ELPROMA **RESILIENT**
TIME SYSTEMS

Security • Synchronization • Reliability • Performance

TRANSPORTATION   ARMY / POLICE   ICT   PUBLIC ADMINISTRATION

Synchronization

- PTP IEEE1588 Grandmaster
- NTP STRATUM-1 Time Server
- GPS Galileo Glonass Beidou time

Security

- SAT Time-firewall w/ ANT auto-OFF
- GNSS anti-jamming/spoofing
- GPS L1 jammed signal mitigation**
- GNSS simulation for RF-denied env.**
- GNSS city-canyon multipath mitigation

Reliability

- STARLINK / IRIDIUM LEO backup**
- DCF77 / 225kHz Solec K. backup**
- 5071A HROG-10 full UTC backup*
- 10x remote NTP servers backup
- HA CARP redundancy

Performance

- Internal stability < 2 ns
- GNSS accuracy   < 5 ns
- PTP accuracy   < 100 µs

Consider also other Elproma products:

- NTS-4000 for GNSS-less medium OCXO holdover
- NTS-5000 for GNSS less long Rubidium holdover
both offer much better performance & security.

Why NTS-3000 is is a wise choise?

- Low cost - high performance
- Thousands of sold network sync appliances worldwide
- Better simple own time server than sorry when get unsynchronized

NTS-3000

NTP/PTP IEEE1588 Time Server

The NTS-3000 is a low cost PTP IEE1588:2008 GRANDMASTER clock and NTP/SNTP Time Server.

It offers a technology suite to meet the synchronization needs of evolving small and medium IT/OT, including ICT enterprises, public administration, transportation, water distribution, smart metering. The NTS-3000 server provides robust synchronization services ensuring good accuracy and security.

When used with Elproma's external LEVEL-2** GPS anti-jamming filter and LEVEL-3** GNSS simulator, the NTS-3000 ensures resilient timing, even operating in GNSS-denied havy jammed RF environments. Product supports HA CARP networking redundancy.
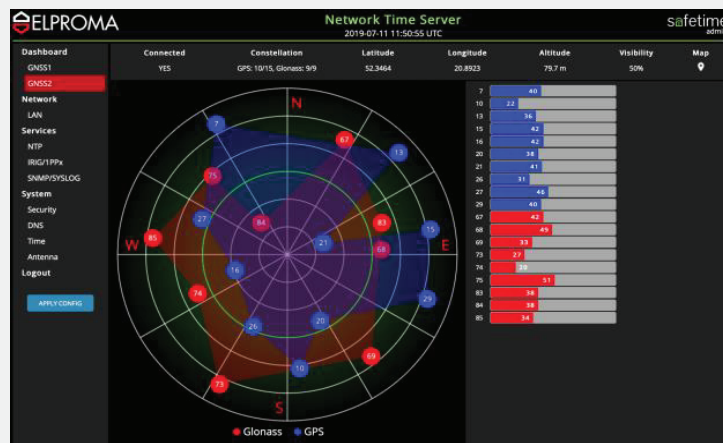
Made in EU

CE

ISO 9001
QUALITY
ASSURANCE

GNSS multi-path mitigation
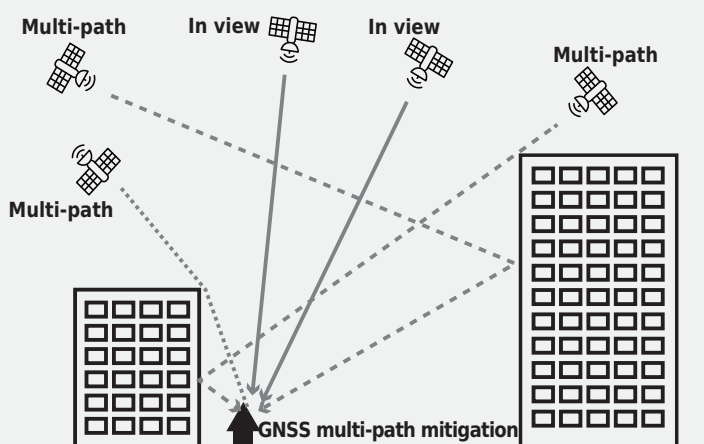
Elproma std. servers survive receiving GNSS inside city-canyon

Built-in SAT signal monitoring. GPS jamming alarms call MIB-2 traps

Ref. Time

- std. 1x GNSS receiver • opt. 2nd GNSS receiver
  std. supporting GPS, Galileo, Glonass, Beidou
- opt. opt. supporting DCF77 or 225 kHz Solec Kuj.
- std. 1x 5071A* / HROG-10* direct synchronization
  10x backup NTP serves (incl. eTimePL** system)

Inputs

- std. 2x GNSS physical or simulated signal LEVEL-3
- std. 2×ToD time-scale ref. (clock + calendar)
  opt. direct 5071A*/HROG-10* for UTC/TAI
  opt. backup STARLINK / IRIDIUM modem**
- std. 1×1PPS frequency ref.

ANT1/ANT2 IO support both physical GNSS and simulated LEVEL-3 signals

Outputs

- std. 2x GNSS simulation signal LEVEL-3 compatible
- std. 2x ToD ToD (Time of a Day code multiple std.)

ANT1/ANT2 support GNSS NMEA183 signal simulation LEVEL-3 compatible

LAN

- std. (main) 2x 100/10 Mbps x86 sw time-stamps

PTP & NTP

- **IEEE1588:2008** Grandmaster with sw-stamping

- **Stratum 1 NTP Time Server** (all NTP versions)
  Stratum 2 NTP/SNTP Client synced to Stratum 1
  Performance: up. to 10 000 clients/s per port LAN
  up to 100,000 NTP clients/port LAN
  1024s polling up to 10 mln.NTP clients/port LAN

Accuracy , Stability , Holdover

< 2 ns Server internal
< 5 ns GNSS receiver

Protocols

- IEEE 1588-2008 (PTP Precision Time Protocol)
- NTPv4, NTPv3 (NTP Network Time Protocol)
- Cs5071A*/HROG-10* (direct sync ToD+PPS to UTC/TAI)
- IPv4 / IPv6** • DHCP • SSH • SFTP • TELNET • SYSLOG
- VLAN (1x PTP-slave, 9x PTP-master, 10x NTP) • HA CARP
- MIB-2 SNMPv3 supporting UNSYNC and JAM-attack to OSS soft.
- Zabbix (supports default management) • OSS via MIB 2

Environmental

- Redundant** power: 110-230VAC (1A), 120-370 VDC (1A)
- Max. current consumption: 1A(AC) / 2A(DC)
- Max. power consumption: 60W (typical), 80W (max)
- Operating temperature –5°C to +60°C
- Storage temperature: –55°C to +80°C
- Humidity: 5% to 95% (non condensing) • MTBF 391000h
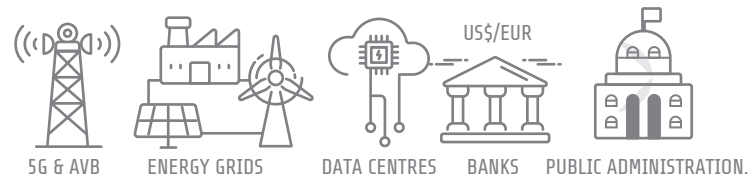- std. (1U): 44,4 (H)×484 (W)×300 (D) mm • Weight: 4.2 kg

Security & Reliability

- NTS-3000 has built-in advanced GNSS satellite traceability.
- The SNMP supports MIB 2 compatible to any OSS software. Our MIB 2 file defines one of the world's most significant event traps database, that incl. GNSS jamming & spoofing.
- Built-in crypto std. RSA, MD5, DES, SSL, SHA-1, SHA-2.
- When equipped with LEVEL2** filter or LEVEL3** simulator, NTS-3000 ensures resilient UTC time even in GNSS-denied, heavily jammed RF environment. Server can also receive a Time Sync Attack alarms from wide area National Cyber Protection System (e.g. ARGOS**). When connected to ground National Time Dissemination System (eCzasPL**), the NTS-3000 time server does not need GPS /GNSS at all. In case of unexpected GNSS receiver security vulnerability the other vendor replaceable GNSS modules are available.

* extra feature not requiring hardware update   ** requiring additional hardware

NTS-3000 Series Back panel

ELPROMA RESILIENT TIME SYSTEMS

Security • Synchronization • Reliability • Performance

US$/EUR

5G & AVB   ENERGY GRIDS   DATA CENTRES   BANKS   PUBLIC ADMINISTRATION.

Synchronization

- PTP IEEE1588 Grandmaster
- NTP STRATUM-1 Time Server
- GPS Galileo Glonass Beidou time

Security

- SAT Time-firewall w/ ANT auto-OFF
- GNSS anti-jamming/spoofing
- GPS L1 jammed signal mitigation**
- GNSS simulation for RF-denied env.**
- GNSS city-canyon multipath mitigation

Why NTS-4000 is a wise choise?

- OCP (Facebook) choice or GNSS-rcv for Data Centers.
- African biggest single Smart Grid energy deployment (50pcs).
- European biggest single Stock Exchange deployment (10pcs).
- They trusted us: PUB-administration, NMI-metrology, Enterprises.

Reliability

- STARLINK / IRIDIUM LEO backup**
- DCF77 / 225kHz Solec K. backup**
- 5071A HROG-10 full UTC backup*
- 20x remote NTP servers backup
- HA CARP redundancy

Performance

- Internal stability < 2 ns
- GNSS accuracy   < 5 ns
- PTP accuracy   < 20 ns
- OCXO holdover (1d) 0,6 µs
- OCXO holdover (7d) 47 µs

Product advantages over NTS-3000

- Single HQ OCXO holdover for GPS less opeation
- More I/O sync incl. 1PPS-out, 10MHz, IRIG-B AM
- Higher PTP accuracy thanks to hw stamping
- NTS is std. 1U, but it can be 2U offering
  freedom for the future upgrades.

◁D NTS-4000 HQ OCXO

NTP/PTP IEEE1588 Modular Time Server

The NTS-4000 HQ OCXO is a professional GRANDMASTER clock with advanced cyber-security capabilities. Server is created from scratch in 2024, keeping 100% backward compatibility to original 2008 appliance. It basis on a state-of-the-art FPGA chipset that offers a powerful free space margin for the future.

It offers a technology suite to meet the synchronization needs of evolving Industry 4.0 IT/OT networks: NIS2 public administration, LTE/5G telecom, energy smart grid, data centers, financial market, enterprises. The server provides robust synchronization services ensuring accuracy, stability, security and reliability.

When used with Elproma's external LEVEL-2** GPS L1 anti-jamming filter and LEVEL-3** GNSS simulator, NTS-4000 time server ensures resilient timing, even in GNSS-denied, heavily jammed RF environments. Product supports HA CARP networking redundancy. Custom built appliance (ext. options) grooves to 3U**.

Made in EU

CE

ISO 9001 QUALITY ASSURANCE

* extra feature not requiring hardware update   ** requiring additional hardware   e-mail: info@elproma.nl   www.elproma-electronics.eu

Ref. Time

- std. 1x GNSS receiver • opt. 2nd GNSS receiver
  - std. supporting GPS, Galileo, Glonass, Beidou
  - opt. supporting DCF77 or 225 kHz Solec Kuj.
- opt. 1x 5071A* / HROG-10* direct synchronization
- std. 20x backup NTP serves (incl. eTimePL** system)

Inputs

- std. 2x GNSS physical or simulated signal LEVEL-3
- std. 2×ToD time-scale ref. (clock + calendar)
  - opt. direct 5071A*/HROG-10* for UTC/TAI
  - opt. backup STARLINK / IRIDIUM modem**
- std. 1×1PPS frequency ref.
- std. 1×IRIG-B AM
- opt. 2×IRIG DCLS FO**

ANT1/ANT2 IO support both physical GNSS and simulated LEVEL-3 signals

Outputs

- std. 2x GNSS simulation signal LEVEL-3 compatible
- std. 2x ToD ToD (Time of a Day code multiple std.)
- std. 1×1PPS frequency ref.
- std. 1×10MHz frequency ref. or 2.048 MHz*
- std. 1×IRIG-B AM
- opt. 2x IRIG-B TTL level 5V, 2x IRIG-B ST FO IRIG-B DCLS
- opt. 4x IRIG-B RS422 DCLS, 1x MOSFET PPS/PPM/PPH
- opt. 4x ALARM RELAYS

ANT1/ANT2 support GNSS NMEA183 signal simulation LEVEL-3 compatible

LAN

- std. (main) 2x 100/10 Mbps x86 sw time-stamps ⎫
- opt. (ext) 8x 1 GbE (SFP/RJ45) sw time-stamps ⎬ NTS-40xx
- (ext) 16x 1 GbE (SFP/RJ45) sw time-stamps ⎪
- (ext) 24x 1 GbE (SFP/RJ45) sw time-stamps ⎭
- std. (main) ⎡2x 1 GbE (SFP) FPGA hw time-stamps ⎫
-     or ⎣4x 1 GbE (SFP) FPGA hw time-stamps ⎬ NTS-42xx
- opt. (ext) 4x 1 GbE (SFP) FPGA hw time-stamps ⎭
- std. (config) 1x 100/10 Mbps for management

Notes! Choose base std. platform between new FPGA and x86 archtecture.
The FPGA hw supports x10,000 better PTP sync accuracy than x86.
The old 8/16 GbE ports x86 std. extentions are requiring 2U size.
The old 24 GbE ports are custom built requiring 3U size chassis.
The new 2/4 GbE port bssed on FPGA supports 1pcs. 4x1GbE ext..

PTP & NTP

- **IEEE1588:2008** Grandmaster, submaster (slave)
  one-step, peer-to-peer, transport UDP, RAW layer2
  Profiles: telecom G.8275.1, G.8275.2, G.8265.1
       default, power IEEE C37.238*, pwr. utility*
       AVB 802.1AS, automotive, enterprise, HA*
  Performance: up to 128 msg/s (per port LAN)
       up to 1000 clients (per port LAN)
- **Stratum 1 NTP Time Server** (all NTP versions)
  Stratum 2 NTP/SNTP Client synced to Stratum 1
  Performance: up. to 10 000 clients/s per port LAN
       up to 100,000 NTP clients/port LAN
  1024s polling up to 10 mln.NTP clients/port LAN

Accuracy , Stability , Holdover

| < 2 ns | Server internal | < 100 ns | IRIG DCLS FO |
| < 5 ns | GNSS receiver | < 2 µs | IRIB-B AM/TTL |

< 20ns PTP-2-PTP hw-stamps < $5x10E^{-11}$ /sec HQ OXCO
<100ns PPS, PPM, PPH

Protocols

- IEEE 1588-2008 (PTP Precision Time Protocol)
- NTPv4, NTPv3 (NTP Network Time Protocol)
- IRIG, AFNAR*, STANAG4430*, NASA36* (contact for more)
- SyncE* (Synchronous Ethernet)
- Cs5071A*/HROG-10* (direct sync ToD+PPS to UTC/TAI)
- IPv4 / IPv6** • DHCP • SSH • SFTP • TELNET • SYSLOG
- VLAN (1x PTP-slave, 9x PTP-master, 10x NTP) • HA CARP
- MIB-2 SNMPv3 supporting UNSYNC and JAM-attack to OSS soft.
- Zabbix (supports default management) • OSS via MIB 2

Environmental

- Redundant power: 110-230VAC or 120-370VDC or
- 20-70VDC. • Max. current consumption: 1A(AC) / 2A(DC)
- Max. power consumption: 60W (typical), 80W (max)
- Operating temperature –5°C to +60°C
- Storage temperature: –55°C to +80°C
- Humidity: 5% to 95% (non condensing) • MTBF 391000h
- std.(1U): 44,4 (H)×484 (W)×300 (D) mm • Weight: 4.2 kg
- opt.(2U): 88,8 (H)×484 (W)×300 (D) mm • Weight: 6.1 kg
- opt.(3U): 133,2 (H)×484 (W)×300 (D) mm • Weight: 7.9 kg

Security & Reliability

- NTS-4000 has built-in advanced GNSS satellite traceability.
- The SNMP supports MIB 2 compatible to any OSS software.
  Our MIB 2 file defines one of the world's most significant
  event traps database, that incl. GNSS jamming & spoofing.
- Built-in crypto std. RSA, MD5, DES, SSL, SHA-1, SHA-2.
- When equipped with LEVEL2** filter or LEVEL3** simulator,
  NTS-4000 ensures resilient UTC time even in GNSS-denied,
  heavily jammed RF environment. Server can also receive
  a Time Sync Attack alarms from wide area National Cyber
  Protection System (e.g. ARGOS**). When connected to
  ground National Time Dissemination System (eCzasPL**),
  the NTS-4000 time server does not need GPS /GNSS at all.
  In case of unexpected GNSS receiver security vulnerability
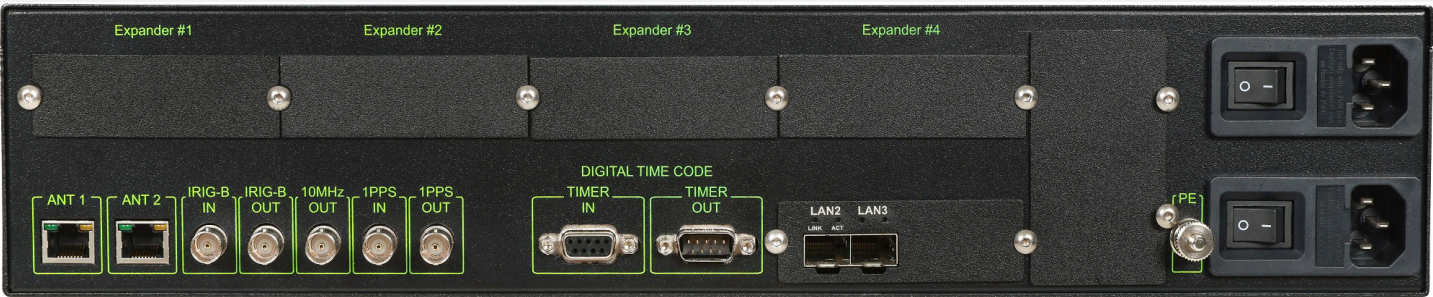 the other vendor replaceable GNSS modules are available.

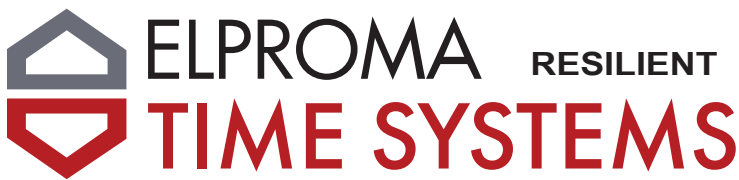 * extra feature not requiring hardware update   ** requiring additional hardware

NTS-4000 Series 1U Back panel

NTS-4000 Series 2U Back panel
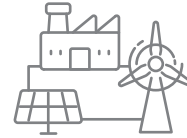
ELPROMA RESILIENT
TIME SYSTEMS

Security • Synchronization • Reliability • Performance

5G TELECOM
DVB–T2 AVB

INDUSTRY 4.0
SMART FACTORY

ENERGY UTILITY
SMART GRID

ICT & CLOUD
DATA CENTRES

BANKS
STOCK EXCHANGE

OSC
GNSS
PPS
LAN
NTP
PTP
IRIG

RS232   USB   LAN2

Setup Keyboard

ELPROMA
TIME SYSTEMS

Status Display

NTS-5000 Series
Network Time Systems

Synchronization

• PTP IEEE1588 Grandmaster
• NTP STRATUM-1 Time Server
• GPS Galileo Glonass Beidou time

Security

• SAT Time-firewall w/ ANT auto-OFF
• GNSS anti-jammig/spoofing
• GPS L1 jammed signal mitigation**
• GNSS simulation for RF-denied env.**
• GNSS city-canyon multipath mitigation

Why NTS-5000 is a wise choise?

• OCP Facebook choice of GNSS-receiver for Data Centers.
• Asian biggest single Smart Grid deployment   (300pcs).
• European #1 single Air Traffic Ctrl. deployment (50pcs).
• They trusted us: EU Parliament, Stock Exchanges, NATO.

Reliability

• STARLINK / IRIDIUM LEO backup**
• DCF77 / 225kHz Solec K. backup**
• 5071A HROG-10 full UTC backup*
• 30x remote NTP servers backup
• HA CARP redundancy

Performance

• Internal stability < 2 ns
• GNSS accuracy   < 5 ns
• PTP accuracy   < 25 ns
• IRIG DCLS FO* <100 ns
• Rb holdover (1d) 0,5 µs
• Rb holdover (7d) 3,7 µs
• OCXO holdover (1d) 0,6 µs
• OCXO holdover (7d) 47 µs

Product advantages over NTS-4000

• Dual Rubidium & OCXO ultra-long holdover

Product advantages over NTS-3000

• LAN modularity from std. 2   up to max. 20
• More sync I/O and higer PTP accuracy
• 2U freedom of future upgrades

NTS-5000 Rb OCXO

NTP/PTP IEEE1588 Modular Time Server

The NTS-5000 Rb OCXO is a carrier-grade GRANDMASTER clock with advanced cyber-security capabilities. Server is created from scratch in 2024, keeping 100% backward compatibility to original 2004 appliance. It has built-in dual redundancy for each critical function. It is based on a state-of-the-art FPGA chipset that offers a powerful free space margin for flexible product growth through the coming decades.

It offers a technology suite to meet the synchronization needs of evolving Industry 4.0 IT/OT networks - specially 5G, smart grid, data centres, financial markets. The server provides robust synchronization services ensuring accuracy, stability, security and reliability for any wide-area distributed architecture or any critical infrastructure. When used with Elproma's external LEVEL-2** GPS L1 anti-jamming filter and LEVEL-3** GNSS simulator, the NTS-5000 time server ensures resilient timing, even in GNSS-denied, heavily jammed RF environments. It is PRS / PRC / PRTC compliant. Custom built options grooves to 3U**.

Made in EU

CE

ISO 9001
QUALITY
ASSURANCE

Ref. Time

- std. 1x GNSS receiver • opt. 2nd GNSS receiver
  - std. supporting GPS, Galileo, Glonass, Beidou
  - opt. supporting DCF77 or 225 kHz Solec Kuj.
- opt. 1x 5071A* / HROG-10* direct synchronization
- std. 30x backup NTP serves (incl. eTimePL** system)

Inputs

- std. 2x GNSS physical or simulated signal LEVEL-3
- std. 2×ToD time-scale ref. (clock + calendar)
  - opt. direct 5071A*/HROG-10* for UTC/TAI
  - opt. backup STARLINK / IRIDIUM modem**
- std. 1×1PPS frequency ref.
- opt. 1×IRIG-B AM
- opt. 2×IRIG DCLS FO**

ANT1/ANT2 IO support both physical GNSS and simulated LEVEL-3 signals

Outputs

- std. 2x GNSS simulation signal LEVEL-3 compatible
- std. 2x ToD ToD (Time of a Day code multiple std.)
- std. 1×1PPS frequency ref.
- std. 1×10MHz frequency ref. or 2.048 MHz*
- opt. 1×IRIG-B AM
- opt. 2x IRIG-B AM o TTL (selectable)**
- opt. 2×IRIG DCLS FO**
- opt. 4×IRIG DCLS FO rs422**

ANT1/ANT2 support GNSS NMEA183 signal simulation LEVEL-3 compatible

LAN

- std. (main) 2x 100/10 Mbps x86 sw time-stamps ⎤
- opt. (ext) 8x 1 GbE (SFP/RJ45) sw time-stamps ⎥
  - (ext) 16x 1 GbE (SFP/RJ45) sw time-stamps ⎥ NTS-50xx
  - (ext) 24x 1 GbE (SFP/RJ45) sw time-stamps ⎦
- std. (main) ⎡2x 1 GbE (SFP) FPGA hw time-stamps⎤
  - or ⎣4x 1 GbE (SFP) FPGA hw time-stamps⎥ NTS-52xx
- opt. (ext) 4x 1 GbE (SFP) FPGA hw time-stamps⎥
- std. (config) 1x 100/10 Mbps for management ⎦

Notes! Choose base std. platform between new FPGA and x86 archtecture.
The FPGA hw supports x10,000 better PTP sync accuracy than x86.
The old 8/16 GbE ports x86 std. extentions are requiring 2U size.
The old 24 GbE ports are custom built requiring 3U size chassis.
The new 2/4 GbE port bssed on FPGA supports 1pcs. 4x1GbE ext.

PTP & NTP

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  one-step, peer-to-peer, transport UDP, RAW layer2
  Profiles: telecom G.8275.1, G.8275.2, G.8265,1
  default, power IEEE C37.238*, pwr. utility*
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  Performance: up to 128 msg/s (per port LAN)
  up to 1000 clients (per port LAN)
- **Stratum 1 NTP Time Server** (all NTP versions)
  Stratum 2 NTP/SNTP Client synced to Stratum 1
  Performance: up. to 10 000 clients/s per port LAN
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  1024s polling up to 10 mln.NTP clients/port LAN

Accuracy , Stability , Holdover

< 2 ns Server internal	< 100 ns IRIG DCLS FO
< 5 ns GNSS receiver	< 2 µs IRIB-B AM/TTL
< 20ns PTP-2-PTP hw-stamps	< $5 \times 10E^{-11}$ /sec HQ OXCO
<100ns PPS, PPM, PPH	< $11 \times 10E^{-11}$ /day Rubidium

Days	1d	2d	3d	4d	5d	6d	7d	14d
ERROR µs	0,5	1,2	1,8	2,4	2,9	3,3	3,7	3,9

Rubidium UTC holdover accuracy degradation on each next day of server operation

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

OCXO osc. UTC holdover accuracy degradation on each next day of server operation

Protocols

- IEEE 1588-2008 (PTP Precision Time Protocol)
- NTPv4, NTPv3 (NTP Network Time Protocol)
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- IPv4 / IPv6** • DHCP • SSH • SFTP • TELNET • SYSLOG
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Environmental

- Redundant power: 110-230VAC, 20-70VDC, 370VDC
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- Max. power consumption: 60W (typical), 80W (max)
- Operating temperature –5°C to +60°C
- Storage temperature: –55°C to +80°C
- Humidity: 5% to 95% (non condensing) • MTBF 391000h
- std. (2U): 88,8 (H)×484 (W)×300 (D) mm • Weight: 6.1 kg
- opt. (3U): 133,2 (H)×484 (W)×300 (D) mm • Weight: 7.9 kg

Security & Reliability

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- When equipped with LEVEL2** filter or LEVEL3** simulator, NTS-5000 ensures resilient UTC time even in GNSS-denied, heavily jammed RF environment. Server can also receive a Time Sync Attack alarms from wide area National Cyber Protection System (e.g. ARGOS**). When connected to ground National Time Dissemination System (eCzasPL**), the NTS-5000 time server does not need GPS /GNSS at all. In case of unexpected GNSS receiver security vulnerability the other vendor replaceable GNSS modules are available.

* extra feature not requiring hardware update   ** requiring additional hardware

NTS-5000 Series 2U Back panel

ELPROMA TIME SYSTEMS

AUTONOMOUS VEHICLE

INDUSTRY 4.0

SECURITY/CCTV SYSTEMS

SMART ENERGY
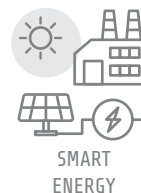
- HARDWARE TIME STAMPING
- NTP SERVER STRATUM-1
- PTP IEEE1588 GRANDMASTER
- GNSS anti-jamming/spoofing
- Reference time from GNSS
- GNSS Reacquisition < 1s
- GNSS Hot Start (TTFF) < 5s
- GNSS Warm Start (TTFF) <25s
- GNSS Cold Start (TTFF) <35s

- TCXO based holdover
- Holdover 1 hour* < 4ms
- Holdover 24 hour* < 100ms
- Linux & TCP/IP (IPv4/IPv6*)
- 100/10Mbps Ethernet LAN
- 1PPS precision time support
- NTP authentication
- MD5, RSA, DSA, SSL security
- HTTP, HTTPS, TELNET*, SSH
- SYSLOG
- RS232/485/USB interface
- 30m (38dB) antenna included
- PTP/NTP clock retrieving with
- PPS & ToD output generation

NTS-PICO3

NTP/IEEE 1588 Miniature Time Server

NTS-PICO3 is 3rd generation PICO miniature time server from Elproma.
It delivers UTC or PTP (TAI) ref. time directly to the network using NTP and PTP IEEE1588:2008. The standard version of product includes hardware time stamping of 1PPS and IEEE1588v2 packets. Hardware stamping is also possible for RTC* and NTP-PTP cross-timestamp*.

The **NTS-PICO3** is equipped with single 100/10Mbps Ethernet port supporting both IPv4 and IPv6*. The server has been designed for small industrial applications, incl. the automotive. It has passive cooling and it can operate 24/7 in harsh environmental conditions.

NTS-PICO3 is powered at 9-30 VDC. The product at arrival is equipped with a 38dB GNSS antenna and 30m coax cable SMA ended.

A built-in GNSS satellite receiver incl. TCXO oscillator for a short-time holdover.
The server supports simultaneously GPS and GALILEO or GLONASS, QZSS/BE-IDOU* L1*.

GNSS Synchronization and SBAS support

- GPS L1 w/ AGPS (1575,42MHz)
- GLONASS L1 (1598,06-1605,38MHz)
- GALILEO E1 (1575,42MHz)
- BEIDOU* L1 (1561,09-1575,42MHz)
- EGNOS
- WAAS
- GAGAN

Supported Time Protocols

- NTP v2, v3, v4 (RFC1305, RFC1119, RFC5905, RFC5906, RFC5907, RFC1769)
- PTP v2 IEEE1588-2008 (PTPv2), gPTP (802.1AS), SNTP (RFC2030)
- TSA* a Time Stamping gateway for link with Elproma NTS-TSA-RFC3161 product
- Note! Unit supports all* NTP/PTP modes incl. Unicast, Broadcast and Multicast.

I/O

- 1x LAN Ethernet 10/100 Base-T (RJ45)
- 1x SMA GNSS antenna
- 1x SMA 1PPS* output
- 1x RJ45 RS232C
- 1x RJ45 1PPS* input
- 1x Micro-USB 2.0

Hardware

- Heavy Duty Industrial Solution (metal housing)
- MTBF 50000hrs

Remote configuration

- HTTP • HTTPS • SSH • TELNET* • NTPQ/NTPDC
- SNMP* • ZABBIX*

MultiSAT GNSS receiver & antenna:

- 32-channel (acquisition: -143dBm; reacquisition: -160dBm; tracking: -160dBm)
- GNSS active marine antenna, w/ 38dB amplifier and 30m H155 coax cable (SMA ended)
- Receiver accuracy RMS is better than 15 ns (nanoseconds)

Accuracy (better than)

- GNSS Multi-SAT receiver to UTC (RMS): 15 [ns] (nanoseconds)
- NTP client via public Internet: 100 [ms] (miliseconds)
- NTP client at LAN: 500 [µs] (microseconds)
- PTP hardware timestamping at LAN: 200 [ns] (nanoseconds)
- NTP-PTP software* cross-timestamping: 1.5 [µs] (typ. <1 microseconds)
- OSC holdover* (1 hour): 4 [ms] (miliseconds)
- OSC holdover* (24 hours): 100 [ms] (miliseconds)

Mechanical/environmental

- Size: 73 x 54 x 26mm
- Weight netto NTS-pico3 (only): 0.125kg
- Weight netto GNSS Antenna w/ 30m cable: 2.3kg
- Weight brutto BOX (NTS-pico3 & Antenna): 2.7kg
- Power: 9-30VDC (backup lithium* battery: 3V 620mAh)
- Operating temperature: -20°C to +70°C
- Storage temperature: -40°C to +85°C
- Humidity: up to 95% (non-condensing),
- conformal coating option*
- MTBF 50000hrs

*option

Suitable for: • Industry 4.0 • Autonomous Vehicles • Smart-city • Smart grid • Process Automation • Robots

Made in EU

ISO 9001 QUALITY ASSURANCE

ELPROMA

MILITARY PUBLIC INSTITUTION CYBERSECURITY

ARGOS
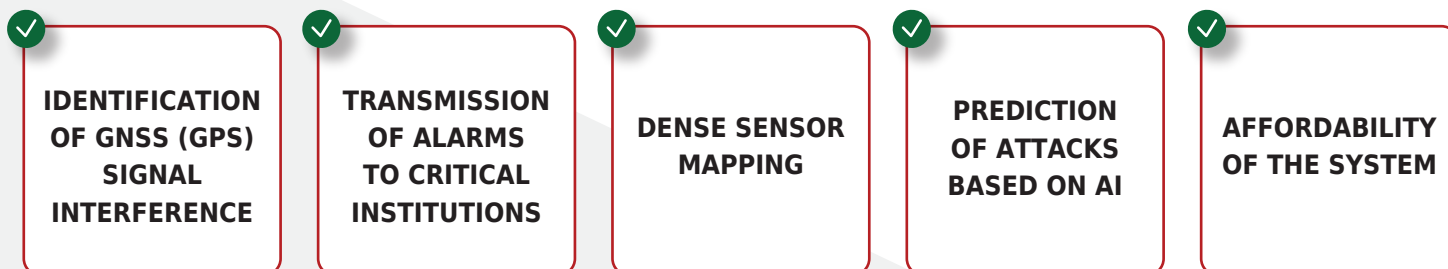## GNSS JAMMING / SPOOFING MONITORING SYSTEM

GNSS (GPS) SIGNAL INTERFERENCE IS A THREAT TO NATIONAL SECURITY

LACK OF CONTROL OVER CRITICAL INFRASTRUCTURE

LACK OF CONTROL OVER THE FINANCIAL SYSTEM

LACK OF COMMUNICATION

MAIN ADVANTAGES OF THE ARGOS SYSTEM

IDENTIFICATION OF GNSS (GPS) SIGNAL INTERFERENCE

TRANSMISSION OF ALARMS TO CRITICAL INSTITUTIONS

DENSE SENSOR MAPPING

PREDICTION OF ATTACKS BASED ON AI
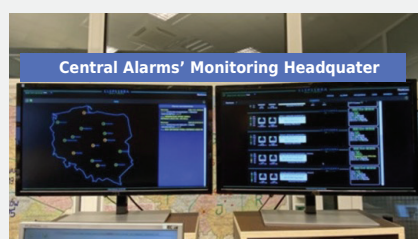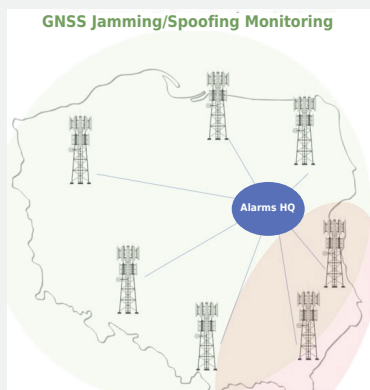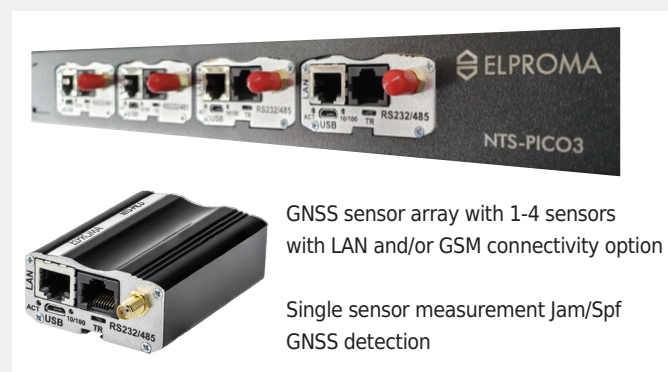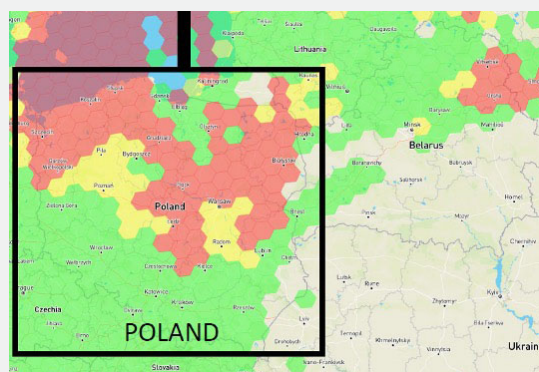
AFFORDABILITY OF THE SYSTEM

ENHANCED FUNCTIONALITY OF THE ARGOS SYSTEM

- **Recognition and monitoring of GNSS jamming and spoofing** over the national territory.
- **Alert function with notification** of the Crisis Management Centre.
- **Dense mapping** over the entire national territory.
- **Ease of integration** with any existing critical infrastructure:
  telco, energy, transport (Air Traffic Control, Railways), measurement points e.g. wheather stations, etc.
- **Precise measurement of GNSS signals**, ie: GPS, Galileo, Glonass*, Beidou*, IRNSS*, in the "L1" and "L5" frequency bands.
- Built-in* **spectrum analyser** for GNSS signals.
- **Automatic sending of MIB2 trap class alarms** directly to OSS class systems operating critical infrastructures of the country and to   Emergency Management Centres.
- Each sensor **measures and reports GNSS interference**, but is also immune to:
  – **Reflections** (meacoooning multipath-mitigation GNSS),
  – **Jamming**,
  – **Spoofing**.
- It also recognises **local attacks** using mobile GPS jammers, conducted by small 2-3 person sabotage groups.
- **The open architecture** of ARGOS allows for horizontal and vertical scalability, and by incorporating AI at the DSP level allows new complex threat vectors to be identified in a hybrid model.
- System 100% designed and **manufactured by Polish company Elproma**.
- Low sensor price - more than 10x lower than solutions offered on the market.
- **System based on NTP/PTP time server sensor designed** for autonomous vehicles and robots, a proven solution, extended by a customised signal receiver.
- **Proprietary EDMS software** can integrate up to 200,000 sensors operated simultaneously.

* - on request

ARGOS - FULL SECURITY IN HYBRID CONFLICT

POLAND

NTS-PICO3

GNSS sensor array with 1-4 sensors with LAN and/or GSM connectivity option

Single sensor measurement Jam/Spf GNSS detection

GNSS Jamming/Spoofing Monitoring

Alarms HQ

Central Alarms' Monitoring Headquater

Alarms HQ

The ARGOS system, is a new statistical quantitative (not qualitative) approach to detecting GPS signal interference. Based on BIG DATA, collected in real time from industrial sensors ARGOS identifies interference represented numerically (binary evaluation 1 is interference; 0 is no interference). Additionally, using the AI and machine learning functions available in the cloud (ML), ARGOS can predict development trends or identify new radio attack vectors.

ARGOS is a robust modern industrial solution with effective binary interference recognition (JAM/SPF) GPS.

Recommended for the system, the ARGOS dense mapping should divide the national territory into 10x10km operational squares allowing the creation of an interference bitmap image to identify both large-scale national radio attacks and small-scale ones, i.e. those that may indicate the diversionary nature of the activities of small, local diversionary groups (e.g.: interference with local railway junctions railways). The ARGOS system is the digital approach currently favoured by NATO.

An important feature of ARGOS is that it is an industrial solution in the Operational Technology (OT) class, and therefore with features of continuous 24/7 operation, fault tolerance, reliability and operational stability. The system is based on a tried-and-tested, Polish--manufactured component of the Elproma NTS-PICO3 time synchronisation server, used in autonomous solutions (robots, cars Industry40). ARGOS is a stationary system, so it does not depend on the state of destruction of the transport infrastructure, which can be important in the event of armed conflict. Thanks to its low energy consumption, the sensors can be installed at any point (e.g. at the BTS). Based on the experience of past armed conflicts, there is no 100% destruction of the infrastructure of the telecommunications (BTS), as it is essential for warfare for all parties to the conflict. System restoration from the destruction phase can be carried out by available technical staff trained in basic radio installations.

ELPROMA IS:

- Global brand in telemetry and time systems
- Technology owner and creator of the synchronization market
- Global provider of comprehensive security systems for stabilization and time precision
- Polish engineering company since 1992

- THE WORLD'S HIGHEST QUALITY ISO 9001
- IQ-Net AUDIT (QUALITY AUSTRIA)
- NATO (CODIFICATION)
- POLISH NATIONAL MAIN OFFICE OF MEASUREMENT ATTESTATION