TSN SYSTEMS

A cooperative partnership between:

EDAG umon Time Sensitive Networks

Automotive Ethernet

Multimodal Test & Measurement Solutions

Control complexity.

Want to know more about TSN Systems?

www.tsn.systems

Control complexity

Complexity can be controlled by collective intelligence – whether in nature or with autonomous mobility.

Master the required technology change with TSN Systems efficiently with our unique measurement and analysis tools for time-sensitive Automotive Ethernet.

Solve complex tasks quickly and with high accuracy

With the imminent introduction of Automotive Ethernet as a backbone architecture, engineers can to speed up quickly and easily without having to deal with understanding the underlying technology.

TSN Tools and TSN Box

Whether domains, zones, AVB, TSN infotainment or backbone: The unique TSN Box and TSN Tools allow employees to get started quickly and with a steep learning curve.

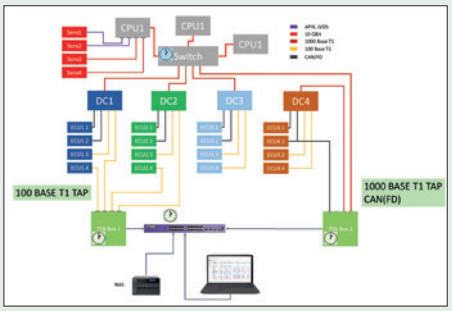
Our strengths lie in the following fields of application

PTP Analysis	AVB/TSN Simulation	Sensor Data Simulation	TAP 100/1000 Base T1

TSN Box

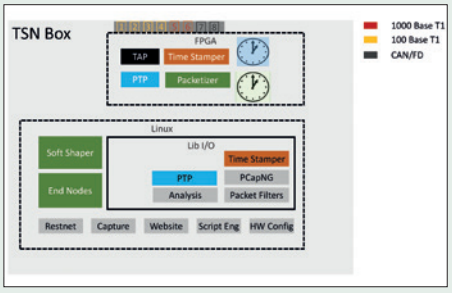
The Network Interface and Gateway

The TSN Box functions as a network interface/ gateway and media converter for time sensitive automotive Ethernet networks and CAN/CAN FD. The box prepares the data and communicates with TSN Tools. The FPGA-based hardware supports various modes as TAP, data logger and AVB Talker/Listener.



Nanosecond precise time stamps

TSN Box provides a multiple clock domain FPGA timestamp engine with 30ns precision. The timestamp engine can be driven by the DUT clock (car PTP), the local clock or an external PTP grandmaster. In this mode multiple TSN Boxes can be synchronized.



Traffic Generator AVB/TSN Talker

The system provides a flexible signal generation unit that allows rest-net simulations of many relevant signal types in the TSN world. Signal generation and rest bus simulation can be done as audio/video talkers, sensor data generation/playback or general command and control data. The flexible yet precise AVB and TSN Talker within the TSN Box can handle the biggest challenges.

Supports natively future TSN protocols

The TSN Box provides right away a feature rich set of support for the AVB and TSN protocols typically used in Automotive Ethernet architectures of 2021 and beyond. The solution is the ideal partner to explore PTPv2, 802.1ASrev and different shaping options within TSN such as credit based, time aware or asynchronous shapers.

Physical Parameters TSN Box	
Mech. dimensions	230x58x191 mm
Weight	1.96 kg
External Power Supply	12V, 0.34 kg
Power consumption	typ. 20 W
Temperature range	0-70 °C

Feature	Ports	Sync precision	Availability
CAN2.0 / CAN FD	2x Ports/Buses	<1 µs	✓
Ethernet TAP	2x 100BASE-T1 (4x Ports)	< 30 ns	✓
	1x 1000BASE-T (2x Ports)	< 30 ns	Q1/2018 1000BASE-T1
TAP PTP Analysis	802.1AS		✓
	802.1AS rev		Q2/2018
Talker/Listener	Best-effort	< 10 µs	✓
	IEEE 802.1Qav	< 30 ns	Q1/2018
	IEEE 802.1Qbv	< 30 ns	Q2/2018
	IEEE 802.1Qcr		Q4/2018
	IEEE 802.1Qcc		Q4/2018
	IEEE 802.1Qbu		
Output ports	1 x 1000 Base T	< 40 ns	✓
	2 x 10GBase T	< 40 ns	Q2/2018
Local Logging	1 x USB3 SSD		Q1/2018
API for all functions			✓
Script engine			Q1/2018

TSN Tools

Control Complexity

The TSN Tools software provides a high level network analysis and visualization approach to keep track at any time.

Platform independent

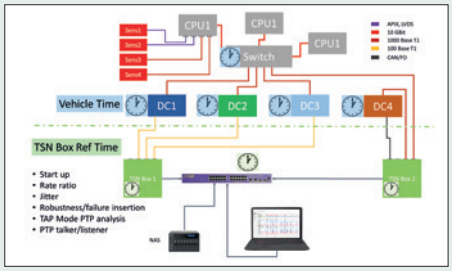
TSN Tools is supported for Windows 7/10 and Linux platforms and tailored to fit into existing and new workflows of automotive development. Embedded software specialists do not need to exit their well-known Linux development environment.

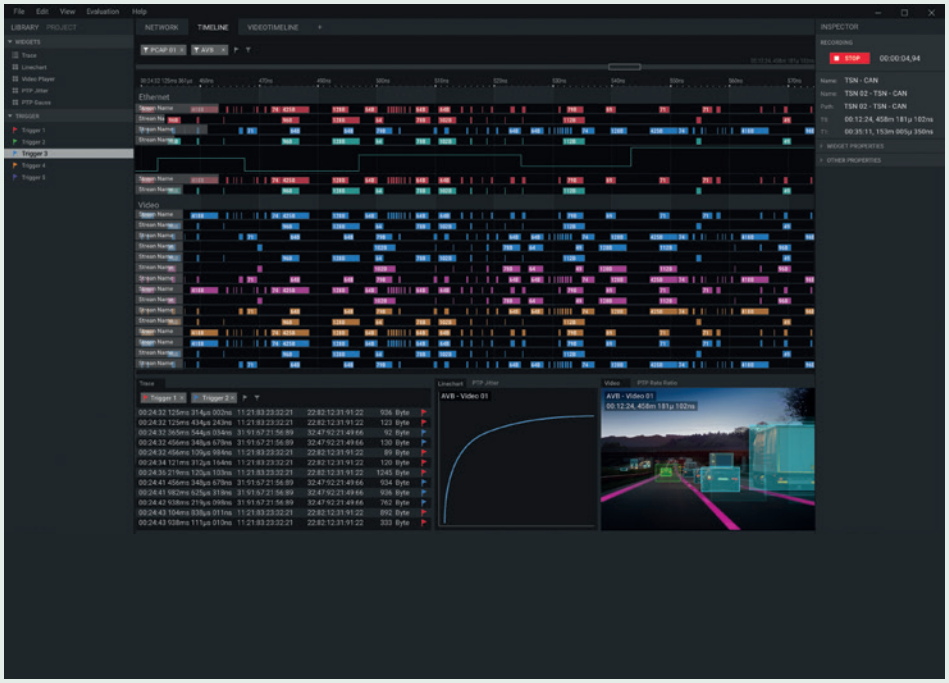
Easy-to-use

Automotive Ethernet is a complex animal. TSN Tools is aiming to provide a Test & Measurement solution on technical expert level but with a highly intuitive user interface. This provides the average automotive engineer a steep learning curve when starting ECU development with Automotive Ethernet functionality.

ADAS Testing and Analysis

Testing and analysis of future generations of automotive architectures, ADAS and autonomous driving will be challenging. TSN Tools supports a wide variety of use cases, including payload analysis, deep trigger analysis, multi-signal time line and much more.



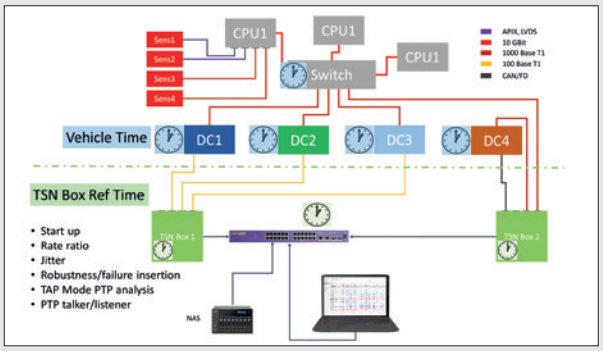


Use cases

1

PTP start up testing

PTP timing is essential for any time sensitive network. PTP start-up and stability can be tested under many circumstances to ensure proper behaviour. TSN Tools and TSN Box support various PTPv2 testing scenarios (IEEE 802.1AS and IEEE 802.1 ASrev).



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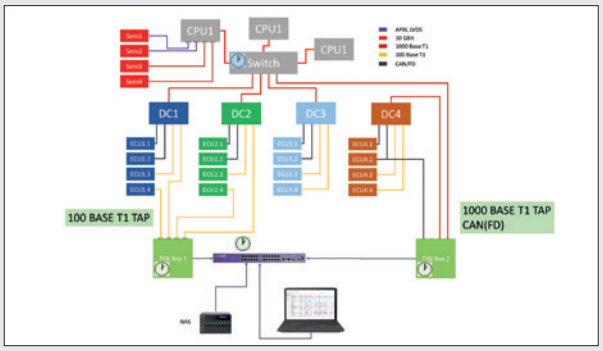
Multi-link TSN Tap

Since Ethernet is not a bus, looking into an Automotive Ethernet link is not easy especially when PTP and AVB/TSN are involved. TSN Box provides a total of six Ethernet ports for serving as fully transparent 100/1000 BASE-T1 TAP with nanosecond precision timestamps.



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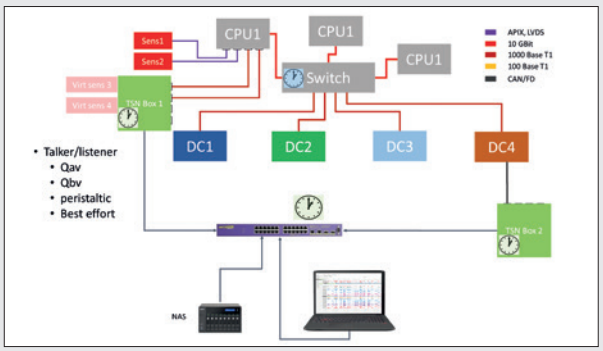
Sensor Data Simulation

Rest-Net simulation, signal generation and sensor data simulation/playback are serious and challenging problems during development and testing of ADAS and autonomous functions. TSN Box is the right partner for many situations.



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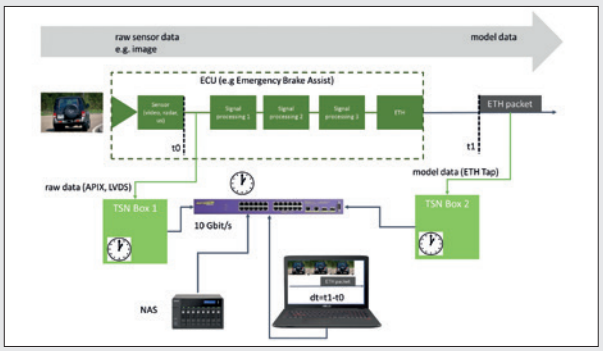
ADAS Testing and Analysis

TSN Tools supports a wide variety of use cases, including payload analysis, deep trigger analysis, multi-signal timeline and much more to address future generations of automotive network architectures.



TAP Device
AVB/TSN Switch
AVB/TSN Talker/Listener
PTP Analysis
A/V Content Analysis
Rest Net Simulation
Gateway

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Want to get started?

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Team Fulda

» TSN Tools
» Simulation & E/E Architecture
» Marketing & Sales

Team Cape Town

» TSN Box
» Hardware & Embedded Firmware
» AVB/TSN Talker Listener
» AVB/TSN Switch
» TAP Device

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