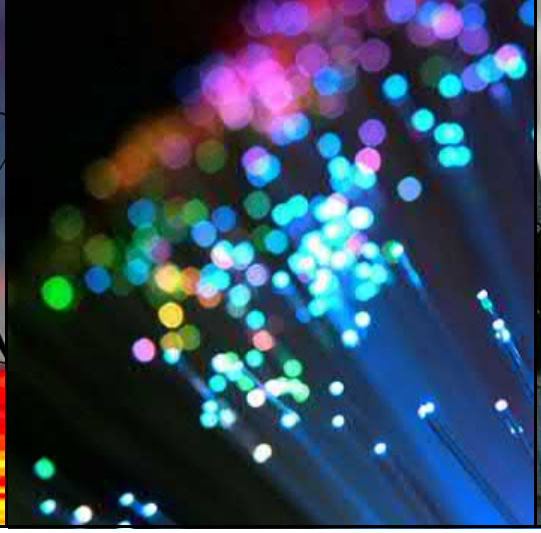



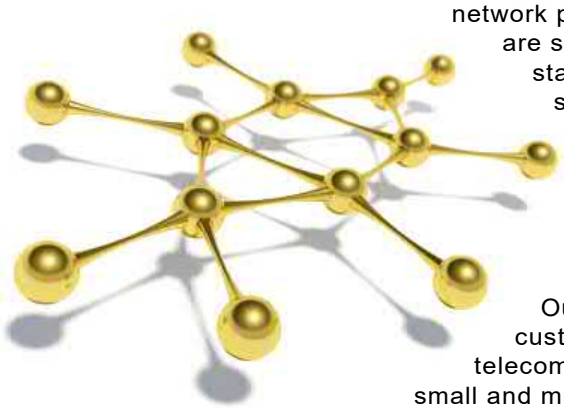

ALBEDO Telecom Catalog 2021

PROD_CATALOG_ENG v.21.0

ALBEDO delivers solutions that enable telecom infrastructures of to verify, install, monitor, troubleshoot, and migrate mission critical applications in more than 2500 customers and 110 countries.

ALBEDO's core expertise range from Protection, Synchronization, Test & Measurement, Transmission, WAN emulation, SIP trunking and Lawful interception. Our customers are Manufacturers, R&D labs, Universities, Military, Power Utilities, Railways, Mobile and Telecom operators willing to install, analyze or maintain telecom infrastructures supporting critical voice, video and data applications.

Finance to Telcos



Whether you need help with a specific network problem now, or you are still at the planning stage, ALBEDO has a solution for you. From tailored on-site monitoring systems, to any kind of telecom testers we may meet your needs.

Our experts provide customized answers large telecom operators to and small and middle size organizations. We are more than willing to share their tricks of the trade with your organization's system engineers.

Power Utilities to R+D

ALBEDO products and services integrate with your business ever since the beginning, and we will work with you to get solutions to questions such as:

- Do you have to set-up PTP Master, Boundary or Client Clocks?
- Do you test 10GbE, PTP, SyncE, IP, VoIP, IPTV, Datacom, T1, E1, C37.94?
- Which OTDR satisfies your needs?
- What about a WAN emulator to verify your new telecom services?
- Do you need to emulate an IP-PBX or checking an SIP trunk for call operation and call quality
- Do you need a GbE tap capable to capture at 100% wireline?
- Does your Carrier match the SLA? What causes bad QoS on the IP cloud?

Our experts will help you to find the weak spots of your network, offer alternatives and tell you on what to do, when and why.

We understand how essential networking and telecoms are to your business. We also know that there are so many different technology solutions that it may be very difficult to decide which one better fits your requirements.

ALBEDO Telecom

About **ALBEDO Telecom** (*)

ALBEDO Telecom is a manufacturer of Synchronization nodes, Telecom testers, WAN emulators, Ethernet taps and OTDRs, which core expertise range from PTP, SyncE, GbE, 10GbE, T1/E1, Jitter/Wander, C37.94 and Optical technologies. Most of our 850 customers are Utilities, Telecom operators, Train/Air traffic control, Military and Labs that use ALBEDO solutions all over the world.

At ALBEDO Telecom, we convert ideas into tangible, manufacture worthy solutions. With our understanding of telecoms, quality monitoring systems, test and measurement, engineering, production processes and most importantly the end users -their behavior and needs- we attempt to enrich user experience at all levels. We develop projects from scratch and with special emphasis on aesthetics and ergonomics. Since its foundation ALBEDO Telecom has always been innovating in the fields of synchronization, networking and testing.

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Milestones

ALBEDO has thousands of customers in the five continent including operators, manufacturers, R+D centers, universities, military forces and police. For instance: CISCO, Hydro-Quebec, UTE, ABB, Siemens, Nokia, Meinberg, ADVA, Vodafone, Vivo, China Telecom, FT, MT, NATO, Telefonica, SEL, Orange, Claro, NASA, Disney, Wind, Bosch, Man, Bahrat, Indra, REE, BSNL, Tata and many more. Engineers, today working for ALBEDO, have designed and developed outstanding solutions:

- **1983**: ICT 2017: world first PCM analyzer with microprocessor
- **1989**: ICT 2045: portable multiplexer from 64 kbit/s up to 140 Mbit/s
- **1991**: ICT 2040: OEM to HP and then Agilent
- **1994**: Flexacom: multitechnolgy transmission platform
- **1999**: Victoria: world first hand-held tester SONET/SDH tester
- **2004**: Combo: world first stackable SONET/SDH tester
- **2009**: Net.Shark: world first hand-held tap with active filters
- **2012**: Net.Storm: world first handy wirespeed WAN emulator
- **2014**: Ether10.Genius: world smallest 10Gb/s Ethernet tester
- **2017**: Net.Sync: PTP Grand Master Clock
- **2018**: xGenius: transmission & synchronization tester
- **2019**: Zeus: Utility tester for legacy and IEC-61850 substations
- **2020**: Net.Time: first PTP/NTP over PRP boundary clock

2017

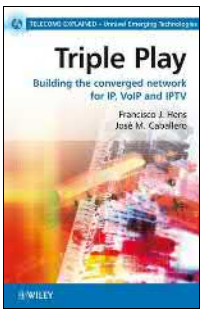
2020

Publications

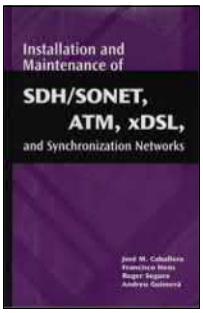
We are also authors of a lot several books:

- Triple Play: Building the converged network for IP, VoIP and IPTV
- Installation & Maintenance of SONET& Synchronization Networks

WILEY - Boston



Artechouse - London



*(*)**ALBEDO**, also known as reflection coefficient, is the ratio of reflected radiation from the surface to incident radiation upon it.*

xGenius (a new dimension)

xGenius is a hand-held tester suitable for labs or field, equipped with plenty of interfaces such as IP/Ethernet/PTP/T1/E1/C37.94/Data/VF. It is battery operated (up to 24h of operation), light (1.9kg) and very rugged. xGenius has been designed to verify networks up to 10Gb/s and supports master/slave Sync-E/PTP emulation. Moreover, xGenius has a set of programmable filters to capture live data traffic at wire-speed. Operation modes includes Performance and Quality tests at interfaces and the ability to emulate and analyse PTP/SyncE, while measuring Freq./Phase, PDV metrics, analyze/generate TIE/MTIE/TDEV and TE. A built-in Rubidium clock disciplined with GPS provides an accuracy of a few nanoseconds.

The instrument is suitable for measuring legacy and next-gen networks because it has the most common access, back-haul and synchronization interfaces. Field engineers do not need to carry any more several testers or multiple modules to turn up and monitor telecom infrastructures. xGenius is equipped with all of the features you may need or imagine.

All-in-one

Built with latest technology it is a light while rugged tester that facilitates many hours of continuous operation.

- Ports: 2SFP+, 2RJ45, 2BNC, DTE/DCE, GPS
- Hot-swappable modules for C37.94, Datacom, VF Port, Codir G703
- FTD, 2-way FDV, FDV, 2-way FTD, FLR, SES, PEU and PEA
- TCP test - RFC 6349
- Programmable filters to capture live data traffic at wire-speed
- Save captured data in PCAP format
- Optical Power Meter, Frequency-MHz, offset-ppm, drift-ppm/r
- Symmetrical & Asymmetrical RFC2544 and Y.1564 (e-SAM)
- Multistreams for IPTV, VoIP, and Critical Data verification
- Test Rate: N x 64 kb/s N=1...12, G.821: ES, SES, UAS, DM
- Q-in-Q for demarcation tests, MPLS support
- Ethernet Line freq. (MHz), offset (ppm), drift (ppm/s)
- PTP / IEEE 1588v2 support decod, genera (master/slave)
- Master Clock operation on each port using int/ext ref.
- Ext. clock input E1/T1, 10/2.0/1.5 kHz
- Ext. clock input including SyncE, PPS, ToD...
- G.826, G.821, and M.2100
- 2-way-delay (RTD), 1-way Delay (GPS accuracy)
- Jitter level/toler/transfer
- Wander gen, TIE, MTIE, TDEV, FPC
- Round Trip Delay (ms)
- 1-way Delay synchronized with GPS
- Analysis / Generation ESMC messages
- SSM count and rate
- SyncE MTIE / TDEV measurement
- SyncE Wander analysis and generation

Code	**Description** (+ info... www.albedotelecom.com)
AT.xGenius.HH	Ether.Genius hand-held tester. Battery operated. GBE tester with optional T1/E1, data communications and synchronization capabilities includes dual 10/100/1000 Mb/s electrical ports, dual optical ports. QoS statistics, RFC2544 performance test, BER test, continuous / burst / ramp / random traffic generation, traffic statistics, error analysis, connectivity test (PING, Trace Route), analysis filters, event insertion, endpoint and through operation modes, graphical display of events, report generation and export. Includes AC/DC adapter, transportation bag, one RJ-45 patch cable, One BNC-BNC patch cable.
AT.xGenius.1564	eSAM (ITU-T Y.1564). Test of up to 8 services simultaneously. Set up of CIR, EIR and policing rate. Per stream quality objectives. Measurement of Information rate (IR), Frame Transfer Delay (FTD), Frame Delay Variation (FDV), Frame Loss Ratio (FLR) and Availability.
AT.xGenius.MPLS	MPLS test. Generation of a single or double label according RFC 3032. Configuration of TTL, Traffic class, Label. Filter selection rules by Label and Traffic class field. Frame analysis of MPLS Packets. Top LSPs (with Network search option).
AT.xGenius.WIRE	Cable test. Wiremap with open and short circuit detection. Measurement of distance to fault. Crossover / straight cable detection. Measurement of skew.
AT.xGenius.POE	Power over Ethernet test. PoE / PoE+ end point and pass through as per IEEE 802.3af and IEEE 802.3at with voltage and current measurement.
AT.xGenius.SE	SyncE Clock Emulation. Synchronization testing according to ITU-T G.8261, G.8262, G.8264. Ethernet line frequency (MHz), offset (ppm), drift (ppm/s). Analysis / Generation of ESMC messages. External reference clock input 2048 kbit/s, 2048 kHz, 1544 kbit/s, 1544 kHz, 10 MHz, Synchronous Ethernet and 1 PPS. External reference clock output 2048 kHz and 1 PPS. 1PPS input / output adapter not included.
AT.xGenius.SEW	SyncE Wander test. Synchronous Ethernet TIE / MTIE / TDEV measurement. Synchronous Ethernet wander generation.
AT.xGenius.PTP	IEEE 1588v2 / PTP Clock Emulation. PTP master and slave emulation. PTP passive monitoring. PTP message classification and analysis. PDV analysis. External reference clock input 2048 kbit/s, 2048 kHz, 10 MHz and Synchronous Ethernet. External reference clock input 2048 kbit/s, 2048 kHz, 1544 kbit/s, 1544 kHz, 10 MHz, Synchronous Ethernet and 1 PPS. External reference clock output 2048 kHz and 1 PPS.
AT.xGenius.PTPW	IEEE 1588v2 / PTP wander test. PTP TIE / MTIE / TDEV measurement.

Zeus (substation tester)

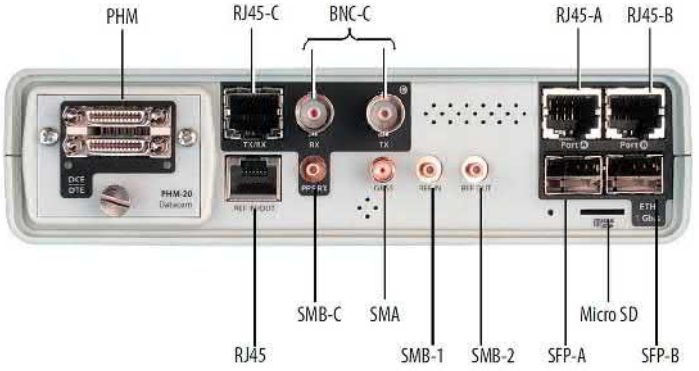
Zeus provides deep insights to design, install, maintain, troubleshoot and engineer communications infrastructures of the Smart Grid and more particularly of the Power Substations. The unit is able to test Ethernet/IP, PTP, GbE, IRIG-B, T1/E1, G703, C37.94, GOOSE, SV and MMS protocols. One-way-delay tests, assisted by GPS, is possible at all interfaces, and it has a set of programmable filters to capture live data traffic at wire-speed.

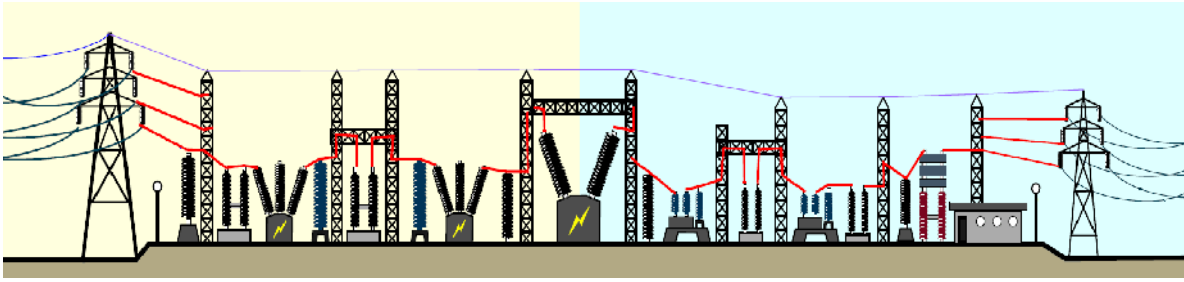
IEC 61850 support

Step-by-step proprietary architectures are being replaced by standards relaying on optical Ethernet, so there is a clear need for tools that can manage both old and new interfaces. This is Zeus, a tester capable of verifying, activating and troubleshooting all kinds of communications infrastructures including those that were installed in recent decades and the latest that will be installed in the coming years. All together are transforming substations into a more flexible, robust and scalable systems thanks to the integration and interconnectivity of different manufacturers using fibers and standardized protocols.

Applications

- Installation tool
- Ethernet Maintenance
- IEC 61850 migration
- Protocol Analysis
- Substation maintenance
- C37.94 Teleprotection
- Serial Communications
- Troubleshooting
- PTP Clock emulation
- IRIG-B support
- GOOSE analysis
- MMS capture
- Substations Surveillance
- One-way delay
- Synchronization
- IED Acceptance
- Substation certification
- Atomic Rubidium clock





GOOSE, SV, MMS

Zeus has a set of programmable filters to capture live data traffic at wire-speed. You can now analyze GOOSE, SV, MMS and other protocols to decode and save them in PCAP format or calculate propagation delay from local or remote substations.

PTP Synchronization

Utility companies have strict timing requirements that Zeus can test and adjust by means of advanced features that allow to measure and emulate PTP, IRIG-B, 1PPS, ToD, T1/E1. The internal oscillator of the tester can be OCXO or Rubidium depending on the accuracy you need or more particularly if you need to operate in hold-over.

C37.94 Protection

A uninterrupted supply of energy requires protection functions to ensure the reliable operation of the power system. With Zeus you will fully test C37.94 systems measuring frequency, events, one way delay, and all kind of events.

Resilience

A flexible and robust network is core of intelligent substations that are capable of guaranteeing the control and operation of mission-critical applications. Therefore, it is important to have advanced instruments to verify, measure and adjust each protocol according to the strict requirements defined by IEC 61850 regarding interconnectivity, latency, symmetry and redundancy.

An additional challenge is how to design reliable and redundant, while cost effective, networks capable of recovering data flows quickly after a failure to support applications that do not tolerate even a millisecond of network interruption without severely affecting operations that eventually could cause blackouts and even put endangered the safety of company's employees. Consequently, an acceptance procedure is a must to verify the conditions of all mission critical systems and protections deployed across the power grid.

Net.Time (Utility clock)

Net.Time Power is a synchronization node, compliant with IEC 61850, that supports PTP over PRP and multiple clock options such as NTP, SyncE, 1PPS, ToD and IRIG-B to satisfy all timing needs of utility substations. It also includes Power and Telecom PTP profiles and Rubidium to simplify the provision of timing facilitating the integration of the installed plant for perfect control, protection and data acquisition.

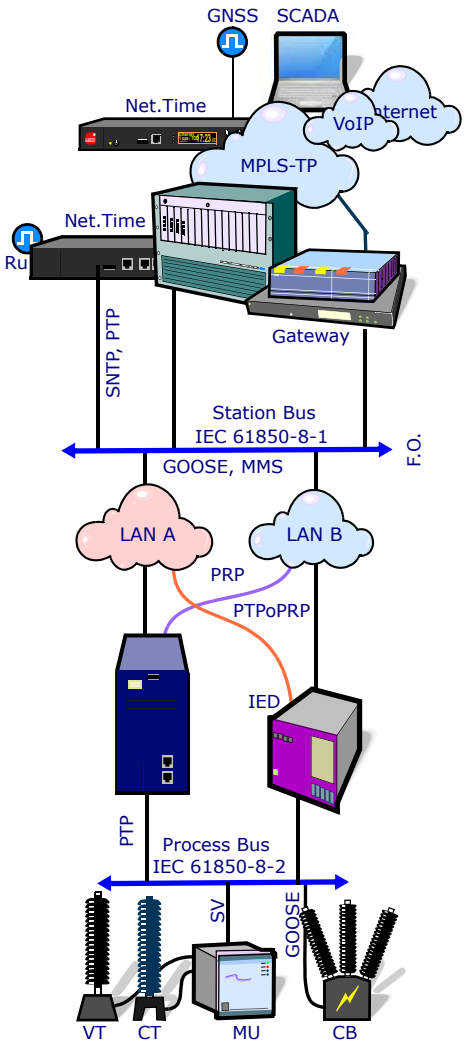
PTP & NTP over PRP timing

The basic architecture of electricity distribution changed very little during the first 100 years. However, in the lasts decades, the concept of Smart Grid emerged thanks to the massive use of ICT technologies to increase the efficiency, resilience and quality of the service. Generation plants, substations and customers are now connected with telecommunication networks.Substation automation

Substation automation refers to using data from intelligent electronic devices to enable stability, increase security and maintain the system integrity. To make it possible a new standard was released, the IEC-61850 that facilitates the intensive use of digital technologies and guarantees the interoperability between vendors, appliances and processes.

- Supports PTP Telecom and Power profiles to interconnect both type of clocks, which is a common necessity in power grids.
- It is a PRP native (DAN-P clock) with Double interface, then it does not need a Redundancy Box reducing costs and simplifying installation.
- OCXO / Rubidium are internal oscillator options to match any hold-over.
- Supports 1PPS, MHz, Mb/s, PTP and SNTP enabling features such as NTP-to-PTP translation facilitating the coexistence of legacy new equipment, and migration.
- Delivers SNTP, PTP, 1PPS and IRIG-B signals to protect all appliances.

There are partial solutions but none satisfies simultaneously all the above-mentioned requirements of the power industry as Net.Time does.



Benefits

No doubts about the advantages of the new standard that facilitates interoperation but the adoption will be a gradual process. Net.Time Power facilitates a smooth migration to the new and legacy protocols improving on this way the capacity to integrate any appliance of the substation. All technologies will coexist for a long time therefore the versatility is a valuable aspect offered by Net.Time Power that also has interesting advantages:

- Improves availability of NTP/PTP timing services through standard buses.
- Support installed base using IRIG-B, SNTP and 1PPS.
- Provides a more reliable synchronization for mission-critical infrastructures
- PTP over PRP offers better accuracy, simplifies wiring and maintenance
- Facilitates interoperability between Utility and Telecom profiles

It deserves special mention the support of PTP protocol in redundant PRP which requires careful considerations. Theoretically, any PTP clock could be attached to a PRP-protected network adapting a Redundancy Box (RedBox). However, this is not an optimal solution because it involves deploying a new device adding complexity and price. By implementing the PRP in the timing node the equipment is directly attached to the network.

Net.Time node includes multi-protocol and redundant operation features. It simplifies the migration to PTP by providing NTP synchronization to legacy nodes. The NTP and PTP services work concurrently so that network administrators do not need to choose which one to enable and install two or more boxes for each protocol. The unified Net.Time approach has a direct effect in CAPEX but OPEX will be reduced as well.

Ether10.Genius (up to 10 Gbit/s)

Ether10.Genius is a hand-held tester 100% suitable for labs or field use because is full equipped (IP/Ethernet/PTP/T1/E1), battery operated (up to 24h of operation), light (1.2kg) and very rugged. The unit is able to test Ethernet/IP networks up to 10Gb/s while supporting master/slave Sync-E/PTP emulation. It also has interfaces for PDH/T1/E1/E0 and IEEE C37.94. Operation modes includes Performance and Quality tests at interfaces and the ability to emulate and analyze PTP/SyncE, while measuring Freq./Phase, PDV metrics, analyze/generate TIE/MTIE/TDEV and TE. A built-in Rubidium clock disciplined with GPS provides an accuracy of a few nsec.

The instrument is suitable for measuring legacy and next-gen networks because it has the most common access, back-haul and synchronization interfaces. Field engineers do not need to carry any more several testers or multiple modules to turn up and monitor telecom infrastructures. Ether10.Genius is equipped with all of the features you may need or imagine.

All-in-one

Built with latest technology it is a light while rugged tester that facilitates many hours of continuous operation.

- Ports: 2SFP+, 2RJ45, 2BNC, GPS, 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
- FTD, 2-way FDV, FDV, 2-way FTD, FLR, SES, PEU and PEA
- Symmetrical & Asymmetrical RFC2544 and Y.1564 (e-SAM)
- Multistreams for IPTV, VoIP, and Critical Data verification
- Q-in-Q for demarcation tests, MPLS support
- Ethernet Line freq. (MHz), offset (ppm), drift (ppm/s)
- PTP / IEEE 1588v2 support decod, genera (master/slave)
- Master Clock operation on each port using int/ext reference
- Analysis / Generation ESMC messages and SSM count and rate
- Ext. clock input including E1/T1, 10/2.0/1.5 kHz, SyncE, PPS, ToD...
- SyncE MTIE / TDEV measurement, SyncE Wander ana/gen
- G.826, G.821, and M.2100
- 2-way-delay (RTD), 1-way Delay (GPS accuracy)
- Jitter level/toler/transfer, Wander gen, TIE, MTIE, TDEV, FPC
- Test Rate: N x 64 kb/s N=1..12, G.821: ES, SES, UAS, DM
- Round Trip Delay (ms) 1-way Delay synchronized with GPS
- Optical Power Meter, Frequency-MHz, offset-ppm, drift-ppm/r

Code	**Description** (+ info... www.albedotelecom.com)
AT.E10Genius.HH	Ether.Genius hand-held tester. Battery operated. GBE tester with optional T1/E1, data communications and synchronization capabilities includes dual 10/100/1000 Mb/s electrical ports, dual optical ports. QoS statistics, RFC2544 performance test, BER test, continuous / burst / ramp / random traffic generation, traffic statistics, error analysis, connectivity test (PING, Trace Route), analysis filters, event insertion, endpoint and through operation modes, graphical display of events, report generation and export. Includes AC/DC adapter, transportation bag, one RJ-45 patch cable, One BNC-BNC patch cable.
AT.E10Genius.1564	eSAM (ITU-T Y.1564). Test of up to 8 services simultaneously. Set up of CIR, EIR and policing rate. Per stream quality objectives. Measurement of Information rate (IR), Frame Transfer Delay (FTD), Frame Delay Variation (FDV), Frame Loss Ratio (FLR) and Availability.
AT.E10Genius.MPLS	MPLS test. Generation of a single or double label according RFC 3032. Configuration of TTL, Traffic class, Label. Filter selection rules by Label and Traffic class field. Frame analysis of MPLS Packets. Top LSPs (with Network search option).
AT.E10Genius.WIRE	Cable test. Wiremap with open and short circuit detection. Measurement of distance to fault. Crossover / straight cable detection. Measurement of skew.
AT.E10Genius.POE	Power over Ethernet test. PoE / PoE+ end point and pass through as per IEEE 802.3af and IEEE 802.3at with voltage and current measurement.
AT.E10Genius.SE	SyncE Clock Emulation. Synchronization testing according to ITU-T G.8261, G.8262, G.8264. Ethernet line frequency (MHz), offset (ppm), drift (ppm/s). Analysis / Generation of ESMC messages. External reference clock input 2048 kbit/s, 2048 kHz, 1544 kbit/s, 1544 kHz, 10 MHz, Synchronous Ethernet and 1 PPS. External reference clock output 2048 kHz and 1 PPS. 1PPS input / output adapter not included.
AT.E10Genius.SEW	SyncE Wander test. Synchronous Ethernet TIE / MTIE / TDEV measurement. Synchronous Ethernet wander generation.
AT.E10Genius.PTP	IEEE 1588v2 / PTP Clock Emulation. PTP master and slave emulation. PTP passive monitoring. PTP message classification and analysis. PDV analysis. External reference clock input 2048 kbit/s, 2048 kHz, 10 MHz and Synchronous Ethernet. External reference clock input 2048 kbit/s, 2048 kHz, 1544 kbit/s, 1544 kHz, 10 MHz, Synchronous Ethernet and 1 PPS. External reference clock output 2048 kHz and 1 PPS.
AT.E10Genius.PTPW	IEEE 1588v2 / PTP wander test. PTP TIE / MTIE / TDEV measurement.
AT.E10Genius.OCXO	OCXO time reference. High performance internal oscillator replacing the standard time reference installed in the application board.
AT.E10Genius.GPS	GPS receiver and antenna. Provides absolute time reference for synchronization tests through the GPS satellite network. Connection is through RJ-45 male.
AT.89	C37.94 Adapter. Input / output, Smart Serial to SFP, IEEE C37.94 interface.

Ether.Genius (6-in-1 tester)

Ether.Genius is a hand–held tester suitable for labs and field operations, light and well protected. The unit is able to test Ethernet/IP networks up to 1Gb/s and supporting Sync-E/PTP protocols. It also has multiple optical/electrical interfaces interfaces for GbE/PDH/T1/E1/E0/C37.94 and Datacom as well. Operation modes include Performance and Quality tests at all interfaces and the ability to emulate PTP/SyncE, while featuring well on Frequency/Phase and PDV metrics. It is indeed the smallest test set with a built-in Rubidium clock GPS disciplined.

Timing

- Built-in atomic Rubidium clock
- Built-in GPS / GLONASS receiver
- Internal: better than ±2.0 ppm, OCXO better than ±0.1 ppm
- External: SyncE, 1544, 2048 Mb/s, 1544, 2048 10 MHz, 1 pps
- Output: 2048 kHz, 1 pps

GbE Features

- FTD, 2-way FDV, FDV, 2-way FTD, FLR, SES, PEU and PEA
- Symmetrical & Asymmetrical RFC2544 and Y.1564 (e-SAM) tests
- Multistreams for IPTV, VoIP, and Critical Data verification
- Ethernet Line frequency (MHz), offset (ppm), drift (ppm/s)

PTP / SyncE Features

- PTP / IEEE 1588v2 support decoding
- PTP support / generation as master or slave
- Master Clock operation on each port using internal/external ref.
- Analysis / Generation ESMC messages and SSM count and rate
- Ext. clock input including 2048 kb/s, 2048 Hz, and Synchronous Ethernet
- MTIE / TDEV / TE measurement

T1, E1 and Datacom Features

- G.826, G.821, and M.2100. RTD One-way Delay (GPS accuracy)
- Jitter level/tolerance/transfer, Wander Generation and TIE, MTIE, TDEV
- V.11/X.24, V.24/V.28, V.24/V.35, V.24/V.11, V.36/RS449, EIA530(A)
- DTE, DCE emulation and monitor

C37.94 Measurement

- Rate: Nx64 kb/s, N = 1 to 12, G.821 performance: ES, SES, UAS, DM
- Round Trip Delay (ms) One-way Delay synchronized with GPS (us)
- Optical Power Meter, Frequency-MHz, offset-ppm, drift-ppm/s.

Code	**Description** (+ info... www.albedotelecom.com)
AT.EGenius.HH	Ether.Genius hand-held tester. Battery operated. GBE tester with optional E1, data communications and synchronization capabilities includes dual 10/100/1000 Mb/s electrical ports, dual optical ports. QoS statistics, RFC2544 performance test, BER test, continuous / burst / ramp / random traffic generation, traffic statistics, error analysis, connectivity test (PING, Trace Route), analysis filters, event insertion, endpoint and through operation modes, graphical display of events, report generation and export. Includes AC/DC adapter, transportation bag, one RJ-45 patch cable, One BNC-BNC patch cable. SFP transceivers not included.
AT.EGenius.T1-E1	T1, E1 testing including Bantam, BNC and RJ48 connectors, T1/E1 generation and analysis; internal, recovered and external clock references; G.821, G.826 and M.2100 performance analysis; frequency and received power level measurements; CAS ABCD bits generation and analysis; delay measurement.
AT.EGenius.Data	Datacom. DTE / DCE emulation and datacom monitor modes. V.24/V.28 (RS-232) asynchronous and synchronous interfaces, X.21/V.11, V35, V36 (RS-449), EIA-530, EIA-530A. No datacom cables included.
AT.EGenius.SEW	SyncE wander test. Synchronous Ethernet TIE / MTIE / TDEV measurement. Synchronous Ethernet wander generation.
AT.EGenius.PTP	IEEE 1588v2 / PTP clock emulation. PTP master and slave emulation. PTP passive monitoring. PTP message classification and analysis. PDV analysis. External reference clock input 2048 kbit/s, 2048 kHz, 10 MHz and Synchronous Ethernet. External reference clock input 2048 kbit/s, 2048 kHz, 1544 kbit/s, 1544 kHz, 10 MHz, Synchronous Ethernet and 1 PPS. External reference clock output 2048 kHz and 1 PPS.
AT.EGenius.PTPW	IEEE 1588v2 / PTP wander test. PTP TIE / MTIE / TDEV measurement.
AT.EGenius.OCXO	OCXO time reference. High performance internal oscillator replacing the standard time reference installed in the application board.
AT.91	Sync adapter. Smart Serial to RJ45. External reference clock input 1 PPS. External reference clock output 1 PPS. Additional external reference clock input 2048 kb/s, 2048 kHz, 1544 kbit/s, 1544 kHz, 10 MHz. Additional external reference clock output 2048 kHz
AT.ESync.GPS	GPS receiver and antenna. Provides absolute time reference for synchronization tests through the GPS satellite network. Connection is through RJ-45 male i/f.

Ether.Giga (the new deal)

Ether.Giga is a dual port tester equipped with all standard features, plus new ones such as eSAM, Multistream, FCS error insertion, etc. to quickly install, validate or troubleshoot Ethernet and IP networks, while verifying the Quality of the new Multiplay applications.

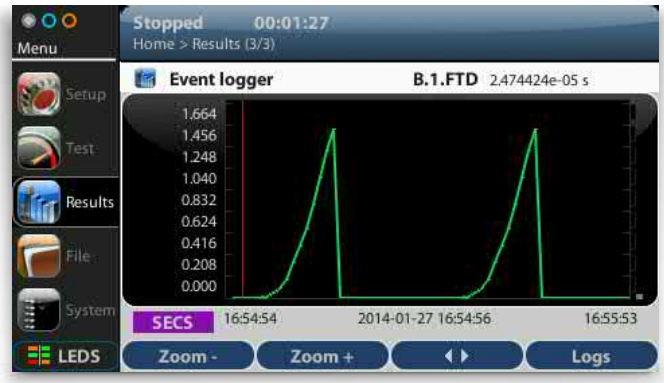
Outstanding commodity

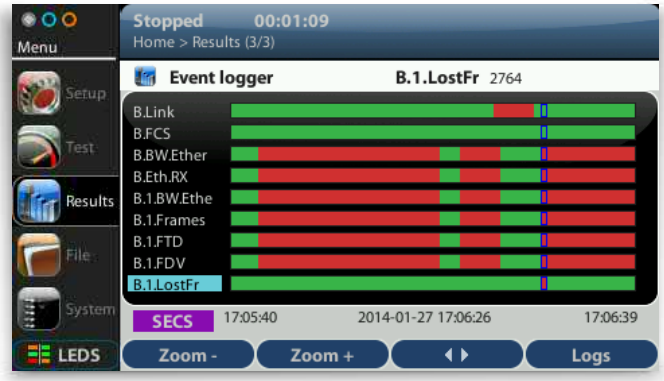
ALBEDO Ether.Giga is an Ethernet & IP tester equipped with all the features of legacy testers such as BER and RFC2544, plus the new ones like Y.1564, Y.1731, and FCS error insertion in pass mode therefore it is capable to verify the QoS and SLA of new Multiplay services offering field technicians tools to quickly and easily validate and troubleshoot Ethernet services, including multiplay applications such as VoIP, IPTV, VoD, high-performance Computing, Virtualization Services, Data Centers and Storage that require significant levels of bandwidth.

ITU-T Y.1564 (e-SAM test)

This methodology executes multiple traffic streams 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.





Features & Benefits

This tester supports ALL the features including the most advanced suites like asymmetric RFC2544 and eSAM.

- Y.1564 FTD, 2-way, FTD&/FDV, FLR, SES, PEU and PEA
- Y.1731 QoS statistics
- 2 x SFP + 2 x RJ45 interfaces
- Symmetrical & Asymmetrical RFC2544 test
- FCS error insertion in pass-through mode
- Multistreams for IPTV, VoIP, and Critical Data verification
- Q-in-Q for demarcation tests and MPLS support
- L1/L2/L3/L4 loopback
- Scan MAC/IP/VLAN/QinQ
- Advanced touch screen GUI

Applications

- QoS and SLA certification
- Automatic RFC2544, Y1464
- IPTV, VoIP, Data assurance
- VNC, LAN or wi-fi control
- Spot sources of degradation
- Soft LEDs all events at a glance
- Best price - Top featured.

Code	**Description** (full information at www.albedotelecom.com)
AT.EGiga.HH	Ether.Giga hand-held tester. Battery operated. GBE testing including dual 10/100/1000 Mb/s RJ-45 electrical ports, dual optical ports, QoS statistics, RFC2544 performance test, BER test, continuous / burst / ramp / random traffic generation, traffic statistics, error analysis, connectivity test (PING, Trace Route), analysis filters, event insertion, endpoint and pass-through operation modes, graphical display of events, report generation and export. Includes AC/DC adapter, transportation bag and one RJ-45 patch cable. SFP transceivers not included.
AT.EGiga.Mstr	Multistream Test. Generation over eight independent traffic streams. Eight analysis filters for each test port.
AT.EGiga.1564	eSAM (ITU-T Y.1564). Test of up to 8 services simultaneously. Set up of CIR, EIR and policing rate. Per stream quality objectives. Measurement of Information rate (IR), Frame Transfer Delay (FTD), Frame Delay Variation (FDV), Frame Loss Ratio (FLR) and Availability.
AT.EGiga.IPV6	IPV6 test. Decoding and analysis of IPV6 datagrams. IPV6 traffic statistics and events. IPV6 packet filtering. Top IPV6 source and destination address
AT.EGiga.MPLS	MPLS test. Generation of a single or double label according RFC 3032. Configuration of TTL, Traffic class, Label. Filter selection rules by Label and Traffic class field. Frame analysis of MPLS Packets. Top LSPs (with Network search option).
AT.EGiga.WIRE	Cable test. Wiremap with open and short circuit detection. Measurement of distance to fault. Crossover / straight cable detection. Measurement of the cable skew.
AT.EGiga.POE	Power over Ethernet test. PoE / PoE+ end point and pass through as per IEEE 802.3af and IEEE 802.3at with voltage and current measurement.

AT-One (best in town)

ALBEDO Telecom is delighted to present the AT.One, the ultimate and world's most comprehensive BER analyzer / generator for T1, E1, Datacom, Jitter, Wander, Pulse mask, Frame Relay, VF, and more. The AT.One is truly rugged and is ideal for field engineers installing and maintaining T1, E1 and Datacom circuits.

Designed with the latest technology is light, fast, friendly and comprehensive. Believe or not, it is the envy of our competitors that dream to have one day a similar unit. Ideal for field engineers installing, commissioning and troubleshooting T1, E1 links, ISDN, Voice Services, Synchronization Networks, and Datacom circuits.

(*)AT.2048 as stand alone E1 tester is a subset of AT.One

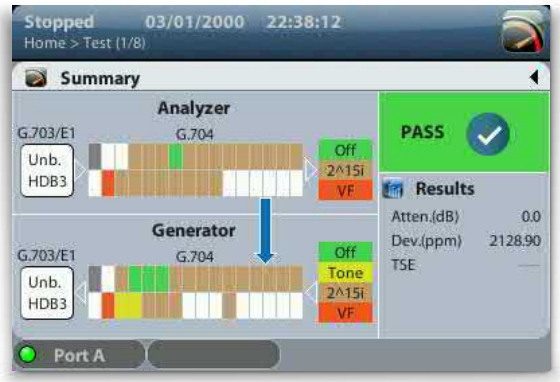
24h. of non-stop operation on batteries

This instrument is fully designed and manufactured by ALBEDO Telecom, because we love to control the entire process to ensure first-class quality. This tester uses a brand new platform. Take a look and try this innovative and flexible tool, you will love it after discovering how the latest FPGA can overcome previous limitations in accuracy, space or performance. Honestly, nothing else can really be compared with this outstanding update for T1/E1/Datacom/Jitter/Wander testing.

The state-of-the-art in T1, E1 and Datacom testing

The AT-2048 is an excellent tester for network operators, contractors and enterprise users that have to manage fixed and mobile networks that are using T1, E1 and Datacom backhaul circuits.

- 2015 technology: very fast!
- Based on Linux (does not hang-up)
- Double port Bantam, BNC and RJ45
- Extra rugged but lightweight
- Monitor and Pass Through modes
- Jitter measurement, Wander measurement (with all masks)
- Pulse Mask
- Cisco Data Cables, 2xUSB & RJ45Ports
- VNC remote control
- Hand-held 1 kg / 2.2 lb.



Applications and Users

- Installation and Maintenance
- Jitter / Wander / Pulse Mask Measurement
- Mobile Synchronization
- Mobile, Digital Voice and Data Operators
- Laboratories and Central Office plants
- Air Traffic Control, Military and Power Utilities links

Code	Description
AT.One.HH	T1 / E1 / Datacom hand-held tester. Battery operated. Dual port E1 and T1 testing, co-directional interface testing, data communications testing; internal, recovered or external clock reference; frequency and received power level measurements; G.821, G.826 and M.2100 performance analysis; round trip delay measurement; defect and anomaly insertion and analysis with graphical display of events; VF analysis; report generation and export. Includes AC / DC adapter, transportation bag and one BNC-BNC patch cable. [REQUIRES: AT.ONE.E1 or AT.ONE.T1 or AT.ONE.DATA]
AT.One.T1	T1 test. ANSI T1.102 1544 kb/s dual port testing including RJ-48 and Bantam connectors. T1 generation and analysis; ANSI T1.403 SF (D4) and ESF frame structures with robbed bit generation and analysis; FDL signaling channel; T1 frame occupation map; Add / drop of T1 time slots to analog and low rate digital interface. Includes two RJ-48 to Bantam adapters.
AT.One.E1	E1 test. ITU-T G.703 2048 kb/s dual port testing including BNC and RJ48 connectors, E1 generation and analysis; ITU-T G.704 frame structure with or without CRC and with or without CAS; CAS ABCD bits generation and analysis; FAS / NFAS analysis; E1 frame occupation map; add / drop to analog and low rate digital interface.
AT.One.Data	Datacom test. DTE / DCE emulation and datacom monitor modes. V24 / V.28 (RS-232) asynchronous and synchronous interfaces, X.21 / V.11 (RS-422), V.35, V.36 (RS-449), EIA-530 and EIA-530A. Datacom cables not included.
AT.One.JW	E1 / T1 Jitter / Wander. Peak-to-peak jitter, RMS jitter, max. jitter, jitter hits detection. Configuration of jitter filters. Frequency offset (ppm), frequency drift (ppm/s). Wander metrics (TIE, MTIE, TDEV). Sinusoidal jitter and wander generation. [REQUIRES: AT.ONE.E1 or AT.ONE.T1]
AT.One.Pulse	Pulse Mask Analysis. Displays the pulse shape and checks compliance with ITU-T G.703 or ANSI T1.102 masks. Includes eye diagram operation mode and analysis of pulse time and level metrics. [REQUIRES: AT.ONE.E1 or AT.ONE.T1]
AT.VNC.RC	Graphical Remote Control. Based on VNC for Windows and Linux. Ethernet/IP remote control that duplicates the gui in a remote computer
AT.SNMP.RC	SNMP Remote Control and automation. Based on SNMP protocol allows user to control the tester remotelly using SNMP queries

AT-2048 (best in town)

ALBEDO Telecom is delighted to present the AT.2048, the ultimate and world's most comprehensive BER analyzer / generator for E1, Datacom, Jitter, Wander, Pulse mask, Frame Relay, VF, and more. The AT.2048 is truly rugged and is ideal for field engineers installing and maintaining E1 and Datacom circuits.

Designed with the latest technology is light, fast, friendly and comprehensive. Believe or not, it is the envy of our competitors that dream to have one day a similar unit. Ideal for field engineers installing, commissioning and troubleshooting E1 links, ISDN, Voice Services, Synchronization Networks, and Datacom circuits.

24h. of non-stop operation on batteries

This instrument is fully designed and manufactured by ALBEDO Telecom, because we love to control the entire process to ensure first-class quality. This tester uses a brand new platform. Take a look and try this innovative and flexible tool, you will love it after discovering how the latest FPGA can overcome previous limitations in accuracy, space or performance. Honestly, nothing else can really be compared with this outstanding update for E1/Datacom/Jitter/Wander testing.

The state-of-the-art in E1 testing

The AT-2048 is an excellent tester for network operators, contractors and enterprise users that have to manage fixed and mobile networks that are using E1 and Data-com backhaul circuits.

- 2012 technology: very fast!
- Based on Linux (does not hang-up)
- Double port BNC and RJ45
- Extra rugged but lightweight
- Monitor and Pass Through modes
- Jitter measurement, Wander measurement (with all masks)
- Pulse Mask
- Cisco Data Cables, 2xUSB & RJ45Ports
- VNC remote control
- Hand-held 1 kg / 2.2 lb.

Applications

- Installation and Maintenance
- Jitter / Wander / Pulse Mask Measurement
- Mobile Synchronization

Users

- Mobile, Digital Voice and Data Operators
- Laboratories and Central Office plants
- Air Traffic Control, Military and Power Utilities links

Code	Description
AT.2048.Base	E1 hand-held tester. Battery operated. ITU-T G.703 testing including BNC and RJ48 connectors, dual port E1 generation and analysis, co-directional interface; internal, recovered and external clock references; G.821, G.826 and M.2100 performance analysis; frequency and received power level measurements; CAS ABCD bits generation and analysis; delay measurement in E1 and co-directional interfaces; graphical display of events; report generation and export. Includes AC/DC adapter, transportation bag and one BNC-BNC patch cable.
AT.2048.Data	Datacom hardware option. DTE / DCE emulation and datacom monitor modes. V.24/V.28 (RS-232) asynchronous and synchronous interfaces, X.21/V.11, V35, V36 (RS-449), EIA-530 and EIA-530A. No datacom cables included.
AT.2048.JW	E1 Jitter / Wander. Peak-to-peak jitter, RMS jitter, max. jitter, jitter hits detection. Configuration of jitter filters. Frequency offset (ppm), frequency drift (ppm/s). Wander metrics (TIE, MTIE, TDEV). Sinusoidal jitter and wander generation.
AT.2048.Pulse	Pulse Mask Analysis. Displays the pulse shape and checks compliance with ITU-T G.703 mask. Includes eye diagram operation mode and analysis of pulse time.
AT.VNC.RC	Graphical Remote Control. Based on VNC for Windows and Linux. Ethernet/IP remote control that duplicates the tester graphical user interface in a host.
AT.2048.V.24	V.24/V.28/RS-232 cables. V.24/V.28/RS-232 DTE and DCE interface cables.
AT.2048.X.21	X.21/V.11 cables. X.21/V.11 DTE and DCE interface cables.
AT.2048.V.35	V.35 cables. V.35 DTE and DCE interface cables.
AT.2048.V.36	V.36/RS-449 cables. V.36/RS-449 DTE and DCE interface cables.
AT.80	VF adapter. G.711 test, PCM, level and frequency. Balanced 600 ohms impedance.
AT.86	Stereo audio adapter. Stereo audio input adapter.

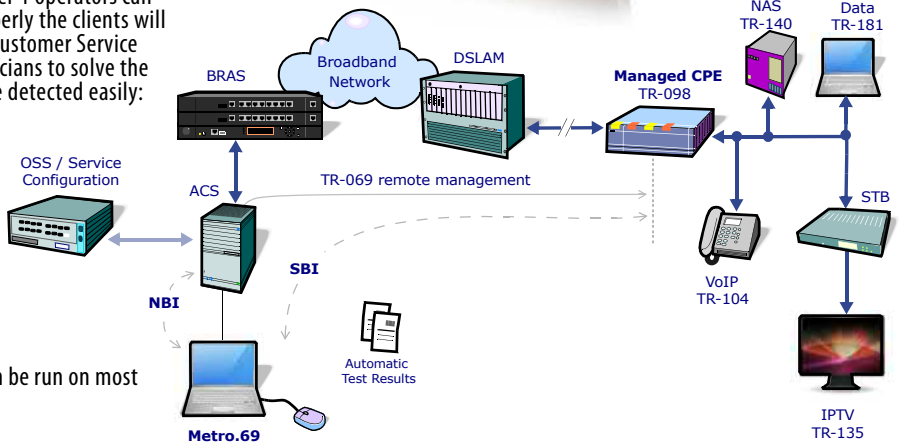
MeTro.69 (TR-069 Protocol Validator)

Advanced testing tool that automates the acceptance test of TR-069 protocols implemented in routers or any CPE. MeTro.69 facilitates the complete validation by means of different Libraries of Test Cases. It supports all BBF data models including TR-181. Tools to set up the testing scenario are included e.g. ftp, http and STUN servers, BBF compliant ACS, traffic generator and analyser. Users can edit proprietary test cases. It can work against commercial ACS brands. Automatic Wireshark captures are available for debugging tasks.

Due to the continuous evolution of technology, telecommunications companies often have to remotely update the CPE software using the TR-069 protocol. Verifying its correct support in the CPEs is fundamental so that the Tier 1 operators can carry out their work correctly. If the TR-069 is not working properly the clients will suffer the consequences. They will end up complaining to the Customer Service Departments and finally, it will be necessary to mobilize technicians to solve the problems generated. Issues around TR-069 protocol that can be detected easily:

- Wrong implementation of RPC method
- Notifications (Off/Active/Passive) don't work
- Parameters not defined in the Data Model
- Can't change values defined as writable
- Notification of parameters incorrectly defined
- The CPE losses the connection with the ACS
- Not possible to create multi-instance objects

Metro.69 is a self-contained live software environment that can be run on most x64/x86 based laptops or computers.

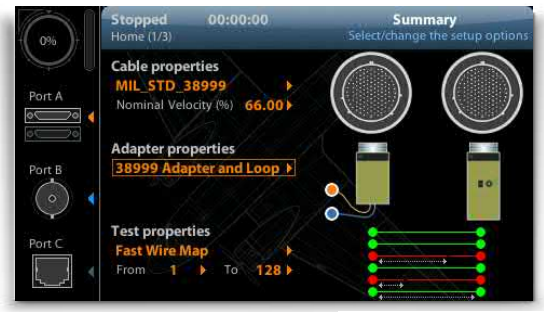


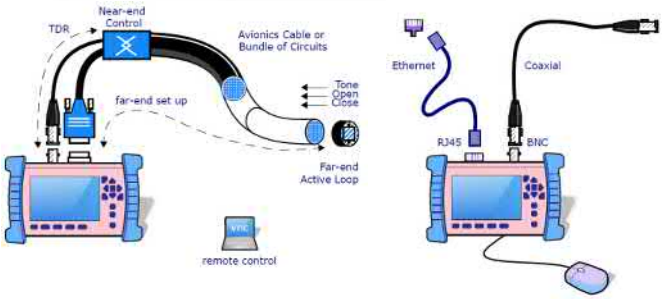
Metro.Cable (custom TDR)

Metro.Cable is a customizable time-domain reflectometer (TDR) to characterize and locate faults in metallic cables of any nature (i.e. untwisted lines, twisted pair wire, coaxial cable, non-standard bundle, etc.). It can also be used to locate discontinuities, bandwidth, FEXT, or any other impairment in the electrical path. It has two default interfaces BNC and RJ45 for coaxial cables and Ethernet cables, while the third interface can be adapted to any demand to satisfy the necessity of fault location in non-standard cables.

Metro.Cable has native interfaces for the most popular cables used in telecoms, coaxial & twisted pairs, that are connected to the board by means of BNC and RJ45 conectors. Metro.Cable can also satisfy the need of testing special cables made of two, three or any number of conductors. In order to make it possible Metro cable uses two adapters: the Near-end and the Far-end Active Loop that facilitate the selection of each pair and the generation of special test signals.

- Near-end adapter. Near-end adapter is a switching matrix that allow the selection of any pair of conductors to execute the TDR test.
- Far-end Active Loop adapter. Far-end adapter communicated with an independent media with the Metro.Cable board can open/close any two circuits, generate a tone or a special impedance





Metro.ISO (protective testing)

Metro.ISO it is a next generation Insulation up to 50 MΩ. It cantest Insulation-Resistance, Capacitance, AC / DC Voltage, Cable test. Protective procedure to avoid accidents caused by a wrong selection (i.e. isolation instead of insulation)

Metro.ISO M1 (analog testing)

Metro.ISO.M1 is an Insulation Measuring instrument with the ability to measure cable insulations up to 20 GΩ and user selectable test voltage: 100, 250, 500 V DC. It can be configured to test Resistance, Capacitance, AC / DC Voltage and Cable length.

Metro.FLB (fault location bridge)

The Metro.FLB is an automatic fault detector particularly designed for telephone cables. Insulation faults on copper lines can either be permanent or due to deterioration, or caused by external agents such as weather. All the impairments are detected rapidly to repair and service restoration.

Net.Shark (a real tap in a hand)

This tap is quite unique because it is capable of Filtering Traffic, Capture, Storage and Tap at wirespeed in an small, compact and battery operated devices. They support ALL the features of high-end taps and capture devices in a small, battery operated instrument to provide mobility and storage capacity to reach any point of the network. Net.Shark includes ALL the features of active taps to tap connecting their favorite protocol analyzer as usually, or go anywhere to filter, capture and save packets. It includes 2x16 programmable filters to identify flows by MPLS, TCP, UDP, VLAN, IP, MAC, etc. work at wirespeed without generating any delay, lost, or jitter.

Filters

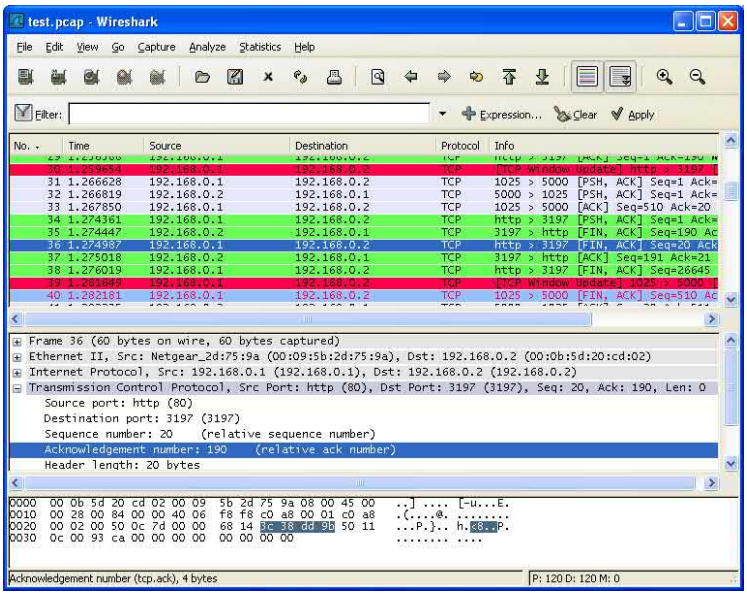
- Sixteen (16) simultaneous filters can be applied to the traffic
- Ethernet source and destination MAC addresses
- Ethertype value with selection mask
- VLAN-VID with selection mask, VLAN-CoS value with selection mask
- IP source, destination, IP address group: subset of addresses filtered by masks
- Protocol encapsulated in the IP packet (TCP, UDP, Telnet, FTP, etc.)
- DSCP field, single value and range, TCP/UDP port, single value and range
- Agnostics filters defined by 16 bits masks and user defined offset
- Lawful filter: 64 byte pattern match at any place in the frame payload

traffic aggregation | wirespeed | full duplex | PCAP capture

More Features & Benefits

Built as a field device it can be use anywhere to capture packets:

- 100% firmware/hardware operation
- Full Duplex Wirespeed tap & nanosecond accuracy
- Filter/Capture/Tap at full duplex GbE
- Filtering, Capture, Decoding & Aggregation by FPGA
- NTP Synchronised PCAP Time Stamp
- WireShark friendly for protocol analysis
- Real time Multistream captures for IPTV
- Non-stop packet tap 24/7/365
- Storage in SD card
- No MAC, no IP: Undetectable
- Captures CRC errored frames
- VNC remote control
- Access via standard web browser
- Fault tolerant to AC power loss
- 4.5h of operation with batteries in 2.6 lbs
- VNC remote control/IP Bandwidth



Users

- Any WireShark user requiring GbE performance
- VoIP providers and installers
- R+D centers
- Lawful applications .

Code	**Description** (+ info... www.albedotelecom.com)
AT.NShark.HH	NetShark hand-held. Battery operated tap including 2 Line ports (SFP interfaces supporting 10BASE-T, 100BASE-TX, 100BASE-FX, 1000BASE-T, 1000BASE-SX, 1000BASE-LX, 1000BASE-ZX), 2 Mirror ports (RJ45 interfaces including 10BASE-T, 100BASE-TX, 1000BASE-T), aggregation function in one mirror port, SD card storage in PCAP / PCAPNG format with hardware timestamps. Includes AC/DC adapter, transportation bag, two units of RJ45 SFP transceiver (10BASE-T, 100BASE-TX, 1000BASE-T).
AT.NShark.NS	Network Search. Automatic detection of up 16 most frequent streams listed by IPV4, IPV6 VLAN and MAC.
AT.NShark.POE	Power over Ethernet bridge. PoE / PoE+ pass through as per IEEE 802.3af and IEEE 802.3at.
AT.VNC.RC	Graphical Remote Control. Based on VNC for Windows and Linux. Ethernet/IP remote control that duplicates the tester graphical user interface in a remote computer.
AT.SNMP.RC	SNMP Remote Control and Automation. Based on SNMP protocol allows user to control the tester remotely using SNMP queries.
AT.Wi-Fi.RC	Wi.Fi USB. Remote Control wireless interface to be used together with VNC.

Net.Hunter (spot, capture & save)

This Packet Capture Device is ideal for those experts that require real-time analysis of 100% of the IP packets transmitted through an Ethernet Link. Troubleshooting, Security and Forensic are typical applications of Net.Hunter. Interestingly it includes an embedded TAP that forwards those packets that are compliant with any of the 16+16 programmable filters.

Suspicious packets can either be saved in the internal SSD disk, or tapped to a LAN. Net.Hunter is undetectable as it has no IP or MAC address, whilst operations are executed in FDX mode [Tx+Rx], with ZERO delay and ZERO loss of customer' traffic

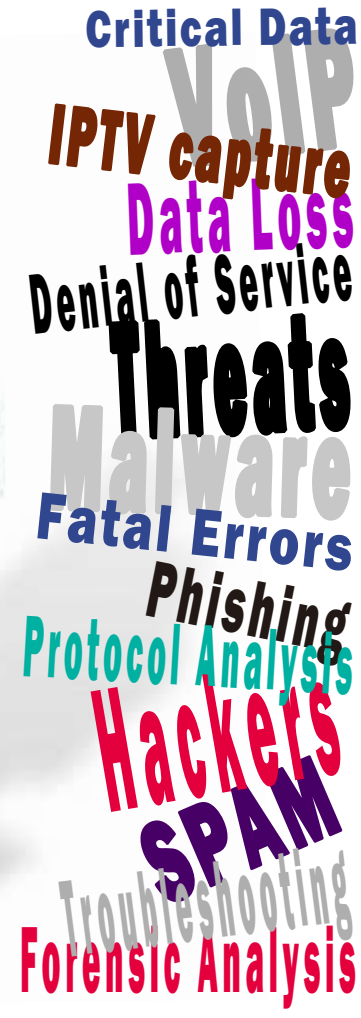
A tireless packet Sniffer

Net.Hunter filters, captures, taps & saves packets to a local SSD disk at wirespeed, wherever you are. It is a stream-to-disk device that can filter, copy, save and eventually tap packets at wire-speed to assist those who need to monitor, tap and record any data without disturbing the live traffic or generating any delay or loss.

Top Featured Appliance

Built as a field device Net.Hunter can be used to capture data at any point

- Hand-held and rack format
- 100% firmware/hardware operation
- Non-stop packet tap 24/7/365
- Filter/Capture/Tap at full duplex GbE
- Filtering, Capture, Decoding & Aggregation by FPGA
- Storage size: up to 512 GB disk
- Capture & Record at wire-speed (2Gb/s)
- Smart Capture: first Filter and then Record
- NTP Synchronised PCAP Time Stamp
- WireShark friendly for protocol analysis
- VoIP, IPTV, Data, TCP/IP and more
- Real time Multistream captures for IPTV
- No MAC, no IP means Undetectable
- Monitor and Pass Through modes
- Captures CRC errored frames
- Built-in Tap to 1000BASE-T and Wi-Fi
- Wi-Fi Multi/Broadcast capture & record
- 16+16 Programmable Filters
- Fault tolerant to AC power loss
- 4.5h of operation on batteries
- Law applications



Users

- Power Utilities to capture GOOSE, SV, MMS, PTP, NTP protocols
- 5G operators to capture PTP, NTP and Ethernet IP protocols
- Finance and Banks organizations for security
- Enterprise Forensic Analysis
- Cyber security, Defense and Intelligence agencies
- e-Banking
- Law / Police / Intelligence applications
- Telecom Troubleshooters
- Complement to Firewalls .

Code	**Description** (+ info... www.albedotelecom.com)
AT.NHunterk.HH	Net.Hunter hand-held. Battery operated capture device including 2 Line ports (SFP interfaces supporting 10BASE-T, 100BASE-TX, 100BASE-FX, 1000BASE-T, 1000BASE-SX, 1000BASE-LX, 1000BASE-ZX), 2 Mirror ports (RJ45 interfaces including 10BASE-T, 100BASE-TX, 1000BASE-T), aggregation function in one mirror port, storage in internal high speed SDD in PCAP / PCAPNG format with hardware timestamps. Includes AC/DC adapter, transportation bag, two units of RJ45 SFP transceiver (10BASE-T, 100BASE-TX, 1000BASE-T).
AT.NHunter.SSD120	SSD 120 GB: Internal Solid State Drive with capacity 120GB - Need to be purchased with the Net.Hunter base unit for line speed capturing.
AT.NHunter.SSD512	SSD 512 GB: Internal Solid State Drive with capacity 512GB - Need to be purchased with the Net.Hunter base unit for line speed capturing.
AT.NHunter.NS	Network Search. Automatic detection of up 16 most frequent streams listed by IPV4, IPV6, VLAN and MAC.
AT.NHunter.POE	Power over Ethernet bridge. PoE / PoE+ pass through as per IEEE 802.3af and IEEE 802.3at.
AT.VNC.RC	Graphical Remote Control. Based on VNC for Windows and Linux. Ethernet/IP remote control that duplicates the tester graphical user interface in a remote device.
AT.SNMP.RC	SNMP Remote Control and Automation. Based on SNMP protocol allows user to control the tester remotelly using SNMP queries.

Net.Storm (compact WAN emulator)

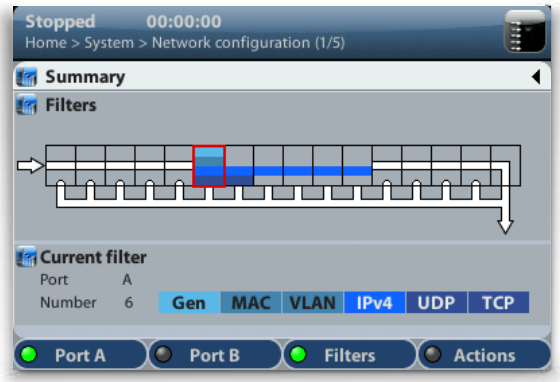
This device emulates ANY link/network based on VLAN, VPN, MPLS, etc. in terms of bandwidth & traffic impairments. Bandwidth control is done by means of Traffic Shaping & Policing specified in fr/s or bit/s, while impairments (delay, loss, jitter...), are inserted in a 100% controlled way choosing packets part of MAC/IP/TCP/UDP flows defined by the user.

Now it is possible

Yes, modelling arbitrary network dynamics to verify any IP based solution, is now possible. Because Net.Storm is able to simulate any network condition to check how tolerant your services, protocols and devices are when quality / capacity degradations occur. It replicates accurately combined effects such as packet delay, errors, loss, bandwidth variations, traffic shaping and traffic policing

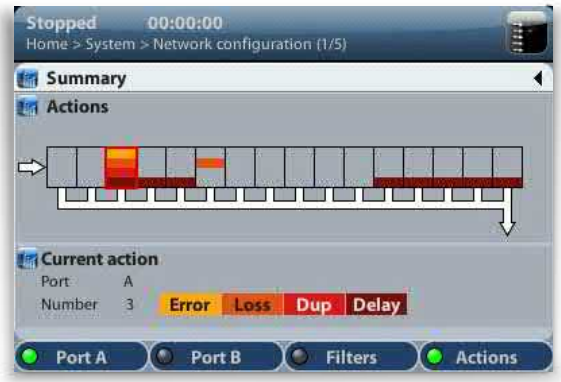
Features and Benefits

- Exact replication of any traffic condition (delay, jitter, loss, error, duplication,...)
- Multiple traffic patterns (uniform, exponential, burst, random, two-state random,...)
- Strict bandwidth control in fr/s or bit/s
- 16+16 filters: MAC, IP, TCP, UDP...
- Wirespeed performance at full duplex
- Accuracy better than < 1µs at FDX Gbit/s
- Hand-held or rack mounted



Applications

- Roll out of IEEE 1588v2 - PTP
- Check critical data applications
- Tolerance of services to QoS degradation
- Assured service and SLA verification
- Identification of degraded sources
- Testing IPTV / VoIP and any Multiplay developments
- Stability networking resources
- Deployment of circuit emulation over packet networks
- Network Design.
- IP Applications Development
- VoD, and real/time services.
- Approval and Acceptance Tests
- QoS verification in Internet-like networks
- Laboratories willing to emulate network conditions
- Protocol testing



Users

- Software applications based on Internet
- R&D centers and Operator Laboratories
- Satellite communications delays emulation
- Submarine links emulation
- HD Television test
- Military application willing to simulate extreme conditions

Code	**Description** (+ info... www.albedotelecom.com)
AT.NStorm.HH	Net.Storm hand-held. Battery operated gigabit Ethernet impairment generator including 2 gigabit Ethernet interfaces electrical and optical (SFPs based). Full Duplex operation at 1 Gb/s. Simultaneous and independent impairment generation in up to 16 traffic flows. Supports generation of frame loss, bit error, duplication, delay, jitter, reordering, bandwidth control. Includes AC/DC adapter, transportation bag and one RJ-45 patch cable. SFP not included.
AT.NStorm.rack	NetStorm 19' rack. 2xGigabit Ethernet interfaces electrical and optical (SFPs based) Full Duplex operation at 1 Gbit/s or 1,5 Mframes/s, Traffic impairments can be defined over max. 16 traffic flows Actions: Packet loss, error, duplication, delay, jitter, reordering, bandwidth control. Accuracy better than 10-6 secs. at 1 Gbit/s.
AT.VNC.RC	Graphical Remote Control. Based on VNC standards for Windows and Linux. Ethernet/IP remote control that duplicates the tester graphical user interface in a remote computer.
AT.SNMP.RC	SNMP Remote Control and Automation. Based on SNMP protocol allows user to control the tester remotely using SNMP queries.

VoIP.Master (SIP trunk & VoIP turn up)

VoIP.Master helps organizations accelerate revenue generation through quick and effective testing of SIP Trunks, VoIP services and VoIP equipment. Designed to meet the needs of VoIP technicians, USB-VoIP.Master has one of the simplest user interfaces on the market. With a powerful feature set USB-VoIP.Master provides a comprehensive test capability required for next generation voice environments. Based on a USB memory device, USB-VoIP.Master is a self-contained live software environment that can be run on most x86/X64 based laptops or computers. By using a live USB memory device users are able to turn existing laptop or computer assets into a powerful VoIP tester without the concern of anti-virus or other corporate lock-down issues that may be present when using the device in a native Windows mode.

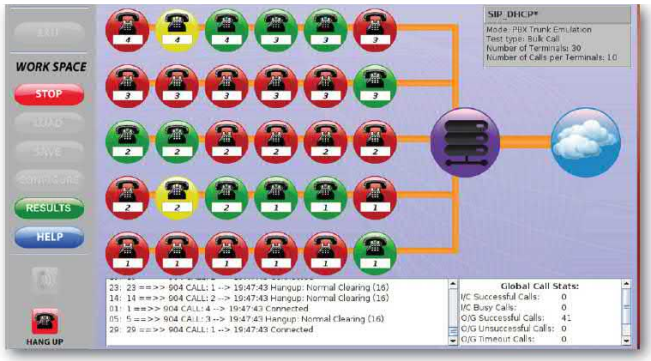
USB-VoIP.Master offers the most comprehensive support for VoIP turn-up and maintenance testing through its unique functional testing approach. By providing this capability USB-VoIP.Master can emulate key VoIP/UC infrastructure elements allowing users to quickly test and ensure the correct operation and performance of VoIP networks and equipment. Users can for example connect USB-VoIP.Master to SIP trunks and networks emulating an IPBX, making multiple VoIP calls ensuring the trunk is operational and performing to pre-agreed Service Level Agreements. USB-VoIP.Master can also emulate a SIP VoIP network allowing VoIP equipment to be tested without the need for an operational SIP trunk or network, ideal for pre-staging prior to deployment

Turn-up and Maintenance tester

VoIP.Master can support up to 30 simultaneous VoIP calls using 'Virtual Terminals' in PBX and Network emulation mode. Any combination of outgoing/incoming calls is supported, incoming calls on answer are presented with an auto-attendant capability providing users the ability to select the required mode of operation for call.

Powerful Emulation Workspace

- Support for IP-PBX and Network emulation modes.
- Up to 30 simultaneous VoIP calls
- Real-time quality indicator of the of SIP Trunks and VoIP circuits
- Single Call, Sequential Call and Bulk Call modes
- Multiple codec support

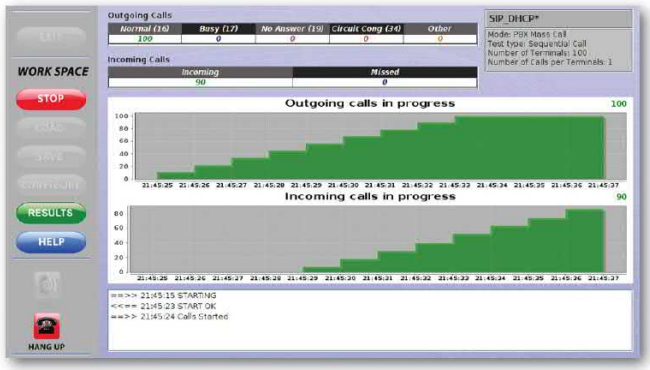


Call Quality Metrics

- Call quality metrics using ITU-T E-Model
- Real-time coloured coded MOS indication for each terminal (call).
- Detailed media (RTP) statistics for each call
- Pass/Fail thresholds can be set for MOS or RTP metrics (Jitter/Delay/Loss).

Mass Call Mode

- Emulation of up to 200 simultaneous calls (incoming/outgoing)
- Support for Equipment and Network emulation modes
- Comprehensive PDF test reports with call quality metrics



Key Features and Benefits

- Comprehensive PDF test reports with call quality metrics.
- T.38 Fax CPE and Network emulation
- Send or receive fax's using T.38 or in-band (G.711)

Code	**Description** (+ info... www.albedotelecom.com)
AT.UTBL-S5-FL	USB-VoIP.Master 'Lite' VoIP/UC Tester with 5 Terminals and Floating License. USB based SIP Tester running live Linux based version of UC-VoIP.Master, can be used on most x86 based computers or notebooks. Provides PBX (CPE) emulation mode and ITSP (Network) emulation modes supporting up to 5 simultaneous 'Virtual Terminals' (Calls) in Single, Sequential and Bulk call modes. Plea a se Note that VoIP.Master Lite does not include a G.729 license as standard this can be purchased as an option. Includes: USB stick and magnetic USB case, Single Floating User License for VoIP.Master Application which allows for use on any host (computer).
AT.UTBU-S15-FL	USB-VoIP.Master USB based SIP VoIP/UC Tester with 15 Terminals and Floating License. USB based SIP Tester running live Linux based version of UC-VoIP.Master, can be used on most x86 based computers or notebooks. Provides PBX (CPE) emulation mode and ITSP (Network) emulation modes supporting up to 15 simultaneous 'Virtual Terminals' (Calls) in Single, Sequential and Bulk call modes. 1 x G.729 codec license included as standard additional licenses can be purchased. T.38 Fax capability available as optional extra. Includes: USB stick and magnetic USB case, Single Floating User License for VoIP.Master which allows for use on any host.
AT.UTBU-S30-FL	USB-VoIP.Master USB based SIP VoIP/UC Tester with 30 Terminals, Mass Call Mode and Floating License. USB based SIP Tester running live Linux based version of UC-VoIP.Master, can be used on most x86 based computers or notebooks. Provides PBX (CPE) emulation mode and ITSP (Network) emulation modes supporting up to 30 simultaneous 'Virtual Terminals' (Calls) in Single, Sequential and Bulk call modes. Also includes Mass Call mode supporting 200 simultaneous calls in PBX and ITSP to test trunk capacity. 1 x G.729 codec license included as standard additional licenses can be purchased. T.38 Fax capability available as optional extra.

2020 Buyer' Guide

	10GE	OWD	T1/E1	Eth/IP	Test	Clock	SyncE	PTP	TIE	SLA	Tap	Captur	Cable	OTDR	VoIP	TR069	Serial	Goose	SV	C3794
AT-One			★		★				✓	✓							★			
AT-2048			★		★				✓	✓							★			
Ether.Genius		★	★	✓	★	★	★	★	★	✓		♥	✓				★			★
Ether10.Genius	★	★	★	✓	★	★	★	★	★	✓		♥	★	✓			★			★
Ether.Giga				★	★							♥	✓							
Ether.DuaLoop				✓	✓															
Ether10.Loop	✓			✓	✓															
Ether.Loop				♥	✓															
Ether.Sync		✓		✓	★	★	★	★	✓	✓										
Metro.Cable					★								★							
MeTro.69					★											★				
Metro.ISO					★															
Metro.OTDR														★						
Net.Audit		✓		✓					✓	★										
Net.Hunter				✓				♥			✓	★								
Net.Shark				✓				♥			★	✓								
Net.Storm		♥		♥				♥												
Net.Sync		★		★	✓	✓	✓	✓	✓	♥			✓							
Net.Time				♥	♥	★	✓	✓	✓	♥										
VoIP.Master				♥	★					✓					★					
xGenius	★	★	★	★	✓	♥	★	★	★	✓	✓	★	♥	♥	♥		★	♥	♥	★
Zeus		★	★	★	★	♥	★	★	★	✓	✓	★	♥	♥	♥		★	★	★	★

★ Best option ✓ Good option ♥ Partial support

ALBEDO is an ISO9001 certified company. ALBEDO aim is to be the best technological partner of our customers offering them products to install, synchronize, monitor and troubleshoot transmission resources. ALBEDO designs and markets products that contain a high degree of sophistication and offer a great added value where accuracy and reliability is fundamental in a changing technological environment. Customer satisfaction is our objective and the main driver of our improvement.

ALBEDO

innovation heartbeat

3 Years WARRANTY

Each ALBEDO Telecom product is warranted to be free from defects in material and workmanship under normal use and service. The warranty period is three years for the Unit and its Accessories except batteries that only have a six months that begins on the date of shipment. This warranty extends only to the original buyer or end-user customer of an ALBEDO Telecom authorized reseller, and does not apply to batteries or to any product which, in ALBEDO Telecom's opinion, has been misused, altered, neglected or damaged by accident or abnormal conditions of operation or handling. ALBEDO Telecom warrants that software will operate substantially in accordance with its functional specifications for six months. ALBEDO Telecom does not warrant that software will be error free or operate without interruption. ALBEDO Telecom authorized resellers shall extend this warranty on new and unused products to customers only but have no authority to extend or reduce the warranty. Warranty support is available if product is purchased through an ALBEDO Telecom authorized sales channel. ALBEDO Telecom reserves the right to invoice buyer for importation costs of repair/replacement parts and transport to an authorized service place. ALBEDO Telecom's warranty obligation is limited, at ALBEDO Telecom's option, to refund of the purchase price, free of charge repair, or replacement of a defective product which is returned to an ALBEDO Telecom authorized service place within the warranty period. To obtain warranty service, contact your nearest ALBEDO Telecom authorized service place or send the product, with a description of the difficulty, postage and insurance prepaid. ALBEDO Telecom does not assume any risk for damage in transit. Following warranty repair, the product will be returned to Buyer, transportation prepaid. If ALBEDO Telecom determines that the failure was caused by misuse, alteration, accident or abnormal condition of operation or handling, ALBEDO Telecom will provide an estimate of repair costs and obtain authorization before commencing the work. Following repair, the product will be returned to the Buyer transportation prepaid and the Buyer will be billed for the repair and return transportation charges.

ALBEDO TELECOM inc.Register in 1110 Brickell Av. Miami, FL 33131

aims

+ **LEARN** from business models and case studies
+ **UNDERSTAND** the potential of interoperability with legacy services
+ **EXPERIENCE** specialised synchronization network solutions
+ **ASSESS** different solutions for installation and maintenance