



Augsburg (visitable at short notice)

## TESTBED TSN (TIME-SENSITIVE NETWORKING)

Application for the manufacturing industry

### SUMMARY

We are an open, neutral and pre-competitive testbed for the validation of extensions to the IEEE 802.1 standard family for time-sensitive networking (TSN) based on SME use cases. The extensions make it possible to run heterogeneous real-time applications in a single TSN network. Among the 35 partners, there are 13 SME partners. Liaison contracts with the IEEE 802.1 Working Group and OPC Foundation exist.

### CURRENT SITUATION

The TSN testbed is conceived as a continuous plugfest which always starts with SME requirements and use cases. These use cases provide the basis for the architecture, electricians and mechanics used and are reflected in the Plugfest demonstrator. Plugfest means that all 35 testbed partners (13 SME) involved continuously try out their (pre-)products with one another. The Federal Ministry Industrie 4.0 Competence Center in Augsburg hosts the testbed and provides a factory building and all industrial technical equipment to implement the use cases.

### PROJECT DESCRIPTION

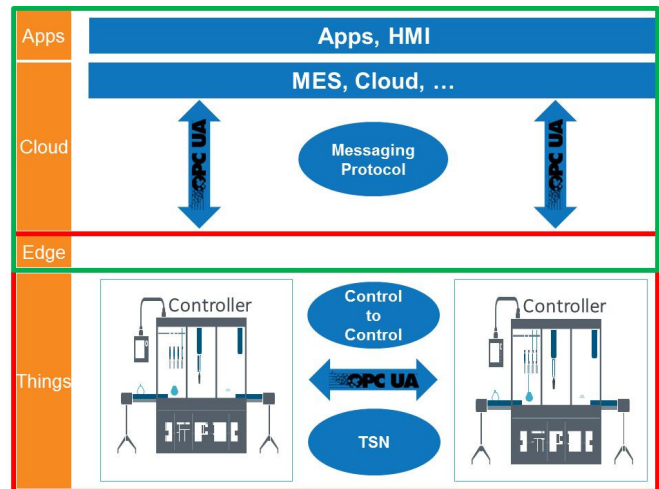
The IEEE 802.1 standards form the basis of the testbed. TSN is validated as deterministic, real-time Ethernet communication. The testbed also deliberately works with standard templates, so as to be able to validate the different use cases against the IEEE standards and standard projects. These are used to define the technology, the architecture and the network. The key technologies concerned are switches and end-devices, time synchronization, decentralized network configuration, the forwarding of real-time data with bounded latency and the setting up of time-critical data streams. Robots and control components from different manufacturers are networked. There are four plugfests happening per year. The testbed works closely together with the IIC and Fraunhofer FOKUS TSN testbeds.

### SOLUTION

Semantic interoperability of interaction at control level is based on OPC UA, which also supports communication up to cloud level. Different real-time applications which use TSN are run in a network. Network coherence with different protocols is the validation yardstick.

### INDUSTRIE 4.0 – FEATURES

Validation of TSN (deterministic, real-time communication) via Ethernet in a heterogeneous context with decentralized network configuration. Cloud connection provided.



### PARTNERS



### CONTACT

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### STANDARDIZATION APPROACHES

The following (series of) standards are used and validated: IEEE 802.1, IEEE 1588, IEC 62541 (OPC UA), IEC 62443 (IT security), IEC 61360-1 (semantics) and others.