

# **THE NEXT GENERATION OF MOBILE COMMUNICATION:**

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Launch of 5G as from 2020

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## Key Facts

- › The fifth generation of mobile communication will set new standards in terms of speed, bandwidth and stability.
- › The foray into the Internet of Things (IoT) in people's daily lives will be hugely supported by 5G.
- › Industry has acknowledged the potential for its application and is making huge investments in the expansion of mobile infrastructures.

## Report

### TEASER – NEW POTENTIAL APPLICATIONS

The Internet of Things, machine-to-machine communication, mobile virtual reality, instant payments – until recently, these terms all seemed to describe far-off visions of the future, but now represent actual technical innovations we can expect to see in the next few years.

This new paradigm shift will be made possible by 5G, the fifth generation of mobile communication technology.

### HISTORY AND DEFINITION OF THE 5G MOBILE COMMUNICATION NETWORK

Each of the four previous generations of mobile communication can be easily distinguished by clear characteristics, and each one aimed to remedy the weaknesses of the previous generation. For example, from the first generation, analogue telephony, to the third generation, we saw the elimination of major data security weaknesses and satisfied people's demand for mobile communication. The next significant step in the evolution of mobile communication was the currently active 4G LTE network, which brought broadband to mobile end devices for the first time and significantly reduced latency times for

data usage, clearly boosting acceptance for mobile services.

The fifth generation of mobile communication will distinguish itself by offering comprehensive (global) networking in real time, ensuring entry into the Internet of Things and machine-to-machine communication.

### INFRASTRUCTURE AND RANGE OF SERVICES

This will be associated with a comprehensive expansion of existing communications infrastructure (2G, 3G, 4G, WiFi) by network and infrastructure operators. By 2020, the GSMA mobile communications trade association expects to see USD 1.4 billion invested in technology for mobile networks in order to ensure higher global coverage and network density, which will go hand in hand with increased performance.

With 5G, the aim of the industry is to ensure that the following range of services can be offered:

- **Bandwidth:** Download speeds of up to 10 Gbit/sec
- **Reaction time:** Response time/latency of under 1 ms
- **Stability:** Downtime of under one third of a second per year
- **Number of users:** Network cells will be able to communicate with 1,000 times more users in future

Generation	Primary services	Key differentiator	Weakness (addressed by subsequent generation)
1G	Analogue phone calls	Mobility	Poor spectral efficiency, major security issues
2G	Digital phone calls and messaging	Secure, mass adoption	Limited data rates – Difficult to support demand for internet/ e-mail
3G	Phone calls, messaging, data	Better internet experience	Real Performance failed to match hype, failure of WAP for internet access, Tied to legacy, mobile specific architecture and protocols
4G	Phone calls, messaging, broadband data, All-IP Services (including voice, messaging)	Faster broadband internet, applications, lower latency	?

Figure 1: Chronological list of generations of mobile communication with their key differentiators and weaknesses

- **Energy requirements:** Up to ten times more energy-efficient than 4G

The two major factors that make the launch of 5G so significant are the extremely high bandwidth of 10 Gbit/sec and the much shorter latency periods of under 1 millisecond. By comparison: 10 Gbit/second corresponds to 10,000 Mbit/second. This would make 5G about 100 times faster than 4G/LTE, which reaches download speeds of up to 100 Mbits per second. This would make it possible to download a high-resolution film of more than 10 GB within seconds.

#### OPPORTUNITIES FOR APPLICATIONS

This kind of performance from a mobile network will open up hitherto unimagined opportunities for applications, going far beyond the obvious benefits of a fast, stable network for the use of mobile video telephony and the streaming of high-resolution video content.

The way in which we travel will also change as a result of autonomous vehicles. The new mobile communication standard will help to make the use of cars safer and more conven-

ient. Autonomous cars will be able to automatically collect information about their surroundings and potential hazards during the journey, but also share this information in real time. Processing the hugely increased amounts of data collected by an individual car, and constantly exchanging this information with other vehicles on the road, can now be ensured for the first time with the aid of 5G infrastructure. The industry also predicts similar potential applications for robots resulting from 5G. While robots' applications today tend to be mainly static, carrying out repetitive tasks, in future, they will develop cognitive characteristics and will be able to help people in a more productive and independent way. As a result, the new mobile infrastructure will not be solely limited to enabling the remote operation and monitoring of robots. As with autonomous cars, it will rather form the basis for processing a flood of information that robots will detect about their environment using sensors. The data collected will be transferred to the continually growing, intelligent reservoir of knowledge in the

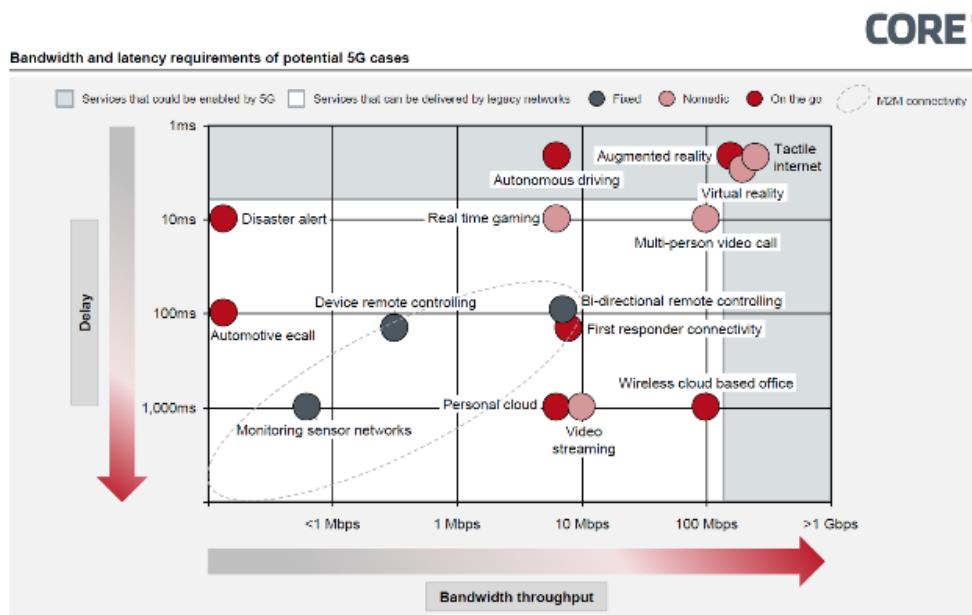


Figure 2: Potential use of standard applications in a comparison of bandwidth and response time Source: GSMA Intelligence

cloud, to which the robots have constant access. The cognitive abilities of the robots will thus evolve alongside the increasing amounts of data. The prerequisite for this kind of information processing by robots and autonomous cars is the evolution of the mobile communications network. Both in terms of the industrial work of robots and autonomous cars on the road, a stable network with consistently low latency periods is essential in order to guarantee the safety of road users.

Other opportunities for the use of 5G also include the entertainment and services industry, where new forms of social media and consultancy will emerge in connection with virtual reality technology. Virtual reality (VR) enables the user to experience reality and its corresponding physical sensations via computer-generated virtual reality in real time. While VR is currently limited to wearing special goggles at a designated station, this will change with the development of new mobile devices that will enable the user to experi-

ence virtual reality regardless of their location. This will result in significant changes for social networks as people are able to broadcast live, as well as enabling these services to be adopted by more, as yet untapped segments of society.

It will also open up new opportunities for consultancy-based industries. One-to-one appointments with customers can be carried out regardless of time and place thanks to virtual reality. The prerequisite for the user-friendliness of such developments also lies in ensuring a fast mobile connection with low latency.

Consequently, it is expected that the banking industry, at least in retail banking – apart from the investment requirements of corporate business – will experience a range of as yet unimaginable changes in its business models as a result of 5G, as well as in terms of back-office operations and IT structures. The effectiveness of these changes must be taken into account in strategic discussions. For example, we would cite the requirements

of PSD2 and instant payments, where contemporary IT infrastructures would currently not meet efficiency requirements for use in retail banking business processes and products if the upcoming requirements are not taken into account.

#### SUMMARY

In conclusion, we can state that industry is aware of the enormous range of opportunities for applications with a higher performance mobile network and is, therefore, also investing heavily in the expansion of the

communications network. The fifth generation of mobile communications will thus become one of the top innovation drivers in the next few years. If the industry succeeds in implementing the standards required for 5G, new opportunities will open up in terms of dynamic economic growth. Innovations and technologies such as autonomous vehicles, intelligent, interactive robots and mobile virtual reality will be available on the mass market and represent an enormous opportunity for the finance and insurance industry to stand alongside this evolution.

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