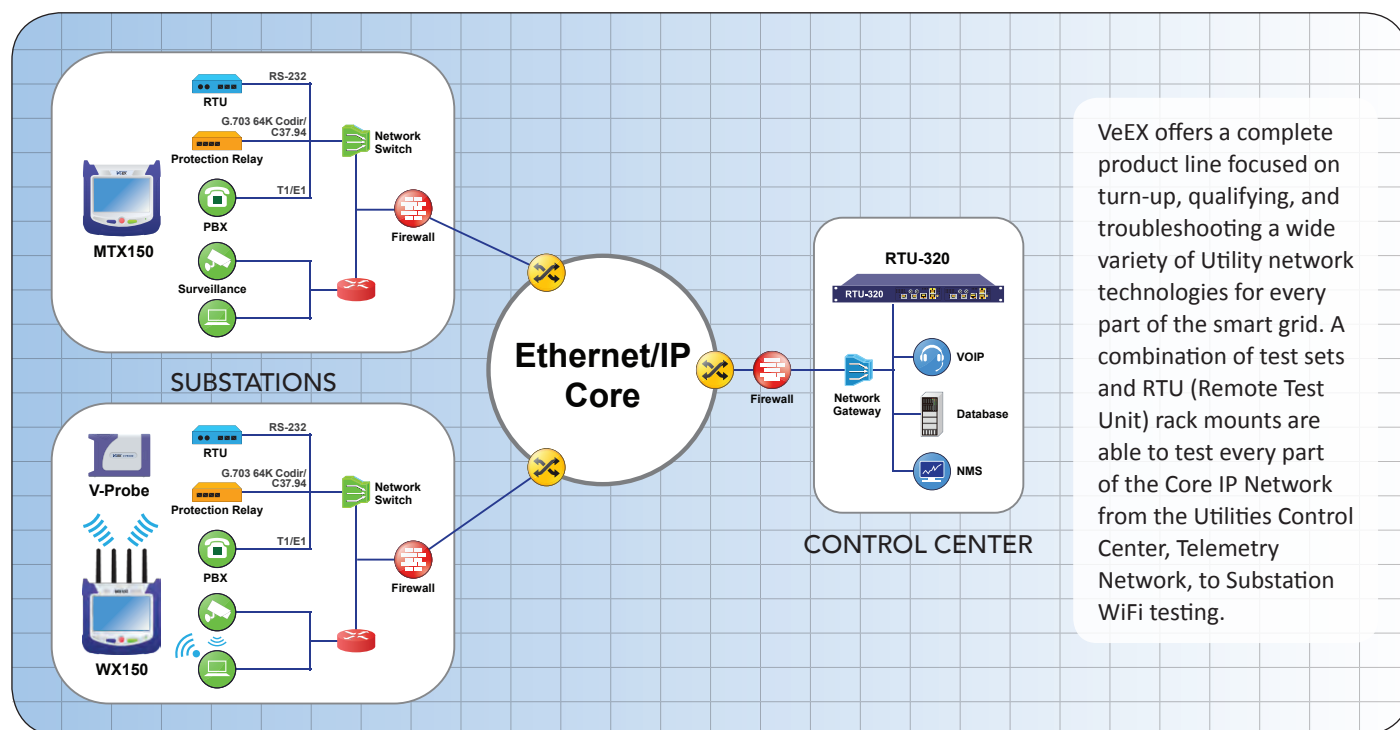


Advanced Telecom Networks are Key to Efficient & Resilient Power Delivery

VeEX® Utilities Network Test Solutions

The diversity of communications technologies within the Utilities market is unlike any other telecom network. Testing requirements vary by network, with one network comprised of different virtual communications protocols and physical infrastructure. As a Utility, Power & Gas provider, you have very specific testing needs and requirements depending on the environment (FAN, HAN) and group (Field/Control Center).



Utilities Control Center Test Solutions by VeEX

The Utilities Control Center typically consists of a communication node capable of taking different rates/protocols and aggregating the data onto a single link/communication protocol.

Supporting Legacy and Modern Technologies

MTX150 - Multi-service & Installation

- Supports Datacom, 64K to 1GE on the same module

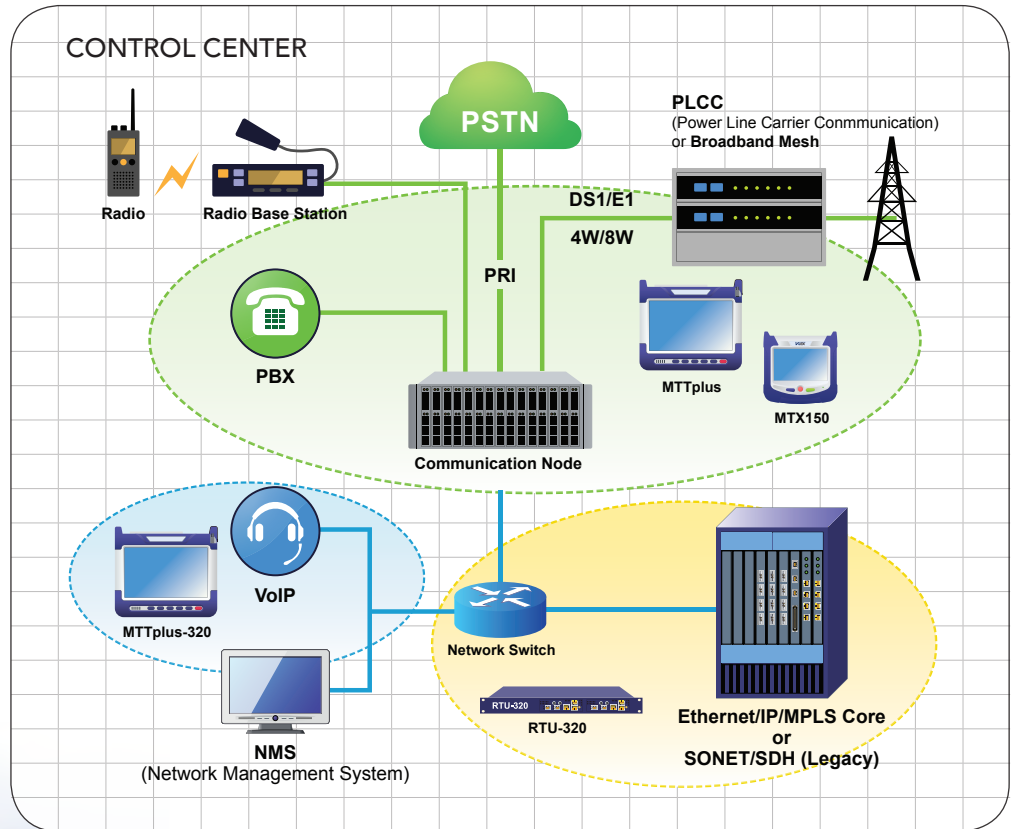
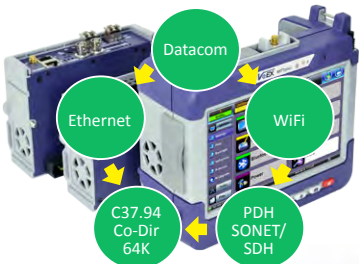
MTTPlus* with 320 Module

- Multi-service Test Set
- 64K to 10GE Dual Port

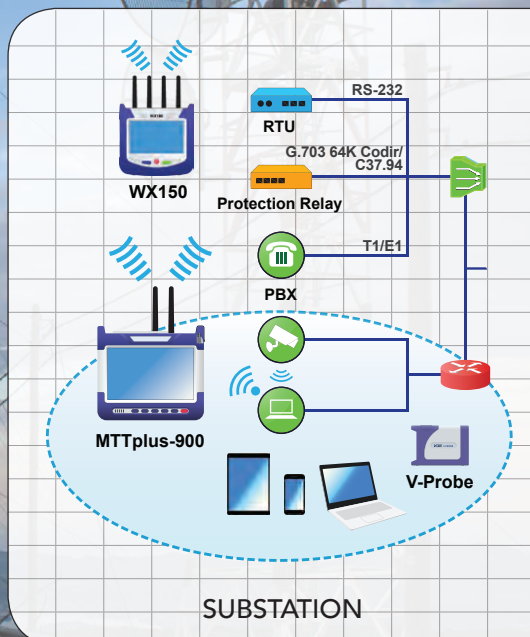
* MTTPlus chassis with MTT-200 Adapter supports legacy MTT modules

RTU-320 - Remote Test Unit

- Run multiple simultaneous tests to remote test sets
- Layer 2-4



[POWER DISTRIBUTION 24/7]



WiFi Testing and Interference Check

MTTplus-900/WX150 and V-Probe

Spectrum Analyzer Checks for Interference Within Unlicensed Bands

- Signal & Noise Tracking

AP Discovery & Survey

- Client AP Scan
- Channel View

Network Performance test to the V-Probe (UDP/TCP)

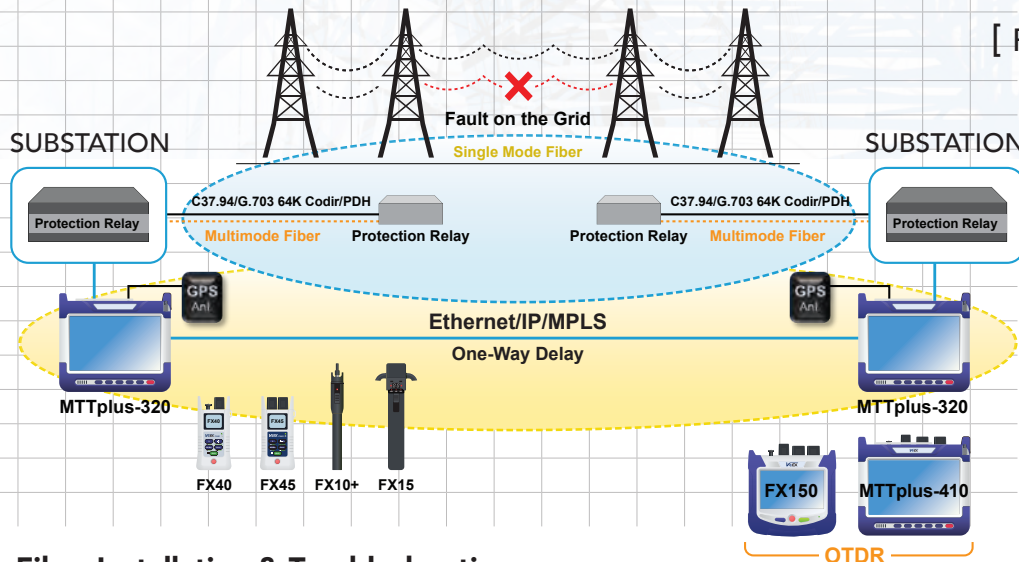
- QoE (Quality of Experience)
- Bandwidth Performance
- Capacity Testing

Auto-Test Function

- Security Check
- Coverage Check
- Interference
- Top Talkers
- Connectivity Check
- Auto Channel Selection



[PROTECTION RELAY]



Telemetry Network and One-Way Delay with C37.94 & G.703 64K Codir Testing

MTTplus-320

- Run C37.94 BERT/RTD Tests Measure C37.94 One-Way Delay in an Asymmetric Network (IP/MPLS or Broadband Mesh) by using portable GNSS/GPS to acquire accurate timing on the test sets
- Run G.703 64K Codir BERT, Through Mode, and Pulse Mask Test

Fiber Installation & Troubleshooting

FX40/FX45

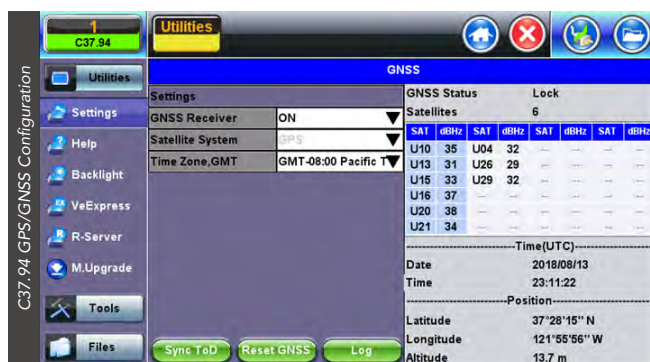
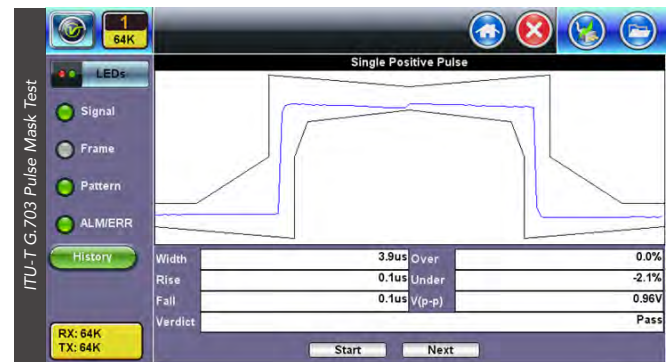
- OPM (Optical Power Meter)
- OLS (Optical Light Source)

FX10+/FX15

- VFL (Visual Fault Locator)
- LFI (Live Fiber Identifier)

FX150/MTTplus-410

- OTDR



This screenshot displays the C37.94 Data Monitor interface, showing a table of test results. The table has columns for T/S, Line bits, Hex, and T/S. The data is organized into two main sections, 1 and 2, each with multiple rows of test results. A status bar at the bottom shows Page 1 and navigation buttons (Prev, Next).

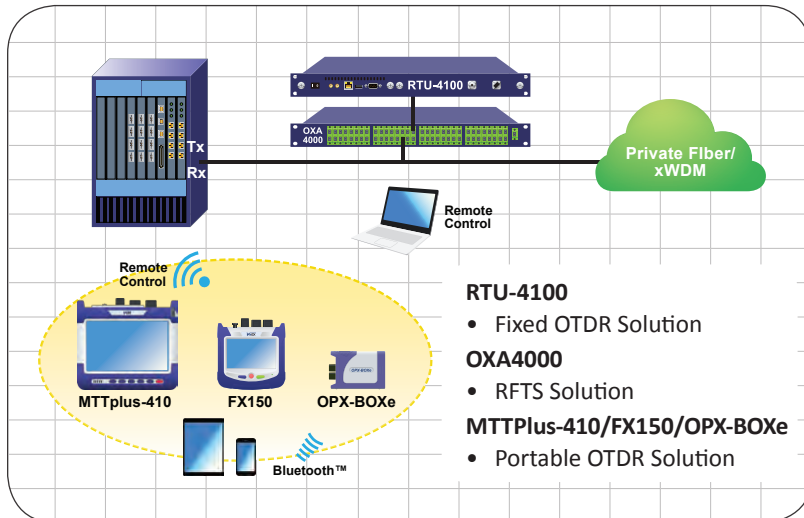
T/S	Line bits	Hex	T/S	Line bits	Hex	T/S	Line bits	Hex
0	10011011	9B	1	00001111	0F	2	111110	
3	11111	F	4	11111	F	5	11111	F
6	11111	F	7	11111	F	8	00000	0
9	01111	7	10	11111	F	11	11111	F
12	11111	F	13	11111	F	14	11111	F
15	11111	F	16	11111	F	17	11111	F
18	11111	F	19	11111	F	20	11111	F
21	11111	F	22	11111	F	23	11111	F
24	11111	F	25	11111	F	26	11111	F
27	11111	F	28	11111	F	29	11111	F
30	11111	F	31	11111	F			



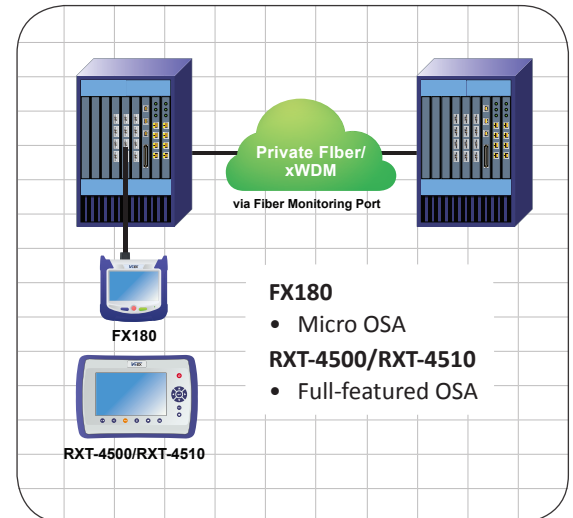
Utilities as a CLEC

VeEX is focused on serving the Utilities Market segment effectively with a complete product line aimed at testing within Utility-specific environments – addressing turn up and troubleshooting needs. Legacy SONET requires TDM testing and Wander & Jitter measurements; Fiber Network Infrastructure requires OTDR & Fiber Monitoring; and LTE Networks require CPRI/eCPRI Link validation and Time & Sync Testing – we have products to address all of these requirements, both in the Control Center and Field.

In-service Fiber Testing/Monitoring



xWDM OSA Solutions



TEST TOOLS FOR ALL TEAMS AND ENVIRONMENTS

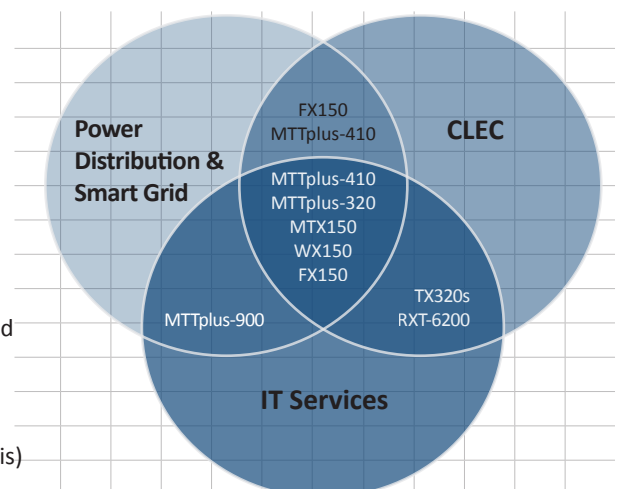
Platform Highlights

- Supports legacy & modern rates--64K to 10G--on a single unit
- Feature rich, future-proof, cost-effective platform
- Easy navigation from simple and uniform user interface
- Significantly shorter boot up times than competitors enables more time for test and turn up
- Expand test functions with a growing list of test modules for modular platforms



Test Set Solutions

- Datacom (Legacy Rates/Modules)
- PDH/SONET/SDH
- 10/100/1000M, 10G & 100G
- Dual Port (OWD)
- GNSS Map Viewer
- Fiber Testing
- Built-In Atomic Clock (High-Precision Field Time/Sync/Wander Test)
- C37.94 & G.703 64K Codir (Telemetry)
- CPRI/OBSAI (Fronthaul)
- WiFi (Performance and Spectrum Analysis)
- Layer 4 Throughput (Customer Quality of Experience)



Product Matrix	MTTPlus/MTX/WX/FX					TX/RXT				RTU Platform		
	MTTplus-320	MTX150	MTTplus-900	WX150	MTTplus-410/ FXxxx	TXxxxS	RXT-6xxx	RXT-41xx	RXT-45xx	RTU-320	OXA4000	RTU-4100
Test Features												
Power Distribution & Smart Grid												
C37.94 BERT/Monitor/RTD	•	•				•						
C37.94 GNSS Assisted One-Way Delay	•					•						
SM/MM Fiber Identification/Fault Location/Qualification					•	•		•				
Portable OTDR (Optical Time Domain Reflectometer)					•	•		•				
G.703 64K Co-Directional BERT/RTD/Terminated & Through Mode, ITU-T Pulse Mask Test	•	•				•						
WiFi (Performance and Spectrum Analysis)			•	•								
Time & Sync Testing (1588v2/SyncE Master & Slave Emulation)	•					•						
Atomic Clock Assisted One-Way Delay (Ethernet)						•						
Datacom		•										
PDH/SONET/SDH BERT/Clock Wander	•	•				•	•					
Utility IT Services & Data Centers												
Remote RFC2544/Y.1564 Layer2/3 Throughput Test						•				•		
Remote Layer 4 Throughput (Customer Quality of Experience)										•		
WiFi (Performance and Spectrum Analysis)			•	•								
Optical Switch/FWDM Matrix											•	
Remote Fiber Monitoring (RFTS)												•
Portable OTDR (Optical Time Domain Reflectometer)					•	•		•				
SM/MM Fiber Identification/Fault Location/Qualification					•	•		•				
Utilities as a CLEC												
Portable RFC2544/Y.1564 Layer2/3 Throughput Test	•	• 1GE					•					
Portable Layer 4 Throughput (Customer Quality of Experience)	•	• 1GE	•	•		•	•					
100G/40G and lower rate Optics Diagnostics Test							•					
100G/40G RFC2544/Y.1564 Layer 2/3 Throughput Test						•	•					
Portable OTDR (Optical Time Domain Reflectometer)					•	•		•				
Portable OSA (Optical Spectrum Analyzer)					•				•			
SM/MM Fiber Identification/Fault Location/Qualification					•	•		•				

Common Acronyms	
AAA	Authentication, Authorization, & Accounting
AMI	Advanced Metering Infrastructure (sensors communication via RF)
DA	Distributed Automation
DER	Distributed Energy Source
DHCP	Dynamic Host Configuration Protocol
DMS	Distribution Management System
DNS	Domain Name System
FAN	Field Area Network
GIS	Geographic Information System
HAN	Home Area Network
HMI	Human Machine Interface
IDS	Intrusion Detection System
IoT	Internet of Things
IVR	Interactive Voice Response
LTE	Long Term Evolution (Private LTE)
MDMS	Meter Data Management System
NAN	Neighborhood Area Network
OMS	Outage Management System
PLC	Programmable Logic Controllers (connects to sensors)
PLCC	Power Line Carrier Communication (usually DS1/D1, 4W - Four Wire, E&M - Ear & Mouth, 8W - Eight Wire)
QoE	Quality of Experience
RTU	Remote Terminal Unit (connects to sensors)
RTU	Remote Test Unit (by VeEX)
SCADA	Supervisory Control & Data Acquisition
VPN	Virtual Private Network
WiSUN	Wireless Smart Ubiquitous Networks
Zigbee	ZigZag & Bee