



DESIGNED & ENGINEERED IN TÜRKİYE

GNSS TIME SERVER — INDUSTRIAL CLASS

GNSS Server

Time is not distributed
until it is verified.

PTP grandmaster, boundary clock and Stratum-1 NTP on one platform for substations, telecom networks, finance, broadcasting and defence/public networks. Dual antenna and dual card, holdover, jamming/spoofing detection, X.733 alarms and central AAA — the antenna only at the centre, correct time on every device.

2–24

PHYSICAL PTP
PORTS

3

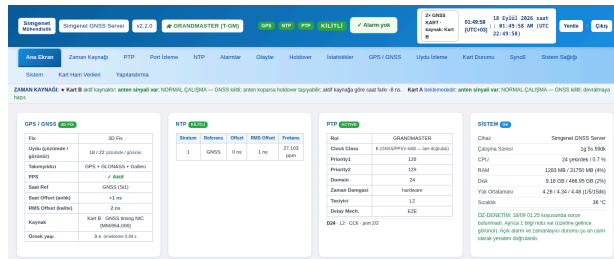
PTP PROFILES

2x2

DUAL ANTENNA ·
DUAL CARD

Stratum-1
NTP · NTS

SECURE TIME



Simgenet GNSS Server · timing infrastructure managed from one panel

Simgenet GNSS Server

Product Brochure · SMG-UB-GNSS-EN · Rev. 3

Simgenet Mühendislik

Enerji San. ve Tic. Ltd. Şti.



01

CORPORATE

The Platform That Generates and Distributes Time

Simgenet Mühendislik is a Turkish engineering company delivering industrial networking and critical-infrastructure communication systems. The GNSS Server software is **entirely original**, developed in house at Simgenet.

2000

FOUNDED

500+

PROJECTS DELIVERED

30+

COUNTRIES SERVED

100+

PRODUCTS

■ Why time is critical

Ordering protection records in substations, radio synchronization in telecom networks, transaction stamps in finance and stream alignment in broadcasting — all depend on every device in the network **seeing the same instant**. If time drifts, records become inconsistent and protection systems make the wrong decision.

■ Why our own timing platform

- **Technological sovereignty** — no dependence on a foreign vendor's roadmap
- **Features on request** — ports, profiles and interfaces adapted to the project
- **Local engineering and support** — in your language and your time zone
- **Long life** — for a 15–20-year infrastructure life cycle

Our departments are separate. The software of Simgenet-branded products is developed in our own **manufacturing and R&D department**; transmission systems and field deployment are run by separate specialist teams. Installation, commissioning and maintenance are delivered under a single responsibility.

Our Mission

To deliver innovative, reliable and sustainable technology solutions for industrial networking and critical-infrastructure communication, safeguarding our customers' business continuity.

Our Vision

To become Türkiye's most trusted and innovative network-infrastructure technology partner and a globally recognized brand.



02

PLATFORM

What Is the Simgenet GNSS Server?

A time server that distributes precise satellite-derived time to the servers, network devices and recording systems on the network. It offers the widely used **PTP** and **NTP** protocols on one platform; not a single box but **a model family whose port count and interfaces are configured per project.**

■ One device, two roles

The same hardware and the same software run as both grandmaster and boundary clock. The role is selected in the per-port configuration matrix; the device is not restarted to switch.

■ Multi-domain

Every Ethernet port can be assigned its own domain, profile and role. Telecom and power profiles run simultaneously on the same device.

■ Never publishes wrong time

Distribution ports do not open until time is verified; if the source is doubtful the clock class is honestly downgraded. Bad time never reaches the network.

Key Capabilities

- IEEE 1588v2 PTP — hardware-level timestamping
- Telecom profiles: ITU-T G.8275.1 and G.8275.2
- Energy/power profile: IEC/IEEE 61850-9-3
- GNSS-disciplined Stratum-1 NTP server and client
- Multi-constellation GNSS receiver and PPS input
- Dual GNSS receiver and antenna input (active-standby)
- Upstream-GM PTP uplink and external 1PPS reference input
- Client monitoring through in-band IEEE 1588 management
- SyncE (EEC lock monitoring and holdover); secure NTP with NTS
- Jamming / spoofing / antenna-fault detection; X.733 alarm management
- Central AAA: RADIUS, TACACS+ (command authorization), LDAP/AD; CoA
- REST API, SNMP v3 + MIB + traps, TLS syslog, diagnostic bundle, scheduled backup and rollback

Works without an antenna too. The device does not have to have its own antenna. It can take PTP from an antenna-fed grandmaster and distribute it downstream on many ports as a boundary clock — the most practical way to extend the timing chain without running an antenna to every site.



03

OPERATING MODES

Grandmaster, Boundary Clock and Port Multiplication

■ Grandmaster (T-GM)

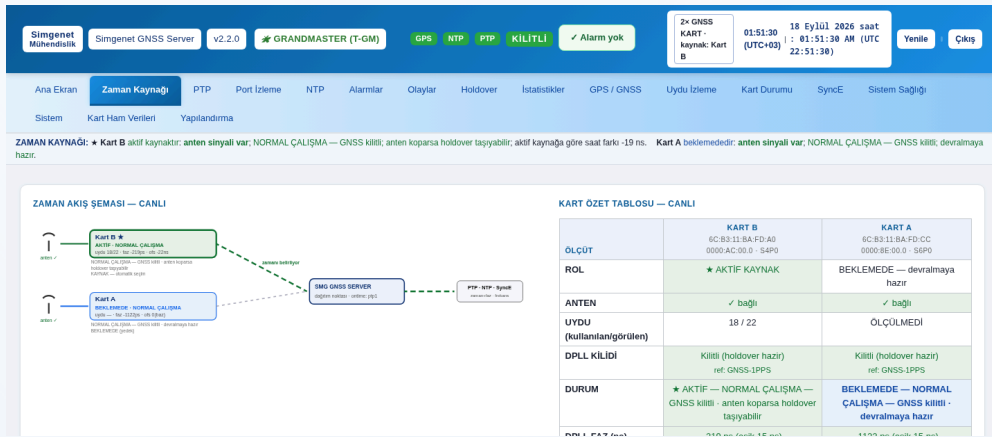
Disciplines the time from the GNSS receiver, becomes the network's **primary time source** and distributes time downstream. Sits at the top of the timing hierarchy.

- Locked operation with GNSS and PPS
- Configurable clockClass, clockAccuracy and priority
- Holdover and clock-class downgrade on GNSS loss

■ Boundary Clock (T-BC)

Takes time from an upstream grandmaster over the PTP uplink port, **regenerates** it and distributes it to downstream devices. The chain is extended with accuracy recovered at every step.

- When an uplink port is assigned the domain switches to BC mode automatically
- When the uplink is removed the same domain becomes a GNSS-locked GM
- Transitions happen without restarting the device



Time-distribution topology on one screen

The upstream GM, the device's role and the device connected to each port are detected automatically; source, offset, delay and state per port are watched in the same table.

Port-multiplier architecture. The cost of the antenna, the roof penetration and the high-stability oscillator stays with the grandmaster at the top; **port capacity is scaled out** with antenna-less boundary clocks below it. A structure designed for telecom and ISP backbones and for control-centre architectures.



04

STANDARDS

PTP Profiles and NTP

Time distribution is configured to the standard of the target sector. Different ports on the same device can run different profiles; the layer and delay mechanism lock automatically to the selected profile.

■ ITU-T G.8275.1 — telecom

- Layer 2 multicast, end-to-end (E2E) delay
- Domain range 24–43
- For networks with full timing support

■ ITU-T G.8275.2 — telecom (IP)

- Layer 3 / UDP-IPv4, end-to-end (E2E) delay
- Domain range 44–63
- For networks with partial timing support

■ IEC/IEEE 61850-9-3 — power

- Peer-to-peer (P2P) delay mechanism
- Power profile for substation automation
- Common time base with protection and recording systems

■ NTP — broad compatibility

- GNSS-disciplined **Stratum-1** server
- Operation as server and client
- A large client population with no port limit

Timescale and delay mechanism. The PTP/TAI or ARB/UTC timescale can be selected; currentUtcOffset is managed automatically. Both end-to-end (E2E) and peer-to-peer (P2P) delay mechanisms are supported.



05

CONTINUITY

Redundancy and Uninterrupted Operation

The time source is the layer of critical infrastructure with the least tolerance for a single point of failure. The platform is designed to offer redundancy at every step of the reference chain.

■ Dual GNSS receiver and antenna input

Two independent reference cards run active-standby. When one receiver loses satellite view, time generation continues from the other reference.

■ Redundant reference inputs

GNSS is not the only source: the upstream-GM PTP uplink and the external 1PPS input can also be used as references. On source loss the system moves to the next reference in line.

■ Holdover

When the GNSS signal is lost, the high-stability OCXO oscillator keeps time within the defined budget. If the source is doubtful, the clock class is downgraded and the state is honestly reported to the network.

■ 1+1 with two devices

Two time servers work together with the standard **BMCA**; when the primary source is lost, clients move to the second. No separate proprietary protocol is required.

Never degrades silently. The most dangerous fault in a timing infrastructure is wrong time distributed as if it were correct. The platform does not open distribution ports until time is verified; on a doubtful source it downgrades the clock class and records the event in the black box.



07

SECURITY AND OPERATIONS

Signal Security, Alarms and Sustainable Operations

The most dangerous fault in a timing infrastructure is wrong time distributed as if it were correct. The GNSS Server **watches the signal with suspicion**, downgrades the clock class on doubt, writes the event to alarms and the black box, and gives the administrator a "why" screen.

■ Jamming, spoofing and antenna-fault detection

- Sudden SNR drop and position-jump monitoring — jamming/spoofing suspicion alarm
- Dual-card **cross-check**: the two receivers validate each other; on mismatch, failover to the safe side
- Antenna fault / disconnection detection; antenna cable delay compensation
- clockClass downgrade on a doubtful source — bad time never reaches the network

■ Alarm management — X.733

- Severity classes: critical / major / minor; only critical in the top bar (antenna disconnected, spoofing/jamming, GNSS lock loss, clock error, service fault)
- Alarms menu: acknowledgement, bulk alarms, planned-maintenance tag; Events history
- SNMP v2c/v3 + MIB (RFC 8173 PTP MIB + enterprise) + traps; TLS syslog; daily e-mail report
- Time Source strip: source, lock, reason, duration — holdover reason on one screen

■ Access and identity (AAA)

- HTTPS-only; CSR generation and signed-certificate upload
- RADIUS (privilege level, RFC 5607) · TACACS+ (authentication, authorization, command authorization, accounting) · LDAP/AD
- Three roles: administrator / engineer / operator; session termination with RADIUS CoA/Disconnect
- Local fallback account when the server is unreachable; brute-force lockout

■ Operations and integrity

- Scheduled backup + verification; configuration versions and rollback
- Signed software integrity: manifest signature, file-integrity guard, SSH key-change alarm
- **Diagnostic bundle** with one command: context, timing chain, events, configuration — readable offline
- REST API and web; e-mail and webhook notification; PRP/DAN dual LAN (IEC 62439-3) for management/NTP; SyncE EEC lock monitoring; secure NTP with NTS

Installation in Four Steps

1 · Network

Management address,
HTTPS, AAA

2 · Antenna / card

Receiver cards, antenna
delay, dual card

3 · Profile / domain

G.8275.1 / .2 / 61850-9-3,
domain, priorities

4 · Ports

Port × domain matrix, roles,
client monitoring



08

USE

Use Cases and Architectures

■ Power and substations

A common time base for protection, measurement and recording devices with the IEC/IEEE 61850-9-3 power profile. Event records are ordered consistently between centres.

■ Telecom and ISP backbone

Network synchronization with the G.8275.1 and G.8275.2 telecom profiles. The timing chain is extended along the backbone with boundary-clock layers.

■ Control-centre architecture

The antenna only at the centre; port multiplication with antenna-less boundary clocks in the lower layers. Time is distributed to a large device population without running an antenna to every building.

■ Finance, broadcasting and defence

Stratum-1 NTP and PTP offered together for transaction stamps, stream alignment and record integrity; access is controlled by role.

Typical Positioning

Centre

GNSS-antenna grandmaster — the network's primary time source, 1+1 redundant

Distribution

Antenna-less boundary clock — takes PTP from above, distributes on many ports

Edge

Clients — fed by PTP and NTP, monitored in band

Designed per project. The number of centres, chain depth and port requirement vary by site; the architecture and model selection are decided together on a project basis.



09

MODELS

Port Configuration and Model Family

The product is not a single box but a model family with **2 to 24 physical PTP distribution ports depending on product type**. Port count, interface type and reference inputs are optimized per project.

Compact

2–4 ports

Single centre, limited clients;
substation or branch distribution.

Medium

8–12 ports

Multi-layer distribution; control
room and aggregation layer.

High density

Up to 24 ports

Distribution to a large device
population from one chassis;
control centre.

■ Interface options

- 1G copper and 1G fiber distribution ports
- 10G / 25G SFP interface options
- No port limit for NTP distribution
- Every port can be assigned its own domain, profile and role

■ Reference and sync inputs

- Multi-constellation GNSS receiver input (dual-receiver option)
- External **1PPS** reference input
- Upstream-GM **PTP uplink** (boundary-clock mode)
- Priority: GNSS → holdover → clock-class downgrade; BMCA between devices

An antenna is not mandatory. Models positioned purely for port multiplication carry no GNSS receiver or antenna line; the device takes time from the upstream grandmaster over PTP. This lowers installation and operating cost markedly.



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SPECIFICATIONS

Simgenet GNSS Server

FEATURE	SIMGENET GNSS SERVER
Clock modes	T-GM (grandmaster, GNSS-fed) · T-BC (boundary clock)
Mode switching	Dynamic — BC when an uplink is assigned, GM when removed; no restart
PTP	IEEE 1588-2019 (v2.1; 1588-2008 compatible), hardware timestamping
PTP profiles	ITU-T G.8275.1 (L2, E2E, domain 24–43) · G.8275.2 (L3/UDP-IPv4 unicast, E2E, 44–63) · IEC/IEEE 61850-9-3 (P2P) · IEEE C37.238 power profile · gPTP / IEEE 802.1AS
Delay mechanism	End-to-end (E2E) and peer-to-peer (P2P)
Multi-domain	Domain, profile and role assignment per port (master / slave)
Timescale	PTP/TAI or ARB/UTC · currentUtcOffset automatic
NTP	GNSS-disciplined Stratum-1 server and client · NTS (secure NTP)
SyncE	EEC lock monitoring and holdover
GNSS receiver	Multi-constellation: GPS / GLONASS / Galileo / BeiDou + PPS
Antenna input	Single or dual GNSS antenna input (active-standby)
Reference inputs	GNSS (constellation selection) · external 1PPS · upstream-GM PTP uplink
Management network	PRP/DAN dual LAN and HSR (IEC 62439-3) — for management and NTP
Holdover	High-stability OCXO oscillator, Rubidium option; graded clock-class downgrade, duration/error monitoring, reason screen
Signal security	Jamming / spoofing suspicion (SNR drop, position jump), dual-card cross-check, antenna fault detection, cable delay compensation
Distribution ports	2–24 physical PTP ports by product type; 1G and 10G/25G SFP options
Timing outputs	1PPS · 10 MHz · IRIG-B (card option)
Redundancy	1+1 with two devices (standard BMCA)
Monitoring	In-band IEEE 1588 client monitoring · LLDP neighbour discovery · X.733 alarms (critical/major/minor; acknowledgement, bulk, planned maintenance) · Events · black box · SNMP v2c/v3 + MIB (RFC 8173 + enterprise) + traps · TLS syslog · daily e-mail report · context ID and decision log per event
Management	HTTPS-only web (CSR + signed certificate; SCEP/EST + OCSP) · REST API · NETCONF/YANG (ietf-ptp, RFC 8575) · three roles · e-mail / webhook · scheduled backup + verification · configuration versions (running/startup) and rollback · signed software integrity · diagnostic bundle
Authentication	RADIUS (RFC 5607 privilege level) · TACACS+ (AAA, command authorization, accounting) · LDAP/AD · CoA/Disconnect (RFC 5176) · 802.1X management port · local fallback · brute-force lockout



Why Simgenet GNSS Server

One platform, two roles

Grandmaster and boundary clock in the same device; the role is chosen per port, no restart to switch.

Antenna-less port multiplication

Takes PTP from above and distributes on many ports — extends the timing chain without running an antenna to every site.

Redundant from the start

Dual GNSS receiver, redundant reference inputs, OCXO holdover and 1+1 operation with two devices.

Original and supported

Software developed entirely in house at Simgenet; features added on request, no foreign-vendor dependency.

GET IN TOUCH

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