

Enhanced Road Safety due to Vehicle-to-X Communication

Resolution taken on 8th November 2017 based on a recommendation by the DVR Executive Committee on Vehicle Technology

Preamble

Intelligent and connected traffic systems can contribute to increasing road safety. These intelligent and connected traffic systems include Vehicle-to-X¹ (V2X) technologies which implement new functions by wireless exchange of information from road users to road users and from road users to the infrastructure. In the context of various national and international research projects various types of V2X systems with widely differing functions have been developed. Depending on the application, the systems can address various situations - ranging from potentially dangerous situations to simple provision of information - and road users of all types. Furthermore, there are different forms of information provision and communication (e.g. pWLAN², mobile radio transmission) between road users and from road user to road infrastructure.

Background

The aim is to prevent accidents or mitigate their severity. Automated communication of safety-relevant information can achieve this aim by

¹ In this context the term 'Vehicle-to-X' refers to the automated exchange of information between vehicles, currently focusing on passenger cars, emergency and rescue vehicles, commercial vehicles as well as motorcycles. The term is not limited to motor vehicles and can include bicycles or pedestrians equipped with specific electronical devices, other vehicles as well as road infrastructure.

² pWLAN is a technical standard specifically intended for vehicle communication. Information about imminent road risks is shared within milliseconds among vehicles travelling in the same vicinity.

passing on such information without delay and hence providing more time to react. Depending on the hazard to be avoided, either the driver or the vehicle system itself can respond. For example, notifications about traffic jams ahead are less time-sensitive than warnings about an imminent collision at an intersection.

DVR recognises that in particular those applications which are able to transmit information without delay to alert the driver if an unsafe situation is developing have a high potential to reduce accidents. In the next step the information can be used to improve the quality of autonomous vehicle functions (e.g. emergency braking). To enable these highly efficient safety functions, the entire process chain must meet defined functional safety requirements.

Data privacy and data security must be ensured.

To advance the deployment of communication-based vehicle safety functions, designed to prevent accidents or to warn the driver of an imminent collision, the applied communication technology must fulfil the following requirements:

- real-time information provision (transmission latency <3 ms with total communication latency of maximum 100 ms),
- constant and unrestricted availability for car-to-car applications,
- minimum range of 300 m,
- 360-degree awareness in the vicinity of the vehicle,
- compliance with international standards to allow interoperability of vehicles from different manufacturers and vehicle-to-infrastructure communication,
- functionality during the life cycle of the vehicle without causing additional and regular communication costs for the vehicle owner
- prioritisation of urgent safety notifications.

As early as 2013 the national project SIM TD (Sichere Intelligente Mobilität – Testfeld Deutschland) showed that such technologies can already enhance traffic safety. In the largest field trial for Vehicle-to-X communication conducted to date, the very first cooperative traffic centre was installed. This was connected to the traffic centres within one of the German federal states via standardised interfaces and was able to communicate with more than 100 roadside stations and 120 vehicles. The main finding of the project was that the tested technologies work under real-world conditions. Additional driver assistance systems, such as electronic brake light, cross-traffic assistant and

stop sign assistant, have been demonstrated to enhance overall road safety. The analysis of GIDAS accident data showed that these three systems could potentially address 33 percent of all accidents (maximum field of effect³).⁴

In 2015 the 'Cooperative ITS Corridor' was initiated in the Netherlands, Germany and Austria to advance this idea. On motorways, mobile road works trailers will apply communication technologies to communicate with approaching vehicles to increase road safety by avoiding rear impact accidents at road works.^{5,6}

The German Insurers Accident Research (UDV) conducted a study using real-world accident data which found that motorcycle safety would benefit in particular from safety functions based on real-time human-to-infrastructure communication technology. For example, intersection assistants, left-turn assistants and curve warning assistants have the potential to address more than 50 percent of severe motorcycle accidents involving personal injury.⁷ In view of the low rate of fleet replacement and the long life cycle of motorcycles in particular, aftermarket solutions should also be considered.

Resolution

To realise additional safety potentials DVR makes the following recommendations:

- To enhance road safety the deployment of real-time communication between road users and from road users to the infrastructure should be given high priority. It is imperative to considerate the findings of the field trials conducted to date. Data security and data privacy must be ensured.
- The applied communication technologies should meet the following requirements:

³"Field of effect" refers to the percentage of accidents that can be addressed by the systems related to all accidents recorded in Germany

⁴ Sichere Intelligente Mobilität – Testfeld Deutschland: Deliverable D5.5, TP5 final report – part A, 30.06.2013.

⁵ Harrer et al. (2016): Europe's C-ITS Corridor paves the way for C2X. ITS International, ROUTE ONE Publishing Ltd. May/June 2016, London.

⁶ Official project website; <http://c-its-korridor.de>.

⁷ Lindenau, Kühn (2014): Intelligente Systeme zur Verbesserung der Motorradsicherheit. Unfallforschung kompakt Nr. 45, German Insurers Accident Research (UDV), Berlin.

- real-time information provision (transmission latency <3 ms with total communication latency of maximum 100 ms)
 - constant and unrestricted availability for car-to-car applications
 - minimum range of 300 m
 - 360-degree awareness in the vicinity of the vehicle
 - compliance with international standards to allow interoperability of vehicles from different manufacturers and vehicle-to-infrastructure communication
 - functionality during the life cycle of the vehicle without causing additional and regular communication costs for the vehicle owner
 - prioritisation of urgent safety notifications.
 - The safety functions to be implemented should work in a real-world accident environment and should not be restricted to passenger cars. Above all motorcycles as well as emergency and rescue vehicles should benefit from these technologies from the outset.
 - The deployment of the following safety functions should have high priority as field tests have proven their performance and readiness for application under real-world conditions:
 - electronic brake light
 - cross-traffic assistant
 - stop sign assistant
- Other useful safety functions are:
- left-turn assistant
 - curve warning assistant for motorcycles
 - approaching emergency vehicle warning
- As the efficiency of the traffic safety functions will grow with the number of users, as many vehicles and road users as possible should be equipped with relevant technologies as quickly as possible. Aftermarket solutions, e.g. for motorcycles, should also be considered.
 - Euro NCAP should emphasise Vehicle-to-X technology and include it into its safety rating scheme.

signed
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 President