BIHAR COMMUNICATIONS PVT LTD
GPS clocks, NTP time servers and master clock systems · Made in India since 1985
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ORNATE 7000 TSDRNT

GPS NTP / PTP Time Server

The ORNATE 7000 TSDRNT is a Stratum-1 network time reference for power, process, IT, telecom, railway and defence installations. It takes time from GNSS satellites (GPS, NavIC, Galileo, BeiDou, GLONASS) and distributes it over **three independent NTP/SNTP ports**, a **dedicated PTP (IEEE 1588) grandmaster port**, 1PPS, RS-232, RS-485 and four programmable potential-free contacts.

Each NTP port has its own IP address, so one unit can serve three separate networks (for example SCADA, office LAN and CCTV) with no routing between them. A 16 × 2 backlit LCD shows date, time and synchronisation status at a glance; a GPS-fail alarm contact reports loss of reference.

Network Time Protocol (NTP)

Stratum-1 NTP server (NTP v3/v4, RFC 5905) for all NTP and SNTP clients – Windows, Linux, IEDs, PLCs, NVRs and switches. Three ports, served in parallel, each with its own IP, mask and gateway.

Precision Time Protocol (PTP)

IEEE 1588-2008 (PTPv2) grandmaster with hardware time-stamping. Default, IEC/IEEE 61850-9-3 power utility and IEEE C37.238-2017 power profiles; Layer 2 or UDP/IPv4; E2E or P2P; multicast and unicast.

Security Features

Password-protected web configuration with login lock-out and session time-out. Management commands are cryptographically signed (HMAC-SHA256); the password never travels on the network. NTP control/monitor queries are disabled.

Easy Setup & Central Management

Configure from any web browser, or manage every unit on the network from the BiharCom Management Server software: live status, history, events and settings. Alarms and events are sent to two SYSLOG servers.

FEATURES

- Multi-band (L1 + L5) multi-constellation GNSS: GPS, NavIC, Galileo, BeiDou, GLONASS, QZSS
- Nanosecond-class GNSS timing reference
- 3 × independent NTP / SNTP Ethernet ports
- 1 × PTP grandmaster port with hardware time-stamping
- PTP power profiles: IEC/IEEE 61850-9-3 and IEEE C37.238-2017
- TAI time-scale with UTC offset and leap-second warning from GNSS
- Holdover, settable from 1 min to 24 h
- 4 × programmable potential-free contacts (PFC)
- GPS-fail alarm contact (fail-safe)
- 1PPS, RS-232 and RS-485 time outputs
- Built-in web server for configuration
- Central management software for multiple units
- Remote alarm and event logging via SYSLOG
- Time-zone offset setting (UTC −12:00 to +14:00)
- Self-monitoring watchdog with automatic port recovery
- Universal AC / DC power supply
- Never serves untraceable time: outputs held when unsynchronised

Supported Time Outputs

- NTP v3 / v4 and SNTP
- PTPv2 (IEEE 1588-2008) – L2 and UDP/IPv4
- 1PPS (TTL, BNC)
- NMEA ZDA, NGTS, T-Format on RS-232 / RS-485
- PFC: PPS, PP5S, PPM, PPQH, PPHH, PPH, PPD

TECHNICAL SPECIFICATION

GNSS Receiver	
Constellations	GPS, NavIC (IRNSS), Galileo, BeiDou, GLONASS, QZSS
Frequency bands	L1 / E1 / B1 and L5 / E5a / B2a (dual-band)
Channels	184
Receiver timing accuracy	5 ns (1σ), GNSS receiver specification
Time reference	UTC from GNSS, disciplined system clock (1PPS-locked)
Holdover	Keeps serving time after loss of GNSS for a settable period (1 min – 24 h, default 4 h), then reports "not synchronised"

Antenna	
Type	Active multi-band GNSS timing antenna, outdoor
Antenna cable	RG-6, 50 m standard (other lengths on request)
Protection	Weather-proof radome; lightning arrester supplied
Mounting	Pole / wall mount with fixing accessories

Display, Indication & Configuration	
Display	2 × 16 character backlit LCD
Status LEDs	Power, System OK; link / activity on every Ethernet port
Displayed data	Date and UTC time Synchronisation state, GNSS and 1PPS status Port IP address and NTP request count Unit ID
Configuration methods	Web browser (HTTP), password protected BiharCom Management Server software (Windows)
Settings storage	Non-volatile memory; restore defaults from the management software

Network Protocols & Management	
Time protocols	NTP v3 / v4 (RFC 5905) server, SNTP clients PTPv2 – IEEE 1588-2008 grandmaster (multi-profile)
Networking	IPv4, UDP, TCP, ARP, ICMP (ping), IGMPv2 (PTP port)
Web server	HTTP, browser-based status and configuration
SYSLOG	RFC 5424, two configurable servers, selectable facility, severity and event groups (sync, GNSS, alarm, network, PTP, outputs, system, configuration, security)
Central management	Auto-discovery of units, live status, clock history, event log, remote configuration, save and reboot

Applications

- ◇ Substation automation (IEC 61850) and numerical relays
- ◇ Event loggers and disturbance recorders
- ◇ SCADA, DCS and EMS servers
- ◇ Slave display clocks (wired and RF)
- ◇ Telecom, railway and control-room networks
- ◇ Data centres, CCTV / NVR and IT servers

TECHNICAL SPECIFICATION

NTP Ports (LAN)	
Ports	3 × RJ45, 10/100 Mbps, auto-negotiation
Addressing	Independent static IP, mask and gateway per port
Protocol	NTP v3 / v4, SNTP; UDP / IPv4
Mode	Server (unicast client / server)
Stratum	1 when synchronised; 16 with alarm flag (LI = 3) when not

Time Signal Outputs	
1PPS output	1 pulse per second, rising edge on time TTL level: 5 V open circuit, ≈ 2.5 V into 50 Ω; BNC 100 ms pulse width Suppressed when not synchronised
Serial outputs	1 × RS-232 (DB9) and 1 × isolated RS-485 NMEA ZDA, NGTS, T-Format (selectable per port) 1200 – 115200 baud, 8-N-1
PFC outputs	4 × programmable potential-free contacts Modes: PPS, PP5S, PPM, PPQH, PPHH, PPH, PPD (time of day settable) Pulse width 10 ms – 10 s UTC or IST time base; normal or inverted Solid-state, normally open; 125 V DC / 88 V AC rms, 75 mA
Alarm contact	1 × GPS-fail potential-free changeover contact (NO / COM / NC) Rating 30 V DC, 1 A (SELV) Fail-safe: relay drops out on fault or power loss Optional alarm while in holdover

PTP Port	
Port	1 × RJ45, 10/100 Mbps, hardware time-stamping
Standard	IEEE 1588-2008 (PTPv2), grandmaster, two-step
Profiles	Default E2E and P2P IEC/IEEE 61850-9-3 (power utility) IEEE C37.238-2017 (power, with TLV) Custom
Transport	Ethernet Layer 2 or UDP / IPv4 (own IP)
Delay mechanism	End-to-end (E2E) or peer-to-peer (P2P)
Messaging	Multicast, unicast (negotiated, up to 32 slaves) or both; hybrid unicast Delay_Resp
Message rates	Sync up to 16 / s; Announce up to 8 / s
Domain / priority	Domain 0 – 127 or 254; Priority 1 / 2 settable
Time-scale	PTP (TAI) with UTC offset and leap flags from GNSS, or ARB
Best master	Steps aside automatically if a better grandmaster appears

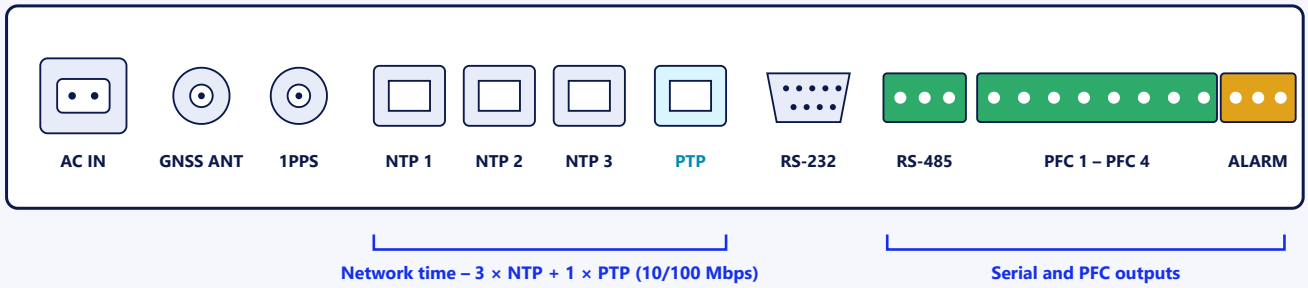
Power Supply	
Input	90 – 264 V AC, 47 – 63 Hz / 127 – 370 V DC
Consumption	< 15 W

Environmental	
Operating temperature	0 to +50 °C
Storage temperature	−20 to +70 °C
Humidity	Up to 90 % RH, non-condensing

Mechanical	
Mounting	1U, 19″ rack mount
Enclosure	Metal, front LCD, rear connections

CONNECTIONS & MANAGEMENT

REAR PANEL CONNECTIONS



BiharCom Management Server	
Platform	Windows PC, browser-based interface
Discovery	Finds every time server on the local network automatically
Live status	Sync state, satellites, holdover, port and PTP status, alarms
History	Clock state and offset history per unit
Events	Central event list with severity
Configuration	Time, network, PTP, PFC, serial, SYSLOG and password – for any unit, from one screen
Access	Administrator login; each unit protected by its own password

Standard Supply	
1	ORNATE 7000 TSDRNT GPS NTP / PTP Time Server, 1U 19″
2	Active GNSS timing antenna with mounting accessories
3	RG-6 antenna cable, 50 m, with lightning arrester
4	BiharCom Management Server software
5	User manual

Synchronisation Integrity	
Not synchronised	NTP stratum 16 with alarm flag; PTP clock class "not traceable"; 1PPS and serial time withheld
Holdover	Keeps serving time for the set holdover period; optional alarm while in holdover
Self-recovery	Watchdog supervision; a stalled network port is reset on its own without disturbing the others
Status reporting	LCD, alarm contact, web page, management software and SYSLOG

Network Security Features	
Web access	User name and password; 5 failed logins lock access for 60 s; 15 min session time-out
Management commands	HMAC-SHA256 signed with one-time challenge (replay-protected); password never sent over the network
NTP hardening	Control (mode 6) and private (mode 7) queries disabled – no amplification risk
Audit	Logins, failures and configuration changes reported to SYSLOG

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