ELECTRONICS & DEFENSE

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
- 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
- Built-in precise timing sources monitoring

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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

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.

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

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.

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.

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) *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
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, v5.1

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

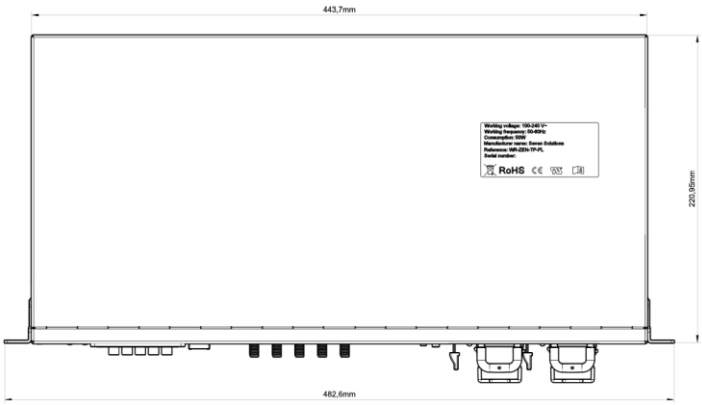
Front Panel	
UART	• RS232 Serial, RJ45 connector (Management) • 1x ARM Mini- USB (B) UART (Management)
Ethernet	2x 100/1000 Base-T RJ45 (Management, NTP)
SFP Ports	2x 1GbE for timing distribution (WR/PTPv2/NTP selectable)
Timing I/O	5x SMA connectors (3V @50Ω, TTL compatible): • 10 MHz SIN OUT (LVTTL) • 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)
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 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-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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March 6, 2024