



European Telecommunications  
Network Operators' Association

# THE STATE OF DIGITAL COMMUNICATIONS 2019

IDEAS, FACTS AND FIGURES ON THE SECTOR



Annual Economic Report

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## EXECUTIVE SUMMARY

*Digital is everything and everything is digital. As our societies and economies experience unprecedented tech-driven change, this Report provides you with the latest on one of the most important enablers of progress and growth: digital communications. Here, in summary, our main findings.*

**Digital communications significantly contribute to the European economy and society, in both direct and indirect terms. However, a greater potential might be held back by lower spend and investment.**

Europeans enjoy a dynamic telecoms sector, which has delivered, over the years, on a series of key economic and societal enablers.

In terms of direct impact, we note that broadband coverage is high (almost 97%), speeds are higher than the global average (70.5 MB for fixed, 34.9 MB for mobile) and infrastructure competition is vibrant. In terms of indirect impact, **ETNO members created a yearly €139.4bn value added** (including salaries, interest, ...) and paid **over €42bn of taxes**.

When looking at telecoms investment and spend, however, the European sector appears less healthy than global peers. **CapEx per capita in Europe is €83.2**, which is less than half than in Japan (€188.5) and lower than in the USA (€135.3). In addition, Europeans use less (and hence spend less on) telecom services, with the average European telecoms spend per capita at €30.1, as opposed to over €70 in the US, €52 in Japan and €57.4 in Australia. This ultimately means that the investment capacity of the industry is being put under pressure, with the CapEx/revenue ratio at

18%. Our ability to deliver faster and more roll-out for Europeans is hampered by these dynamics.

**European customers enjoy varied offers that meet sophisticated needs, for both retail and business users. Diverse service portfolios, including cloud, security and IoT, show a steady evolution of the sector.**

European users' needs are being met by a fast evolution of the telecoms offer. In terms of technology, the total number of 4G connections keeps on rising steadily also in 2018, connections to faster fixed technologies continue growing (fibre, cable, VDSL) and so does data usage for both mobile and fixed.

In terms of commercial offers, **fixed-mobile convergence is strong**, with a growing take-up of converged services, as consumers seek to reduce complexity and get a better value. Despite strong competitive pressure from OTT video offers, the operators' video offer is expected to continue growing in the coming years and it has grown over €1bn for the first time in 2019 (Western Europe).

When looking at businesses, the IT services offer has significantly expanded over the past years, with a diverse portfolio that includes **cloud, security, unified communications, enterprise services**

and others. Similarly, the growth of IoT is continuing with IoT revenues expected to reach €5.2bn by 2025. Automotive, smart buildings and utilities are expected to be among the top contributors to this growth.

**5G enables dramatic broadband enhancements and new use cases for economic growth. Key challenges for Europe include slow and costly spectrum release.**

5G technology is happening, it will empower a wealth of consumer and business activities, and become a central infrastructure for growth and economic progress. The work to make fixed and mobile networks come together into 1 smart 5G network is well underway. **Network virtualisation, edge computing and further mobile and fixed network investment** will enable both superior retail broadband services and a new, central role in the industrial value chains.

Along with further fixed investment, spectrum is the lifeblood of 5G deployment. Unfortunately, the auctioning process is not always as timely. Only a few European countries have already concluded the relevant spectrum auctions: only 6 European countries for the 700MHz, only 4 for the mmWave and only 3 for all the 3.4, 3.5, 3.6 and 3.7GHz bands.

The **price tag for acquiring spectrum rights remains high**, especially if we consider that the real network investment can only come after spectrum has been awarded. Since 2000, European telcos have spent €110bn on 3G bands, €37.6bn on 4G bands and – while at the very beginning of the process – they have already spent €12.4bn in 5G bands. From this viewpoint, both the conditions attached to the licenses and the design of the auctions remain crucial to ensure that investment incentives are not hampered.

**Digital operators will shape the future against the background of a hyper-dynamic competitive environment. Policy is pivotal in defining Europe's place on the global stage.**

Telecom operators are transforming into fully digital agents, with a realignment of the relationship between the infrastructures and the broader digital ecosystem. This transformation builds on 3 main enablers: superior networks, network-enabled services beyond just commodity, and service-based collaboration with the digital ecosystem.

Ultimately, **networks will become platforms** and they will be characterized by a higher degree of openness, which will in turn enable an intense collaboration with verticals and with the broader ecosystem.

However, a challenging competitive environment awaits, and it has not been fully recognised by regulators and policymakers yet. Networks, in Europe, are highly regulated. At the same time, **competition in the telecom sector now happens on 3 levels:** on the top, with tech companies absorbing further value and potentially disintermediating some telecom functions. On the side, with alternative operators who rely on regulated access, but also on consolidation, which brings stronger competitors to the table. Below, with increasing investment in entities deploying pure fibre and adding to the infrastructure competition game.

**Policymakers hold some of the key levers in the game:** for example, market structure, spectrum auctions, licence conditions, barriers to deployment, proportionate fixed regulation, service regulation. A factual recognition of the competitive environment will help determine whether the outcome of the current market trends is a stronger or a weaker sector. With 5G and the digital transformation of society in the making, this is going to be a key strategic challenge in defining Europe's place on global stage.

A hand is shown in the lower right, reaching towards a complex network of glowing blue nodes and lines that fills the upper and middle portions of the frame. The background is dark, making the bright blue elements stand out. The text is overlaid on a teal rectangular box in the upper left.

ETNO MEMBERS CREATED A YEARLY  
**€139.4bn** VALUE ADDED

# INTRODUCTION

This report has been commissioned by ETNO to provide market context and a qualitative assessment of digital communications within Europe and beyond. The future is exciting and the prospects for positive transformation and growth are numerous. As the telecoms sector takes centre-stage in enabling socio-economic growth, this report offers a fact-based picture of the main opportunities and challenges.

The changing nature of the digital services and customer expectations within the telecoms market continues to drive innovation, thereby helping to improve both the business and consumer environments. Digital communications providers need to carefully consider economic, political and social factors in order to remain successful and innovative in the European market.

This report answers three fundamental questions.

- What have digital communications providers delivered to their customers?
- How do digital communications providers support the economies and citizens in Europe?
- What will digital communications providers' innovations be and when will they occur?

The remainder of this document is laid out as follows.

## 01/ DIGITAL COMMUNICATIONS PROVIDERS GREATLY CONTRIBUTE TO EUROPEANS' LIVES.

This part of the report considers how digital communications providers help to directly improve the lives of European citizens through the services that they offer, the jobs that they provide and the value that they bring to the wider economy.

## 02/ SUPPLYING DIGITAL COMMUNICATIONS TO EUROPE'S SOPHISTICATED CUSTOMERS.

This part of the report provides analysis of the trends and market dynamics that are currently active within the European telecoms market.

## 03/ THE EMERGING MARKET TRENDS, OPPORTUNITIES AND CHALLENGES FOR DIGITAL OPERATORS.

This part of the report considers the future possibilities for services, technology and the market as a whole as new players compete with current service providers.

# 01/

## **DIGITAL COMMUNICATIONS PROVIDERS GREATLY CONTRIBUTE TO EUROPEANS' LIVES.**

Digital communications providers help to directly improve the lives of European citizens through the services that they offer, the jobs that they provide and the value that they bring to the wider economy

A hand is shown from the bottom, holding a glowing network of white nodes and lines that radiates upwards. The background is a gradient of blue. A teal box contains text, and a purple box with the number 9 is in the top right corner.

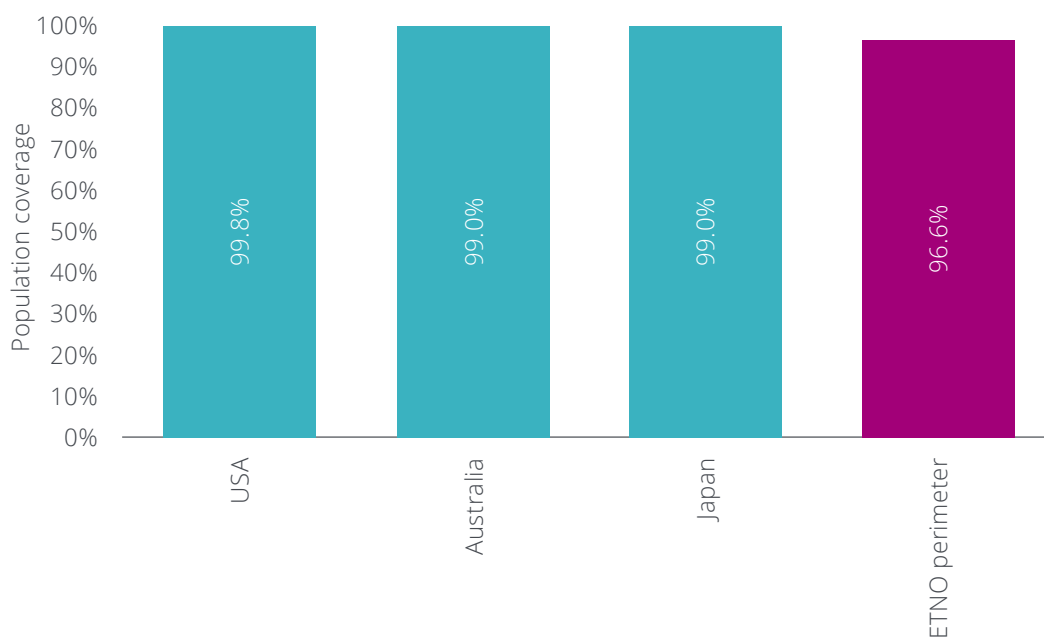
INVESTMENT PER CAPITA  
IN EUROPE IS **€83.2**

## DIRECT IMPACT FOR EUROPEANS

Digital communications providers have produced good outcomes for the people of Europe. Europeans benefit from good coverage, and they have an exceptionally wide choice of retail providers and very low prices. As a consequence, they are particularly digitally engaged.

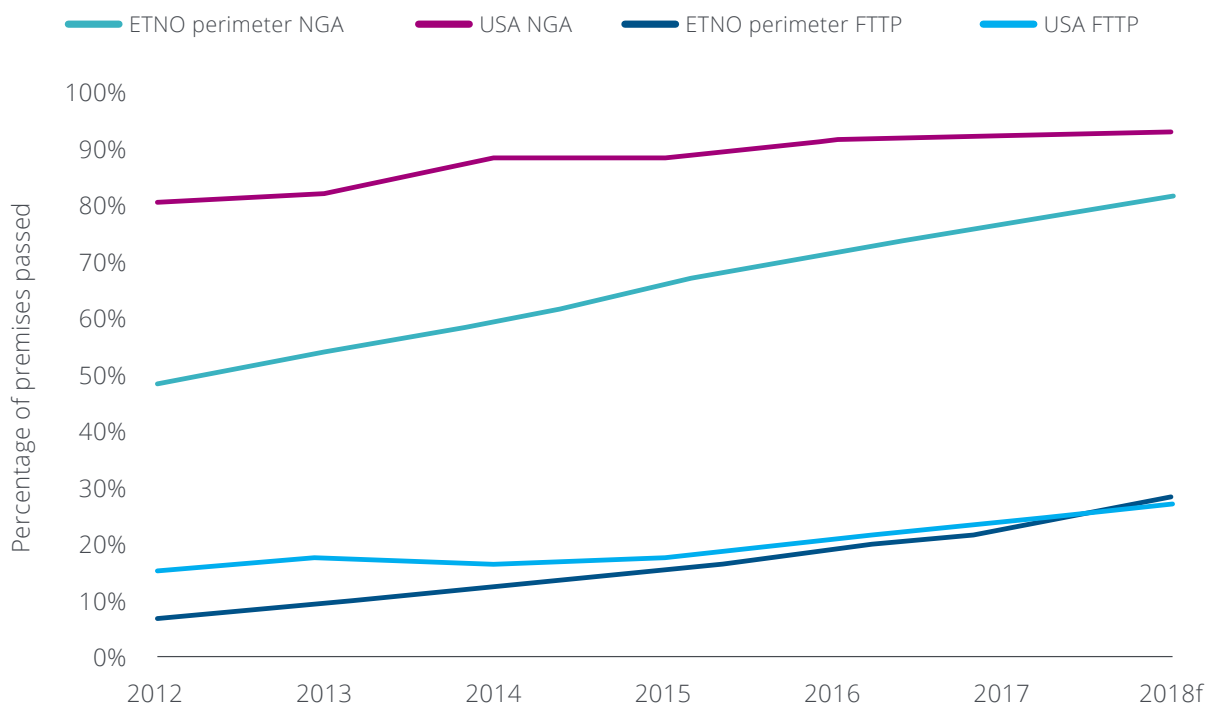
4G population coverage by at least one operator stood at 99% or above in 14 countries in the ETNO perimeter in 2017, and at 96.6% in the ETNO perimeter overall (Figure 3.1).

**Figure 3.1: Percentage of the population covered by at least one LTE/WiMAX mobile operator, ETNO perimeter, Australia, Japan and the USA, 2017 (Japanese data is from 2016)**



Source: ITU

**Figure 3.2: NGA and FTTP coverage, ETNO perimeter and the USA, 2012–2018 (forecast)**



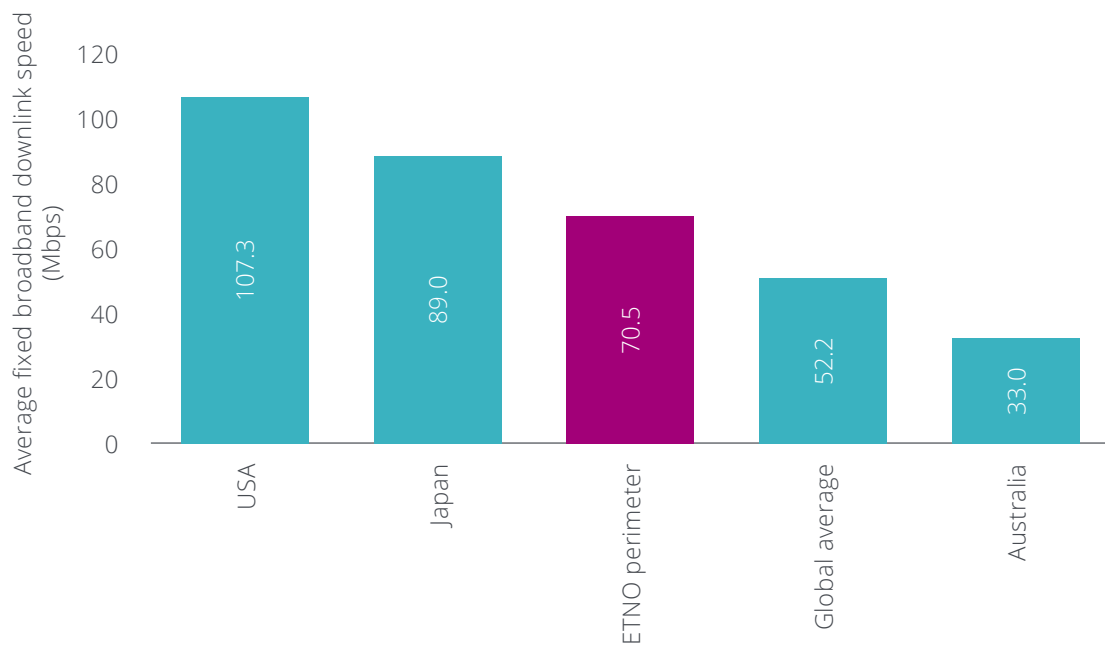
Source: Analysys Mason, 2018

The path to achieving Europe's 'Gigabit Society' targets remains uphill, but heavy investment by European operators has led to increased fixed broadband availability and choice in Europe.<sup>1</sup> The USA has a historical legacy of denser cable infrastructure than Europe, but European countries have largely caught up with the USA in terms of both next-generation access (NGA, meaning FTTx or cable) availability and FTTH availability. This is, to a large extent, because European operators have built fibre-based fixed access, despite a more challenging regulatory environment.

<sup>1</sup> <https://ec.europa.eu/digital-single-market/en/policies/improving-connectivity-and-access>

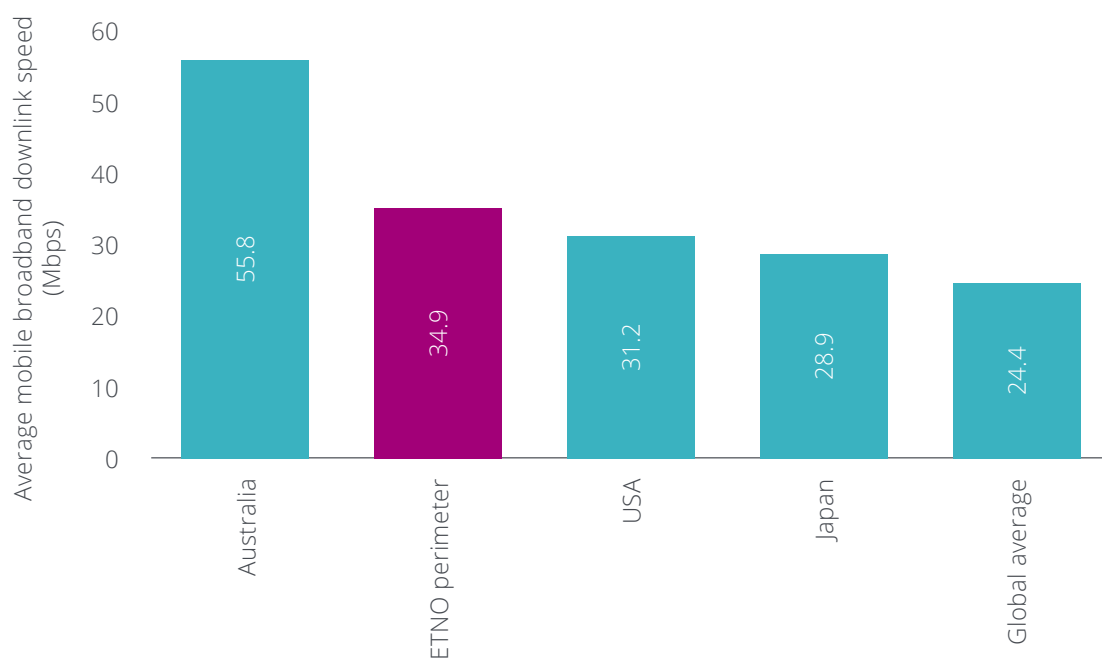
12 of the top-20 countries in the world in terms of average downlink mobile speed, plus 11 of the top-20 countries in the world for average downlink fixed broadband speed are within the ETNO perimeter. Fixed broadband speeds are lower than in Japan and the USA, but average mobile broadband speeds are significantly higher in the EU perimeter than in those two countries (Figures 3.3 and 3.4). (Average speed on mobile networks is a function of capacity and utilisation, so high figures can be a factor of low usage.)

**Figure 3.3: Average fixed broadband downlink speeds, ETNO perimeter, Australia, Japan and the USA, November 2018**



Source: Analysys Mason, 2019

**Figure 3.4:** Average mobile broadband downlink speeds, ETNO perimeter, Australia, Japan and the USA, November 2018

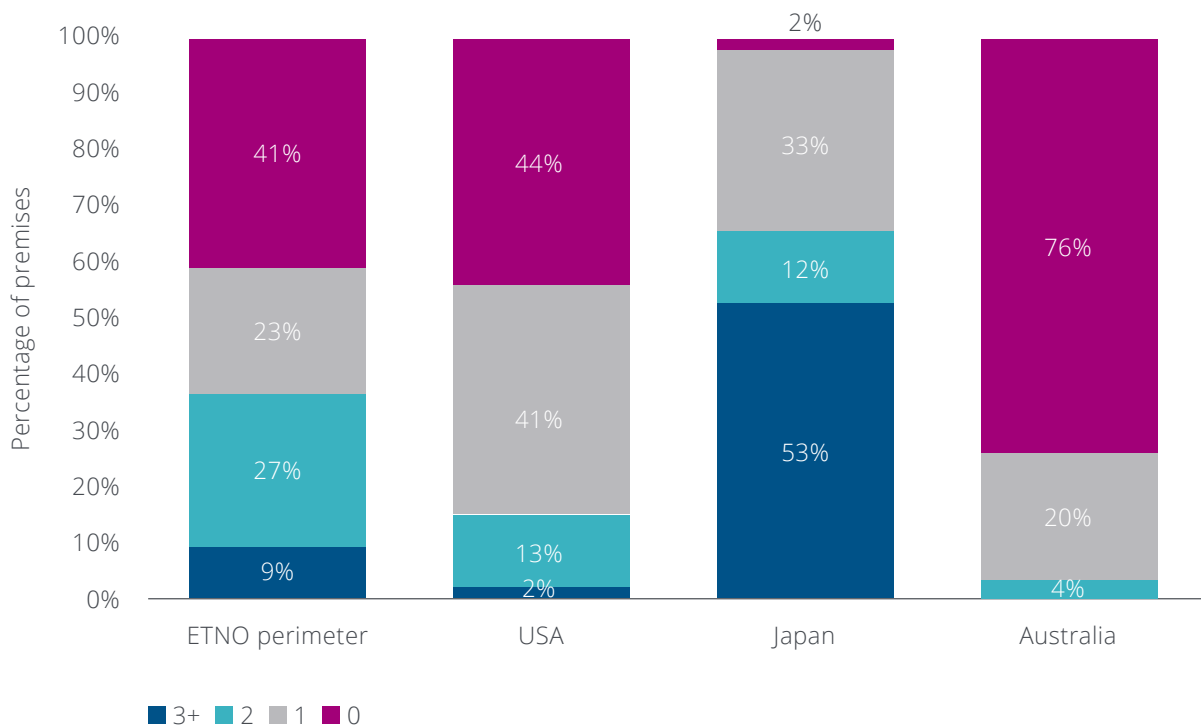


Source: Analysys Mason, 2019

Moreover, European consumers have a good level of choice in terms of retail providers of fixed and mobile telecoms.

At a fixed infrastructure level, consumers in Europe can typically choose between a broader range of ultrafast broadband suppliers than is possible in other geographies. However, both regions are some way behind Japan, where urban dwellers frequently have a choice of cable and two different FTTP infrastructures (Figure 3.5).

Figure 3.5: Choice of FTTP and cable infrastructures, ETNO perimeter, USA, Japan and Australia 2017

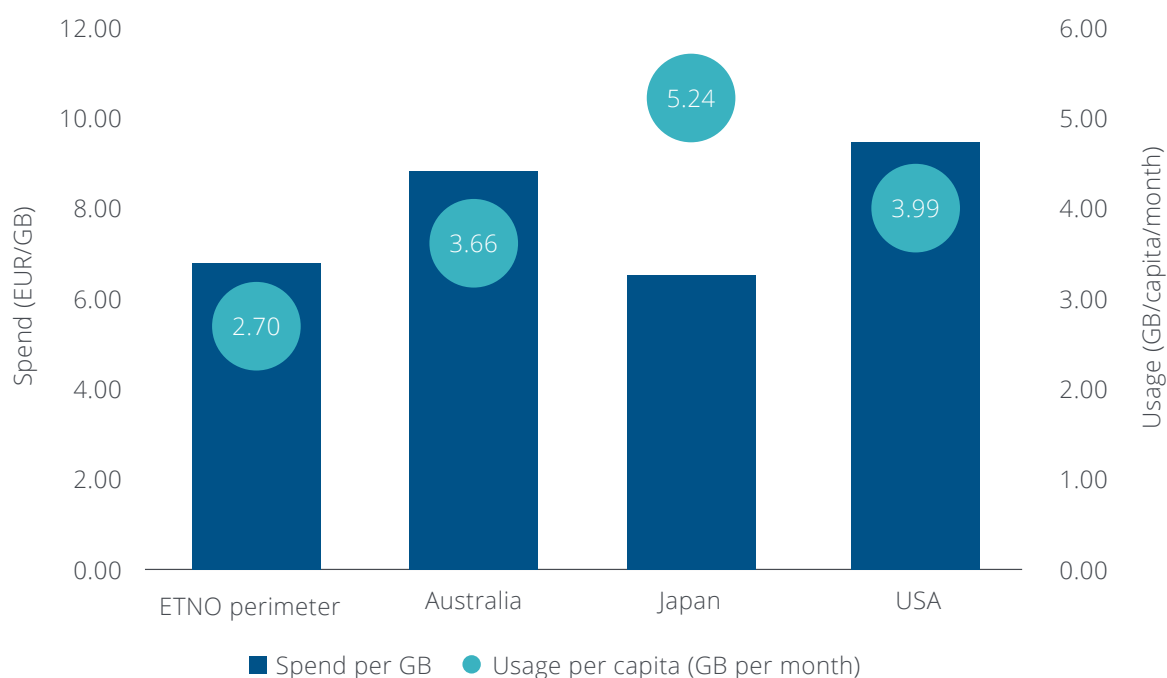


Source: FCC, 2017 and Analysys Mason, 2018

The average spend per gigabyte of mobile data in the ETNO perimeter in 2017 was lower than that in Australia and the USA, and was broadly comparable with that in Japan (Figure 3.6). The average mobile data usage per capita in the ETNO perimeter was lower than that in all three other countries, despite low prices and spend. There is however, huge variation between European countries in terms of average usage, and, perhaps because of the current low usage, mobile data traffic growth is currently stronger in Europe than in Australia, Japan and the USA.

The average spend per month per capita on all telecoms services in the ETNO perimeter is under half that in Australia and the USA, and a little more than half that in Japan (Figure 3.7).

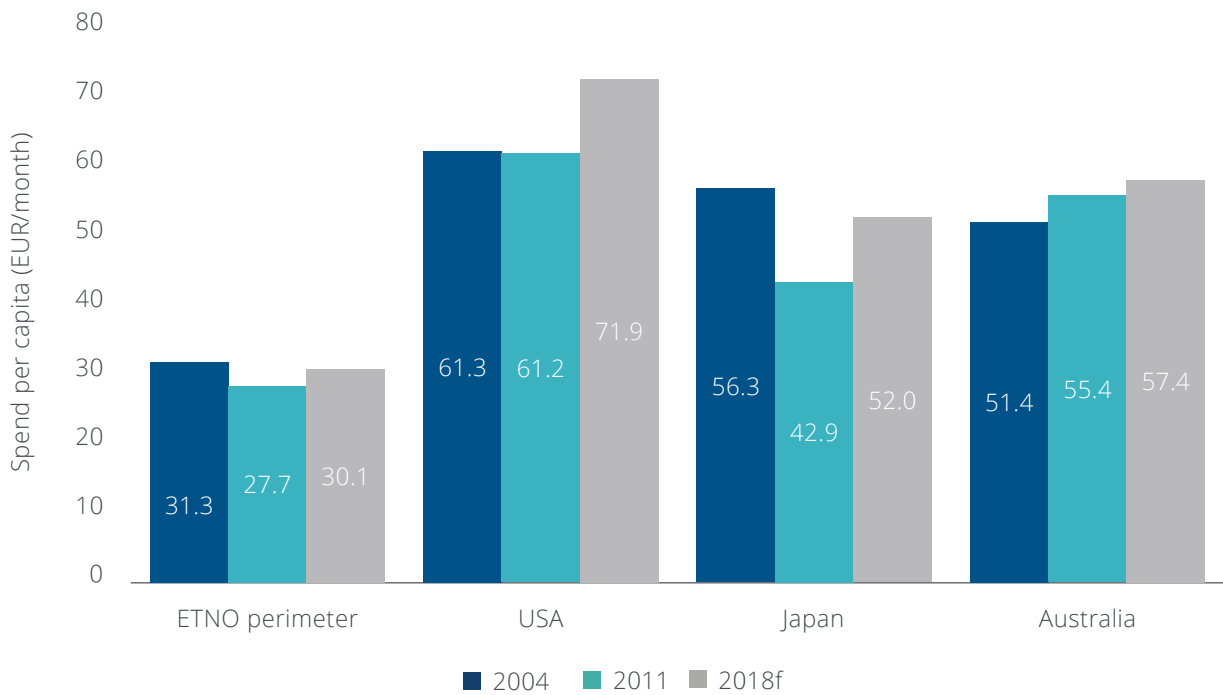
**Figure 3.6: Average spend per gigabyte of mobile data used<sup>2</sup> and average mobile data usage per capita, ETNO perimeter, Australia, Japan and the USA, 2017**



Source: Analysys Mason, 2019

<sup>2</sup> Total service revenue divided by data traffic.

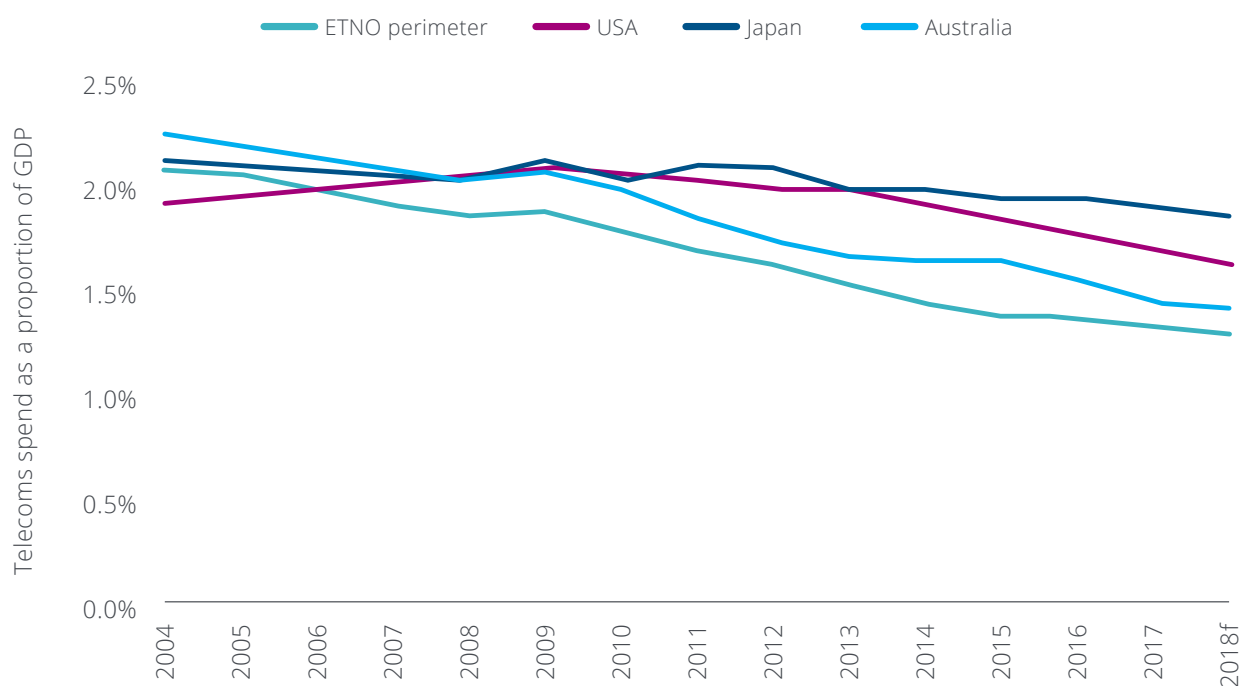
Figure 3.7: Average mass-market telecoms spend per capita, ETNO perimeter, the USA, Japan and Australia, 2004, 2011 and 2018 (forecast)



Source: Analysys Mason, 2018

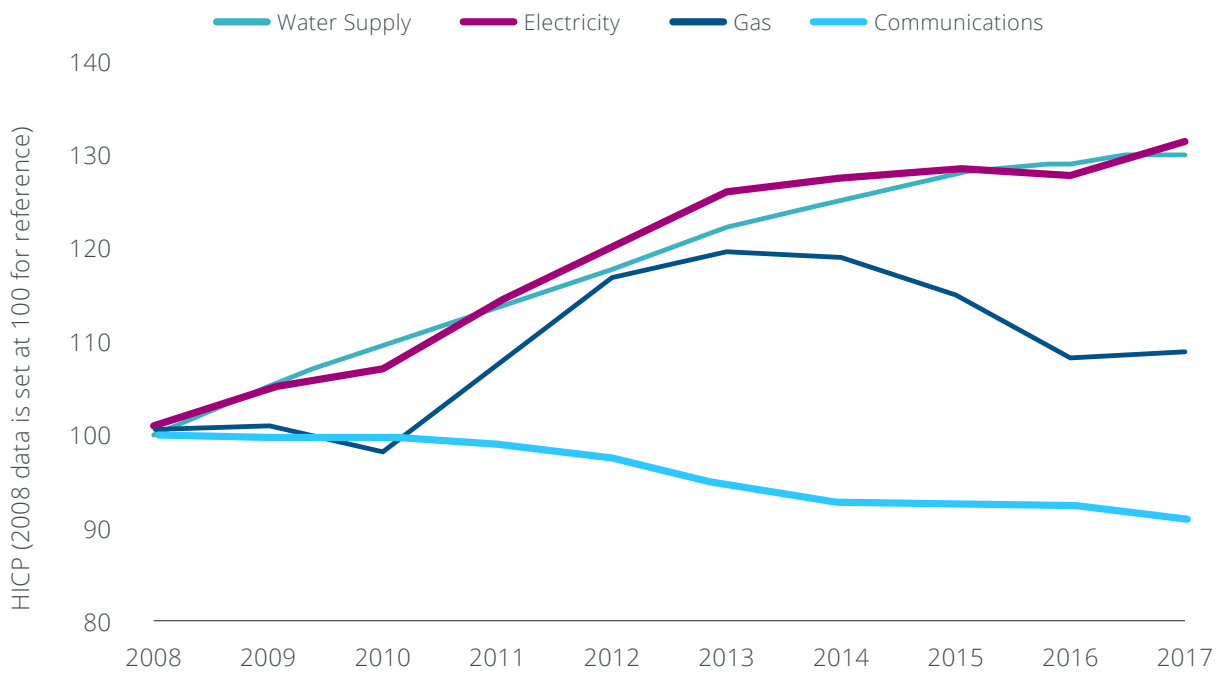
The lower spend in Europe can only partly be explained by the region's lower average GDP per capita. This does not provide the whole picture; the spend on telecoms services as a proportion of GDP is actually lower than that in Japan and the USA, and is falling more quickly (Figure 3.8). In fact, telecoms services are unique among major infrastructure-based services in Europe because they are the only ones whose prices have fallen over time (Figure 3.9).

**Figure 3.8: Mass-market telecoms spend as proportion of GDP, 2004–2018f**



Source: Analysys Mason, 2018

Figure 3.9: Harmonised index of consumer prices (HICP) for infrastructure-based services, Europe, 2008-2017



Source: Eurostat

The question of inclusion remains crucial to the continent: many geographic areas still need to catch up, both in terms of demand stimulation and facilitating investment in roll-outs. However, European consumers are among the most-digitally engaged in the world in terms of Internet usage, but the picture is not homogeneous: the Nordic region, the UK, Ireland and the Benelux region come at the top of world rankings. Moreover, digital engagement in these leading European markets is particularly democratised: Internet usage for people within the 55–74 year old age group and for those with low educational attainment is significantly higher than in the equivalent sectors in all other advanced economies.<sup>3</sup>

In its 2017 Digital Economy Outlook report, the OECD reported that all of the top 10 and 16 of the top 20 of its members in terms of online purchasing were within the ETNO perimeter.<sup>4</sup> All of the top-10 OECD members in terms of the use of egovernment services were within the ETNO perimeter.<sup>5</sup>

The adoption of advanced online/ICT services by businesses is also high in Europe. The 2017 Digital Economy Outlook report records the worldwide leaders in terms of the adoption of cloud services and the performance of big data analytics as European, although the USA did not form part of these surveys.<sup>6</sup> As with consumer behaviour, there is a wide variation in adoption within the ETNO perimeter, and northern European nations are significantly ahead of the rest.

However, much more needs to be done in terms of demand stimulation and fibre take-up, and subsequently of 5G, especially in light of the potential mismatch between capacity and demand, as outlined in Part B of this report.

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<sup>3</sup> [www.read.oecd-ilibrary.org/science-and-technology/oecd-digital-economy-outlook-2017\\_9789264276284-en#page171](http://www.read.oecd-ilibrary.org/science-and-technology/oecd-digital-economy-outlook-2017_9789264276284-en#page171)

<sup>4</sup> [www.read.oecd-ilibrary.org/science-and-technology/oecd-digital-economy-outlook-2017\\_9789264276284-en#page174](http://www.read.oecd-ilibrary.org/science-and-technology/oecd-digital-economy-outlook-2017_9789264276284-en#page174)

<sup>5</sup> [www.read.oecd-ilibrary.org/science-and-technology/oecd-digital-economy-outlook-2017\\_9789264276284-en#page176](http://www.read.oecd-ilibrary.org/science-and-technology/oecd-digital-economy-outlook-2017_9789264276284-en#page176)

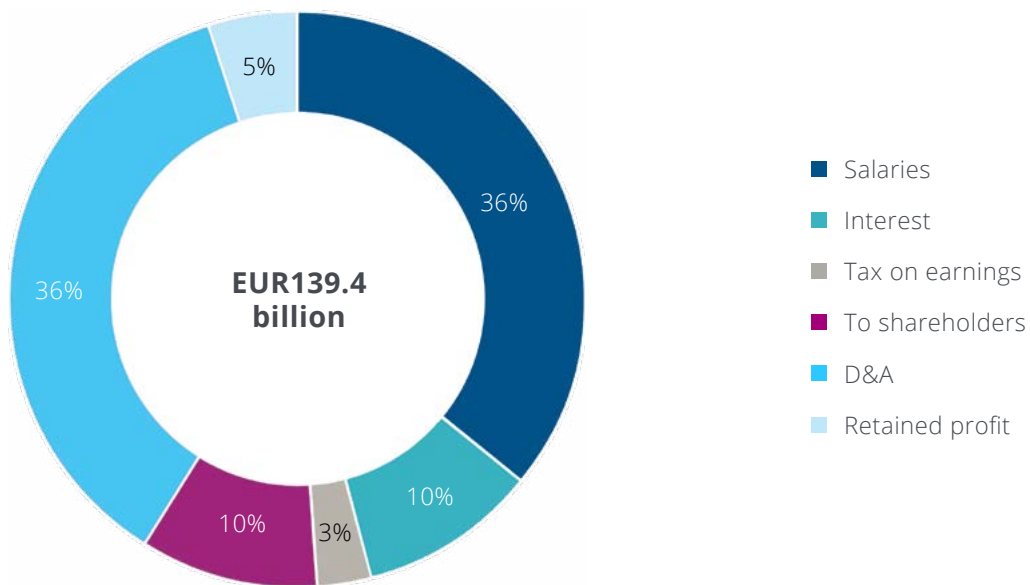
<sup>6</sup> [www.read.oecd-ilibrary.org/science-and-technology/oecd-digital-economy-outlook-2017\\_9789264276284-en#page166](http://www.read.oecd-ilibrary.org/science-and-technology/oecd-digital-economy-outlook-2017_9789264276284-en#page166)

## INDIRECT IMPACT

European operators contribute both directly and indirectly to the economic well-being of European citizens through their investment in digital infrastructure, and also through taxation and their investment in skills. However, strong competition compared with that in other developed economies has hampered investment. This check on investment will end up affecting end users directly, even though they currently benefit from low prices, and will inhibit the growth of the European digital economy.

At a group level, ETNO members (including non-European subsidiaries) created EUR139.4 billion of value added (revenue minus the cost of goods and services) in 2017. Value added was distributed as shown in **Figure 4.1**.

**Figure 4.1: Breakdown of value added from ETNO members (group level), 2017**



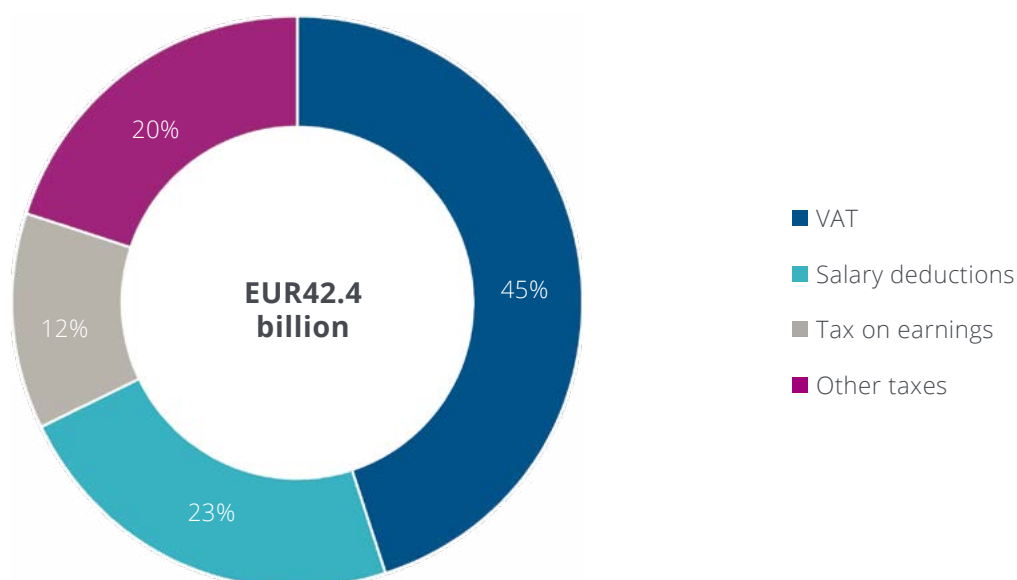
Source: Analysys Mason, 2018

This value added translated into a significant and sizeable injection of wealth into the economy and across society; overall, 59% of the value added was distributed to employees, shareholders and financial institutions, and as tax on earnings. Salaries constituted 36% of the total value added. 41% of the value added was retained in businesses, either as retained profit or as depreciation and amortisation. The 36% retained as depreciation and amortisation reflects that operators are still asset-heavy businesses, despite the process of digital transformation.

Within the ETNO perimeter, ETNO members paid an estimated EUR42.4 billion in direct and indirect taxes in 2017, which contributed to government funds and projects (**Figure 4.2**). This figure represents about 22% of their total revenue. Moreover, ETNO members pay taxes in the countries and tax jurisdictions where they actually take revenue, where their employees actually work, and where they buy goods and services, hence their tax contribution is in line with other established verticals. This stands in contrast to large non-European digital platforms, that can route their revenue to low-tax jurisdictions inside the European Union, and can declare artificially low profits in those jurisdictions. A 2018 European Commission communication on the taxation of digital businesses notes:

“The current international tax rules were designed for ‘brick and mortar’ businesses. They are largely based on physical presence and were not designed to cope with business models driven primarily by intangible assets, data and knowledge. [...] As a result, companies with digital business models pay less than half the tax rate of businesses with traditional business models, with an effective average tax rate of 9.5% compared to 23.2%.”<sup>7</sup>

**Figure 4.2: Total direct and indirect tax, ETNO members (ETNO perimeter only), 2017**

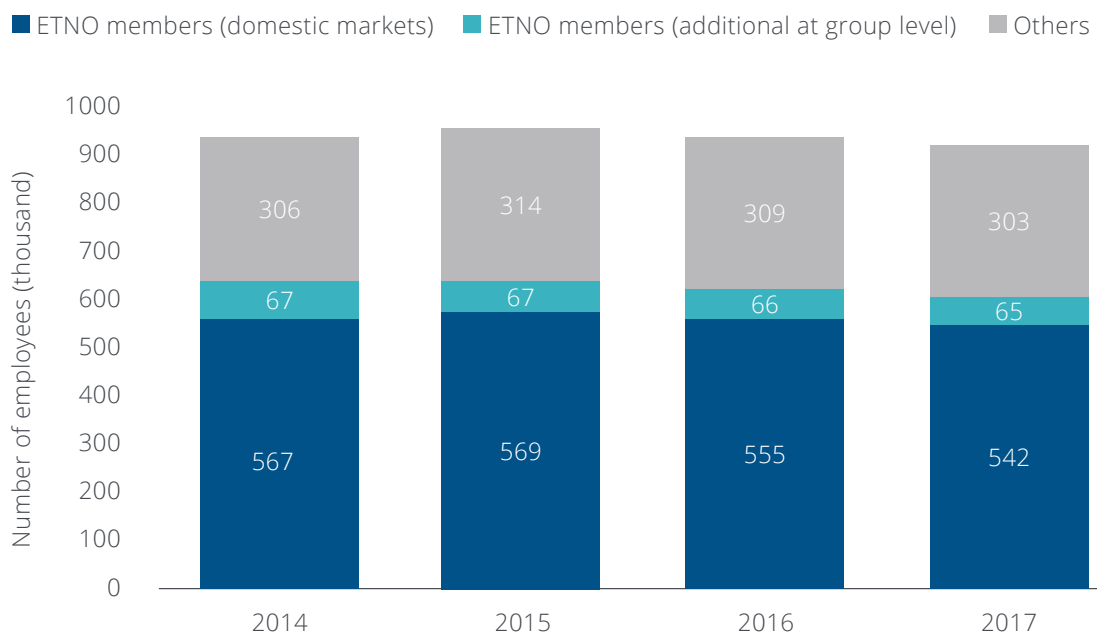


Source: Analysys Mason, 2018

<sup>7</sup> “Time to establish a modern, fair and efficient taxation standard for the digital economy” (EU-CO 2018 146 final).

European operators create high-quality employment, not only for their own staff but also for the suppliers that sell them goods and services. At a domestic operator level, ETNO members had 542 000 employees in December 2017 (607 000 including other operations within the ETNO perimeter) (Figure 4.3).

Figure 4.3: Number of employees within the ETNO perimeter, 2014–2017



Source: Analysys Mason, 2018

ETNO members are big-hitters globally, both in terms of revenue and investment, despite having small domestic markets by global standards. 4 of the top-12 operating groups globally are headquartered in Europe, and 3 of these are ETNO members (Figure 4.4).

**Figure 4.4: Top 12 operating groups in the world by revenue, 2017**

 : ETNO Members     : ETNO Observers

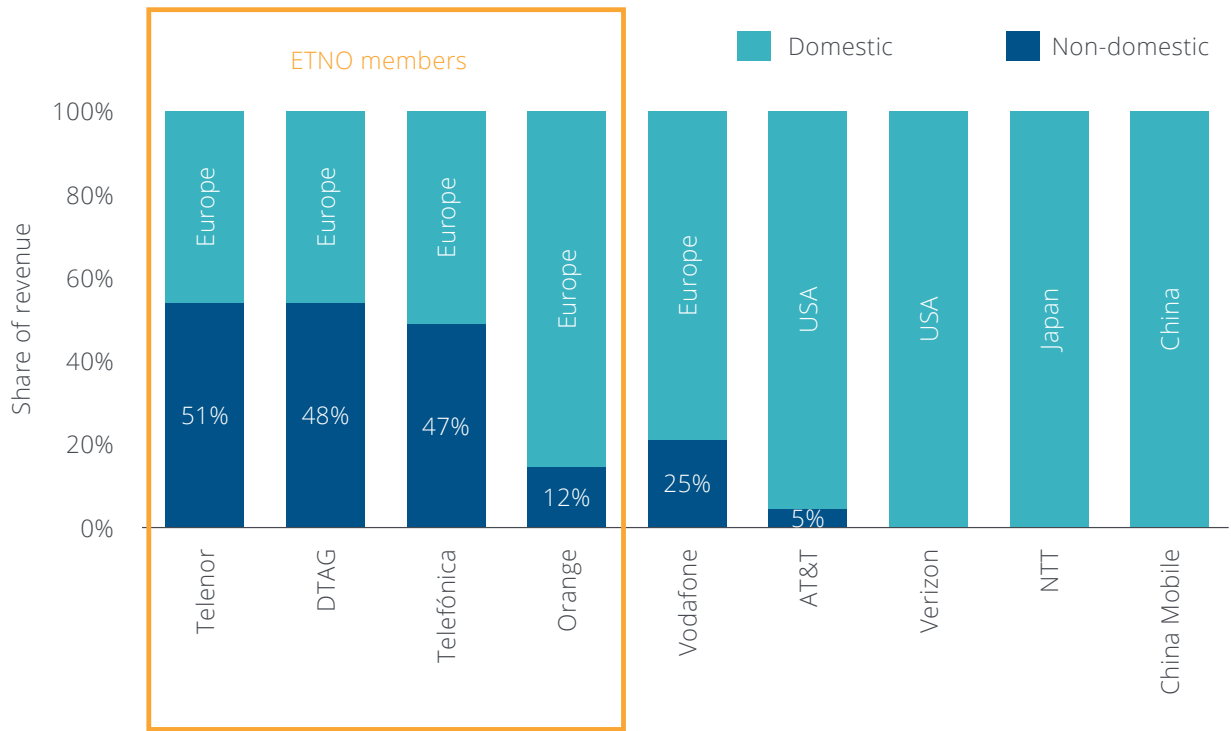
Rank	Operating group	2017 revenue (EUR billion)	
1	AT&T	142.42	
2	Verizon	111.81	
3	China Mobile	97.15	
4	NTT	92.96	
5	Deutsche Telekom	75.10	
6	SoftBank	52.63	
7	Telefónica	52.12	
8	América Móvil	48.05	
9	China Telecom	48.02	
10	Vodafone	46.67	
11	Comcast	46.59	
12	Orange	41.18	

Source: Analysys Mason, 2018

# 01/ Digital communications providers greatly contribute to Europeans' lives

Overall, at a group level, 32% of ETNO member revenue came from outside Europe in 2017. Deutsche Telekom, Telefónica and Telenor each derives about half of their revenue from outside Europe. In contrast, the largest telecoms players in the world such as AT&T, Verizon, NTT and China Mobile have very little presence as operating businesses beyond their traditional domestic markets except for large enterprise services (Figure 4.5).

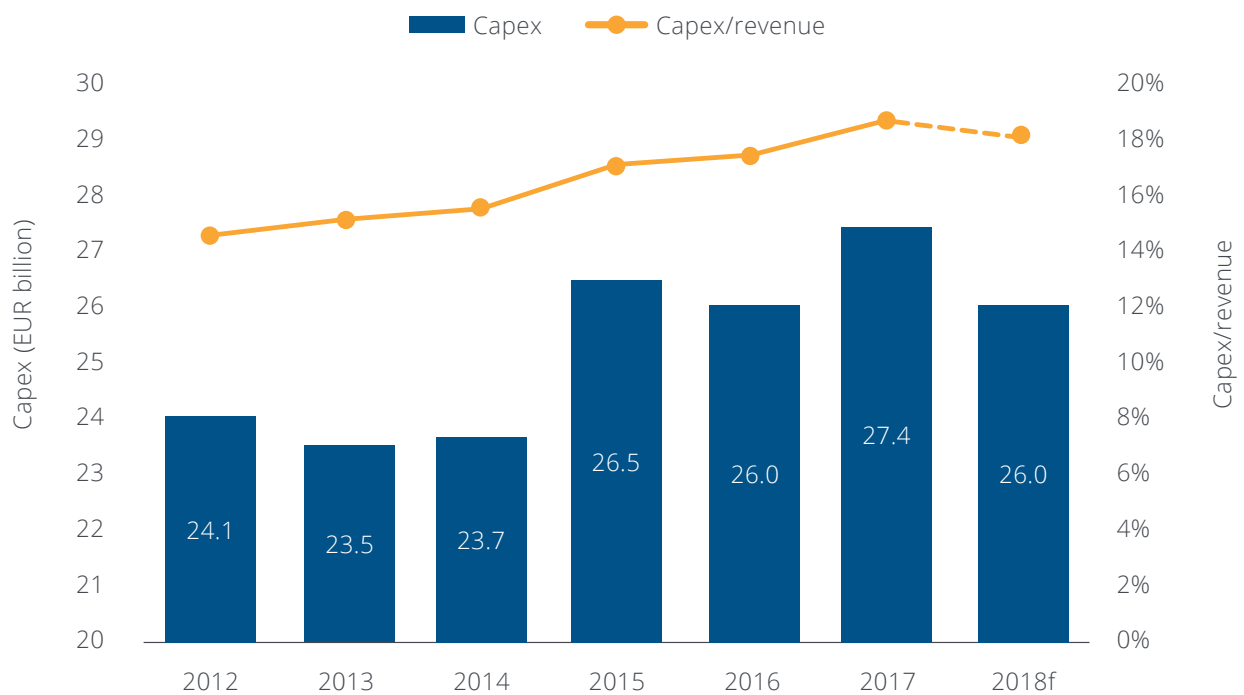
**Figure 4.5: Proportion of revenue from domestic and non-domestic operating businesses, last full financial year**



Source: Analysys Mason, 2018

One of the financial characteristics that sets European operators apart from other operators worldwide is their growing capital expenditure, both in real terms and as a proportion of revenue. The total capex for ETNO members was EUR27.4 billion in 2017, which is up over 5% on the figure from 2016 and up 14% from 2012, even though revenue fell by 1% in 2017 and has fallen by 11% since 2012 (**Figure 4.6**). This is putting pressure on European telcos and it would need to be fully recognised by policymakers.

**Figure 4.6: ETNO member capex, and capex/revenue, 2012-2018f**

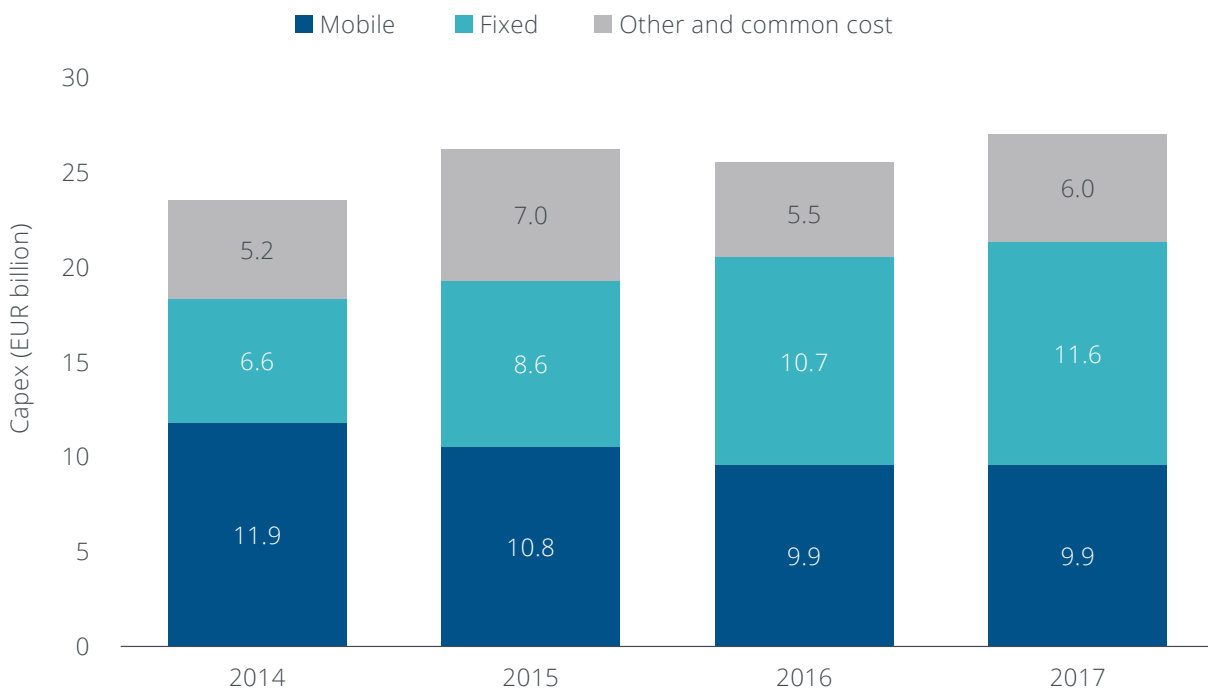


Source: Analysys Mason, 2018

In fact, since 2012, the aggregate capex as a proportion of revenue among ETNO members in their domestic markets has grown every year. Based on the half-year figures for 2018, spending in 2018 will be down by about 4%, but capex as a proportion of revenue will still be higher than average. This bucks global trends and shows that European operators are already stretching their ability to invest: further pressure to increase investment levels in the future will require operators to show better returns.

ETNO operators tend to have integrated fixed–mobile lines of business, so the split between fixed and mobile capex is becoming more difficult to assess. Many of the costs are common to both fixed and mobile access networks, so the following is an estimate (Figure 4.7). The proportion of capex that is being used for fibre infrastructure is notably high among ETNO members, and shows few signs of easing off, except in countries where a large part of the one-off infrastructure roll-out (both fixed and mobile) has already been achieved. 5G is beginning to show up as an item in capital expenditure, along with the network transformation (backhaul, digital infrastructure and virtualisation) that will enable the full potential of 5G.

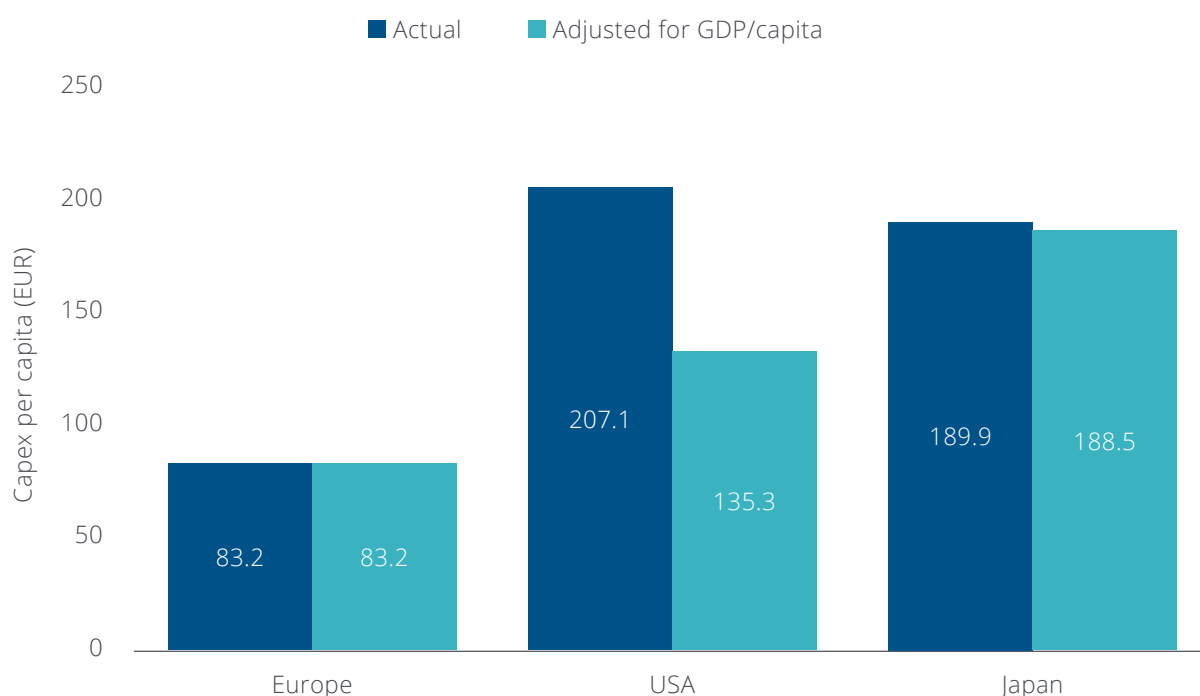
Figure 4.7: Split of capex into fixed and mobile for ETNO members, 2014–2017 [CapEx does not include Spectrum]



Source: Analysys Mason, 2018

The growth in investment by European operators brings both direct and indirect benefits to Europeans, but it disguises a profound problem at the heart of the European telecoms sector. ETNO members invested EUR83 per capita in 2017, which is significantly lower than the amounts invested by operators in the USA or in Japan, even after allowing for differences in GDP and PPP (Figure 4.8). (In fact, Japan has very similar GDP per capita when adjusted for PPP to the ETNO perimeter, and Japan's investment per capita is over twice that of the ETNO members.)

**Figure 4.8: Capex per capita, ETNO perimeter, USA and Japan, 2017**



Source: Analysys Mason, 2018

This stark discrepancy between capex for ETNO members and that for other operators around the world is directly connected to the low overall spend and ARPU in Europe. This itself is the result of the competition and supply focus (as opposed to demand focus) that the EU framework fosters. The combination of low investment per capita, high capital intensity (18%) and low return is clearly not a sustainable or desirable position for operators. ROCE remains stubbornly low in the sector for ETNO members (sub-10%). In the final analysis, consumers or businesses stand to lose because they are, in effect, trading low levels of investment per capita for low prices. As the telecoms operator business transitions to using new operating models that are centred on 5G, the vicious cycle of low investment and low return will not help the economic well-being of Europe.

# 02/

## **SUPPLYING DIGITAL COMMUNICATIONS TO EUROPE'S SOPHISTICATED CUSTOMERS.**

This part of the report provides analysis of the trends and market dynamics that are currently active within the European telecoms market.

IN 2025, WE EXPECT OVER **800mIn**  
ACTIVE IOT CONNECTIONS IN EUROPE

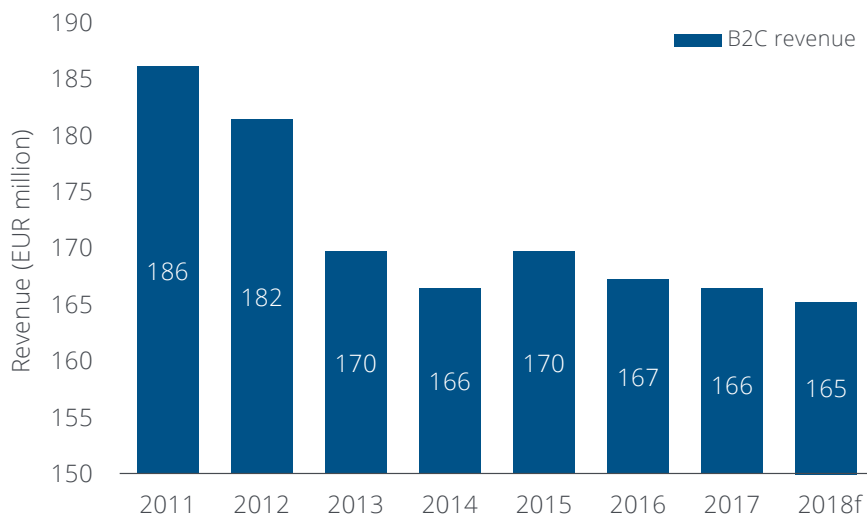
## TRENDS IN REVENUES AND CONSUMER SERVICES

### Operator revenue is becoming stable

There is no strong growth for operators in the EU28, but revenue is stabilising – following declining service revenue over recent years. Revenue grew in 2014 and 2015, and only modest overall declines have been recorded in more recent years (Figure 5.1). The top-line figures hide the complex mixture of services that contribute to the revenue as well as the different trends within Europe. The characteristics of the market in Western Europe differ from those in Central and Eastern Europe in the following ways.

- Revenue in Western Europe is falling. The largest falls are in voice services, but these are almost offset by revenue growth in fixed broadband services. Broadband revenue growth has been sustained by the widescale deployment of FTTP access networks across the region; such deployments have been made possible by large investments, mainly from ETNO members. There is also some growth in the number of subscribers for fixed services within the region, which is adding to the overall revenue growth.
- Mobile data and fixed broadband are key areas for retail revenue growth in Central and Eastern Europe. The increased revenue from retail mobile data (driven by improved LTE network coverage, faster LTE-A speeds and capacity upgrades) has led to a growth in the total telecoms revenue in the region. The demand for mobile video content has helped to increase the mobile data revenue (but not the overall revenue) and to boost subscriber migration from prepaid to more-expensive contract plans.

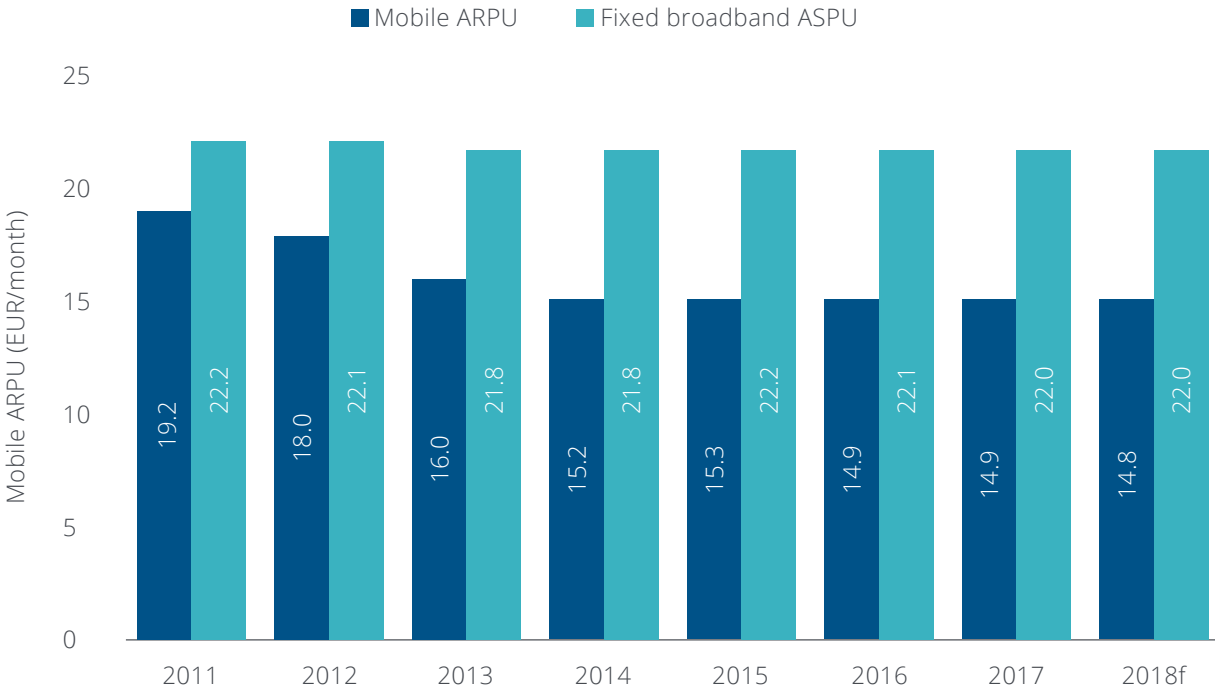
Figure 5.1: Revenue growth in consumer services (ETNO perimeter), 2011–2018 (forecast)



Source: Analysys Mason, 2018

Telecoms subscribers across Europe are paying less per month for their services, despite the introduction of new products and the increased use of data. Over the last 7 years, the overall ARPU for fixed broadband services in the ETNO member countries stabilised and the overall ARPU for mobile broadband services decreased (Figure 5.2). Mobile ARPU trends vary across Europe; the key factor determining ARPU has been the degree of competition in each country, and there is some correlation between high levels of competition and low ARPU. In the Netherlands, instead, recent developments on the merger of T-Mobile and Tele2 have the potential to lead to a better market environment and a healthier sector that can, in turn, deliver stronger levels of investment and improved value propositions for customers.

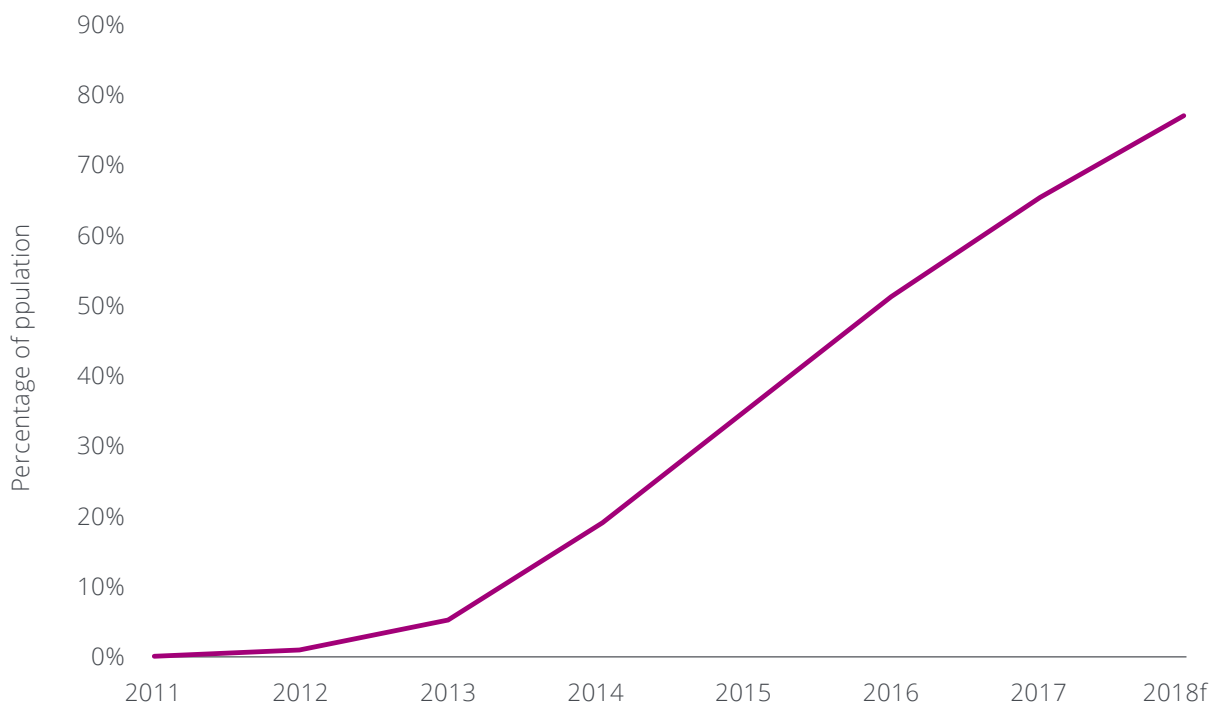
**Figure 5.2: Mobile ASPU and fixed broadband ASPU, ETNO perimeter, 2011–2018 (forecast)**



Source: Analysys Mason, 2018  
 ASPU = Average Spend Per User

4G is becoming the default mobile technology across European countries. Penetration rates for 4G are over 70% of the population (Figure 5.3). The improved experience and greater available bandwidth are leading to an increase in subscriber data usage, but this does not result in an ARPU increase.

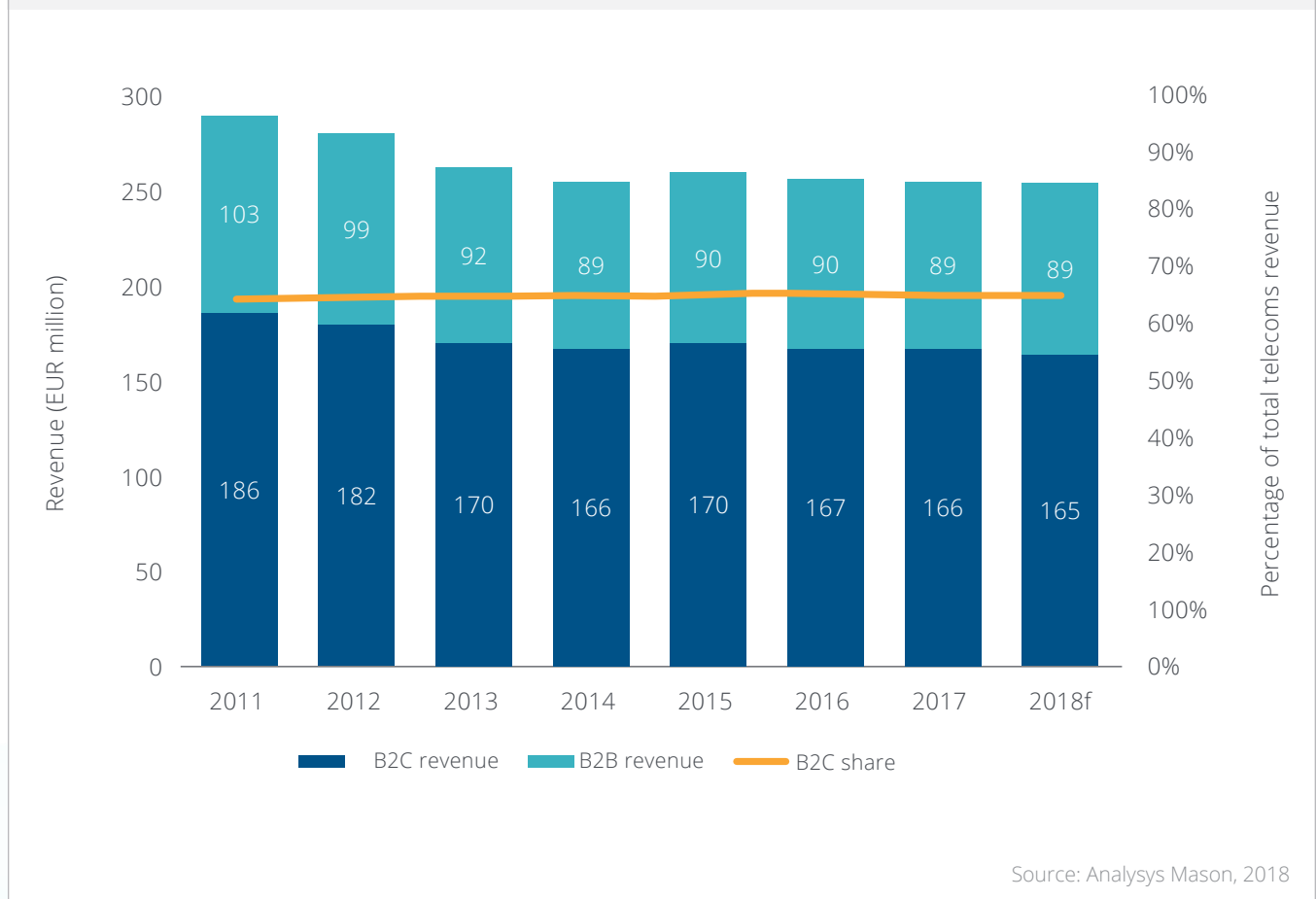
**Figure 5.3: Total number of 4G connections (excluding M2M) as a percentage of the population, ETNO perimeter, 2011–2018 (forecast)**



Source: Analysys Mason, 2018

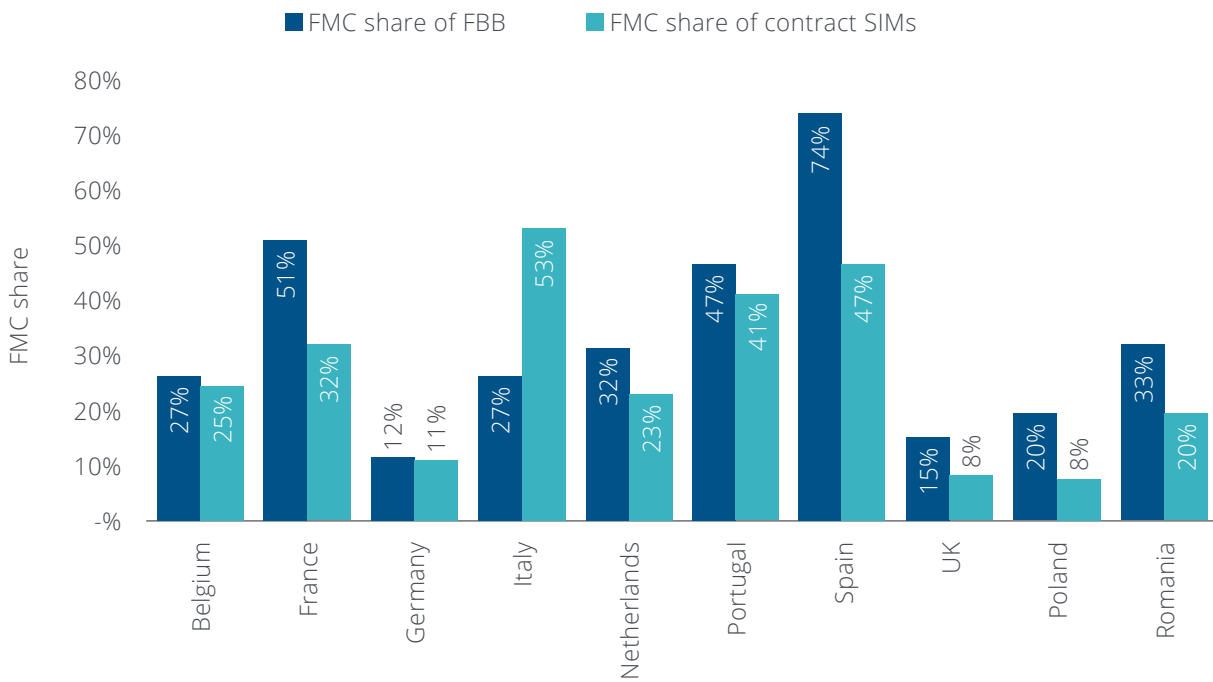
Consumer spending (B2C revenue) is larger than that for business services (B2B revenue) (Figure 5.4), and the B2C share of the total revenue has now stabilised after its peak in 2015. The revenue for both consumer and business services has been falling since 2011, but the decline in consumer services revenue is less acute, leading to the increased share of total revenue over time.

**Figure 5.4: B2B and B2C revenue within the ETNO perimeter, 2011–2018 (forecast)**



The take-up of fixed and mobile converged services is growing as consumers seek to reduce complexity and save costs in their communications services spending. Operators with relatively high shares in both fixed and mobile markets have increased their supply of fixed–mobile converged bundles.

Figure 5.5: FMC share of fixed broadband subscriptions and FMC share of all contract SIMs

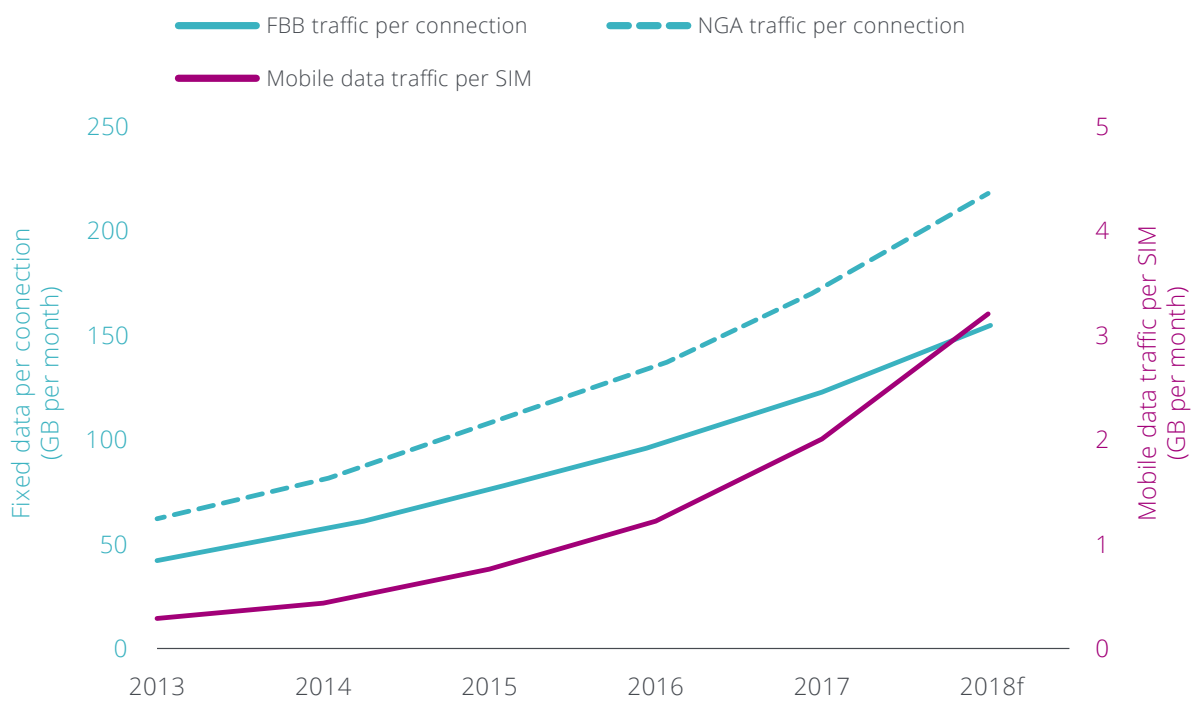


Source: Analysys Mason, 2018

FTTP offers operators long-term benefits, but proves to be very challenging in terms of return on investment in the short term. Mobile discounts given as part of a fixed-mobile convergence (FMC) offer create value for both customers and operators, as they help to reduce customer churn and maximise the acquisition of new clients. Very few ETNO members have a separate mobile line of business, which leads them to prefer the integrated model and therefore actively promote FMC propositions. Some markets (for example, Spain) have an outstanding take-up of FMC products (Figure 5.5).

Data usage for both mobile and fixed lines is growing quickly (Figure 5.6), which is resulting in consumers migrating onto larger mobile data packages and higher-speed fixed broadband connections. This growth is partly due to a rapid shift from linear to non-linear viewing, and partly due to the ubiquity of portable devices.

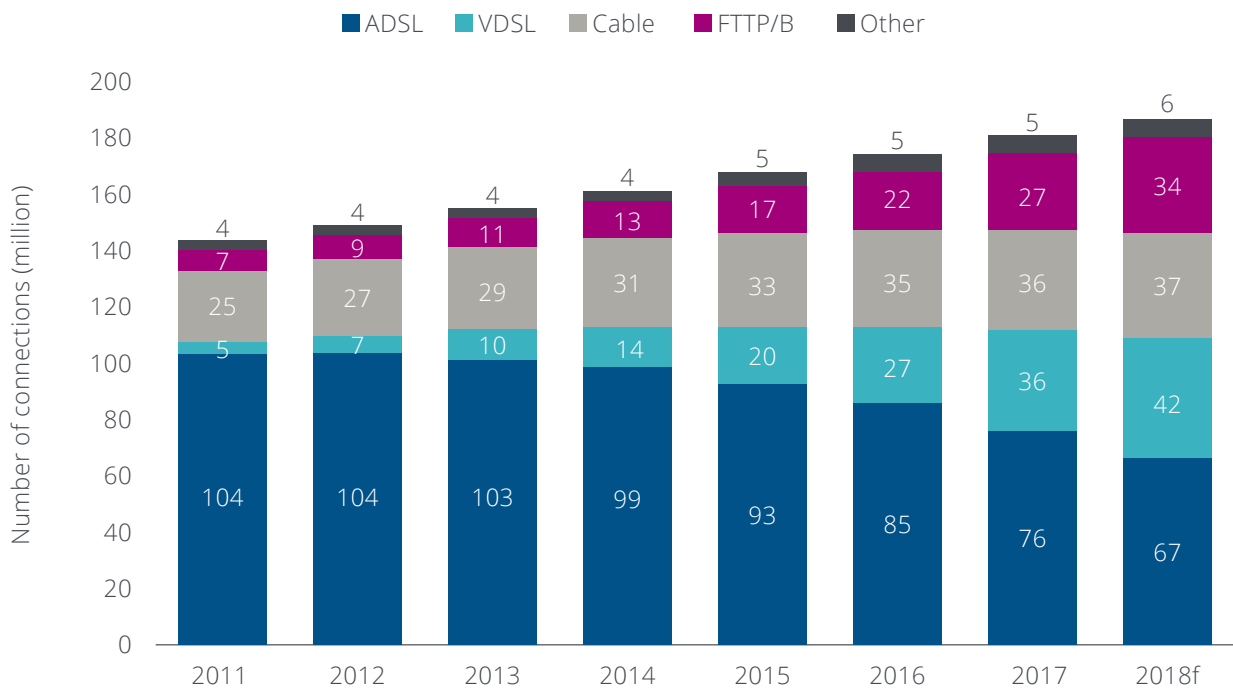
**Figure 5.6: Fixed and mobile data usage per connection, ETNO perimeter, 2013–2018 (forecast)**



Source: Analysys Mason, 2018

The number of fixed broadband connections is nearing saturation in Western Europe, but the take-up of next-generation access (NGA, including VDSL and FTTC/FTTP) is growing as it replaces older technologies. FTTH has come of age and ETNO members have been critical in achieving this. The take-up of fixed broadband is still growing in Central and Eastern Europe, and NGA investments are increasing thanks to a better economic environment. As the take-up of NGA services increases, the use of slower ADSL-based services declines (**Figure 5.7**).

**Figure 5.7: The number of fixed broadband connections by technology, ETNO perimeter, 2011–2018 (forecast)**



Source: Analysys Mason, 2018

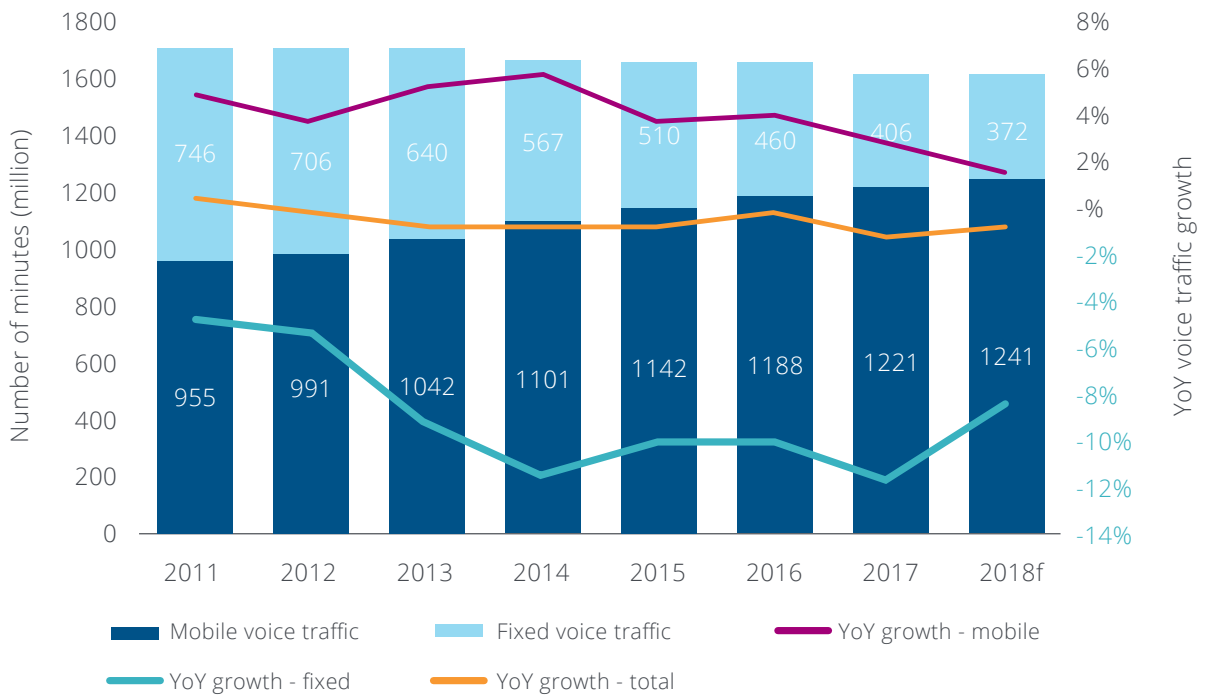
The demand for fixed voice is already in decline, and is matched by a decline in demand for mobile voice. New, app-based digital personal communications services have led to a fragmented market, as Europeans demand a better experience and an increasing variety of digital services. Telecoms operators are highly trusted by consumers, which enables them to put forward trustworthy product and service portfolios in a fragmented digital market.

## Market Challenges

European operators have faced a number of challenges in the past year due to increased market competition and a decrease of revenues.

- **Competition is leading some operators to break back bundles that contain video into their constituent parts.** The ever-growing number of OTT video services is likely to negatively affect the operators' own TV/content services. The increased richness, quality and quantity of OTT content combined with low costs will reduce operators' ability to grow their digital services portfolios making it likely that digital operators will move away from their own content services in favour of distributing channels for OTT services.
- It is becoming more challenging to generate increased **revenue from FMC bundles**.
- Operators need to find **new ways to engage with consumers** and to differentiate given the difficulties of competing against OTT players for content.
- **Market saturation** is affecting European operators in a number of areas; for example, the rate of total voice revenue growth is slowing as the total voice traffic for mobile and fixed services declines (**Figure 5.8**). Mobile data growth continues (**Figure 5.6**), but subscribers' usage (in terms of hours spent on mobile devices) is reaching a maximum. Growth will now be more organic and less dramatic as the initial take-up of apps is completed, resulting in more modest growth. A new generation of smartphone app (such as virtual reality or augmented reality) may again trigger higher data usage, but these are not yet being widely used.
- There is increasing **pressure on telecom operators to invest ahead of demand**, including supply-centred policy agendas that call for investment in additional capacity, while putting little or no emphasis on the need of a stronger demand. Policymakers, both at the EU and national levels, should be aware that heavy investment in such additional capacity should be matched by the ability to ensure adequate returns. .
- Finding the **optimal balance of fixed, mobile and Wi-Fi assets** among European operators to meet the growing expectations of good coverage in every type of indoor and outdoor physical location is challenging.
- 5G has the potential to empower the territorial inclusion of users, as new commercial offers can complement or replace pure fixed access. However, the optimal **balance of investment between 5G and fibre** for consumer broadband remains an uncertainty.

**Figure 5.8: Voice traffic growth, ETNO perimeter, 2011-2018 (forecast)**

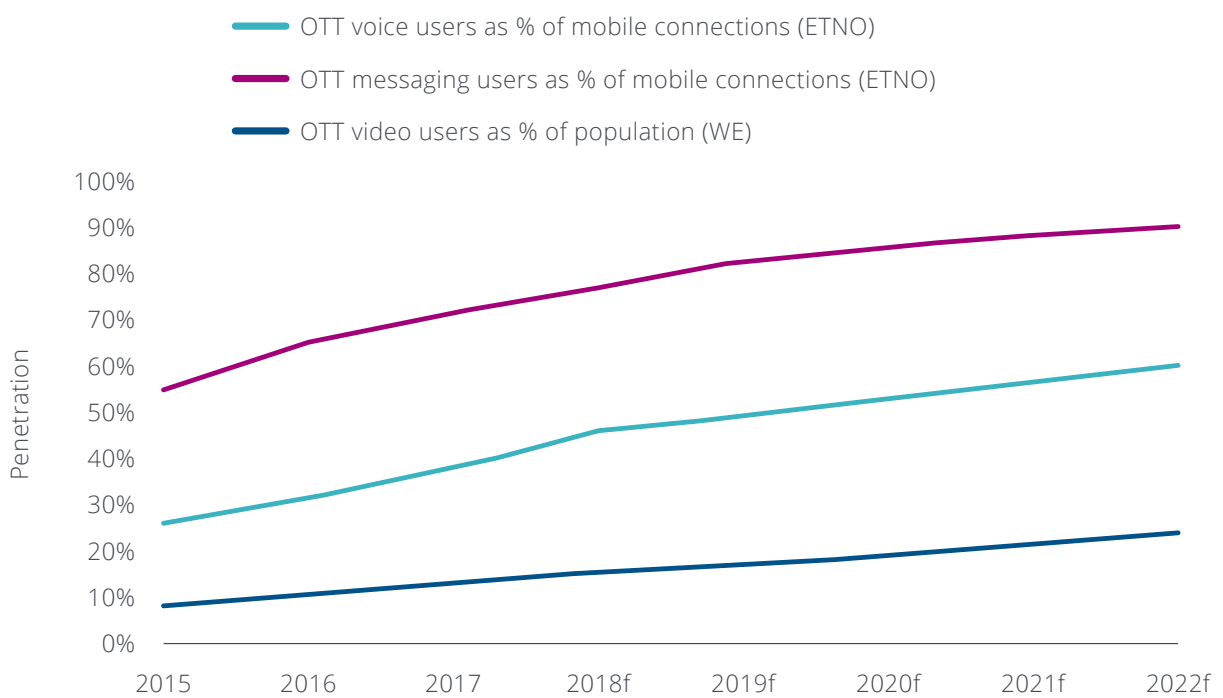


Source: Analysys Mason, 2018

## Trends for digital services suppliers

All operators are being affected by the highly competitive market that has been created by the introduction of OTT services. In the ETNO perimeter, over 70% of mobile users are also users of OTT messaging services (**Figure 5.9**). The implications for this have already been felt, and there has been a dramatic decrease in SMS revenue. By 2020, most mobile users will also be users of OTT voice services, thereby applying further competitive pressure to operators' voice services. Traditional TV services continue to be affected by OTT video services, which are already used by over 15% of all Western Europeans.

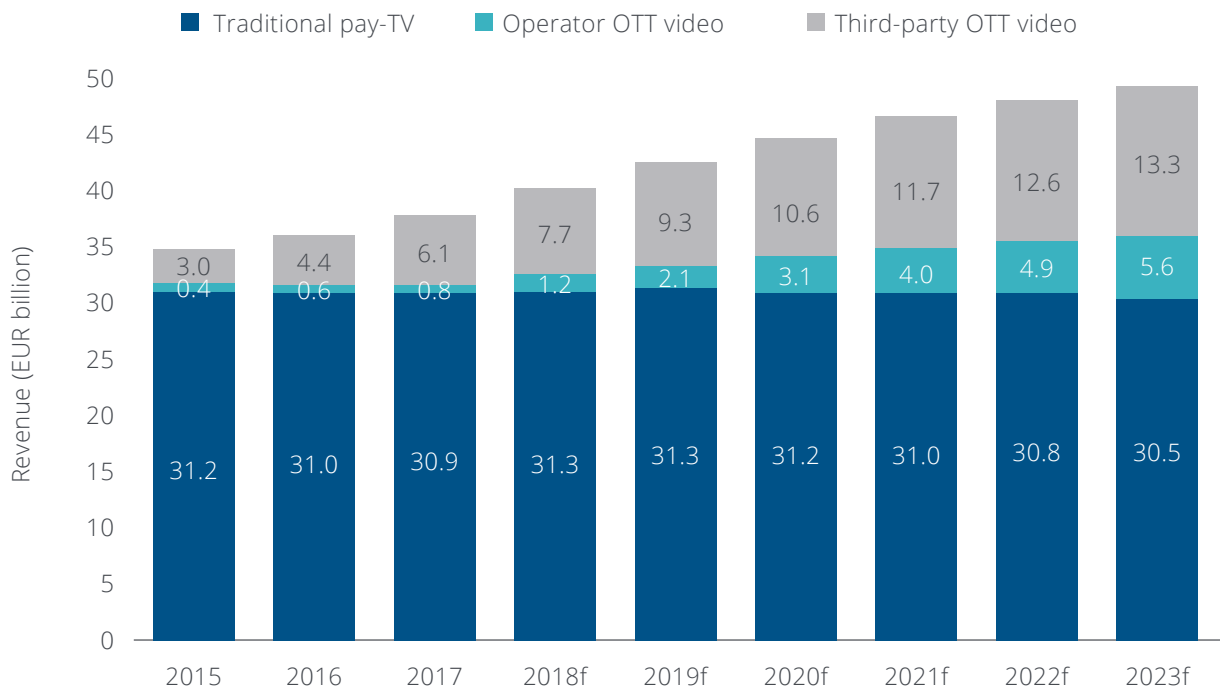
**Figure 3.9: Penetration of OTT services, Western Europe, 2015–2022 (forecast)**



Source: Analysys Mason, 2018

Operators that are supplying traditional pay-TV services within Western Europe are having to compete with OTT service providers, whose retail revenue continues to rise as traditional pay-TV services stagnate (Figure 5.10). At the same time, operators' revenue from OTT video are expected to grow in the coming years. OTT vendors are heavily concentrated in a few global companies (Amazon Prime and Netflix), meaning that they are able to provide a greater amount of content than the much more fragmented traditional TV providers can. Global competitors are therefore already affecting ETNO members' services, and are expected to continue to do so.

**Figure 5.10: Traditional pay-TV and OTT retail revenue, Western Europe, 2015–2023 (forecast)**

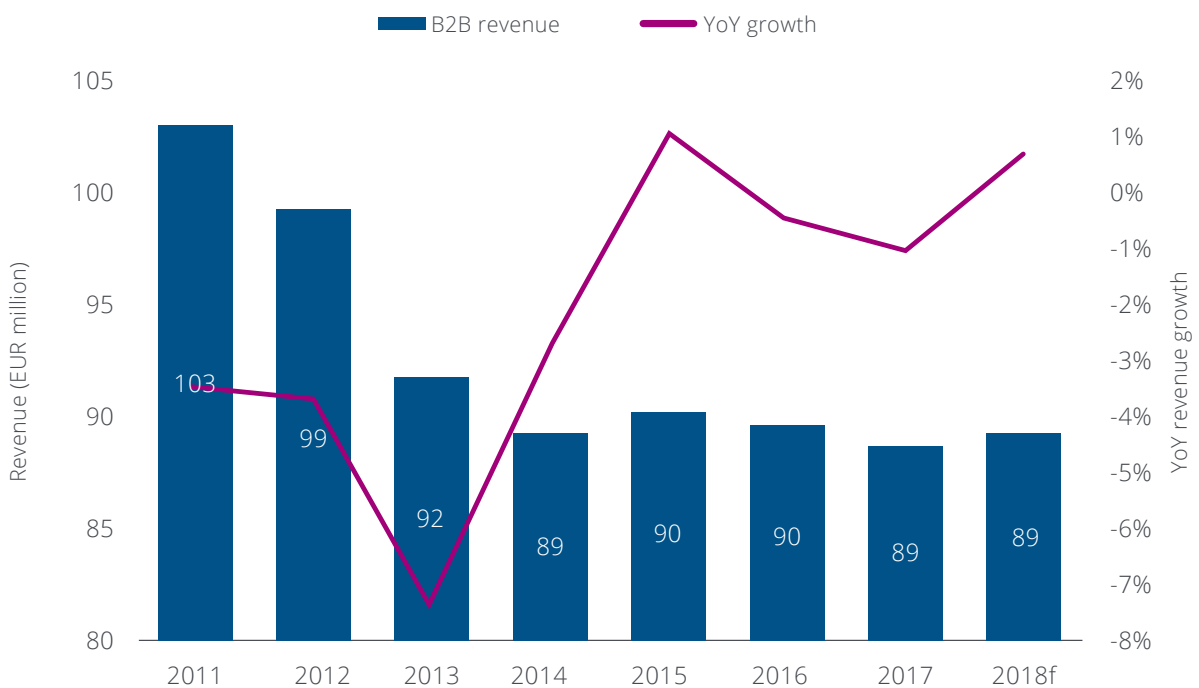


Source: Analysys Mason, 2018

## TRENDS IN BUSINESS SERVICES

The business services market is the source of at least 30% of revenue for most established operators, and is therefore very important to them (Figure 5.4). However, there are contrasting issues within this market. Declining revenue for traditional connectivity-based services continues to erode the total revenue (Figure 6.1).

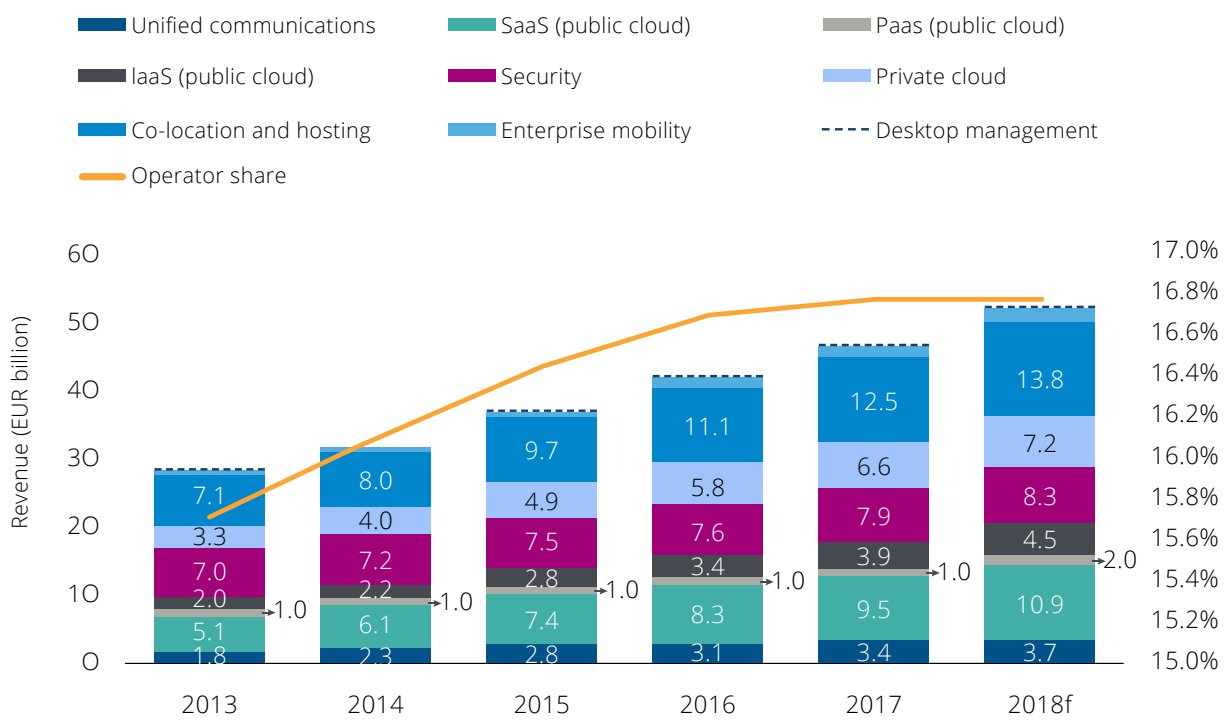
Figure 6.1: B2B connectivity services revenue, ETNO perimeter, 2011–2018 (forecast)



Source: Analysys Mason, 2018

However, according to Analysys Mason research, revenue growth from new IT services ( which include cloud, security, enterprise and other services) is almost offsetting these declines. Larger operators, in particular, have achieved revenue growth in the business services market by selling more IT services (Figure 6.2); connectivity revenue growth (excluding IoT) has been limited. IoT and IT services are lower-margin services that tend to dilute margins as their take-up grows, even though they contribute to overall revenue growth.

**Figure 6.2: Total European IT B2B service revenues and operator % share, Europe, 2013–2018 (forecast)**



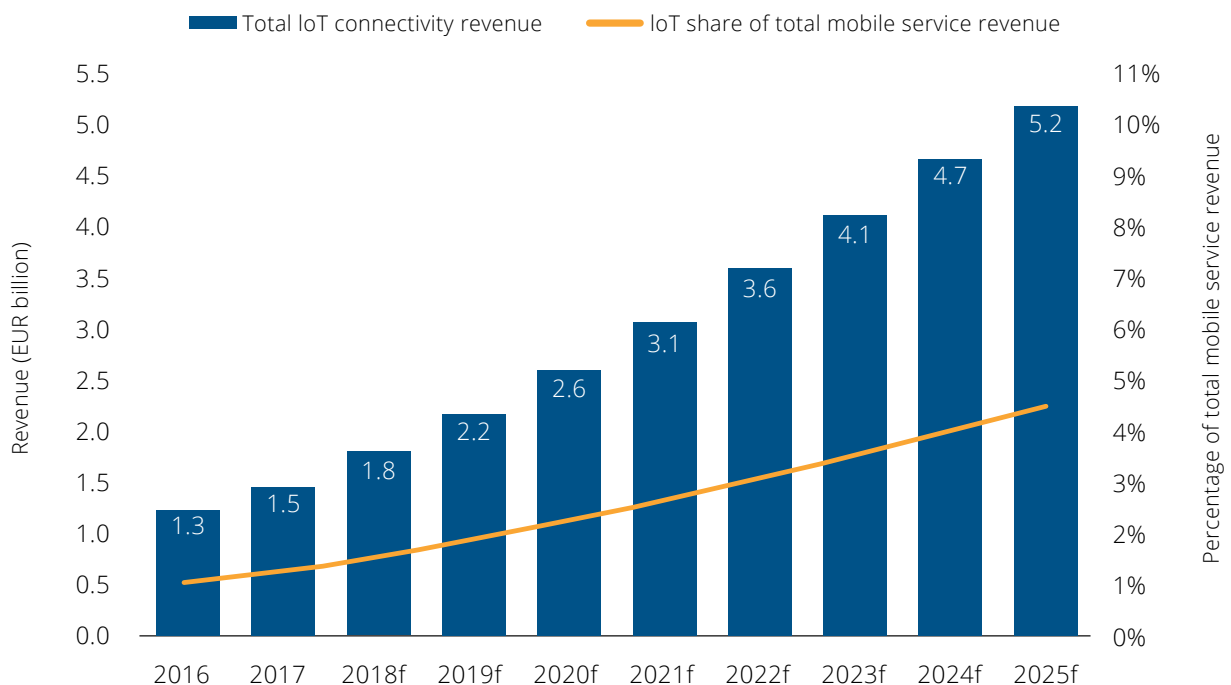
Source: Analysys Mason, 2018

In Western Europe, a standard model for building IT services is emerging; operators acquire IT and cloud service providers to obtain the people and processes that they lack. Elisa, KPN, Orange, Swisscom, Telia and others have followed this model to add new business services capabilities to their portfolios.

## IoT

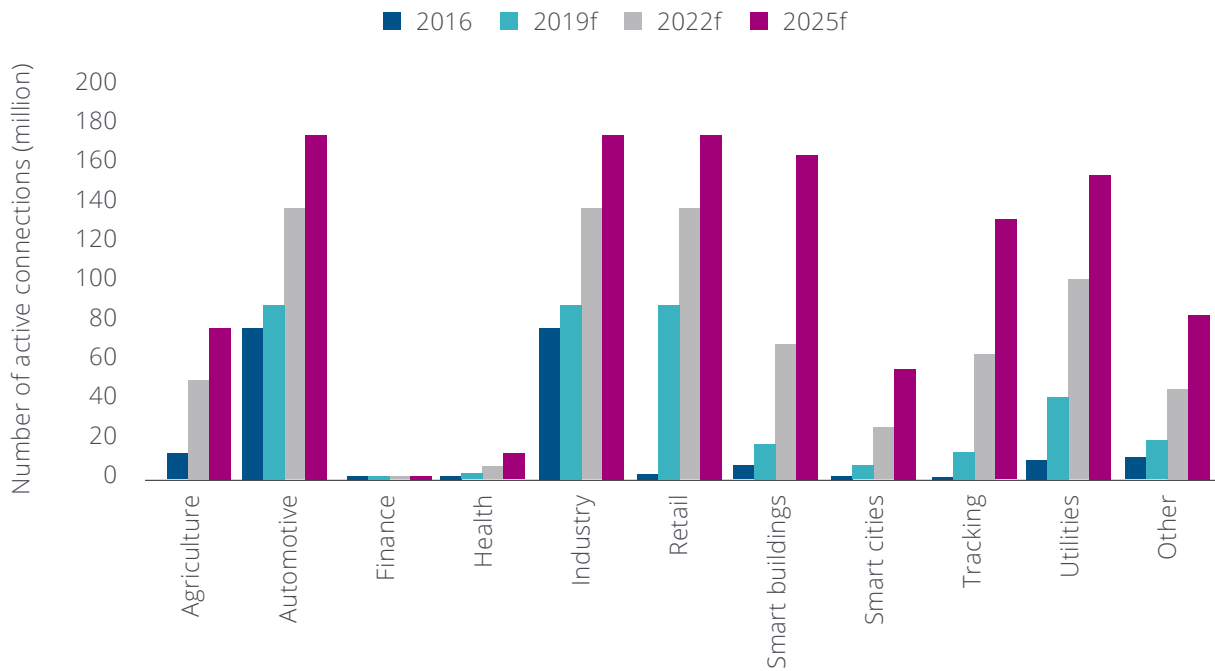
As of 2017, there are 78.6 million mobile IoT connections in Western Europe, and 27 million in Central and Eastern Europe. The number of connections is expected to grow rapidly, and will reach 433.9 million in Western Europe by 2023. However, there is limited value in just providing connectivity. IoT connectivity will represent only 5% of the total telecoms revenue in 2025 (**Figure 6.3**), despite its growth, and accounts for less than 15% of the total IoT value chain; devices, data monitoring and other value-added revenue streams are often not captured by digital operators. In order for digital operators to deliver the whole value chain they will need to address vertical markets (**Figure 6.4**).

**Figure 6.3: IoT revenue forecast, ETNO perimeter, 2016–2025 (forecast)**



Source: Analysys Mason, 2018

**Figure 6.4-a:** Number of active IoT connections by vertical industry sector, ETNO perimeter



Source: Analysys Mason, 2018

**Figure 6.4-b:** Number of active IoT connections by vertical industry sector, ETNO perimeter

Sector	Number of active connections (million), 2016	Number of active connections (million), 2019f	Number of active connections (million), 2022f	Number of active connections (million), 2025f
Agriculture	0.51	12.03	46.92	70.26
Automotive	45.01	84.21	129.00	163.71
Finance	0.09	0.11	0.12	0.12
Health	0.87	2.79	6.05	10.34
Industry	0.26	3.81	13.06	18.61
Retail	1.53	2.28	2.65	3.09
Smart buildings	5.08	15.99	65.12	154.06
Smart cities	1.01	6.59	24.80	53.63
Tracking	0.68	13.26	59.44	124.80
Utilities	9.79	41.11	96.74	145.04
Other	9.80	18.26	43.09	79.14

Source: Analysys Mason, 2019

New IoT technologies providing low-power wide-area (LPWA) wireless services are beginning to account for a significant number of IoT connections and this share is expected to grow to over 30% by 2025. NB-IoT (Number-Based) will have the largest share of connections in both the LPWA market and the overall market, but there is no dominant LPWA technology yet.

Operators are aware of the need to build an ecosystem of support for their IoT technologies, and many have set up labs to develop, support and demonstrate the relevant business cases. Leading operators are doing this; KPN has its IoT Academy and Deutsche Telekom and Vodafone have their IoT Labs.

Traditional connectivity-based revenue remains under constant pressure as enterprises adopt newer, lower-cost technologies and services. For example, enterprises have shifted from dedicated lease line services to IP-based SIP services for voice. OTT suppliers are providing increasingly credible hosted services (such as infrastructure-as-a-service with hosting within Europe) that now address security and latency issues. Operators' business services need to compete with those of global providers that have significant resources and are able to amortise their costs over global markets, helping to reduce service costs and deliver greater functionality.

Many operators have moved to form partnerships with OTT providers due to the B2B landscape that demands ever-more differentiated services. Amazon's AWS, for example, has 130 operators acting as managed service provider partners globally. Forming such partnerships is, however, very competitive among operators and requires that new IT skills are adopted through the training of their employees and deployment of new technologies.



# 03/

## **THE EMERGING MARKET TRENDS, OPPORTUNITIES AND CHALLENGES FOR DIGITAL OPERATORS.**

This part of the report considers the future possibilities for services, technology and the market as a whole as new players compete with current service providers.

IN 2025, WE EXPECT **138mIn**  
5G CONNECTIONS IN EU 28



## 5G AND THE OPENING OF DIGITAL COMMUNICATIONS NETWORKS

The telecoms industry is undergoing a period of major transition on multiple fronts, wireless and wireline. In 2019, the most significant aspect of that process will be the advent of 5G.

The 5G new radio (NR) standards will greatly enhance many aspects of the performance of mobile networks, from data rates to latency. However, the intersection of 5G with several other new technologies is far more important for the future opportunities of European operators. These opportunities include network virtualisation, end-to-end automation, the convergence of cloud and connectivity and a new wave of investment in high-quality fibre. 5G has been devised from scratch to support these endeavours, which, when brought together, will add up to create a broad next-generation platform. This platform will have the potential to transform operators' businesses and cost bases, and to have a significant socio-economic impact.

ETNO members are already at the heart of the evolution and deployment of these new platforms, thereby highlighting their continuing willingness to invest in advanced, expensive infrastructure (wireless, wireline and cloud) in order to enhance their business models in a competitive market.

### The opportunity of the 5G platform for operators

Past generations of wired or wireless connectivity have driven socio-economic change by enabling new processes and interactions based on a general-purpose underpinning. This allowed digital services to be added on top; such services had a minimal relationship to the network and were typically monetised by non-operators.

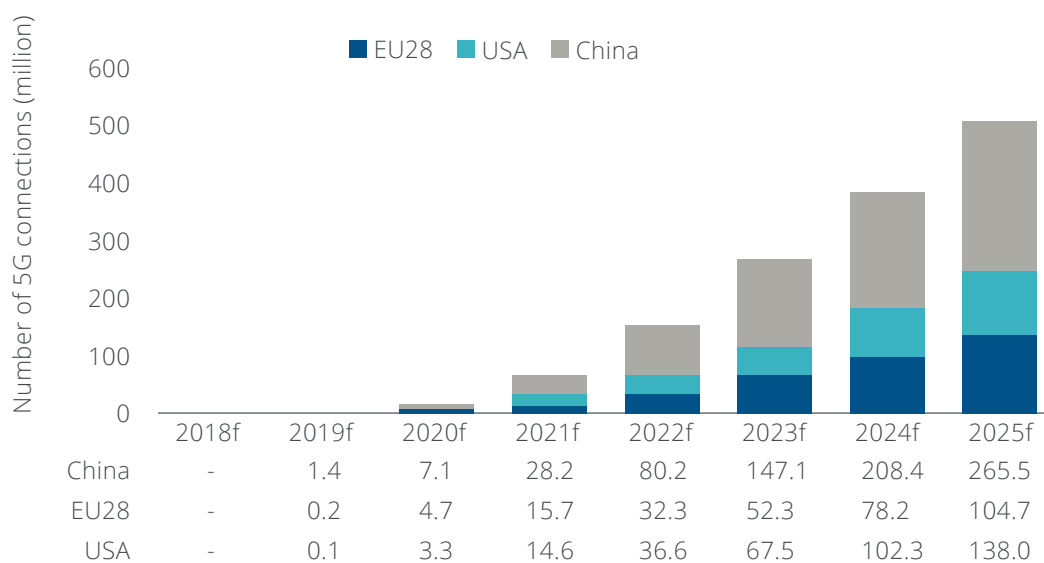
The 5G platform promises to integrate connectivity fully with the digital layer by virtualising networks and allowing applications to access the exact type of connectivity that they require, automatically and on-demand. This promises to increase the value of the connectivity, and will help operators to provide more and more digital services themselves, because the boundaries between value chain roles will become fluid.

Initially, the focus will often be on enhancements to familiar mobile broadband services. These initial use cases alone may not be enough to reverse the long-term decline in mobile revenue, but will serve to improve user experience and ease network congestion. However, most European operators believe that new, industrial use cases will be essential to the 5G business case and many are already trialling these. They will be enabled by the next release of 3GPP standards (Release 16, scheduled for late 2019), which will specifically address industrially focused capabilities such as low latency.

Many operators will also use 5G for fixed-wireless access (FWA), either as a challenge to traditional fixed broadband or as a qualitatively solid complement to full fibre in areas where full-fibre deployment is uneconomic. There are FWA solutions running in mmWave or sub-6GHz spectrum, and there is also a non-3GPP alternative, WiGig, in unlicensed 60GHz spectrum.

We expect that eMBB and FWA will be the primary factors driving growth in the number of 5G connections during the first 2 years of the forecast shown in **Figure 7.1**, because these are addressing established customer bases and ecosystems. Together they will serve to bring Europe closer to achieving universal access to fast, reliable connectivity everywhere, with all the social and economic benefits that such ubiquitous connectivity can support.

**Figure 7.1: Forecast for the number of 5G connections 2018–2025**



Source: Analysys Mason, 2018

Industrial applications will often take a little longer to reach full commercial maturity, but will have a very high impact. From Release 16, 5G networks will support many capabilities that are essential to industrial applications, such as ultra-low power, ultra-low latency, enhanced security and very high availability/reliability. These will support applications that were previously only possible over fixed lines (such as robotics services) or that were not possible to implement at all (such as advanced intelligent transportation systems (ITS)). These, in turn, will have profound effects on many aspects of life in the future: how a city is organised, how healthcare and social care are delivered and how humans communicate with friends and colleagues, and indeed robots.

In this context, the operator and the application will be far more-closely related than previously, because the application will have such specific, often demanding, connectivity requirements. This will allow operators to take a bigger role in certain industrial value chains and, as the whole network becomes virtualised, to create network 'slices' to support specific users.

Additionally, there will be greater willingness to adopt forms of shared investment to make these changes happen, particularly in industries where connected digital services are business-critical.

### Spectrum: slow release and high cost

Initially, there will be three principal spectrum bands for 5G.

- Sub-1GHz (600MHz and 700MHz bands): deployed for coverage as with 800MHz.
- C-band (3.4GHz to 3.8GHz; an extension to 4.2GHz is under consideration by many regulators): when deployed with massive MIMO this is likely to have approximately the same coverage as 1800MHz, albeit with poorer outdoor-to-indoor propagation.
- mmWave: huge additional capacity useful for small radius macrocells and additional small cells, but with very limited outdoor-to-indoor propagation. In the EU, the first mmWave band designated for 5G is 26GHz; 42GHz has also been identified as a priority band to study for 5G for the medium term.

There has been a slow release of sub-1GHz spectrum for 5G (700MHz in Europe’s case). Many of the first 5G spectrum auctions have focused on the C-band. This offers high capacity without the engineering challenges of mmWave bands. The second wave of 5G deployments and use cases will lean on 5G new radio’s ability to run in mmWave spectrum bands. A few MNOs are already using these high-frequency, high-capacity bands in their first deployments, notably in the USA. At the time of writing there had been only two national mmWave auctions in the EU (in Ireland and Italy). Authorities within the ETNO perimeter are at different stages of development.

**Figure 7.2: State of development of 5G spectrum auctions in ETNO perimeter countries, December 2018**

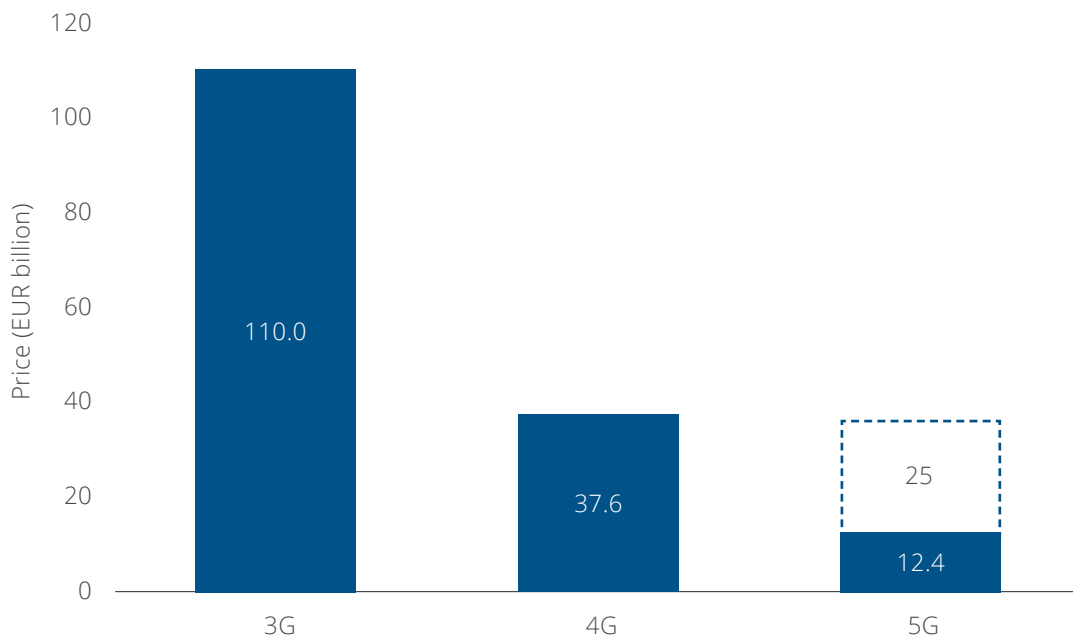
Country	700MHz	3.4GHz	3.5GHz	3.6GHz	3.7GHz	mmWave
<b>Austria</b>	auction announced	auction announced	auction announced	auction announced	auction announced	
<b>Belgium</b>	auction announced	consultation opened	consultation opened	auction announced	consultation opened	
<b>Bulgaria</b>		consultation opened	consultation opened	consultation opened	consultation opened	
<b>Croatia</b>	auction announced	auction announced	auction announced	auction announced	auction announced	
<b>Czech Republic</b>	auction proposed	auction concluded	auction concluded	auction concluded	auction concluded	
<b>Denmark</b>	consultation closed					
<b>Estonia</b>	consultation closed	consultation closed	consultation closed	consultation closed	consultation closed	

<b>Finland</b>	auction concluded	auction concluded	auction concluded	auction concluded	auction concluded	
<b>France</b>	auction concluded	auction announced	auction announced	auction announced	auction announced	
<b>Germany</b>	auction concluded	auction announced	auction announced	auction announced	auction announced	
<b>Greece</b>		auction announced	auction announced	auction announced	auction announced	
<b>Hungary</b>	auction announced					
<b>Iceland</b>	auction concluded					
<b>Ireland</b>	consultation opened	auction concluded	auction concluded	auction concluded	auction concluded	auction concluded
<b>Italy</b>	auction concluded	consultation opened	consultation opened	auction concluded	auction concluded	auction concluded
<b>Latvia</b>		auction concluded		auction concluded	auction concluded	
<b>Lithuania</b>		consultation opened	consultation opened	consultation opened	consultation opened	
<b>Malta</b>	auction proposed					
<b>Netherlands</b>	auction announced					
<b>Norway</b>	auction announced					
<b>Poland</b>	auction announced	consultation opened	consultation opened	consultation opened	consultation opened	
<b>Portugal</b>	consultation closed			consultation closed		consultation closed
<b>Romania</b>	auction proposed	consultation opened	consultation opened	consultation opened		consultation opened
<b>Slovakia</b>	consultation opened					
<b>Slovenia</b>		auction announced				auction proposed
<b>Spain</b>	auction proposed	auction proposed	auction proposed	auction concluded	auction concluded	
<b>Sweden</b>	auction concluded	auction announced	auction announced	auction announced	auction announced	auction announced
<b>Switzerland</b>	auction proposed	auction proposed	auction proposed	auction proposed		
<b>United Kingdom</b>	auction proposed	auction concluded	auction concluded	auction proposed	auction proposed	

Source: Analysys Mason, 2018

Since 2000, when the first 3G auctions took place, operators within the ETNO perimeter have paid EUR160 billion for spectrum licences (excluding annual licence fees) in the main sub-6GHz spectrum bands. Since 2015, EUR12.4 billion has been spent on licences in the 5G bands (this includes the 700MHz auctions in France and Germany in 2015). Given that the majority of auctions for 5G bands have not yet taken place, we estimate that the total spending on licences in the 5G bands will look broadly similar to the amounts spent on 4G bands (outlined in dotted line), although substantially less than what was spent in the headier climate preceding the introduction of 3G (Figure 7.3).

Figure 7.3: Prices paid at auction for 3G, 4G and 5G licences, 2000–2018



Source: Analysys Mason, 2019

Harmonised regional and global spectrum allocations for 5G will be decided at the 2019 World Radio Conference, which will help to build confidence in some of the new emerging bands, and will drive the development of the device ecosystem. Regulators are considering earmarking some spectrum for new entrants, industrial users or shared usage. In Germany, for instance, the auto industry is pushing to be allocated its own spectrum in the C-band. This appears to be high-risk for 5G development, as it drives up spectrum costs and limits the amount of spectrum available for nationwide usage.<sup>8</sup> A 5G NR standard for unlicensed spectrum will not be finalised until at least Release 16 (late 2019).

<sup>8</sup> [www.gsma.com/newsroom/press-release/gsma-ignoring-concerns-from-mobile-industry-over-german-spectrum-award-threatens-countrys-5g-future/](http://www.gsma.com/newsroom/press-release/gsma-ignoring-concerns-from-mobile-industry-over-german-spectrum-award-threatens-countrys-5g-future/)

## Fibre/FTTP

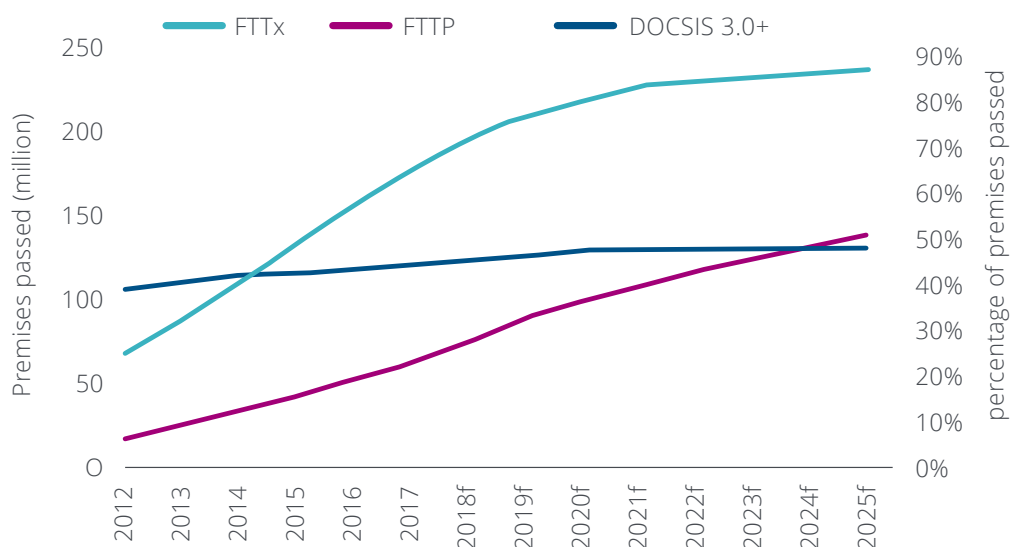
European operators are increasingly pushing fibre deeper into their networks. A range of technologies are being deployed to this end.

The main commercial aim of full fibre/fibre to the premises (FTTP) is, of course, vastly improved residential broadband, but the networks will serve other important purposes. When fibre is almost ubiquitous and reaches deep into cities and buildings, it underpins all digital communications, and hence the investment in a next-generation fixed network based on dense, high-quality fibre is closely intertwined with 5G. The first instances of 5G will rely largely on the existing macrocell sites, but it is likely that in the future, 5G will rely on dense fibre for backhaul and fronthaul, and the two will work together to connect millions of distributed cloud nodes and billions of devices in order to support new ways of living and working.

The current wave of deployment of advanced fibre networks represents a once-in-a-lifetime investment which will allow for an expanding range of new services and service providers for decades to come. With this long-term view in mind, some operators have already started to plan the decommissioning of the copper networks and related infrastructure that have served the industry for the last century.

On top of FTTP, there are other gigabit-capable access technologies, such as DOCSIS3.1 and FTTB/LAN (the latter is mainly confined to Central and Eastern Europe). Some new variants of G.fast can support gigabit speeds under some conditions; the same can be said for some variants of 5G FWA, though the technology is still developing. The number of FTTP premises is expected to double by 2025 (by which time it will cover over half of all premises), whereas the cable DOCSIS3.0+ figure is stabilising (**Figure 7.4**). Operators, excluding cable operators, provided FTTx of some kind (including fibre-to-local nodes with copper termination) to 72% of premises at the end of 2018; this figure is expected to rise to 86% by 2025.

**Figure 7.4: Premises passed by FTTx, FTTP and DOCSIS3.0+, ETNO perimeter, 2012–2025 (forecast)**



Source: Analysys Mason, 2018

## THE FUTURE IS BEING SHAPED BY DIGITAL OPERATORS

A fundamental realignment of the relationship between telecoms infrastructure and the broader digital ecosystem is underway. Telecoms operators will evolve from providing an underpinning to the digital economy to playing active roles within it. European converged operators, who own and operate their own networks, are in a pivotal position to shape the way in which that realignment occurs thanks to their rich infrastructure assets, scale and high level of trust from consumer and businesses. Their future role will be defined on three broad levels.

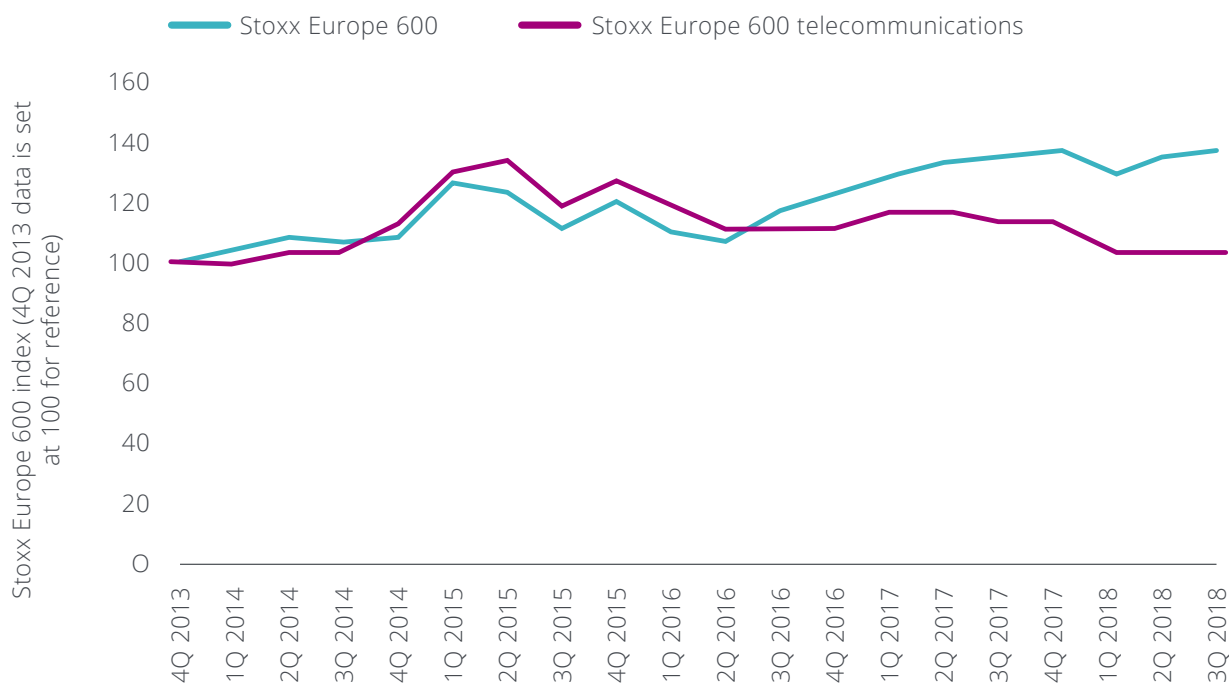
- **Network.** Build, own and operate fundamental network infrastructure fit for the 21st century. This will consist of a mix of dense fibre and next-generation wireless, which will ultimately replace the networks of the previous century. Quality of connectivity is, and will remain, a major driver of value and investment in the sector.
- **Network as a service.** Innovate to make connectivity a less-commoditised proposition, so that virtual networks can serve verticals' specific demands as well as those of consumers.
- **Service.** Collaborate with the broader industry to create new digital services, by making the virtualised network a platform for innovation.

Converged operators will collaborate with suppliers, with other licensed operators, with the broader tech world and with other verticals. This is a win-win situation that spurs broader European (digital) economic growth and helps to reinvigorate the telecoms sector. It could potentially lead to the creation of Europe-based digital businesses with a global reach and therefore high-value employment. Ultimately this will directly improve the lives of Europeans.

The important role of alternative players must not be ignored, and most big European operators are embracing the altnet model themselves. Competition has galvanised the more-established market players to create more-efficient and agile businesses, and many of them, including most ETNO members, ventured outside their home markets and boosted competition across geographies. On one level, European consumers have benefited from this. However, from a regulatory perspective, fostering competition and forcing operators to focus on efficiency fuels a race to the bottom on service and price, and does not free cash for innovation and investment. Efficiency will remain critical for ETNO members, but European operators are clear that this is not sufficient to justify investment in new platforms, or to maximise the returns on those investments. The real rewards will come from successfully transforming from being a connectivity provider to being a digital services provider; this process involves not only the creation of new technologies, but also the formation of new partnerships and the development of new processes.

In this context, operators need to have confidence that their important investments will pay off, and must not be hampered by a dated vision or narrow definition of the communications market, or by an asymmetrical burden of taxation. Just as operators themselves need the right conditions in order to have the confidence to invest, financial entities still need to be convinced that there is a catalyst-for-growth story, and that some of the success from the tech world can be transferred to the European telecoms sector. They have so far not been convinced; telecoms stock has consistently underperformed the general index of European stock since early 2016 (**Figure 8.1**).

**Figure 8.1: Stoxx Europe 600 index and Stoxx Europe 600 index for telecommunications, 4Q 2013–3Q 2018**



Source: Stoxx, 2018

European operators are heavily regulated through a mix of generic competition regulation and telecoms specific regulation. The stated aim of EU regulation is to “bring innovative, affordable services to European consumers”.<sup>9</sup> One of the distinguishing features of the Telecoms Regulatory Framework is “the set-up of ex ante access regulation, which consists of a procedure to identify competitive bottlenecks in telecoms markets and to impose remedies to address such bottlenecks, following competition law principles and methodologies”.<sup>10</sup> In practice, this means that in no other region of the world do telecoms operators have to comply with this level of duty.

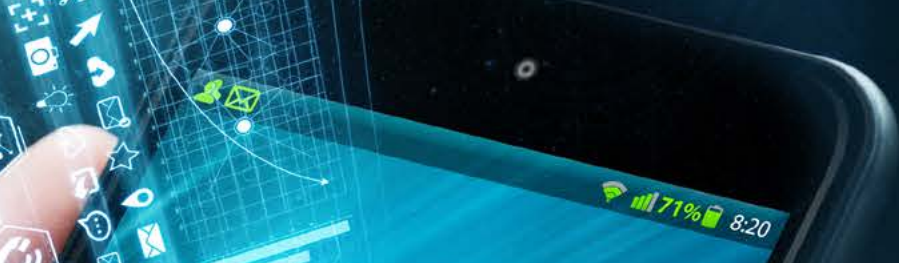
<sup>9</sup> [www.ec.europa.eu/competition/sectors/telecommunications/overview\\_en.html](http://www.ec.europa.eu/competition/sectors/telecommunications/overview_en.html)

<sup>10</sup> [www.ec.europa.eu/competition/sectors/telecommunications/overview\\_en.html](http://www.ec.europa.eu/competition/sectors/telecommunications/overview_en.html)

**Figure 8.2: Service areas subject to ex ante regulation in EU**

Area	Usually subject to ex ante regulation	Sometimes subject to ex ante regulation
Voice termination	Mobile voice termination	
	Fixed voice termination	
Wholesale local fixed access	Local copper loop unbundling	Wholesale PSTN/ISDN line rental (now mainly deregulated)
	Line sharing on copper loops	
		Sub-loop unbundling
	Virtual unbundled local access (VULA) to FTTx (local bitstream)	
	Physical infrastructure access	
		Unbundled FTTP
Wholesale central fixed access	Bitstream access at a regional point of interconnect	
High quality fixed access	Terminating segments of point to point leased lines, Ethernet	
		High quality (business class) bitstream access to FTTx

Source: Analysys Mason, 2018



**Figure 8.2** shows the range of services subject to ex ante regulation. Regulation can simultaneously be applied at different stack layers: wholesale local fixed access can extend across active access (VULA bitstream), passive access (local loop unbundling) and physical infrastructure access (access to ducts and poles). EU legislation makes all mobile operators subject to wholesale data roaming and retail price control on international intra-EU voice. National roaming obligations, where they exist, tend to be the result of remedies to mergers and acquisitions than ex ante regulation. All of these obligations are in addition to those in areas such as spectrum management, mergers and acquisitions, consumer privacy and protection, net neutrality and universal service, where in other markets, competition authorities and NRAs usually play some role.

It is important to recognise that converged operators are now in a sector with heightened levels of competition and that the communications sector no longer consists solely of significant market power (SMP) operators and other licensed operators. Competition now happens at three levels.

- **Above ('over-the-top' (OTT) digital platform businesses).** OTT providers have the potential to absorb value from the telecoms service layer and to disintermediate much of the telecoms core. They are building up a formidable portfolio of infrastructure, both physical core network and cloud, although as yet they appear to have little appetite for investment in underlying connectivity. They have few barriers to growth as their platforms generally benefit from lightly regulated network effects.
- **The side.** These are the traditional challenger operators, many of whose businesses depend critically on regulated access to the infrastructure and active networks of converged operators. Even in this respect, the competitive landscape looks different. Some larger challengers, especially those formed by the consolidation of mobile and cable operators, have already achieved a broadly similar market share, network reach and service scope to ETNO members.
- **Below.** 'Under-the-floor' pure fibre infrastructure plays are often the polar opposite of OTT providers in that they positively embrace their utility status and non-involvement in the provision of digital services. External investment in this type of business, often from infrastructure investment funds, has increased dramatically in last 2 years.

Converged operators do not require special treatment, but they do require a level playing field. Their ability to contribute to the stimulation of the digital economy is held back in several key respects.

- **Barriers to market exit or in-market consolidation for MNOs have been too high.** Nevertheless, there is some optimism regarding the European Commission's change of attitude towards four-to-three consolidation after it granted unconditional approval to the merger in the Netherlands in November 2018.
- **Spectrum prices can be artificially inflated.** There are concerns that governments prioritise raising revenue over the longer-term commercial benefits of a balanced, commercially negotiated price for spectrum. Artificial scarcity can be created to boost income, either by creating unequal blocks, by freeing only parts of relevant bands, or by creating fewer blocks than the number of probable bidders. The balance between imposed annual licence fees and the prices reached in open auctions has also favoured fees on occasion.
- **Conditions imposed on spectrum licences can disincentivise investment.** Coverage obligations (especially for the mid-band 5G spectrum that is unsuitable for extending coverage) and national roaming/wholesale obligations can dampen willingness to invest. Carving out spectrum for local licences aimed at industrial verticals risks reducing the overall benefits of 5G national levels. 5G technology creates the ability for verticals to create virtual, and, if required, local, slices of national networks, whereby they benefit from operational control of the network, but the efficiency and reusability of a national physical network is maintained.
- **Barriers to fixed and mobile infrastructure deployment are too high.** Governments, local authorities and regulators need ambition to help realise the full potential of fibre and 5G. Easing the barriers to deployment that result in lengthy delays in site planning or increased deployment costs should be a key priority.
- **Converged operators often face disproportionate regulation for FTTH.** A wealth of investment models has been developed in the past few years, including individual investments, co-investment and joint ventures, as well as alternative wholesale fibre/FTTH models. It is likely (as has already happened in the more-advanced markets in Europe) that a patchwork of FTTH/gigabit network (co-)owners in each country will emerge. Regulation should not pick winners and losers, as this would hinder the roll-out of something that provides an excellent outcome for Europeans. Symmetrical (de-)regulation will probably deliver a good level of investment and a flourishing commercial wholesale sector. The current model will not deliver these benefits for end users, due to the creation of multiple parallel regulated entry points for access-seekers with very different levels of commitment to invest. Moreover, the obligation to maintain access to copper networks should not be allowed to stand in the way of replacing these high opex networks with full fibre.
- **Telecoms operators are subject to a level of regulation and scrutiny that OTT players are not.** Operators have to ask for permission for data-related innovation, whereas OTTs beg for forgiveness. Tax authorities expect operators to pay tax on a fair basis, but have to request that OTT players do so.

In order to compete in the new market operators need to have an equal opportunity to make adequate returns on investment and therefore grow. This has to involve a shift in the mindset of governments and regulators such that converged operators are no longer treated as part of a former monopoly or as SMP supply-side utilities companies underpinning digital services, but instead are viewed as critical active collaborators within the European digital economy.



## ETNO Perimeter & EU28

Definition of geographical perimeters

ETNO perimeter	EU28
Albania	
Austria	Austria
Belgium	Belgium
Bosnia and Herzegovina	
Bulgaria	Bulgaria
Croatia	Croatia
Cyprus	Cyprus
Czech Republic	Czech Republic
Denmark	Denmark
Estonia	Estonia
Finland	Finland
France	France
FYR Macedonia	
Germany	Germany
Greece	Greece
Hungary	Hungary
Iceland	Iceland
Ireland	Ireland
Italy	Italy
Latvia	Latvia
Lithuania	
Luxembourg	Luxembourg
Malta	Malta
Netherlands	Netherlands
Norway	Norway
Poland	Poland
Portugal	Portugal
Romania	Romania
Slovakia	Slovakia
Slovenia	Slovenia
Sweden	Sweden
Switzerland	Switzerland
UK	UK



# ETNO Members

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Albania



Austria



Belgium



Bosnia and Herzegovina



Bulgaria



Croatia



Cyprus



Denmark



Finland



France



France



Germany



Greece



Hungary



Iceland



Ireland



Italy



Latvia



Lithuania



Luxembourg



Macedonia



Malta



Norway



Poland



Portugal



Romania



Slovakia



Slovenia



Spain



Sweden



Switzerland



The Netherlands



The UK



# ETNO Observers

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China



Finland



Italy



Sweden



USA



USA



USA



USA





# European Telecommunications Network Operators' Association

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