Net.Time a new generation Clock

Just in Time

Net.Time represents the state-of-the-art in timing as it has been designed to deploy the most precise and secure synchronisation networks for critical services such as electricity and telecommunications. Net.Time is fault-tolerant, has a built-in GNSS receiver, Rubidium oscillator, redundant power supply and accepts a wide variety of time references that can be used as primary or backup references. Provides compatibility between timing signals for synchronisation distribution using protocol translation in all directions.

Accurate and reliable synchronisation is an essential resource to keep the stability and safety in 5G as well as in other relevant sectors of the industry including the Power Grid, Finance, Broadcast, IoT, Automation and the Air / Rail / Road Traffic Control. Timing is so crucial that small perturbations may induce a power blackout, phone call breaks, chaos in airports or cause millions in losses in the stock market. GNSS clocks may satisfy all of these timing needs; however, stand-alone solutions are not reliable as per documented reports demonstrate that interferences degrade GPS performance, while cyber-attacks, jamming and spoofing are real threats. Net.Time contains the latest achievements for timing distribution providing any type of signals with the format, level of accuracy and robustness required by each particular application.

Flexible, accurate & secure time

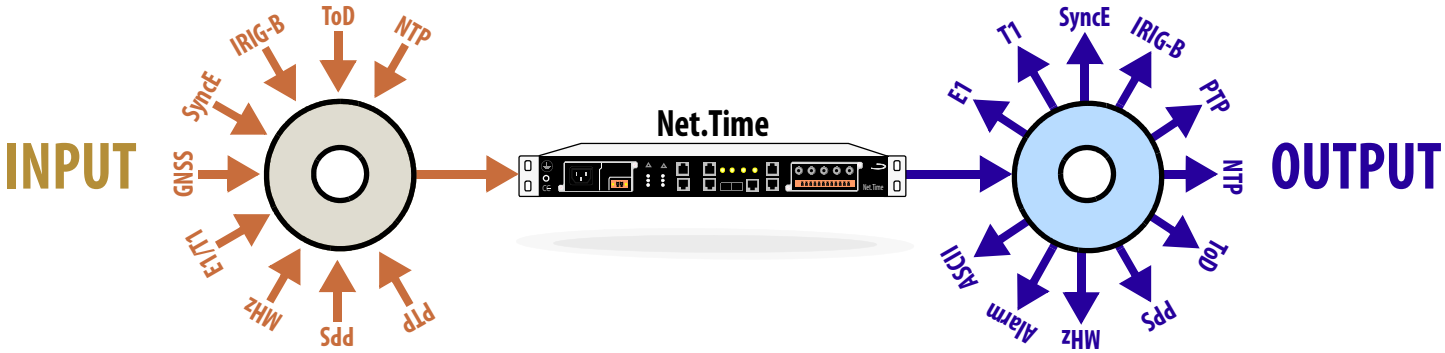
Synchronisation quality is more relevant than ever. Signals must be delivered 24/7 minimising all kind of interruptions, wander and phase errors, this is why Net.Time is network fault tolerant by means of supporting PRP protocol, it is time redundant, as it can use up to 10 different input signals, and it has double Power Supply.

Profile & Protocol Translator

When GNSS is not used, Net.Time is generally collocated at the edge of the transmission network to receive a reference such as PTP or NTP, then, it filters the possible impairments, asymmetric delays, time errors, even wander if necessary, to discipline the internal oscillator that could be Rubidium. Once locked Net.Time delivers the synchronisation signals to each client with appropriate format and media, and providing the highest level of accuracy. The leading technology of Net.Time makes it perfectly suited for the most demanding applications thanks to its stability pace, the flexibility to accept a large variety of input/output signals, and the unique ability to translate any protocol and input profile to the selected output timing signal ready for distribution.

ALBEDO

Net.Time Tau



Applications

At ALBEDO we have more than 25 years of experience as a manufacturer of testers devoted to the verification of synchronisation networks. Our clients are clock Manufacturers, Telecom, Power Utilities, Banks, Railways and Air Traffic Control companies that have always relied on our sophisticated equipment to install and verify the quality of their synchronisation devices and networks. It does not matter if time signals are based on circuits or packets, our xGenius or Zeus testers are always ready to measure the timing quality and identify the sources of degradation. That was the starting point of Net.Time design using the latest available technology and bearing in mind a few, but fundamental, objectives:

1. Simplify the **migration** to PTP architectures starting from legacy signals like NTP, IRIG-B or TDM based.
2. Facilitate the **integration** of different timing architectures offering seamless translations and a wide variety of inputs / outputs that can be used as primary or backup references.

With all the accumulated experience in synchronism, we present Net.Time that has an endless number of outstanding features that position it among the most accurate, reliable and competitive in the market *to keep your network in sync*.

Telecom

5G operators require accurate phase and time alignment at the backhaul of the wireless in order to increase the density of terminals reducing cells size. Timing is also necessary for reusing the frequencies, to control the hand-over, logging the events and many more new services that are boosting the mobile business. Net.Time in Telecom networks is deployed at the edges and generally configured as a boundary clock to provide a high level of accuracy and protection with signals such as PTP, SyncE, PPS, T1/E1 and MHz.

Cost-effective Rubidium

Power Utilities

Net.Time provides timing to legacy and newly deployed devices through redundant paths to achieve fail-safe operation while supports all relevant timing distribution and redundant transmission requested by the power grid. ALBEDO' clocks are compliant with IEC 61850 to simplify the transition to the currently standard adopted by the industry which is considered a key enabler of the Smart Grid. The unit supports PTP and NTP over PRP and multiple reference options are possible: GNSS, PTP, NTP, ToD, IRIG-B, PPS, etc. to satisfy all timing needs in each substation. The unit implements Power and Telecom profiles for those grids using both, typically Telecom in the WAN and Power in the substation making on this way easier the integration of the installed plant for perfect control, protection and data acquisition. Net.Time is network fault tolerant by means of PRP, it can operate up to 65ºC and can be assembled with double power supply for redundancy.

Rail and Road Transport

Railways need timing for traffic control, signalling, information panels, station clocks, railway substations, etc. The energy demand is in movement and modern trains are also power generators on the move sending it back to the grid. To ensure optimal operation accurate synchronisation is essential being a must at converter stations.

Road transport services require continuous location tracking of the fleet while for autonomous driving require precise timing for control and determine the exact positioning on the road. Interestingly IoT is addressing this niche defining objects like trucks with embedded sensors with PTP timing.

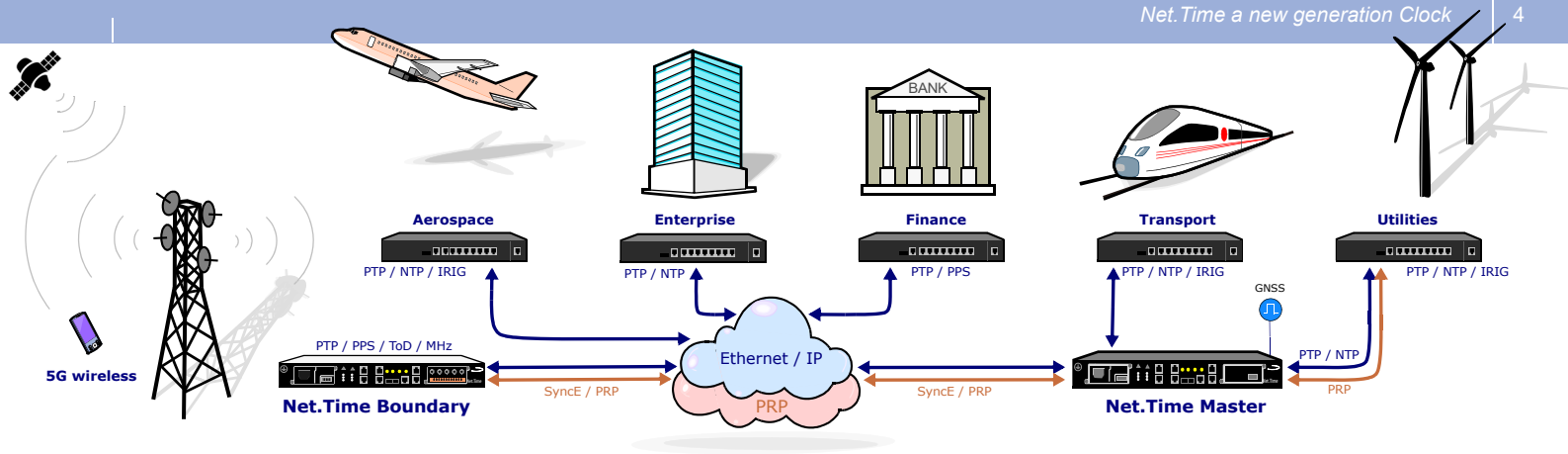
Finance

Banks, Stock exchanges and other Financial institutions are legally committed to register operations with a consistent and accurate time-stamps provided by Net.Time that in this context is disciplined with GPS or PTP to satisfy the mandate of national regulators for highly precision and traceable timing to confirm when any financial operation occurs, including money transfers, currency exchange, credit card payments, stock market operations all must be logged in a chronological manner. According to the European Securities and Markets Authority (ESMA) accurate timing and traceability is imperative to confirm when transactions occur (Directive MiFID 2, since 01/01/18).

Aerospace

Time is a key resource in Navigation Systems to ensure the proper functioning. Inherited signals such as IRIG-B, NTP and TDM are still in use but progressively are being replaced by PTP time-stamping systems to provide a unique, accurate and consistent synchronisation based on

Net.Time equipped with atomic oscillators disciplined by GNSS and distributed throughout the territory, air traffic control centres and airports.



About Net.Time

Net.Time uses the latest electronics components for efficient power consumption and uses a built in GNSS receiver to provide a good accuracy to its clients. Alternatively the satellite signal can be used as back-up and then select an alternative reference signal tor to discipline a Rubidium oscillator which is ideal for mission critical applications assuring an excellent time when locked but more particularly in hold-over mode.

I/O flexibility: PTP, NTP, ToD, SyncE, PPS, IRIG-B, 1/2/5/10 MHz, E1/T1, PRP

Net.Time is highly stable in any configuration: locked, hold-over even in free running mode thanks to its excellent oscillators and the advanced FPGA assistance that maintains control rooms and operation centrers in a good synchronisation state.

KEY FEATURES

- GNSS built-in 72 channels
- Rubidium / OCXO oscillator
- Power / Telecom PTP profile
- PRP network fault tolerant
- Full NTP support
- Simultaneous PTP and NTP
- I/O: PTP, NTP, ToD, PPS, IRIG-B, SyncE, T1/E1, MHz
- SSH password and fully encrypted configuration
- Carrier-class: 2 x Vac / Vdc
- +65ºC fan-less operation
- 256 PTP unicast clients
- IEC 61850 compliant
- Modules: future proof

Net.Time can be configured as Master or Slave clock depending on the application, whilst the Boundary clock configuration promotes GNSS as redundant source of timing and selects PTP as the time protocol reference over the IP network.

PTP domain

There is no question about the advantages of the PTP protocol because, among other things, it improves precision, flexibility and interoperation. However, nothing happens overnight, and its adoption in Airports, Substations, Base stations and Central Offices will be a gradual process where Net.Time can play an important role facilitating the transition integrating all the devices deployed through the great versatility of interfaces, protocols and profiles. All in the same unit, therefore Net.Time doesn't need protocol translators, profile converters, or Redbox to ensure the coexistence of legacy devices, using IRIG or T1 / E1, and new ones that already have PTP interfaces.

NTP Time Server

Net.Time can be configured as an NTP server for those enterprises willing to improve the quality of their internal processes where they should stop relying on external sources excessively fluctuating signals, or the poor quality of internal servers that always under risk of introducing errors in the synchronism signal. NTP and PTP can coexist so administrators do not need to choose which one to enable or the installation of a device for each protocol.

Native PRP clock (DAN-P)

PRP assurance

Net.Time is a native Parallel Redundancy Protocol DAN-P clock, hence it does not need a Redbox to support PRP, reducing costs and simplifying the system. PTP over PRP in mission critical application offers better accuracy, minimising wiring and maintenance. 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.

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BENEFITS

- Universal Protocol translator
- Universal Profile translator
- Network fault tolerant
- No PRP RedBox required
- Time assurance: n x refs.
- Flexibility: multiple outputs

APPLICATIONS

- Master / Boundary / Slave
- Substation clock
- Air Traffic Control
- 5G Edge clock
- Stand-alone GPS clock
- NTP server

Synchronisation features	
PTP function	• Grandmaster, Slave and Boundary clock • Up to 256 unicast clients at 128 packets/sec • PTP profile translation from Port A to Port B
PTP profiles	• Default profiles (IEEE 1588-2008 Annex J) • Telecom frequency profile (ITU-T G.8265.1) • Telecom phase and time profile (ITU-T G.8275.1) • PTS / APTS profile (ITU-T G.8275.2) • Utility Profile (IEC 61850-9-3) • Power Profile (IEC C37.238)
NTP function	• Port A: NTP server / Port B: 1000 transactions per second • NTPv3 (RFC 1305) and NTPv4 (RFC 5905) server and client • SNTPv3 (RFC 1769) server
SyncE function	• Interfaces: RJ45 and SFP • Full ESMC / SSM support as per ITU-T G.8264 and G.781 • SyncE for time holdover during GNSS outage
GNSS	• GPS, GLONASS, Beidou, Galileo support • 72 channels in the L1 band • Single and Multiple constellation • Cable delay compensation
Time Inputs / Outputs	• Time: PTP, NTP, IRIG-B (B00X, B12X, B13X, B14X, B15X, B22X), ToD (ITU-T G.8271, China Mobile and NMEA) • Phase: 1PPS, 1PP2S • Frequency: 1544 kHz, 2048 kHz, 5 MHz, 10 MHz, 1544 kb/s (T1), 2048 kb/s (E1), SyncE
Rubidium / OCXO oscillators	Internal Oscillator • Default OCXO better than ±0.1 ppm • Optional Rubidium better than ±5.0 e-11 Rubidium features • Aging (1 day, 24 hours warm up): ±4 e-11 • Aging (1 year): ±1.5 e-9 • Warm-up (time to <1.5 e-9): 15 minutes (typical 25° C) Locked Accuracy • To UTC (24 h locked to GNSS, peak value, ±2° C): ±40 ns • To reference (24 h locked to 1PPS / ToD, peak value ±2° C): ±10 ns Hold-over Accuracy • OCXO: <1µs (1h ±2°C) / <10µs (12h ±2°C) • Rubidium: <100ns (2h ±2°C) / <1µs (24h ±2°C) / <10µs (120h ±2°C) Freerun Accuracy • Accuracy on shipment at 25°C: ±5 e-11
PRP resilience	• PRP extension for IEEE 1588 / IEC 61588 • Link Redundancy Entity (LRE) / IEC 62439-3
Ports	• 2 x RJ45 (10BASE-T, 100BASE-TX, 1000BASE-T): PTP, NTP, SyncE, PRP (in/out) • 2 x SFP (100BASE-FX, 1000BASE-LX,1000BASE-T, 1000BASE-ZX, 1000BASE-BX): PTP, NTP, SyncE, PRP (in/out) • 1 x SMA port: GNSS (in) • 3 x SMB ports: IRIG-B (in/out), 1PPS (in/out), 1PP2S (in/out), 10 MHz (in/out), 5 MHz (in/out), 2048 kHz (in/out), 1544 kHz (in/out) • 2 x RJ48: IRIG-B (in/out), ToD (in/out), 10 MHz (in/out), 5 MHz (in/out), 2048 kHz (in/out), 1544 kHz (in/out)

Platform	
Operation	• Fan-less operation ETSI 1U rack mountable (1¾" x 10" x 19" / 240 mm), weight: 2.8kg / 6.2lb • Temperature / Humidity range: -10°C ~ +65°C, 10% ~ 90% Redundant power supply: • AC: 85 ~ 264 Vac, 47 - 63 Hz (IEC 60320 C13/C14) • DC: 18 ~ 75 Vdc (2-pin 5.1 mm) • Universal: 85 ~ 264 Vac or 100 ~ 370 Vdc (2-pin 5.1 mm) • Power Consumption: 10W ~ 14W
Front/Back Panel	• LEDs: Platform (PSU1, PSU2, System), Application (Alarm, GNSS, Locked), Ports (Link, Activity) • 1 x RJ45 Network and Time interfaces • 1 x RJ45 Management Interfaces • USB software and firmware upgrade • 1 x Expansion module • 1 x Reset button
Management	• Local console by CLI (RJ-45) • SSH through management interface (RJ-45, 10/100BASE-T) • RFC 3164 Syslog event reporting (device role) • TFTP software and firmware upgrade

Net.Time is a clock conceived to simplify transition from NTP and IRIG-B synchronization to the more accurate IEEE 1588 / PTP protocol. With this purpose in mind, Net.Time offers seamless translation between both protocols. Net.Time also offers a high variety of clock reference inputs and outputs that could serve as primary or backup references, to synchronize new generation and legacy appliances and processes or even for monitoring purposes.