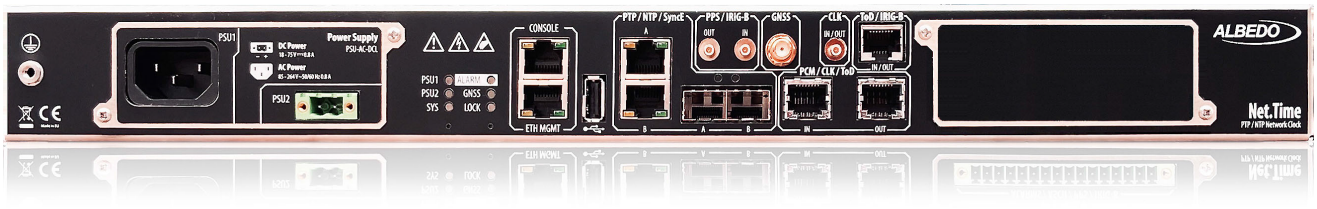
ALBEDO
it's all about timing



Net.Time τ is a PTP Grandmaster clock designed to satisfy frequency and phase synchronization requirements of wireless network requiring PTP, NTP and SyncE accepts a wide variety of time references.

Datasheet

Updated on 5/10/22

Net.Time τ - a cornerstone in timing

Net.Time τ can be configured as Master, Slave and Boundary clock with redundant in/out clock reference. Multiple options for input (GNSS, PTP, SyncE, ToD, PPS, T1/E1, MHz) and output (PTP, SyncE, ToD, PPS, T1/E1, MHz) references enable many combinations that facilitates the translation of timing protocols to integrate new and legacy architectures in the telecom industry.

1. Clock Performance

- Default OCXO better than ±0.1 ppm
- Optional Rubidium better than ±5.0 e-11

1.1 Locking time

Table 1. *Locking time*

	OCXO	Rubidium
Locking time	< 5 min	< 4 hours

1.2 Performance (Locked)

Table 2. *Oscillators performance*

Reference	OCXO	Rubidium
GNSS	± 45 ns	± 40 ns
1PPS / ToD	± 10 ns	±10 ns

1.3 Performance (Hold-over)

Table 3. *Oscillators performance*

	OCXO	Rubidium
Phase within ±100 ns	-	10 hours
Phase within ±500 ns	2 hours	24 hours
Phase within ±1.0 µs	4 hours	48 hours
Phase within ±10.0 µs	24 hours	-

2. Ports

Control

- 2 x RJ45: Console and Management
- 1 x USB: Storage

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

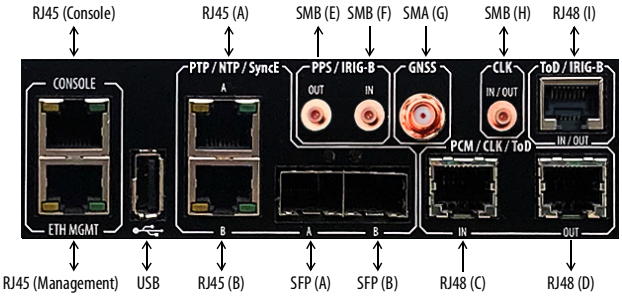


Figure 1. *Mainframe ports*

Table 4. *Signals and interfaces*

	GNSS	PTP	SyncE	ToD	PPS	T1/E1	MHz
RJ45 (A)		out	out				
SPF (A)		out	out				
RJ45 (B)		in/out	in/out				
SPF (B)		in/out	in/out				
RJ48 (C)				in		in	in
RJ48 (D)				out		out	out
SMB (E)					out		
SMB (F)					in		
SMA (G)	in						
SMB (H)							out
RJ48 (I)				in/out			

3. Ethernet

- 2 x RJ-45: 10BASE-T, 100BASE-TX, 1000BASE-T
- 2 x SFP: 100BASE-FX, 1000BASE-LX, 1000BASE-ZX, 1000BASE-BX
- RJ-45 / SFP work in combo mode, only one of each pair is active

4. GNSS Input

- GPS/GLONASS/Beidou/Galileo over SMA
- Single or multiple constellation selection
- Fixed position mode for GNSS references
- Automatic setting of UTC-to-TAI offset (leap sec. count) through GNSS
- 4V - 5V DC output in GNSS port to feed an external antenna
- Cable delay compensation
- Automatic antenna detection

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5. Clock Reference Inputs

- PTP over RJ-45 and SFP
- Synchronous Ethernet over RJ.48 and SFP
- 1.5 / 2.0 / 5 / 10 MHz and 1.5 / 2.0 Mb/s over RJ-48
- ToD over RJ-48 (ITU-T G.8271, China Mobile and NMEA)
- 1 PPSS over SMB (ITU-T G.8271)
- Custom delay compensation for phase and time inputs

6. Clock Reference Outputs

- PTP over RJ-45 and SFP
- Synchronous Ethernet over RJ.48 and SFP
- 1.5 / 2.0 / 5 / 10 MHz, 1.5 / 2.0 Mb/s over RJ-48 (square pulse 2.2 Vpp)
- 2.048 Mb/s (ITU-T G.703), 1.544 Mb/s (ANSI T1.102)
- 1.5 / 2.0 / 5 / 10 over SMB (square pulse, 2.2 Vpp)
- ToD over RJ-48 (ITU-T G.8271 and NMEA)
- PPS with custom period over SMB (ITU-T G.8271)
- Custom delay compensation for phase and time outputs

7. PTP

- Up to 256 unicast users per port
- IEEE 1588-2008 Annex J (Default profiles)
- ITU-T G.8265.1 "Telecom frequency profile"
- ITU-T G.8275.1 "Telecom phase and time profile"
- ITU-T G.8275.2 "PTS / APTS profile"

8. Protocol Translator

- When the Protocol Translator function is enabled the B port becomes a PTP slave while A port remains operating as a PTP master
- PTP messages are forwarded / terminated as specified in IEEE 1588
- Ports A and B have independent PTP profiles

9. SyncE

- Synchronous Ethernet clock input or output from port B.
- Synchronous Ethernet clock output from port A.
- RJ-45: 100BASE-TX, 1000BASE-T
- SFP: 100BASE-FX, 1000BASE-SX / LX / ZX / BX
- Generation, decoding, forwarding of ESMC

10. Protocols and Frames

- Auto-negotiation 10 / 100 / 1000 Mb/s
- Ability to disable auto-negotiation and force line settings
- DIX and IEEE 802.1Q Ethernet frame formats
- Configuration of the VLAN VID
- User Priority if the VLAN encapsulation is enabled (IEEE 802.1Q format)
- Configuration of DSCP CoS labels
- ARP (IETF RFC 826) for automatic resolution of remote MAC address in IP Endpoint mode (IPv4 network protocol)
- DHCP (client side) (IETF RFC 2131)
- Static IPv4 local profile configuration

11. Statistics

- Current, max / min traffic in b/s, frames/s, % channel capacity
- Unicast, multicast, broadcast traffic in b/s, frames/s, % channel capacity
- IPv4 and IPv6 statistics in b/s, frames/s, % channel capacity
- UDP traffic in b/s, frames/s, % channel capacity
- Simultaneous per-port statistics for ports A and B

12. Platform

12.1 Management

- Web Server
- CLI management interface through Console interface (RJ45)
- Remote management SSH through ETH MGMT interface
- USB soft and firmware updates
- RFC 3164 Syslog event reporting (device role)
- Support of SNMPv2c as defined in RFC 1901
- Support of SNMPv3 as defined in RFC 3410, RFC 3411, RFC 3412
- Support of SNMP traps to report events trough SNMPv2c and SNMPv3.

12.2 Ergonomics

- Fanless operation
- Dimensions: 44 mm x 228 mm x 435 mm (equivalent to 1U in 19" rack)
- Weight: 1.9 kg / 4.2 lb

12.3 Power Supply

- Redundant power supply (Single or Double)
- AC: 100 ~ 240 VAC, 50- 60 Hz (IEC 60320 C13/C14)
- DC: 18 ~ 75 VDC or 43 ~160 VDC (2-pin 5.1 mm)
- AC/DC: 85 - 264 VAC and 100 - 370 VDC (2-pin 5.1 mm)

12.4 LEDs

- Platform: PSU1, PSU2, System
- Application: Alarm, GNSS, Locked

12.5 USB

- Software and firmware upgrade
- Configuration, results, user files

12.6 Environmental

- Storage: -40 ~ +85ºC
- Operating: -40 ~ +70ºC temp. / 0 ~ 95%RH (non condensing)

12.7 Certificatons

- Safety: IEC / EN 62368-1, UL 62368-1, CSA C22.2 No. 62368-1
- EMC: EN 55022 / 55024 / 61000, CISPR 22:2008 / 24:2010, FCC Part 15
- Other: EN 63000 (RoHS), EN 303 413 V1.1.1 (RED)

13. Ordering Information

Table 5. *Base configuration*

Code	Description
NT.TAU.GM.AC	Net.Time Grandmaster Clock. Includes dual 10 / 100 / 1000 Mb/s electrical Ethernet port and dual 100 / 1000 Mb/s optical Ethernet supplying synchronization as specified in IEEE 1588-2008 Annex J "Default Profiles", ITU-T G.8261.1 "Telecom frequency profile", ITU-T G.8275.1 "Telecom phase and time profile" and ITU-T G.8275.2 "PTS / APTS profile" to a maximum of 64 clocks. Internal OCXO timing source. GPS, GLONASS, BeiDou and Galileo clock reference input. Synchronous Ethernet input / output and ESMC generation and decoding as specified in ITU-T G.8261, G.8262 and G.8264,.1PPS, 1PP2S and time-of-day inputs and outputs. 2048 kHz, 2048 kb/s, 1544 kHz, 10 MHz and 5 MHz clock reference inputs and outputs. Frame and network statistics. Console and and Ethernet management ports. Simple Network Management Protocol (SNMP) management. USB firmware upgrade. Single AC power supply unit (PSU-AC).
NT.TAU.GM.ACDC	Net.Time Grandmaster Clock. Includes dual 10 / 100 / 1000 Mb/s electrical Ethernet port and dual 100 / 1000 Mb/s optical Ethernet supplying synchronization as specified in IEEE 1588-2008 Annex J "Default Profiles", ITU-T G.8261.1 "Telecom frequency profile", ITU-T G.8275.1 "Telecom phase and time profile" and ITU-T G.8275.2 "PTS / APTS profile" to a maximum of 64 clocks. Internal OCXO timing source. GPS, GLONASS, BeiDou and Galileo clock reference input. Synchronous Ethernet input / output and ESMC generation and decoding as specified in ITU-T G.8261, G.8262 and G.8264,.1PPS, 1PP2S and time-of-day inputs and outputs. 2048 kHz, 2048 kb/s, 1544 kHz, 10 MHz and 5 MHz clock reference inputs and outputs. Frame and network statistics. Console and and Ethernet management ports. USB firmware upgrade. Single AC 5 – 264 V / DC 100 – 370 V power supply unit (PSU-ACDC).
NT.TAU.GM.DCL	Net.Time Grandmaster Clock. Includes dual 10 / 100 / 1000 Mb/s electrical Ethernet port and dual 100 / 1000 Mb/s optical Ethernet supplying synchronization as specified in IEEE 1588-2008 Annex J "Default Profiles", ITU-T G.8261.1 "Telecom frequency profile", ITU-T G.8275.1 "Telecom phase and time profile" and ITU-T G.8275.2 "PTS / APTS profile" to a maximum of 64 clocks. Internal OCXO timing source. GPS, GLONASS, BeiDou and Galileo clock reference input. Synchronous Ethernet input / output and ESMC generation and decoding as specified in ITU-T G.8261, G.8262 and G.8264,.1PPS, 1PP2S and time-of-day inputs and outputs. 2048 kHz, 2048 kb/s, 1544 kHz, 10 MHz and 5 MHz clock reference inputs and outputs. Frame and network statistics. Console and and Ethernet management ports. Simple Network Management Protocol (SNMP) management. USB firmware upgrade. Single DC 18 – 75 V power supply unit (PSU-DCL).

Table 5. *Base configuration*

Code	Description
NT.TAU.GM.DCH	Net.Time Grandmaster Clock. Includes dual 10 / 100 / 1000 Mb/s electrical Ethernet port and dual 100 / 1000 Mb/s optical Ethernet supplying synchronization as specified in IEEE 1588-2008 Annex J "Default Profiles", ITU-T G.8261.1 "Telecom frequency profile", ITU-T G.8275.1 "Telecom phase and time profile" and ITU-T G.8275.2 "PTS / APTS profile" to a maximum of 64 clocks. Internal OCXO timing source. GPS, GLONASS, BeiDou and Galileo clock reference input. Synchronous Ethernet input / output and ESMC generation and decoding as specified in ITU-T G.8261, G.8262 and G.8264,.1PPS, 1PP2S and time-of-day inputs and outputs. 2048 kHz, 2048 kb/s, 1544 kHz, 10 MHz and 5 MHz clock reference inputs and outputs. Frame and network statistics. Console and and Ethernet management ports. Simple Network Management Protocol (SNMP) management. USB firmware upgrade. Single DC 43– 160 V power supply unit (PSU-ACDC).

Table 6. *Optional features*

Code	Description
NT.TAU.BC	Adds PTP profile translation functionality.
NT.TAU.GM.USR256	Increases number of client unicast clocks from 64 to 128 in NT.TAU.GM.AC or NT.TAU.GM.DCL.
NT.TAU.GM.USR256	Increases number of client unicast clocks from 64 to 256 in AT.NT.TAU.GM.AC or NT.TAU.GM.DCL.

Table 7. *Hardware options*

Code	Description
NT.TAU.FHM.RB	Replaces OCXO internal timing source by an atomic (Rubidium) internal timing source in AT.NT.PWR.GM.AC or AT.NT.PWR.GM.DCL
NT.TAU.PSU.AC	Adds an additional AC power supply unit.
NT.TAU.PSU.ACDC	Adds an additional AC / DC power supply unit.
NT.TAU.PSU.DCL	Adds an additional low voltage DC power supply unit.
NT.TAU.PSU.DCH	Adds an additional high voltage DC power supply unit.

Table 8. *Accessories*

Code	Description
NT.ANT	GNSS kit. GNSS antenna kit for fixed installation up to 50 m. Includes antenna, surge arrestor and accessories.
NT.ANTC	GNSS kit. GNSS antenna kit for fixed installation up to 200 m. Includes antenna, surge arrestor, in-line amplifier 35 dB gain and accessories.

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