

# MAKING CELLULAR COMMUNICATION STANDARDS

## AN INTRODUCTION TO OPEN CELLULAR STANDARDS

Open cellular standards are the telecommunication technologies that make your mobile phone or smartphone stay wirelessly connected to cellular networks while moving over large distances. They enable mobile device connectivity and interoperability through their use of a complex radio system that transmits data between mobile devices and the cellular network. It is these standards that have enabled the smartphone revolution and will now enable the Internet of Things (IoT). The fifth generation of the open cellular standard is called 5G.

Inventing the next generation global cellular communication technologies is a massive task which could not be accomplished by one single company or organisation alone. The tried and tested open standards development model has been carefully designed to incentivise some of the world's greatest R&D engineers to focus their research and resources on inventing solutions to the technical challenges that each new standard aims to solve.

The technical requirements for each generation of standard are agreed by the International Telecommunication Union (ITU) and delivered by the '3rd Generation Partnership Project' (3GPP), the body that coordinates cellular standards development.

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## HOW ARE OPEN CELLULAR COMMUNICATION STANDARDS MADE?

3GPP is a consortium of seven regional Standards Development Organisations (SDOs) including ETSI, the European standardisation organisation dealing with telecommunication, broadcasting and other electronic communication networks and services.

3GPP oversees the process of developing new cellular communication standards. It establishes the timeframe and manages the process for developing the standard through numerous technical meetings which take place across the globe, with different groups addressing different aspects which are all developed in parallel. 3GPP is also responsible for publishing the final specifications, and subsequent revisions. Once finalised, the regional SDOs transpose the technical specifications into official standards recognised by the respective standards body.

**The development of a cellular communication standard happens in several stages:**



### 1. Objective setting:

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Hundreds of leading engineers, representing public and private sector organisations, gather under the auspices of 3GPP to organize the work needed to meet the technical requirements for the next generation of cellular standards. Some of these requirements are download speeds and low latency, needed to enable advances in mobile device functionality, consumer experience and the development of new digital services and markets.



### 2. Research and development:

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World leading telecommunications engineers work within their own organisations (or collaboratively) to develop cutting-edge technologies that provide solution to the technical challenges identified. At the cost of thousands of years of working hours and billions of Euros in R&D (which often pre-dates standardisation work), many competing inventions are developed and voluntarily submitted for possible use in the standard. Some become part of the standard, but most do not.

### 3. Voluntary contribution and FRAND commitment:

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During standardisation work, organisations inform their regional SDO whether they are willing to license their new intellectual property (IP) on a Fair, Reasonable, and Non-Discriminatory basis, if their patented technical solutions are selected for inclusion in the final cellular communication standard. This is called the FRAND commitment. The FRAND commitment is very important as it gives SDOs, global device manufacturers, and network owners the certainty that the full standard will be accessible, without any single patent owner being able to arbitrarily block access to essential technology. In the rare instances that organisations declare they are not willing to license their patented technology on a FRAND basis, this technology is excluded from the process and work continues to find an alternative solution.

#### 4. Testing and selecting 'best in class' cellular technologies:



Tens of thousands of technical solutions are submitted to the standardisation process. They are then sorted into categories for testing, review and selection in 3GPP working groups. The 'best in class' technologies from each working group are then agreed upon by consensus.

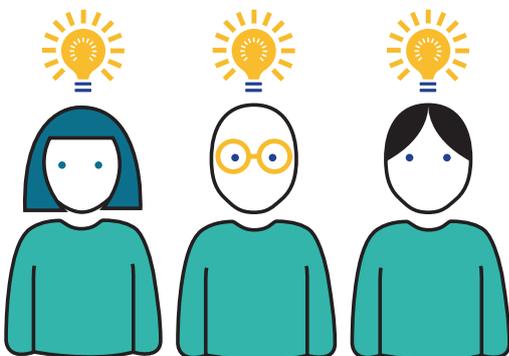


#### 5. Publishing the standard:

Once the testing and selection phase is complete, 3GPP puts out a document called a release. The release, which is usually thousands of pages long, contains detailed technical specifications on how to manufacture (or 'implement') the numerous innovative cellular technologies contained within, and how they function together. These technical specifications are then transposed into standards by the SDOs.

Open cellular communications standards are **open...**

- at point of technology **contribution**: any innovator with a technical solution to an identified need is welcome to join the collaborative standardisation process
- at the point of **access** to the technical specifications: the final document on the newly standardised technology is accessible to anyone interested in **implementing** the standard into a product



## EUROPE'S ROLE IN CREATING AND SUPPORTING THE SYSTEM OF OPEN CELLULAR STANDARDS

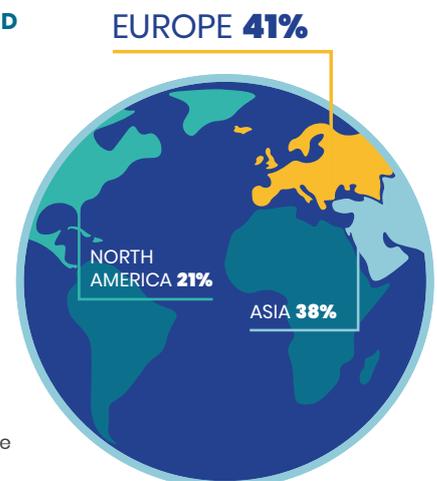
European companies led the creation of globally successful cellular standard and the model of open cellular standards development. Over the past decades, many of the world's most innovative and R&D-intensive companies – including European technology giants Ericsson, Orange, and Nokia – have invested billions of Euros into inventing ground-breaking cellular technologies to contribute to open standards. European companies have been major contributors of technology to each generation of open standards since. They are once again among the key contributors to 5G.

European institutions have also made efforts, such as providing funding through Horizon 2020 and a tailored public-private partnership (5GPPP). The partnership earmarked public funding of €700 million, which industry agreed to match by up to 5 times, to create a fund of more than €3 billion.

The EU's Digital Single Market ambitions are inextricably linked to technologies that "work smoothly and reliably together, provide economies of scale, foster research and innovation and keep markets open."<sup>1</sup> That is why Europe needs to support the open cellular standards model which has delivered clear and tangible benefits over the past three decades.

Despite past commitments, there is a danger that Europe's cellular technology innovation crown is starting to slip, as other world regions recognise leadership in this sector as a priority strategic asset. It is therefore important that the European Union backs up its recognition of the strategic importance of 5G and open cellular standards by prioritising policies that protect fair legal and commercial frameworks, within which a world leading digital innovation ecosystem can develop.

#### CELLULAR STANDARD DEVELOPMENT PARTICIPATION BY REGION:



Indicative figures based on 3GPP delegate participation 1999-2015

<sup>1</sup> IPR Enforcement Package, Press Release, 29 Nov 2017 [http://europa.eu/rapid/press-release\\_MEMO-17-4943\\_en.htm](http://europa.eu/rapid/press-release_MEMO-17-4943_en.htm)