A Vehicle-to-Everything Solution for Connected and Autonomous Vehicles

The Altran V2X ITS Software Framework
V2X Overview and Industry Trends

Altran V2X stack enables faster time to market and rapid development of V2X equipment for safety and non-safety applications. The stack is compliant to US and Europe specifications.

Vehicle-to-everything (V2X) communication is the sending of information from a vehicle to any unit that is related to the vehicle, and vice versa. The Global V2X market for Automotive is projected to reach USD 99.48 Billion by 2024, growing at a CAGR of over 17%, due to technological advancements, increasing demand for safety features in vehicle, government stringent rules for better traffic management and growing trend for connected vehicles. (ref 1)

The deployment of V2X connectivity is a game changer for the whole ecosystem, from Automotive Original Equipment Manufacturers (OEM) and their suppliers, to roadside unit (Telecom Service Providers, Smart city solution providers) and mobile device (handset manufacturers).
Enhance ADAS systems using V2X

Today’s car systems use Advanced Driver Assistance Systems (ADAS) to enhance safety in vehicles. ADAS technology leverages vision/camera systems, sensor technology and car data networks to provide a safer driving experience. With the advent of newer technologies these systems are improving rapidly, but they still have their own limitations due to the range of their sensors and can be influenced by inclement weather or obstacles like buildings, towers, etc. Vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I) and vehicle-to-pedestrian (V2P) technologies, collectively known as V2X, overcomes these limitations faced by today’s ADAS systems and will serve as the foundation for intelligent transport systems (ITS).

According to Intelligent Transportation Society of America (ITS America), V2X will allow next-generation traffic management systems to not only report when and where congestion occurs but they will also adaptively direct traffic to mitigate congestion (ref 2). Mobile phones and GPS will include V2X technology that will provide V2X features even for existing vehicles and protect vulnerable road users like cyclists and pedestrians. V2V has the potential to help drivers avoid or mitigate 70 to 80 percent of vehicle crashes involving unimpaired drivers, and that could help prevent many thousands of deaths and injuries on roads every year.

Altran V2X Framework Overview

Altran offers V2X stack for rapid prototyping/development of V2X equipment for OBU and RSU. Some of the key features of the stack are the following:

**Hardware, Network and OS Agnostic** Altran’s V2X Software stack is agnostic to radio technology and vendors. It supports DSRC and C-V2X technologies and is pre-ported on leading V2X platforms in the market (NXP, Auto- talks and Qualcomm). The stack is auto-grade and available on popular operating systems like Linux, Android and Real Time Operation System.

**Platform Abstraction** The stack components (V2X core stack and applications) can be run independently across cores of a processor or different processors. Integration with V2X subsystems like GPS, CAN, Security, IoT Sensors and HMI is provided through well-defined APIs.

**Rich Set of APIs** A rich set of APIs for application developers to use facility layer APIs provided above the base V2X stack layer to access decoded V2X messages and other information such as position, timing and vehicle data.

**Proven Interoperability** Successful participation in V2X interoperability and conformance events. WAVE TCI 2.0 and ETSI TTCN based in-house conformance testing.

**Automotive Grade** Auto SPICE and MISRA C 2012 compliant.

**Security and Privacy** Supports self-sign, SCMS client and integration with third-party SCMS servers. Pre-integrated with Hardware security modules (eHSM) or OpenSSL for message encryption and decryption.

**Linux Test System** An x86 based Linux system is provided to test V2X stack and test applications without target hardware. Applications can be lab tested before target hardware system is qualified and ready.
**Standard Compliance**

IEEE 802.11p  
IEEE 1609.2 (Security), IEEE 1609.3 (WSMP, WSA), IEEE 1609.4  
SAE J2735 (BSM, MAP, SPaT, TIM, RSA, EVA, ICA, …)  
SAE 2945/1  
SCMS CAMP LLC

GN EN 302 636-4-1  
BTP TS 103 248  
CAM EN 302 637-2  
DENM EN 302 637-3  
Security TS 103 097
Platforms
- Auto talks Craton2
- Auto talks Secton
- NXP Road Link
- Qualcomm Atheros
- ST Telemaco 3P
- iMX6 Quad Core

Key Use Cases Supported

V2V
- Forward collision warning
- Dangerous Goods Warning
- Stationary vehicle warning
- Emergency Braking

V2I
- Curve Speed Warning
- Road works warning
- Road hazard warning
- Dangerous goods warning
- Time to Green
- Point of Interest (Electric Vehicle Charging Station)
- BEEPS (BlockChain Enabled Enterprise Platooning Services)

V2P
- Human Presence on Road
Why Altran?

Our software frameworks offer best-in-class solutions that significantly reduce the total cost of ownership and time-to-market. We are a trusted partner with over 25 years of experience in technology and engineering. We are proud of our up-to-the-minute expertise in the domain with regular participation and conformance verification at Plugfest events.

With a strong culture of innovation, we offer continuous experimentation with newer technologies and collaboration with leading standards, bodies and forums, along with a global delivery model for optimized cost and timely delivery.

<table>
<thead>
<tr>
<th>Key Features of the V2X ITS Framework</th>
<th>Altran in Automotive</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Rich-set of APIs written in C and are available across all layers and portable across platforms</td>
<td>• A combined expertise in wireless communications and automotive which accelerate development, integration and deployment of products and services, from car to cloud across market segments.</td>
</tr>
<tr>
<td>• Integration with IoT sensors</td>
<td>#1 in Cellular &amp; Wi-Fi</td>
</tr>
<tr>
<td>• Customizationservices based on request</td>
<td>#1 in automotive product engineering services.</td>
</tr>
<tr>
<td>• Low latency and high reliability event/message delivery</td>
<td>• Well positioned in three strategic domains - Autonomous driving/Connectivity // Sustainable mobility // Complete vehicle development</td>
</tr>
<tr>
<td>• Message priority support</td>
<td>• Global player serving leading automotive players: Technological expertise and deep understanding of Product engineering and Manufacturing processes for OEMs and Tiers1.</td>
</tr>
<tr>
<td>• AVB, Bluetooth and LTE complimentary offering to support next generation V2X</td>
<td>• End-to-end high value offering for next gen cars around Autonomous Driving / ADAS, Artificial Intelligence, Connectivity, HMI, Digital services, and Electric/Electronic systems/architectures</td>
</tr>
<tr>
<td>• Flexible business models - binary or source code licensing options</td>
<td></td>
</tr>
</tbody>
</table>

Example of a use case with 2GETTHERE:

• Since 2009, our engineers work alongside experts from 2getthere, a leading developer of mobility solutions, to design, produce and deliver driverless electric vehicles. The driverless vehicles, each with a capacity of 24 passengers, were fully engineered and produced by our teams.

• 2getthere delivers Autonomous Vehicle Systems for Smart Cities with a 25+ years of experience with autonomous vehicles in various demanding environments.
To know more about Altran capabilities, mail us on: marketing@altran.com

About Altran

Altran ranks as the undisputed global leader in Engineering and R&D services. The company offers clients an unmatched value proposition to address their transformation and innovation needs. Altran works alongside its clients, from initial concept through industrialization, to invent the products and services of tomorrow. For over 35 years, the company has provided expertise in Automotive, Aeronautics, Space, Defense & Naval, Rail, Infra & Transport, Energy, Industrial & Consumer, Life Sciences, Communications, Semiconductor & Electronics, Software & Internet, Finance & Public Sector. The Aricent acquisition extends this leadership to semiconductors, digital experience and design innovation. Altran generated revenues of €2.9 billion in 2018, with some 47,000 employees in more than 30 countries.

© 2019 Altran. All rights reserved.

All Altran brand and product names are service marks, trademarks, or registered marks of Altran in the United States and other countries.

www.altran.com