

Net.Time is a Grandmaster and Boundary clock that supports PTP and NTP over PRP and multiple input/output options such as IRIG-B, 1PPS, ToD and SyncE to satisfy all timing needs of power utility, enterprise and telecom applications.

## Datasheet

Updated on 18/3/20

# Net.Time a seamless migration to PTP

Net.Time is a boundary clock designed to simplify migration to PTP protocol from NTP and/or IRIG-B architectures. Net.Time offers seamless translation while offering a high variety of clock reference inputs and outputs that may be used as primary or backup references, monitoring and synchronization of both new generation and legacy appliances.

## 1. Interfaces

### 1.1 Ethernet

- Port A: 10Mb/s ~ 1G/s by SFP & RJ45
- Port B: 10Mb/s ~ 1G/s by SFP & RJ45

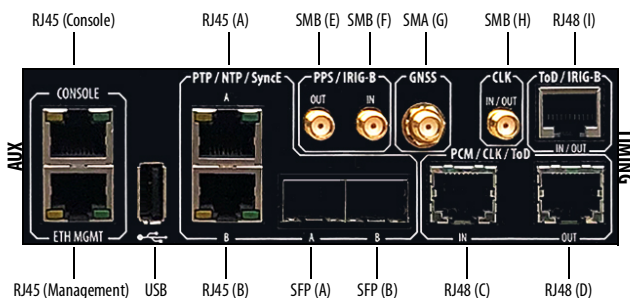


Figure 1. Physical interfaces

### 1.2 Timing

- RJ48: balanced (V11) 100 Ω
- SFP: optical and electrical models supported
- SMA: unbalanced 50 Ω
- SMB: unbalanced 50 Ω

	PTP	NTP	SyncE	PPS	PP2S	ToD	GNSS	T1/E1	MHz	IRIGB
RJ45 (A)	out	out	in/out							
RJ45 (B)	in	in	in/out							
SFP (A)	out	out	in/out							
SFP (B)	in	in	in/out							
SMB (E)				out	out					out
SMB (F)				in	in					
SMB (H)										in/out
SMA (G)							in			
RJ48 (I)										in
RJ48 (C)									in	in
RJ48 (D)						out		out	out	

Table 1. Signals and interfaces

### 1.3 Management

- RJ45 (Console): RS-232
- RJ45 (Management): 10/100 Base-T

## 2. GNSS

- Built-in GNSS receiver
- Single and Multiple constellation
- Fixed position mode for GNSS references
- Automatic setting of UTC-to-TAI offset (leap sec. count)
- 4 ~ 5 VDC output
- Cable delay compensation
- Automatic antenna detection

## 3. Synchronization Inputs

Custom delay compensation for phase and time

### 3.1 Frequency

- Hz: 1544 kHz, 2048 kHz, 5 MHz, 10 MHz
- b/s: 1544 kb/s (T1), 2048 (E1)
- SyncE

### 3.2 Phase

- PPS: 1PPS, 1PP2S

### 3.3 Time

- ToD: ITU-T G.8271, China Mobile and NMEA
- IRIG-B: B00X, B12X, B13X, B14X, B15X, B22X
- IRIG-B: Up to 25 Vpp and AC/DC coupling
- GNSS: GPS, GLONASS, Beidou, Galileo
- PTP: Default, Telecom, Power, Utility profiles
- NTP: NTPv3, NTPv4, SNTPv3

## 4. Synchronization Outputs

Custom delay compensation for phase and time

### 4.1 Frequency

- Hz: 1544 kHz, 2048 kHz, 5 MHz, 10 MHz
- b/s: 1544 kb/s (T1), 2048 (E1)
- SyncE

### 4.2 Phase

- PPS: 1PPS, 1PP2S

### 4.3 Time

- ToD: ITU-T G.8271, China Mobile and NMEA
- IRIG-B: B00X, B12X, B13X, B14X, B15X, B22X
- IRIG-B: 5 Vpp with AC/DC coupling
- PTP: Default, Telecom, Power, Utility profiles
- NTP: NTPv3, NTPv4, SNTPv3

## 5. Oscillators

### 5.1 Internal Oscillator

- Rubidium better than  $\pm 5.0 \text{ e-11}$
- OCXO better than  $\pm 0.1 \text{ ppm}$
- Internal time reference better than  $\pm 2.0 \text{ ppm}$

5.2 Rubidium features

**GNSS Locked**

- Time/Phase Accuracy to UTC:  $\pm 20$  ns at  $1\sigma$  after 24 hours lock
- Frequency Accuracy:  $1 \text{ e-}11$  (averaged over one week)

**Hold-over**

- Output freq. accuracy (after 24 h. locked):  $1.5 \text{ e-}11 / 24\text{h}$
- Output time accuracy (after 24 h. locked):  $\pm 100 \text{ ns} / 2\text{h} \pm 1.0\mu\text{s} / 24 \text{ h}$

**Freerun**

- Output freq. accuracy (7.5 minutes warm up):  $\pm 1 \text{ e-}9$
- Output freq. accuracy on shipment (24 h warm up):  $\pm 5.0 \text{ e-}11$
- Aging (1 day, 24 hours warm up):  $\pm 0.5 \text{ e-}11$
- Aging (1 year):  $\pm 1 \text{ e-}9$

6. Ethernet PHY

6.1 Interfaces

RJ45-SFP ports work in combo mode

- 2 x RJ45: 10BASE-T, 100BASE-TX, 1000BASE-T
- 2 x SFP: 10BASE-T, 100BASE-TX, 100BASE-FX, 1000BASE-LX, 1000BASE-T, 1000BASE-ZX, 1000BASE-BX

6.2 Auto-Negotiation

- Bit rate: 10 Mbit/s, 100 Mbit/s, 1 Gbit/s
- Disable auto-negotiation, force line settings

7. Ethernet MAC

- Formats: DIX, IEEE 802.1Q
- Enable / Disable VLAN and Q-in-Q modes
- VLAN VID / User Priority setting

8. Parallel Redundancy Protocol (PRP)

- PRP extension for IEEE 1588 / IEC 61588
- Link Redundancy Entity (LRE) (IEC 62439-3)
- Generation of RCT trailers
- Duplicate discard mode
- PRP supervision frame generation and decoding

9. Internet Protocol (IP)

- Configuration of DSCP CoS labels
- IPv4 ARP (IETF RFC 826)
- IPv4 [and IPv6] destination address resolution through DNS
- DHCP (client side) (IETF RFC 2131)

10. Precision Time Protocol (PTP)

10.1 General

- Port A: PTP master
- Port B: PTP slave
- 256 clients @ 128 packets/sec
- Unicast and multicast addressing
- Configuration: Domain, Priority 1, Priority 2, Local Priority

10.2 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)

**Operation**

- 1-step clock
- 2-step clock

**Messages**

Setting of message rates

- Sync
- Delay Request
- Peer Delay Request
- Announce messages: rate and time-out
- End-to-end and peer-to-peer path delay mechanisms
- Encapsulations: PTP over UDP / IPv4, PTP over Ethernet

11. Network Time Protocol (NTP)

**General**

- Port A: NTP master
- 1000 transactions per second

**NTP versions**

- NTPv3 (RFC 1305) master and slave
- NTPv4 (RFC 5905) master and slave
- SNTPv3 (RFC 1769) master

**Configuration**

- Unsynchronized stratum
- Maximum/ Minimum polling interval

12. Generalized Boundary Clock (GBC)

**General**

- Port A: PTP / NTP / SNTP master
- Port B: PTP slave

**Operation**

- PTP messages are forwarded / terminated as specified in IEEE 1588
- PTP profile translation from Port-A to Port-B

13. Synchronous Ethernet (SyncE)

13.1 General

- Interfaces: RJ45 and SFP
- Full ESMC / SSM support as per ITU-T G.8264 and G.781
- Heart-beat and event SSM messages
- QL to be transported by the SSM

14. Statistics

- Bandwidth, U/M/Broadcast, IPv4/v6, UDP
- PRP LRE: Count, Port A/B, RCT, Errors, Duplicated, Mismatches...
- System: CPU usage, Memory usage

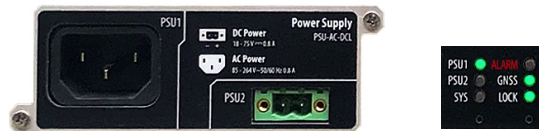


Figure 2. LEDs and Power Supply

15. Platform

15.1 Management

- CLI management interface through Console interface (RJ45)
- Remote management SSH and Telnet through ETH MGMT interface
- USB and TFTP soft and firmware updates
- RFC 3164 Syslog event reporting (device role)

15.2 Ergonomics

- Fanless operation
- 19" / ETSI/1U/240 mm rack mount
- Weight: 3.4 kg / 8.7 lb

15.3 Power Supply

- Redundant power supply (AC+AC, AC+DC, DC+DC)
- AC: 85 ~ 264 VAC (IEC 60320 C13/C14)
- DC: 18 ~ 75 VDC (3-pin 5.0 mm)
- AC/DC: 85 ~ 264 VAC or 100 ~ 370 VDC (3-pin 5.0 mm)

15.4 LEDs

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

15.5 USB

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

15.6 General

- Storage: -20 ~ +70°C
- Operating: -10 ~ +65°C temp. / 10 ~ 90% humidity
- Environmental operation conditions follow IEEE 1613 and IEC 61850-3