



## **5G mobile network technology: developments in the transport sector**

Number 30, 2019

Part of the [Tranzinfo Hot Topics](#) series, this issue offers a selection of material on the developing role of fifth-generation (5G) mobile network technology in the transport sector. 5G is currently being rolled out in cities across the world. It promises to play a much larger role in industry and everyday life than existing 3G and 4G technology. Due to its speed, capacity and the reliability of its connectivity, 5G technology promises to transform industries as diverse as retail, education, entertainment, and transport with improved performance, efficiency, and cost. In the transport sector, proponents of 5G technology claim that it will help to speed the development of connected and autonomous vehicles, enlarging the possibilities for vehicle to vehicle (V2V) and vehicle to everything (V2X) connectivity. Other areas of transport such as logistics and rail are also set to benefit.

The automobile and tech industries have been divided for several years on whether to use Wi-Fi based DSRC or 5G cellular based communications in connected cars and the debate is ongoing. Recently, however, [European Union member states](#) rejected an effort to mandate Wi-Fi as the standard for future car-to-car communications, leaving the door open to 5G-connected cars in Europe, but not precluding Wi-Fi from being used as well.

This Hot Topic focuses on the fast-developing area of 5G mobile network technology in connected and autonomous vehicles.

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## Opportunities/benefits

### [Recent advances in connected and automated vehicles](#)

Elliott, D et al., Journal of Traffic and Transportation Engineering, vol. 6, no. 2, April 2019

A comprehensive review of recent advances in CAV technology and the role of 5G.

### [5G communication: an overview of vehicle-to-everything, drones, and healthcare use-cases](#)

Ullah, H et al., IEEE Access, vol. 7, 2019

An investigation of the potential beneficiaries of 5G in three main use cases: vehicle-to-everything (V2X) communication, drones, and healthcare. Highlights the problems and deficiencies of current cellular technologies with respect to these use-cases and highlights how 5G will overcome those deficiencies.

### [Development in the mobility technology ecosystem - how can 5G help?](#)

McKinsey & Company, June 2019

Fifth-generation wireless technology, or 5G, will be a key enabler of more reliable communication for vehicles, which will play a critical role in managing the safety challenges that come with vehicle automation and autonomy. 5G will significantly reduce latency and increase reliability compared with current technologies, enabling new use cases such as trajectory sharing, real-time local updates, and coordinated driving.

### [Impacts of 5G on productivity and economic growth](#)

Australian Government, Department of Communications and the Arts, 9 April 2018

This working paper provides estimates of the costs and benefits that may stem from 5G and the impacts on businesses and consumers.

### [5G Americas White Paper: Cellular V2X Communications Towards 5G](#)

5G Americas, March 2018

Describes the current status of V2X with a focus on the Americas region and provides insights into how emerging 5G technologies will accelerate the realization of advanced V2X communication to improve the transport experience and quality of life.

### [Special report: 5G and the autonomous vehicle](#)

Automotive World, 1 October 2018

Investigates the role of 5G in the development of an ecosystem for autonomous vehicles

### [5G for V2X Communications](#)

Molinaro, A & Campolo, C, 5G Italy, 2018

Describes the status quo of V2X communications by analyzing the main application requirements and current activities in the R&D community

towards 5G-enabled V2X. Also covers research challenges and opportunities, along with perspectives about system design and enablers for 5G-V2X communications.

#### [Connected roads of the future: use cases, requirements, and design considerations for vehicle-to-everything communications](#)

Boban, M et al., IEEE Vehicular Technology Magazine, vol 13, no. 3, 2018

The ultimate goal of next-generation vehicle-to-everything (V2X) communication systems is enabling accident-free, cooperative automated driving that uses the available roadway efficiently. This paper analyses possible system designs for fifth-generation (5G) V2X that could help to achieve this goal.

#### [5G mobile: disrupting the automotive sector](#)

Teece, DJ, U.C. Berkeley, 2017

The automotive applications of 5G not only highlight the potential for 5G to enable increased productivity and sales, but also the social gains from—among other things—improvements in traffic flow, reduced wear and tear on infrastructure and on vehicles, reduced Green House Gas (GHG) emissions and reduced collisions and fatalities. 5G will provide a perhaps substantial boost to so-called “V2X” communications, which in turn will augment and enhance the capabilities of autonomous vehicles. It is through this mechanism that the social benefits—which in many cases can be easily translated into what economists call gains in output—will be realized.

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## Case studies/trials

#### [Automotive and transport among most-tested use cases for 5G technologies](#)

Intelligent Transport, UK, January 2019

The automotive and transport sectors currently account for the most 5G pilots in the EU, according to a report from the European Commission's 5G Observatory.

#### [The European 5G annual journal 2019](#)

5G PPP, 2019

Presents an analysis of 5G projects in Europe over the past year.

#### [KPMG 2019 autonomous vehicles readiness index: assessing countries' preparedness for autonomous vehicles](#)

KPMG International, 2019

Many of the top countries, such as the Netherlands and the UK, are developing 5G networks and using them to test autonomous vehicles.

#### [5G connectivity to be deployed at London's Smart Mobility Living Lab](#)

Traffic Technology Today, 7 November 2019

UK-based telecommunications company O2 has signed an agreement to provide 5G connectivity for the testing of connected and autonomous vehicles (CAVs) in the Smart Mobility Living Lab (SMLL), an urban testbed in London.

#### [Verizon 5G Ultra Wideband network now live at Mcity Test Facility](#)

University of Michigan, 10 September 2019

The Verizon 5G Ultra Wideband network is now live at the University of Michigan Mcity Test Facility where Verizon is testing various 5G solutions designed to boost pedestrian safety and avoid car accidents.

#### [Future of technology explored in Melbourne testbed](#)

City of Melbourne, 23 May 2019

The City of Melbourne has established a testbed for telecommunication providers and technology companies to trial emerging technologies including 5G and the Internet of Things (IoT).

#### [New Zealand's first 5G-connected driverless car tested on Auckland streets](#)

Spark New Zealand, 13 March 2019

A 5G-connected driverless car is being tested in Auckland's Wynyard Quarter Innovation Precinct, in a collaboration between Spark New Zealand and Ohmio Automotion.

#### [West Midlands to become UK's first large-scale 5G testbed](#)

Department for Digital, Culture, Media & Sport, 4 September 2019

The West Midlands region has been selected to be the UK's first multi-city 5G test bed, with an initial focus on new digital technologies sectors including transport.

#### [Researchers set an autonomous vehicle communications record using 5G: a movie's worth of data sent in seconds](#)

University of Warwick, 26 September 2019

Researchers at the University of Warwick have set a new 5G communications speed record to a level 4 autonomous vehicle, allowing for rapid sharing of large quantities of data between vehicles and with traffic management systems.

#### [Will this be the world's most accurate streetmap? Ambitious project launches in UK](#)

ZDNet, 7 May 2019

The UK's national mapping agency, the Ordnance Survey, has launched a trial to create highly detailed streetmaps to help with the rollout of 5G and autonomous vehicles.

#### [LG Uplus completes 5G self-driving car trial in Seoul](#)

RCR Wireless News, 11 March 2019

Korean carrier LG Uplus and Hanyang University showcased an autonomous vehicle driving itself for 25 minutes across 8 kilometres, using 5G connectivity.

### [South Korea builds fake city to boost self-driving cars](#)

EFE, 4 July 2019

South Korea has opened K-City, the world's first fifth-generation (5G) network-based mobility technology testing site in Hwaseong, Gyeonggi Province, to trial self-driving cars in a real road environment.

### [Telstra turns on free 5G-enabled Wi-Fi and Australia's first 5G connected car](#)

Telstra media release, 27 March 2018

Telstra trialled a 5G connected vehicle with the Intel 5G Automotive Trial Platform as part of a roll-out of 5G services near its Innovation Centre on the Gold Coast.

### [Intel and Ericsson 5G connected cars trial attains 1Gbps speeds](#)

ZDNet, 7 November 2017

A 5G trial in Tokyo between NTT DoCoMo, Intel, Ericsson, Denso, and Toyota has attained data speeds of 1Gbps/600Mbps for 4K video streaming in a connected vehicle travelling at 30km/h, the companies have announced.

### [5G connected car pilot project \(Barcelona\)](#)

The 5G Connected Car pilot project, developed by SEAT, Telefónica, Ficoso, ETRA, Qualcomm and 5G Barcelona, with the collaboration of CCTC and UPC, combines the benefits of 5G technology such as low latency and edge computing in 2 fields: road safety, and information and entertainment.

### [5G opportunities and challenges to be examined](#)

Parliament of Australia, 19 September 2019

The Federal Government has initiated a Parliamentary inquiry into fifth-generation (5G) mobile network technology in Australia.

### [The 5G Infrastructure Public Private Partnership \(5G PPP\)](#)

A joint initiative between the European Commission and European ICT industry (ICT manufacturers, telecommunications operators, service providers, SMEs and researcher Institutions). The 5G-PPP is now in its third phase where many new projects were launched in Brussels in June 2018. The 5G PPP will deliver solutions, architectures, technologies and standards for the next generation communication infrastructures of the coming decade.

### [5G Automotive Association \(5GAA\)](#)

A global, cross-industry organisation of companies from the automotive, technology, and telecommunications industries, working together to develop solutions for future mobility and transportation services.

The 5GAA supports the idea that 5G will be the ultimate platform to enable C-ITS and the provision of V2X. The site includes 5G studies, test results and white papers.

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## Risks

### [EU coordinated risk assessment of the cybersecurity of 5G networks](#)

NIS Cooperation Group, October 2019

This high-level report sets out the key common findings emerging from the national risk assessments of 5G networks carried out by each EU member state

### [Securing 5G Networks: challenges and recommendations](#)

Council on Foreign Relations, US, 15 July 2019

Western governments are grappling with the risks posed by Huawei and other Chinese vendors of 5G infrastructure equipment. U.S. policymakers need to adopt a broader strategy that includes technical measures, regulatory adjustments, a sensible legal liability regime, diplomacy, and investments in research and cybersecurity skills training.

### [Overview of risks introduced by 5G adoption in the United States](#)

Cybersecurity and Infrastructure Security Agency, US, 31 July 2019

5G hardware, software, and services provided by untrusted entities could increase the risk of compromise to the confidentiality, integrity, and availability of network assets. The United States Government can manage these vulnerabilities and increase the security of communications networks by adopting a number of measures.

### ['Make or break' moment for 5G](#)

BBC News 29 October 2019

The World Radiocommunication Conference 2019 in Egypt will attempt to find global agreement on how 5G airwaves should be allocated, with the European Space Agency warning that opening up the airwaves will harm climate change research and make weather forecasting more difficult.

### ['Australia's last chance': Huawei pleads for lift in 5G ban as UK dithers](#)

The Age, 1 November 2019

In a submission to an Australian Government inquiry into 5G in Australia, Huawei has urged the committee to request the government to reconsider its ban.

### [The road to 5G: the inevitable cost of infrastructure growth](#)

McKinsey & Company, February 2018

Network cost could double as operators strive to meet demand for increased capacity and deploy 5G. How can they maintain their profits?

### [Misinformation about Australia's 5G network](#)

ARPANSA, 3 June 2019

A fact sheet produced by the Australian Radiation Protection and Nuclear Safety Agency. Contrary to some claims, there are no established health effects from the radio waves that the 5G network uses.

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