ELECTRONICS & DEFENSE

WHITE RABBIT Z16

The reliable precise time fan-out for White Rabbit distribution

hw version >v5.0 (Low Jitter version)

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 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-based WRZ OS
- Datacenter Optimized design
- Failover mechanisms
- Holdover capability
- Extended monitoring and management
- Redundant hot swappable power supply & fans
- Low jitter/phase noise frequency dissemination
- Built-in precise timing sources monitoring

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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 IEEE 1588-2008 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 enhacement

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.

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

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	*Failover mechanism to ensure continuous operation by switching over multiple timing sources in case of failure:* • White Rabbit (accuracy <1ns) • External references (GNSS, Atomic Clocks) *Precise timing sources monitoring to evaluate the synchronization performance of multiple sources.*
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: • Default • G.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, v5.1

Management & Communications	
Control	CLI & Web-GUI: HTTP(s)
Authentication	• RADIUS • TACACS+
Monitoring	• SNMPv3 (SNMPv2) + Traps with enterprise MIB • Smart-Alerts • REST-API
Network	• SSHv2 (OpenSSH 8.1) + SFTP/SCP • HTTP(s) • DHCP • LLDP • Rsyslog

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	-97.4	-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: LVTTL 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: LVTTL 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): • 10MHz OUT (LVTTL) • PPS OUT (LVTTL) • PPS IN (LVTTL) • 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)
Weight	3.0 kg
Color	White (Metallic)
Environmental Conditions	
Temperature	Operational: -10 to +50 ºC Storage: -30 to +70 ºC
Humidity	0% ~ 90% RH

Back Panel Modules	
Power Supply	2x Redundant & Hot-swappable • 100-240VAC, 50-60 Hz • 50W (max. 80W) • 48 VDC modules available (optional)
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-LJ-01
Product configuration	**P/N**
WR-Z16-LJ	EQP-WR-Z16-LJ-01
WR-Z16-LJ with Holdover	EQP-WR-Z16-LJ-02
WR-Z16-LJ with -48 VDC	EQP-WR-Z16-LJ-100

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