

# 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.
- Multi-source time references.
- Linux-based WRZ OS.
- Failover mechanisms & Holdover.
- Robustness & Redundancy.
- 32x Configurable timing outputs.
- Low jitter/phase noise frequency dissemination.
- Built-in precise timing sources monitoring.

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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 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 TP devices enable extensive monitoring via REST-API and SNMP including the combination of smart alerts with traps. By providing templates, it facilitates its integration with third-party networking and monitoring tools. Moreover, it allows automatic topology discovery via LLDP and comprehensible remote logging through rsyslog.

### Precise timing sources monitoring

The WRZ-OS incorporates a precise timing sources monitoring system which allow to evaluate the synchronization performance of multiple time references 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

To ensure continuous operation the WR-ZEN TP-32BNC incorporates a failover mechanism. It provides a safer version of the “Best-Master-Clock” algorithm as it only allows switching over multiple (predetermined) timing sources when a failure is detected. 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	<i>Failover mechanism to ensure continuous operation by switching over multiple timing sources in case of failure:</i> <ul style="list-style-type: none"><li>• White Rabbit (accuracy &lt;1ns)</li><li>• External references (GNSS, Atomic Clocks)</li></ul> <i>Precise timing sources monitoring to evaluate the synchronization performance of multiple sources.</i>
WR	Supports GM/ Master/ BC/ Slave modes
PTP IEEE 1588-2008	Supports GM/ Master/ BC/ Slave modes, E2E/P2P, L2/L3, Multicast/Unicast. Supported Profiles: <ul style="list-style-type: none"><li>• Default</li><li>• G.8265.1[1]</li><li>• G.8275.1 [1][2]</li><li>• IEEE C37.238-2011[1]</li><li>• IEEE/IEC 61850-9-3 [1]</li></ul>
NTP	Supports Client & Server modes Supports NTP v2, v3 & v4 Supports hardware timestamping
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)
Authentication	<ul style="list-style-type: none"><li>• RADIUS</li><li>• 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 (OpenSSH 8.1) + SFTP/SCP</li><li>• HTTP(s)</li><li>• DHCP</li><li>• LLDP</li><li>• Rsyslog</li></ul>

[1]: PTP License not included in default package

[2] Not supported in firmware version v5.0, v5.1

## Security Features

- Configurable Password Policy
- Authentication: RADIUS; TACACS+
- Enable/Block protocols
- SFTP/SCP: Securely transfers files to and from the device over an SSH session
- SNMP v3: Remotely configure and manage over an encrypted connection
- HTTPS support
- Firewall configuration
- Alert notifications via SNMP traps and email
- Signed software updates

## 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
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## 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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