



CAPABILITY BRIEF

Connex Drive: Enabling TSN-DDS Synergies

HIGHLIGHTS

Enables deterministic and reliable data distribution for safety-critical applications in vehicles

Fosters interoperability within vehicle subsystems

Allows for scalable and flexible integration of evolving designs, supporting innovation in automotive applications

Enables comprehensive management of different types of traffic based on its criticality using DDS™ and TSN QoS parameters

Consolidates in-vehicle communication networks onto a single Ethernet backbone to reduce cost

Connex Drive® is integrated with TSN to provide the communications backbone for current and future software-defined vehicles. Together, Connex Drive and TSN enable rapid, deterministic communication for complex distributed systems and subsystems, over a general purpose network to reduce cost and weight. This combination enables ultra-low latency for data in motion across domains, including Advanced Driver-Assistance Systems (ADAS), Automated Driving (AD) and Digital Cockpit.

RTI CONNEX DRIVE: SUPPORTING THE DDS-TSN STANDARD

In April 2023, the Object Management Group® (OMG®) published the specification for a DDS-TSN standard. This new standard enables software applications using the Data Distribution Service (DDS) databus to be deployed on, and leverage, TSN-enabled networks. It defines rules for mapping DDS features onto TSN concepts to support the design, deployment and execution of DDS systems over TSN networks in a standardized fashion. The DDS-TSN standard allows for highly secure communications for software-defined vehicles (SDVs) with configurable Quality of Service (QoS) across complex, fast-moving systems.

With its powerful built-in tools, Connex Drive is able to support DDS-TSN capabilities “out-of-the-box” through simple QoS configurations. This capability allows existing Connex systems to take advantage of all that TSN has to offer with little or no changes to the application code. Even with high-volume traffic on the network, critical Connex Drive communications are unaffected.

DDS-TSN BENEFITS

Running Connex Drive over TSN offers several benefits:

Deterministic Communication: TSN provides deterministic networking, ensuring that data packets are delivered within predefined time bounds. This is crucial for real-time systems in SDVs, where timely and predictable communication is essential for safety and performance.



Interoperability: Connex Drive with TSN enables interoperability between various components within the automotive ecosystem. Connex Drive ensures that different systems from different vendors can communicate seamlessly, fostering collaboration and integration in the automotive industry.

High Bandwidth and Low Latency: TSN offers high bandwidth and low latency, which are critical for transmitting large volumes of data generated by sensors in autonomous vehicles. Connex Drive can leverage these capabilities to efficiently transfer sensor data, control commands, and other information between different parts of the vehicle's software stack.

Fault Tolerance and Redundancy: As it's built on the brokerless DDS standard, Connex Drive avoids single-point failures. TSN itself supports fault tolerance mechanisms such as redundancy and failover, which enhance the reliability and robustness of the communication network. This combination of features ensure continuous operation even in the event of network failures or component malfunctions.

Simplified Development: Connex Drive abstracts away many of the complexities associated with real-time communication and networking, allowing developers to focus on building higher-level functionality for SDVs. By integrating TSN support into its framework, Connex Drive streamlines the development process and accelerates time-to-market for automotive applications.

Scalability: Connex Drive provides tools and APIs for managing communication and data exchange in many different environments. Its data-centric foundation enables a highly scalable network infrastructure that allows for expansion as future project needs evolve, providing the flexibility to react quickly to changes in the marketplace.

Compliance with Automotive Standards: Connex Drive with TSN adheres to industry standards and regulations governing automotive communication and networking, such as ISO 26262 for functional safety and ISO 21434 for security. By ensuring compliance with these standards, Connex Drive helps automotive OEMs and suppliers meet the stringent requirements for safety and security in SDVs.

By leveraging DDS and TSN together, automotive manufacturers can consolidate communication networks within vehicles onto a single Ethernet backbone. This consolidation reduces the amount of cabling required, simplifies network management, and lowers overall system costs.

Combining TSN and Connex Drive provides the necessary building blocks for complex, advanced communications by combining technologies at the application software and network hardware levels. This approach delivers a complete distributed networking solution from hardware to applications that offers interoperability, high performance, fault tolerance, simplified development, scalability, and compliance with automotive standards.

PARTNER NETWORK: FROM SIMULATION TO DEPLOYMENT IN PRODUCTION

A comprehensive toolchain is vital for handling the evolving development objectives of SDVs. To deliver seamless integration, RTI has partnered with the leading vendors of TSN simulation and hardware (Figure 1). RTI supports a variety of unique customer use cases through its large ecosystem of hardware platforms and operating system partners. Our TSN partners include NXP, RTaW, SoC-e, and United Electronic Industries (UEI/Ametek).

In addition, our Professional Services team has the experience and expertise to help stand up the system and optimize communications across multiple architectures.

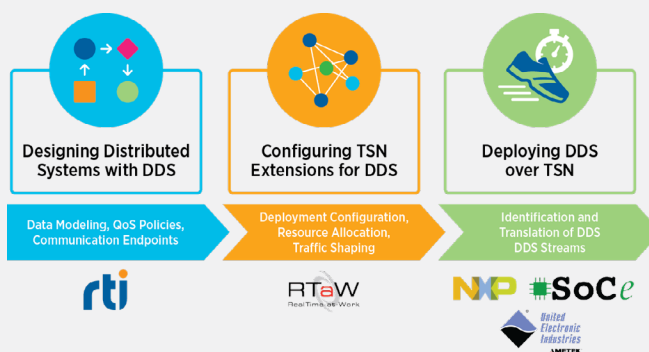


Figure 1: TSN Partner Network

For more information on Connex Drive over TSN, please visit www.rti.com/tsn.

ABOUT RTI

Real-Time Innovations (RTI) is the infrastructure software company for smart-world systems. Across industries, RTI Connex® is the leading software framework for intelligent distributed systems. RTI runs a smarter world.

RTI is the market leader in products compliant with the Data Distribution Service (DDS™) standard. RTI is privately held and headquartered in Silicon Valley with regional offices in Colorado, Spain, and Singapore.

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