

# 5G Connectivity

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## **Abstract:**

The article highlights the importance of 5G Connectivity in the EU policy context as highlighted by European Commission's 5G Action Plan. Without first-class communication networks, there will be no Digital Single Market. The Commission initiated visionary EU-funded research activities already in 2012, which led to the setup of the European 5G Public Private Partnership (5G PPP). In this context, an important policy objective of the Commission is pursuing its 5G spectrum roadmap, which has taken on board the view of the Member States, and serves the Gigabit connectivity targets of the Union. In order to make 5G deployment a success, it is essential to set the conditions ensuring timely access to the appropriate spectrum and allowing for the necessary investment in high-capacity networks. The European Electronic Communications Code promotes a more flexible and dynamic access to spectrum, through trading and leasing, but also sharing solutions, notably with regard to the spectrum licensing. However, the current availability of spectrum for 5G in all bands, low, mid and high, is still a challenge in Europe. Whereas the 700 MHz band has already been harmonised at EU level, there are also a legal obligations to assign upper bands in all Member States by end of 2020. The Commission will insist on the 2020 deadline and consider derogations only in very exceptional cases and if fully justified. We may not compromise 5G deployment and services take-up to the benefit of industry, society and the environment by the short-sighted objective of maximising auction revenues. While health matters remain a national competence, we need to engage with all relevant authorities to ensure that all decisions regarding radio exposure limits that go beyond the European and international precautionary levels are made in full knowledge of the evidence and of the likely consequences. The European Commission is following the developments, attentive to address important horizontal topics of efficient and sustainable spectrum management, establishing a favourable mind set to spectrum sharing - both by regulators and industrial players -, as well as contributing to the green transformation of other economic sectors. These topics should underlie a longer-term European spectrum strategy.

## **5G Connectivity enables the digital transformation**

Our society is undergoing a rapid and profound transformation: a digital transformation that will change our way of life forever. Yet the success of this revolution is far from guaranteed. If this transformation is to succeed - and I believe it must succeed - it will be due to a combination of the right political, strategic and economic choices.

A society built on citizens' ability to connect to anything from anywhere in order to manage their daily lives is only possible if connectivity is reliable and ubiquitous. Without first-class communication networks, there will be no Digital Single Market<sup>1</sup>.

5G technology is not only enabling much faster access rates (about 10 times more than 4G), it is also designed and expected to provide mission-critical services for vertical sectors, such as the mobility, energy and health sectors, leading to the digital transformation of our economy and society. This importance of very high capacity networks and 5G in particular was highlighted in the 5G Action

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<sup>1</sup> VIOLA R., *5G in Italy White Book*, Introduction.

Plan<sup>2</sup> that the Commission adopted in September 2016, as part of a comprehensive connectivity package setting out the European ambitions for a Gigabit Society.

Today, the data traffic on mobile networks grows at least at a rate of 50% per year. Novel applications like Virtual Reality will require more capacity, more speed and faster response time from communication networks. High Performance Computing systems will further generate huge data volumes.

5G will be a key enabler for the Internet of Things by providing a platform to connect a massive number of sensors, devices and actuators with stringent energy and transmission constraints. Furthermore, mission-critical services requiring very high reliability, global coverage and/or very low latency, which are up to now handled by specific networks, typically public safety, will become natively supported by the 5G infrastructure.

The European Commission initiated visionary EU-funded research activities already in 2012, which led to the setup of the European 5G Public Private Partnership (5G PPP). The 5G PPP has been implemented under the European Horizon 2020 programme with about € 700 Million of public support over the 2014-2020 period. The private sector contribution is matching that amount by a factor of at least five<sup>3</sup>. As a result, European 5G technology and technological actors are among the leaders. This is by the way something that is also well reflected by the EU contributions to standards in the 3GPP. Altogether, the 5G PPP represents the largest 5G R&D initiative in the world.

Thus, 5G networks are considered by the European Commission as a strategic asset. They support the digital transformation of the industry, the public sector and society as a whole.

## **No 5G services without spectrum**

An important policy objective of the Commission is pursuing its 5G spectrum roadmap for the Union. This roadmap has taken on board the view of the Member States, expressed through three targeted opinions (in 2016, 2018 and 2019) by the Radio Spectrum Policy Group (RSPG) and serves the Gigabit connectivity targets of the Union.

The Commission has delivered on the harmonised availability of the three pioneer bands (700 MHz, 3.6 GHz, and 26 GHz) with the adoption of technical harmonisation decisions. The Ultra High-Frequency (UHF) Decision of the Parliament and the Council marked a milestone in repurposing the 700 MHz band by mid-2020 for mobile use with ambitious coverage objectives, while safeguarding sufficient spectrum for evolving terrestrial broadcasting until 2030. In addition, with the adoption of the European Electronic Communications Code, Member States are bound by a common deadline (end-2020) for allowing use of the 3.6 GHz band and at least 1 GHz of spectrum in the 26 GHz band.

Spectrum which provides both good coverage and capacity can be found in the 3.6 GHz band, which has become the primary 5G band in Europe. Its effective authorisation in large contiguous blocks for public operators, while also enabling the variety of vertical applications (different business models are possible) is a key factor for Europe's 5G leadership. For the new 26 GHz band, a spectrum sharing approach has been adopted to ensure the 5G coexistence with satellite services in order to deliver a politically balanced solution on both 5G connectivity and monitoring climate change.

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<sup>2</sup> European Commission, "5G for Europe: An Action Plan", COM(2016)588.

<sup>3</sup> BARANI B. & STUCKMANN P., "Leading-edge 5G Research and Innovation: An undivided commitment of Europe", *5G in Italy White Book*.

The Commission is committed to making all existing bands below 6 GHz “5G-ready” by end 2021 as well as harmonising more mm-wave spectrum (most likely 40.5-43.5 GHz and 66-71 GHz) after WRC-19. With 5G, we are de facto moving from the previous spectrum target of 1 200 MHz for wireless broadband to a more ambitious spectrum target, which could be as much as ten times higher.

5G is expected to drive convergence of different access technologies and service requirements into a common network infrastructure. In this context of the anticipated “system of systems”, the Commission also works towards providing more spectrum for radio LANs (e.g. in the 6 GHz range) as well as ensuring efficient use and expanding dedicated spectrum bands for sectorial use such as the 5.9 GHz band for road and rail intelligent transport systems. Vertical sectors may need dedicated spectrum e.g. in specific mission-critical use cases, which are not adequately addressed by public networks. Connected and automated mobility is a clear 5G priority. Its ultimate success in terms of innovation and deployment fostering EU leadership depends on our success in leveraging a wider ecosystem that not only means safety for cars and trains but also for pedestrians and bikes. Clearly, we support efficient spectrum use, technology neutrality and a future-proof solution that encompasses safety for all people that have access to our roads.

## **Unlocking investment with the European Electronic Communications Code**

The Code must be implemented by Member States by December 2020. It provides a framework for enhanced coordination on 5G infrastructure deployment and spectrum management. It also ensures the timely assignment of any EU-harmonised band and long licence durations for public operators (a minimum 20 years’ period), network densification and infrastructure sharing. In order to make 5G deployment a pan-European success, it is paramount to set the authorisation conditions for using 5G spectrum so as to promote ambitious infrastructure rollout and innovative services in the single market. The Peer Review Forum established by the Code gives a strengthened role to the RSPG, the high-level group of Member States advising the Commission. It should become a viable EU-level platform for constructive assessment and best practice development on authorisations and spectrum awards, in order to help deliver on single market objectives and investment in infrastructure. This platform should ensure a coordinated approach to 5G spectrum management to enable the big variety of 5G use cases and stakeholders. To this end, embedding the pro-investment spectrum principles of the Code is key – in authorisation rules, sharing conditions, licence durations or facilitating spectrum leasing.

In order to make 5G deployment a success, it is essential to set the conditions ensuring timely access to the appropriate spectrum and allowing for the necessary investment in high-capacity networks. The Code therefore promotes a more flexible and dynamic access to spectrum, through trading and leasing, but also sharing solutions, notably with regard to the spectrum licensing.

The design of auctions and conditions attached to licences (in particular for the 5G pioneer bands) will determine competition and Europe’s innovation potential for many years to come. It is essential that policy makers and regulators make future-proof decisions to favour economic growth and societal welfare. This is about promoting investment in 5G infrastructure and services, for mobile broadband but also for digitalising various industry sectors. I would caution against auction designs that risk to extract excessive capital from the market, as they are likely to undermine investment capacity in network deployment.

## **The European 5G Observatory: Monitoring 5G in Europe**

In October 2019, the 5G Observatory released its latest report showing that the European operators are head-to-head with other leading regions in the world preparing for the commercial launch of 5G this year. European mobile operators have been working for two years with equipment manufacturers and vertical sectors on various trials in order to validate 5G's capabilities. At the end of September 2019, it was clear that they are heavily involved in 5G testing with 165 trials reported at that time (up from 138 in Q4/2018) in EU-28 countries.

During 2019, many European mobile operators were preparing the commercial phase as the first 5G smartphones and other devices became available in the second or third quarter. Commercial services are available in a number of cities in Europe. Deployments are on-going with first 5G base stations deployed in many European cities. Many European Member States enjoy 5G services (Austria, Finland, Estonia, Germany, Ireland, Italy, Spain, Romania). In several countries, there are more than one 5G service provider: TIM and Vodafone in Italy, T-Mobile and Vodafone in Germany; the latest announced commercial service launches were in Romania (Orange - November 2019), Germany (T-Mobile Germany – September 2019) and Ireland (Vodafone – August 2019). Further launches are expected soon.

However, the current availability of spectrum for 5G in all bands, low, mid and high, is still a challenge in Europe. Whereas the 700 MHz band has already been harmonised at EU level, there are also a legal obligations to assign upper bands in all Member States by end of 2020. The Observatory shows some recent progress, although, most of the work is still to be done. The Commission will insist on the 2020 deadline and consider derogations only in very exceptional cases and if fully justified. I hope the situation will look even better at the end of 2020.

Industry has made clear that Europe cannot expect to lead in 5G deployment if significant improvements are not introduced in spectrum management to ensure that investments on a wide scale – starting in cities and along transport routes – can generate an adequate return. We need indeed strong leadership from industry, the main driver leading to an EU competitive advantage. From its side, the Commission is contributing by funding trials, of EUR 300 million in the last phase of the 5G-PPP. The Commission attributes high importance to the automotive and transport sectors in the deployment of 5G in Europe. The Commission is encouraging cooperation between Member States and among stakeholders on cross-border initiatives for the establishment of large scale testing and early deployment of 5G corridors.

### **Concluding remarks**

To make 5G a reality we have to address enhanced security and trust, interoperable platforms across verticals and above all spectrum availability. Spectrum is a key resource to make wide-spread and universally accessible 5G services a reality – both enhanced broadband for citizens and businesses, and the Internet of Things. The Union's 5G pioneer bands should be harnessed for use by operators and other stakeholders as soon as possible. The European Electronic Communications Code and the UHF Decision are setting out a clear roadmap for Member States to ensure this happens by the end of 2020. There is a sense of urgency to succeed in achieving this objective in a coordinated way. Harmonised spectrum availability is a major factor to ensure Europe's 5G leadership.

We may not compromise 5G deployment and services take-up to the benefit of industry, society and the environment by the short-sighted objective of maximising auction revenues. While health matters remain a national competence, we need to engage with all relevant authorities to ensure that all decisions regarding radio exposure limits that go beyond the European and international precautionary levels are made in full knowledge of the evidence and of the likely consequences.

Looking into the next Commission term and beyond, we have to address important horizontal topics of efficient and sustainable spectrum management. On the one hand, this is about establishing a favourable mind set to spectrum sharing, both by regulators and industrial players. On the other hand, sustainability is measured by the green footprint of wireless networks themselves and also their contribution to the green transformation of other economic sectors. These topics should underlie a longer-term European spectrum strategy with the relevant EU-level bodies such as the Radio Spectrum Policy Group becoming the leading actors. We may also think of revamping our Spectrum Policy Programme<sup>4</sup> at the EU level to match recent developments.

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<sup>4</sup> Pursuant to Article 4(4) of the Code.