ELECTRONICS & DEFENSE

WHITE RABBIT ZEN TP-FL

The fundamental standalone node

WR-ZEN TP-FL
hw version >v4.0 (Low Jitter version)

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
- Multi-source time references
- Linux-based WRZ OS
- Failover mechanisms & Holdover
- Robusteness & Redundancy
- Configurable timing ouputs via expansion modules
- Low jitter/phase noise frequency dissemination

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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.

Interoperability

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

Resiliency

To ensure continuous operation the WR-ZEN TP-FL 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.

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.

Advanced Management

The WR-ZEN TP devices enable 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.

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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.

Low jitter enhacement

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

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)
WR	Supports GM/ Master/ BC/ Slave modes
PTP IEEE 1588-2008	Supports Master mode, 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
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)
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

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

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	-97.2	-96.4
10 Hz	-112.3	-111.4
100 Hz	-134.5	-134.7
1 kHz	-148.1	-148.2
10 kHz	-150.0	-149.9
100 kHz	-150.0	-149.9

ADEV		
@1s	1.02E-12	1.19E-12
@10s	1.20E-13	1.47E-13
@100s	1.42E-14	2.51E-14
@1000s	1.79E-15	3.24E-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

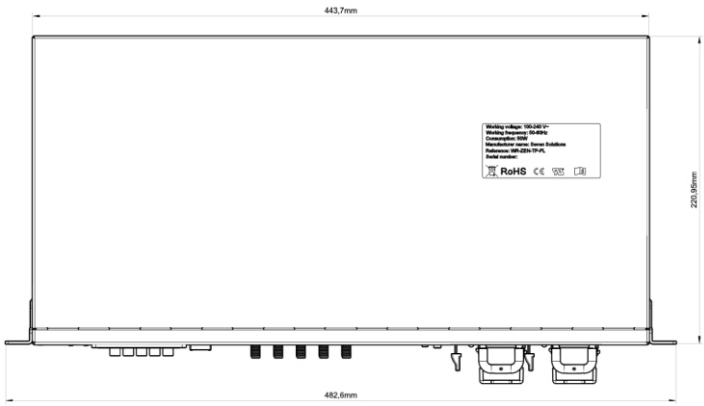
Front Panel	
UART	• RS232 Serial, RJ45 connector (Management) • 1x ARM Mini- USB (B) UART (Management)
Ethernet	2x 100/1000 Base-T RJ45 (Management, NTP)
SFP Ports	2x 1GbE for timing distribution (WR/PTPv2/NTP selectable)
Timing I/O	5x SMA connectors (3V @50Ω, TTL compatible): • 10 MHz SIN OUT (LVTTL) • 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)
Certifications	ROHS, FCC, CE, SE
Environmental Conditions	
Temperature	-10ºC ~ +50ºC
Humidity	0% ~ 90% RH
Fans	2x Embedded fan modules Airblow: 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-LJ-01
Product configuration	**P/N**
WR ZEN TP FL with FMC 4x1PPS	EQP-TMP-FL-LJ-4-01
WR ZEN TP FL with FMC 8x1PPS	EQP-TMP-FL-LJ-8-01
WR ZEN TP FL with HO	EQP-TMP-FL-LJ-02
WR ZEN TP FL with FMC 4x1PPS & HO	EQP-TMP-FL-LJ-4-02
WR ZEN TP FL with FMC 8x1PPS & HO	EQP-TMP-FL-LJ-8-02
WR ZEN TP FL with 48 VDC	EQP-TMP-FL-LJ-100

WR-ZEN TP-FL


WR-ZEN TP-FL 4PPS

WR-ZEN TP-FL 8PPS



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