Net.Time GM52 grandmaster clock

the Path to Excellence

Net.Time GM52 is a general purpose PTP Grandmaster conceived to supply synchronization to clients connected to Ethernet / IP networks. Once locked to the reference it delivers highly accurate synchronization to all the clients connected by optical or electrical links. All of them will receive a selection of timing signals.

PTP time-stamps

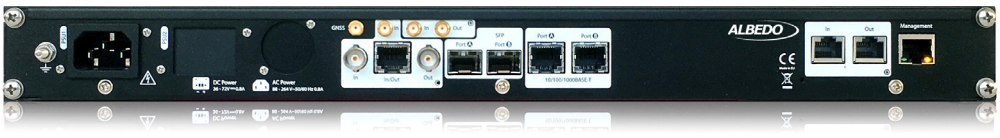
Synchronization enables a lot of services in the industry including telecontrol, navigation, power management, supervision... moreover, it is so fundamental that certain technologies would not even work. Timing services --so far served by a bundle of technologies capable of providing Frequency signals-- now is in a convergence process to new the paradigm, based on PTP, to satisfy all the demands that now also include Phase and ToD information. It is true that for a while GSM was adopted in many installations but it is not a practical solution for massive deployments, moreover the use of GNSS is not straight forward as have to be filtered and then synthesize a new signal.

Precision Time Protocol (PTP/IEEE1588) has emerged as the preferred solution in IP packet networks, PTP not only improves the precision by means of hardware time stamping, but also adds Phase and ToD to the Frequency. All together allow the support of higher bit rates and the use, in a more efficient way, the existing resources. The benefits of using PTP go beyond that as it is a low cost solution, the setup is easy and little bandwidth is needed for PTP streams. Ideal when the final objective is to attend a massive demand of industry and consumers market applications.

"Rubidium, Fault Tolerant, Double Port, 2048 Clients"

It all depends on time

Net.Time has a built-in GNSS receiver to discipline the internal clock (OCXO or Rubidium) that feeds a powerful engine capable to generate millions of PTP packets that will reach a scalable number of PTP clients. Net.Time also supports a alternative time inputs/outputs including TDM, T1/E1, Mb/s, MHz, SyncE and 1pps to be used as internal references or timing signals. In addition to providing time accuracy and synchronization.



ALBEDO Telecom

Mission Critical

LTE operators, Power utilities, Finance corporations, Manufacturing plants, Terrestrial and Aerial transport, all are migrating to PTP protocol to satisfy the synchronization demands they have of their mission critical applications. Timing distribution across the existing Ethernet/IP back-haul is now a commodity to match the required accuracy and redundancy level of these new scenarios to manage real-time events over wide, cellular and metropolitan areas.

Finance Corporations

Financial services rely on powerful transport layer capable to provide high speed, availability, security and reliability. At the timing side, NTP and GNSS has been la widely used to synchronize nodes, transactions, and to log time-stamped events in a chronological sequence. Nevertheless today are in the migration pace to PTP that will improve the quality and functionalities of this service.

Air Navigation

Timing is a key resource to ensure the correct operation of the Air Navigation Systems. Legacy signal --such as IRIG B, NTP and TDM-- are still on use but are being progressively substituted by PTP time stamping to provide a unique, accurate and coherent synchronization signals based on atomic clocks disciplined by GNSS and distributed across the IP network to the whole territory.

LTE-TDD turn-up

For many years the frequency synchronization requirements of GSM and 3G were satisfied by means of TDM signals such as T1 / E1. This solution was quite straight forward because the infrastructure to support mobile backhaul was made of SONET / SDH thereby timing was extracted directly from the PHY layer or it was transported by a separate network if higher quality was demanded. However new LTE deployments have stronger requirements at synchronization plane in order to reduce the size of the cells reusing more often available frequencies and, very important, wireless terminals have to share up/downstream channels to improve the efficiency by using phase information.

Power Utilities

Smart grid automation requires extremely precise time accuracy --and stability as well-- for tasks such as peak-hour billing, virtual power generators, or outage management. It is also necessary for the automatic protection of high voltage lines that are permanently supervised, when a substations detects an event, it is time-stamped and transmitted to ensure correct operation. Good sync improves monitoring accuracy and troubleshooting ability too. Phasors that have been used as timing source, are moving forward PTP synchronization and clocks are now deployed across the power network to increase the level of accuracy and redundancy.

Acceptance test

There is a renewed interest in synchronization testing related with network commissioning tasks and troubleshooting because PTP packets, distributed across the IP network, may suffer impairments that will degrade the quality of the extracted signal. ALBEDO portfolio offers a comprehensive range of PTP solutions including master and slave clocks, PTP / SyncE testers, WAN emulators and PTP packet capture appliances to assist the installation and maintenance of new synchronization protocol.

Ether(10).Genius testers

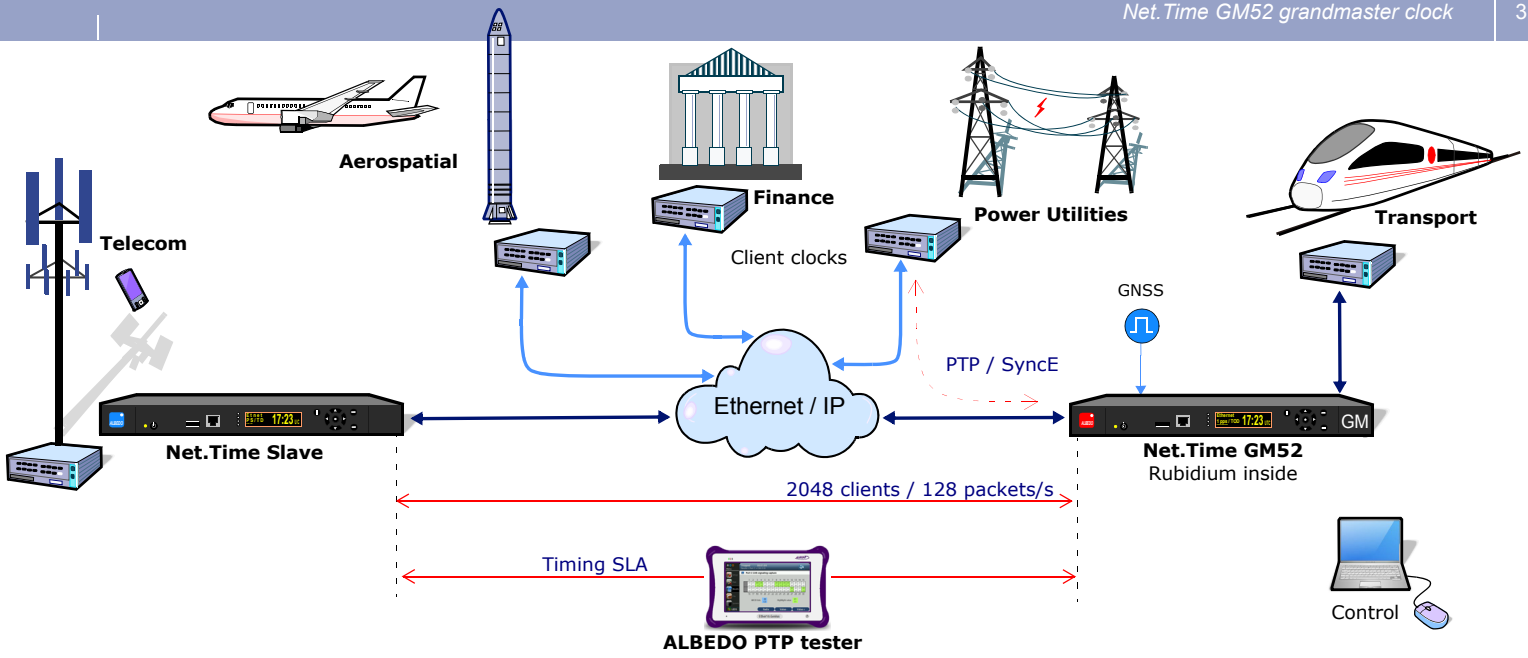
Ether.Genius and Ether10.Genius are two testers intended for service activation by means of eSAM and RFC2544, and can also asset the PTP/SyncE connectivity and quality levels required by at point of the network from 10Mb/s up to 10Gb/s.

Net.Storm WAN emulator

This instrument can generate, in a 100% controlled way, packet impairments to PTP packets to verify how boundary clocks manage with packet lost and packet delay variation (PDV or Jitter).

Net.Hunter capture device

This handheld tap filters and captures PTP flows at wirespeed in full duplex mode and saves them in PCAP format. The rest of the traffic (protocols, data, etc.) will pass with zero delay and no loss at all.



USERS

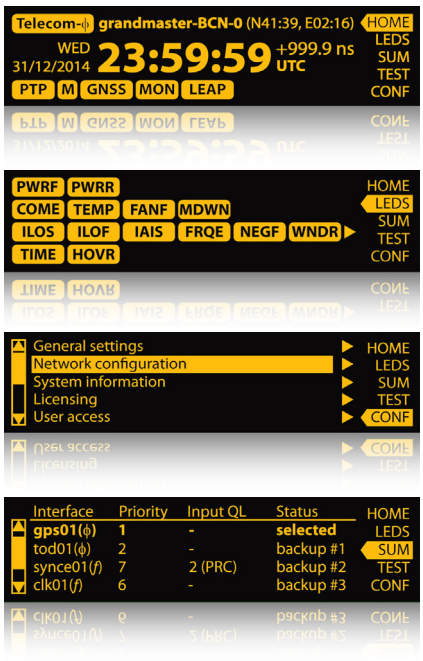
- Wireline & Wireless
- Telecom, Utilities, Finance
- Airports, Railways
- Military, Intelligence
- Manufacturing Industry
- Broadcasting

KEY FEATURES

- Default, Power, Telecom
- 1 GbE, 10/100/1000 BASE-T
- Dual IEEE 1588-2008 (v2) ports 2xSFP and 2xRJ45
- 1024 PTP clients per port
- PTP, SyncE, 1pps, ToD, T1, E1, 10MHz
- Disciplined by GPS, Galileo, GLONASS, BeiDou inputs
- 20 ns accuracy (Rubidium)
- ±8 ns time stamp resolution
- Carrier-class: 2xAC or 2xDC and 2xpack Lipo batteries

BENEFITS

- Built-in GNSS receiver
- Power fault tolerant
- Rubidium stability
- Enhanced holdover
- Hardware time-stamp



Sync excellence

Engineers can easily configure and control Net.Time GM52 operation locally or remotely by means of CLI and SNMP. Once the configuration is saved, Net.Time GM52 will be ready broadcast PTP packets to all clients accordingly. If more than one Net.Time GM is installed on your network, the PTP Best Master Clock (BMC) algorithm automatically decides which one becomes Grandmaster.

Dual Gigabit ports

Net.Time GM52 is a dual port device that can provide PTP synchronization to service two independent sub-domains. Each port has optical and electrical interfaces (SFP & RJ45) from 10Mb/s to 1G/s. The unit is always shipped with the all four Ethernet interfaces enabled (2xRJ45 + 2xSFP). Two are the ports and 1024 is the number of clients supported by each one making it a very scalable device from 1 to 2048 clients receiving up to 128 packets/sec each.

Hold-over mode

The unit incorporates a native GNSS receiver to discipline the internal Rubidium (or OCXO) clock that feeds a high performance engine. This architecture is the core mechanism to generate time-stamped PTP streams, SyncE flows and a set of legacy signals such as T1, E1, 10 MHz, 1.5 Mbit/s, 2 Mbit/s and 1pps.

The internal clock can also be disciplined by alternative signals such as 1pps, MHz, Mbit/s, and SyncE however, if the selected time reference is lost or not available, the Net.Time GM52 can work in hold-over mode to continue providing an accurate synchronization.

Fault-tolerant carrier-class

Net.Time GM52 is built as a 1U rack-mountable, it is a fanless appliance and can be equipped with a combination of redundant power source (i.e. 2xAC, 2xDC, AC+DC) moreover, it always has a built-in Li-po battery that warranties the operation during four hours in the event of fatal power down. ❑

Synchronization features	
Grand Master PTP function	• PTP Clock: PTP Grandmaster (IEEE 1588v2) • 1-step and 2-step clock mechanisms • Unicast and multicast addressing • End-to-end and peer-to-peer path delay mechanisms • PTP over UDP / IPv4, PTP over Ethernet • Up to 1028 unicast clients • Support of ITU-T G.8265.1 and G.8275.1 profiles • Time stamp resolution ±8.0 ns
PTP profiles	• Default IEEE 1588v2 • Support of ITU-T G.811, ITU-T G.8272 • Frequency Delivery ITU-T G.8265.1
Synchronous Ethernet function	• ITU-T G.8261 and G.8262 compliant • Provides backup Synchronous Ethernet synchronization to client devices • Full ESMC / SSM support as per ITU-T G.8264 and G.78
Timing Inputs	• Built-in GNSS receiver • 1544kHz, 2048kHz, 10MHz, T1, E1, Synchronous Ethernet (SyncE) • 1 pps / ToD with NMEA format
Timing Outputs	• PTP Clock IEEE 1588v2 • Synchronous Ethernet • E1, 2048 kbit/s, 2048 kHz • T1, 1544 kbit/s, 1544 kHz • ToD / 1 pps
Timing Accuracy	• OCXO better than ±0.1 ppm • Rubidium better than ±5.0 e-11 • Time stamp resolution ±8.0 ns
Rubidium operation	Freerun • Output freq. accuracy (7.5 min warm up): ±1e-9 • Output freq. accuracy on shipment (24h warm up): ±5e-11 • Aging (1 day, 24h warm up): ±.4e-11 • Aging (1 year): ±1.5e-9 GPS Locked • Time/Phase Accuracy to UTC: ±20 ns • Frequency Accuracy: ±1e-11 (averaged over one week) Hold-over • Output freq. accuracy (after 24h locked): ±1e-11 / 24h • Output time accuracy (after 24h locked): ±10
OCXO operation	Freerun • Output freq. accuracy: ±1e-7 • Locked time/phase accuracy to UTC (after 24h locked): ±25 ns Hold-over • Output freq. accuracy (after 24h locked): ±3e-10 / 2h • Output time accuracy (after 24h locked): ±2.0 µs / 2h
Interfaces	• 4 x SMA ports: GNSS(n), 1pps(in), 1pps(out) • 2 x BNC: for T1(in), T1(out), E1(in), E1(out), 10MHz(in), 10MHz(out) • 1 x RJ45: for T1(in/out), E1(in/out), 10MHz(in/out) • 2 x SFP ports: for PTP (out), SyncE (in/out) • 2 x 1000BASE-T ports: for PTP (out), SyncE (in/out) • 2 x RJ48: for 1pps(in), ToD(in), 1pps(out), ToD(out)

Platform	
Mechanical	• ETSI 1U rack mountable: 1¾"x10"x19" / 240 mm • Weight: 3.4kg / 8.7lb • Fanless operation • Temperature range: -10°C to +50°C • Humidity range: 10% to 90%
Power Redundancy	• AC+AC or AC+DC or DC+DC / VDC: (-40 to 60V / VAC: 110 to 240V) • Lipo battery: up to 3h of continuous operation with Rubidium clock
Front Pannel	• Display: OLED 256 x 64 pixels, • LEDs: Power, System, Alarm, Clock • Keypad: Power On/Off, Up, Down, Left, Right, Page Up, Page Down, Esc
Back Pannel	• Network and Time interfaces • Management Interfaces
Management	• Local console by CLI • Remote management by SSH • USB: upgrades, configuration, results, user files

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