

WHITE RABBIT Z16

The reliable precise time fan-out for
White Rabbit distribution



hw version >v5.0 (Low Jitter version)

The reliable precise time fan-out for White Rabbit distribution on 1G Ethernet-based networks. The WR-Z16 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 and very precise IEEE 1588 (PTP) in all its optical interfaces and supports NTP interoperability. Picosecond-level frequency distribution is available through digital clock.

The WR-Z16 incorporates 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
- Multi-source time references
- Distance range over 80 km using fiber
- Linux OS
- Datacenter Optimized design
- Failover mechanisms
- Holdover capability
- Extended monitoring and management
- Redundant hot swappable power supply & fans
- Health monitoring
- Low jitter/phase noise frequency dissemination

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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 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

To ensure continuous operation the WR-Z16 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.

Low jitter enhancement

The low jitter/low phase noise version of the WR-Z16 includes improved clock circuitry in order to enhance the stability and accuracy of the timing outputs. As result of the improved performance, the WR-Z16 is able to meet the most demanding requirements in terms of time and frequency distribution.

Advanced Management

The WR-Z16 enables 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.

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.

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">White Rabbit (accuracy <1ns)External references (GNSS, Atomic Clocks)
WR	Supports GM/ Master/ BC/ Slave modes
PTP IEEE 1588-2008	Supports Master mode, E2E/P2P, L2/L3, Multicast/ Unicast. Supported Profiles: <ul style="list-style-type: none">DefaultG.8265.1[1]G.8275.1 [1][2]IEEE C37.238-2011[1]IEEE/IEC 61850-9-3[1]
NTP	Supports Client & Server modes Supports NTP v2, v3 & v4 Supports hardware timestamping
Holdover (optional)	Accuracy (learning 3 days from GNSS) below 1.5us @ 24h

[1]: PTP License not included in default package
[2] Not supported in firmware version v5.0

Management & Communications	
Control	CLI & Web-GUI: HTTP(s)
Authentication	<ul style="list-style-type: none">RADIUSTACACS+
Monitoring	<ul style="list-style-type: none">SNMPv3 (SNMPv2) + Traps with enterprise MIBSmart-AlertsREST-API
Network	<ul style="list-style-type: none">SSHv2 (OpenSSH 8.1) + SFTP/SCPHTTP(s)DHCPLLDPRsyslog

Security Features
<ul style="list-style-type: none">Configurable Password PolicyAuthentication: RADIUS; TACACS+Enable/Block protocolsSFTP/SCP: Securely transfers files to and from the device over an SSH sessionSNMP v3: Remotely configure and manage over an encrypted connectionHTTPS supportFirewall configurationAlert notifications via SNMP traps and emailSigned software updates

Specifications: 10MHz output		
Phase noise (dBc/Hz)	GM	Slave
1 Hz	-97.4	-95.8
10 Hz	-111.6	-109.8
100 Hz	-131.4	-131.5
1 kHz	-145.1	-145.2
10 kHz	-151.0	-150.9
100 kHz	-152.8	-153.0

ADEV		
@1s	8.52E-13	1.23E-12
@10s	1.09E-13	1.39E-13
@100s	1.55E-14	1.71E-14
@1000s	2.24E-15	2.95E-15
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"> • 10MHz OUT (LVTTTL) • PPS OUT (LVTTTL) • PPS IN (LVTTTL) • 10MHz IN (TTL/CMOS/ECL/clipped sine)
Leds	• 3xLEDs for status information
Physical Specification	
Dimension	431 mm x 44 mm x 330 mm (Designed for EIA 19" rack)
Color	White (Metallic)
Certifications	ROHS, FCC, CE, SE
Environmental Conditions	
Temperature	-10°C ~ +50°C
Humidity	0% ~ 90% RH

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	

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

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

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