EtherCAT and TSN: the perfect match

What is TSN?
TSN (Time-Sensitive Networking) is a set of standards to improve the real-time features of today’s commercial (IEEE 802.1) networks through advanced synchronization, availability, guaranteed resources and rapid response. These standards can be supported by switches and end stations. The TSN task group is part of the IEEE 802.1 working group, which is responsible for bridged (switched) networks.

Communication with improved real-time characteristics runs parallel to classic communication methods according to the best effort principle, in which the data exchange works as quickly as possible, depending on the network traffic situation.

The TSN standard does not define how to use the enhancements in combination with application tasks.

How does TSN work?
Unlike many networking standards, TSN does not communicate in an ad hoc fashion, but rather through data streams. A stream is a data channel with a defined bandwidth from a sender (talker) to a group of recipients (listeners). Streams are bundled in traffic classes by the networking components and forwarded with low latency.

Synchronization of all network components is the most exceptional feature of TSN. This allows automation systems to interact with outstanding precision.

EtherCAT communication with TSN
Using TSN, it is possible to communicate via an IEEE 802.1 network with predictable delay. This makes it possible to run a variety of tasks with a single high-speed Ethernet interface:
- operate several slave segments
- communicate with a higher-level controller
- connect video cameras
- ...

Groups of EtherCAT devices are connected as one segment to the TSN domain. From an EtherCAT point of view, a TSN domain can essentially be regarded as a large switch that acts as a port multiplier for a control system. The adjustment is made via an adaptation function. A software layer can enable this in the master, as well as in the switch or the first slave of the EtherCAT segment. The EtherCAT slaves remain unchanged by this functionality.
**What is EtherCAT?**
EtherCAT (Ethernet for Control Automation Technology) is an open Industrial-Ethernet solution. EtherCAT sets new standards with respect to real-time performance, low costs, flexible topology and ease of use.

[www.ethercat.org](http://www.ethercat.org)