

## **Time Sensitive Networking helps lead the way to Industry 4.0**

**The focus of the CC-Link Partner Association (CLPA) stand (Hall 9, Stand G23) at Hannover Messe 2019 is CC-Link IE TSN, an Industry 4.0 focussed open industrial Ethernet that offers a market leading combination of gigabit bandwidth and Time Sensitive Networking (TSN).**

*John Browett, General Manager of CLPA Europe, looks at the key features that establish why CC-Link IE TSN is the future of open industrial Ethernet technology*

The data driven approach of Industry 4.0 is driving key developments in every industrial sector. By leveraging the power of machine and process data, manufacturers can gain actionable insights to improve their businesses as a whole, e.g. boosting productivity, throughput, product quality and uptime.

But how to get this data? In practice, it means increasing process transparency. This is being done by adding vast numbers of smart, connected devices that generate, share and analyse relevant data. However, the devices need to be connected to an equally intelligent, open and efficient network in order to get the data to edge servers and beyond for it to be turned into the desired information.

This requirement is the guiding principle behind the creation of CC-Link IE TSN, which builds on the existing CC-Link IE open gigabit industrial Ethernet network technology, and expands it with the additional functionality of Time Sensitive Networking (TSN).

### **Performance**

TSN is a recent technology standardised by the Institute of Electrical and Electronics Engineers (IEEE) in order to improve Ethernet determinism. More precisely, CC-Link IE TSN adopts IEEE 802.1AS - "Timing and Synchronisation for Time-Sensitive Applications" and IEEE 802.1Qbv - "Enhancements for Scheduled Traffic" TSN standards.

In this way, the solution can precisely synchronise any device on the network as well as prioritise urgent cyclic traffic over deferrable transient data, without any loss of performance. As a result, manufacturers can rely on high performance integration of control, safety and motion traffic on the same network, even for the most demanding motion control applications, characterised by cycle times measured in  $\mu\text{s}$ .

Combine this with the 1Gbit bandwidth offered by CC-Link IE TSN, and you have the capacity to accommodate the "explosion" of data that Industry 4.0 is now generating.

### **Connectivity**

However, an optimal communication speed may be useless if different network devices are not interoperable, e.g. due to different closed, proprietary standards and protocols. CC-Link IE TSN addresses this challenge by offering an open Ethernet platform that is not locked to a specific vendor system, similar to all the

other members of the CC-Link family. Even more, this latest technology from the CLPA further reinforces openness by adhering to the TSN standards .

In addition, the ability of TSN to handle both cyclic and transient data on a single network boosts connectivity by bridging the conventional factory divide between information technology (IT) and operational technology (OT). As a result, CC-Link IE TSN offers a barrier-free data flow at any level of the enterprise.

Another tool to ensure maximum connectivity is the comprehensive development ecosystem for CC-Link IE TSN compatible Ethernet devices. In particular, the network technology is compatible with TCP/IP, thus it blends seamlessly with other Ethernet-based devices, infrastructure and protocols. By supporting different communication speeds and combinations of hardware- and software-based masters and slaves, manufacturers can implement solutions that best suit their needs whilst adapting to any existing product designs.

## **Intelligence**

The network of the future is not only characterised by advanced physical properties, such as performance and connectivity, but also displays its own intelligence, in order to enable efficient processes. This is why CC-Link IE TSN supports a number of Smart functions.

Firstly, the synchronicity offered by TSN means that it is possible to gain deeper insights into system operation, meaning troubleshooting is faster and downtime is further minimised. Moreover, additional analytics, such as AI-based predictive maintenance, are possible.

Secondly, devices on a CC-Link IE TSN network can be probed or queried with Simple Network Management Protocol (SNMP) for diagnostic purposes, without the need for special tools to collect device status information.

Finally, the CC-Link IE TSN network technology builds on the CLPA's Control & Communication System Profile (CSP+) technology, which allows individual devices on a network to be defined by a profile, minimising engineering time and simplifying configuration and maintenance. As a result, configuring and maintaining networks is a nearly automatic process. The CLPA has also extended this concept to "CSP+ for Machine", which allows further process transparency to be achieved by treating a machine as a single device and extracting process data via OPC UA.

## **Comprehensive solution for Industry 4.0**

While Industry 4.0 promises to bring industries to the next level by creating ever more efficient processes, none of this can happen without a suitable network system that allows the data and information to flow unimpeded to all who need it. By choosing cutting-edge solutions, such as CC-Link IE TSN, businesses can not only benefit from

high-performance open network technologies, but also from future-proof solutions to meet developing Industry 4.0 requirements.

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**Image Caption:**

**Image 1:** CC-Link IE TSN optimises the benefits already offered by CC-Link IE, the world's first open gigabit industrial Ethernet, by improving communication functions and synchronization accuracy.



**Keywords:** CC-Link Partner Association, CLPA, CC-Link IE TSN, gigabit industrial Ethernet, time sensitive networking, TSN, Hannover Messe, Industry 4.0, performance, connectivity, intelligence, high-performance open network technologies, CSP+



## About The CC-Link Partner Association (CLPA)

The CLPA is an international organisation founded in 2000 dedicated to the technical development and promotion of the CC-Link family of open automation networks. The CLPA's key technology is CC-Link IE TSN, the world's first open industrial Ethernet to combine gigabit bandwidth with Time Sensitive Networking (TSN), making it an ideal solution for Industry 4.0 applications. Currently the CLPA has over 3,400 member companies worldwide, with more than 1,800 certified products available from over 300 manufacturers.

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