

# WHAT ARE CELLULAR COMMUNICATION STANDARDS?

## HOW DO CELLULAR COMMUNICATION STANDARDS AFFECT MY LIFE?

Cellular communication standards, like 4G and 5G, are the blueprints for the complex radio system and networks that enable mobile communication and global device connectivity. They provide the foundation for entirely new digital ecosystems and marketplaces, like mobile apps and the Internet of Things (IoT).

They are the reason you can access social media and order an Uber on your smartphone while on the go. Or, if you have a smartwatch, you can even leave that smartphone at home when you are out for a run because your notifications can be sent to your wrist.

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## WHAT DO WE MEAN BY “CELLULAR TECHNOLOGY”?

‘Cellular’ technology is the name given to the cutting-edge telecommunication technologies that are selected to be part of cellular communication standards. The latter enable smartphones and other mobile devices to stay wirelessly connected to cellular networks while moving over large distances. By contrast, other wireless communication standards like Wi-Fi provide much more limited mobility (within the range of a single domestic or commercial access point).

Cellular standards use complex radio systems to transmit information between mobile devices within the cellular network. The name ‘cellular’ describes the pattern of small geographical area radio “cells” created around towers or antennae. By working together, the whole cellular network can accommodate a huge number of connections and can find and transmit to a mobile device wherever it is located within the network even if its connection is moving rapidly from cell to cell.



Cutting-edge **technologies** and **solutions**.

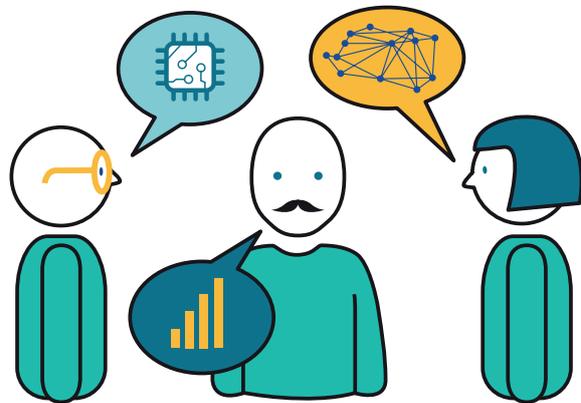
## HOW ARE THE CELLULAR COMMUNICATION STANDARDS CREATED?

Standards are published documents containing the technical specifications or blueprints for the complex radio systems and physical networks that enable mobile communication.<sup>1</sup>

Cellular communication standards are developed in an open system of both competition and collaboration between leading research and development (R&D) focused companies, universities and public institutions.

After years of R&D, organisations voluntarily submit their cutting-edge inventions to the standardisation process for testing, review, and selection. Experts then weave together the best new technologies to create a single updated set of blueprints for the next generation of networks and devices.

Individual hardware manufacturers then use the blueprints to build mobile devices and the core network. This ensures that the cellular network and mobile devices are compatible, interoperable and enabled with the latest and best telecommunication technologies.



<sup>1</sup> <https://www.3gpp.org/specifications/specifications>

## WHAT ARE THE BENEFITS OF CELLULAR COMMUNICATION STANDARDS?

Each generation of cellular standards targets a new set of advances for networks and services. The first generation (1G) enabled truly mobile wireless communication. 2G ushered in the era of text messaging. 3G was defined by mobile internet access, and 4G delivered the high data speeds that have enabled the smartphone revolution and app ecosystem which continue to transform society to this day.

The open standardisation system which delivered the global mobile communication revolution is based on a European model of collaborative technology development dating back to 2G/GSM and has four major benefits:

**1. Focusing global R&D resources.** The development process has been carefully designed to maximise innovation in two ways. Firstly, by establishing technical challenges and setting clear objectives at the start of the standardisation process, R&D efforts are channelled in the required directions. Secondly, the global adoption of cellular communication standards by hardware manufacturers and network owners provides strong incentives for companies, universities, and research organisations to commit resources to inventing new and better telecommunication solutions.

**2. Promoting competition and innovation in connected hardware and services.** High performance cellular networks and mobile devices are the foundation for a large proportion of the digital economy. While there are currently a relatively small number of organisations that contribute technologies to cellular standards development, a much greater (and quickly growing) number of companies implement them in their connected products. Global access to cellular standards creates greater competition and innovation in the development of new devices (e.g. smartphones). In turn, high-performance cellular networks and devices provide the platform for entirely new digital ecosystems and marketplaces, like the app ecosystem and the IoT. Without recent improvements to cellular standards, it would be impossible to upload high-resolution photos or videos to social media while on the move or unlock an electric scooter on the go.

**3. Rapid consumer access to the latest and best technologies.** Having open access to a standardised set of best-in-class telecommunication technologies is a key incentive for hardware manufacturers and network providers to implement R&D breakthroughs quickly and on a global scale. In turn, this leads to rapid consumer access to new mobile functionality and services. For example, while mobile phones were not widespread in the 1990s, today there are over 2 billion smartphone users and over 5 billion mobile subscribers.

**4. Ensuring global device interoperability.** In the modern world, consumers expect to be able to use their devices seamlessly whether in Brussels, Washington, or Tokyo. Cellular communication standards have achieved global reach, with all connected hardware manufacturers and network owners implementing the same core technologies. This means that devices made by different brands can seamlessly 'talk' with the network and with one another worldwide. Without cellular standards, we would depend on an alternative, fragmented range of less advanced networks with limited geographic reach. Our devices would only be able to communicate with others of the same type and in certain regions.

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## WHAT ARE THE BENEFITS OF THE 5G CELLULAR STANDARD?

The 5G standard is now being rolled out and will help enable future developments in areas such as autonomous driving and the Internet of Things (IoT) by allowing the transmission of large amounts of data, at extremely high speeds, with close-to-zero delay (latency), between vast numbers of devices on the same network.

While 4G is most commonly implemented in smartphones, smart watches, laptops, and other ICT products, 5G is likely to be used to connect numerous other household and commercial products from large appliances to heating systems and cars.

Hence, cellular standards are about to become extremely important across entirely new sectors and industries. Most of these new applications have not yet been imagined, but some early applications will be:

**Industrial IoT** Readily available mobile broadband solutions will create a boom in the number of industrial IoT networks, with hundreds of sensors and devices across supply chains able to communicate in real time, at high speeds, with low latency, and simultaneously with each other. Entire industries will be able to revolutionise their internal processes.

**Connected and autonomous vehicles** 5G will enable any car to communicate simultaneously, reliably, and at highspeed with any number of other surrounding cars. This will be crucial for road safety in a future where connected and autonomous driving is widespread.

**Telehealth** Applications such as remote surgery will be possible, enabled by high data speeds coupled with extremely low response time between devices and network (latency).

