

A milestone on the road to fully connected traffic 5G NetMobil project develops real-time communication solutions to boost safety and efficiency

May 5, 2020

PI 10944 BBM Fi/af

- ▶ Research project advances the state of the art in direct vehicle-to-vehicle and vehicle-to-infrastructure communication.
- ▶ Its results pave the way to standardization and mass production.
- ▶ Sixteen partners – major players, medium-sized enterprises, and research institutions – are finding solutions for key challenges in automotive real-time communication.

Stuttgart and Hildesheim, Germany – Safer, more convenient, greener: connected vehicles that can communicate with roadside infrastructure in real time reduce emissions and the risk of accidents. This communication requires a stable and reliable data link provided by high-performance 5G, the new fifth-generation wireless technology for cellular networks, or by Wi-Fi-based alternatives (ITS-G5). Sixteen research institutions, medium-sized enterprises, and major players have been working toward this goal over the past three years in the 5G NetMobil research project. They are now presenting their results which will enable major strides for a new era in mobility. “With the 5G NetMobil project, we have achieved decisive milestones on the road to fully connected driving and are demonstrating how modern communication technologies can make our road traffic safer, more efficient, and more economical, all at the same time,” says Thomas Rachel MdB, parliamentary state secretary in the German Ministry of Education and Research. His ministry had funded this research project with 9.5 million euros. The groundwork done in this project in the areas of networks, security, and communication protocols now underpins efforts to standardize specifications, develop new business models, and ramp up the partners’ first production runs.

A launch pad for innovative traffic engineering

In many traffic situations, it is virtually impossible for drivers to see everything they need to, such as pedestrians crossing convoluted intersections or vehicles suddenly emerging from blind alleys. Radar, ultrasonic, and video sensors are the eyes of modern vehicles. They monitor the traffic situation around the vehicle, but they cannot see around corners or behind obstacles. Direct vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I) and vehicle-to-network (V2N) communication enables vehicles to share data in real time with one another and their surroundings – even data on things that cannot be seen. The partners in the 5G NetMobil project are using this communication capability to develop tools such as a crossing assistant to protect pedestrians and cyclists at blind intersections. A camera installed in the roadside infrastructure detects pedestrians and warns vehicles within just a few milliseconds to prevent critical situations, for instance, when a car turns into a side street. Another item on the research agenda is platooning. In the future, commercial vehicles will be able to join up in convoy-like platoons where synchronized acceleration, braking, and steering enables trucks to operate at very close ranks thanks to V2V communication. This automated drafting – that is, tailgating another vehicle to ride in its slipstream – reduces fuel consumption and boosts safety on freeways. Experts from the participating companies and universities have laid out the groundwork for platooning with vehicles less than ten meters apart and for parallel platooning in agriculture. “The work of the research project is relevant to a wide range of applications. This not only benefits project partners from industry and research, but especially road users,” says Dr. Frank Hofmann from Robert Bosch GmbH, who is coordinating the research project on the manufacturing end.

Paving the way to standardization and new business models

This research project’s brief was to find solutions to key challenges in automotive real-time communication. There’s a good reason for this: direct V2V and V2I communication has to be failsafe, with high data rates and low latency, for fully connected driving to become reality. But what happens if the quality of the data link changes, leaving less bandwidth available for direct V2V communication? The experts developed an agile “quality of service” concept to detect changes in the provided network quality and alerts the connected driving functions accordingly. This way, the distance between vehicles in a platooned convoy can be increased automatically when network quality decreases. Another focal point of this research was to break the main cellular network down into discrete virtual networks (slicing). A separate subnet is now reserved for safety-critical functions such as alerting drivers to pedestrians at an intersection. This safeguard ensures data communication for these functions is always enabled. Another discrete virtual network handles data transmissions to stream videos

and update the road map. Its operations can be temporarily suspended when the data rate dips. This research project has also made significant contributions to hybrid communication where the more stable connection – either the cellular network technology or a Wi-Fi-based alternative – is used to prevent the data link from dropping out while the vehicle is on the move. “The insights gained in this project are now flowing into the global standardization of communications infrastructure. They are cornerstones for partner companies’ further development efforts,” Hofmann says.

Other questions and answers:

Are all partners in the 5G NetMobil project going to use the new 5G mobile communications technology to connect their vehicles?

No, the participating partners are pursuing different technological approaches to enable direct communication between vehicles and infrastructure – based on either cellular network technology or Wi-Fi-based alternatives (ITS-G5). This project aimed to build the foundation for standardizing both technologies and enabling manufacturer- and technology-agnostic communication.

What use cases were developed in this project?

The 5G NetMobil project focused on five applications – high-density platooning of commercial vehicles separated by less than ten meters, parallel platooning of harvesters, a crossing assistant that uses infrastructure-based detection to protect pedestrians and cyclists, and smart traffic control that enables vehicles to ride a wave of green lights and steers them swiftly through city traffic. Another task on its agenda was to draft specifications for the fifth-generation cellular network to meet the requirements of safety-related applications and treat the user to a satisfying user experience.

Partners in the 5G NetMobil project:

[Robert Bosch GmbH](#) (project coordinator)

[Technische Universität Dresden](#) (project co-coordinator)

[Acticom GmbH](#)

[BMW AG](#)

[CLAAS GmbH](#)

[Deutsche Telekom AG](#)

[dresden elektronik ingenieurtechnik GmbH](#)

[Ericsson GmbH](#)

[Fraunhofer Heinrich-Hertz-Institut](#)

[Heusch/Boesefeldt GmbH](#)

[Hochschule für Technik und Wirtschaft des Saarlandes – htw saar](#)

[Logic Way GmbH](#)

[Nokia](#)

[Technische Universität Kaiserslautern](#)

[Vodafone GmbH](#)

[Volkswagen AG](#)

Press photographs: #2971684, #2971685, #2971686, #2971687, #2971688, #2971689, #2971690

Additional information:

Link to [project website](#)

Contact person for press inquiries

Annett Fischer,

Phone: +49 711 811-6286

Twitter: @Annett__Fischer

Mobility Solutions is the largest Bosch Group business sector. It generated sales of 46.8 billion euros in 2019, and thus contributed 60 percent of total sales from operations. This makes the Bosch Group one of the leading automotive suppliers. The Mobility Solutions business sector pursues a vision of mobility that is safe, sustainable, and exciting, and combines the group's expertise in the domains of personalization, automation, electrification, and connectivity. For its customers, the outcome is integrated mobility solutions. The business sector's main areas of activity are injection technology and powertrain peripherals for internal-combustion engines, diverse solutions for powertrain electrification, vehicle safety systems, driver-assistance and automated functions, technology for user-friendly infotainment as well as vehicle-to-vehicle and vehicle-to-infrastructure communication, repair-shop concepts, and technology and services for the automotive aftermarket. Bosch is synonymous with important automotive innovations, such as electronic engine management, the ESP anti-skid system, and common-rail diesel technology.

The Bosch Group is a leading global supplier of technology and services. It employs roughly 400,000 associates worldwide (as of December 31, 2019). The company generated sales of 77.7 billion euros in 2019. Its operations are divided into four business sectors: Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology. As a leading IoT provider, Bosch offers innovative solutions for smart homes, Industry 4.0, and connected mobility. Bosch pursuing a vision of mobility that is sustainable, safe, and exciting. It uses its expertise in sensor technology, software, and services, as well as its own IoT cloud, to offer its customers connected, cross-domain solutions from a single source. The Bosch Group's strategic objective is to facilitate connected living with products and solutions that either contain artificial intelligence (AI) or have been developed or manufactured with its help. Bosch improves quality of life worldwide with products and services that are innovative and spark enthusiasm. In short, Bosch creates technology that is "Invented for life." The Bosch Group comprises Robert Bosch GmbH and its roughly 440 subsidiary and regional companies in 60 countries. Including sales and service partners, Bosch's global manufacturing, engineering, and sales network covers nearly every country in the world. The basis for the company's future growth is its innovative strength. Bosch employs some 72,600 associates in research and development at 126 locations across the globe, as well as roughly 30,000 software engineers.

To learn more, please visit www.bosch.com, iot.bosch.com, www.bosch-press.com, twitter.com/BoschPress.