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
- Multi-source time references
- Distance range over 80 km using fiber
- Linux-based WRZ OS
- Datacenter Optimized design
- Seamless Failover 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 IEEE 1588-2008 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	*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) • PTP • NTP (Time of Day only) *Precise timing sources monitoring to evaluate the synchronization performance of multiple sources.*
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: • Default • G.8265.1[1] • G.8275.1 [1] • IEEE C37.238-2011[1] • IEEE/IEC 61850-9-3[1] • Enterprise [1] • IEEE 1588-2019 HA [1]
SyncE	• Available in all PTP ports • Supports key sections of the ITU-T G.8261, G.8262 & G.8264
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

[1]: PTP License not included in default package

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 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)
Authentication	• RADIUS • TACACS+
Monitoring	• SNMPv3 (SNMPv2) + Traps with enterprise MIB • Smart-Alerts • REST-API
Network	• SSHv2 + SFTP/SCP • HTTP(s) • DHCP • LLDP • Rsyslog

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

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: 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 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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