

Time-Sensitive Networking for Industrial Automation

Unlocking the Future of Industrial Automation

The IEC/IEEE 60802 standard defines Time-Sensitive Networking profiles for industrial automation. The profiles select features, options, configurations, defaults, protocols, and procedures of bridges, end stations, and Local Area Networks to build industrial automation networks.

Standard IEEE 802.3™ Ethernet has proven to be an efficient and cost-effective networking technology for decades. Its success is driven by economies of scale and depth of expertise across a broad, multi-industry networking community. Since inception, Ethernet has continuously evolved to meet the needs of a wide range of application areas.

As part of the evolution, IEEE 802.1™ Time-Sensitive Networking (TSN) was introduced to support time- and/or mission-critical applications. TSN extends the usability of Ethernet networks into domains such as industrial automation, professional audio/video, aerospace, and automotive. In addition to the base standards specifying the technology, TSN profile specifications have been introduced to simplify interoperability, deployment, and TSN use within specific application areas. IEC/IEEE 60802 is a profile specification targeting industrial automation applications.

In today's rapidly evolving industrial automation landscape, network convergence is no longer an option – it is a necessity. That's where IEEE 802.1 Time-Sensitive Networking (TSN) becomes paramount for smart factories by providing real-time communication for critical industrial applications and heterogeneous communications over the same infrastructure.

TSN enables network convergence as it allows multiple independent applications to coexist on a single, standard Ethernet infrastructure, delivering:

- **Real-time Quality of Service** for time and mission-critical operations.
- **Common management schemes** and **converged security** through open standards, enhancing interoperability and streamlining network management thus enabling digital twin.

The International Electrotechnical Commission (IEC) and IEEE SA established the IEC/IEEE 60802 Joint Project to bring together industrial automation and networking experts to specify the use of TSN for industrial automation in a profile specification. The Joint Project brought the best of the two worlds together and has resulted in the IEC/IEEE 60802 "Time-Sensitive Networking Profile for Industrial Automation" dual-logo standard.

The IEC/IEEE 60802 standard is a cornerstone and a game changer for network convergence. It selects the essential TSN features and provides guidelines on how TSN can best serve industrial automation needs. In addition, it provides a unified management scheme and converged security benefiting industrial automation vendors and users.

The IEC/IEEE 60802 standard benefits vendors offering and developing TSN products as well as industrial automation technology users and provides the foundation for further developments in the industry. Furthermore, this dual-logo standard serves as a basis for other standards organizations and consortia to develop building blocks in the industrial automation ecosystem. IEC/IEEE 60802 provides the basis for test and conformance specifications, which are essential in industrial automation. The TSN Industrial Automation Conformance Collaboration (TIACC, <https://www.tiacc.net>) is already developing a unified test plan. Overall, IEC/IEEE 60802 plays an important role in the advancement of networking in industrial automation.

"Industrial communication is entering a new phase in which convergence is becoming a strategic prerequisite for digital manufacturing. Future industrial networks must combine deterministic real-time communication for core control tasks with parallel data streams for asset management, diagnostics, digital twins, AI use cases, and virtualized automation architectures. PROFIBUS & PROFINET International (PI) fully recognizes the importance of such standardization: users and member companies need stable, long-term technology

foundations for investments and product roadmaps. IEC/IEEE 60802 provides this globally recognized basis and supports scalable adoption across the industrial ecosystem. The collaboration between automation experts, networking specialists, and standardization organizations has been essential to achieving strong technical results and broad market acceptance. It ensures that TSN is technically sound, practical, interoperable, and relevant for real industrial deployments. PI and its member companies contributed their experience from existing industrial Ethernet solutions to the standardization process. We see IEC/IEEE 60802 as an important step toward extending converged, deterministic Ethernet to a broader range of industrial automation applications. With IEC/IEEE 60802 now referenced in our actual specification, we are establishing a consistent implementation basis for the next generation of converged industrial networks. In parallel, PI is engaged in TIACC certification activities to support conformance, interoperability, and long-term confidence for users and vendors alike,” said Xaver Schmidt, Chairman of PROFIBUS & PROFINET International.

“The IEC/IEEE 60802 standard is a cornerstone for the adoption of Time-Sensitive Networking (TSN) in industrial automation to deliver deterministic, high-performance communication over standard Ethernet, along with support for gigabit bandwidth and beyond,” said John Browett, General Manager CC-Link Partner Association - Europe. “This new standard is a vital step toward global interoperability. The open TSN standards enable seamless IT/OT convergence, deliver the foundation of converged networks, and drive the digitalization of manufacturing. Mitsubishi Electric and other members of CLPA have been very active in the adoption of TSN in industrial automation and have contributed to the development of the IEC/IEEE 60802 standard from the very beginning. We also actively participate in the TIACC initiative, which will help strengthen the place of IEC/IEEE 60802 in industrial automation further by helping ensure robust conformance, multi-vendor compatibility, and a secure foundation for the next generation of industrial networking solutions.”

“The release of IEC/IEEE 60802 is a landmark achievement for industrial automation and a testament to what our industry can accomplish through collaboration. This new standard gives the industrial automation industry a common, deterministic networking foundation, establishing a shared framework for interoperable automation across vendors and devices. The OPC Foundation is proud to have contributed to this important milestone, and we look forward to seeing IEC/IEEE 60802 accelerate the adoption of open, standards-based industrial automation worldwide,” said Peter Lutz, Director of Field Level Communications in OPC Foundation.

“The publication of the IEC/IEEE 60802 TSN Profile for industrial automation is a major milestone for the future of industrial networking,” said Dave Cavalcanti, Principal Engineer at Intel Corporation and President of the Avnu Alliance. “This specification gives the industrial ecosystem a common, standards-based foundation for deploying deterministic, interoperable Ethernet-based converged networks across automation systems. By aligning the industry around a common profile specification, IEC/IEEE 60802 helps accelerate multi-vendor interoperability, simplifies adoption, and creates a clearer path to certification and scalable deployment. Intel and many other Avnu Alliance members have supported this effort and continue working together with the ecosystem to help bring interoperable TSN solutions to industrial automation and other markets.”

“There is no doubt that TSN is a game-changing technology across several industries, ranging from mobile communications to in-vehicle networking in the automotive sector. In this context, the IEC/IEEE 60802 TSN Profile for Industrial Automation is expected to play a fundamental role, as it provides truly standardized mechanisms that extend Ethernet capabilities with deterministic real-time communication, enabling it to meet the stringent requirements of industrial automation. Until now, this level of standardization and performance has not been available, which has led to the emergence of multiple Ethernet-based real-time networking solutions for industrial automation. We believe that IEC/IEEE 60802 will become the preferred transport technology for industrial automation, and we therefore actively contribute to its standardization and further development,” said Joao Lopes, Principal Engineer, NXP CTO System Innovation, NXP Semiconductors.

IEC/IEEE 60802 is available for purchase at the [IEEE Standards Store](#), at [IEEE Xplore](#), and at the [IEC Webstore](#).

What opportunities do you see with TSN in your industrial environment? Share your thoughts! 🗨️

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