

CAPABILITY BRIEF

Testing and Simulation

A DATA-CENTRIC FOUNDATION FOR OPTIMAL SDV TESTING AND SIMULATION

HIGHLIGHTS

Seamlessly integrates new and legacy simulators and systems integration labs while adding humans and hardware in the loop to create new Live, Virtual and Constructive (LVC) environments

Enables reliable, real-time data transport for complex architectures from native development to third party integrations, including dSPACE, NI LabVIEW™ and MathWorks Simulink®

Supports leading gaming engines with native plugins or case + code, making it easy to integrate EPIC Games® Unreal Engine® and Unity® with other DDS-based applications

Supports broad integration of different automotive platforms in a common architecture, including AUTOSAR Classic and AUTOSAR Adaptive, ROS 2 and Time-Sensitive Networking (TSN)

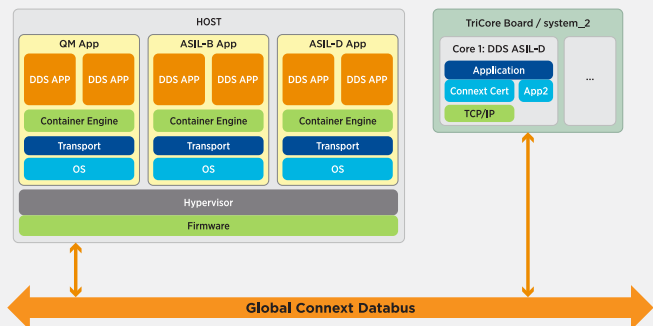
TESTING AND SIMULATION TAKE OVER IN SDVs

OEMs use continuous integration and continuous delivery (CI/CD) to address frequent software updates and deployments in the field. With the new emphasis on software at the core of the vehicle, the industry is moving towards a more rapid way to test code updates and new designs that enable more rapid platform evolution. Accelerating the speed of data communication to support advanced testing and simulation capabilities becomes priority one.

In this environment, it's essential to reduce development time by decoupling deployment and development tasks from the design itself. Easing integration across different hardware and software architectures with modular computing is vital. One proven way to achieve this integration for SDVs is through a data-centric architecture based on the Data Distribution Service (DDS™) standard.

Built on DDS, RTI Connex Drive enables the development of flexible architectures based on advanced Quality of Service (QoS) configurations, which streamlines maintainability by establishing a single, reliable middleware (communication framework) for all data sources. Connex Drive provides an ideal solution for proving the viability of CI/CD models across a variety of product components — everything from low-level ECUs to high-performance cloud-based computing.

As code becomes the center of the software-defined vehicle (SDV), it is vital to ensure programming quality and eliminate unpredictable behavior through a comprehensive testing and simulation framework. By focusing more on the simulation stage, OEMs can reduce both development cost and time-to-market. Connex Drive® provides the data-centric software framework needed to efficiently manage the complexity of modern vehicle testing and simulation environments, thereby bridging the gap to production environments.

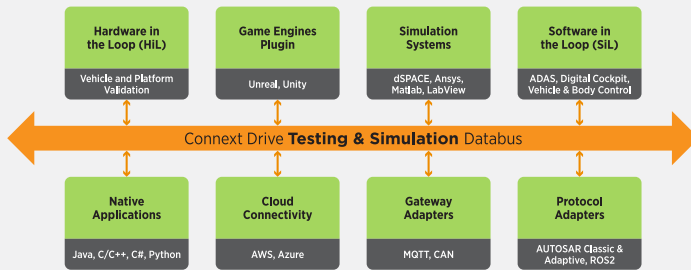


INTEROPERABILITY ACROSS PLATFORMS FOR HiL AND SiL

Connex Drive supports a large variety of Hardware in the Loop (HiL) and Software in the Loop (SiL) systems — this enables users to validate the algorithms, target controllers and overall vehicle technology development to achieve the required levels of quality and performance.

As a backbone communication platform, Connex Drive can integrate the functionality of multiple sub-systems and enable modular testing. This data-driven approach reduces the complexity of the testbench, making it easier to integrate hardware and software products from multiple vendors, thus reducing development time. It is future-proof and extensible, also allowing for model extensions and option configurations for alternative components supplied by different vendors.

Connex Drive provides seamless integration with ecosystem standards such as AUTOSAR Classic, AUTOSAR Adaptive and ROS 2. In addition, it provides native integration with leading solutions such as LabView, Simulink and gaming engines such as Unreal Engine and Unity, as well as a wide variety of Hardware in the Loop (HiL) systems.



Before a vehicle production program gets to the construction stage, it must be repeatedly modeled and tested in order to reduce program risk and the potential for future expensive redesign efforts. Dataflows need to be built into the model from the earliest stages, based on realistic parameters, such as durability or reliability. For this, engineers rely on different modeling and simulation environments:

Ansys. The integration of Connex Drive with Ansys SCADE was tested in the Indy Autonomous Challenge for autonomous high-speed racing. RTI Connex Drive was tightly integrated with the Ansys simulation platform and Ansys SCADE model-based development environment, allowing teams to quickly design, test, rebuild and race their virtual cars on the digital track.

LabVIEW. The RTI DDS Toolkit provided with Connex Drive enables a fast, secure and interoperable data communications infrastructure for LabVIEW. It can be used to distribute real-time data between LabVIEW Virtual Instruments, as well as between LabVIEW and other applications. Developers can reliably scale systems to hundreds or even thousands of applications distributed across local and wide-area networks. By abstracting communication and managing all the low-level networking details, the RTI Toolkit can significantly reduce the amount of custom code required to support system communications.

Simulink. Simulink enables fast, accurate modeling and simulation. Connex Drive works with DDS Blockset to integrate Simulink with DDS protocols easily and automatically. DDS Blockset is a MathWorks productivity tool that provides engineers with DDS custom blocks to model communication between Simulink and pure DDS applications.

Unity. Connex Drive can feed real-time data into, and extract data from, any Unity project – this enables a more immersive and realistic simulation experience. Requirements for visualization and/or virtual interaction for DDS-based applications can be met using the Unity gaming engine. This combination enables users to rapidly create a visualization of real-time data, and more.

Unreal Engine. The **Unreal Engine Plugin for RTI Connex Drive** makes it easy to integrate an Unreal Engine project with other applications that have been developed using Connex Drive. The plugin is designed for projects that need to publish in real time, information that is received and processed by other applications. All actions are implemented in the Blueprint, without the need to code anything in C++.

RTI: DRIVING INNOVATION IN TESTING AND SIMULATION ENVIRONMENTS

RTI is active in many of the leading consortia that are working to solve critical problems to help accelerate testing and simulation in the software-defined vehicle era, including:



REAL-WORLD USE CASE

Audi: Audi's hardware-in-the-loop simulation feeds realistic data to components to test hundreds of ECUs using Connex Drive technology. Connex Drive enables a modular environment that scales to test entire vehicles and complex scenarios.

To learn more about Connex Drive, please visit: rti.com/drive.

ABOUT RTI

Real-Time Innovations (RTI) is the largest software framework company for autonomous systems. RTI Connex Drive® is the world's leading architecture for developing intelligent distributed systems. Uniquely, Connex Drive shares data directly, connecting AI algorithms to real-time networks of devices to build autonomous systems.

RTI is the best in the world at ensuring our customers' success in deploying production systems. With over 2,000 designs, RTI software runs over 250 autonomous vehicle programs, controls the largest power plants in North America, coordinates combat management on U.S. Navy ships, drives a new generation of medical robotics, enables flying cars, and provides 24/7 intelligence for hospital and emergency medicine. RTI runs a smarter world.

RTI is the leading vendor of products compliant with the Object Management Group® (OMG®) Data Distribution Service (DDS™) standard. RTI is privately held and headquartered in Sunnyvale, California with regional offices in Colorado, Spain and Singapore.

Download a free 30-day trial of the latest, fully-functional Connex Drive software today: www.rti.com/free-trial/drive.

RTI, Real-Time Innovations and the phrase "Your systems. Working as one," are registered trademarks or trademarks of Real-Time Innovations, Inc. All other trademarks used in this document are the property of their respective owners. ©2024 RTI. All rights reserved. CB-032 V2 1223

2 • rti.com