



# WHITE RABBIT ZEN TP-32BNC

The reliable node that provides multiple legacy 10MHz/xPPS timing outputs.

## WHITE RABBIT ZEN TIME PROVIDER: WR-ZEN TP-32BNC hw version >v4.0 (Low Jitter version)

The WR-ZEN TP-32BNC is the reliable node that provides multiple legacy 10MHz/xPPS timing outputs for all equipment in your rack cabinet through White Rabbit time transfer and its redundant connections.

The WR-ZEN TP-32BNC easily distributes time and frequency to other equipment by implementing standard timing protocols such as PTP, NTP, IRIGB, 10MHz/xPPS, etc.

The WR-ZEN TP-32BNC combines ultra-stable clocks with low jitter and temperature compensated clock resources to enhance its synchronization accuracy.

- Sub-nanosecond time accuracy and picosecond level precision.
- WR, PTPv2 and NTP over optical interfaces.
- Extended management and monitoring.
- Distance range over 80km using fiber.
- High availability with seamless failover, multi-source redundancy and Ethernet bonding
- Holdover capability
- Robustness & Redundancy.
- 32x Configurable timing outputs.
- Low jitter/phase noise frequency dissemination.
- Built-in precise timing sources monitoring.
- Support for HATI

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### High Accuracy

The WR-ZEN TP-32BNC implements the White-Rabbit (WR) protocol, an high-accuracy extension of PTP based on SyncE, that allows to easily distribute sub-nanoseconds timing within Metro Area Network distances and beyond. Worth to mention, that a timing network using WR protocol is not affected by the traffic load nor the number of hops.

### Interoperability

Used as time provider or interoperability node, the WR-ZEN TP-32BNC can distribute standard PTP IEEE 1588-2008 and Synchronous Ethernet for the last hop through its 2x fiber ports using the most common profiles such as Telecoms profiles (G.8265.1, G.8275.1) & Power profiles (IEEE C37.238-2011 and IEEE/IEC 61850-9-3). It also provides NTP interoperability and 10MHz/PPS distribution.

### Advanced Management

The WR-ZEN provides extensive monitoring via REST API and SNMP, including smart alerts combined with traps, and facilitates integration with third-party networking and monitoring tools. It supports automatic topology discovery via LLDP, remote logging through Rsyslog, as well as in-band management and Ethernet bonding for flexible link configuration, redundancy, and high availability.

### Precise timing sources monitoring

The WRZ-OS incorporates a precise timing sources monitoring system which allow to evaluate the synchronization performance of multiple timing sources (WR, PTP, 1PPS+10MHz) received in the unit. Relevant metrics are computed and can be visualized in the WebUI. The monitoring data is collected and stored in a built-in database that can be exported using the integrated management tools.

### Resiliency

The WR-ZEN devices incorporates seamless failover mechanisms to switch between multiple timing sources when a failure is detected, ensuring maximum availability and optimal synchronization performance even during the transitions. Additionally, an optional Holdover oscillator can be included to maintain high accuracy (1.5us < 24h) even if all timing references are down.

### Intuitive configuration

The new version of WRZ-OS introduces a complete web interface redesigned to provide an excellent user experience: By the means of timing presets, a complex configuration can be done in a few clicks. Simultaneously, the CLI tool has also been rethought to allow straightforward configuration from the terminal to advanced users.

### Enhanced Security

TACACS+/RADIUS have been integrated to enable remote authentication for networked access control through a centralized server. The secure version of most of the protocols such as SFTP, HTTPS, SNMPv3 has been implemented and a firewall has been incorporated to provide a robust system against malicious users..

### Low jitter enhancement

The low jitter/low phase noise version of the WR-ZEN TP 32 BNC includes improved clock circuitry in order to enhance the stability and accuracy of the timing outputs. As result of the improved performance, the WR-ZEN TP-FL is able to meet the most demanding requirements in terms of time and frequency distribution.

## Technical Specifications

Timing & Synchronization	
Multi-sources	<p><i>Failover mechanism to ensure continuous operation by switching over multiple timing sources in case of failure:</i></p> <ul style="list-style-type: none"> <li>White Rabbit (accuracy &lt;1ns)</li> <li>External references (GNSS, Atomic Clocks)</li> <li>PTP</li> <li>NTP (Time of Day only)</li> </ul> <p><i>Seamless failover option available for WR &amp; GM timing sources.</i></p> <p><i>Precise timing sources monitoring to evaluate the synchronization performance of multiple sources.</i></p>
WR	Supports HATI (Safran's High Accuracy IP Core) / Supports GM/ Master/ BC/ Slave modes
PTP IEEE 1588-2008	<p>Supports GM/ Master/ BC/ Slave modes, E2E/P2P, L2/L3, Multicast/Unicast.</p> <p>Support for using PTP timing sources for WR fanout</p> <p>Supported Profiles:</p> <ul style="list-style-type: none"> <li>Default</li> <li>G.8265.1[1]</li> <li>G.8275.1 [1]</li> <li>IEEE C37.238-2011[1]</li> <li>IEEE/IEC 61850-9-3 [1]</li> <li>Enterprise [1]</li> <li>IEEE 1588-2019 HA [1]</li> </ul>
NTP	<p>Supports Client &amp; Server modes</p> <p>Supports NTP v2, v3 &amp; v4</p> <p>Supports hardware timestamping</p> <p>Multiple servers configuration</p> <p>NTS support</p>
SyncE	Available in all PTP ports / Supports key sections of the ITU-T G.8261, G.8262 & G.8264
IRIG-B (optional)	Supported via configurable BNC outputs
Holdover (optional)	Accuracy (learning 3 days from GNSS) below 1.5us @ 24h
Management & Communications	
Control	CLI & Web-GUI: HTTP(s), in-band management
Authentication	<ul style="list-style-type: none"> <li>RADIUS, TACACS+</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>SNMPv3 (SNMPv2) + Traps with enterprise MIB</li> <li>Smart-Alerts</li> <li>REST-API</li> </ul>
Network	<ul style="list-style-type: none"> <li>SSHv2 + SFTP/SCP, HTTP(s), DHCP, LLDP, Rsyslog, Ethernet bonding</li> </ul>

[1]: PTP License not included in default package

Security Features
<ul style="list-style-type: none"> <li>• Authentication: RADIUS; TACACS+</li> <li>• Enable/Block protocols</li> <li>• SFTP/SCP: Securely transfers files to and from the device over an SSH session</li> <li>• SNMP v3: Remotely configure and manage over an encrypted connection</li> <li>• HTTPS support</li> <li>• Firewall configuration</li> <li>• Alert notifications via SNMP traps and email</li> </ul>

Specifications: 10MHz output		
Phase noise (dBc/Hz)	GM	Slave
1 Hz	-97.2	-96.4
10 Hz	-112.3	-111.4
100 Hz	-134.5	-134.7
1 kHz	-148.1	-148.2
10 kHz	-150.0	-149.9
100 kHz	-150.0	-149.9

ADEV		
@1s	1.02E-12	1.19E-12
@10s	1.20E-13	1.47E-13
@100s	1.42E-14	2.51E-14
@1000s	1.79E-15	3.24E-15

Signal waveform & Levels: LVTTTL into 50 ohm, SMA

Specifications: 1PPS output	
Accuracy when locked (WR or ext. reference)	< 1ns
Holdover (after 3 days locked to GNSS reference) *requires Holdover option	
After 4 hours	< 100 ns
After 8 hours	< 500 ns
After 24 hours	< 1.5us

Signal waveform & Levels: LVTTTL into 50 ohm, SMA

Front Panel	
UART	<ul style="list-style-type: none"> <li>• RS232 Serial, RJ45 connector (Management)</li> <li>• 1x ARM Mini- USB (B) UART (Management)</li> </ul>
Ethernet	2x 100/1000 Base-T RJ45 (Management, NTP)
SFP Ports	2x 1GbE for timing distribution (WR/PTPv2/NTP selectable)
Timing I/O	5x SMA connectors (3V @50Ω, TTL compatible): <ul style="list-style-type: none"> <li>• 10 MHz SIN OUT (LVTTTL)</li> <li>• 10MHz OUT (LVTTTL)</li> <li>• PPS OUT (LVTTTL)</li> <li>• PPS IN (LVTTTL)</li> <li>• 10MHz IN (TTL/CMOS/ECL/clipped sine)</li> </ul>
LCD display	Information panel for alerts and basic network configuration
LEDs	3xLEDs for status information
BNC Fanout	32x BNC configurable outputs divided in 2 blocks: <ul style="list-style-type: none"> <li>• A&amp;B: 10MHz/xPPS/IRIG-B (LVTTTL, with selectable 50Ω termination).</li> <li>• C&amp;D: xPPS/IRIG-B (LVTTTL, with selectable 50Ω termination).</li> </ul>
Power supply	2x Redundant & Hot-swappable <ul style="list-style-type: none"> <li>• 100-240 VAC, 50-60 Hz</li> <li>• -48 VDC modules available (optional)</li> <li>• 50W (max. 80W)</li> </ul>

Physical Specification	
Dimension	428 mm x 88 mm x 220 mm (Designed for EIA 19" rack)
Color	White (Metallic)
Weight	4.2 kg

Environmental Conditions	
Temperature	Operational: -10 to +50 °C Storage: -30 to +70 °C
Humidity	0% ~ 90% RH

Agency approvals	
Certifications	CE, TUV, FCC part 15 class A, RoHS, REACH, WEEE

Ordering information	
Base unit	P/N: EQP-TP32BNC-LJ-02
<b>Product configuration</b>	<b>P/N</b>
WR ZEN TP-32BNC	EQP-TP32BNC-LJ-02
WR ZEN TP-32BNC with Holdover	EQP-TP32BNC-LJ-03



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