

WHITE RABBIT ZEN TP-FL

The fundamental standalone node

WR-ZEN TP-FL
hw version >v4.0

The WR-ZEN TP-FL is the fundamental standalone node that provides the White Rabbit features to a wide range of applications making use of its redundant connections.

The WR-ZEN TP-FL easily distributes time and frequency to other equipment by implementing widely available timing protocols: PTP, NTP, 10MHz/PPS.

The WR-ZEN TP-FL combines ultra-stable clocks with low jitter and temperature compensated clock resources to enhance its synchronization accuracy in a costeffective 1U form factor.

Optional expansion modules are available in order to provide additional configurable timing outputs, including 1PPS, 10MHz and IRIG signals, or/and enhanced holdover capability.

- 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
- High availability with seamless failover, multi-source redundancy and Ethernet bonding
- Holdover capability
- Robusteness & Redundancy
- Configurable timing ouputs via expansion modules
- Built-in precise timing sources monitoring
- Support for HATI

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High Accuracy

The WR-ZEN TP-FL 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.

Resiliency

The WR-ZEN devices 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.

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

Advanced Management

The WR-ZEN 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..

Interoperability

Used as time provider or interoperability node, the WR-ZEN TP-FL can distribute standard PTP IEEE 1588-2008 and Synchronous Ethernet 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.

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.

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) *Seamless failover option available for WR & GM timing sources.* *Precise timing sources monitoring to evaluate the synchronization performance of multiple sources.*
WR	Supports HATI (Safran's High Accuracy IP Core) Supports 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][2] • IEEE C37.238-2011[1] • IEEE/IEC 61850-9-3 [1] • Enterprise [1] • IEEE 1588-2019 HA [1]
NTP	Supports Client & Server modes Supports NTP v2, v3 & v4 Supports hardware timestamping Multiple servers configuration NTS support
SyncE	• Available in all PTP ports • Supports key sections of the ITU-T G.8261, G.8262 & G.8264
IRIG-B (optional)	Supported via expansion card
Holdover (optional)	Accuracy (learning 3 days from GNSS) below 1.5us @ 24h
Management & Communications	
Control	CLI & Web-GUI: HTTP(s), in-band management
Authentication	• RADIUS • TACACS+
Monitoring	• SNMPv3 (SNMPv2) + Traps with enterprise MIB • Smart-Alerts • REST-API
Network	• SSHv2 + SFTP/SCP • HTTP(s) • DHCP • LLDP • Rsyslog • Ethernet bonding

[1]: PTP License not included in default package

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	-86.2	-76.5
10 Hz	-87.6	-79.7
100 Hz	-107.2	-112.4
1 kHz	-140.8	-143.6
10 kHz	-143.0	-145.3
100 kHz	-146.0	-149.1
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

Front Panel	
UART	• RS232 Serial, RJ45 connector (Management) • 1x ARM Mini- USB (B) UART (Management)
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): • 10 MHz SIN OUT (LVTTL) • 10MHz OUT (LVTTL) • PPS OUT (LVTTL) • PPS IN (LVTTL) • 10MHz IN (TTL/CMOS/ECL/clipped sine)
LCD display	Information panel for alerts and basic network configuration
LEDs	3xLEDs for status information
Power supply	2x Redundant & Hot-swappable • 100-240 VAC, 50-60 Hz • -48 VDC modules available (optional) • 50W (max. 80W)
Physical Specification	
Dimension	444 mm x 43 mm x 221 mm (Designed for EIA 19” rack)
Color	White (Metallic)
Weight	3.9 kg
Agency approvals	
Certifications	CE, TUV, FCC part 15 class A, RoHS, REACH, WEEE
Environmental Conditions	
Temperature	Operational: -10 to +50 ºC Storage: -30 to +70 ºC
Humidity	0% ~ 90% RH
Fans	2x Embedded fan modules Airflow: blowing out
Expansion modules (optional)	
FMC 4x1PPS expansion	LVTTL into 50 ohm, SMA Configurable options: • 4x 1PPS/10 MHz/ xPPS/ IRIG-B • 2x 1PPS/10 MHz/ xPPS/ IRIG-B + + 2x 1PPS/10 MHz/ xPPS/ IRIG-B
FMC 8x1PPS expansion	LVTTL into 50 ohm, SMA Configurable options: • 8x 1PPS/10 MHz/ xPPS/ IRIG-B • 4x 1PPS/10 MHz/ xPPS/ IRIG-B + + 4x 1PPS/10 MHz/ xPPS/ IRIG-B

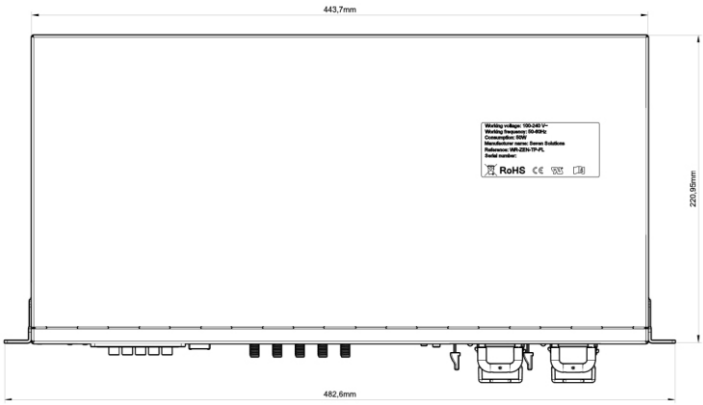
Ordering information	
Base unit	P/N: EQP-TMP-FL-01
Product configuration	**P/N**
WR ZEN TP FL	EQP-TMP-FL-01
WR ZEN TP FL with FMC 4x1PPS	EQP-TMP-FL-4-01
WR ZEN TP FL with FMC 8x1PPS	EQP-TMP-FL-8-01
WR ZEN TP FL with HO	EQP-TMP-FL-02
WR ZEN TP FL with FMC 4x1PPS & HO	EQP-TMP-FL-4-02
WR ZEN TP FL with FMC 8x1PPS & HO	EQP-TMP-FL-8-02
WR ZEN TP FL with -48 VDC	EQP-TMP-FL-100



WR-ZEN TP-FL


WR-ZEN TP-FL 4PPS


WR-ZEN TP-FL 8PPS



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