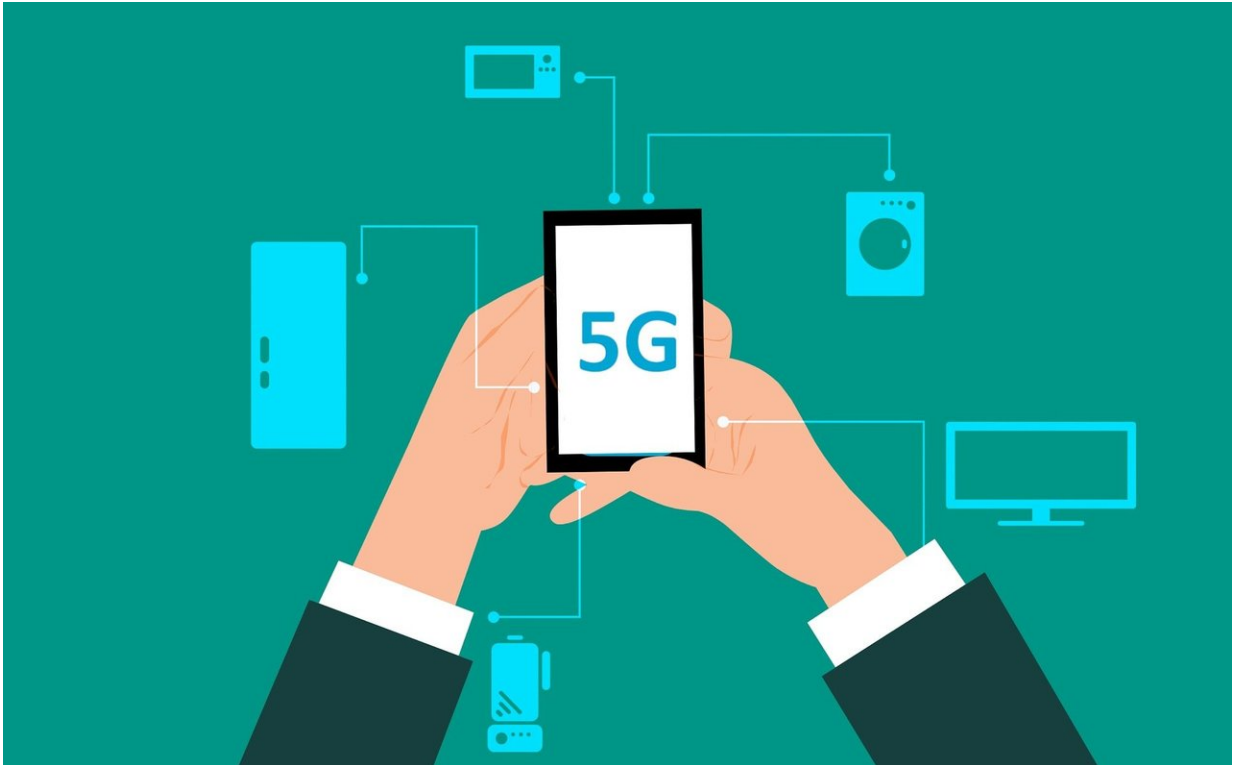


5G network to improve road safety

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Next-generation mobile network and fast data transmission solutions can be used to collect a huge amount of data on vehicles on the road. The information can be used, for example, to provide road weather services, carry out road maintenance and control self-driving cars. Ultimately the aim is to reduce accidents.

VTT's 5G-Safe project explores the possibilities of using the 5G mobile network to improve [road safety](#) in collaboration with partners such as the Finnish Meteorological Institute, Destia and Unikie. The project is part of the Challenge Finland competition and financed by Business Finland.

Thanks to the fast 5G network and new data transmission solutions, vast amounts of sensor, video and radar data can be collected from vehicles. The information can also be transmitted in almost real time.

"The data can be collected automatically without the drivers needing to do anything themselves. The required technology can be installed at the factory", explains Senior Scientist Tiia Ojanperä from VTT. "The data can also be processed and warnings sent to other road users by means of automated systems."

Icy corner ahead—please slow down!

Local road weather services are one of the key applications for the collected data. In the future, real-time weather information and warnings can be sent directly to drivers' satellite navigation devices, for example.

"The new solutions give drivers access to highly localised data, such as warnings about icy conditions around the corner. Drivers can use the information to choose a different route or change the way they drive."

Some automated weather warnings can also be transmitted via the 4G [mobile network](#), and solutions are being introduced gradually. However, transmitting real-time video footage or 3-D views between vehicles requires considerably more network capacity. The fast 5G network has the required capacity.

"One way to use vehicle videos and 3-D views is a see-through application piloted as part of our project. It can be used, for example, to

share the dashboard camera footage of a lorry holding up a long queue of cars with the drivers stuck behind the lorry. This increases safety especially in poor weather conditions such as when visibility is obstructed by drifting snow", Ojanperä explains.

Crowdsourcing information for road maintenance purposes

5G technology also opens up new possibilities from the perspective of road maintenance. The new technology provides an extremely efficient way to collect information on the condition of roads. The data can be used to alert road maintenance providers to a range of issues requiring their attention, such as snow build-up, potholes or fallen trees.

"Road maintenance contractors are currently responsible for collecting this information themselves and therefore need to drive around to inspect roads visually. This is highly labour-intensive work. If

monitoring could be crowdsourced to all road users, road maintenance contractors could work considerably more efficiently and also cut their costs."

Having access to comprehensive and reliable data would allow road maintenance contractors to prioritise the most urgent jobs. Issues could be identified at an earlier stage and fixed more promptly. More efficient maintenance could improve the entire road network and therefore increase road safety.

Self-driving cars expand their territory

5G technology helps human drivers behind the wheel, but its impact on self-driving cars could be even more revolutionary. Real-time data can

be used to better control self-driving cars and change their behaviour on the basis of observations. VTT's self-driving car Martti has already trialled these possibilities in respect of, for example, detecting icy conditions and obstacles on the road in advance.

Precise information can be vital in challenging conditions and even expand the potential uses of self-driving cars. Self-driving cars are currently mostly used in areas where weather conditions are not a problem. This does not need to be the case in the future.

"Controlling self-driving cars in Finland's climate requires accurate information on road conditions almost in [real time](#). The [new technology](#) makes it possible to collect data from areas beyond the cars' own sensors. These kinds of services are extremely important for future self-driving cars."

Towards global markets

Services developed in the course of the 5G-Safe project have been piloted in real-life environments, such as on the Finnish Meteorological Institute's winter vehicle test track in Sodankylä, Lapland. The next step is to commercialise the results.

"Our research partners Destia, the Finnish Meteorological Institute and Unikie are good examples of organisations that have benefited from technological innovations. Our partners have already begun to commercialise these services", Ojanperä says. "However, more extensive commercialisation will need to wait until the 5G network is rolled out. The fact that there are already applications and demand for the 5G network is useful for [network](#) device manufacturers and operators."

VTT is currently planning a follow-up project involving further development of vehicle solutions based on 5G technology. "The new

project will also include partners elsewhere in Europe. There is clearly a lot of interest in solutions and services that improve [road](#) safety on the global market as well."

Provided by VTT Technical Research Centre of Finland

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