

PTP Grandmaster Clock Combiner VCH-505 – Vremya-ch

 vremya-ch.com/index.php/en/products-en/telecommunic-en/vch-505-en/index.html



The **VCH-505 PTP Grandmaster Clock Combiner** is designed to provide high-precision frequency and time synchronization in digital telecommunications networks.

Its primary application is as a **precision time server for packet-switched networks**, supporting PTP and NTP. The VCH-505 can also be deployed in SDH networks as a **Transit Node Clock (TNC)** or **Local Node Clock (LNC)**.

Key Features

- synchronization inputs: **10 / 2.048 MHz, BITS (E1), 1 PPS, ToD & 1 PPS, SyncE, and PTPv2 Slave**.
- Synchronization outputs: **10 / 2.048 MHz, 2.048 Mbit/s, BITS (E1), 1 PPS, ToD & 1 PPS, SyncE, and PTP Grandmaster**.
- Continuous monitoring of input synchronization signals using **TE, MTIE, TDEV, $\Delta f/f$** parameters.
- Internal DOCXO aging (frequency drift) compensation in Holdover mode (DOCXO+ option).
- Redundant, hot-swappable power supply modules for **100–240 V AC or 36–72 V DC operation**.
- When synchronized to GNSS, the unit complies with **ITU-T G.811**.
- Optional multi-band GNSS receiver providing compliance with **ITU-T G.811.1**.
- **Reference frequency and UTC time combining** in accordance with **ITU-T G.811.1 / G.8272.1**.
- Optional expansion modules:
 - 16 additional **2.048 MHz / 2.048 Mbit/s outputs** ;

- 4 additional **10 / 2.048 MHz outputs** and 4 additional **1 PPS outputs** ;
- **10GbE SFP+** ports (x2).
- Supports **GLONASS, GPS, BeiDou, and Galileo** .
- **GNSS spoofing detection** .
- Compact **1U, 19-inch rack-mount** design.
- Four isolated **1000BASE-X SFP ports** .
- Up to **16 independent PTP/NTP configurations per Ethernet port** , each with its own IPv4 address.
- VLAN tagging support.
- Time reference reception from **GNSS, ToD & 1 PPS, or PTPv2 Slave** . – Web-based control/monitoring. – Global multi-user NMS (Linux, PostgreSQL).

Main Technical Specifications

Internal oscillator :

High-stability DOCXO with a temperature stability of $\pm 5.0 \times 10^{-11}$ over the +10 to +70 °C temperature range.

Optional oscillator:

Rubidium oscillator with stability up to $\pm 1.0 \times 10^{-10}$ over the –10 to +75 °C temperature range.

Maximum server clock synchronization error relative to UTC :

± 30 ns when synchronized to GPS/GLONASS or an external 1 PPS reference.

Holdover performance after loss of GPS/GLONASS synchronization , at constant ambient temperature, during the first 24 hours:

- DOCXO: **within ± 10 μ s**.
- Rubidium oscillator: **within ± 2 μ s** .
- When used with the **VCH-1008C hydrogen maser** in frequency-and-time combiner mode: **3 ns** .

Management interfaces and protocols : HTTPS, SSH, SNMPv2.

Power supply inputs 1 and 2 : 100–240 V AC or 36–72 V DC, in any combination.

Power consumption : 40 W max.

MTBF : at least 120,000 hours

Service life : 20 years.

Operating Conditions

ambient temperature: +5 to +40 °C

Relative humidity at +25 °C: up to 95%.

Dimensions (W × H × D): 440 × 32 × 252 mm.

Weight : 4.2 kg max.

Standards Compliance

The VCH-505 supports or complies with the following telecommunications and networking standards:

ITU-T: G.703, G.704, G.781, G.811, G.811.1, G.812, G.8261, G.8262, G.8264, G.8272, G.8273.2, G.8265.1, G.8275.1, G.8275.2.

PTP: IEEE 1588v2.

Ethernet / VLAN: IEEE 802.1Q, 802.1ad, 802.1p.

NTP / SNTP: RFC 1059 (NTPv1), RFC 1119 (NTPv2), RFC 1305 (NTPv3), RFC 5905 (NTPv4), RFC 4330 (SNTPv4).

Safety and EMC: GOST IEC 62368-1-2014 GOST CISPR 32-2015.

PTPv2 Capabilities

The VCH-505 supports IEEE 1588v2 Precision Time Protocol and provides:

- **Master, Slave, and Boundary Clock (Class C)** operating modes.
- Internal time-scale resolution of **5 ns** .
- 4 isolated SFP ports (1000BASE-X).
- 2 isolated 10GbE SFP+ ports option.
- PTP message addressing in **unicast, multicast, and mixed modes** .
- **one-step / two-step** timestamping.
- **one-way / two-way** operation.
- PTP transport over:
 - Ethernet Layer 2;
 - UDP/IPv4 Layer 3;
- delay measurement using:
 - **End-to-End (E2E)** ;
 - **Peer-to-Peer (P2P)** .
- **Synchronous Ethernet (SyncE)** .
- **Ethernet Synchronization Messaging Channel (ESMC)** messages.
- Support for up to **1,024 PTP clients per port** at a synchronization message rate of up to **128 packets per second** .

Supported PTP Profiles

ITU-T G.8265.1 — unicast, Layer 3

ITU-T G.8275.1 — multicast, Layer 2, SyncE

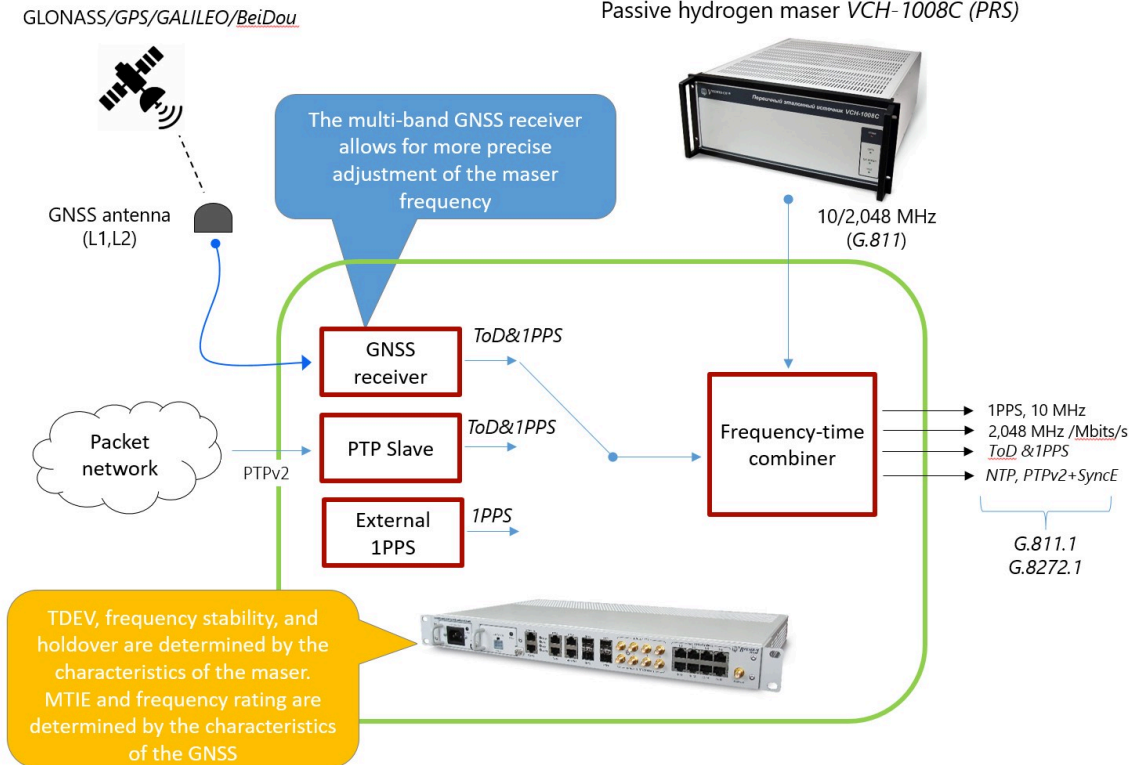
ITU-T G.8275.2 — unicast, Layer 3, SyncE Custom profiles based on user-defined combinations of the supported parameters

NTP Server Capabilities

The VCH-505 supports **NTPv3 and NTPv4** in accordance with **IETF RFC 1305 and RFC 5905** .

- **Stratum 1** operation.
- Up to **50,000 NTP clients per port** .

Frequency-Time combiner mode



VCH-505 in packet-switched and SDH networks

