Press Release

Findings from the DEKRA Road Safety Report 2025

V2X technology on the road: A whole new dimension of safety

- Wireless communication with other vehicles or infrastructure
- Potential for digital early warning system in road traffic
- Reliable signal coverage and cyber security essential

Road mobility is facing a profound change. While driver assistance systems are already helping to reduce accidents, intelligent interconnectivity of vehicles, infrastructure, and road users is opening up a whole new dimension of safety. "V2X technology is becoming a key factor in preventive traffic management", says Thomas Jäger, Senior Vice President Global Connectivity and ITS Technologies at DEKRA. The latest DEKRA Road Safety Report 2025, "The Changing Face of Mobility", shows, among other things, how wireless communication among vehicles and between vehicles and infrastructure can help reduce the number of accidents.

Although specific quantitative data on the direct impact of V2X on road safety is still limited, some studies suggest positive effects. For example, a few years ago, the German Road Safety Council (DVR) referred to an evaluation by automotive supplier Continental of data from the German In-Depth Accident Study from 2005 to 2020: According to this, 30 percent of cyclists crossing intersections in Germany and 37 percent of pedestrians crossing roads were obscured before accidents occurred.

"They are not detected by conventional sensor-based safety systems, or are detected too late to prevent a collision", explains the DEKRA expert. In his opinion, V2X could remedy this situation through rapid information transmission. "The great added value of this communication is that it can inform drivers about dangerous situations along their route in a fraction of a second and warn them, while these dangers are not yet visible to the driver", he adds. During a future highly or fully automated journey, a vehicle could even brake or change lanes independently to avoid a collision.

A look at the statistics shows that accidents are often caused by poor visibility, unexpected maneuvers, or human error. V2X offers the first opportunity to exchange

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traffic information not only locally, but also in a wider environment. Vehicles communicate directly with each other, with traffic lights, traffic management systems, and even with the smartphones of unprotected road users like cyclists and pedestrians. Warnings can be issued in real time, even if the danger is behind a bend, an obstacle, or in a blind spot. With sufficient lead time, drivers receive important information before they can perceive the situation themselves. V2X therefore has the potential to serve as a kind of digital early warning system in road traffic.

A question of technology

To make the best possible use of V2X and provide the necessary connectivity, appropriate communication technologies are required. In Europe, these include the IEEE 802.11p Wi-Fi standard and the C-V2X (Cellular-Vehicle-to-Everything) mobile communications standard based on 4G and, in the future, 5G. However, 5G networks are once again significantly more powerful than their predecessor generation. While 4G only allows data rates of up to 100 megabits per second in practice, the 5G standard allows up to 1 or more gigabits per second – with a latency of 1 to 10 milliseconds. “If vehicles are to exchange data in real time with each other and with the infrastructure, such as traffic lights or traffic management systems, such an ultra-short delay time is essential”, says the DEKRA expert.

It is still unclear which standard will ultimately prevail in Europe. The US, Korea, and China have chosen the C-V2X (4G LTE, 5G NR) standard. An important aspect in this context is reliable signal coverage. After all, most applications related to connected mobility heavily depend on functioning communication. For non-safety-related applications such as infotainment, a loss of signal coverage is not critical – the user can easily determine whether connectivity is available or not. However, for safety-related services or applications such as e-call, warning indicators should be triggered to inform the user of communication failures. In addition, the system should be able to resume operation independently as soon as there is a stable signal again.

Cyber-secure connectivity

“What should be guaranteed at all times is protection against cybercrime”, demands DEKRA expert Jäger. To prevent external attacks as far as possible, manufacturers must ensure that all new vehicle types since July 2022 are tamper-proof in terms of connectivity and data transmission. Since July 2024, this regulation has applied to all vehicles newly registered in the EU. The basis for this is the set of rules developed in 2020 by the United Nations World Forum for Harmonization of Vehicle Regulations (UNECE WP.29), according to which manufacturers must operate a certified

management system for both cyber security (UNR 155) and software updates (UN-R 156) throughout the entire development and service life of a vehicle. In addition, the cybersecurity requirements of the EU Radio Equipment Directive will provide additional security for connected products from August 2025, as will the new EU Cyber Resilience Act from 2027.

The role of V2X in smart cities

In addition to road safety, V2X and the associated Intelligent Transport Systems (ITS) are also becoming increasingly important for future urban development. Digital solutions, networked infrastructures, and intelligent systems are being used for “smart cities” to optimize areas such as road traffic. For example, V2X can reduce traffic jams and delays by connecting to traffic lights and other traffic facilities. Adaptive traffic light systems adjust to traffic volume in real time and improve traffic flow. With the help of V2X, electric vehicles can be efficiently guided to charging stations and charging times optimized.

“Today's mobility environment consists of many different road users, and new innovations are constantly creating new opportunities”, explains Thomas Jäger. All participants must be connected in a modern city ecosystem to ensure road safety, he says. For example, the rising number of fatal accidents involving e-bikes and e-scooters has been a negative trend for years. “V2X is one way to reduce the number of road fatalities, as timely warnings in our vehicles alone would be a decisive advantage”, says the DEKRA expert.

Further background information on this topic, as well as many other aspects of “The Changing Face of Mobility”, can be found in the DEKRA Road Safety Report 2025. It is available at www.dekra-roadsafety.com.

About DEKRA

For 100 years, DEKRA has been a trusted name in safety. Founded in 1925 with the original goal of improving road safety through vehicle inspections, DEKRA has grown to become the world's largest independent, non-listed expert organization in the field of testing, inspection, and certification. Today, as a global partner, the company supports its customers with comprehensive services and solutions to drive safety and sustainability forward—fully aligned with DEKRA's anniversary motto, "Securing the Future." In 2024, DEKRA generated revenue of 4.3 billion euros. Around 48,000 employees are providing qualified and independent expert services in approximately 60 countries across five continents. DEKRA holds a Platinum rating from EcoVadis, placing it among the top 1% of the world's most sustainable companies.