

## Upgrading automation devices with TSN connectivity

**Businesses driving their digital transformation journeys are demanding access to all data in their manufacturing systems. This requires the combination of IT and OT networks, selecting Ethernet as a backbone, and enabling automation devices with Time-Sensitive Networking (TSN) communications. Product vendors who address this can leverage their existing solutions to quickly provide next-level capabilities. Knowing how to start, how to support TSN based industrial Ethernet protocols and how to leverage a corresponding development ecosystem, is key to ensuring success.**

*John Browett, General Manager of CLPA Europe, looks at how to fit TSN within existing platforms and communications protocols.*

TSN is an innovative Ethernet technology defined by IEEE 802.1 standards that resides at Layer 2 of the OSI 7 layer model. This is quickly proving its essential role in the Connected Industries of the Future thanks to its unique ability to support convergence on the factory floor as well as between IT and OT worlds. Its importance is being acknowledged by various industries, which are recognising the value of automation solutions with TSN capabilities.

Device vendors may be wondering if the time is right to adopt TSN. In fact, there is a strong case for taking action now, as it offers a competitive advantage to vendors, machine builders and end users. Implementing this technology within their products today is a safe bet that can enhance competitiveness and market share. Many businesses are currently undergoing their digital transformation and it is key for automation vendors to support them now with future-oriented devices. Even more, with typical life cycles of 20-25 years for automation components, adding future-oriented technologies, such as TSN, in factories is key to drive differentiation and competitiveness in the short run, while being able to adapt over the long run.

For those who think maybe now is not the time for action, a clear parallel can be drawn between TSN and smartphone technology, which has been quickly transitioning from 2G to 3G, 4G and recently 5G. Instead of waiting for the “next” technology, competitive manufacturers promptly implemented these advancements within their products as the technology landscape continued to evolve. This helped them to address immediate market demands. Most technical specialists will agree that any given technology continually evolves and therefore waiting for it to be “finished” is a futile strategy that will see their companies falling behind.

### TSN role within industrial Ethernet protocols

When adopting TSN, companies need to consider a number of practicalities. For example, forward-looking device vendors interested in adding TSN capabilities to their products may be wondering how TSN affects the general support that their solutions already offer for current industrial Ethernet protocols. To this end, it is important to note that this innovative technology was designed to improve standard

Ethernet and it only operates at Layer 2 of the OSI model. TSN is intended to work with various protocols and support their convergence to enhance interconnectivity, helping users have different traffic types coexisting on a single network.

Ultimately, this technology is just a ‘pipe’ and therefore, industrial Ethernet protocols are still required to cover the remaining application use cases, such as safety and motion control. Hence it is important for device manufacturers to understand that TSN cannot replace all industrial Ethernet connectivity. Instead, they should leverage an industrial Ethernet solution that supports all key use cases while also providing the convergence benefits that are offered by TSN, such as CC-Link IE TSN. This is the first open and widely supported network technology that combines gigabit bandwidth with TSN capabilities.

### **Upgrading automation devices**

Once a key solution for industrial communications has been selected, companies should look at how to upgrade their products to provide these new capabilities. The development ecosystem available depends on the technology selected. For example, CC-Link IE TSN offers multiple options, both software- and hardware-based, which can offer different speeds of TSN implementation, device performance and certification classes.

As a result of the many development methods available, vendors can make sure that the right technical solution is available for the specific product they want to deliver. For instance, software protocol stacks are ideal for businesses interested in quickly implementing CC-Link IE TSN, as they offer perhaps the fastest method to enhance existing products by reducing in-house development time and costs. Furthermore, they are generally portable, so they can be applied with minimal changes. When performance is more important, hardware solutions are best suited to ensure CC-Link IE TSN conformance. These include Application Specific Integrated Circuits (ASICs), also referred to as dedicated communication Large Scale Integrations (LSIs), as well as Field Programmable Gate Arrays (FPGAs).

Ultimately, while TSN will change over time, as all new technologies do, automation vendors can benefit from considerable gains by providing innovative capabilities to their devices now. There is broad acceptance of CC-Link IE TSN today, and the ecosystem continues to grow rapidly. By leveraging this open network technology, both device vendors and machine builders can tap into new market opportunities quickly, futureproofing their businesses and their customers’ operations.

**- ENDS -**

CLPA380      How will TSN fit in with my existing development process and platform?

**Caption:** TSN works with various protocols that enhances interconnectivity and

supports convergence

**Keywords:** TSN, Time-Sensitive Networking, CC-Link IE TSN, CLPA, CC-Link Partner Association, TSN product development

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

The CLPA is an international organisation founded in 2000, now celebrating its 20th Anniversary. Over the last 20 years, the CLPA has been 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 the leading solution for Industry 4.0 applications. Currently the CLPA has almost 3,800 member companies worldwide, and more than 2,000 compatible products available from over 340 manufacturers. Around 30 million devices using CLPA technology are in use worldwide.

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