



kapsch >>>
challenging limits

Kapsch TrafficCom

Kapsch Connected Vehicle Software.

Since 2008 Kapsch has as a company taken an active part in the V2X arena and relevant standardization bodies. Kapsch's accumulated knowledge in this area is key for providing the right support for OEMs, Tier 1 companies and V2X integrators looking for developing V2X products. Our dedication for providing state of the art software solutions for interoperable vehicles has frequently been demonstrated in co-operative plug tests and customer projects. By combining the ability to supply customers with tailored V2X hardware and software solutions with a long experience in delivering end to end solutions, Kapsch prides itself on being able to support customers from early prototype phase to series manufacturing.

Kapsch Connected Vehicle Software Suite.

Kapsch Connected Vehicle Software Suite is a modular and efficient software environment ideal for building innovative V2X systems. The Software Suite is mainly developed to accommodate Safety, Traffic Efficiency and Information applications, but it also features support for customized applications with proprietary messages. By facilitating intelligent support functions for

filtering and ordering of V2X data, the Software Suite forms a rapid development framework for V2X applications with a small footprint and high reliability. In order to lead the V2X connected vehicle development and to support our customers, Kapsch is continuously improving the Software Suite with quality and efficiency enhancing features.

Software Development Kit.

A rich software development kit (SDK) is supported for customers who are interested in V2X application development. In order to kick-start the application development are example code, interfaces and clear usage instructions provided in the

SDK manual. Together with a tablet for viewing purposes becomes applications implemented on a rapid prototyping platform a robust system for in-vehicle demonstrations and similar.

Software Structure.

Kapsch Connected Vehicle Software Suite is modular with clear interfaces between the different domains. A well-structured software allows for efficient adaption to multiple product

scenarios with distributed software as well as easy verification and trouble shooting.

V2X Applications.

A variety of V2X Applications for Safety, Efficiency, Traffic Information and customer specific purposes are under development.

All Kapsch applications are characterized by low footprint, focus on high level and solid functionality.

Safety

- > Emergency Electronic Brake Light (EEBL)
- > Forward Crash Warning (FCW)
- > Blind Spot Warning/Lane Change Warning (BSW/LCW)
- > Intersection Movement Assist (IMA)
- > Left Turn Assist (LTA)
- > Control Loss Warning (CLW)



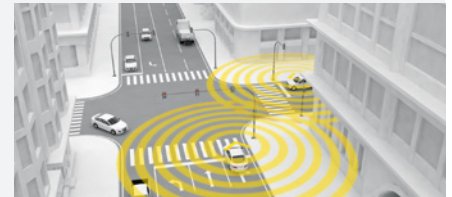
Emergency Electronic Brake Light (EEBL)



Forward Collision Warning (FCW)



Blind Spot Warning/Lane Change Warning (BSW/LCW)



Intersection Movement Assist (IMA)



Left Turn Assist (LTA)



Control Loss Warning (CLW)

Efficiency.

- > Green Light Optimal Speed Advisory (GLOSA)
- > Platooning/Cooperative Adaptive Cruise Control (CACC)

Traffic Information.

- > In Vehicle Information (IVI)

Customized.

- Coordination of commercial site vehicles such as
- > Port vehicles
 - > Harvesters

V2X Application Services.

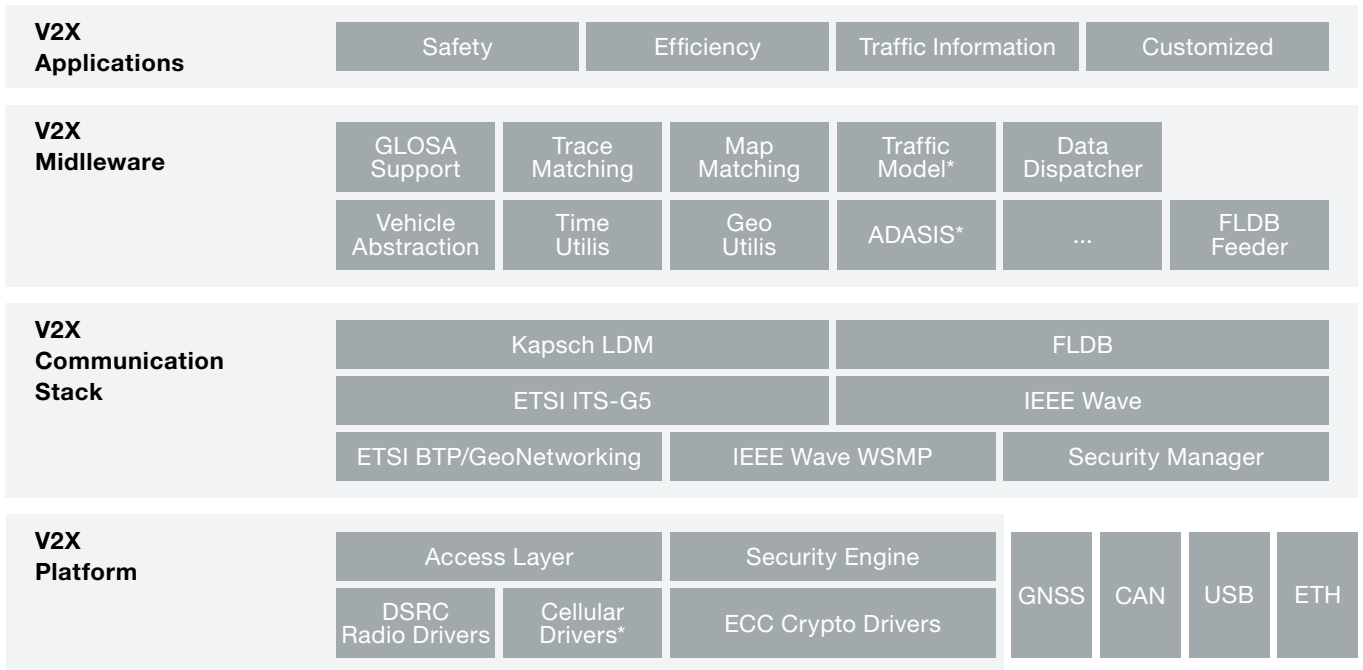
The V2X Applications Services domain prepares the information needed for each specific application which in turn facilitates

rapid V2X Application development with focus on functionality.

V2X Communication Stack.

Kapsch V2X Communication Stack currently supports ETSI ITS-G5, IEEE WAVE communication protocols and relevant security standards. The communication stack is easily adapt-

able to new standards and comprises lower level intelligent sorting and filtering mechanisms for fast and ordered application access to incoming V2X data.



*to be developed

Technical features.

ITS Facilities

- > EN 302 637-2, EN 302 637-3, EN 302 895, ETSI TS 102 894-2
- > SAE J2735, SAE J2945/1

Network and Transport

- > EN 302 636, EN 302 931
- > IEEE 1609.3

Access Layer

- > IEEE 802.11p, EN 302 663, EN 302 571, TS 102 687
- > IEEE 1609.4

Security

- > ETSI TS 103 097, ETSI TS 102 941
- > IEEE 1609.2

Cross Layer

- > TS 102 792

Other

- > Autosar (in progress)
- > Misra C (in progress)

Development Processes.

Automotive SPICE

- > ISO26262

Cooperative Verification.

C-ITS ETSI Plugtest™

- > Participation in ITS CMS Event 1– w5

Car 2 Car Communication Consortium

- > Participation in first C2C-CC pre-certification for ITS-G5 stack

Regression Tests

- > TTCN-3 test suite for ITS-G5 is used as regression base for V2X Communication Stack
- Participation in Omni Air Certification Services (OCS) Accreditation Program for WAVE certification suite

Kapsch TrafficCom

Kapsch TrafficCom is a provider of intelligent transportation systems (ITS) in the segments of toll collection, city access control and parking space management, traffic management, traffic monitoring, utility vehicle monitoring, electronic vehicle registration and V2X cooperative systems. The end-to-end solutions of Kapsch TrafficCom cover the entire value creation chain of its customers, from components and design to the installation and operation of systems, all from a single source. The core business comprises the development, installation and operation of electronic toll collection and traffic management systems. Reference projects in more than 50 countries on all continents have made Kapsch TrafficCom a globally recognized ITS provider. As part of the Kapsch Group, an Austrian family-owned technology group founded in 1892, Kapsch TrafficCom is headquartered in Vienna, Austria, and has subsidiaries and branches in 33 countries. It has also been listed since 2007 on the Vienna Stock Exchange (KTCG) and earned revenues of EUR 526 million in the 2015/16 fiscal year. The company employs over 4,600 employees worldwide.

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