



ERT

Assessment of 5G Deployment Status in Europe

Produced in partnership with



Global Counsel



Introduction

The European Round Table for Industry (ERT) and Global Counsel have undertaken a review of available data to evaluate progress in rolling out 5G, focusing on a comparison of nationwide roll-out of 5G in Europe and around the world.

It reveals that Europe as a whole – and the largest individual nations – are behind global competitors in deploying 5G networks at this point of time. This does not, however, prevent the EU from redressing the situation when moving to standalone 5G in the near future.

This paper summarises that data, and the evidence of the underlying causes, with a focus on key metrics that can inform future choices by national and European policymakers. It is not too late to close the gap with the United States, South Korea and China, especially when moving to standalone 5G, but it is urgent to take action to address that gap. This paper should therefore be read in conjunction with ERT's position paper on a Regulatory Framework for 5G, which recommends particular policies to reduce the costs of investing in 5G to unlock private financing for this critical infrastructure.

The gap

Commercialisation:

- More than half of EU Member States have not yet launched 5G commercial services, whereas the first commercial services were available in South Korea and the US one year ago.
- The share of the subscriptions using 4G networks is around 70% in Europe in 2019, significantly lower than in the US, China and South Korea, where it reaches around 90%.

Infrastructure:

- The EU-27 has deployed around ten 5G base stations per million capita, whereas South Korea has rolled out around 1,500 base stations per million (by the end of 2019).
 - The EU-27 has upgraded 1% of 4G base stations to 5G, whereas South Korea upgraded 98% (by the end of 2019).
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Underlying causes of the gap

High and inconsistent costs:

- Price per MHz per capita for mid band (3-5 GHz) spectrum was estimated at €0.43 cents in Italy, more than ten times higher than in Finland.

Availability of spectrum:

- Two thirds of EU-27 countries have not yet allocated mid-band (3-5 GHz) spectrum, whereas South Korea and China allocated this spectrum band in June 2018 and 2019 respectively.

Revenues and return on investment:

- Unlike Europe, telecoms revenues in the US and South Korea between 2017 and 2018 increased faster than investment.
- Return on invested capital was twice as much in the US in 2018 than in Europe.

1. 5G is a step change technology which presents unprecedented economic opportunities

5G will be integral to the future of Europe's digital infrastructure and resilience. During the first half of this year, we have witnessed an unprecedented, accelerated transition to mass home-working, living and leisure during the COVID-19 crisis, which have shown the importance and critical aspects of the network infrastructures. Some of these shifts in behaviour and working are likely to endure or re-emerge in the years to come. Greater bandwidth demands from video-streaming, video-conferencing and online gaming, combined with the shifting geography of mobile usage and longer peak hours, highlight the need for deeper investment in telecom infrastructure and a regulatory framework that encourages and facilitates this.

5G technology will play a critical role in meeting increasing network demand. Its key features include low latency, higher data rates, increased reliability and security, and lower power consumption. Efficient roll-out of 5G will therefore allow telecoms operators and other service providers to better manage traffic on their networks and provide a higher quality service for European consumers and higher speed online.

However, 5G is not just about improving the status quo. It will interconnect a huge array of technologies as well as enabling completely new services and transforming how they are delivered. For consumers, we will see the potential of virtual and augmented reality services and gaming, and the roll-out of advanced smart home devices and services.

Looking beyond the crisis and the consumer-related aspects, the quality of connectivity will mean even more for industry, as enterprises will depend on connectivity for their business survival. There are moreover a myriad of business opportunities that further improve consumer choice and industrial competitiveness.

The European Commission considers 5G a “key asset for Europe to compete in the global market”¹. There is an opportunity now to address Europe's inadequate view on the industrial dimensions and how telecoms networks will evolve to cater for new enterprise-oriented use cases like smart manufacturing, cities, transport, vehicles, utilities, connected healthcare, etc.

“5G is not just an upgrade – it is a new technology”

*Thierry Breton,
Commissioner for the
Internal Market*

¹ COM(2016)588, “5G for Europe: An Action Plan”

Secure, reliable & high-performing connectivity is the basis of the promise of “Industry 4.0”, enabling the transformation of Europe’s manufacturing industry to a smart manufacturing environment.

5G roll-out, including a combination of public nationwide, as well as private local industrial 5G networks, is crucial to providing reliable connectivity for numerous IoT devices and sensors and creating digital industrial ecosystems, composed of various industries, research centres and end users. This will accelerate industrial digitalisation by offering opportunities for Europe’s developers and industrial firms to create innovative industrial applications and use cases.

Investing in 5G infrastructure in Europe needs to be realised to provide high service levels to citizens, other infrastructures (e.g. roads, railways), enterprises, industrial sites, cities, as well as remote areas.

2. Europe has significant industrial strengths which can underpin 5G deployment

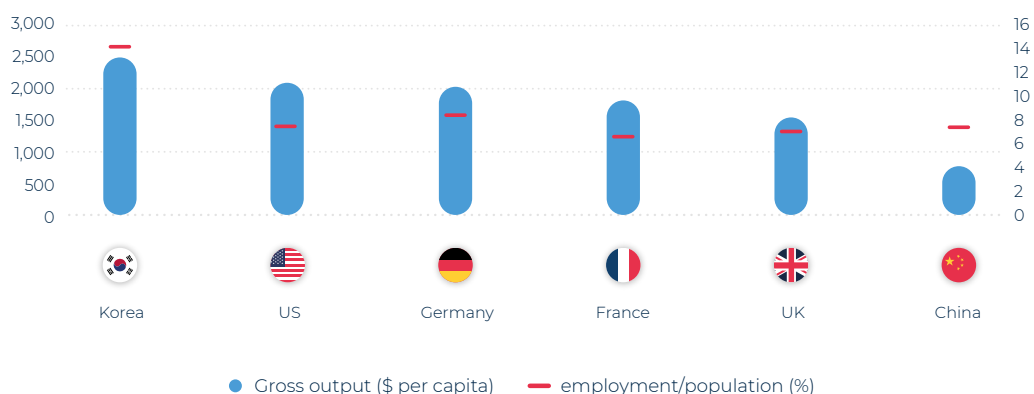
Europe’s sophisticated research base, industrial sector and consumer markets should underpin rapid deployment of 5G and development of an innovative 5G and IoT sector. It has renowned academic and university institutions, with more researchers than in the US or China², and globally leading research, innovation capacity and funding mechanisms. Cities like Berlin, Paris, Amsterdam and Lisbon have emerged as start-up hubs and hotbeds of digital innovation. These strengths are also reflected in the specific technologies for 5G deployment, with a high proportion of 5G trials (around 40% of all 5G trials conducted worldwide in Q3 2019³) taking place in Europe. Europe is also the home to two globally leading mobile infrastructure suppliers with significant R&D and manufacturing presence in Europe.

Regarding the demand for 5G services, Europe’s industrial and economic strengths lie in the very sectors where the benefits from 5G and IoT applications will be greatest, such as manufacturing, automotive and healthcare. Six of the largest 100 firms in the world are European manufacturers⁴.

Meanwhile Europe also has one of the largest markets in the world for consumer and business services, from equipment providers to IoT and AI applications developers and platforms. IHS Markit predicts that the 5G value chain in Germany, for example, will generate a higher economic output per capita in Germany than in China by 2035 (see figure 1).

These positive economic effects will not be restricted to the 5G value chain and will have broader economic benefits across the economy. 5G will help to increase productivity and competitiveness in key industrial sectors, support the digitisation of SMEs and support millions of jobs. Indeed, it is estimated that the 5G value chain will support around seven jobs per thousand inhabitants in Germany, France and the UK by 2035 (see figure 1).

Figure 1: Economic Contributions of the 5G Value Chain (2035)



Source: IHS Markit

² European Commission [report](#) on “China – Challenges and Prospects of an Industrial and Innovation Powerhouse”

³ 20 5G trials were conducted in Europe in Q3 2019; GSMA intelligence

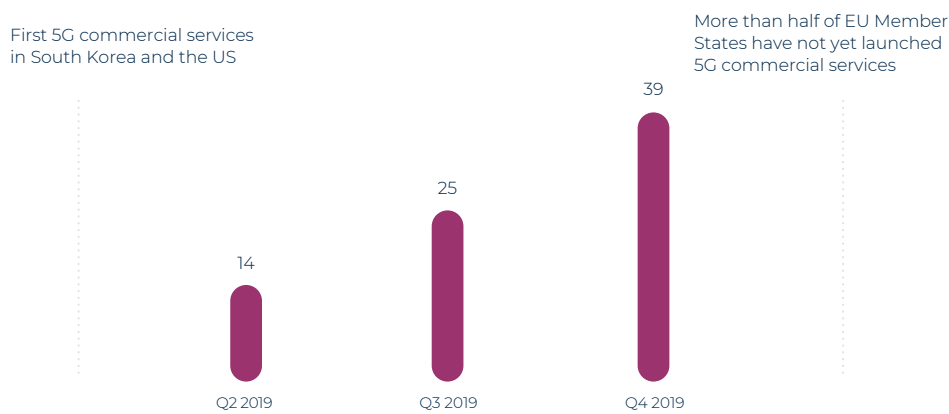
⁴ 2019 Fortune Global 500

3. Europe is nonetheless behind other countries in both commercialisation and infrastructure

Despite these assets and strengths, Europe has been slower than other regions in 5G large-scale commercial services (see figure 2). For example, Verizon in the US launched 5G commercial services using high-band spectrum in April 2019. By contrast, the first commercial services were only available in seven European countries three months later, and several have still today seen no 5G commercial launches. Overall, at time of writing, only 13 EU Member States have launched 5G commercial services (see figures 2 and 3).

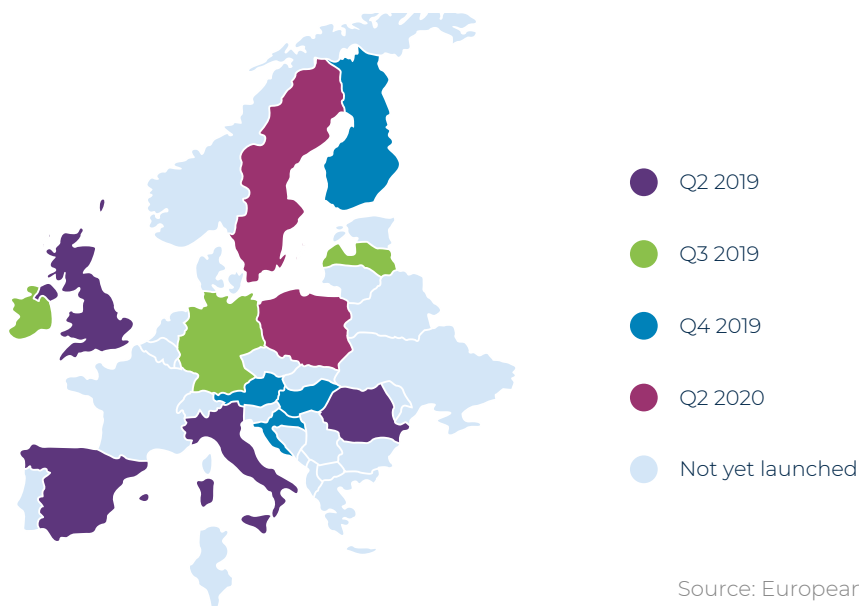
Europe's 5G roll-out is hampered by legacy challenges with several European countries delaying their migration to 4G. As an example of this, the share of the subscriptions using 4G networks is significantly higher in the US, China and South Korea than in Europe (see figure 4). This late adoption will slow demand for gigabit mobile networks, which in turn will hamper efforts to rapidly offer 5G services.

Figure 2: Launch of First 5G Commercial Services (share of EU Member States, %)



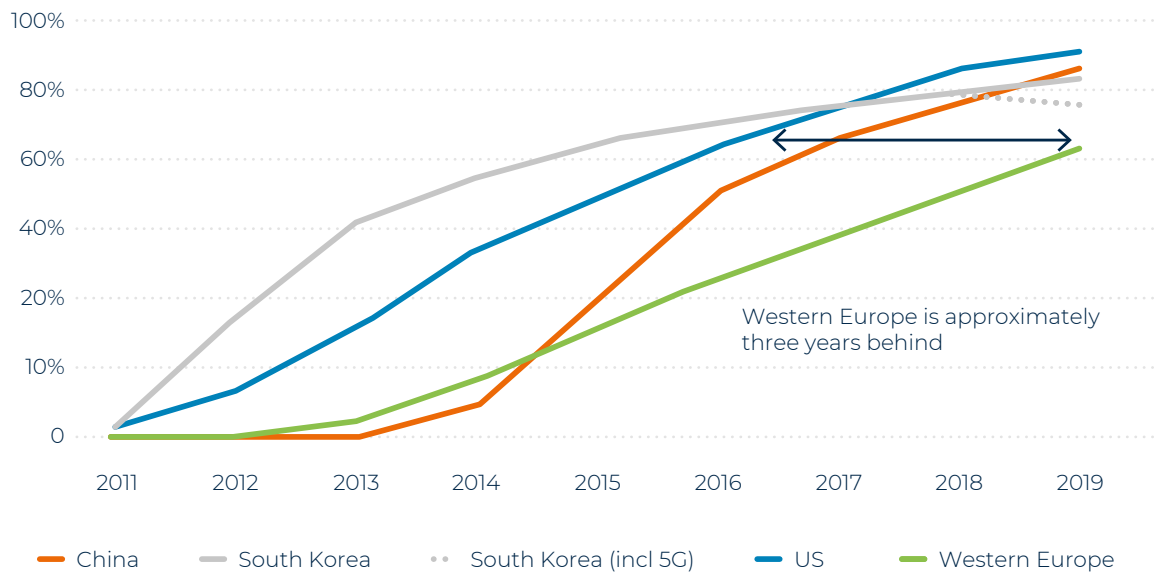
Source: European 5G Observatory

Figure 3: Launch of First 5G Commercial Services (map of EU Member States)



Source: European 5G Observatory

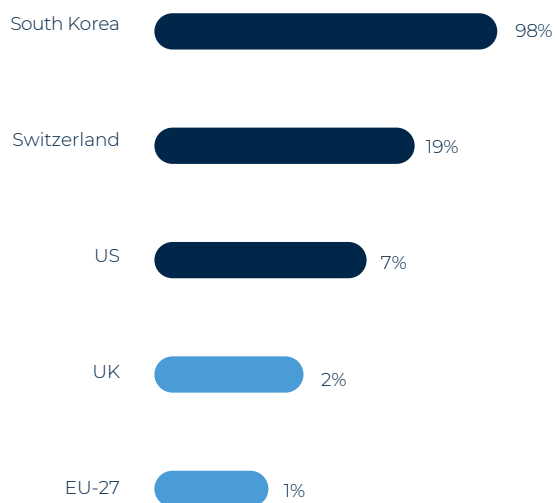
Figure 4: 4G Usage (% of subscriptions using 4G networks)



Source: Ericsson Mobility Report

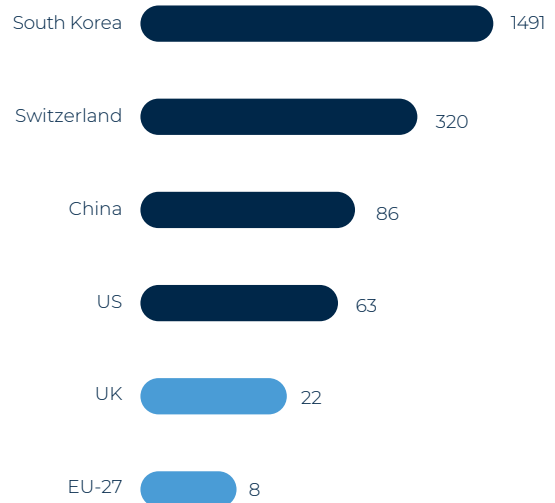
This trend is also reflected in the deployment of infrastructure, where EU countries have been slower than international peers to deploy 5G infrastructure. This applies both to the migration from 4G to 5G access infrastructure and to constructing standalone 5G access infrastructure (see figures 5 and 6). EU countries' deployment of 5G base stations and upgrade of 4G base stations are dwarfed by those of South Korea and are significantly behind the United States.

Figure 5: Share of 4G Base Station Sites that have been upgraded to 5G (low or mid band; Q4 2019; logarithmic X axis)



Source: ERT calculations

Figure 6: 5G Base Stations (low and mid band) per million capita (Q4 2019; logarithmic X axis)



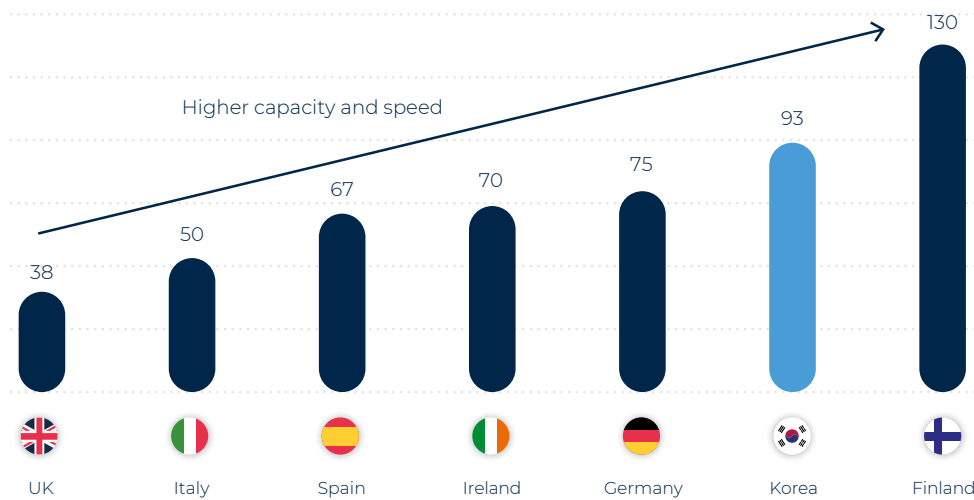
Source: ERT calculations

4. Factors in European performance

One of the key conditions for roll-out of commercial 5G services is spectrum availability. In several European countries, telecoms operators have been allocated narrower bandwidth in mid-band (3-5 GHz) spectrum than, for example, South Korea, constraining capacity to offer higher data speeds to consumers (see figure 7).

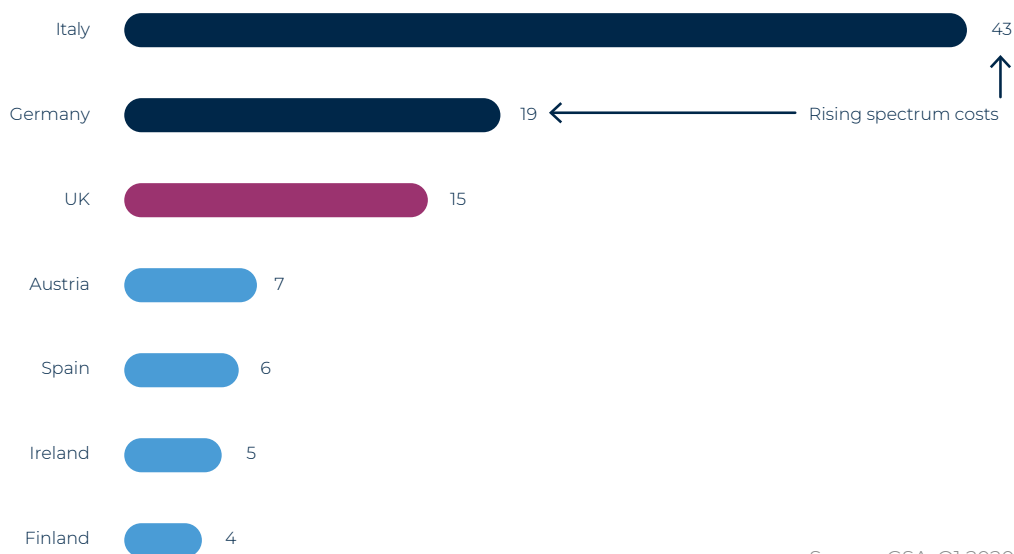
Spectrum licensing has also been costly and contributes to rising investments costs. In some cases, spectrum licensing has been priced particularly high, such as in Italy (see figure 8). This is indicative of notable variations in auction prices. For example, prices have been four times higher in Germany than in Finland, while Finland has assigned wider bandwidth per bidder on average than in Germany.

Figure 7: Average Bandwidth Assigned Per Bidder (MHz; mid band spectrum, 3-5 GHz)



Source: GSA, Q1 2020

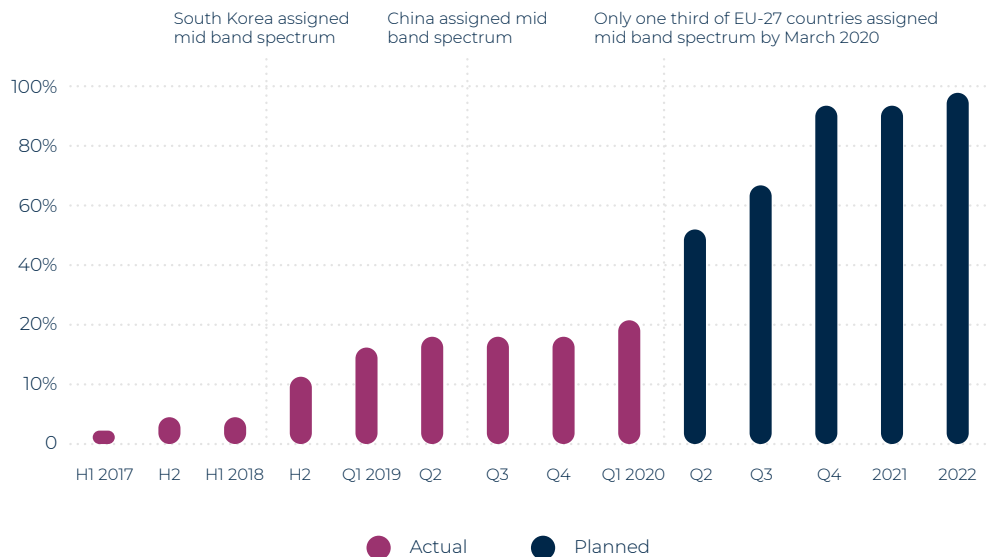
Figure 8: Price Per MHz Per Capita For Mid Band Spectrum (€ cents; 3-5 GHz)



Source: GSA, Q1 2020

This availability of spectrum is not just an issue in absolute terms for the roll-out of 5G. However, it is also an area where Europe is demonstrably performing poorly relative to international competitors. Complicated spectrum allocation processes and a lack of co-ordinated decision-making have led to uncertainty and consequently, restrictions on the abilities of providers to plan investment and network deployment (see figure 9), not to mention raising funds from investors.

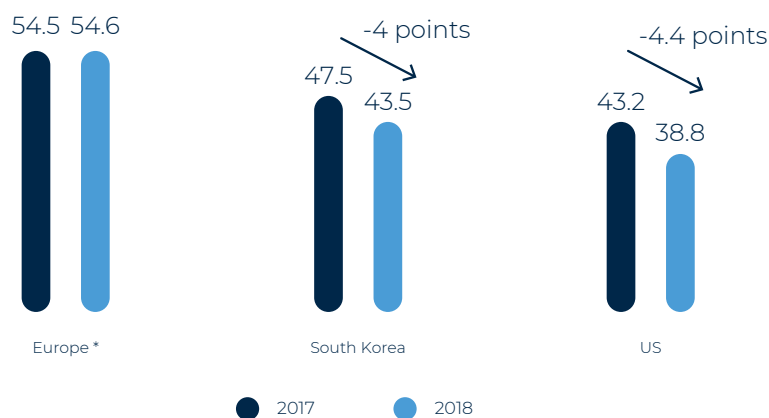
Figure 9: Availability of Mid Band (3-5 GHz) Spectrum in EU-27 (share of EU-27 Member States, %)



Source: European 5G Observatory, NRA
Comment: No data available for Malta

A further challenge facing 5G deployment is the structure of the European market, which is highly fragmented. While intense competition has delivered some benefits in lower consumer pricing and service innovation, it has arguably been maintained through preventing rational market consolidation and meant that revenues have declined while investment costs have risen, reducing commercial and investor viability. Between 2017 and 2018, the ratio CapEx/EBITDA remained broadly flat for European operators, whereas the same ratio has dropped in the US and South Korea. This means that, unlike Europe, telecoms revenues in the US and South Korea between 2017 and 2018 actually increased faster than investment (see figure 10). This has led to a return on invested capital that is twice as much in the US (in 2018) than in Europe (see figure 11).

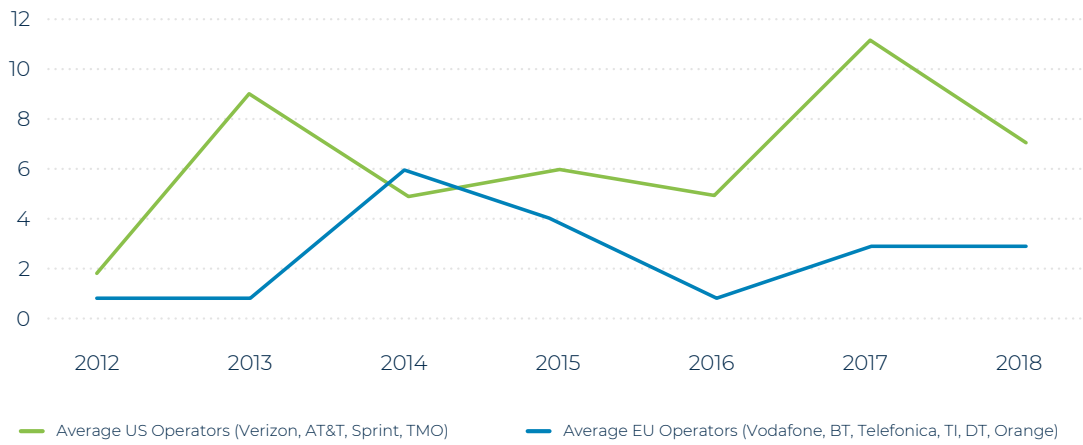
Figure 10: Investment Intensity (CapEx/EBITDA, %)



Source: ETNO, The State of Digital Communications 2020

*Using membership of European Telecommunications Network Operators Association (ETNO) as a proxy

Figure 11: Return on Invested Capital (%)



Source: S&P Capital IQ

Swift and cost-effective spectrum allocation coupled with a sound investment climate remain the bedrock of the effective and efficient roll-out of 5G across Europe.

At national level, swift 5G deployment has also been frustrated by the processes for obtaining planning permissions and construction permits, diverging upper limits for EMF power and varying tower height limits. For example, the time to obtain permissions varies greatly for macro-sites: some European markets take up to ten times longer to grant permissions than others.

These outstanding challenges raise a number of burning questions for European policymakers, outlined in the [ERT Position on Regulatory Framework for 5G](#). Among them, the most pressing strategic questions which need to be addressed include: what concrete steps can be taken to ease the roll-out on the field? How should we approach harmonising EMF rules? How best to support network sharing agreements?

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