# SPECIFICATIONS



| Product Description | TSN-Analyzer |
|---|---|
| Description | TSN-Analyzer 2-Port / WLAN |
| SAP No. | 10008755 |
| IEEE Ethernet | IEEE 802.3u 100Base-TX and 802.3z Gigabit Ethernet<br>IEEE 802.3Ab 1000Base-T Gigabit Ethernet |
| TX-Port (10 / 100 / 1000 MBit / s) | RJ45 / Auto-Negotiation / Auto MDI/MDI-X /<br>supports lengths up to 100 m (Cat 6) |
| IEEE WLAN | IEEE 802.11 b/g/n/ac wireless |
| Time Sensitive Network | IEEE 802.1As – Time Synchronizing<br>IEEE 802.3Br and 802.1Qbu – Frame Preemption<br>IEEE 802.1Qav and Qbv – Traffic-Shaping<br>IEEE 802.1Cb – Frame Replication and Elimination<br>IEEE 802.1Qbv – Time-Aware Shaper<br>IEEE 802.1Qcc – SRP Enhancements<br>IEEE 802.1Qch – Cyclic Queuing and Forwarding<br>IEEE 802.1Qci – Per-Stream Filtering and Policing<br>IEEE 802.1Qci – Stream Filtering and Policing |
| PTP-Master / Slave | IEEE 802.1AS - Timing and Synchronization for<br>Time-Sensitive Applications in Bridged Local Area Networks |
| **Other Displays / Interfaces** | |
| Status LEDs | Power (green) / Ready (green) / CPU Activity (green) |
| Status LEDs TSN | PTP Master (green) / PTP Slave (green) |
| Status LEDs RJ45 | SPD: Port Speed 1.0 Gbit/s (green) / LNK / ACT: Data Link / Traffic (yellow) |
| Connections | 6-pin terminal: +2.5V, GND, PPS in, PPS out, TRIG in, TRIG out |
| **Power Supply** | |
| Voltage | 12 – 36 VDC |
| Power consumption at 24 VDC | 8,0 watt, 330 mA |
| Galvanic isolation | 500 VDC |
| **Management** | |
| Management | Web Interface Management |
| Firmware Update | Firmware Update, backup and restore via TFTP, HTTP, or USB |
| Extensions | Modular software extensions unlockable via InnoRoute App Store |
| **Environmental Conditions** | |
| Operating temperature | -25 °C – +65 °C |
| Storage temperature | -25 °C – +85 °C |
| **Mechanical Design** | |
| Dimensions (W x H x D) | 155 mm x 30 mm x 108 mm |
| Weight | 480 g |
| Protection class | IP 20 |
| Housing | stainless steel, powder-coated |
| **Approvals** | |
| Base standard | DIN EN 55032:2016-02 - Class A / DIN EN 61000-6-2:2005 |




**COMMISSIONING, MONITORING and ANALYSIS**
of TSN Networks

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## KEY FACTS

- COMPREHENSIVE NETWORK MONITORING:
  The TSN Analyzer checks the correct prioritization of data packets to ensure that real-time data is transmitted reliably. This is essential for the smooth operation of modern production facilities.
- FLEXIBLE APPLICATION:
  Thanks to its robust design and the option for DIN rail mounting, the Analyzer is suitable both for product development in the laboratory and for continuous operation in production networks.
- USER-FRIENDLY OPERATION:
  Through a graphical interface, users can easily view the analysis results and make the necessary adjustments. This significantly simplifies network diagnosis and optimization.
- MODULAR DESIGN:
  The TSN Analyzer can be expanded with various modules such as TSN endpoints, traffic generators, and protocol converters to meet different requirements.
- COST-EFFICIENCY:
  Compared to other solutions, our TSN Analyzer is affordable and compact, making it easy to integrate into existing systems.



With these features, the TSN Analyzer ensures that TSN networks operate efficiently and reliably – a key factor in optimizing industrial processes.

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**Headquarters** eks Engel FOS GmbH & Co. KG • Schützenstraße 2–4 • 57482 Wenden-Hillmicke • Germany
Tel. +49 2762 9313-600 • Fax +49 2762 9313-7906 • info@eks-engel.de • www.eks-engel.de

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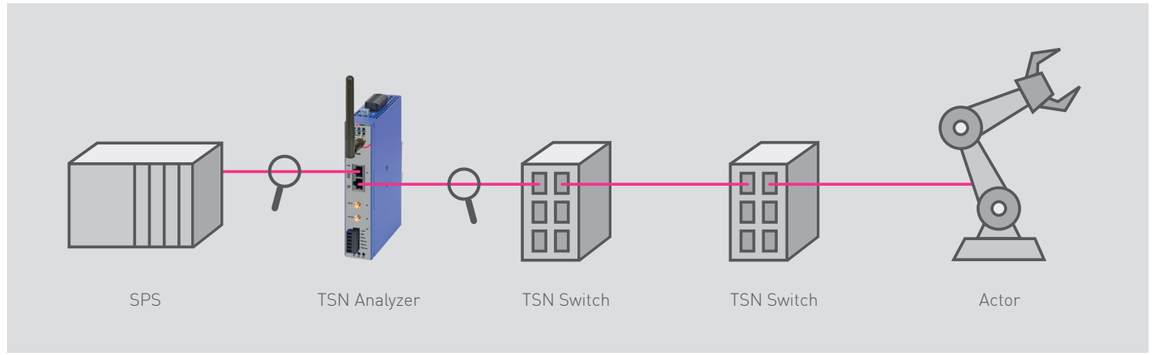



## SEMI-PASSIVE TAP
PRECISE NETWORK MONITORING WITHOUT DISRUPTION

The Semi-Passive TAP is a special function that enables passive network monitoring by checking only selected data packets relevant to TSN analysis. Network traffic remains unaffected. Unlike a full TAP, which delivers an exact copy of all traffic, this smart TAP focuses on specific data streams or network segments of interest for TSN analysis. This saves bandwidth and resources while allowing more precise analysis of key Time-Sensitive Networking parameters such as latency, jitter, and packet loss. The collected data is analyzed to identify potential issues like transmission delays, timing errors, or bandwidth problems. The Semi-Passive TAP is optimized for monitoring TSN protocols and real-time data, enabling targeted troubleshooting and network optimization. It also calculates the PTP offset on the line.

# USE CASES / TEST CASES

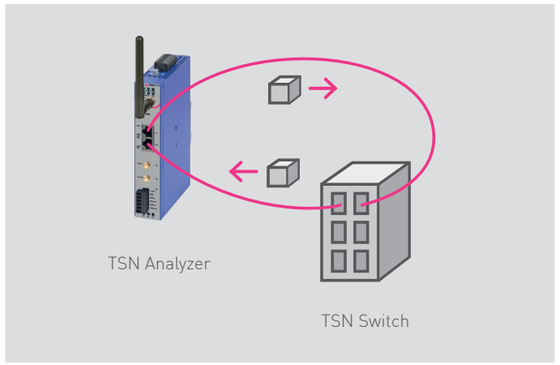
**802.1Q BRIDGES & BRIDGED NETWORKS**
- IEEE 802.1AS – Precision Time Protocol (PTP)
- IEEE 802.1Qbv – Time-Aware Shaper
- IEEE 802.1Qci – Per-Stream Filtering and Policing
- IEEE 802.1Qch – Cyclic queuing and forwarding

**802.1AS GPTP**
- PTP-Master, PTP-Slave
- Two-Step Timestamping (HW)

## TRAFFIC GENERATOR
REALISTIC TESTS FOR MAXIMUM NETWORK PERFORMANCE

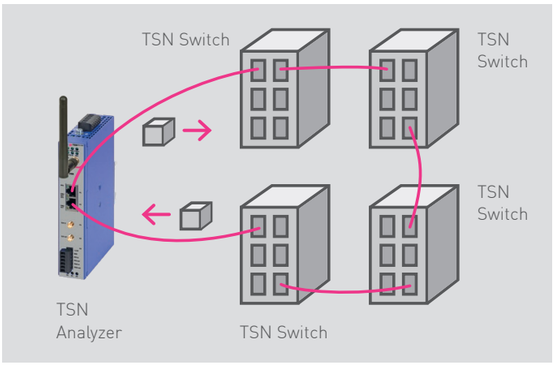
**HOW ROBUST IS YOUR TSN NETWORK?**

The Traffic Generator pushes it to the limit! It simulates authentic data streams with defined parameters such as data rate, packet size, and timestamps to test network behavior under real-world conditions. Advanced mechanisms such as Time-Aware Scheduling (TAS) are rigorously tested to detect bottlenecks, delays, or errors early on. Whether for load testing or performance tuning, the Traffic Generator allows you to optimize your network for maximum efficiency and reliability.



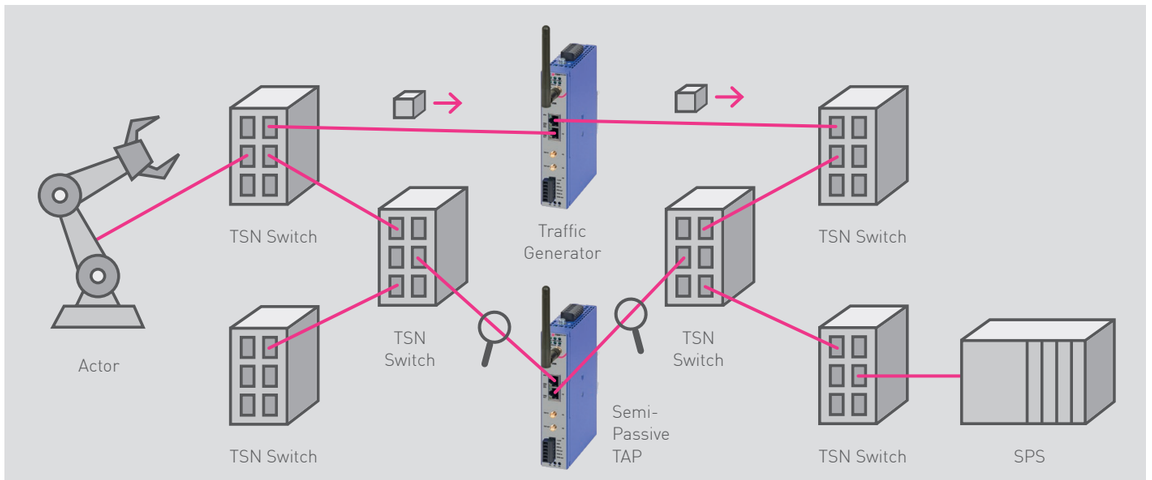

## SWITCH TEST
GUARANTEED PERFORMANCE FOR YOUR TSN INFRASTRUCTURE

A TSN switch is the backbone of reliable real-time communication—make sure it works correctly! Our comprehensive switch test validates whether TSN protocols such as TAS, PFC, and Frame Preemption are correctly processed by the switch. Simulated traffic is used to check if prioritization, latency management, and bandwidth control are optimally configured. Precise analysis helps identify and fix weaknesses.




## NETWORK TEST
THE COMPLETE TSN QUALITY CHECK

Rely on a TSN network that makes no compromises! The comprehensive network test ensures that all components—from switches to end devices—work together optimally. Using state-of-the-art analysis tools, we check whether TSN mechanisms such as time synchronization, prioritization, and Time-Aware Scheduling are functioning flawlessly. Identify weaknesses early and optimize your network for stable, low-latency real-time communication.




## COMBINED TEST
HOLISTIC ANALYSIS FOR MAXIMUM STABILITY

Precision meets performance! The combined test using multiple TSN Analyzers as a Traffic Generator and/or Semi-Passive TAP provides a complete network analysis. The Traffic Generator produces realistic data streams, the TAP monitors traffic without interference, and the Analyzer evaluates critical parameters such as latency, jitter, and packet loss. The result: optimal, error-free real-time communication—ready for the most demanding requirements.