

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

HQ High Quality Oscillator

# NTS-4000

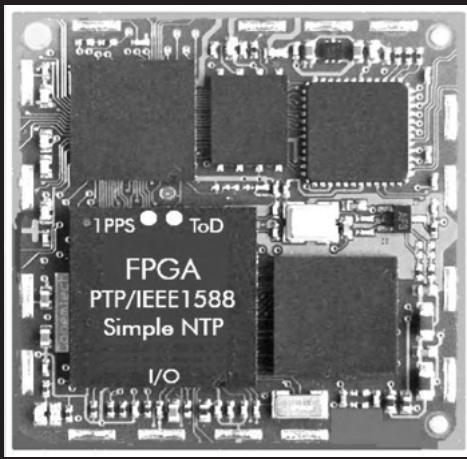
# OCXO

## NTP/PTP IEEE1588 Network Time Server

- PTP IEEE1588 Grandmaster
- NTP Time Server STRATUM1

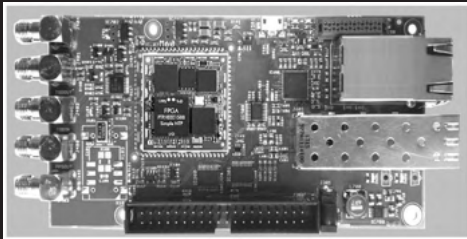


- GNSS Jamming\* Detection
- GNSS Spoofing\* Detection
- ATTACK Auto-ON Holdover
- HOLDOVER HQ OCXO
- NTP RFC 5905 - 5909
- SNTP RFC 4330 2030
- PTP IEEE1588:2008
- DAYTIME RFC867 RFC868
- LAN 2x 100Mbps sw-stamp
- LAN 1GbE\* hw-stamp PHY
- LAN 10GbE\* sw-stamp
- IRIG-B AM(BNC) DCLS(DSUB9)
- SyncE via Expander NIC
- REMOTE HTTP(S) TELNET, SSH
- SNMPv3 MIB2 RADIUS
- OUTPUT PPS PPM PPH 10MHz
- CRYPTO MD5 RSA DSA SSL
- REDUNDANT 2x PWR Supply
- REDUNDANT 2x ANT\* GNSS



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
- RFC867
- RFC868

## 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
- Broadcasting
  - SMPTE 2059.2
- 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). It 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).



LAN1-LAN2  
Time-stamping Software

LAN3-LAN4  
Hardware time-stamping

## 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 (1 pcs 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 @ 2-sigma/ < 5ns
- PTP master2slave sync (LAN3-4) < 25ns
- Network performance 9000 req/s
- Max. concurrent 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 hardware 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: 484x 300x 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

**HQ OCXO holdover** measurement error is a difference between an indication of the NTS-4000 device under test 1PPS-output true value in relation to reference UTC(PL) signal provided by the Polish Central Office of Measures (atomic clock 5071A).

Days	1d	2d	3d	4d	5d	6d	7d	14d
ERROR µs	0,6	2,8	7,2	13,7	22,1	32,9	45,9	184