Next-Generation Electrical/Electronic Zonal Architecture

ACHIEVING INTEGRATION THROUGH DATA CENTRICITY WITH CONNEXT DRIVE

HIGHLIGHTS

RTI Connext Drive® offers an automotive-grade data-centric software framework that optimizes cost, network distribution, safety and security.

Enables reliable, real-time data transport for Next-Generation Electrical/Electronic Zonal Architecture components, from ECUs to Central and Zonal Gateways.

Supports broad integration of different automotive platforms in a common architecture including Time-Sensitive Networking (TSN) support.

Provides a safety certification pathway to achieve up to ISO 26262 ASIL D.

THE RISE OF NEXT GEN E/E ZONAL ARCHITECTURE

The automotive industry is undergoing an unprecedented shift as manufacturers race to develop connected and autonomous mobility solutions. However, because modern vehicles often include over one hundred Electronic Control Units (ECUs), manufacturers are well aware of the interoperability challenges posed by ECUs and the need to integrate, simplify and free up space under the hood for new functionality.

This imperative has given rise to Next Gen E/E Zonal Architecture. The central aspect of this trend is transitioning towards consolidating vehicle computing capabilities for optimized cost, power distribution, security, flexibility and weight.

Connext Drive provides the data-centric software framework needed to efficiently manage this complexity and integrate new and evolving technologies to seamlessly support Next Gen E/E Zonal Architecture in tomorrow’s autonomous vehicles.

CONSOLIDATING DOMAINS TO UNLOCK POTENTIAL

Defining and implementing a modern architecture is vital in order to unlock the potential of next-generation vehicles. Of course, this will not happen all at once, but rather through a gradual evolution. This evolution starts with the consolidation of several domains, such as Advanced Driver Assistance Systems (ADAS), Body, Cockpit or Telematics, and concludes with the Central and Zonal Gateways approach of Next Gen E/E.

What are the current roadblocks? Legacy E/E architecture is highly complex, due to the exponential growth of actuators, sensors and processing capabilities within resource-constrained environments. In fact, using traditional E/E architectures, based on CAN or Ethernet, can quickly become both costly and a major architectural limitation. The functionality needed for autonomous vehicles increases the demand for sensors and wiring harnesses, which in turn increases the need for intelligent networks and power distribution. In addition, OEMs are under pressure to create flexible, scalable and reliable E/E architectures to satisfy new requirements in the automotive industry.
ACHIEVING ECU CONSOLIDATION AND COMPUTING CENTRALIZATION

The combination of Next Gen E/E Zonal Architecture with Connext Drive supports manufacturers who are trying to consolidate ECUs and domains into zones. These zones have already triggered the need for high-performance networking, further emphasizing the need for centralization and transition to new technologies such as TSN. Centralizing the computing capabilities in one high-performance computer is enabled by end-to-end communication and data-centric software components. Connext Drive offers a variety of advantages for manufacturers engaged in creating scalable and future-proof vehicle architecture. These benefits include:

- Product components that enable the given functionality for each vehicle zone: ECUs, Central Gateway and Zonal Gateway.
- The simplification of the overall wiring harnesses (which is currently the third-highest component cost) through TSN support.
- Supports communication libraries certified for systems up to ISO 26262 ASIL D
- Provides the only proven connectivity standard that is used by ROS 2, AUTOSAR Classic/OSEK and AUTOSAR Adaptive for autonomous vehicles.
- The ability to reduce cost, both in terms of components and labor, which enables manufacturers to prioritize overall scalability through a data-centric approach.
- The ability to build a next-generation in-vehicle architecture despite unknown requirements, such as hardware, capability of autonomy and dynamic updates at deployment.
- The ability to evolve from classic automotive products into new architectures that include ADAS and telematics applications, making it possible to compete in new markets with dedicated product offerings.

REAL-WORLD USE CASE

- **Li Auto:** With the development of intelligent in-vehicle systems, communication between components has become more complex and critical. The adoption of advanced sensors such as Lidar, radar, etc., alongside the need to support more sophisticated data models and application algorithms, have imposed tremendous challenges in the Next Gen E/E Architecture. In addition, the requirements of functional safety (FuSa) and cybersecurity must also be considered from day one. The RTI Connext Drive connectivity framework helps to accelerate Li Auto’s development in this challenging landscape.

To learn more about Connext Drive, visit: [rti.com/drive](http://rti.com/drive)

Figure 1: A sample autonomous vehicle system architecture using Connext Drive and a layered databus architecture to integrate multiple components and platforms. Connext Drive is the first and only framework to be used in all the common automotive ecosystems.

ABOUT RTI

Real-Time Innovations (RTI) is the largest software framework company for autonomous systems. RTI Connext® is the world’s leading architecture for developing intelligent distributed systems. Uniquely, Connext 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 1,700 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 Connext software today: [https://www.rti.com/downloads](https://www.rti.com/downloads)