

February 24, 2026
SoftBank Corp.
Murata Manufacturing Co., Ltd.
CC-Link Partner Association

In World First, SoftBank, Murata and CLPA Achieve TSN over 5G, Paving Way for 5G Expansion into Industrial Sectors

Collaborators achieve 122-ns average time synchronization accuracy over 5G and verify CC-Link IE TSN Class B operation

SoftBank Corp. (President & CEO: Junichi Miyakawa, “SoftBank”), Murata Manufacturing Co., Ltd. (President : Norio Nakajima, “Murata”), and CC-Link Partner Association (CLPA) (Global Director : Manabu Hamaguchi, “CLPA”) successfully demonstrated TSN over 5G^{*1}, a technology that enables Time-Sensitive Networking (TSN)—which provides highly accurate time synchronization—over a 5G network. This marks the world’s first^{*2} successful demonstration of TSN over 5G conducted by a mobile network operator.

In this laboratory-based demonstration, the collaborating parties achieved highly accurate time synchronization with an average error of 122 nanoseconds (ns) over a 5G network, well below the 3GPP-defined requirement of 900 ns or less^{*3}. In addition, they confirmed that CC-Link IE TSN Class B-compliant industrial devices—an industrial Ethernet standard widely used in factory automation and certified by CLPA—operated successfully over the 5G network.

This achievement represents an important step toward enabling the wireless control of industrial equipment, which has traditionally relied on wired networks.

*1 TSN (Time-Sensitive Networking) is a set of IEEE-standardized Ethernet technologies designed to enable real-time communications by reducing latency variation (jitter) and enabling highly precise time synchronization among multiple devices. TSN over 5G is a technology standardized in 3GPP Release 16 that enables TSN functionality over 5G networks.

*2 As of January 29, 2026 (according to SoftBank research)

*3 3GPP TS 22.832 “Study on enhancements for cyber-physical control applications in vertical domains; Stage 1”

Background of the demonstration

In factories and manufacturing environments, highly accurate time synchronization is essential to ensure that multiple devices operate in precisely coordinated timing. In CC-Link IE TSN, an industrial Ethernet standard certified by CLPA, Class B requires strict real-time performance and determinism based on precise time synchronization and low jitter, and has therefore been primarily implemented in wired networks.

At the same time, demand for wireless industrial networks has been steadily increasing, driven by needs such as greater flexibility in equipment layout and improved maintainability. In response to these needs, 3GPP Release 16 standardized TSN over 5G, enabling TSN-based high-precision time synchronization over 5G networks. This has raised expectations for industrial 5G networks capable of delivering real-time performance and determinism comparable to wired networks.

Accordingly, SoftBank, Murata, and CLPA jointly conducted this demonstration of TSN over 5G to advance the wireless transformation of industrial networks.

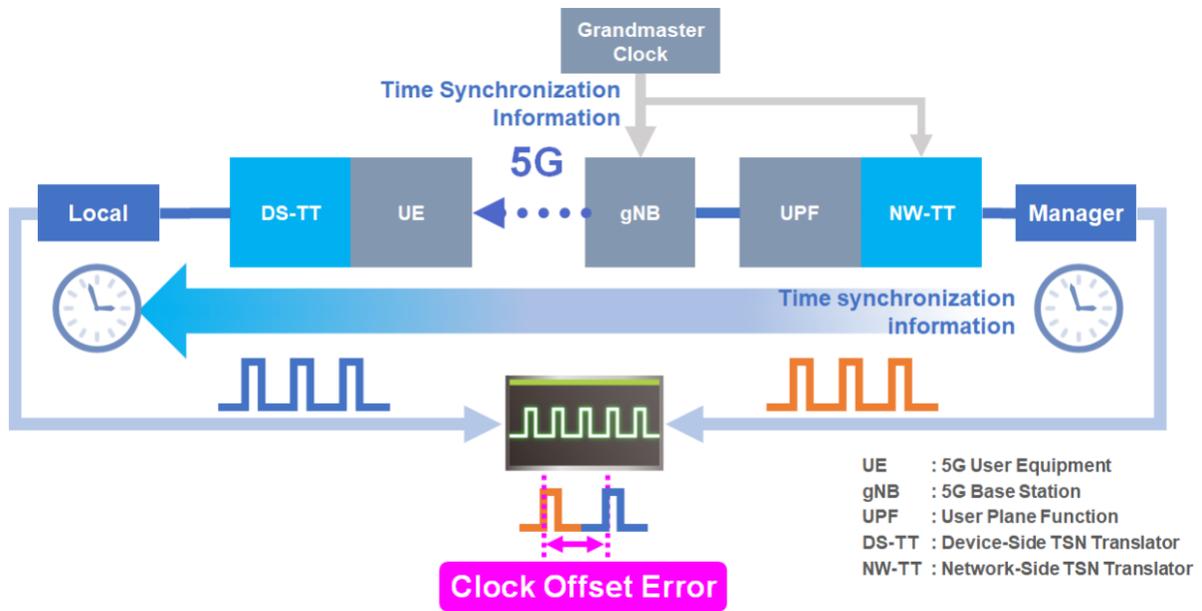
Overview of the demonstration

In this demonstration, a TSN over 5G environment was constructed in a laboratory using private 5G (standalone configuration). Based on gPTP (generalized Precision Time Protocol)—the time synchronization protocol used in TSN over 5G—the time difference was measured between the device side, connected to a DS-TT (Device-Side TSN Translator), and the network side, connected to an NW-TT (Network-Side TSN Translator). The results confirmed that time synchronization with an average error of 122 ns was achieved over the 5G network.

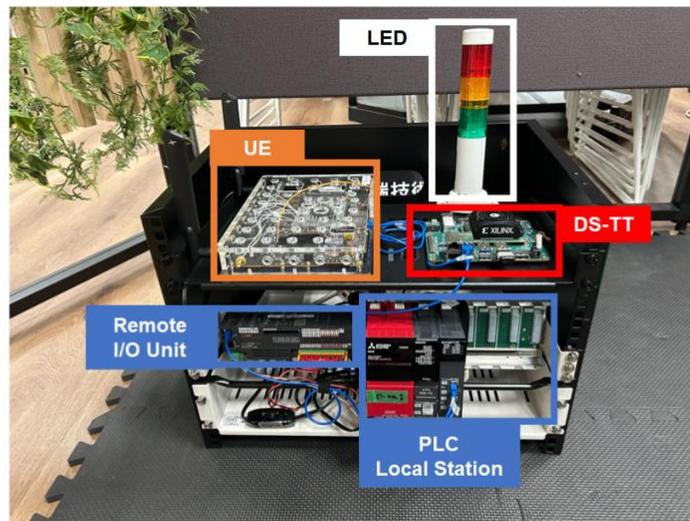
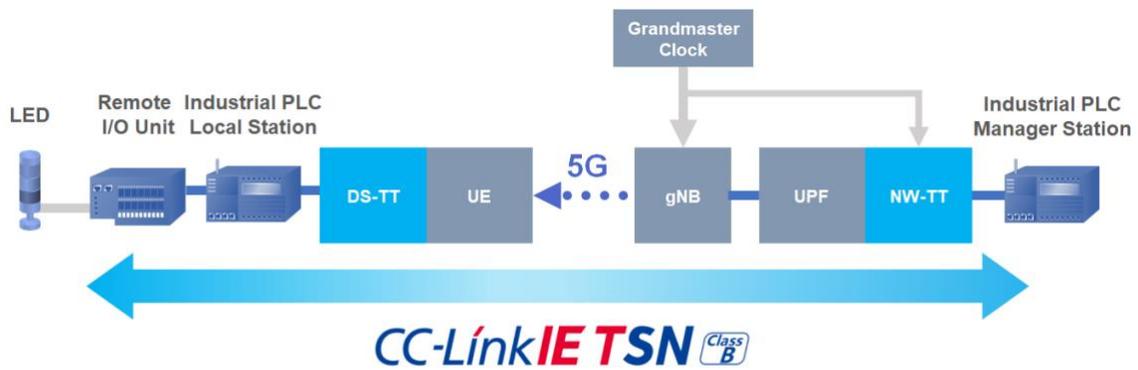
In addition, an end-to-end control environment using actual industrial devices was evaluated under factory-floor assumptions. CC-Link IE TSN-compatible remote I/O units and PLCs (Programmable Logic Controllers) were connected via the 5G network, enabling real-time transmission of control signals from the PLC to input/output devices such as switches and indicator lights (LEDs). Within this verification environment, the parties confirmed more than six hours of continuous communication, while maintaining time synchronization accuracy within 1 microsecond, meeting the requirement of CC-Link IE TSN Class B specifications required for industrial equipment control.

Through this demonstration, the parties verified that TSN over 5G can satisfy both 3GPP requirements and CC-Link IE TSN Class B performance levels, enabling highly accurate time synchronization and reliable industrial device control. This represents a significant milestone toward the wireless transformation of industrial networks, which have traditionally relied on wired control.

The results of this demonstration are scheduled to be exhibited at the Murata Electronics Europe B.V. booth at MWC Barcelona 2026.



Time Synchronization Evaluation Configuration



Industrial Device Connectivity Configuration

Roles of each organization

SoftBank: Provision of the TSN over 5G-compatible environment (including gNB, UE, UPF, etc.)

Murata Manufacturing: Provision of DS-TT and NW-TT

CLPA: Provision of industrial devices, verification of communication behavior, and confirmation of industrial device operation

Future outlook

The outcomes of this demonstration go beyond enabling wireless industrial networks. By supporting precise, real-time coordination between AI, robots, and industrial equipment, TSN over 5G is expected to play a key role in enabling Physical AI^{*4}. The realization of Physical AI requires communication infrastructures with high real-time performance and determinism, and TSN over 5G is positioned as a core enabling technology. Going forward, SoftBank, Murata, and CLPA will leverage the insights gained from this demonstration to promote new industrial use cases utilizing 5G and to support the broader adoption of Physical AI in real-world applications.

*4 Physical AI refers to technologies in which AI analyzes and makes decisions based on information obtained from robot sensors, cameras, and external systems, enabling robots to perform flexible and complex physical actions based on those decisions.

Executive comments from each organization

Ryuji Wakikawa, Vice President and Head of Research Institute of Advanced Technology at SoftBank Corp., said:

“This achievement marks a breakthrough in extending 5G into industrial control domains that have long depended on wired infrastructure. SoftBank will continue to lead the validation and deployment of advanced technologies, building the communications foundation that accelerates industrial transformation and enables the realization of Physical AI.”

Makoto Kawashima, Corporate Officer, Murata Manufacturing Co., Ltd., said:

“The demonstration was a challenging initiative in which we leveraged our extensive experience in the communication field to contribute to TSN through software technology. We sincerely appreciate the collaboration with SoftBank and CLPA. We will continue to work toward realizing a future society in which highly accurate time synchronization is established as essential infrastructure, allowing a wide range of machines and devices to operate cooperatively.”

Manabu Hamaguchi, Global Director, CC-Link Partner Association, said:

“By enabling ‘CC-Link IE TSN’ and ‘TSN over 5G’ systems, we believe that significant added value can be delivered to a wide range of industries, including manufacturing, logistics, and agriculture, and we have high expectations for an early commercial release.”

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