SMIT STUDIES MEDIA INNOVATION TECHNOLOGY

POLICY BRIEF 33

7 January 2020

Three main regulatory challenges for 5G roll-out in Belgium

Pol Camps, Simon Delaere and Jaco van der Bank



The highly anticipated, yet fiercely debated, fifth generation of mobile connectivity could soon be available in Belgium. 5G and network slicing promise to enable new use cases across different industries, potentially resulting in productivity gains and increased public safety. However, there are challenges ahead. First, mobile network operators need to find innovative business models to monetise the necessary network investments. Second, important policy-related challenges need to be addressed, including agreeing on a spectrum allocation scheme, in the short term, and in the long run, preparing for a disruption in the labour market by fostering the necessary ICT-savvy skills among citizens in an inclusive manner. SMIT was involved in the 5GUARDS imec.icon project, which investigated network slicing technology and the concern of clarifying business cases and business models, all applied to the specific use case of public safety and security. In this policy brief, we will highlight some of the key findings of this research, focusing on providing some recommendations on how businesses and policymakers in Belgium can prepare for 5G.

1. What are 5G and network slicing?

5G will improve network reliability, increase network capacity and speeds, and allow a multitude of users to download (and upload) media content at much faster rates than we are able to with today's wireless networks. 5G network enhancements are needed to keep up with the expected growth in data consumption from traditional devices and in the number of connected objects.

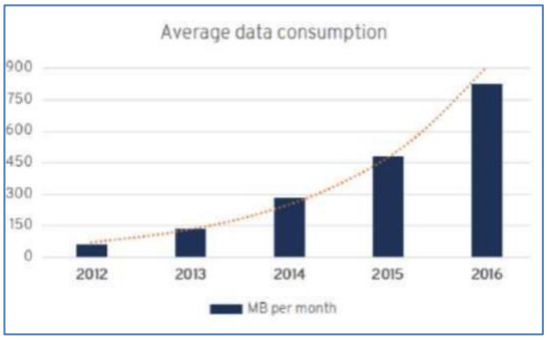

Figure 1 Data consumption of wireless networks in Belgium[1].

1 BIPT, 2017. Economic situation of the telecoms sector 2016. Available at: http://bipt.be/En/operators/telecommunication/Statistics/publications/economic-situation-of-the-telecoms-sector-2016.

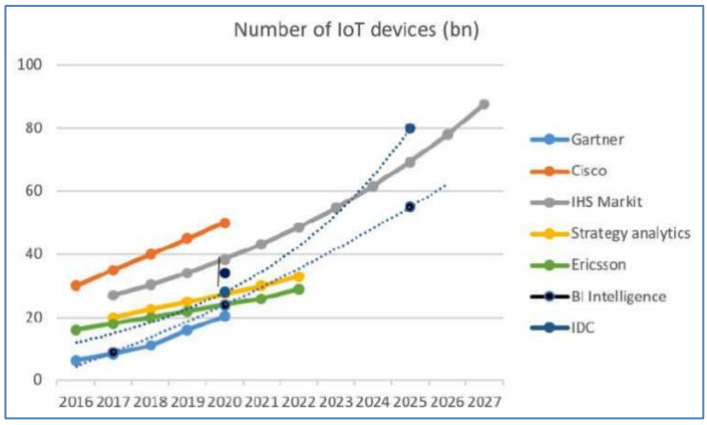

Figure 2 Expected amount of IoT devices (multiple sources)

But 5G will bring more than faster speeds: it promises to deliver lower data transfer delays (i.e. lower latency), higher reliability, and network efficiency improvements. It will do so by making use of a set of new technologies, operating over a much wider range of frequency bands. One such technology is network slicing. Slicing allows mobile network operators to "cut" a wireless network up into different "slices", give these slices specific characteristics, and reserve them for specific uses -think of a highway divided in three general use lanes, a carpool lane and an emergency lane. This enables distinct virtual networks and multiple tenants to be supported on a common physical network infrastructure. This technology will allow connectivity providers to tailor quality-of-service (QoS) features to customers and use cases with diverse requirements, will enhance operational cost efficiency, and will increase the scalability of network infrastructure investments. Therefore, 5G networks are expected to enable new use cases that demand superior performance and have distinct QoS requirements.

Currently, dozens of research projects, trials, and demonstrations are being done, and auctions of "5G" spectrum bands have been—and are being—carried out across Europe. Industry reports and interviews with our project partners showed that while they are confident on the development of the required technical improvements, the need to identify the adequate business cases and business models remains.

2. 5G-enabled use cases will have a strong economic and societal impact

Through many new use cases, 5G can benefit and disrupt different industries. One of them is manufacturing, which in 2017 represented about 11% of jobs in Belgium[2]. 5G promises productivity gains by enabling, among others, automation and augmented reality, innovations that drive Industry 4.0. Industry 4.0 requires ultra-low latency, ultra-high availability and reliable indoor coverage, as well as massive amounts of data from a multitude of connected objects[3]. In addition, enhanced network performance can bring cost reductions and knowledge by collecting and using more data, thereby improving productivity. Belgium measures as one of the highest in labour productivity among OECD countries[4]. Belgium is also a trade-dependent country whose exports (and imports) constitute over 80% of its GDP[5]. Moreover, almost 80% of its exports go to other European countries, according to the Belgian Foreign Trade Agency. Therefore, lagging behind on telecommunications-enabled innovations could affect the competitiveness of the country.

2 Eurostat, 2017. National accounts employment data by industry [Data file]. Available at: https://ec.europa.eu/eurostat/web/products-datasets/product?code=nama_10_a64_e

3 5GPPP, 2015. 5G and the Factories of the Future, White paper.

4 OECD, 2019. OECD Compendium of Productivity Indicators 2019, OECD Publishing, Paris. https://doi.org/10.1787/b2774f97-en

5 WITS. Belgium trade statistics: Exports, Imports, Products, Tariffs, GDP and related Development Indicator. Available at: https://wits.worldbank.org/CountryProfile/en/BEL

Public safety and security use cases are another prime example of the potential impact of 5G. These use cases include the live video surveillance with drones at large industrial sites or crowded events (which requires high throughput), and real-time remote control of assets and workers with a large number of sensors (which requires low latency and high reliability).

Guarding, which represents the biggest portion of current revenue in the security services industry, is a segment that can be largely disrupted. In this sector there is a strong linear relationship between turnover and number of employees, showing that today the main factor that determines a company's size is its manpower. However, automatisation will bring cost-efficiency and functionality improvements: connected drones reduce the need for human surveillance and accomplish tasks much faster and safer than people can, while collecting data at a lower cost and automatically sending it to the cloud to be analysed and visualised in near real-time. In addition, 5G can improve the quality of the connectivity and information available to address calamities in critical infrastructure sites and crowded events. The 5Guards project showed so by demonstrating network traffic prioritisation through different slices on the same network.

3. 5G business models are still unclear

As illustrated above, 5G deployment will be driven by use cases beyond traditional telecommunications services. Revenues will increasingly stem from products on top of the communications networks that will depend on each industry to monetise. This will add pressure on mobile network operators to find business models that can monetise connectivity provision in a context where data is increasingly commoditised.

Offering better connectivity requires carriers to invest heavily in network infrastructure transformation. And these networks are then used by content and application providers that profit from them without sharing the investment. Moreover, cross-sector competition is increasing, as technology and service firms are already investing in their own connectivity provision offerings. Last, network slicing enables the presence of new roles performing different intermediate functions.

So far, the response by operators has mostly focused on cost-cutting and increasing the number of bundled offers. Still, telecommunications companies face a stagnating market. MNOs risk losing their traditional relevance within the value network, potentially becoming mere connectivity or network service providers. On the contrary, they could take a ubiquitous role, e.g. through a centralised platform that integrates further. However, integrated platforms can also be operated by other players owning valuable complementary assets, such as technology companies, who have a stronger financial position, customer base and data. Partnering will be of key importance for business models within decentralised ecosystems or specialised in certain use cases, but it remains unclear who will bear the investment expenditures and by consequence how the benefits will be shared[6].

4. Policy requirements and challenges

To conclude, this section identifies three types of challenges that policymakers will have to consider and act upon to achieve optimal implementation of 5G and the use cases it enables.

***Spectrum allocation*:** The delay of spectrum auctions in Belgium can have a strong impact on the timely development and adoption of 5G-enabled use cases, and in turn, can have an economic impact by affecting the competitiveness of the country's regions. Freeing up the necessary spectrum bands in a way that fosters competition and investment is, therefore, a requirement, whether it is done by auctioning licenses completely to mobile network operators or by allocating some to industry players. Most European regulators have now either announced auctions of 5G

6 For an extended analysis see https://ieeexplore.ieee.org/document/8894822

spectrum or have already held them. However, the discussion over the distribution of spectrum auction proceeds between Belgian regions is still unresolved. In March of 2019, the different governments could not yet reach an agreement, which has led to the speculation that 5G networks will only be up and running in Belgium in 2021, at the earliest. This contrasts with the objectives of the new Flemish government, which stated in its coalition agreement that a fast roll-out of a 5G network in Flanders is considered a priority.

Building skills: Enterprises and individuals will need to acquire adequate skill sets to adapt to the new use cases, which will gradually require more ICT- and data-savvy jobs. However, currently there is a "skills shortage" for ICT-related profiles in Belgium. Such shortage may result in unfilled vacancies and, consequently, in more inequality in the labour market and unrealised productivity gains. Skills shortages can also result in other economic costs, such as hiring costs and slower technology adoption by companies, ultimately hampering innovation. Policies should address this challenge through skills development and upgrading, by supporting and incentivising (prospective) workers and businesses to invest in it, and by encouraging female inclusion in STEM (science, technology, engineering and mathematics) studies, since Belgium currently ranks low in proportion of female young graduates in information technology-related sciences (Figure 3).

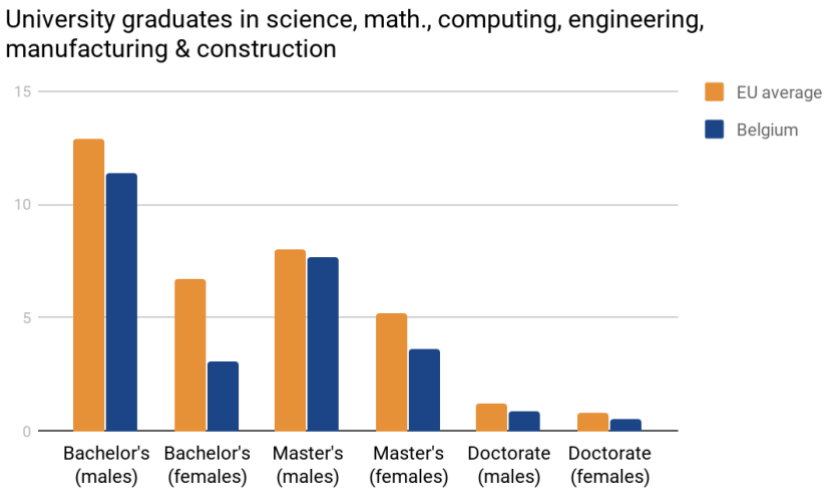

Figure 3 Proportion of university graduates per thousand inhabitants, by gender and level.

Flanders, through its 'Vision 2050' strategy, and the federal government, through the 'Digital Belgium' initiative, already claim the acquisition of relevant digital skills by (prospective) workers to be a priority, which is an important step. In addition, policymakers must prepare plans to address the changes in the workplace brought by automation, in order to avoid citizen discontent from a potentially abrupt disruption.

***Other regulatory and political challenges*:** The use of higher frequencies, which have a shorter propagation range and limited ability to penetrate walls or buildings (e.g. millimetre waves) will require the deployment of vast amounts of what are called "small cells" in urban and other dense areas. This brings a regulatory challenge as regional and local governments may face opposition in terms of visual pollution and health concerns. Independently of the factual base of such concerns, a bad perception among the public opinion may arise, and in turn, be translated into prohibiting regulations or boycotting actions. For instance, the current legislation regarding the maximum levels of exposure to radiation is particularly strict in Brussels, where it is more than 50 times stricter than EU and WHO Recommendations. Moreover, the city halted its 5G tests and plans due to health-related concerns. Consequently, 5G may be available first in certain non-urban areas, for example on roads, or for industrial applications with private network business models. In addition, regulation will need to force companies to build the hardware elements in a way that is both efficient and has a low visual and environmental impact. Network infrastructure sharing can fulfil this purpose. Finally, geopolitical tensions are also at play.

Since 5G networks will be used for critical applications, for example, water and power distribution, the question of who supplies the underlying network infrastructure becomes important. Political tensions or consumer weariness may come from concerns that Chinese companies would unlawfully take advantage of owning the telecommunications network equipment to steal national security-sensitive data from critical infrastructure. Even though the Belgian Centre for Cybersecurity released a statement informing that it has found no evidence of Huawei—a network provider of all three Belgian MNOs—posing an espionage threat, pressure from the US on this regard can still be expected. Therefore, outside political pressure (for example see[7]) has the potential to influence the timing, the cost, and the origin of the network infrastructure deployed in Belgium.

Table 1 Recap of regulatory requirements and challenges.

When	What	Why
Today	Access to spectrum	e.g. to support use cases and set up the competitive environment
Short/medium-term	Other regulatory challenges, e.g. hardware deployment	e.g. enable smooth network rollout, foster innovation
Longer-term	Skills development	Enhance technology adoption, productivity and growth

5. Conclusion

In conclusion, 5G is an enabling technology for digitisation and the deployment of many innovations, enabling use cases that would not be possible with current, 4G networks. It is not only a technical innovation, on the contrary, but it also has a strong economic and societal relevance. However, to assure that 5G and the enabled technologies have a timely and satisfactory impact, certain policy and business model challenges will need to be addressed. Moreover, the explained economic, environmental, and political challenges may make 5G first available only in certain areas and for certain use cases (e.g. safety in industrial sites), where the business models and societal benefits are clearer. Moreover, challenges make the impact of 5G time-dependent, as lagging adoption can have consequences for national economies and businesses.

Pol Camps (pol.camps@imec.be) is a researcher at imec-SMIT-VUB within the Media & Society Programme. His research focuses on business models for telecommunications and smart mobility and, more generally, ICT innovations.

Simon Delaere (simon.delaere@imec.be) is senior researcher and research valorisation manager at imec-SMIT-VUB. He coordinates projects in the Media & Society Programme, mostly focusing on policy and business aspects of new digital products and services. As a valorisation manager, he helps to define and implement SMIT's research strategy and represents the centre externally, for example in NEM, the Content Innovation Council, the Big Data Value Assocation and the Sectorraad Media, of which he is the Chairman.

Jaco van der Bank (jaco.vanderbank@imec.be) is a researcher at imec- SMIT-VUB. He is involved in Flemish and European research projects in the domain of 5G, personalisation and media service applications. In these projects, he is responsible for the development of novel business models and commercialisation strategies.

7 https://www.vrt.be/vrtnws/nl/2019/09/26/_als-belgie-chinese-5g-technologie-koopt-komt-navo-in-gevaar/