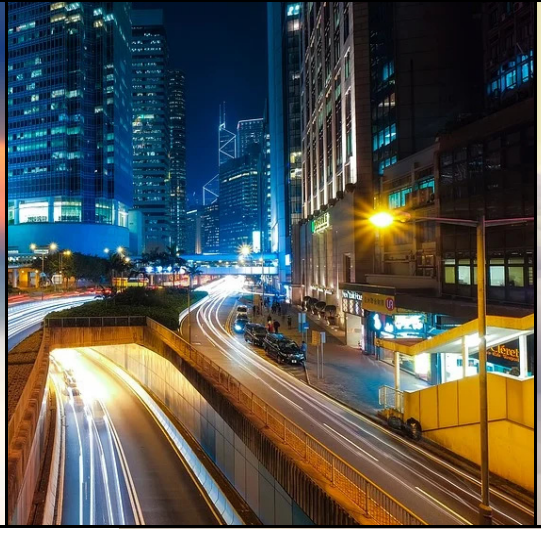




Net.Time φ a substation clock

It's all about time

Net.Time φ is a PTP/NTP over PRP clock designed to facilitate the integration of conventional substations with the new IEC 61850 standards by offering a wide variety of reference inputs and outputs. It can be equipped with a Rubidium oscillator, the best option for time quality especially in hold-over. It is powerful as it supports up to 22 simultaneous outputs, and very flexible because it can be disciplined with multiple back-up inputs.

Grid Automation

Time is an indispensable resource in grid automation required in critical applications such as Data Acquisition, Protection Relays Switchgears, SCADA, Events logging, Synchrophasors even in Virtual Plants to integrate renewable energy.

Rubidium & OCXO

The information, captured in real time at multiple points of the grid, must be processed and correlated. Only a perfect synchronization permits taking correct decisions to manage generation, transmission, distribution and protection resources, as a whole, to maintain a compact and effective power service. To achieve all these goals Net.Time provides a unified architecture aimed at guaranteeing the integrity of all the components in the electrical system, facilitating interconnection, stability and performance through a set of standardized protocols and information structures that will reduce commissioning and maintenance costs.

Optical & Electrical Ports

Accuracy at the Substation

GNSS is a common reference however jamming and spoofing make GNSS vulnerable, this is why Net.Time accepts multiple time references making it a sophisticated, flexible and versatile clock. This is one of the reasons why all the substations in the world are migrating towards the new PTP IEC-61850 standards but without putting at risk the installed base of IRIG-B, NTP, PPS and other legacy time codes.

Net.Time can be equipped with an OCXO or Rubidium oscillator to ensure quality timing especially in hold-over.

ALBEDO

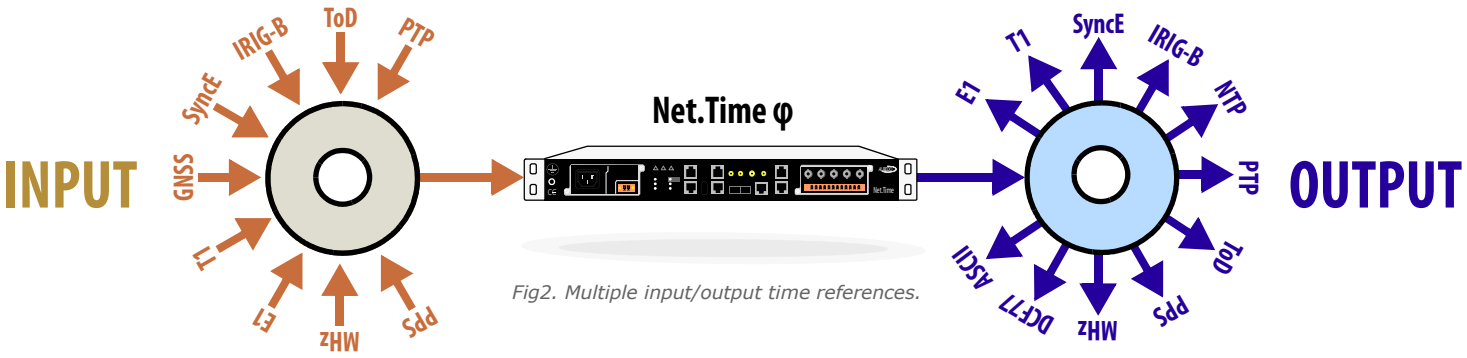


Fig2. Multiple input/output time references.

New Generation Clock

Fault tolerant to reference

GNSS is the most common reference, but we know that it is vulnerable then Net.Time accepts several references that can be programmed hierarchically making it in a sophisticated, versatile and reliable clock.

Scalable Architecture

Net.Time has five modules that allow you to configure the clock according to each topology, each module has a unique combination of interfaces and protocols to optimally distribute the synchronization in any substation.

22 simultaneous Outputs

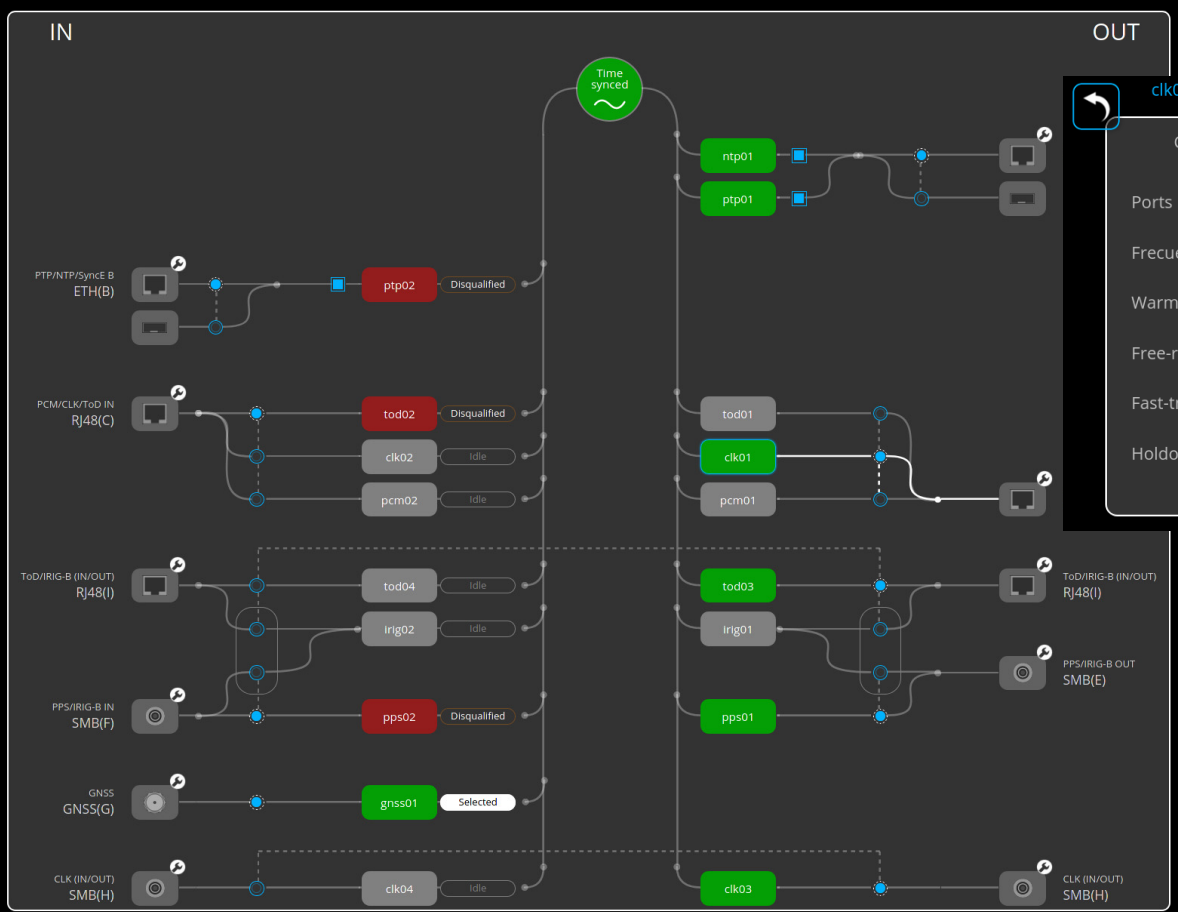
Advanced web interface

A web user interface permits engineers to interact with Net.Time to monitor and fully configure using a graphical application that is downloaded from the unit through an IP network. User experience is improved with a friendly tool that shortens the learning curve during the configuration and monitoring.

High performance

The objective of IEC-61850 was to develop the interoperability of multivendor devices by means of set of standards that simplify the connections through the more reliable optical fibers. The deployment of this infrastructure will immediately reduce the interferences and increase the transmission bit rate up to 1G/s.

Fig3. Graphical User Interface based on a web server.



Seamless Integration

This appliance was conceived to pave the transition to smart substations. With this purpose in mind Net.Time offers seamless translation of protocols by means of a wide variety of inputs / outputs for primary or backup time references.

Seamless migration to ICE-61850 standards

Smooth migration to PTP

Net.Time ensures that the new and more accurate PTP will be able to co-exist not only with SNTP but also with the veteran and robust IRIG-B. This coexistence will likely last for years and for this reason Net.Time integrates these --and many more time protocols-- under a powerful and dedicated architecture that favors cooperation, interconnection and eventually smooth migration. All technologies will continue to function normally and harmoniously thanks to the versatility provided by advanced electronic design in addition to the powerful processing capabilities of FPGAs. Therefore, all protocols are treated with the same respect to deliver the best possible level of performance and accuracy.

Native PRP support

The PRP offered by Net.Time, for both NTP and PTP, deserves to be highlighted as it avoids the use of external RedBoxes that would increase the cost of the installation. By implementing PRP in the clock, the redundancy is perfectly integrated and, what is more important, it allows a unified management simplifying the system and avoiding incompatibilities.

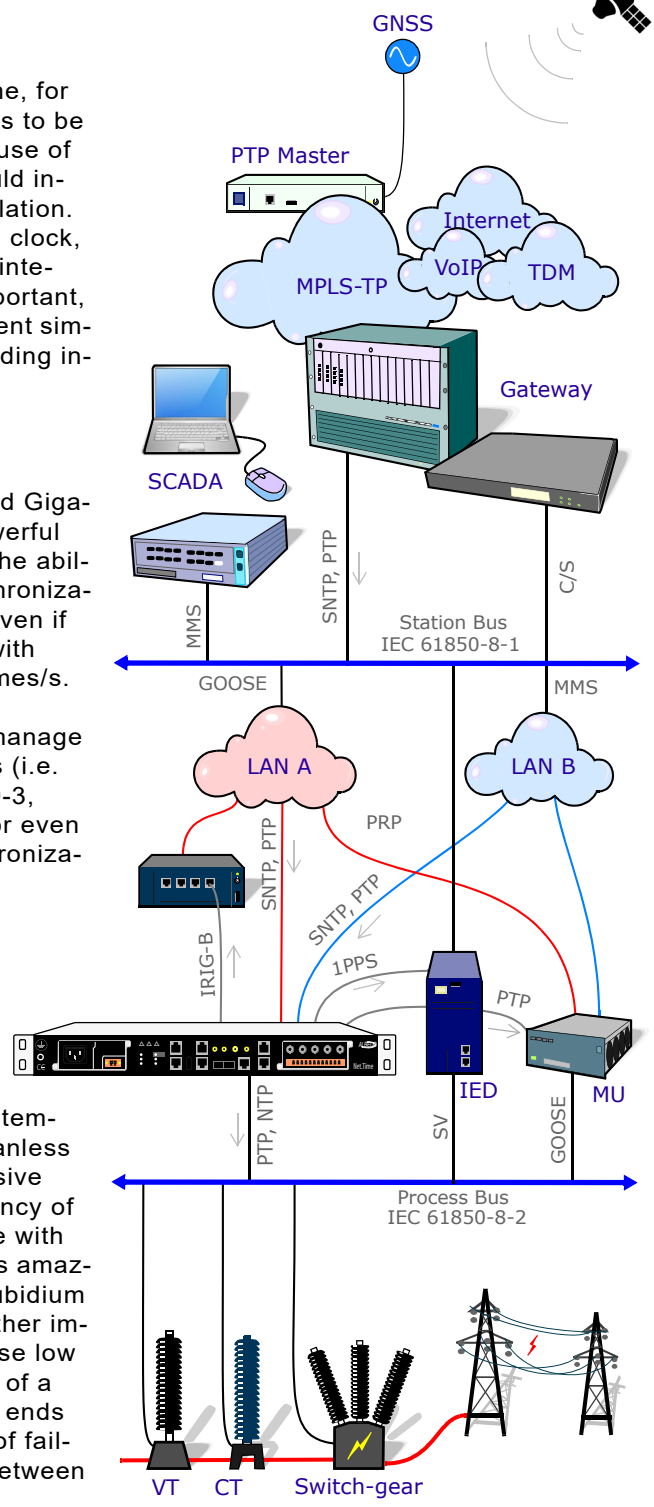
512 unicast clients

Net.Time has two high speed Gigabit Ethernet ports and a powerful hardware PTP engine with the ability to provide accurate synchronization to hundreds of clients even if they work in unicast mode with message rate up to 128 frames/s.

It can also simultaneously manage clients with different profiles (i.e. IEEE C37.238, IEC 61850-9-3, IEEE 1588 Default profile) or even running with different synchronization protocols (PTP, NTP).

Fanless 70ºC Operation

Net.Time is a clock totally prepared for the challenging environment of substations, its hardware has been designed to work with temperatures of up to 70ºC in fanless operation thanks to the passive heat removal and the efficiency of the electronics. For instance with OCXO power consumption is amazingly below 10W and with Rubidium is about 14W. This has another important consequence because low consumption allows the use of a passive cooling system that ends up reducing the probability of failures or MTBF (Mean Time Between Failures).



KEY FEATURES

- 512 PTP unicast clients
- 22 simultaneous outputs
- 70ºC Fanless Operation
- 9 time references
- 5 timing modules
- 1Gb/s, 100Mb/s,10Mb/s
- Optical / electrical interfaces
- Rubidium / OCXO oscillator
- PTP / NTP over PRP
- Simultaneous PTP and NTP
- Native PRP support
- Advanced web interface
- Full support of PTP, NTP, ToD, n x PPS, IRIG-B, DCF77, SyncE, MHz, T1, E1

APPLICATIONS

- Conventional Substations
- IEC-61850 Substations
- Railways infrastructures
- Synchrophasors
- Differential Teleprotection
- Virtual Power Utilities

BENEFITS

- Atomic accuracy
- Seamless integration
- Direct IRIG-B integration
- Fault tolerant to reference
- Solution to any time demand
- 5 years waranty
- Better MTBF

Net.Time φ (Phi) technical data

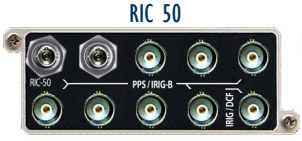
Features	
PTP roles	• Grandmaster, Boundary, Slave clock • Up to 512 unicast clients at 128 packets/sec (256 per port)
PTP profiles	• Default profiles (IEEE 1588-2008 Annex J) • PTS / APTS profile (ITU-T G.8275.2) • Utility Profile (IEC 61850-9-3) • Power Profile (IEC C37.238)
NTP function	• Port A: NTP server (1000 transactions per second in total) • NTPv3 (RFC 1305) and NTPv4 (RFC 5905) server and client • SNTPv3 (RFC 1769) server
GNSS	• GPS, GLONASS, Beidou, Galileo support / Single and Multiple constellation • Cable delay compensation
Platform time protocols	• Frequency: 1544 kHz, 2048 kHz, 5 MHz, 10 MHz, 1544 kb/s (T1), 2048 kb/s (E1), SyncE • Phase: User programmable PPS • Time: PTP, NTP, ToD (ITU-T G.8271, China Mobile, NMEA), IRIG-B (B00X, B12X, B13X, B14X, B15X, B22X), DFC77
Clock Performance	• Rubidium better than ±5.0 e-11 • OCXO better than ±0.1 ppm • Internal time reference better than ±2.0 ppm • Rubidium hold-over: 100 ns @ 10h, 500 ns @ 24h, 1µs @ 48 hours • OCXO hold-over: 500 ns @ 2h, 1µs @ 4h, 5µs @ 24 hours
PRP resilience	• PRP extension for IEEE 1588 / IEC 61588 • Link Redundancy Entity (LRE) / IEC 62439-3
Ports	• Timing: 2 x SFP, 2 x RJ-45, 1 x SMA: unbalanced 50 Ω, 3 x SMB: unbalanced 50 Ω, 3 x RJ-48: balanced (RS-422) 100 Ω • Control: 2 x RJ45 (Console and Management), USB (Storage)

Platform	
Operation	• Dimensions: 1U rack mountable 1¾" x 10" x 19" (equivalent to 44 mm x 228 mm x 435 mm) • Weight: 1.9 kg / 4.2 lb (aluminum case) • Fan-less operation, Temperature / Humidity range: -40 ~ +70°C temp. / 0 ~ 95% RH (non condensing) • Redundant power supply (AC, DC, AC+AC, AC+DC, DC+DC) • Power consumption: 10W with OCXO, 14W with Rubidium
Front/Back Panel	• Display and keyboard. LEDs: Platform (PSU1, PSU2, System), Application (alarm, GNSS, locked), Port (link, activity) • Network and Time interfaces. Management Interfaces. USB software and firmware upgrade
Management	• Graphical User Interface for configuration and monitoring based on web server • Local console by CLI (RJ-45) • SSH through management interface (RJ-45, 10/100BASE-T) • RFC 3164 Syslog event reporting (device role)

Modules	
RIC 50	• 5 x BNC or ST: IRIG-B, PPS • 5 x BNC: IRIG-B, PPS, DCF77, MHz
RIC 52	• 4 x RJ48: ToD, IRIG-B, ASCII • 5 x BNC: IRIG-B, PPS, DCF77, MHz
RIC 54	• 4 x BNC: IRIG-B, PPS / 1 x BNC: MHz • Connector: IRIG-B, PPS, ASCII, Alarm
RIC 82	• 5 x BNC or ST: IRIG-B, PPS • Connector: IRIG-B, PPS, ASCII, Alarm
RIC 84	• 5 x BNC or ST: IRIG-B, PPS • Connector: IRIG-B, PPS, ASCII, Alarm, Relay

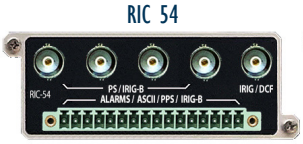
Net.Time Phi is a PTP clock conceived to simplify transition from NTP and IRIG-B synchronization in Power Utilities to the more precise and versatile IEEE 1588 / PTP protocol. Net.Time offers seamless migration to IEC 65850 by offering a high variety of clock reference inputs that could be configured as primary or backup references facilitating the synchronization of heterogeneous and multivendor appliances supporting PTP, PRP, NTP, SyncE, PPS, ToD, IRIG-B, E1, T1, MHz and DCF77.

RIC 50



RIC 52

RIC 54



RIC 82

RIC 84