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, Δf/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 **±5.0 × 10 $^{-11}$** over the +10 to +70 °C temperature range.
Optional oscillator:
Rubidium oscillator with stability up to **±1.0 × 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 μs.**
– Rubidium oscillator: **within ±2 μs** .
– 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.

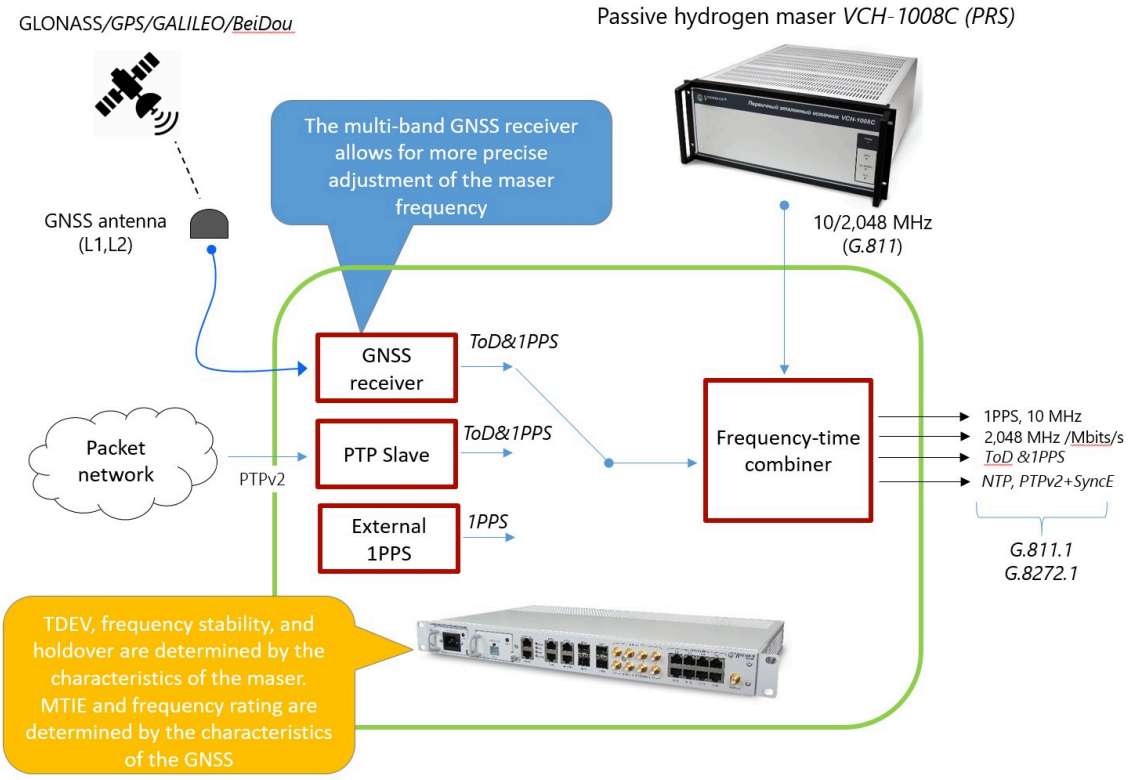
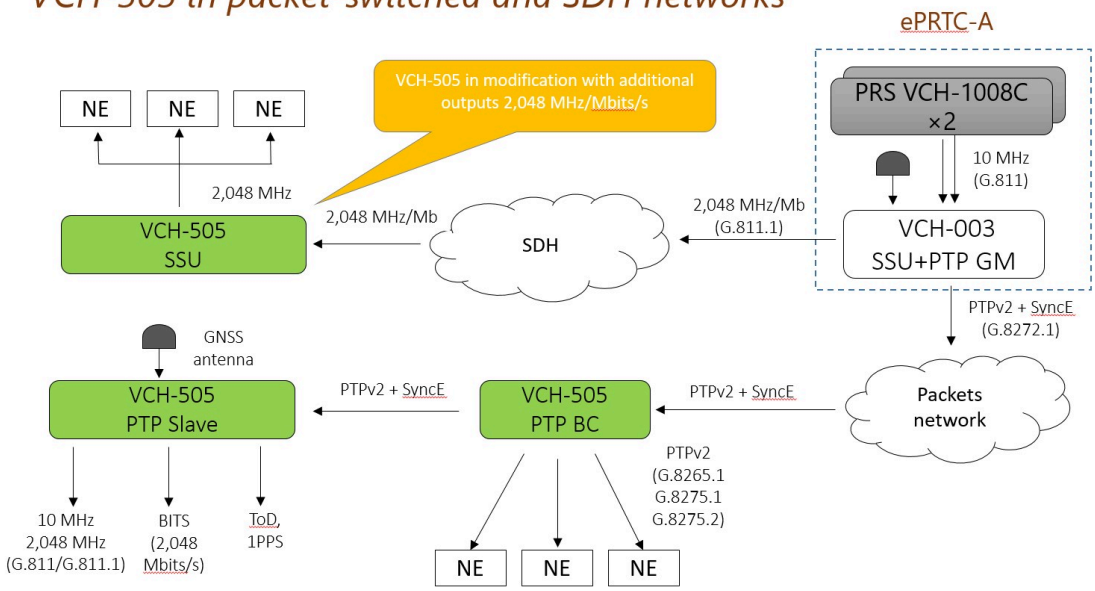
PTPv2 Capabilities
The VCH-505 supports IEEE 1588v2 Precision Time Protocol and provides:
– **Master, Slave, and Boundary Clock (Class C)** operating modes.
– Internal time-scale resolution of **5 ns** .

– 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