The regular geographic scope of this study includes the EU Member States, as well as three countries that are members of the EEA (Norway, Iceland and Lichtenstein), together with Switzerland. Unless explicitly stated, all data sets referred to as ‘Europe’ cover all of these countries.

This report is authored by GSMA Intelligence, the definitive source of global mobile operator data, analysis and forecasts; and a publisher of authoritative industry reports and research. Our data covers every operator group, network and MVNO in every country worldwide – from Afghanistan to Zimbabwe. It is the most accurate and complete set of industry metrics available, comprising tens of millions of individual data points, updated daily. GSMA Intelligence is relied on by leading operators, vendors, regulators, financial institutions and third-party industry players, to support strategic decision-making and long-term investment planning. The data is used as an industry reference point and is frequently cited by the media and by the industry itself. Our team of analysts and experts produce regular thought-leading research reports across a range of industry topics.

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The GSMA represents the interests of mobile operators worldwide, uniting nearly 800 operators with more than 250 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and Internet companies, as well as organisations in adjacent industry sectors. The GSMA also produces industry-leading events such as Mobile World Congress, Mobile World Congress Shanghai and the Mobile 360 Series conferences.

For more information, please visit the GSMA corporate website at www.gsma.com.
Follow the GSMA on Twitter: @GSMA.
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### MAKING EUROPE MORE COMPETITIVE

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Executive Summary

After a number of years that have seen significant revenue declines and falling profitability, there are growing signs that a recovery is now underway in the European mobile industry. Revenue trends have reached a potentially important inflection point, as the rate of decline is now easing and a number of operators are sounding more positive on the outlook. Data growth is accelerating, driven by the increasing migration to LTE networks as operators are rapidly building out network coverage, with Digital Dividend spectrum now available in most markets.

4G connections are showing exponential growth, from just 3% of connections at the end of 2013 to a forecast level of close to 10% by the start of 2015, and will overtake the number of 3G connections in less than five years. Smartphone adoption is reaching critical mass in Europe, with smartphones set to account for more than half of the connection base in Europe by the end of this year.

The migration to 4G networks and growing levels of smartphone adoption, along with other data-intensive devices such as dongles and tablets, is leading to accelerating data traffic growth across Europe. Forecasts from Cisco indicate that mobile data traffic will grow at a compound annual growth rate (CAGR) of 50% over the period 2013-18 in Western Europe. There is increasing evidence of a change in consumer behaviour when presented with the greater opportunities offered by new applications and services running over 4G, particularly with regard to the consumption of video content.

Operators are increasingly monetising data traffic through the use of tiered and family data plans. Operators across the region are reporting an increasing proportion of subscribers on tiered data plans, which in turn is helping to drive improving revenue trends. Tiered plans give consumers visibility and control over their spending on mobile data, whilst also reducing the risks of ‘bill shock’.

However, the outlook for the industry remains fragile, with renewed concerns over the economic outlook in Europe being one factor that could lead to a reversal of the more positive trends evident today. Revenue trends are likely to remain negative on a two to three-year view, before approaching a stabilisation. This highlights the need for operators to continue to innovate and collaborate to develop new partnerships and market-relevant services, with more sustainable business models needed if operators are to fund the significant future investment requirements.

Operator capex for the period 2008-14 will total around €155 billion; it could then increase to as much as €170 billion for the six year period to 2020 as operators continue to add network capacity and expand LTE network coverage. However, this level of investment will depend upon operators seeing an ongoing recovery in both revenue trends and profitability. If these trends do not improve, the levels of investment highlighted in this report may well be at risk.
Operators also face conflicting demands on investment budgets beyond infrastructure capex. The ongoing need to support continued network rollout and capacity investment, alongside diminishing returns, will continue to prompt network operators in Europe to seek to consolidate in order to deliver economies of scale. However, there remain significant regulatory and structural barriers to consolidation, which serve to limit the number of such deals. An increasing proportion of acquisition-related investment is likely to focus on allowing mobile operators to offer both convergent and digital services, in part as a response to the growing consumer demand for these bundled offerings.

The mobile industry is playing a central role in supporting economic activity and recovery in the region, contributing 3.1% to Europe’s gross domestic product (GDP) in 2013, equivalent to €433 billion. This will increase to nearly €500 billion by 2020. These figures capture the direct, indirect and productivity impacts of the mobile ecosystem, but do not include much of the positive impact from mobile services, which are improving welfare in the region. These include the role of mobile services in helping to modernise access to public services such as the health system, and the development of new products in a range of markets including transport and energy.

The mobile industry plays a significant role in European employment. In 2013, mobile operators and the wider ecosystem jointly provided employment to 1.8 million people. The industry also makes an important contribution to funding the public sector, in the form of general taxation (€74 billion in 2013), and through additional payments for spectrum (over €3 billion raised through auctions in 2013 alone).

By fostering an environment for mobile innovation, offering new opportunities for businesses, and delivering advanced services for citizens across the region, mobile technologies are transcending borders and helping to create a digital single market. This will deliver social and economic benefits across the region, and help push Europe back to the forefront of the global mobile industry. Mobile is delivering a range of innovative new services and applications in Europe, including machine-to-machine (M2M) deployments, digital commerce, mobile identity services and advanced network solutions.

As operators and governments increasingly recognise the potential of connecting almost anything and anyone through the Internet of Things, active M2M deployments are beginning to accelerate. There were 46 million M2M connections across the region by the end of 2013, a number that will grow at a CAGR of 23% out to 2020, bringing the total to 190 million. The fastest growing M2M sectors in the region are in the areas of automotive, security, compliance reporting, utilities and health. Alliances and partnerships between operators, service providers and technology companies can help to overcome some of the existing deployment barriers, allowing potentially significant upside to these forecasts.

Digital commerce is changing the way people and businesses buy and sell, and mass-market smartphones with touchscreens, fast connections and an array of feature-rich applications are extending the convenience and interactivity of online commerce. More than 250 digital commerce services have been launched in Europe to date, and the industry is expected to grow rapidly in the next few years, from just under €320 billion in 2013 to almost €500 billion in 2017, a CAGR of 12%. Mobile is rapidly becoming a key enabler of digital commerce, making online transactions easier and more secure. M-commerce will account for 18% of total digital commerce in Europe by 2017, up from 9% in 2013.
With the rapid growth of online commerce, social media, gaming and other online activities, there is a growing need for citizens to be able to manage and authenticate their identities online. Consumers are demanding greater security for online services and more robust data protection to alleviate concerns about their digital privacy. Mobile authentication via a mobile phone allows secure and convenient access to digital services and provides a gateway to a vast range of government and public services, including e-government portals, cross-border services, mobile health, smart cities, mobile voting and mobile identity.

As consumer appetite for mobile data and richer services continues to grow, operators are increasingly embracing the potential of new technologies in an effort to retain an important and relevant relationship with their customers and to maintain networks capable of meeting ever-growing customer demand. These solutions include Rich Communication Service (RCS) voice and messaging, video-based calling and Voice over LTE (VoLTE). The launch rate of these services is accelerating across Europe. Whilst the technology shift in Europe towards 4G is still underway, there is increasing speculation and debate on what the next generation of mobile services or ‘5G’ might look like. A key question is whether 5G will represent a truly generational shift in connectivity or the consolidation of existing cellular and Wi-Fi technologies.

For policymakers across the European Union, improving the region’s competitiveness is a high priority. To prosper in an increasingly digital global economy, Europe’s enterprises and consumers need world-class connectivity and access to advanced digital technologies. In this respect, the outlook is gradually brightening.

After several years of decline, the health of Europe’s mobile industry is beginning to improve. To sustain that recovery, industry leaders and policymakers need to build a common agenda that prioritises Europe’s long-term socio-economic prospects. As the EU institutions look to create a single telecoms market, it is recommended that they develop a simplified, pro-investment regulatory framework, pursue more harmonisation at the European level, and ensure the consistent application of rules irrespective of the technology used, who is providing the service, or where end-users are located.

Even-handed regulation across the value chain will open up opportunities for all players to offer compelling new internet services, together with innovative, interoperable and secure telecommunications services. Europe’s operators must have the commercial freedom to develop new business models, innovate at the network and service level, and offer customised services that can attract investment and drive innovation and competition in the global marketplace.
After several years of decline, the health of Europe’s mobile industry is beginning to improve. To sustain that recovery, industry leaders and policymakers need to build a common agenda that prioritises Europe’s long-term socio-economic prospects.
MOBILE ECONOMY EUROPE

Unique subscribers and SIM connections

<table>
<thead>
<tr>
<th>UNIQUE MOBILE SUBSCRIBERS</th>
<th>2013</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>428M</td>
<td>454M</td>
</tr>
<tr>
<td>PENETRATION RATE</td>
<td>78%</td>
<td>82%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONNECTIONS*</th>
<th>2013</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>689M</td>
<td>762M</td>
</tr>
<tr>
<td>PENETRATION RATE</td>
<td>126%</td>
<td>138%</td>
</tr>
</tbody>
</table>

*Excluding M2M

Accelerating migration to 4G underway

LTE connections to increase from 3% of total at end 2013 to 53% by 2020.

By 2020 there will be 564M smartphone connections.

LTE and smartphones fuelling data growth and revenue recovery

Data traffic in Western Europe forecast to grow at 50% CAGR 2013-18*.

Operators increasingly monetising traffic growth through tiered and shared tariff plans.

Revenue trends at important inflection point with outlook improving.

*Source: Cisco
Mobile driving innovation and economic growth across the region

- App economy revenues forecast at US$16.5B in 2014
- M-commerce to account for 18% of total digital commerce by 2017
- Delivering innovative new services. M2M connections to grow at a CAGR of 23% out to 2020

Mobile ecosystem contribution to GDP

2013: €433B, 3.1% GDP in 2013
2020: €492B

Public funding

- Mobile ecosystem contribution to public funding in Europe before regulatory fees

Employment

Jobs directly supported by mobile industry

- 1.8M in 2013

Plus an additional

- 0.6M INDIRECT JOBS supported in 2013
European unique subscriber growth

In the past year, unique subscriber growth has slowed to below 1% year-on-year (YoY) on average across Europe. This reflects subscriber penetration reaching an average of 79% across Europe, at the top end of the 70-80% range at which growth typically stalls in more developed markets. There is limited scope for future subscriber growth, with the penetration rate expected to reach 82% by 2020.

Source: GSMA Intelligence
The European market leads the world in terms of unique subscriber penetration; 79% as of September 2014 compared to a global average of 49%. Europe ranks second in terms of total SIM penetration, with lower levels of multi-SIM ownership in Europe than in many other regions.

### Population penetration rates
September 2014

<table>
<thead>
<tr>
<th>Region</th>
<th>Connection penetration rate</th>
<th>Unique subscriber penetration rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-Saharan Africa</td>
<td>38%</td>
<td>70%</td>
</tr>
<tr>
<td>Asia Pacific</td>
<td>44%</td>
<td>90%</td>
</tr>
<tr>
<td>Global average</td>
<td>49%</td>
<td>96%</td>
</tr>
<tr>
<td>Middle East and North Africa</td>
<td>50%</td>
<td>105%</td>
</tr>
<tr>
<td>Latin America</td>
<td>52%</td>
<td>112%</td>
</tr>
<tr>
<td>Commonwealth of Independent States</td>
<td>68%</td>
<td>147%</td>
</tr>
<tr>
<td>North America</td>
<td>70%</td>
<td>97%</td>
</tr>
<tr>
<td>Europe</td>
<td>79%</td>
<td>126%</td>
</tr>
</tbody>
</table>
Recurring revenue trends appear to have reached a potentially significant inflection point in Europe. Although revenues are still declining at an annual rate of 7.3% in the first two quarters of 2014, this represents a clear improvement from 2013, when for the full-year recurring revenues dropped by 8.4%. Third quarter results from a number of European operators have shown a further improvement in revenue trends.

There are still differences in revenue trends at a national level, although most markets are showing signs of improvement. Of the five largest economies (France, Germany, Italy, Spain and the United Kingdom), the UK has shown the strongest performance, reaching close to stability in the second quarter of 2014 on a year-over-year basis (minus 0.6%) as compared with a 5.8% decline in 2013 as a whole.

The economically weaker Southern European economies have witnessed some of the biggest revenue declines over recent years. There are tentative signs that Spain might be improving. TeliaSonera reported that mobile service revenue growth in Spain fell by 5.3% YoY in the third quarter 2014 after an 11% drop in the second quarter. Similarly, Vodafone Spain saw a clear sequential improvement with mobile service revenues declining 11.4% in the third quarter, an improvement of almost nine percentage points from the second quarter.

There are growing signs across many European markets that 4G rollouts and consequent increasing data usage are beginning to have a positive impact on the overall financial performance of operators. The main differential among these countries appears to be their economic climate, rather than any sharp differences in the regulatory or competitive environments. As discussed later in this section, revenue trends are forecast to show further improvements in the coming years. However, with the economic outlook across Europe again becoming more uncertain, there are some risks to these forecasts.

Source: GSMA Intelligence

Recurring mobile revenue growth

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<tbody>
<tr>
<td>YoY change</td>
<td></td>
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<td></td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>YoY change in rolling 12-month total</td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>
Major European countries recurring revenue trends

Source: GSMA Intelligence

- Italy: Q1 2012 to Q2 2014
  - Q1 2012: -11.8%
  - Q2 2014: -18.3%

- Germany: Q1 2012 to Q2 2014
  - Q1 2012: -3.6%
  - Q2 2014: 0.6%

- France: Q1 2012 to Q2 2014
  - Q1 2012: -7.5%
  - Q2 2014: -15.1%

- Spain: Q1 2012 to Q2 2014
  - Q1 2012: -11.8%
  - Q2 2014: -18.3%
1.2 Shift to 4G now underway across Europe

3G connections grew to more than half of the total connection base in Europe over the course of 2013. However, they have reached a peak at 54% and their share will begin to decline by the middle of 2015. This reflects the increasing migration to 4G networks that is now underway in Europe. By the start of 2015, 4G connections are expected to have reached close to 10%, up from under 5% of connections at the start of 2014. It is expected that 4G connections will overtake the number of 3G connections in less than five years from now (by the second quarter of 2019). By 2020, over half of the connection base in Europe will be 4G (excluding M2M connections).

Most European countries have now re-allocated the Digital Dividend (DD) spectrum that was freed-up by the switchover from analogue to digital broadcasting for use by the mobile operators. Out of the 28 countries in the EU, 24 have had spectrum auctions and assigned the 800MHz band. Operators have launched 36 networks in 19 countries using this DD spectrum. Most countries have assigned the entire spectrum available in the band, a total of 60MHz (2x30MHz). The one exception is Romania, where 2x5MHz of spectrum are still unsold. The four countries yet to assign DD spectrum are Bulgaria, Cyprus, Malta and Poland. Out of these four, to date only Malta has announced plans for an auction.

By mid-2014, 4G network coverage had reached the majority of the population in many European countries, including the Nordic region, Benelux, France, Germany, Italy, Portugal, Spain, and Switzerland. In the remaining European countries, operators are rapidly building out 4G coverage. In Europe as a whole, 4G reached a majority of the population for the first time during 2014.

---

1. Where at least two networks or one dominant network had over 50% population coverage
4G/LTE networks offer the consumer a robust data connection, as well as higher data transmission speeds and reductions in latency. The latter is likely to be of increasing importance going forward for more advanced applications. There is growing evidence of a change in consumer behaviour when presented with the greater opportunities offered by these new applications and services, particularly with regard to video content. EE has found that its 4G customer base is using social media more frequently than its 3G customer base, with 4G more generally encouraging more data intensive sessions with more pictures, video and downloading. As operators continue to build out their LTE networks and the technology itself continues to evolve to provide higher download speeds on a more consistent basis, the proportion of high definition video content carried on the networks is set to increase.

Source: GSMA Intelligence

2. http://ee.co.uk/content/dam/everything-everywhere/Newsroom/PDFs%20for%20newsroom/EE%20Mobile%20Living%20Index%20H1%202014.pdf
For the operators there are tangible cost implications as well as potential revenue benefits. Growing data traffic increases both operating and investment costs, but European operators are now beginning to demonstrate an increasing ability to monetise this data traffic.

According to the Cisco VNI Mobile 2014 report, a 4G connection generates 15 times as much traffic as earlier-generation connections. Verizon Wireless, for example, which covers 303 million people or 97% of the U.S. population, has said that its 4G network is five times more efficient than 3G was. However, Europe continues to lag North America in data usage. This gap should close going forward from a differential of 2.4 times in 2013 to 1.9 times in 2018. This trend will largely reflect the increasing adoption of 4G services in Europe.

Per subscriber data usage
GB per unique subscriber per month
Bouygues Telecom in France provides a good example of where LTE has led to increasing data usage. Bouygues re-farmed its 2G spectrum, enabling 4G coverage to reach over 60% of the population by late 2013 and 70% by mid-2014. While the company is only just beginning to see the benefits of its strategy, it has invested heavily in preparation for it. Bouygues spent €1.5 billion to acquire additional spectrum plus an additional €70 million annual regulatory fee relating to re-farming its 2G spectrum. The company credits this spectrum aggregation policy with its ability to offer an anticipated speed of 300MB per second service in 2015.

Having launched its 4G network commercially on 1 October 2013, the network covers 71% of the French domestic population as of September 2014, and 22% of Bouygues’s subscribers were on 4G plans at that point. Bouygues has begun trialling a TV-over-4G service using a 4G set-top box/router (BBox 4G) and is offering Netflix’s streaming video service as a subscription that can be accessed through both its fixed broadband set-top box (BBox) as well as on mobiles and tablets.

Bouygues indicates that its 4G customers are using four times the amount of data as an average customer (over 2GB per month). In addition, its 4G users are themselves consuming more data as time passes, using more data-intensive applications and services and as the coverage of Bouygues’s 4G network improves. Across its total connection base (excluding M2M connections), data usage increased 21% sequentially in the second quarter of 2014 alone and a further 24% in the third quarter to 587MB, more than double the level in the prior year.
In Sweden, the first country in Europe to launch 4G, benefits are now very visible in the results of the two largest players, TeliaSonera and Tele2. Both operators have 4G population coverage exceeding 95% and smartphone penetration of more than 70% of their connection base. As such, the 4G market in Sweden is now sufficiently developed to see that 4G can have an enduring positive effect on revenues, rather than just a short-term boost.

**4G driving improvement in Swedish revenues**

![Graph showing TeliaSonera and Tele2 ARPU and service revenue growth from Q3 2013 to Q3 2014.](image-url)
In Italy, TIM has seen a substantial turnaround based largely on its 4G network advantage, as currently only TIM and Vodafone have built out a 4G network. This has allowed TIM to price its data packages at a premium. For example, it has replaced a 2GB 3G data bundle for €10 per month with €15 and €19 monthly options, which provide 500MB and 1GB of 4G data respectively.

**TIM turnaround driven by 4G**

Source: Company reports
Smartphone adoption is reaching critical mass in Europe, with smartphones set to account for more than half of the connection base in Europe by the end of 2015. There remains ample room for the smartphone base to grow, before reaching the typical saturation level of around 80% of connections. Indeed, growth in smartphone connections is forecast to continue at a double-digit annual rate through to the end of 2017.

Recent results from operators across Europe have highlighted the rapid adoption of smartphones. Vodafone has reported that smartphone adoption among its connection base increased by seven percentage points annually to reach 48% in the European region by the end of September 2014. Telefónica likewise has reported a 56% smartphone adoption in Spain as of the second quarter of 2014, 50% in the UK, and 33% in Germany. Deutsche Telekom has reached a level approaching saturation, with 74% smartphone adoption in Germany by the end of September 2014.

Smartphone adoption to approach 80% by 2020
1.4 Mobile data growth accelerating

The accelerating migration to 4G networks and increasing levels of smartphone adoption, along with other data-intensive devices such as dongles and tablets, is leading to accelerating data traffic growth across Europe. Forecasts from CISCO indicate that mobile data traffic in Western Europe will grow at a CAGR of 50% per annum over the period 2013-18, slower than many developing regions but in line with North America.

Source: Cisco VNI Mobile 2014 white paper

Mobile data volume growth

<table>
<thead>
<tr>
<th>Year</th>
<th>Western Europe</th>
<th>Central &amp; Eastern Europe</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>200,000</td>
<td>200,000</td>
</tr>
<tr>
<td>2013</td>
<td>400,000</td>
<td>400,000</td>
</tr>
<tr>
<td>2014</td>
<td>600,000</td>
<td>600,000</td>
</tr>
<tr>
<td>2015</td>
<td>800,000</td>
<td>800,000</td>
</tr>
<tr>
<td>2016</td>
<td>1,000,000</td>
<td>1,000,000</td>
</tr>
<tr>
<td>2017</td>
<td>1,200,000</td>
<td>1,200,000</td>
</tr>
<tr>
<td>2018</td>
<td>1,400,000</td>
<td>1,400,000</td>
</tr>
</tbody>
</table>

TB PER MONTH

Central & Eastern Europe

Western Europe

CAGR

2018: 67.6%

2013-18: 49.6%
4G is a key driver of data traffic growth. Cisco estimates that 4G, despite being only 3% of connections in 2013, already generated 30% of global mobile data traffic, and expects the proportion globally to increase to over 50% in 2015, with a 4G device producing six times as much data traffic as other devices. Vodafone indicated in early 2014 that while 4G-capable smartphones accounted for only 11% of their installed smartphone base, these were already generating over 17% of the total data traffic over their European network, a statistic that is made more relevant given still more limited network coverage for the company’s 4G network.

Ericsson consumer research into active TV and internet users shows that 27% of Germans use a mobile device to watch TV or video on a weekly basis. This is a typical level for Western Europe, but the figure is even higher in Sweden. Sweden also has the highest 4G penetration rate in Europe – where TV viewing via a mobile device is 42%. In France, 25% of consumers in the Ericsson study state that they watch video on a smartphone on a weekly basis, with their viewing time exceeding three hours. In Italy and Spain, smartphone owners who watch video on their device state that they view more than four hours of content on a weekly basis. YouTube said in October 2014 that mobile devices now generate 50% of its traffic, up from 41% in 2013.

An increasingly common tariff trend in Europe, and elsewhere, is for tiered data plans. A growing proportion of contract tariffs now offer unlimited voice minutes and text messages. As a result, the key variable that subscribers choose, and implicitly assign a value to, is the allowance of inclusive data usage in their monthly tariff (there are also plans offered by some operators with limited voice and SMS allowances, but even here the data allowance is increasingly becoming the key variable and marketing point).

Cisco looked at the impact of such plans in its 2014 VNI Mobile white paper. It found that tiered plans now represent more than half of all plans, up from only 4% three years ago. Unlimited data plans have decreased proportionately over the same period. Despite the drop in unlimited data plans, data usage has continued to grow. In the previous year, average usage per device on a tiered plan grew 17%, from 922MB per month to 1,081MB per month. This is an encouraging sign for operators as they look to monetise increasing data usage at a time when revenues and profitability from traditional voice and messaging services remain under pressure.

In Sweden, TeliaSonera now has 40% of its mobile base on a data-centric plan. The company has seen ARPU rise from SEK180 (€19.5) when it launched the first such plan (in the first quarter of 2013) to SEK191 as of the third quarter of 2014. This has helped support a doubling of data volumes, to nearly 1GB per month for consumers, as over 15% of users now reach their data limit and close to 80% of those go on to purchase a top-up package. Another Swedish operator, Tele2, has over 60% of users subscribed to a data-centric tariff. In the first quarter of 2014, 60% of those were on an entry-level bundle, while by the third quarter 60% were on a bundle above entry level. This helped to drive an acceleration of service revenue growth to 4.6% in the third quarter compared to just over 2% in the first half of 2014, with ARPU up 5.7% year-over-year in the third quarter. Despite an increasing number of users on larger data-bundle tariffs, data top-ups in the third quarter of 2014 were 2.7 times the level in the previous year.

Another prominent example of data-centric tariffing is Vodafone, which launched Vodafone ‘Red’ in September 2012. Red tariffs incorporate unlimited voice minutes and SMS, with prices scaling based on incremental data allowances. As of the second quarter of 2014, 14.3 million customers had signed up for Vodafone Red plans, with the proposition available across 20 countries. While it has witnessed some ARPU erosion as a result of its introduction, Vodafone points to its simplified tariff structure as driving higher net promoter scores (NPS – a key metric used to measure customer satisfaction), lower churn, and greater data usage. By focusing on incremental data allowances, Vodafone can tailor its plans to stimulate data use. In its 2013 annual report, the company stated that on average, European smartphone users consume 250MB of mobile data per month – approximately a quarter of that consumed on average in the US. However, as of the first quarter 2014, Vodafone revealed that Vodafone Red smartphone customers were on average consuming 800MB per month; almost double that of its non-Vodafone Red customer base. In addition, the company is also seeing an uplift in voice usage, with Vodafone Red customers on average generating an extra 11% voice traffic.

Vodafone designed the Red tariff structure to help stimulate data usage through the use of tiered pricing, at a time when more traditional revenue streams were under significant pressure. This has helped to improve revenue trends and therefore reduce margin declines at a time when profitability in the European market has been under pressure. In addition, content bundles (such as those with Netflix or Spotify) have further stimulated data consumption, with 4G networks making streaming a more user-friendly experience for consumers. Moving to more sustainable business models is a key issue if operators across the region are to fund the significant investment levels required to support future traffic growth.

An area of nascent innovation in Europe, but more widely adopted in other regions such as North America and the more advanced Asian markets, are multi-SIM or family/household tariff plans. These are similar to individual tiered plans, and typically offer unlimited texts and minutes or very large bundles of such, and a separate data allowance that is shared among the other plan members. The advantages to an operator of such a plan include increasing usage among lower-using household members as they become accustomed to and reliant on data usage. It also brings more users under contract rather than prepaid tariffs, and typically lowers churn as compared with individual plans. So far, only a few operators in Europe are offering such plans, including EE in the UK, Telefónica in Spain, and TeliaSonera in Sweden. Globally, according to Cisco, over one-third of mobile data plans are shared as opposed to individual.
Europe remains a relatively fragmented mobile market

Europe remains a relatively fragmented and generally highly competitive market with a large number of operators, many of whom are sub-scale. This is especially true when comparing Europe to North America. There are signs of consolidation across Europe gaining pace, with a number of deals in recent years, although these deals often include relatively stringent merger conditions. However, the reduction in the number of network operators does not need to imply less competition, given ongoing competition at the retail service level.

Four European countries have seen consolidation of mobile network operators since the start of this decade:

- Orange and T-Mobile in the UK in 2010 to form EE
- Orange and 3 in Austria in 2013
- O2 and 3 in Ireland
- O2 and E-Plus in Germany

In the first two examples, sufficient time has passed to judge the impact of the mergers on the local markets. While there have been some positive financial impacts, a fair reading would suggest that the impact on the market as a whole has been modest at best, and in some cases only temporary. For example, ARPU recovered in the UK for a few quarters before resuming a downward trend. From a consumer perspective, while there is no evidence that in the medium- to long-term consumers are paying more, there does seem to be an improvement in capital investment levels by the operators. This in turn can lead to an improved consumer experience despite a reduction in the number of operators.

The recently completed merger of Telefónica Deutschland’s O2 and KPN’s German operator E-Plus is an example of a deal that may allow for greater network investment in the longer term. While the German market previously had four network operators, it had low ARPUs that contributed to low margins by international standards. In 2013, both O2 and E-Plus had operating (EBITDA) margins below 25%. Forecasts suggest the merger of the two operators will generate peak synergies of €800 million per annum (equivalent to around 10% of the two companies combined service revenues), leading to a rise in combined margin from 23% in 2013 to 28% by 2019. The CEO of KPN, Eelco Blok, in fact referred to this when he stated “consolidation really needs to happen to do the necessary investments in both fixed and mobile. The first wave will be in-country mobile consolidation and then later wider-scale consolidation – in a few years’ time there could be [just] three, or four or five big groups in Europe”.

4. Credit Suisse research, Telefónica Deutschland. Updating for the E-Plus deal, 29 September 2014
One factor that affects regulatory decision making around proposed mergers in certain markets is the level of retail competition and therefore pricing. Recent research by GSMA Intelligence highlighted that there is some correlation between the number of MVNOs in a market and ARPU. The following chart shows ARPU relative to the European average in the four markets that have seen significant consolidation of operators at the time of the mergers (or in the case of Germany and Ireland, in the second quarter of 2014, the latest quarter for which there is complete data).

Source: GSMA Intelligence, company data

Note: figures are for the UK market as a whole (not only merged operators)

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In the case of Germany, there were 147 active MVNOs (plus a further 35 sub-brands) as of September 2014. Between the announcement of the proposed merger of O2 and E-Plus in July 2013 and its closure in October 2014, the position of MVNOs in the country was strengthened further by means of remedies sought by the EU as a condition of approval of the deal. These included the release of 30% of O2 and E-Plus’s combined spectrum for use by MVNOs. In June 2014, Telefónica announced a deal with the MVNO Drillisch, giving the latter 20% of the combined network’s capacity and an option to purchase a further 10%.

E-Plus and online messaging service (OMS) provider WhatsApp completed a potentially significant MVNO deal in April. This involves E-Plus selling a WhatsApp branded prepaid SIM card that gives customers unlimited access to WhatsApp over and above their data plans – even if they have no credit on their account. The basic SIM package costs €10, but for an extra €10, users get 600 credits. These can be used interchangeably for 1MB of data, one minute of voice or one SMS (each costs one credit). With WhatsApp reportedly already installed on 90% of smartphones in the country, this gives E-Plus a good opportunity to attract customers from rival operators, while helping WhatsApp to establish itself in the telecoms sector.
1.6 IP-based services continue to grow ‘mindshare’ at expense of mobile operators

With 600 million monthly active users across the globe, WhatsApp’s revenues remain extremely modest in comparison to its user base (just US$10 million in 2013, rising to US$15 million in the first half of this year). However, despite the size of its base, growth, not monetisation, clearly remains the focus. Facebook CEO Mark Zuckerberg asserted that ‘products aren’t really interesting as a business until they have a billion people using them’. WhatsApp also announced it will delay the launch of its free voice service to the first quarter of 2015 (this was originally planned for the second quarter of 2014), citing technical challenges in deploying a high quality offering. Despite the delay, a well-implemented voice service in 2015 as a complement to messaging could represent a further disruptive threat for the mobile operators.

WhatsApp is following the route taken by other OMS providers that already provide both messaging and voice services, such as Skype, KakaoTalk, Line, Viber and WeChat (and Facebook’s own Messenger app). As noted previously, WhatsApp is already installed on an estimated 90% of smartphones in Germany. While there is no regional breakdown of the 600 million active users, its penetration in Europe is no doubt significant.

The Japanese IP messaging and games developer Line reported in October 2014 a penetration rate in Spain of nearly 40% of the population (though it should be noted that less than a third of Line’s global installed base is active). This service is not likely to be as popular in other European countries, but its presence in other markets is still likely to be material.

The overall trend appears to be that a significant share of messaging and increasingly calling is occurring via these OMS providers, leading to a loss of customer relevance as well as revenues for the mobile operators.

The impact of these OMS providers on traditional voice and messaging services has been apparent for some time. Analysys Mason estimated that IP-based voice minutes in Western Europe more than doubled during 2013 to nearly 65 billion, and estimates that messaging via IP-based services will nearly double again in 2014. In the UK, Ofcom reported that messaging volumes fell 24% in 2013 and messaging revenue slightly more (25%), a loss in revenue terms of about £600 million only partially compensated by higher data revenues of £200 million. In France, ARCEP data shows that despite a modest 3% annual rise in messaging volumes in the second quarter of 2014, revenue attributed to those messages fell by 4.4%. In Spain, CNMC reported that messaging volumes fell by 32% YoY in the same period, with messaging revenues falling by slightly more at 33% YoY.

With voice still representing a substantial proportion of mobile operator revenue, the impact on voice revenue is a real concern, but it may not simply be a case that a reduction in operator voice usage minutes equates to a corresponding fall in revenue. Indeed, in markets where operators offer unlimited voice minutes and text messages in most of their packages, the success of VoIP services can be limited but operators must be innovative and proactive.
Impact of IP services in the UK

Source: Ofcom

**Mobile messaging revenues (£B)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Q1 2012</th>
<th>Q2 2012</th>
<th>Q3 2012</th>
<th>Q4 2012</th>
<th>Q1 2013</th>
<th>Q2 2013</th>
<th>Q3 2013</th>
<th>Q4 2013</th>
<th>Q1 2014</th>
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<td>74</td>
<td>96</td>
<td>80</td>
</tr>
</tbody>
</table>

Impact of IP services in Spain

Source: CNMC

**Messaging revenue (€M)**

**Messaging volume (M)**

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Messaging Revenue</th>
<th>Messaging Volume</th>
</tr>
</thead>
<tbody>
<tr>
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<td>206</td>
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<td>Q2 2012</td>
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<td>96</td>
</tr>
<tr>
<td>Q2 2014</td>
<td>680</td>
<td>80</td>
</tr>
</tbody>
</table>
1.7 Trend towards ‘convergence’ accelerating in Europe

In the past year, there has been an acceleration of fixed-mobile convergence in both the bundled packages available to consumers as well as in the acquisitions of fixed and cable assets by established mobile players. The most notable example is Vodafone, which is re-investing some of the proceeds of the sale of its stake in Verizon Wireless into strengthening its competitive position in several of its core European markets. This is both by investing in accelerating and deepening its 4G network rollouts and by asset purchases in new market segments. Across Europe, Vodafone plans to add an additional 36,000 4G sites and 18,000 small cells, and modernise a further 15,000 sites through its ‘Project Spring’ network investment programme.

Separately, Vodafone has announced the acquisition of two cable operators over the past year, namely Kabel Deutschland in Germany and Ono in Spain. There have also been ongoing press reports that Vodafone could consider the acquisition of Fastweb in Italy, a fixed broadband provider that would improve Vodafone’s ability to offer convergent products in the country.

There have been similar moves towards convergent offerings from a number of other European mobile operators, with television services also becoming part of the bundle as part of ‘quad play’ packages. For example, EE recently launched a TV service in the UK delivered over its unbundled fixed network, while Orange acquired Jazztel in Spain. In addition, the French cable operator Numericable acquired the mobile operator SFR, indicating that the move towards convergence is coming not only from the more mobile-focused operators but also from fixed and cable companies.

These developments appear largely to be a response to moves by integrated as well as fixed operators and cable companies to bundle fixed and mobile services, which in part reflects the increasing decoupling of the service and network layers.

There are clear signs from consumers of increasing demand for these convergent offers, which in turn is placing mobile-only operators at a potential competitive disadvantage. For example, TeliaSonera has said that convergence drives loyalty and has seen a 50% drop in churn among triple-play subscribers as compared with phone-only subscribers. Telefónica recently stated that customer lifetimes within its “Fusión” convergence offering are three times that of contract mobile-only customers.

Going forward, the ongoing need to support continued network rollout and capacity investment, alongside diminishing returns, will continue to prompt network operators in Europe to seek to consolidate in order to deliver economies of scale. However, there remain significant regulatory and structural barriers to consolidation, which serve to limit the number of such deals. An increasing proportion of acquisition-related investment is likely to focus on allowing mobile operators to offer both convergent and digital services.
Revenue trends in 2014 to date have seen a clear improvement from those in recent years and forecasts indicate a more significant improvement in the medium term, with recurring revenues for Europe approaching stabilisation on a two to three-year timeline. With revenues from more traditional services still under pressure, this highlights the need for operators to continue to grow revenues from a range of new services and applications.

Source: GSMA Intelligence

European operator revenues (€B)
A combination of declining revenues, competitive and regulatory pressures and the economic backdrop have also led to falling profitability for the European mobile industry. EBITDA margins have declined by almost seven percentage points over the last five years, with negative economies of scale a key factor. Operators are taking a range of measures to maintain profitability, including a move away from handset subsidies (in order to reduce subscriber acquisition costs) as well as ongoing rationalisation of their cost base.

![Europe mobile EBITDA margins](image)

On the capex side, ongoing 4G build outs and the need for increased network capacity will continue to drive investment levels. Only slight growth in absolute spend from 2014 levels is expected, although capex in both 2013 and 2014 were both well above the level in the previous years. This in part reflects the greater efficiency of investment in 4G in comparison with earlier technologies, as 4G can provide greater coverage and network quality per unit of investment. Verizon Wireless, for example, which covers 303 million people or 97% of the U.S. population, has said that its 4G network is five times more efficient than 3G was. However, combined with still declining revenues and the resultant squeeze on margins, cash flow levels may decline to potentially challenging levels.

Total capex for the period 2008-14 is likely to total around €155 billion, but could potentially increase to around €170 billion for the period through to 2020. However, these levels of investment will depend upon operators moving to more sustainable business models, which will include some recovery in both revenue trends and profitability from current levels. If these trends do not improve, the levels of investment highlighted in this report may well be at risk.
Mobile contribution to European social and economic development

2.1 A solid contribution to economic recovery

The economic contribution of the sector in value added terms in 2013 represented 3.1% of Europe’s total GDP. There are four key elements to this impact: the direct contribution of mobile operators; the direct contribution of the mobile ecosystem; the indirect impact on the broader economy; and the increase in productivity brought about by the use of mobile technologies.

The direct contribution from mobile network operators in 2013 was of €105 billion in value added (0.75% of Europe’s GDP). The mobile ecosystem, which in our definition includes infrastructure service providers, retailers and distributors of mobile products and services, handset manufacturers and mobile content providers, generated a total value added of €39 billion (just under 0.3% of GDP). The economic activity directly generated by both mobile operators and the ecosystem has a broader knock-on effect on the rest of the economy, inducing further economic activity valued at €29 billion (0.2% of GDP). Finally, the generalised use of mobile phones in European societies allows individuals to work more efficiently and more productively – it is estimated that the productivity impact of such widespread use of mobile technology in businesses generated an additional €260 billion in value added in 2013, or 1.9% of GDP.
2.1.1 Direct economic contribution

The direct economic contribution to GDP of mobile network operators and the mobile ecosystem is estimated by the value added generated by companies that operate in the sector. Value added is calculated as the total income generated by the industry to its employees (through the payment of wages), to government (through tax contributions) and to company shareholders (in the form of business profits).\(^6\)

**Direct GDP contribution of the mobile ecosystem**

(€B, Percentage of 2013 GDP)

6. Value added by the sector can also be approximated as the difference between the value of sales made by the sector and the direct cost of making those sales.
Further to the direct economic impact, the economic activity of the mobile industry in Europe has a multiplier effect on the rest of the economy, beyond the mobile ecosystem, as operators and the ecosystem purchase inputs and services from their providers in the supply chain, generating sales and value added in other sectors and industries. This effect means that other parts of the economy also benefit from the activity generated by the mobile ecosystem. It is estimated that this resulted in the generation of value added in Europe of €29 billion in 2013 (0.2% of GDP).

Finally, and in addition to the direct and indirect contribution to GDP by mobile network operators and the mobile ecosystem, an estimated 1.9% of the 2013 European GDP reflects the increased productivity brought about by the widespread use of mobile technology in other sectors of the economy. Mobile technology has already facilitated productivity improvements in the region for many workers and businesses, and these are estimated to have generated a €260 billion contribution to GDP in 2013. Overall, in 2013 the mobile industry made a contribution of €433 billion in value added, or 3.1% of the region’s total GDP.

Source: GSMA Intelligence

Total (direct and indirect) contribution to GDP

(2013, €B)
2.1.3 Employment and public funding impacts

In 2013, mobile operators and the ecosystem provided direct employment to approximately 1.8 million people across Europe. From the ecosystem players, the largest employment contribution came from the content provider sector, with approximately 1 million jobs generated, mostly in the areas of mobile application development and mobile entertainment. It should be noted that a significant number of jobs in content and application development were part-time or on a self-employment basis. The mobile operators directly supported around 340,000 jobs across Europe, followed by distributors and retailers with a further 290,000 jobs. There were also a smaller number of jobs supported in the infrastructure and handset manufacturing sectors.

Further to the employment that is sustained within the ecosystem, additional jobs were also indirectly supported in the rest of the economy as the industry’s economic activity generated demand and jobs in other sectors, in particular from the main providers in the direct supply chain of ecosystem companies. The industry indirectly supported approximately 600,000 jobs in this way, bringing the total impact (both direct and indirect) of the mobile industry in Europe to approximately 2.5 million jobs in 2013.

Source: GSMA Intelligence

Employment impacts
(millions of jobs)
The mobile industry also makes a very significant contribution to public funding in the region. The mobile ecosystem makes a sizeable contribution through general taxation, which for most countries in the region includes value added tax and corporation tax, as well as contributions made by people directly employed in the industry through income tax and social security contributions. It is estimated that the sector made a total contribution to the public finances of governments in the region through taxation of approximately €74 billion in 2013.

Source: GSMA Intelligence

**Tax contribution by the mobile industry**

(2013 €B)

In addition to the contribution through taxation, mobile network operators made further contributions to the public finances of governments in the region through the payment of fees for the licence of spectrum bands required for the deployment of mobile broadband services. In 2013, spectrum auctions raised over €3.2 billion. Auctions of spectrum have continued in 2014, although at a lower rate than in the previous year, as most of the cycle for the allocation of 4G networks has already concluded in most European countries. In 2014 to date, spectrum auctions in Greece, Hungary, Poland, Estonia and Slovakia have raised approximately €750 million for their governments.
2.1.4 Outlook to 2020

The economic contribution of the mobile industry will increase over the current decade. By 2020, it is estimated that the industry will generate a total economic value added of €492 billion, in the form of salaries, profits and tax payments. This compares to the figure of €433 billion in 2013. Due to the limited growth prospects for operators and the ecosystem, growth in the industry’s economic contribution will occur at a lower rate than growth in the rest of the economy. The contribution of the mobile industry as a percentage of GDP during this period will therefore reduce from 3.1% in 2013 to 2.8% in 2020.

Despite this trend, the total number of jobs will remain stable throughout the period to 2020. Similarly, the public funding contribution of mobile operators and the ecosystem (excluding spectrum and other regulatory fees) will remain relatively stable at 2013 levels if tax rates remain at current levels.

These projections reflect the assumption that a challenging business environment will persist during the period. Some upside to these projections exists if market conditions improve beyond current expectations. For example, if data volumes and 4G adoption grew faster than currently expected, a larger value added contribution might be achieved both through higher productivity growth in the broader economy and a greater direct contribution from operators and the ecosystem.
2.2 Mobile playing leading role in innovation in Europe

2.2.1 Fostering an environment for innovation

The digital economy is developing rapidly in Europe. New digital technologies and innovations can reshape entire industries and value chains, offer new opportunities for businesses, reduce barriers to entry, and open doors for a new generation of entrepreneurs and innovators.

Innovation is a key area of focus for the European Commission in delivering its Digital Agenda for Europe. Europe is spending 0.8% of GDP less than the US and 1.5% less than Japan every year on research and development (R&D), while a fragmented market is leading to thousands of researchers and innovators to move to countries where conditions are more favourable. In response to these challenges, the Commission has set up the Innovation Union (IU) in a bid to remain competitive in the global marketplace. This is targeting growing R&D investment to 3% of EU GDP by 2020, leading to the creation of 3.7 million jobs and increasing annual GDP by €795 billion by 2020.²

Mobile operators in Europe have moved well beyond traditional core voice, SMS and data propositions to embrace new technologies and new business models, and are continually expanding their product portfolio to deliver new products and services to the consumer. Operators are investing in content to leverage their network assets and commercial presence in support of innovation.

² http://ec.europa.eu/research/innovation-union/index_en.cfm?pg=why
Operators have formed a number of innovation hubs and partnerships to promote innovation and the development of new technologies in Europe:

Deutsche Telekom announced in 2013 the creation of a second European innovation hub, based in Krakow. The new hub will aim to develop partnerships with start-ups from southern and central Europe, and operates under the ‘hub:raum’ brand. DT opened its first innovation hub in Berlin in 2012, which has already brought new services to market. linkist is an app that makes specialised literature easier to read by offering short summaries of non-fiction books, while Stylemarks is an online flea market for second-hand and vintage goods.

Orange is a founding partner of the NUMA innovation hub in Paris created in 2013, and has been supporting the start-up accelerator Le Camping de Paris since its creation. Orange is a founding partner of both the Startup Europe Partnership and the European Digital Forum. The latter aims to help start-ups scale and is one of the six actions for web entrepreneurs outlined in the Entrepreneurship 2020 programme.

Telefónica is another founding member of Startup Europe Partnership. The company has created its own start-up accelerator, Wayru, and has several initiatives aimed at identifying talent and entrepreneurship across the group’s operating companies. These include O2’s ‘Think Big’ project that provides funding and support to young people in the UK who want to make a change in their community.

Vodafone xone provides a wide range of incubation and investment services for start-ups. Recent press reports indicate that the company is moving a research facility from Silicon Valley to London, in order to ‘bring our product development team closer to the customers it serves’. The company already has a number of existing xone bases in Europe, including both Dusseldorf and Milan.

Innovation is coming from across the broader mobile and digital ecosystems. For example, Microsoft collaborates with industry and academia across Europe to support innovation, and is working with around 200 academic institutions across the continent. Microsoft has research centres of excellence in France, Germany and the UK, all of which are part of a much wider network of R&D facilities across Europe.

More recently, Google has announced it is setting up a European arm for its venture capital fund, Google Ventures. The Financial Times reported that Google believes the region will soon become home to some of the biggest tech companies in the world. According to David Drummond (Senior Vice-President, Corporate Development, Google), many of these companies will have begun as start-ups. ‘Every European capital I travel to I see these start-up clusters. It’s obvious that great companies will come out of these ecosystems.’

### 2.2.2 The European app economy seeing rapid growth

The app economy is growing rapidly in Europe, with revenue from apps and app-related products and services forecast to reach US$16.5 billion in 2014 according to VisionMobile, representing a 25% increase from 2012. Europe is a key player in the global app economy, home to the top two app store earners globally in July 2014. These are Supercell in Finland (creators of Clash of Clans and Hay Day) and King in the UK (creators of the Candy Crush Saga and the Bubble Witch Saga). However, despite this strength in app development and revenue generation, Europe’s share of global app revenues will drop to 19% in 2014 from 24% in 2012 due to strong growth in emerging markets, particularly India and China.

![Revenue from apps and app related services](image)

In 2013, the European app economy directly employed approximately 530,000 people in areas such as the development, production, marketing and sales of apps or app-related products and services. This number is forecast to grow by 26% in 2014 to reach 670,000, 60% of which will be developers. In addition, the app economy has a wider impact on employment by creating new jobs in adjacent industries that leverage app-related products and services such as health care, automotive, entertainment and education.

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Europe is a highly fragmented region of national online markets, and many barriers still block the free flow of online services and entertainment across national borders. To remain globally competitive, Europe must leverage its economies of scale and remove these barriers for the completion and growth of the single market.

Pillar 1 of the new European Commission’s Digital Agenda for Europe, and the Commission President Jean-Claude Juncker’s top priority, is the creation of a digital single market for consumers and businesses that will make use of digital technologies to traverse borders and help expand economic growth in Europe. Its completion could lead to the generation of €500 billion of additional GDP growth in Europe over the course of the Commission (a 4% increase in EU GDP in the 10-year period between 2010 and 2020). In addition, a digital single market can be a key driver for innovation, productivity and competitiveness; a mechanism to improve labour markets; a tool to help improve the efficiency and quality of public services; and a facilitator on the path to a greener economy.

A key element in achieving a digital single market is facilitating access to relevant content for all stakeholders in the value chain. With 430 million unique mobile subscribers and 687 million connections in Europe, each with an individual billing relationship with an operator, mobile is in a unique position to help create mechanisms to support this vision. The mobile industry is key to growing the market for online content, and provides a platform for the extension of businesses to ‘on the move’ applications, content and services – both domestically and cross-border. The mobile internet allows consumers to exercise greater choice in their purchases, with easy and ubiquitous information about competing offers for a good or service. By allowing consumers to use their existing billing relationships with operators to make payments for goods and services, or by using mobile identity services, mobile phones can be used to complete transactions via mobile, or to simplify and speed up cross-border travel.

Creating a single market requires harmonisation between fragmented and non-standardised countries, for example in areas such as spectrum allocation criteria, consumer rights, data protection or the digital business environment. Different markets have different applications of privacy and consumer protection laws, and therefore a clear, harmonised set of rules is necessary to promote confidence in the use of a digital single market.
The machine-to-machine (M2M) market has seen rapid growth in Europe over recent years as operators and governments increasingly recognise the potential of the Internet of Things (IoT), and the number of active deployments is beginning to accelerate. The IoT has the potential to play a significant role in realising the potential of digital future, with positive impacts on both the economy and the broader society across Europe.

Across Europe as a whole, there were 52 million M2M connections as of September 2014, representing just under a quarter of the global connections. Growth is set to accelerate over the next few years, with the total number of M2M connections growing at a compound annual growth rate of 23% between 2014 and 2020, bringing the total to 190 million. Europe will remain the second largest market globally during this period, behind Asia Pacific. Five European markets were in the top 10 largest national M2M markets as of September 2014. These cellular M2M growth forecasts reflect the current trajectory that the market is taking based on known and tangible deployments, opportunities and growth inhibitors for each operator and M2M sector.

There could be substantial upside to these forecasts if a number of growth factors are successfully enabled by both industry players and governments, as highlighted in recent research by GSMA Intelligence. The areas below have been identified as possible growth stimulators and that are of particular relevance to Europe:

- The introduction of additional government policies enabling a wider deployment of cellular M2M connections in key sectors such as utilities, smart cities, automotive and healthcare.
- Significant module cost reduction enabling a wider range of connected products and services.
- Low-cost standardised solutions that will enable additional M2M application areas with specific requirements such as low data and long battery life.
- Increased standardisation, such as for global remote provisioning and APIs, enabling more efficient deployment of connected solutions.
- Greater assurance of end-to-end security and deployment of SIM-based user identity and consent management capabilities.
- The development of new operator business models in the M2M space, particularly those that move beyond simply providing the mobile connectivity.

Addressing these growth inhibitors, both at a regional and global level, could see growth rates similar in future to those witnessed over the past few years. This could result in an uplift over the current trajectory forecasts ranging from 30% to 50%.

Growth of cellular M2M in Europe

Source: GSMA Intelligence
Supportive regulatory frameworks can play an important role in stimulating the deployment and adoption of certain M2M applications and services, either at a national or regional level. The European Commission has played an active role in the automotive sector, with the development of its Emergency call (‘eCall’) system for all new vehicles.

Another example of the importance of regulatory support is in the field of smart meters. Under the Third Energy Package, a legislative framework to promote an internal gas and electricity market in the European Union that came into force in September 2009, Member States were required to commence a cost benefit analysis of smart meter rollout and submit the results to the European Commission by September 2012. To date, EU Member States have committed to rolling out close to 200 million smart meters for electricity and 45 million for gas by 2020, at a total potential investment of €45 billion. The European Commission is targeting that 72% of European consumers will have a smart meter for electricity while 40% will have one for gas by 2020.

**The fastest growing industry sectors in the region are in the areas of automotive, security, compliance reporting, utilities and health. Examples of recent deployments in the region:**

- **eCall** is a European initiative intended to bring rapid assistance to motorists involved in a collision anywhere in the EU, and requires an embedded in-vehicle system (IVS) with satellite positioning and mobile connectivity capabilities to be integrated in all new vehicles (turning them into ‘connected cars’). The European Commission had initially proposed that legislation for the introduction of the eCall public safety answering point (PSAP) system would be in place by the end of 2015. However, adoption by the EU Member States has been slower than projected, and the deadline for implementation of the eCall PSAP system has been postponed by two years to 2017/2018.

- An example of a regulation-driven stimulus for the M2M market is connected fiscal cash registers – electronic devices used for control of a country’s tax revenues, such as those deployed in a number of Southern and Eastern European markets to counter tax avoidance. As a result, some of the markets where these initiatives have taken place boast higher M2M adoption rates than the regional average. In Bosnia and Herzegovina for example, M2M accounts for 4.6% of all mobile connections in the country (36% of contract connections).

- In Bulgaria all coffee vending machines, parking voucher payment machines, snack dispensers and even machines that dispense bouncing balls to children must be linked electronically to the National Revenue Agency. Bulgarian law requires sales outlets to record and report income to tax authorities, with provision for fiscal devices to be linked to the National Revenue Agency so that daily turnover can be tracked.

- In August 2013, the UK government selected Telefónica to provide smart metering communications services across the central and southern regions of the UK, a contract worth £1.5 billion (around €1.9b) over 15 years. Telefónica will deploy and operate the communications infrastructure for 42.3 million electricity and gas meters. The connectivity solution will primarily rely on 2G/3G mobile networks and with RF Mesh infill used for uncovered areas. When completed by 2020, there will be almost 23 million smart meter communication hubs connected to Telefónica O2’s mobile network.

- In November 2013, Telekom Austria Group M2M launched SMARTify, a SaaS (Software as a Service) solution for smart metering. Telekom Austria Group will be responsible for IT infrastructure, software and maintenance work. Utility providers will use the platform as a service by paying a monthly flat fee, helping them to reduce investment, minimise risk and achieve economies of scale.

- Orange Business Services together with Weinmann, a global manufacturer of therapeutic system solutions in sleep medicine and ventilation, developed homecareONLINE, a connected medical device solution for sleep therapy.

- Following the trends evident in the M2M industry across the world, operators across Europe are joining international alliances and partnerships in order to increase the range of services. For example, Telecom Italia partnered with two M2M platform providers, Jasper Technologies and Ericsson, allowing it to offer increased technical and commercial flexibility for its M2M and IoT solutions.
2.3.1 The Role of the GSMA in realising the potential of M2M

The initial focus of the Connected Living programme is to accelerate the delivery of new connected devices and services in the M2M market through industry collaboration, appropriate regulation, optimising networks as well as developing key enablers to support the growth of M2M in the immediate future. The ultimate aim is to enable the IoT, a world in which consumers and businesses enjoy rich new services, connected by an intelligent and secure mobile network.

Working with its partners across the ecosystem, the GSMA is active in a number of areas to drive forward this initiative:

- Establishing guidelines for intelligent and efficient communication between machines via the mobile network, and defining future network requirements and capabilities required to allow operators to support M2M devices and services.
- Helping to create a sustainable regulatory and policy environment that will enable operators to deliver the consumer and business benefits of M2M.
- Identifying and developing enablers that will support future network capabilities such as in the areas of end-to-end security, non-GSM device authentication and billing and charging.
- Seeking to unite all industry stakeholders behind a single, common embedded SIM specification to help accelerate the growth in M2M connections. To this end, the GSMA recently announced an agreed specification for a machine (embedded) SIM that addresses remote provisioning requirements, supported by a number of the world’s leading mobile operators.

Engaging with partners across the broader ecosystem, the GSMA is also helping to facilitate the development and drive the adoption of new services in other sectors, with special interest groups for automotive, health, education, utilities and transportation. These groups allow manufacturers and mobile operators to meet and share information, enabling industry cooperation with the goal of resolving barriers to deployments and to accelerate the adoption of services.

New mobile technologies are profoundly changing the way in which people and businesses buy and sell. Mass-market smartphones with touchscreens, fast connections and an array of feature-rich applications are extending the convenience and interactivity of online commerce into the physical bricks and mortar world.

Millions of people now have the internet readily available throughout Europe, with the ability to look up product and service information, download and store vouchers, search for merchants, explore transport options, run price comparisons, buy tickets, purchase products and order services, all whilst on the move. At the same time, retailers, transport operators and other service providers are beginning to use mobile technologies and services to both improve efficiency and create a more compelling experience for their customers, while infrastructure rollouts of NFC and other contactless point of sale (POS) terminals are no longer holding back service adoption.

Over 250 digital commerce services have been launched in Europe to date, by a range of different service providers. As a result, the digital commerce industry is forecast to grow significantly over the next three to five years, from just under US$400 billion in 2013 to US$620 billion in 2017\(^{17}\), a compound annual growth rate of 12%.

Mobile commerce will be a key driver of this expected growth, and will account for 18% of total digital commerce by 2017, up from 9% in 2013. Mobile technologies and services can make online commerce easier and more secure, with credentials stored on a SIM card, for example, used to authenticate an online transaction, reducing the likelihood of fraud and improving the consumer experience.

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**Source:** eMarketer, DigiCapital, GSMA Intelligence

**Growth of the European digital commerce market**

(US$ B)
An increasing range of m-commerce applications and services are available, developed by a growing range of companies and offering an increasing variety of services to end users. shopkick, a real-world shopping app developed in the US, recently launched in Germany. The app claims to have a presence in over 10,000 stores in the US, and at launch had over 1,400 stores in its German network. The app allows users to find the best deals and trending products at their favourite stores.

Yaap shopping was launched as a pilot scheme in Spain in mid-2014, a mobile app that allows users to redeem offers from retailers in their local area. Yaap shopping is a joint venture between two Spanish banks, CaixaBank and Santander, and the mobile operator Telefónica.

There has been substantial momentum in making mobile payment services available to consumers across Europe in the last year. There have been 22 commercial launches of NFC services in 2014 to date, 13 of these by mobile operators. In addition, there have been eight pilots and trials, as well as four commercial Bluetooth Low Energy (BLE) and Host Card Emulation (HCE) launches, plus nine pilots and trials. Mobile operators and banks continue to lead the field in terms of new launches, but retailers and other players are increasingly launching their own solutions. Additionally, NFC is still by far the most established technology for mobile payments, but other solutions such as BLE and HCE are gaining traction as an increasing number of handsets support them.

Some of the most important launches in the past 12 months:

- **BBVA Wallet** in Spain with NFC and HCE functionality, currently with over 250,000 users. It is the most widely used bank application for mobile payments in Spain and one of the most popular in the world.

- **EE UK’s Cash on Tap** contactless/NFC wallet, allowing mobile payments for items under £20 at over 300,000 retail outlets across the UK, and for transport in London.

- **Telenor Norway** launched the Valyou NFC mobile wallet, linked to DNB Visa debit cards. This allows the phone to function like a contactless payment card.

- **La Caixa, Visa Europe, Movistar, Orange, and Vodafone** launched a joint NFC wallet project in Spain, potentially accessible to more than 80% of the Spanish market. Customers will be able to conveniently and securely combine all their cards on their mobile devices, and use them to make purchases at retailers and merchants fitted with contactless POS terminals anywhere in the world.

- **Additionally**, while not a Europe specific initiative, Apple’s entry into mobile payments with Apple Pay is a good example of different stakeholders in the ecosystem cooperating to create a secure end-to-end payments ecosystem encompassing the consumer, merchant, card schemes and banks. It uses NFC and a ‘token’ system for transactions and authentication, and unlocks a potential 800 million iTunes account holders for digital commerce. Visa is working with Apple to roll out Apple Pay across Europe over the course of 2015.

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20. http://ee.co.uk/ee-and-me/travel-shopping/cash-on-tap
Commercial mobile payment service launches in Europe (cumulative)

2.4.1 The role of the GSMA in developing digital commerce

Working with mobile operators, regulators, banks, retailers, transport operators and other service providers throughout the region, the GSMA’s Digital Commerce programme is active in driving the mass adoption of SIM-secured digital commerce services. The GSMA engages regularly with key government and regulatory bodies throughout the region, providing advice and guidance on how to harness the potential benefits of SIM-based services in transport, retail and other sectors of the economy, and developing industry positions on aspects of policy, highlighting the impact of regulation and informing regulators’ decision-making processes.

In addition, as the number of commercial mobile NFC services around the world rises, the GSMA is promoting the use of common standards to enable the global interoperability of services and generate economies of scale, liaising with other relevant stakeholders to ensure the consistency of the overall set of specifications involved in NFC deployments. Covering many topics within mobile commerce, these specifications set out a common framework of requirements to ensure interoperability and an efficient and consistent development and deployment of mobile NFC services.
2.5 Personal data challenges

With the rapid growth of online commerce, social media, gaming and other online activities in countries across Europe, there is a growing need for individuals to be able to manage and authenticate their identities online. Consumers across the region need convenient and secure digital identities to make it both safer and easier to access online services.

In the last year, there have been several high profile global security breaches. These highlight potential serious flaws in the way personal information and data is currently protected online. eBay announced in March that its database containing encrypted passwords and other non-financial data had been hacked. In April of 2014, the Heartbleed bug was disclosed, rendering approximately 17% (around half a million) of the internet’s secure web servers certified by trusted authorities vulnerable to the attack. This allowed the theft of private keys and passwords. Given that a typical consumer has around 26 different online user names but only five different passwords, there are serious questions regarding the suitability of the current password model for online safety and privacy.

Consumers are increasingly voicing concerns around online privacy, and are demanding greater security for online services and more robust data protection. One solution gaining popularity is mobile authentication, whereby using the inherent security of a device that is always with customers, the mobile phone, secure and convenient access to digital services can be unlocked. The use of mobile identity services offers benefits to consumers, operators and other ecosystem players. These services establish the SIM card and the mobile platform as a frontline identity management service provider. Mobile operators are well placed to provide identity services given their strong customer relationships, which in some cases have been enhanced by the provision of other trusted services such as mobile banking.

25. Experian, 17 July 2012
Concerns around mobile identity and personal data

- **83%** of mobile internet users have concerns about sharing their personal information when accessing the internet or apps from a mobile.
- **81%** of mobile users think it is important to have the option of giving permission before third parties use their personal information.
- **65%** of mobile app users check what information an app wants to access and why before installing it.
- **48%** of mobile app users with privacy concerns would limit their use of apps unless they felt sure their personal information was better safeguarded.
- **60%** of mobile users want a consistent set of rules applied to any company accessing their location, regardless of how they obtain this information.
- **82%** of mobile users want to know when, and what type of personal information is being collected from their mobile devices.

Source: GSMA

26. Mobile Privacy: Consumer research insights and considerations for policymakers, GSMA, February 2014
Personal data and mobile identity services in Europe have the potential to act as the gateway to a broad range of government and public services. Benefits would include delivering secure access for individuals, and allowing governments to develop new areas of engagement.

**E-government and public services:** Mobile identity is transforming how citizens and governments interact. In Finland for example, the City of Helsinki has launched a new tax receipt app which allows citizens to calculate the total amount of direct or indirect taxes they pay monthly. Likewise in Estonia, Mobile-ID users can submit tax returns, apply for a driving license, register a motor vehicle, register a new company, access personal information such as health insurance, disability assistance and construction applications, and can apply for personal loans, purchase insurance and pay their utility bills. In addition, e-government services can lead to significant public procurement cost savings, potentially up to €15 billion by 2020. The mission letter for the new Vice President of the Digital Single Market includes the goal of 'supporting ways to make public administration more open and effective by championing the digital and e-government approaches across all Member States and within the Commission'.

**Cross-border services:** Mobile identity solutions are making it possible for citizens and businesses to deal with public administrations in other countries. The recently launched electronic identity, authentication and signature (eIDAS) Regulation is expected to enable and foster seamless electronic transactions across borders. By helping to realise the potential of the Digital Single Market, this would make it easier and safer for individuals, businesses and public administrations in different EU countries to identify and authenticate themselves, sign documents and check the authenticity of documents online.

**mHealth:** Mobile identity is transforming the delivery of healthcare and well-being for patients and practitioners alike. It allows patients to manage their own health, access secure services and support at any time, and benefit from faster and more accurate diagnoses by healthcare professionals. In the UK for example, the South London and Maudsley NHS Trust provides patients with secure, remote access to information from their own homes. This removes the need to travel to clinics, reduces the number of clinic sites required, and increases the number of appointments delivered.

**Smart cities:** City administrations are looking to harness mobile connectivity to address the many challenges of urbanisation, including traffic congestion, waste disposal and rising energy usage, improving quality of life for citizens, making public services more efficient and fuelling economic growth. In Germany for example, the municipal government of Friedrichshafen is bringing together communication technologies with a smart energy grid, delivering electricity consumption data to households allowing regulation of usage, and therefore reducing energy consumption and lowering impact on the environment.

**mVoting:** Trusted digital identities make it easy for citizens to verify and confirm they are who they say they are, and governments are able to authenticate voter identity and eligibility to vote. In 2011, Estonia became the first in the world to allow mVoting in the national parliamentary elections and 3% of all votes were conducted via mobile. As of today, neither mVoting nor eVoting are widespread solutions. As digital initiatives across the world become more mature, the provision of mVoting services is likely to increase.

**mIdentity:** In 2013, Swisscom launched Mobile ID. This is a fully managed strong authentication solution for enterprise and individual users. It combines smartcard level security with ease of use for customers, allowing users to transact across a wide range of industries and services (including government services such as tax, social security, housing and healthcare). In January 2014, Swisscom released signature, an update to the service allowing users to digitally sign any type of media in a legally binding manner using a single mobile authentication process, without requiring any further identity proofing.

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32. [http://www.o2.co.uk/enterprise/sectors/public-sector/health](http://www.o2.co.uk/enterprise/sectors/public-sector/health)
The future development of these services will depend on the maturity of existing identity infrastructures and the cultural, legal and political environments that are particular to each country. For example, countries such as Estonia favour an identity framework based on national digital identities, where the government acts as the primary provider of the identity. In another scenario, such as in Norway, Sweden and Finland, identity is delivered via a hybrid model where both public and private certified providers deliver full registration and management. In this case, a single sign-on portal gives citizens access to numerous service providers, including major banks and other commercial organisations.

In contrast, the UK currently has no national identity schemes. The UK is looking to a more open identity framework where the government plays an enabling role, creating the environment in which to allow private and public organisations (such as banks and mobile operators) to manage identity for citizens, businesses and consumers.

In an effort to help standardise personal data services across the region, the European Commission has pushed for a more transparent, trustworthy and technologically neutral regulatory environment where any offline transaction is available online. As a result, the Electronic Identification and Trust Services (eIDAS) regulation came into effect on 17 September 2014. This aims to enable seamless electronic transactions across the EU, making it easier and safer for individuals, businesses and public administrations in different countries to identify and authenticate themselves, sign documents and check the authenticity of documents online.  

2.5.1 The role of the GSMA in further developing personal data and mobile identity services

The GSMA’s Personal Data programme is working with the majority of mobile operators who have launched mobile identity services across the globe to help realise the potential of mobile identity services. The mobile industry needs to deliver common and consistent interfaces to a range of service providers, which at the same time need to offer seamless and convenient solutions to consumers.

The use of standards and interoperability are therefore key, in particular the need to create a common, industry-wide set of identity-related APIs (application programming interfaces). The GSMA is working closely with operators to establish a uniform set of APIs to underpin key mobile identity services. To help realise this goal, the GSMA has launched its ‘Mobile Connect’ product – supported by a number of leading operators in Europe including Orange, Telefónica and Telenor – which aims to facilitate broad interoperability across a range of mobile operators and service providers.  

2.6 Network 2020

Consumer appetite for mobile data and richer services is growing rapidly in Europe, and as a result, IP communications services such as Skype, WhatsApp and Facebook Messenger are becoming increasingly popular with consumers. These services will continue to gain traction with the growth of LTE networks and devices, meaning operators will need to consider which type of partnership or OTT integration models will allow them to drive revenue and sustain their business models in the longer term.

Embracing an all-IP future solution is vital for operators if they are to retain customer relevance and have a network capable of meeting the ever-growing customer demand for data services and increasingly richer communications. The outgoing European Commission Vice President Neelie Kroes has urged European operators to embrace the move towards mobile IP-based communication and the growing demand for internet player services.

One response to the challenge of OMS providers by the mobile industry is the development of a unique, rich IP-based communications proposition to their customers. Rich Communication Services (RCS) offer voice and messaging, video-based calling, as well as Voice over LTE (VoLTE), and HD Voice services.

RCS is the platform that enables the delivery of communication experiences beyond voice and SMS, providing consumers with instant messaging or chat, live video and file sharing – across all devices, on any network. For operators, deploying RCS is a key way to ensure their service retains relevance for consumers, keeping them connected and offering them competitive solutions with alternative applications, and can enable the generation of new revenue streams through the creation of apps and B2B services. RCS has been launched by 40 operators in 33 different countries, with a commitment from a further 87 operators to launch by the end of 2015.

VoLTE offers operators many potential cost and operational benefits. It eliminates the need to have voice and data on separate networks, and can unlock new revenue potential through deployment in parallel with video calls over LTE and RCS multimedia services. As demand for conversational video calls grows, deploying VoLTE will ensure that video services are fully interoperable across the operator community. No countries have yet launched VoLTE services in Europe, but 19 are in the planning stages.

HD Voice meanwhile provides customers with high quality, clear and more natural voice calls with reduced background noise on mobile and fixed terminal networks. HD Voice services are rapidly expanding throughout Europe, with commercial services available in 30 European countries as of September 2014.

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Current status of RCS, VoLTE and HD Voice

<table>
<thead>
<tr>
<th>Country</th>
<th>RCS</th>
<th>VoLTE</th>
<th>HD Voice</th>
</tr>
</thead>
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</tr>
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Source: GSMA Intelligence, GSA
Europe is still at an early stage in the migration to 4G networks, although it is accelerating sharply. However, there is already growing speculation and analysis around the next generation of mobile services, generally referred to as ‘5G’. Discussions centre on whether 5G will be a true generational shift in connectivity technology or the consolidation of existing 2G, 3G, 4G, Wi-Fi and various other technologies to provide vastly greater network coverage and always-on reliability. Considerable advancements towards the hyper-connected society have already been made. Examples include technologies such as network function virtualisation (NFV), software defined networks (SDN) and heterogeneous networks (HetNets). All of these technologies are regularly bundled under the ‘5G’ banner, despite the fact that they are already being brought to market by vendors and invested in by operators. These technologies will continue to have a significant impact on the mobile industry over the coming years. Placing too much focus now on a future, over-arching vision of a new technology generation could adversely affect progress in these areas between now and the anticipated launch of 5G as a commercial service. This latter point is especially true given the early stage of 4G adoption in many countries throughout Europe.

2.6.1 The role of the GSMA in developing next generation networks

The ‘Green Button Promise’ sums up the next generation network proposition, reflecting the previous experience of using a green button on a device to initiate a voice call, and will fulfil customers’ expectations that services initiated via the calling or messaging buttons will be high quality and fully interoperable, regardless of network. The GSMA’s Network 2020 programme is designed to help operators make IP Communications work as a native service behind the ‘Green Button Promise’, aiming to address and navigate the complexities of progression to an all-IP communications network. The first phase of the programme focuses on helping networks deploy VoLTE and Conversational Video calls over LTE, and encouraging the RCS Ecosystem to help operators prepare for and launch RCS-based interoperable rich communication solutions for their customers around the world.

Additionally, the Network 2020 programme will work with operators to determine the technical and commercial specifications for operator-to-operator quality of service (QoS) for IP Services, and encourage them to incorporate the QoS philosophy into their customer solutions. The Network 2020 programme also aims to help catalyse commercial implementations for IP Interconnect solutions between operators and service/content providers.

Finally, until such time as the industry requirements and definition of 5G have stabilised, the GSMA will focus on improving the overall sustainability of the mobile telecoms sector, allowing more networks to achieve greater connection numbers by enhancing the business model for expanded coverage and offering connectivity to those in the world that currently have no connectivity at all.
Making Europe more competitive

Improving the region’s competitiveness is a high priority for policymakers across the European Union (EU). To prosper in an increasingly digital global economy, Europe’s enterprises and entrepreneurs need world-class connectivity and access to advanced digital technologies. In this respect, the outlook is gradually brightening.

After several years of decline, the health of Europe’s mobile industry is beginning to improve. To sustain that recovery, industry leaders and policymakers need to build a common agenda that prioritises Europe’s long-term socio-economic prospects.

As outlined in the earlier sections of this report, mobile connectivity is helping both individuals and companies to become more efficient and effective, while enhancing the quality of life of people across Europe. At the same time, mobile networks are enabling homes, factories, offices, transport networks, public institutions and even entire cities to become smarter and safer.

With the advent of a new European Commission and European Parliament, there is an opportunity for the EU institutions and the mobile industry to build a genuine partnership focused on harnessing new digital technologies to address the inter-related challenges posed by an aging population, sluggish economic growth, youth unemployment, fiscal deficits, energy shortages and climate change. Mobile technologies could enable the public and private sectors to develop cost-effective solutions and services that help to address each of these challenges.

At the same time, ubiquitous mobile broadband networks are crucial to ensuring Europe’s digital businesses can grow and employ more people. As they review and refine the EU’s regulatory frameworks, incoming policymakers need to be mindful of how they can nurture Europe’s emerging digital economy and make it fully competitive with its North American and Asian counterparts. More broadly, companies across the economy, from heavy industry to consumer services, now depend on fast, reliable connectivity to manage their daily operations.
There are three key areas in which policymakers and industry leaders can work together to enable mobile technologies and services to enhance Europe’s competitiveness:

**Encouraging investment**: Creating an environment in which investors are willing to fund the widespread deployment of advanced mobile networks.

**Enabling innovation**: Ensuring that service providers have the flexibility they require to respond to changing market dynamics and meet the needs of different customer segments.

**Building trust**: Drive the take-up of digital services by Europe’s citizens and businesses through fostering trust and confidence in the integrity of mobile networks and their ability to safeguard sensitive data.

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**3.1 Encouraging investment**

Mobile operators across Europe are continuing to invest in adding network capacity and in further building out LTE network coverage. After investing around €155 billion in the seven years to 2014, this will need to increase further to €170 billion for the six years out to 2020. However, these levels of investment will depend upon operators moving to more sustainable business models and on a clear improvement in the current trends around revenue growth and profitability. More broadly, if Europe can step up investment in information and communications technology (ICT), its digital economy may catch up, and even leapfrog, the other industrial regions, while stimulating economic growth and job creation.

Investors’ willingness to fund the rollout of advanced mobile broadband networks in Europe depends on a number of factors, including spectrum policy, restrictions on base station siting and network sharing, the tax and incentive regime and the extent to which operators can consolidate their mobile operations.
### 3.1.1 Supportive spectrum policies

One of the biggest considerations for investors is the availability and the cost of the internationally harmonised spectrum mobile operators need to cost-effectively extend coverage and enhance capacity. Given the ongoing rapid growth in data traffic on mobile networks, it is already clear that European countries will need to make more spectrum available for mobile broadband services. The GSMA estimates that Europe will need an additional 600MHz to 800MHz of spectrum by 2020 in order to meet the projected demand for data traffic in that year.

Upcoming decisions about the future of the UHF spectrum (470MHz-790MHz) are likely to be a key factor in determining whether Europe’s mobile operators can meet demand, particularly in suburban and rural areas. In a report presented to the European Commission in September 2014, Pascal Lamy, President of Notre Europe, called for the 700MHz band to be repurposed for mobile broadband in the EU by 2020. However, that spectrum may be required earlier in some Member States as Europeans become increasingly accustomed to watching news and entertainment on demand. It is, therefore, essential that Member States have the flexibility to release this spectrum from 2018, if not earlier.

Moreover, the Lamy report’s recommendations on the sub-700MHz (470-694MHz) band could put Europe at a competitive disadvantage compared to other regions. Limiting Europe’s flexibility on the possible co-existence of mobile and digital broadcast services until 2030, as envisaged in the report, could deter investment in the further expansion of advanced mobile networks.

The European Commission should bring the proposed review process of the sub-700MHz band forward to 2020 (rather than 2025) to give Member States the flexibility to meet the needs of the rapidly evolving media and mobile communications markets in the longer term. In parallel, the EU also needs to support a co-primary allocation between broadcast and mobile services for the sub-700MHz band at the World Radiocommunication Conference in 2015.

### 3.1.2 Enabling the expansion of networks

However, spectrum alone is not sufficient to enable Europe’s mobile industry to meet the burgeoning demand for its services. Mobile operators also need to be able to deploy the necessary infrastructure. In some European countries, mobile operators are finding it increasingly difficult to deploy the new base stations required to meet demand for mobile data services. Such deployments can be blocked by environmental restrictions, aesthetic concerns and rules relating to electromagnetic fields/radio frequency (EMF/RF) exposures.

The International Commission on Non-Ionizing Radiation Protection (ICNIRP) has established harmonised international guidelines on EMF/RF exposures. Although these guidelines are endorsed by the World Health Organization (WHO), some European countries have imposed significantly more restrictive EMF exposure limits. These unnecessarily obstructive policies are preventing mobile operators from rolling out new network infrastructure, a particular challenge for the deployment of the 4G networks Europe needs to be fully competitive in the digital economy. The European Commission should encourage Member States to harmonise EMF/RF exposure limit policies in line with the ICNIRP’s international guidelines.
There are other steps policymakers and regulators can take to enable the efficient deployment of new infrastructure. Policymakers should for example eliminate mobile specific taxation that diverts resources away from critical network investment. Regulators could also facilitate further network sharing, which can reduce the environmental and aesthetic impact of new base stations. GSMA research suggests that sharing of sites, masts and radio access networks, as well as national roaming, tend to have a positive impact on coverage, quality of service and pricing of services, as cost savings increase operators’ efficiency.

Europe’s governments should have a regulatory framework that allows voluntary sharing of infrastructure among mobile operators. However, regulators should not mandate network sharing, or apply regulatory constraints or fees, as network deployment can be an important element of competitive advantage in mobile markets. Network sharing should be the result of commercial negotiation.

## 3.1.3 The need for consolidation

In a rapidly changing market, in which mobile operators are seeing both rapid growth in data traffic and growing competition from online service providers, they need sufficient scale to invest in network infrastructure and the development of innovative new services. Today, Europe’s mobile operators lack the economies of scale and scope that, for example, the two largest telecoms companies in the U.S. have access to.

Despite some consolidation in recent years, Europe’s telecoms market remains overly fragmented. Policymakers could consider conducting a comprehensive review of Europe’s antitrust framework and reduce the existing constraints on market driven restructuring. In particular, policymakers could streamline the merger review process and impose less onerous remedies on those mergers that gain approval.

A recent study by Frontier Economics for the GSMA showed that investments in new technologies are a more important driver of unit price reductions than reductions in margins brought about by greater competition. This suggests that competition authorities should place a greater emphasis on the impact of mergers on investment levels. The study identifies several ways in which consolidation would give operators greater incentives and capabilities to invest. Firstly, operators are likely to benefit from a larger customer base leading to economies of scale, which are widely recognised to be significant in mobile markets. Economies of scale are likely to improve operators’ incentive to invest, as they increase the profitability of both expanding coverage to new areas and upgrading the capacity of networks in existing areas. Merged operators can spread any fixed investment costs over a greater number of subscribers and/or higher levels of usage.

Secondly, mergers may allow the merging parties to combine assets which create investment opportunities which would not otherwise arise absent the merger. For example, by combining the spectrum holdings (or retail networks) of the two merging parties, the combined entity may be able to exploit the resulting spectrum to offer better quality or faster services than its rivals or than either party would have otherwise been able to do on its own.
3.1.4 Gauging the impact of mergers on prices

To date, Europe’s competition authorities have raised concerns about mergers that reduce the number of mobile network operators in a national market from four to three, generally on the basis that such mergers would lead to higher prices at the retail level and less scope for MVNO deals at the wholesale level.

Frontier Economics conducted a cross-country review of market performance in the EU, which covered more than a decade. This study showed that there was no evidence that unit prices in three player mobile markets are systematically higher than those in four player markets.

Competition authorities have also tended to place a considerable emphasis on the role of ‘mavericks’ or new entrants in driving mobile market performance when undertaking merger analysis. Many of these operators entered European markets at the beginning of the 3G technology cycle in the early 2000s, although there are exceptions such as the recent entry by Free in France. There was considerable optimism about the prospects for new mobile operators at that point in time. However, many have struggled to earn a sufficient return on their investments as the outlook for the mobile sector has worsened and they have faced challenges in achieving minimum efficient scale. This could affect the investment levels by these operators and their ability to compete in future.

New entrants are struggling to earn a sufficient return on capital

* Analysis by BCG based on non-weighted sample of 21 new entrants across EU having entered the market from 2003 to 2012 and respective EBITDA margins

** Estimate of minimum EBITDA margin required to cover cost of capital (CoC) based on BCG analysis

40. We note however that France was the only major EU country with three MNOs until the entry of Free.
3.1.5 Pushing towards a simplified, pan-European, telecoms market

As well as supporting in-market consolidation, policymakers should continue to pursue greater integration of Europe’s national telecoms markets, thereby enabling Europe’s mobile industry and its customers to benefit from greater economies of scale. On approving the merger of Telefónica’s O2 network with E-Plus in Germany, the European Commission emphasised the need to continue to drive towards a single European telecommunications market, making specific reference to pan-European spectrum management and a unified regulatory regime. The GSMA supports these goals, the delivery of which would underpin the fundamental reforms needed in Europe’s competition/merger review processes.

3.1.6 Pushing towards a simplified regulatory framework

At the same time, the EU should encourage the rollout of mobile infrastructure by implementing a simplified, pro-investment regulatory framework that addresses the transition to all-IP networks and the increasing availability of internet-based communications and content services. To that end, the forthcoming review of the electronic communications regulatory framework should seek to eliminate outdated and unnecessary layers of regulation, focusing on supporting investment in connectivity rather than managing prices. Policymakers could also consider the asymmetries that exist between the applicable rules and principles for investors in European digital infrastructures and those for global Internet companies.

Europe must rapidly adapt its public policies towards the whole ICT sector, recognising its globalised nature and the increasingly outdated policy distinction based on the type of market players. On a technologically neutral basis, telecom operators, internet agents and content providers should all be subject to consistent rules when providing the same services.
The days when mobile connectivity simply enabled voice calls and text messages are long gone. Today, the applications of mobile technologies and services are many and varied.
3.2 Enabling innovation

The days when mobile connectivity simply enabled voice calls and text messages are long gone. Today, the applications of mobile technologies and services are many and varied. As outlined earlier in this report, mobile connectivity is now being used for everything from remote control of irrigation systems to in-vehicle navigation to the monitoring of chronic diseases. With the support of a flexible, consistent and fair regulatory environment, which encourages innovation and differentiation, the mobile industry has the potential to deliver many more socio-economic benefits. To give both entrepreneurs and established businesses the scope they need to innovate, regulators should focus on establishing high-level requirements, rather than prescribing detailed requirements that could quickly become out of date.

3.2.1 Maintaining an open internet

To support the growing data volumes and expanding range of mobile applications, Europe needs an open internet policy framework that:

- Establishes general principles, rather than detailed, rigid provisions.
- Recognises the consumer benefits of traffic management, irrespective of the level of congestion. In order to deliver a high quality ‘best efforts’ service, mobile operators need to be able to manage their limited resources by optimising video traffic, prioritising voice and video services and using other reasonable and proportionate traffic management methods.
- Provides appropriate freedom and flexibility for the development and delivery of innovative services, alongside general internet access.

In essence, Europe’s open internet policy framework needs to encourage, rather than deter, innovation. It should enable mobile operators to provide innovative services that require enhanced levels of quality, such as telemedicine, e-education, virtual private networks (VPNs) for businesses, IP-TV and telepresence.

Data traffic is smartly and actively managed by network operators to ensure the best possible experience for all users - this is becoming even more important as increasing pressure is put on network capacity. Traffic management is needed to ensure that time-sensitive services like voice, video, on-line gaming and enterprise services work in the best way possible. It can be used, for example, to compress video to give consumers the best possible experience on a handset. Choosing the right pathway for data traffic provides better quality and faster service for all users.

If legislation is too prescriptive it will negatively affect a wide range of players in the EU digital value chain, resulting in a lower quality of service for consumers and businesses in Europe. Moreover, the Internet’s role as a platform for creativity and entrepreneurship, open to the widest range of consumers via a variety of different offers, could be severely constrained.
3.2.2 Transparency and competition are key

In fast moving markets, effective competition tends to be far more efficient than detailed regulation at meeting end users’ needs. Policymakers and regulators should rely on competition, underpinned by a high level of transparency, to deliver the connectivity consumers and business users require and expect. As there are low barriers to switching service providers, a high degree of transparency will enable customers to navigate the market and obtain the services that best meet their needs. Europe has a vibrant market for internet access, in which service providers are seeking to differentiate themselves with distinctive services, presenting consumers and business users with plenty of choice.

To maintain this vibrancy, policymakers and regulators should focus their efforts on further enhancing transparency, which drives differentiation and, as a result, service innovation and investment in networks. Furthermore, transparency builds confidence in services, benefitting both consumers and businesses who rely on quality of service, as well as building trust in Internet service providers.

To provide credible transparency, it is recommended that NRAs across the EU ensure they are using appropriate and reliable measurement tools. As network performance is constantly increasing, any measure imposed by NRAs to oversee operators’ evolving traffic management practices should be proportionate in terms of cost-efficiency and added value to the current status.

If measurement tools produce inaccurate or inconsistent results, trust in the tools will diminish and the perceived differentiation in quality will be lower, resulting in less investment. Regulators could also be mindful that a measurement from a device is only a selective snapshot. Results are partly determined by the end user’s current location and distance to the nearest antenna, as well as the capacity and usage of the cell at the specific moment. The performance of mobile internet access, in particular, reflects a wide range of dynamic factors that are outside the control of the network operator, such as the device used, or the performance of the relevant content providers’ servers.

3.2.3 Reforming copyright rules

Beyond the quality of network connectivity, several other factors will govern the future shape of the digital economy. The availability of digital content at affordable prices is also crucial to the ongoing vibrancy and health of the internet. To that end, Europe needs to overhauls its copyright laws. Today, unjustified territorial copyright restrictions, geo-blocking, price discrimination, holdback practices and windowing are all hindering the development of Europe’s digital content market. The proposed Directive on Collective Rights Management should help to address some of these market barriers.

There also needs to be limits on the current imposition in some countries of private copy levies relating to storage devices. In particular, these levies should not be extended to cloud storage services given the difficulties in enforcing the system online and across borders. Moreover, there is a need for multi-territory licensing, allowing operators to take a single European licence for content to cover multiple countries.
Another major challenge for both the digital economy and individual online service providers is reliable authentication. For example, a content provider needs to be sure that they are streaming video to a paying customer, rather than to someone who has hacked into a customer’s account. Mobile connectivity and authentication systems could provide a straightforward and secure way to reduce these risks and remove much of the friction involved in everyday transactions.

Indeed, consumers and businesses are increasingly using mobile technologies and services to transfer money, make payments and access other financial services. That means the mobile industry is increasingly on the radar of financial regulators, as well as telecoms regulators. Ideally, both sets of regulators will coordinate the development of a framework that enables mobile operators and banks to develop and support the ecosystems needed to roll out sophisticated digital commerce propositions in Europe.

In such a young industry, service providers and policymakers need to work together to understand both the potential and the risks associated with mobile commerce services. At this early stage, regulators could avoid imposing rigid rules. In the case of mobile money transfer services, for example, interoperability should not be mandated. Instead, regulators should facilitate dialogue between providers, ensuring that interoperability brings value to the customer, makes commercial sense, is set up at the right time, and regulatory risks are minimised.

More broadly, mobile technologies and services can help to securely authenticate individuals in a wide range of contexts, enabling access to buildings, vehicles and public services, as well as supporting digital transactions. Governments should consider creating a digital identity plan that taps the potential of mobile services to provide a straightforward and secure authentication mechanism. Some European governments are already using mobile technology as a key enabler to deliver digital identity services.

**To achieve wide adoption and the greatest impact on the economy, policymakers could:**

- Identify and assess existing legal, regulatory and policy challenges and barriers that affect the development of mobile identity services;
- Leverage best practice to foster wide-scale mobile identity services and transactions; and
- Engage with mobile operators and the wider ecosystem to facilitate interoperability and innovation.
The astute use of data to guide decisions and actions is a fundamental building block of a knowledge-based modern society. Yet individuals and businesses will only adopt new digital services, and Europe will only realise the associated productivity gains, if users can be confident that sensitive data will not fall into the wrong hands and their privacy is protected. Policymakers can play a pivotal role in creating a climate of trust and in reassuring EU citizens that digital services are secure and safe. At the same time, the public and private sectors need to work together to ensure that children, in particular, can take full advantage of the rich resources available via the internet without endangering their safety.

### 3.3 Building trust and confidence

The widespread take-up and use of mobile-enabled digital services in Europe depends on a robust and effective framework for the protection of personal data and privacy across the EU. Europe needs data protection rules that deliver consistent safeguards for the continent’s citizens, while promoting innovation and ensuring a level playing field for service providers. In this respect, the proposed General Data Protection Regulation is an important piece of legislation that could yield significant socio-economic benefits in Europe.

Ideally, the regulation will create a framework that is both future-proof and flexible enough to allow the development of new services, while maintaining Europe’s high standards in the protection of personal data and privacy. To that end, the regulation should take a risk-based approach that recognises the context in which data is captured and used, and the associated risks, and supports measures to address any such risks. Identified risks can be mitigated by adopting privacy-by-design principles, impact assessments, and by the use of anonymisation and pseudonymisation and other accountability measures that consider the user experience and that facilitate understanding and choice.

In a similar vein, it is not always appropriate to ask for a consumer’s explicit consent to use data in some online contexts. Explicit requests for consent should be reserved for those contexts and categories of data that present the highest risks. An over reliance on an explicit consent regime may burden users and lead to notice and choice fatigue, numbing people to the importance of making privacy decisions when it matters. As a result, an excessive consent regime may lead to less, not more privacy.

Policymakers could also take into account that profiling, which happens every day across a number of industries and services, can provide major benefits to European society. For example, profiling enables location-based customer care or customised offers tailored to an individual’s needs, simplifying the day-to-day life of European customers and citizens. With the right safeguards in place, profiling and privacy can and should co-exist comfortably. Therefore, the focus of any legislative effort should be on reducing the potential adverse effects of the decisions taken based on profiling, rather than targeting profiling itself.

To be efficient and effective, European and global companies need to be able to transfer data between countries and regions with very different privacy regimes. The steps required to make international data transfers need to be simplified to reduce the administrative burdens of EU/EEA businesses and to strengthen international trade and the international competitiveness of EU businesses, while at the same time ensuring that citizens’ personal data will benefit from the same level of protection as if they were in the EU/EEA.
3.3.2 Reducing inconsistencies and inequities

A lack of regulatory clarity and consistency can be a major brake on the development of the digital economy. Therefore, the EU institutions could reduce the inconsistencies between the General Data Protection Regulation and the ePrivacy Directive and ensure that legislation to protect individuals’ personal data is technology-neutral and applies equally and consistently to all players in the internet ecosystem.

As it stands, mobile operators and other communications service providers would be subject to a dual regulatory regime and restrictions and obligations (relating to their use of traffic and location data and separate requirements for customer consent) that do not apply to other internet players. In order to achieve a comprehensive technology neutral-framework, it is essential that legislation treat functionally equivalent services and data equally.

Moreover, it is recommended that policymakers ensure that Europe’s citizens’ personal data has the same level of protection wherever they are and regardless of the geographical location of the service provider or where data is processed.

As well as contributing to the revision of the EU’s data protection rules, the GSMA is encouraging the mobile industry to adopt its privacy principles and guidelines. Designed to help meet policymakers’ calls for businesses to adopt and demonstrate sound privacy practices, the guidelines can shape the way privacy is promoted, managed and protected across the entire mobile ecosystem, reinforcing consumer trust in mobile apps and services.

Eight of the largest mobile operators in Europe are already implementing these guidelines for their own-branded mobile apps. The GSMA is calling on other parties in the mobile ecosystem to follow the lead of these operators and consider how they can adopt the guidelines across their own services.

3.3.3 Network and information security

As the internet is now the backbone of the EU economy and society, any significant failure will have far-reaching consequences. To prevent that happening, a holistic approach to security is required with every link in the internet value chain considered and protected. To that end, the EU needs to impose minimum security requirements, specifically the adoption of risk management practices and the reporting of security breaches, on internet enablers, as well as the underlying telecoms infrastructure. Key internet enablers include payment gateways, social networks, search engines, cloud computing services and application stores.

For example, social networks, which are widely used for communications, can be a ‘backdoor’ through which malware, phishing attempts and other online scams can emerge. Social networks are also widely used by children, who need to be protected from identity and privacy breaches. Similarly, there is a case for imposing common minimum security requirements on applications stores, which could be targeted by fraudsters and criminals, looking to hijack consumers’ devices.

In the business market, companies are increasingly outsourcing their IT infrastructure into the cloud, buying infrastructure-as-a-service, platforms-as-a-service, software-as-a-service and online storage. The providers of these services, which should now be considered critical infrastructure, also need to be subject to a common threshold of security measures.

More broadly, the EU should aim to foster Europeans’ trust and confidence in the security of online services by adopting a global policy approach, where all stakeholders in the internet value chain share equivalent goals and obligations. Regardless of their geographical location or economic sector, all internet providers offering the same services to European citizens should be subject to the same security requirements. The result would be a true level playing field for all businesses, allowing them to compete on an equal footing, as well as an enhanced overall level of security.
3.3.4 Supporting and protecting children

In Europe, mobile connectivity is all-pervasive, with handset penetration now well over 100%. Most of the continent’s teenagers make extensive use of mobile devices and services to access information, communicate with friends and enjoy entertainment. At the same time, mobile devices are playing an increasingly important role in formal education and informal learning, enabling students to benefit from interactive lessons, textbooks and multimedia materials.

Policymakers should look to encourage mLearning - the use of mobile technologies and services by educational institutions and students both inside and outside the classroom. As they develop an mLearning policy, governments should seek to involve employers, community leaders, cultural organisations, youth groups, hospitals and others that can provide authentic sources of information and support.

However, both the public and private sectors need to be mindful that mobile devices, like any tool, can be used in ways that cause harm, so children require guidance and a safe, secure environment to benefit from mobile technologies. The mobile industry has taken a number of steps to protect children online, developing self-regulatory initiatives addressing the need for parental controls, education and awareness. The GSMA takes part in international initiatives related to child online protection, including the ITU’s Child Online Protection programme, and actively engages with governments and regulators looking to address this issue.
For the full report on Mobile Economy: Europe 2014 please visit the GSMA website at
www.gsmamobileeconomy.com/europe

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