



# WHITE RABBIT Z16

The reliable precise time fan-out for White Rabbit distribution

**The WR-Z16 is the reliable precise time fan-out for White Rabbit distribution on 1G Ethernet-based networks. It is a standalone device with 16 SFP connectors which provides sub-nanosecond accuracy time over plug-and-play fiber links.**

The WR-Z16 provides White Rabbit, Synchronous Ethernet (SyncE) and very precise IEEE 1588 (PTP) and NTP interoperability in all its optical interfaces. Picosecond-level frequency distribution is available through digital clock.

The WR-Z16 incorporates Seamless Failover mechanisms which combine multi-source redundancy and holdover capabilities to ensure continued operation.

- Sub-nanosecond time accuracy
- 16 optical timing ports for WR, PTPv2 and NTP
- Distance range over 80 km using fiber
- Datacenter Optimized design
- High availability with seamless failover, multi-source redundancy and Ethernet bonding mechanisms
- Holdover capability
- Extended monitoring and management
- Redundant hot swappable power supply & fans
- Built-in precise timing sources monitoring
- Support for HATI

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## High Accuracy

The WR-Z16 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.

## Interoperability

Placed at the top of the rack the WR-Z16 can distribute standard PTP IEEE1588-2008 and Synchronous Ethernet for the last hop through its 16x 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.

## Resiliency

The WR-Z16 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.

## 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) / GM/ Master/ BC/ Slave modes
PTP IEEE 1588-2008	Supports GM/ Master/ BC/ Slave modes, E2E/P2P, L2/L3, Multicast/Unicast. Support for using PTP timing sources for WR fanout Supported Profiles: <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>
SyncE	<ul style="list-style-type: none"><li>• Available in all PTP ports</li><li>• Supports key sections of the ITU-T G.8261, G.8262 &amp; G.8264</li></ul>
NTP	Supports Client & Server modes Supports NTP v2, v3 & v4 Supports hardware timestamping Multiple servers configuration NTS support
Holdover (optional)	Accuracy (learning 3 days from GNSS) below 1.5us @ 24h

## Advanced Management

The WR-Z16 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

## 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.

## 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.

Management & Communications	
Control	CLI & Web-GUI: HTTP(s), in-band management
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 + SFTP/SCP</li><li>• HTTP(s)</li><li>• DHCP</li><li>• LLDP</li><li>• Rsyslog</li><li>• Ethernet bonding</li></ul>

## Security Features

- 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

[1]: PTP License not included in default package

Specifications: 10MHz output		
Phase noise (dBc/Hz)	GM	Slave
1 Hz	-90.2	-76.4
10 Hz	-89.1	- 81.1
100 Hz	-111.6	-115.7
1 kHz	-140.5	-139.4
10 kHz	-143.4	-143.4
100 kHz	-149.1	-148.2
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	RS232 Serial (RJ45 connector)
Ethernet	2x 100/1000 Base-T RJ45 (Management, NTP)
SFP Ports	16x 1GbE for timing distribution (WR/PTPv2/NTP selectable)
Timing I/O	4x SMA connectors (3V @50Ω, TTL compatible): <ul style="list-style-type: none"> <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>
Leds	• 3xLEDs for status information

Physical Specification	
Dimension	431 mm x 44 mm x 330 mm (Designed for EIA 19" rack)
Weight	3.0 kg
Color	White (Metallic)
Environmental Conditions	
Temperature	Operational: -10 to +50 °C Storage: -30 to +70 °C
Humidity	0% ~ 90% RH

Back Panel Modules	
Power Supply	2x Redundant & Hot-swappable <ul style="list-style-type: none"> <li>• 100-240VAC, 50-60 Hz</li> <li>• 50W (max. 80W)</li> <li>• -48 VDC modules available (optional)</li> </ul>
Fan	2 x Swappable fan modules Airflow: blowing out

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

Ordering information	
Base unit	P/N: EQP-WR-Z16-01
<b>Product configuration</b>	<b>P/N</b>
WR-Z16 WR-Z16 with Holdover WR-Z16 with -48 VDC	EQP-WR-Z16-01 EQP-WR-Z16-02 EQP-WR-Z16-100

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April 7, 2026

