to eight test patterns (any standard test pattern in any order)
- Single cycle and Continuous operations
- Individual pattern timing up to 3599 seconds (1 hour)
- Bit, Code, FBE, ES, and total test time report, per pattern and totals
- Monitors signal frequency, level (dB and dBm) and CRC error count

Datacom Option (TX130E+ only)



Interface via adaptors

RS-449 (422 and 423), X.21, RS-232, V.35 and V.36 serial interface

Modes

DTE, DCE Emulation for all interfaces
Bi-directional data in service transmission monitoring (V.35, X.21, RS-232/V.24, V.36/RS-449)

Measurements

ITU-T G.821 analysis, error type reports
Block error measurement
Round Trip Delay

Error insertion

Bit error(s): single, count and rates (1E-3 through 1E-9)
Block error measurement

Asynchronous operation

Parity selection: odd, even and none
Data bits: 5, 6, 7, or 8 bits
Stop bits: 1, 2 bits
In-band or Out-of-band flow control

Transmit clock sources

Internal
Recovered from test interface

Electrical Interfaces

Single RJ45 10/100/1000 Base-T Port
IEEE 802.3 compliant
100Base-FX with external MC100 media converter (order separately)
1000Base-X with external MC1000 media converter (order separately)

Ethernet Features

Auto Negotiation
Full and Half Duplex
Flow Control

Modes of Operation

Terminate
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 (10,000 bytes)
Fixed and uniform frame size generation
Traffic prioritization via VLAN priority field, MPLS CoS field and the IP TOS/DSCP fields
Up to 3 VLAN and MPLS tags can be added to each user configured traffic stream

RFC2544 Compliance Testing

Automated tests with configurable threshold values and maximum transmit bandwidth settings
Throughput, Latency, Frame Loss, and Back-to-back (burst) tests
Frame sizes: 64, 128, 256, 512, 1024, 1280, and 1518 bytes including 2 user configurable frames

Bit Error Rate Testing

PRBS Patterns: 2³¹-1, 2²³-1, 2²⁰-1, 2¹⁵-1, 2¹¹-1; normal and inverted
Layer 1 Framed: CRPAT, CSPAT, CJPATS
Error Injection: Bit, CRC, Symbol, IP Checksum
One configurable stream with one fixed frame size

Throughput Testing

Single traffic stream with configurable MAC, VLAN, MPLS, IP and UDP 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 burst) 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, 3, and 4 loopback: loops back all incoming unicast traffic and drops all incoming multicast and broadcast traffic

Key Measurements

LED indicators for signal and error/alarm
Error Measurements: Bit, CRC, symbol, IP checksum, jabber frames, runt frames, collisions, late collisions
Alarm Detection: LOS, pattern loss, service disruption
Frame/Package Statistics: Multicast, broadcast, unicast, pause frames, frame size distribution, bandwidth utilization, frame rate, line rate, data rate, frame loss, frame delay variation/jitter (per RFC3393)

Platform Features

Ping Test over WAN (Optional)

Interfaces: E1, DS1, Datacom
 Encapsulation types: PPP over HDLC, Ethernet over HDLC
 IP modes: Static or DHCP
 Ping: Destination IP address, # of Pings, duration, TTL

IP Testing (Optional)

Ping, Trace Route, ARP, FTP/Web tests, Web Browser

VoIP Testing (Optional)

Codecs: G.711 μ -law, G.711 A-law, G.723.1 (optional), G.729 (optional)
 Measurements: MOS (CQ and LQ) and ITU-T G.107 R-factor (CQ and LQ)
 Packet Statistics: data throughput rate, packet loss, packet discard, OOS, duplicate, jitter

VoIP Check

- Simulates VoIP call to the nearest router by sending ICMP traffic with payload/rate mimicking VoIP traffic

VoIP Expert

- Client/Server mode provides bi-directional measurements
- Compatible with any VeEX field tester or centralized VeEX VX1000 Server software

VoIP Call Expert

- VoIP call setup: supports SIP and H.323 protocols
- Configurable jitter buffer (fixed or dynamic)
- Incoming call Auto Answer
- STUN support
- Talk/Listen with USB headset
- DTMF test (RFC4733)
- Signaling trace with protocol decode
- Up to 24 simultaneous calls

IPTV (Optional)

Provides STB emulation
 Analyze up to 3 streams
 Supports IGMP/RTSP signaling
 Codecs MPEG2, MPEG4-part2, and MPEG4 part 10 (H.264)
 IPTV image viewer for stream identification
 PIDs count
 Data Rates (Video, Audio, tables) and error counts
 MDI score
 Channel Zapping test

NetWiz (Optional)

Available on 10/100/1000-T test port
 Detect distance to open/short, wire cross, impedance mismatch
 Network device discovery; Auto Ping verification

WiFi Wiz (Optional)

Supports 802.11 a/b/g/n/ac networks in the 2.4 and 5 GHz bands (requires optional Wi-Fi USB adapter supplied by VeEX)
 SSID detection, infrastructure, Ad-hoc, and encryption
 Signal strength and signal quality
 IP connectivity (Ping, Trace Route, FTP upload/download, Web Test, VoIP Check and VoIP Expert)

* Not included

Advanced Management (Optional)

This option allow users to append work order information to test results (e.g. Job ID, account, location, comments).

- Compatible with R300 Productivity Server (R-Server)
- Authorized test sets can register with specific VeSion R300 Server
- Test results can be uploaded via LAN, Wi-Fi or cellular data connection

Remote Access

The TX130+ offers multiple ways to Remote Control it or access the information remotely (e.g. test results, test profiles, etc.). The test set can be reached via:

- ReVeal MTX PC software
- Scripting via SCPI commands
- Connectivity: 10/100Base-T, Wi-Fi 802.11 a/b/g/n/ac*

ReVeal MTX PC Software

Remote Control (optional)

Remote screen capture and movie capture

Remote Software management: software upgrade, software option management

Test results management

Advanced report generation with .pdf or .csv formats, combine test results, add logos and comments

Test profiles management online or offline test profile creation, upload and download

Wander files retrieval

Test Profile Management

Save and Recall test profiles to internal memory

Additional Test Features

Profiles: Save and recall test profiles

Screen capture: Screen shots in .bmp format via ReVeal MTX PC software

Remote control: via ReVeal MTX PC software

Results saving: 1000 results

Export test results via USB, FTP, or ReVeal MTX PC software

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 lb)
Battery	Lilon smart battery, 2600 mAh 10.8VDC Operating time: 3-5 hours, application dependent
AC Adaptor	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
Display	3.5" QVGA 320x240 color touch-screen
Ruggedness	Survives 1.5m (5 ft) drop to concrete on all sides
Interfaces	USB 2.0, RJ45 10/100-T Ethernet
Languages	Multiple languages supported



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