Industry4.0 Telecom-5G IEC-61850 SmartGrids MiFID II

HQ High Quality Oscillator

NTS-4000 OCXO

NTP/PTP IEEE1588 Network Time Server

- PTP IEEE1588 Grandmaster
- STRATUM-1 NTP Time Server
- Robust HQ OCXO Holdover
- Low-noise TCXO* Clocking



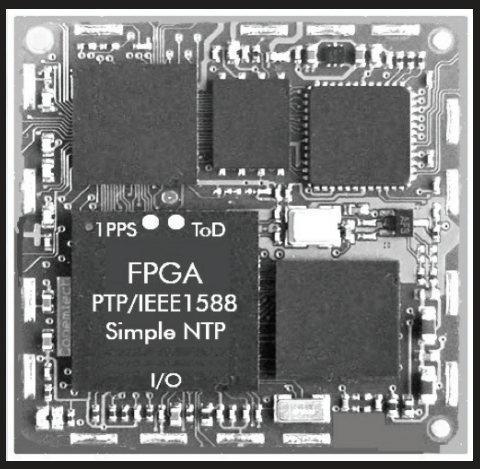
- Max 4x LAN*
  Std. 2x LAN 100Mbps RJ45
  Extra* 2x LAN 1GbE* RJ45
  (or) 1x LAN 10GbE* SFP
- Hardware* Timestamping PHY
  PTP Power*, Telcom* Profiles
- NTP RFC 5905-5909, 1305
- 2x Redundant ANT Inputs
- 1PPS BNC Input/Output
- RS232/485 & USB Interface
- SNMP v2,v3 & MIB2 Agent
- RADIUS client*
- MD5, RSA, DSA, SSL Aecurity
- NTP MD5 SHA Authentication
- HTTP, HTTPS, TELNET, SSH
- IRIG-B DCLS AM Input/Output
- Redundant 2x Power Supply
- OCXO 10MHz PRTC-A Output

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safetime
ADVANCED CYBER-SECURITY SYNC

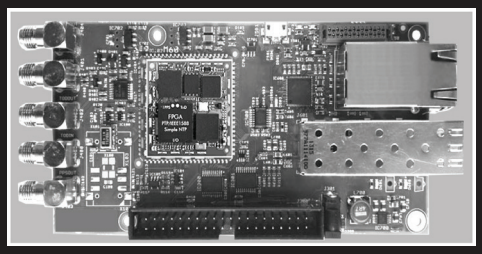
ELPROMA

* extra feature requiring additional hardware and firmware upgrade



FPGA supports hardware timestamping

The miniature 2x2cm embedded PCB includes FPGA and it is a part of P-80 EXPANDER time-computer board



The EXPANDER P-80 computer option is autonomous PTP GRANDMASTER. It supports LAN3-LAN4 1GbE ETH

Network Time Protocol NTP v2, v3, v4 (LAN1-2):

- RFC1305
- RFC1119
- RFC5905
- RFC5906
- RFC5907
- RFC4330
- RFC2030

Server supports PEER mode of NTP

Precision Time Protocol PTP IEEE1588 (LAN3-4):

Profiles:

- Default IEEE1588
- Telecom (incl. SyncE)
  ITU-I G.8265.1
  ITU-I G.8275.1
  ITU-I G.8275.2
- Power & Power Utility
  IEEE C37.238 (v2)
  IEC 61850-9-3
- (S)NTP Server
  RFC4330
  RFC2030

Storage temperature: -55°C to +80°C
Humidity: up to 95%
MTBF 391000 hours

NTS-4000 OCXO delivers time directly to network using NTP, PTP/IEEE1588 protocols. The default configuration is equipped with 2x LAN (LAN1, LAN2) 100/10Mbps speed. The LAN2 can be upgraded to 10GbE* SFP software timestamping interface.

The hardware timestamping option* is available on LAN3 (RJ45) and LAN4 (SFP). I t is requiring additional EXPANDER* network card supporting 1GbE Ethernet. In case of using 1GbE HW-stamping, the LAN2 1x10GbE upgrade is not allowed. The maximum configuration of NTS-4000 supports 4x LAN: 2x 100/10Mbps & 2x 1GbE.

The NTS-4000 server takes ref. time from 2x independent redundant GNSS receivers. Built-in OCXO high performance oscillator ensures UTC when missing GNSS signals. Server can be synchronized to external clocks using 1PPS, IRIG-B, RS232 (ToD) inputs. It also provides ref. time output using 1PPS, IRIG-B, RS232, 10MHz, RS232(ToD).



EXPANDER

Redundant Synchronization Inputs

- 2x RJ45-ANT1/ANT2 for connecting max. smart NTS-antenna:
  Supported GNSS systems: GPS, GLONASS, GALILEO, BEIDOU
  Supported RF receivers: single band L1/E1, optionally dual band L1+L2 or L1 +L5
  Supported UTC accuracy: <5ns* or <15ns or <25ns depends on receiver option
  Note1: Please refer to NTS-antenna specification (1pcs of included to std. product)
  Note2: The „accuracy" to UTC means PPS stability, the max. time error to UTC**.
- max. 10 remote NTP/PTP IEEE1588 time servers (number upgradable on requests)
- PPS BNC (50 Ohm)
- IRIG-B AM (50 Ohm)
- ToD (rs232 DSUB-9)

I/O

- All LAN interfaces are IEEE 802.3 compatible
- 2x LAN Ethernet 100Base-T (RJ45) LAN1-2
- 2x LAN Ethernet 1GbE* EXPANDER* LAN3-4
- 1x LAN Ethernet 10GbE* LAN2* update
- 2x Antenna INPUT or OUTPUT (RJ45)
- 3x RS232C (D-SUB9)
- 1x SMA* PPS-out (EXPANDER LAN3-4*)
- 5x BNC (50 Ohm): PPS, IRIG, 10MHz
- 2x USB 2.0 (for firmware upload)

Remote configuration

- SNMP (v1,2,3)
- MIB 2
- RADIUS
- HTTP
- HTTPS
- SSH
- TELNET
- NTPQ/NTPDC

Holdover

- OCXO HQ oscillator
- TCXO* Low-noise CHIP clocking
- DUAL* Both OCXO & TCXO clocking

Performance

- GNSS 1PPS-in @ 1-sigma/ < 5ns
- PTP master2slave sync (LAN3-4) < 25ns
- Network performance 9000 req/s
- Max. councurrent NTP clients 9.2 mln
- PTP max #SLAVE LAN3-4 32 (default)
  PTP max #SLAVE option: 128/256/450*

Time Accuracy & Time-Stamping

- GNSS receiver NTS-antenna pulse PPSinput: better than 5ns measured at 1-sigma
- GNSS receiver NTS-antenna pulse PPSinput: better than 15ns measured at 2-sigma
- Internal PPS pulse accuracy to UTC**: better than 5ns measured at 3-sigma
- LAN3-LAN4 harware time-stamping PTP/NTP better than 25ns
- LAN1-LAN2 software timestamping PTP/NTP better than 100us IEC61850 NTP/PTP
  MiFID II NTP/PTP

Mechanical/environmental

- Size: 484 x 300 x 44,4 mm (rack'19 1U)
- Operating temp: -55°C to +80°C (receiver)
- Operating temp: 0°C to +60°C (server)
- Storage temp: -55°C to +80°C

Power supply

Power: 110-230 VAC (1A), 50-60Hz
120-370 VDC (1A)
Telecom: 48VDC option* 20-70 VDC (2A)
Option: 2nd redundant* PWR-supply

Holdover Time (NO GNSS)	MAX. TIME ERROR WHEN BASIS ON OSCILLATOR		
	Rubidium	OCXO	TCXO
1 second	0,1 [ns]	5 [ns]	900 [ns]
1 minute	0,01 [µs]	0,3 [µs]	54 [µs]
1 hour	0,03 [µs]	0,5 [µs]	3 240 [µs]
1 day	0,76 [µs]	47 [µs]	77 760 [µs]
1 week	0,01 [ms]	2,2 [ms]	544 [ms]
1 month	0,15 [ms]	39 [ms]	2 000 [ms]
6 months	5 [ms]	400 [ms]	14 000 [ms]
1 year	0,016 [s]	1,6 [s]	28 [s]

LOW-NOISE OXCO+TCXO

1s ..... 3 [ns]
1minute ..... 140 [ns]
1hour ..... 250 [ns]
1day ..... 22 [us]
1week .....1.2 [ms]
1month ..... 22 [ms]
1year ..... 0.9 [s]

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* extra feature requiring additional hardware
** calibrated to metrology standard of Polish Office of Measures