xGenius a new dimension

in Test we Trust

ALBEDO xGenius is a multi-technology tester equipped with 8' screen and all the features you need to install and maintain telecom networks based on 10Gigabit Ethernet, Gigabit Ethernet, 1000/100/10BASE-T, SyncE, T1, E1 and PTP.

It is suitable for measuring legacy and next-gen networks as it has the most common interfaces. Field engineers do not need to carry any more several testers or multiple modules to turn up and monitor telecom infrastructures.

Cloud testing

xGenius is equipped with all of the features you may need or imagine such including BER, RFC2544, eSAM, Multistream, MPLS, Jitter, Wander, etc. to permit the verification of the transmission layer in those terms of performance and quality required to support audio, video or critical data applications.

Built-in **Rubidium** / **GPS** clock

The integrated GPS/GLONASS receiver allows easy connection and use while fast acquisitions and excellent accuracy minimizing the time impairments of external devices. This an ideal solution to synchronize thanks to top performance in holdover mode while top accuracy in a real hand-held battery operated IP tester.

Mobile telecom

Operators have different synchronization requirements. Some of them running 3G may still maintain legacy E1 solely for syntonization. Those focused on LTE, see the impending need for distributing phase-synchronization and also want to avoid having to install GPS receivers at every single cell site. Alternatives are SyncE and PTP that simplify the architecture and can be turned-up with ALBEDO testers.

> **"Ideal tool for Utilities Mobile backhaul by means of Master/Slave PTP emulation TE, Wander, PDV test at all interfaces from 10GbE to T1"**

Power Utilities

Power utility companies must protect high voltage lines and monitor them constantly. Communication between power substations using the standard C37.94 is fundamental order to ensure correct operation while controlling every single alarm and failure. With xGenius a fully integrated test is possible.

ALBEDO Telecom

10 Gigabit Ethernet

Users of xGenius can relay on the instantaneous traffic generation to set up and modify any IP/Ethernet header.

Traffic Scan and Discovering

The unit can quickly scan the network traffic to select those flows to be tested.

BER

Layer 1, 2, and 3 BER testing is supported and can be configured either with generic PRBS test patterns, specific patterns each Ethernet standard, either user test patterns to simulate traffic conditions.

RFC 6349

Throughput also depends on the size of TCP window, buffers, latency, errors, packet loss etc. that requires TCP retransmissions. The the RFC 6349 address all these factors to get a more accurate view of the TCP/IP quality services.

RFC 2544

It verifies the performance of the network testing throughput, frame loss, latency, jitter and burst, that can be executed as symmetric and asymmetric

.

Two independent traffic generators, for each port

e-SAM test

This Ethernet service activation test methodology for turning up, installing and troubleshooting Ethernet-based services allowing the complete validation of Ethernet service-level agreement (SLA) in a single test executed in two phases:

- *Service Configuration,* confirms the end-to-end set-up while quickly checking the Information Rate (IR), Frame Delay Variation (FDV), Frame Loss Ratio (FLR), Frame Loss Ratio at the Service Acceptance Criteria (FLRSAC).

- *Service Performance,* transmits all configured traffic streams at the CIR confirming all traffic is able to transverse the network under full load while checking IR, FDV, FLR and availability.

Synchronization

LTE networks are demanding of accurate frequency and phase time references, particularly those architectures that consider small cells where the frequency re-utilization is a key factor of performance. The tester can set up the synchronization network with an external reference or recovering it from data, or using the built-in Rubidium disciplined with GPS.

SyncE

Complete analysis and generation of the signal, SSM and SSM protocols can be captured and decoded.

PTP Tests

During the installation of PTP connectivity problems may occur between the master and slave units. When troubleshooting these links, the tester can be used in Terminate mode to capture PTP messaging on both the transmit and receive test ports up to 10 Gbit/s. The tester simultaneously generates, receives, and captures PTP messages on the circuit under test.

Jitter & Wander.

Both measurements are executed in real time without the need of external devices.

T1, E1 and Datacom

xGenius provides a scalable test solution for T1, E1 and datacom that includes full set of physical layer tests for balanced / unbalanced circuits including BERT, VF, signal level, round trip delay and one-way-delay with GPS.

One-way delay

One-way Delay (OWD) saves hours of troubleshooting by detecting asymmetric traffic delays. Accuracies 10 times greater than most common SLA can be attained, network providers to differentiate their offering and allowing network planners to understand the delay tolerances affecting their applications

OWD assisted with GPS

C37.94 test

Field engineers can use this tester to turn up new C37.94 deployments, or to troubleshoot teleprotection relays and multiplexer by means features such as bit error rate testing (BERT), G.821, events analysis/generation, optical power meter one-way / round-trip delay, etc. to facilitate engineers to verify protection system that prevent outages in a power substations.

Wirespeed packet capture

xGenius is equipped with a unique technology that ensures packet capture of selected flows and then save them in PCAP format of live traffic in full duplex mode. You can overcome most of the limitations of capture devices, firewalls, protocol analyzers running on Laptops or PCs.

Hot swapable modules for Datacom, C37.94, Codirectional and VF.
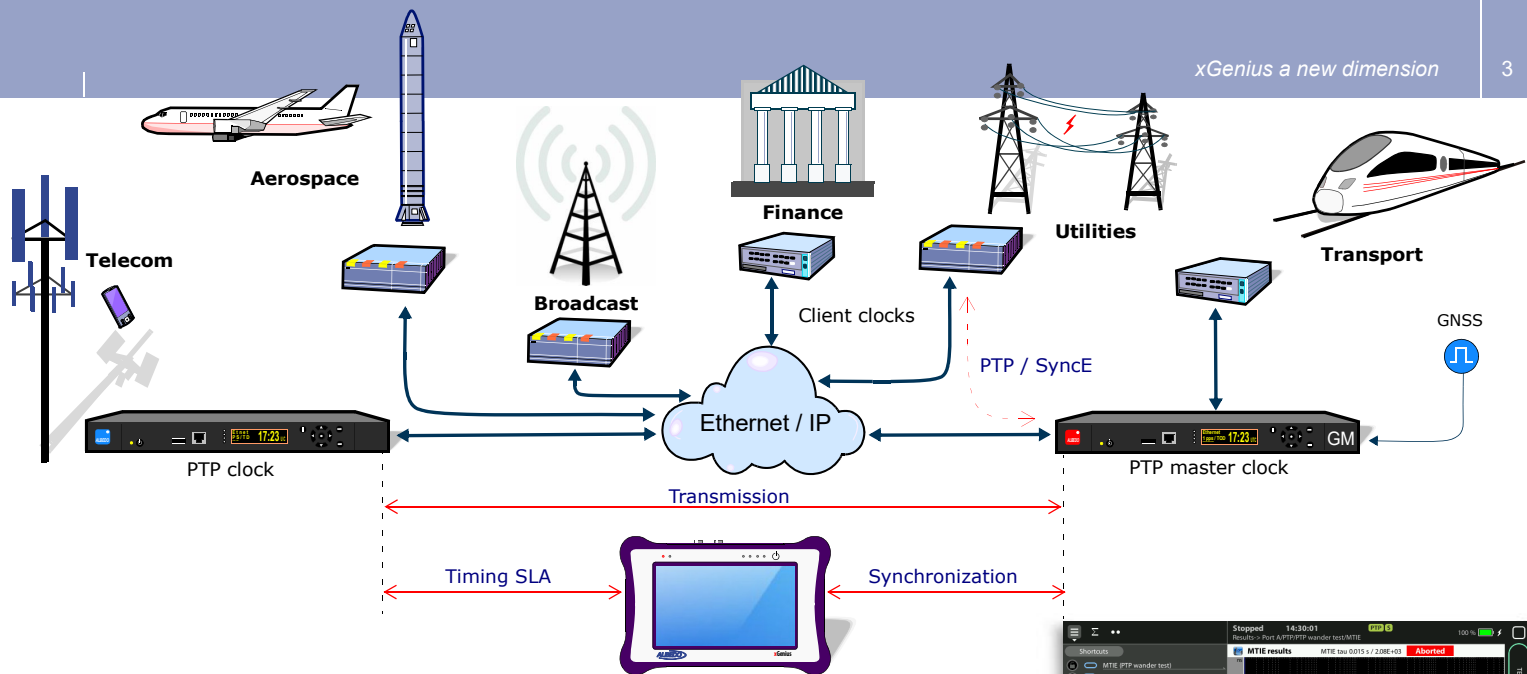
Verify is easy now

The value of innovation

Engineers often have to repeat the same test several times, for them this instrument provides the facilities to execute automatic script that can be distributed by email, while the results are saved on disks. The unit also support SNMP then it can store configuration, management and result information.

KEY FEATURES

- Built-in Rubidium, OCXO, GNSS receiver
- PTP master/slave emulation
- Wander T1, E1, PTP, SyncE
- 1PPS measurement
- TE max |TE|, Constant and dynamic TE components
- ESMC / SSM full support
- Y.1564 (e-SAM) FTD, 2-way FDV, FDV, 2-way FTD, FLR SES, PEU and PEA
- Y.1731 QoS statistics
- Captures any Ethernet protocol and save it in PCAP
- GOOSE and SV time offset and propagation delay
- (A)Symm Y.1564, RFC-2544
- T1, E1, Jitter & Pulse mask
- VNC, LAN or Wi.Fi control
- Hot-swappable modules
- One-way & round trip delay

Double-port field unit

xGenius is a modular tool built in a rugged case with many options can be activated by software. Ideal for field engineers and very useful at labs for installation, commissioning and maintenance of infrastructures to provide a valuable insights to design networks and solving complex issues.

New GUI

The GUI is easy to learn while the engineer may navigate using the touch-screen with a lot of graphical facilities particularly the new outstanding feature of automatic set ups. It is also possible to control remotely by means of VNC to grant full access to the unit using the same layout, but password controlled access, to configure, execute, and get results directly in a public/private IP.

Packets, Circuits & Clocks

Everything is covered by Ether10.Genius a multitechnology tester to install and troubleshoot telecom services based on 10GbE, GbE, SyncE, PTP, Jitter, Wander, T1, E1, IEEE C37.94, Datacom, VF and one-way delay with GPS because it has been designed to deploy and troubleshoot brand new and legacy networks.

BENEFITS

- Quality hold-over
- All-in-one solution
- 8 inches capacitive screen
- 100% hardware included
- Field tester extra rugged

INTERNAL RUBIDIUM

- Freerun (No GPS): Output freq. accuracy on shipment (24 h. warm up): ±5.0e-11
- GPS Locked: Time/Phase Accuracy to UTC: ±20 ns at 1σ after 24 h lock
- Hold-over accuracy (after 24h locked) frequency 1.5e-11/24h time: ±100ns/2h ±1.0 µs/24h

Ethernet / IP	
Interfaces	• 2xSFP / SFP+ : 10GBASE-SR, 10GBASE-LR, 10GBASE-ER, 1000BASE-SX • 1000BASE-LX, 1000BASE-ZX, 1000BASE-BX, 100BASE-FX, 100BASE-TX • 2xRJ45: 1000BASE-T, 100BASE-T, 10BASE-T, PoE detection/ transparency • Autonegotiation: Bit rate at 10, 100, 1000 and 10000 Mbit/s, Disable autonegotiation and direct set up • EtherType II (DIX v.2), IEEE 802.3, IEEE 802.1Q, IEEE 802.1ad; IEEE 802.2—LLC1, IEEE 802.3—SNAP; IPv4 (RFC791), IPv6 RFC2460)
Generation (8 streams)	• Traffic generation and analysis features up to 10 Gb/s, equivalent to 15 millions of frames, if frame size is set to 64 bytes. • MAC address: Source / Destination, Default / User defined, Single / Range • VLAN: Single VLAN support, Q-in-Q stacking, VID, DEI, S-VLAN, C-VLAN, and Priority codepoint • Type / Length: Generation/Analysis, Jumbo frames with MTU up to 10 kB • Bandwidth Profile: Constant, in bit/s and frames/s, Periodic Burst, in high/low traffic, Ramp, in high/low traffic, Poisson • Loopback: L1to L4 layers, filtering conditions, broadcast and ICMP frames control • Layer 1 BER: HF, LF, MF, Long/Short continuous random, PRBS 231-1, A-seed, B-seed, mixed-frequency • Layer 2-4: PRBS 211-1, PRBS 215-1, PRBS 220-1, PRBS 223-1, PRBS 231-1 along with their inverted versions, user (32 bits) • SLA payload; All zeros; Insertion of TSE: single, rate, random; RTD and VF tone generation
Filters for Statistics (up to 8 simultaneously)	• Ethernet Selection: MAC address, Type/Length, C-VID, S-VID, CoS and Priority with selection mask • IPv4 and IPv6 Selection: address, protocol, DSCP, Flow (v6): single value or range. UDP Selection: port: single value or range
Packet Capture	Capture Filters • IEC 61850: GOOSE, SV, MMS preconfigured filters • Generic by 16-bit masks and user defined offset. • Ethernet MAC address, Ethertype, VLAN-VID, VLAN-CoS, S-VLAN / C-VLAN • IPv6 / IPv4 Filters: Address, TCP, UDP, Telnet, FTP, DSCP field, single value and range Storage in PCAP format
Results (per stream & port)	• Twisted Cable: MDI/MDI-X status, Open, Cable Length Test, Short, Polarities, Pair Skew. PoE: voltage and current • SFP: Presence current interface, Vendor, Part number, Optical power (over compatible SFP) • Frame Delay (FTD) Y.1563: Min/Max/Med/Mean; Delay Variation (FDV) RFC1889: Peak; Jitter Curr/Max/Min/Mean • Frame Loss (FLR) Y.1563, Duplicated: Out-of-Order packets (RFC 5236) • Availability: SES and Y.1563 PEU; BER: Count, seconds with errors, Pattern losses, pattern loss seconds
RFC-2544 Y.1564 RFC-6349	• RFC 2544: Throughput, Latency, Frame Loss, Back-to-back, Recovery • eSAM: test up to 8 non-color or 4 color aware services. Configuration: CIR, EIR, max. throughput for each service • Performance test with FTD, FDV, FLR and availability results for all services • RFC 6349: active/passive modes, MTU/MSS/BB configuration, Round-Trip Time, Window Sweep, Transfer Time, TCP efficiency, Buffer delay
ICMP	• RFC 792: IP ping / Traceroute, Generation of ICMP echo request: Dest. IP address, Packet length, Generation interval • Analysis of ICMP echo reply: Round trip time, Lost packets, Time-To-Live Exceeded, Port unreachable

Synchronization, PTP / SyncE, Wander	
Synchronous Ethernet	• Internal Oscillator: Rubidium or OCXO or default (<2.0 ppm) all disciplined to GNSS or alternative time references • Time References: ToD, 1 pps, E1/T1, SyncE, 10/2.048/1.544 MHz (input) - ToD, 1 pps 10/2.048 MHz (output) • Line Analysis: frequency (MHz), offset (ppm), drift (ppm/s) [clause 10]; Offset Generation: ±125 ppm (0.001 ppm) as per ITU-T O.174 • PTP wander analysis/generation [ITU-T O.174 section 8.4] and MTIE / TDEV measurement [ITU-T O.172 clause 10] • SyncE analysis/generation / Decoding ESMC and SSM [ITU-T G.8264]
PTP / IEEE 1588(v2)	• Precision Time Protocol (PTP): Master & Grandmaster id., Priority 1-2, Class, Accuracy, Variance, Time source • PTP over UDP encapsulation, PTP Generation / Analysis / Emulation; hardware-assisted Decoding; End-point and Through modes • Counts: Sync Inter Arrival Delay (IAD) Avg/Curr; Packet Total Delay (PTD): Std Dev/Range; Packet Delay Variation (PDV): Cur/Max/Avg • Two-way TE, max.|TE|on PTP. Low/High frequency TE, Constant/Dynamic TE components. Frequency offset master vs. local clock (ppm)

T1 / E1 / Datacom / C37.94	
Interfaces	• Unbalanced (BNC) 75 Ω and balanced (RJ-45) 120 Ω; Balanced (Bantam) 100 Ω and balanced (RJ-48) 100 Ω • Balanced (RJ-45) 120 Ω Balanced (Bantam) 100 Ω (AT-1544 only) and balanced (RJ-48) 100 Ω • Unbalanced (BNC) 75 Ω Analogue voice frequency audio port • Additional balanced secondary T1, E1 port 0 to -6dB, nominal and PMP -20dB • Bit Rate: 1.544 / 2.048 Mbit/s ± 3ppm. Codes: HDB3 / AMI • 4 x SMA: Clock Source: Internal Timing: 1.544MHz, 2.048 MHz ± 25000 ppm; External Timing; Recovery from Rx Timing (Loop Timing)
BERT	• Unframed: FAS / FAS+CRC4. PCM30: FAS+CAS / FAS+CRC • Standard, non-standard PRBS, and user patterns. Transmit Error Rate • Force Single Error: Bit, Frame, CRC, and BPV (Bipolar Violation); Alarms, Errors Count; G.826, G.821, and M.2100
Datacom	• Smart Serial 26p DTE / DCE ports. DTE, DCE emulation and monitor • V.11/X.24, V.24/V.28, V.24/V.35, V.24/V.11 (V.36/RS449), EIA530 and EIA-530A. Codirectional according G.703 • Rate: 50, 60 bit/s, 1.2, 2.4, 4.8, 8, 9.6, 16, 19.2, 32, 48, 72, 128, 144, 192, 1544 kbit/ Nx56 kbit/s; Nx64 kbit/s, up to 10 Mbit/s
Jitter & Wander	• Overpass O.172: Jitter level, tolerance, transfer and Event detection. 100% digital based generation and analyzer • Wander Generation and Measurements (TIE, MTIE, TDEV). Wander results from 20 to 100 000s
Pulse Mask	• Pulse mask compliance: ANSI T1.102-1999, ITU-T G.703; PASS / FAIL function with Persistent Graphic Display scope • Nominal 2.37V for Coaxial Pair 75 Ohm, Nominal 3.00V for Symmetrical Pair 120 Ohm
C37.94	• Test Rate: N x 64 kbit/s; Frame/Unframed BER; ITU-T G.821: ES, SES, UAS, DM. Results with pass / fail indications • Frequency (Hz), Deviation (ppm), Max deviation; Round Trip Delay (ms), One-way Delay synchornized with GPS • Defects: LOC, AIS, LOF, RDI, LSS, All 0, All 1; Anomalies: FAS, TSE, Slip. Optical Power Meter

Ergonomics	
Hand-held Instrument	• Size: 260 x 160 x 63 mm, Weight: <2.0 kg, IP-54, Mouse, USB, Ethernet ports; SNMP / VNC support, Capacitive Touchscreen: 8 inch • Rechargeable Batteries continuous working up to 24 hs; Operating 0ºC ~ 50º C Storage -20ºC ~ 70ºC;

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