

TRANSPORT SOLUTIONS

ACCESS

TRANSPORT

CARRIER ETHERNET

MOBILE BACKHAUL

Transport Product Solutions

VeEX® offers a complete set of Test and Measurement solutions for Business Services, Access, Metro, Core and Transport networks. Versatile test platforms combine an unparalleled range of technologies to help optimize network performance and reliability. VeEX products address all stages of deployment and field service turn-up to deliver the highest quality services during installation, verification, maintenance, and troubleshooting of networks.

RXT™ Modular Test Platform with VeExpress™



With extreme modularity and an open platform concept, the RXT defines the test set of the future. The RXT's capability to combine multiple technologies, from legacy Datacom to 100G, into a rugged modular platform increases the productivity of technicians who are responsible for the installation, verification, and maintenance of today's complex services. The intuitive user interface also boosts productivity by helping technicians and field engineers to make their job easier, accelerating the learning curve, and reducing training requirements.

- Flexible Test Module design accommodates different module sizes allowing future growth of the RXT Platform into more complex technologies and high-end applications
- RXT-6000 100G Multi-Service Module combines Ethernet, Fibre Channel, CPRI/OBSAI, OTN, SDH/SONET testing, from 10M to 100G
- RXT-3000 10G Multi-Service Module combines Ethernet, SyncE, PTP, Fibre Channel, CPRI/OBSAI, OTN, SDH/SONET, PDH/DSn and Synchronization testing, from 64k to 11G
- Built-in GPS and Atomic Clock reference options
- RXT-2600 SHDSL.bis module combines standard SHDSL, EFM and enhanced SHDSL.bis data rates and up to four copper pairs, for long-reach Ethernet legacy E1/T1 based services
- Brings forward compatibility to existing MTT Test Modules to assure smooth transition and protects previous investment. *Refer to MTT section*

UX400 Multi-Service Universal Test Platform up to 100G

The robust UX400 and UX400R Universal Expert are the most versatile portable multi-service transport test solution to offer test capabilities ranging from DS1/E1 all the way up to 100GE network speeds, in a compact chassis with battery backup autonomy at all rates. Its modular architecture supports up to six independent test modules, multiple concurrent tests, and a browser-based multi-user remote interface for accessing and operating different test modules at the same time, maximizing the use of resources. Test modules can also operate in a centralized rack-mounted version, when portability or battery operation is not required.

Available Technologies

- 40/100G Ethernet and OTN
- 40G OTN/SONET/SDH
- 10G Ethernet, OTN, SONET/SDH
- STM-0/1/4/16, OC-1/3/12/48, DSn/PDH
- Ethernet 10/100/1000Base-T, 100Base-FX/1000Base-X, ITU G.8261 SyncE, IEEE 1588v2 PTP
- 1/2/4/8/10/16G Fibre Channel

Platform Options

- Built-in OPM and VFL
- Built-in Atomic Clock
- Built-in GPS receiver
- Rack-mount version
- CLI/SCPI scripting and remote control
- High-capacity Li-Ion battery for uninterrupted testing

1.5M TO 100G



TX300s Multi-Service Test Set with VeExpress™



The TX300s, with VeExpress asset management, is a full-featured, field-configurable portable test solution for Carrier Ethernet, Backhaul, Mobile, and Transport and field Synchronization testing. This flexible and multi-tasking platform supports OTN, SDH, SONET, PDH, DSn networks, and offers extensive support for Mobile Backhaul technologies with SyncE, 1588v2 PTP, Carrier Ethernet and CPRI/OBSAI testing. VeExpress secure cloud-based environment manages the test sets, licenses and workflow. The all-inclusive hardware reduces CAPEX with no factory returns necessary for upgrades. Test features can be purchased, rented, leased and shared as needed. This allows proactive management of software and hardware assets, ultimately optimizing OPEX.

- Single or Dual test port configurations
- OTN: OTU1/2/1e/2e, ODU0, ODUflex
- SONET/SDH up to OC-192/STM-64
- DSn/PDH: DS1, DS3, E1, E3, E4
- CPRI: 614.4 Mbps to 9.8304 Gbps
- OBSAI: 768 Mbps to 6.144 Gbps
- Ethernet: 10/100/1000Base-T, 100Base-FX/1000Base-X, 10 GE
- Fibre Channel: 1/2/4/8/10G
- SyncE and 1588v2 PTP: Master and Slave Clock emulation, protocol monitoring and decoding, wander/phase analysis



- Built-in Atomic Clock
- Built-in GPS receiver
- Optional factory-installed OTDR
- High-capacity Li-Ion battery for uninterrupted testing

VeExpress™ Asset Management and Optimization Service



Minimize CAPEX and optimize OPEX by managing your VeEX testers with VeExpress. VeExpress manages test sets, licenses and workflow in real time. Stop purchasing test sets loaded with extra features, just in case, or placing multiple orders with varying configurations for different user groups. Reduce your CAPEX by buying what you really need and proactively manage your software and hardware assets. Own, rent or lease-to-own only the required test features, in the right quantities, to optimize your OPEX.

- Buy commonly used test functions required to get the day-to-day job done
- Lease newly adopted technologies without the risk of paying for it up-front
- Rent test features used on a contingency-basis for special cases or projects; Rent ticker only starts when the feature is first assigned and used
- Share the software license pool among different users, including owned, leased and rented features

VeExpress secure cloud-based environment provides the redundancy and speed of geographically-distributed servers around the world as well as scalability and up time. Test platforms and web clients automatically connect to the closest/fastest server available.

TX320s



Dual Test Port Hardware Option



The TX320s dual test port hardware option for the TX300s platform offers a full-featured portable test solution for OTN, SONET/SDH, PDH/DSn, Carrier Ethernet, Fibre Channel and CPRI/OBSAI. This factory-installed hardware option allows the addition of other applications, for example, OTDR, to be installed concurrently in the same test platform.

- All-in-one multi-service test solution
- Dual SFP+ ports support Ethernet interface from 100Base-FX to 10GE, SDH from STM-0 to STM-64, SONET from OC-3 to OC-192, Fibre Channel from 1G to 10G, OTN at OTU1, OTU2, OTU1e/2e and CPRI/OBSAI
- Dual RJ45 ports support 10/100/1000Base-T
- RJ45/Bantam and BNC ports support PDH/DSn electrical interface
- Port 1 and Port 2 support independent and simultaneous measurements or can be configured to perform in-service monitoring

TX130M+

Advanced Services Test Set

The TX130M+ is a full-featured backhaul test solution supporting legacy DSn/ PDH, Metro Ethernet and Synchronized Packet networks. The unit is capable of emulating both Master and Slave clocks according to ITU-T G.8261 SyncE and IEEE 1588v2 standards. This is particularly useful for carrier-class services since either or both of these protocols can be found in mobile networks, utilities, power infrastructure, capital markets, and other modern time-sensitive services. Whether your customers are adopting new carrier-class services or in the process of migrating their legacy networks from TDM to Packet-based backhaul, you will benefit from the wide range of DSn/ PDH and Ethernet interfaces and powerful test features available in the TX130M+ test set. Technicians only need to carry one small portable unit to the field to validate transmission over copper and optical fiber connections including all the sophisticated functions of new synchronization technologies.

- Ethernet: 10/100/1000Base-T and 100Base-FX/1000Base-X
- PDH/DSn: E1, E3, DS1, DS3, ISDN, VF
- ITU-T G.8261 SyncE/IEEE 1588v2 PTP
- Master Clock and Slave Clock emulation
- Protocol monitoring and decoding
- Clock stability (wander) and accuracy (phase) testing



TX130+ PDH/DSn Test Set with Ethernet

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The TX130+ test set offers a single, multifunctional access network installation and maintenance tool. Equipped with PDH/DSn, Datacom and Ethernet interface options, it performs traditional ITU-T/ANSI bring-to-service tests required by large service providers and mobile operators, Datacom tests for legacy interfaces, as well as Ethernet tests for newer IP-based networks. The TX130+ can also be equipped with ISDN PRI and VF channel analysis. Designed for field application, it offers ease-to-use, battery-powered handheld operation and auto-configuration.

- DS1, DS3, E1, E3 testing
- Datacom testing for RS232, RS-449, X.21, and V.35
- 10/100/1000Base-T Ethernet testing
- ISDN PRI including NFAS (2x PRI)

TX150+

SONET/SDH/PDH/DSn Test Set



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The TX150+ is a compact and ruggedized field test set for installing, commissioning and troubleshooting SONET, SDH, PDH and T-Carrier networks. It offers simplified operation and intuitive menu structure and shortcuts. Complete electrical and optical testing with the standard feature set expected from larger test sets. The TX150+ supports SDH, SONET, PDH and DSn signal mapping and multiplexing structures, making it suitable for a global customer base. In addition, ITU-T performance measurements, E3/E1/DS3/DS1 pulse mask analysis, complete error/alarm injection, APS, Service Disruption, Overhead, TCM, Pointers, storage and field changeable Li-Ion battery are all packed into this field friendly unit weighing less than 1 kg. The unit can also be remote controlled for monitoring applications and other offsite or remote tasks.

- SONET: STS-1, OC-1/3/12/48
- SDH: STM-0/1/4/16
- PDH/DSn: E1, E2, E3, E4, DS1, DS3, ISDN, VF
- Jitter and Wander
- IP, VoIP, and Web testing

MX100e+/MX120e+

Advanced Metro Ethernet Test Set

The MX100e+ and MX120e+ are perfectly suited solutions for field technicians installing, commissioning, and maintaining Carrier and Metro Ethernet networks. With RFC2544 test suite and new ITU Y.1564 Ethernet Service Activation Methodology, the intuitive and automated tests ensure Carrier Ethernet SLA for services being transported across mobile backhaul and business Ethernet networks and validated using repeatable pass/fail limits. With additional features like IPv4/IPv6 traffic generation, VLAN Q-in-Q, MAC and VLAN flooding, as well as support for OAM Link and Service protocols, the MX100e+/MX120e+ offer a comprehensive array of test functionalities combined with a price/performance ratio unrivaled in the industry.

- Single (MX100e+) or Dual (MX120e+) 10/100/1000Base-T, 100Base-FX/1000Base-X
- Throughput, latency, frame loss, and back-to-back measurements per industry-standard RFC2544 and V-SAM tests (per ITU-T Y.1564)
- Ethernet BER testing at Layer 1-4, with or without VLAN and MPLS tags
- Q-in-Q (VLAN stacking) and multiple MPLS tag support
- MAC flooding and VLAN flooding
- IPv4/IPv6 traffic generation
- Advanced IP testing: Network discovery, HTTP/FTP test, VoIP, IPTV
- Multiple stream traffic generation and analysis for end-to-end QoS verification of multiple services
- IEEE 802.3ah, ITU-T Y.1731, IEEE 802.1ag OAM support
- Smart Loop mode for Layer 1, Layer 2, Layer 3, and Layer 4



MLX100 Ethernet Responder

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The MLX100 Metro Loopback Expert is an intelligent Ethernet loopback device developed as a perfect companion to VeEX Ethernet products. Loopback control can be performed in-band or via the built-in Ethernet management port via an Internet connection. When paired with the compatible MX/TX series, the MLX100 is a cost-effective solution for point-to-point Service Level Agreement (SLA) verification and end-to-end performance testing.



MTT Platforms and Modules

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The MTT (Modular Test Toolkit) gives field personnel an all-in-one, low-cost platform for installing, verifying, and troubleshooting a wide variety of service technologies. The MTT family includes chassis configurations for diverse testing needs and budgets, and its upgradeable modular design means dramatically lower cost compared to purchasing separate dedicated test sets. Modules are available for multiple testing needs and applications, including metro, DSL, transport, optics, and service.

- **MTT ACM II Chassis:** Advanced Cable Maintenance Toolkit provides a comprehensive handheld test set for qualifying the copper pair for different DSL services including VDSL2, ADSL2+ and SHDSL. The ACM II frequency range extends to 30 MHz - necessary for the more stringent copper loop verification required for VDSL2.
- **MTT C Chassis:** Ideal chassis for those who need service verification testing without the cable maintenance features. It is equipped with the same color screen as the MTT ACM II and supports many MTT modules.

Supported Modules

- **VF TIMS Module** provides complete Voice Frequency testing in the analog voice range of 50 Hz to 20 kHz, supporting loop start, DID and ground start signaling.
- **Dual T1 Module** From cable installation and maintenance to protocol monitoring and service verification, the Dual T1 Modules offers a full suite of tools for testing T1 circuits.
- **Datacom/DDS Module** offers extensive Datacom/DDS testing capabilities for the installation and verification of WAN/data links up to 2 Mbps.
- **SHDSL Module** provides SHDSL 2 and 4-wire modem emulation. STU-C and STU-R functions are supported for installation and prequalification. Advanced diagnostics at the ATM and IP layers are available as well as SHDSL/E1 modes.
- **TDR/DMM Module** provides key fault identification and location tools for the MTT-C Chassis. Features include a metallic TDR and a Digital Multimeter for DC and AC Voltage, 100 MΩ Resistance, Capacitance and DC Current.
- **ADSL2+ ATU-R Module** enables field technicians to perform efficient service installation and verification for a variety of ADSLx technologies.
- **Dual/Single E1 Module** With extensive E1 transmission and signaling testing capabilities, this module is an ideal installation, maintenance and service verification tool for the 2M access network.
- **SDH/SONET Module** addresses the needs for the installation of SDH/SONET as well as PDH/T-Carrier links. This module supports applications from 1.5/2 Mbps up to 2.5 Gbps (STM-16/OC-48) and ATM
- **IEEE C37.94 Module** assists technicians in turning up a new circuit or in isolating problems on both sides (teleprotection and multiplexer) of the IEEE C37.94 network.
- **UDSL Module** supports VDSL2 and ADSLx and addresses some key new features including Vectored VDSL2 and Two Line Bonding.
- **Dual Port Ethernet Module** is a powerful service installation and maintenance tool for 10/100/1000 Base-T, 100Base-FX and 1000Base-SX. With wirespeed traffic generation, this module provides physical layer to IP layer testing.



Application Testing

The VeEX testers support a number of application testing capabilities, perfectly suited for triple-play service assurance verification.

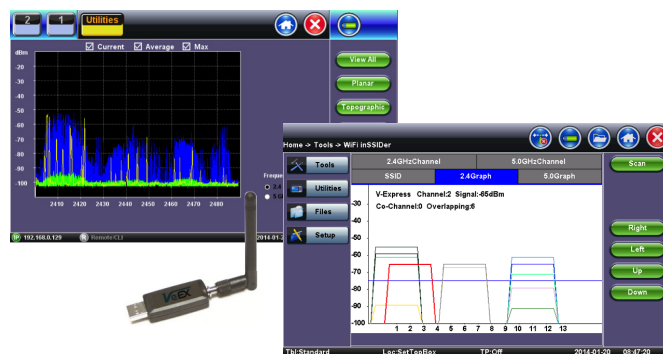
IPTV Testing

IPTV Service Providers have to ensure the transport layer and MPEG payload are both within defined limits, because simply checking packet loss, jitter and related impairments of the Ethernet distribution network is not enough to evaluate the quality of the IPTV content carried in the upper protocol layers. The IPTV Explorer option extracts the MPEG payloads from the Ethernet streams, decodes and displays them to check transport and programming content so that QoS and QoE can all be assessed.



WiFi Testing

WiFi test functions make troubleshooting WiFi networks in 2.4 GHz and 5 GHz bands a simple task (with 802.11 a/b/g/n/ac wireless support). A powerful portable spectrum analyzer on a USB dongle that displays all RF activity in the 2.4 GHz and 5 GHz bands is the ideal tool for enterprise environments with a mix of wireless technologies. With multiple graphical format displays, it helps to visualize and locate RF signals in the spectrums as well as locate and eliminate interference sources (cordless phones, microwave ovens, Bluetooth devices, etc.), discover and remedy competing access points. The WiFi Wiz and InSSIDer functions make troubleshooting connectivity issues a simple task. Scan for available networks and view all access points detailed information along with SSID, signal strength and channel allocation. Connect to Access Points with WEP/WPA or WPA2 encryption and verify IP capabilities to ensure the wireless network is properly installed and configured. A full suite of IP testing features is supported (ping, trace, web browser, etc.).



VoIP Testing

Advanced VoIP analysis and troubleshooting features are offered with IP phone functions that can place and receive calls using SIP or H.323 protocols. Comprehensive Codec support and call options verify voice encoding and translation provisioning. Real-time evaluation of voice quality with a complete set of measurements is available at the end of the call, including packet statistics, jitter statistics, and MOS and R-factor call quality scores. Support VoIP trunk test with bulk call generation of up to 24 simultaneous calls.