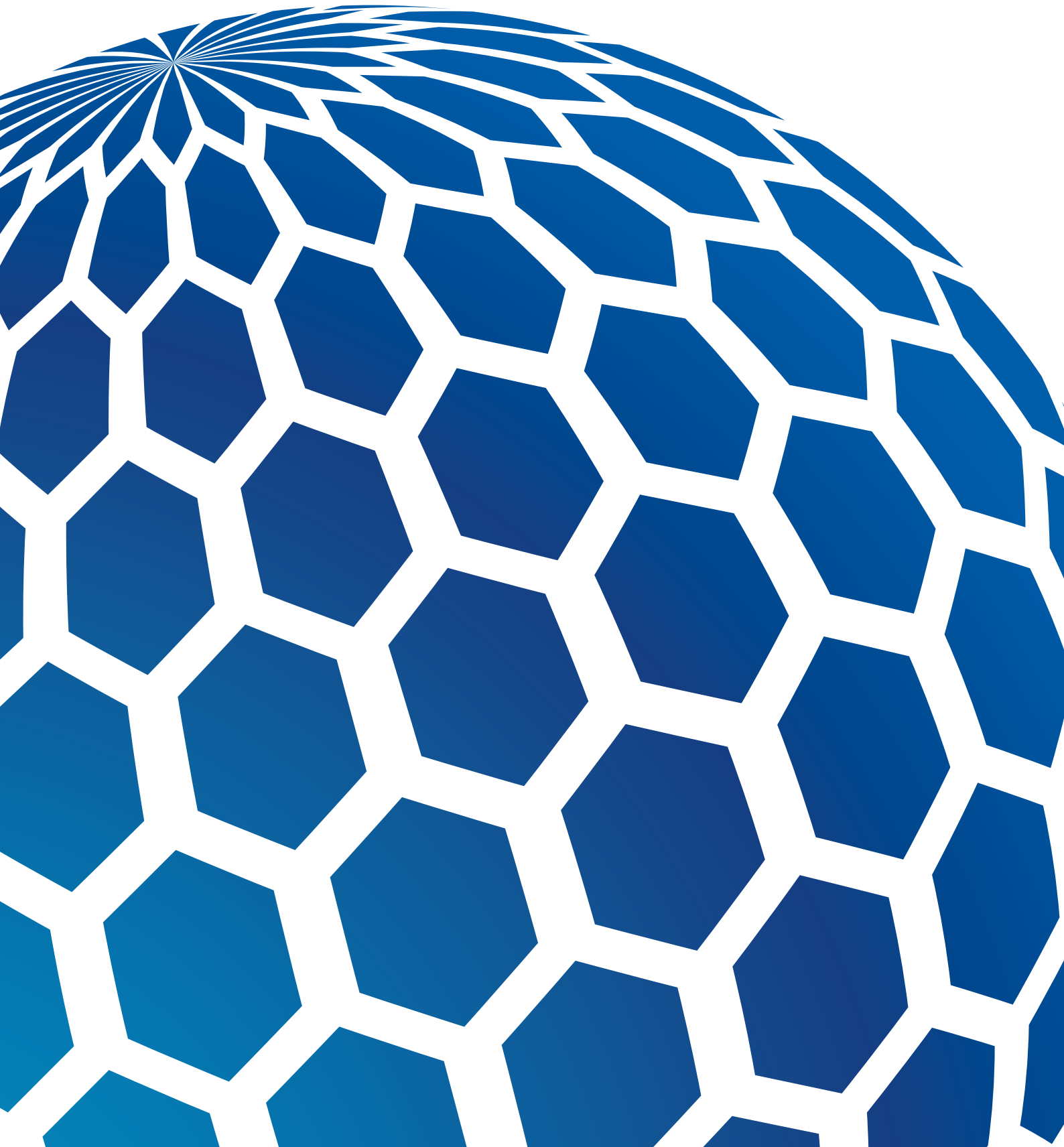# Mobile Economy
Europe 2013

GSMA™

The **GSMA** represents the interests of mobile operators worldwide. Spanning more than 220 countries, the **GSMA** unites nearly 800 of the world's mobile operators with more than 230 companies in the broader mobile ecosystem , including handset makers, software companies, equipment providers and Internet companies, as well as organisations in industry sectors such as financial services, healthcare, media, transport and utilities. The **GSMA** also produces industry-leading events such as the Mobile World Congress and Mobile Asia Expo.

For more information,
please visit the **GSMA** corporate website
at www.gsma.com

or **MOBILE WORLD LIVE,** the online portal for the mobile communications industry,
at www.mobileworldlive.com

GSMA Intelligence is the definitive source of mobile operator data, analysis and forecasts, delivering the most accurate and complete set of industry metrics available. Relied on by a customer base of over 800 of the world's leading mobile operators, device vendors, equipment manufacturers and financial and consultancy firms, the data set is the most scrutinised in the industry. With over 13 million individual data points (updated daily), the service provides coverage of the performance of all 1,140 operators and 1,153 MVNOs across 3,505 networks, 65 groups and 236 countries worldwide.

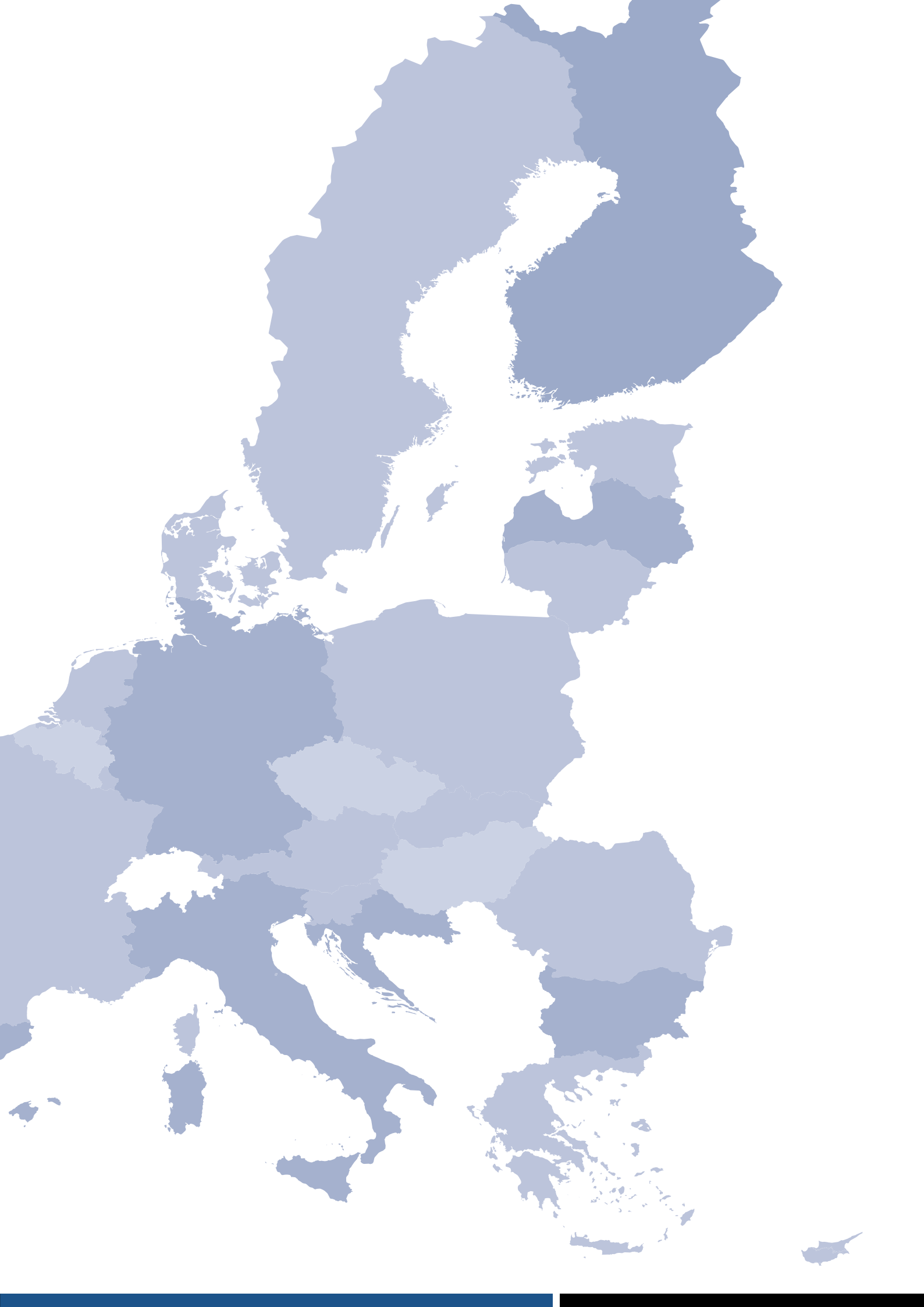For more information,
www.gsmaintellience.com

Contact
info@gsmaintelligence.com

The Boston Consulting Group (BCG) is a global management consulting firm and the world's leading advisor on business strategy. We partner with clients from the private, public, and not-for-profit sectors in all regions to identify their highest-value opportunities, address their most critical challenges, and transform their enterprises. Our customized approach combines deep insight into the dynamics of companies and markets with close collaboration at all levels of the client organization. This ensures that our clients achieve sustainable competitive advantage, build more capable organizations, and secure lasting results. Founded in 1963, BCG is a private company with 78 offices in 43 countries.

CONTENTS

Executive Summary

The European mobile industry is one of the most successful in the world and has a strong track record in innovation and developing new services. Competition and price cuts have increased the affordability of mobile services for consumers, leading to penetration rates in terms of both unique subscribers[1] and smartphones that are amongst the highest in the world. Mobile plays a pivotal role in the European economy, both as an industry in its own right and as an enabling platform for an increasing range of adjacent industries and services.

However, since the GSMA's last review[2] of the industry, market conditions have continued to worsen across the European mobile market with market saturation and more intense competition exacerbating pressure on revenues and margins. This reflects several factors including intense price competition between operators; regulatory action; the impact of new online messaging applications; and a weak economic backdrop. The strong growth in mobile data volumes and the new revenue opportunities around higher data speeds, new forms of content and advanced communication services have proved insufficient to offset the declines in more traditional revenues. Competitive pressures in Europe remain intense and have driven significant price declines for voice and data services, with both voice and mobile broadband pricing in Europe now materially cheaper than the US. These factors have in turn pressured industry profitability, with EBITDA margins down by seven percentage points over the last four years.

1.   See Appendix 2 for definitions
2.   http://www.gsma.com/gsmaeurope/european-mobile-observatory-2011

The financial pressures on European operators, (as well as delays in allocating the Digital Dividend spectrum in the 800MHz band) have contributed to falling investment levels in European mobile, with capex declining in recent years. For example, the higher capex levels in the US (and faster LTE deployments) means that US data speeds are now on average faster than those in Europe, and the gap is expected to grow. Despite seeing the world's first LTE deployments, at the end of 2012 LTE accounted for well under 1% of total devices in Europe, compared to a figure of 11% in the US and 28% in South Korea.

The European mobile industry is now beginning to lag its peers in other developed regions in a number of key areas. Mobile networks have both direct and indirect effects on the productivity and competitiveness of economies, with the result that both consumers and the economic outlook in Europe will continue to suffer unless steps are taken to address some of the challenges facing the industry.

EFFECTIVE PRICE PER MINUTE (€)
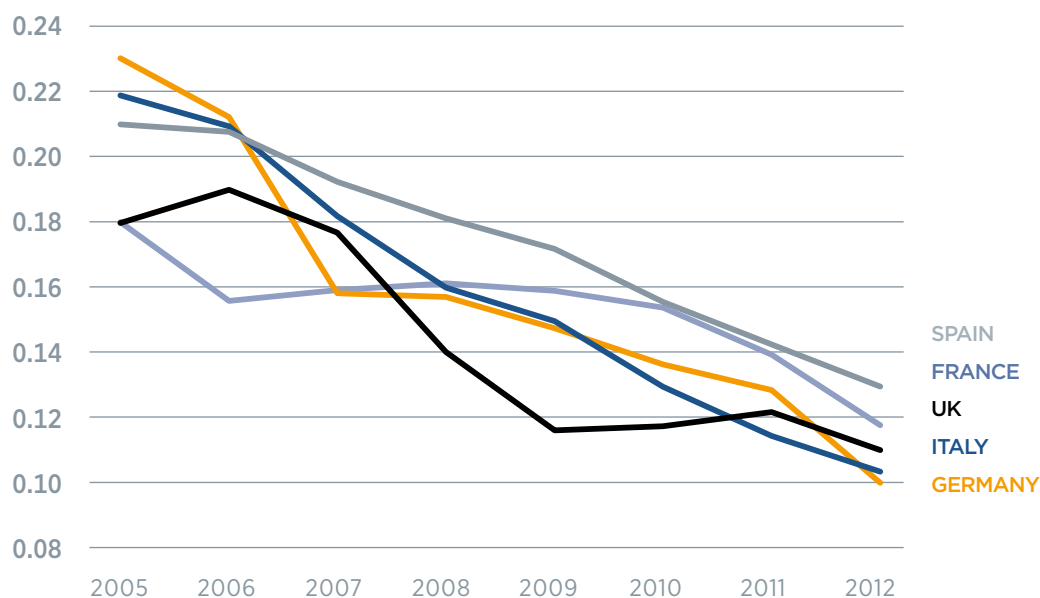
Source: GSMA intelligence

Despite the current challenges, the mobile industry remains a key pillar of the European economy. This is evident both through the direct impact of the mobile industry ecosystem, and through the indirect role that mobile technologies are playing in adjacent industry sectors. The growth and the benefits of the mobile industry to date have been phenomenal. The mobile ecosystem (both directly and indirectly) generated around 2.2% of European GDP in 2012, while also directly contributing 390 thousand jobs to the European economy (see the chapter "Connected Europe" for more details). The industry contributed €53B to public funding last year, while receipts from spectrum auctions alone in the last two years have totalled over €17B. There are also a range of tangible social benefits across a range of other parameters, including in the areas of environment, health, and education.

UNIQUE SUBSCRIBERS & ACTIVE SIM PENETRATION

Legend:
- **UNIQUE SUBSCRIBER PENETRATION** (blue)
- **ACTIVE SIM PENETRATION** (orange)
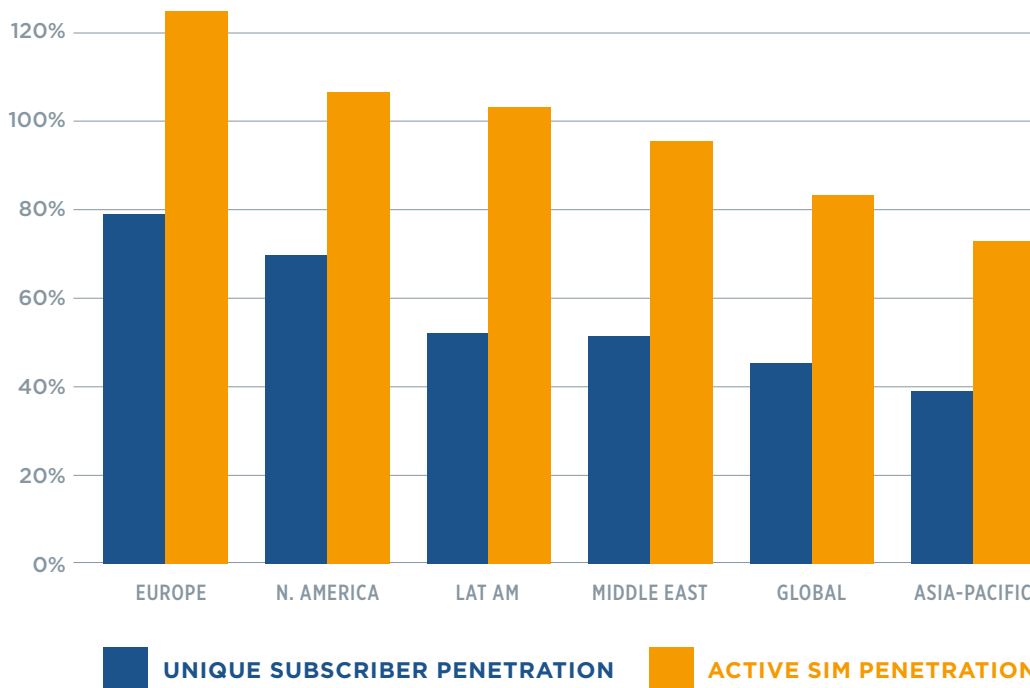
Source: GSMA Intelligence

🛒	mCommerce	🚗	mAutomotive
📖	mEducation	🏢	Smart Cities
➕	mHealth	👤	mIdentity

The mobile industry has the potential to deliver even greater benefits and play a leading role in helping the EU to meet the growth, jobs, sustainability and innovation objectives set out in the EU 2020 strategy. The mobile industry in Europe has evolved beyond the provision of basic voice and data services to offer high speed broadband internet access and data connectivity. We are now seeing a new "third" wave of connectivity, beyond tablets and laptops; to connected cars and buildings (amongst others); with the prospect of connecting almost anything and anyone (what the GSMA refer to as the "Connected Life").

Unleashing the potential of the third wave becomes even more critical at a time when Europe is struggling with high unemployment and low growth. Machina estimate the total Connected Life market revenue opportunity at over €234B in Europe by 2020[3], which includes service improvements and innovative new services,

as well as the scope to make material cost savings. mHealth services alone have potential to deliver cost savings in healthcare delivery of up to €99B, whilst adding €93B to European GDP by 2017, as well as addressing issues around quality of life and mortality rates for millions of people.

There is also the scope to unleash much greater socio economic impact via mobile technology in the coming years, if issues around spectrum availability and delays in accessing to the Digital Dividend spectrum are addressed. This spectrum could generate up to €119B of incremental GDP over the period to 2020, producing €55B of tax revenues and supporting up to 156,000 new jobs across the region. However, these benefits will be substantially delayed if a number of countries delay releasing this spectrum until 2017, which could reduce the GDP benefit by €16B and the new jobs by 67k.

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3. http://connectedlife.gsma.com/the-connected-life-a-usd4-5-trillion-global-impact-in-2020/

EU institutions and the mobile industry have a common agenda: namely building a Connected Europe that can help meet the region's growth, employment, innovation and sustainability challenges. The EU can accelerate the development of a Connected Europe and maximise the economic and social contribution of the mobile industry through a policy and regulatory approach that:

1. Encourages investment in mobile connectivity;

2. Enables innovation in new content and services;

3. Builds consumer confidence in mobile services and applications.

There are a number of critical areas of regulatory and public policy that need to be addressed in order to create the right environment to attract and nurture investment in mobile connectivity. Investment in connectivity is dependent on the timely allocation of sufficient spectrum to allow operators to meet the expected growth in data traffic, both in the short and medium term. The EU has indicated that a total of 1200MHz of spectrum should be identified to meet this anticipated future demand, but with only an average of around 600MHz released at present, Europe is falling behind. As well as addressing issues around spectrum availability and harmonisation, Europe needs to refocus its policies towards facilitating investment and innovation rather than the management of end user prices. European policy should allow the mobile industry to realise the economies of scale offered by a single telecoms market, in order to reduce operating costs and so help operators fund investment in network deployments and new

services. Other issues to be addressed to encourage investment include those around improving the approval process for new base stations (which result in lengthy delays in network deployments), as well as eliminating sector specific taxes that can hinder investment by the mobile industry.

There are a number of policy asks in order to enable the mobile ecosystem to deliver ongoing innovation around new content and services. These include the need to allow operators to engage in service- and customer-orientated network management: as mobile operators already have to prioritise both between types of traffic and types of user in order to ensure the levels of service that consumers expect. Looking forward, in order to be able to maintain these service levels mobile operators need to be free to innovate and create pricing models that are better aligned with the services that the consumer is both wanting to use and willing to pay for, as in any business.

Appropriate and flexible regulation is required in a number of new service areas to allow these services to flourish. In the case of mIdentity, and as trust and reputation become more important assets within the economy, policy makers need to work together with the industry to encourage interoperability and innovation, while ensuring consistency between the different legal and regulatory instruments that affect digital identity management. In the developing field of mHealth there is no need for new medical device legislation, but there is a need to clarify existing regulation as it applies to mobile health solutions. In the case of mPayments, market forces will converge over time on the most compelling solutions, so that a regulatory push for standardisation at this stage of their development could stifle innovation.

Finally, there a number of key issues under the topic of building consumer confidence. Consumers should be provided with meaningful information by operators and service providers as the best way to assist consumers in making choices, while consistent rules should apply for functionally equivalent services. On the topic of data protection, policy makers need to ensure that consumers enjoy consistent privacy experiences across the mobile ecosystem, irrespective of the technologies, infrastructure, business models and data flows involved. The barriers to compromising mobile technologies, particularly UMTS and LTE, are already extremely high. The Commission should foster enhanced cooperation at the international level to improve the security of new networks, while all the actors in the supply chain should be subject to the same obligations to adopt risk management procedures and

to report security breaches (at present only e-communications service provides are subject to these).

Private investment, enterprise and innovation is building a Connected Europe, but the right policy framework can support this activity and help harness the benefits created by third wave of mobile and to realise the full potential of connected living. Maximising a Connected Europe's contribution to EU2020 therefore depends on a number of key partnerships. These include the partnership between the mobile industry itself and adjacent industries that use mobile as a platform to offer content and services; and between the mobile industry and government (at both a national and European level), to ensure that a supportive policy approach helps address the key challenges facing the industry. Without continued investment and growth in mobile networks, facilitated by a supportive regulatory environment, the full range of socioeconomic benefits highlighted above will not be fully realised.

As European Commission Vice President Neelie Kroes stated "there is tough global competition. Other parts of the world are racing ahead, and giving themselves the wireless advantage. The right policy decisions matter to our future. Mobile traffic is predicted to grow at over 60% per year, and our networks are straining. Not providing that capacity means higher prices and less choice for users, less revenue opportunities for businesses, and a European economy that stutters on the world stage"[4].

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4. Neelie Kroes; February 20th 2013

EU institutions and the mobile industry have a common agenda: namely building a Connected Europe that can help meet the region's growth, employment, innovation and sustainability challenges.
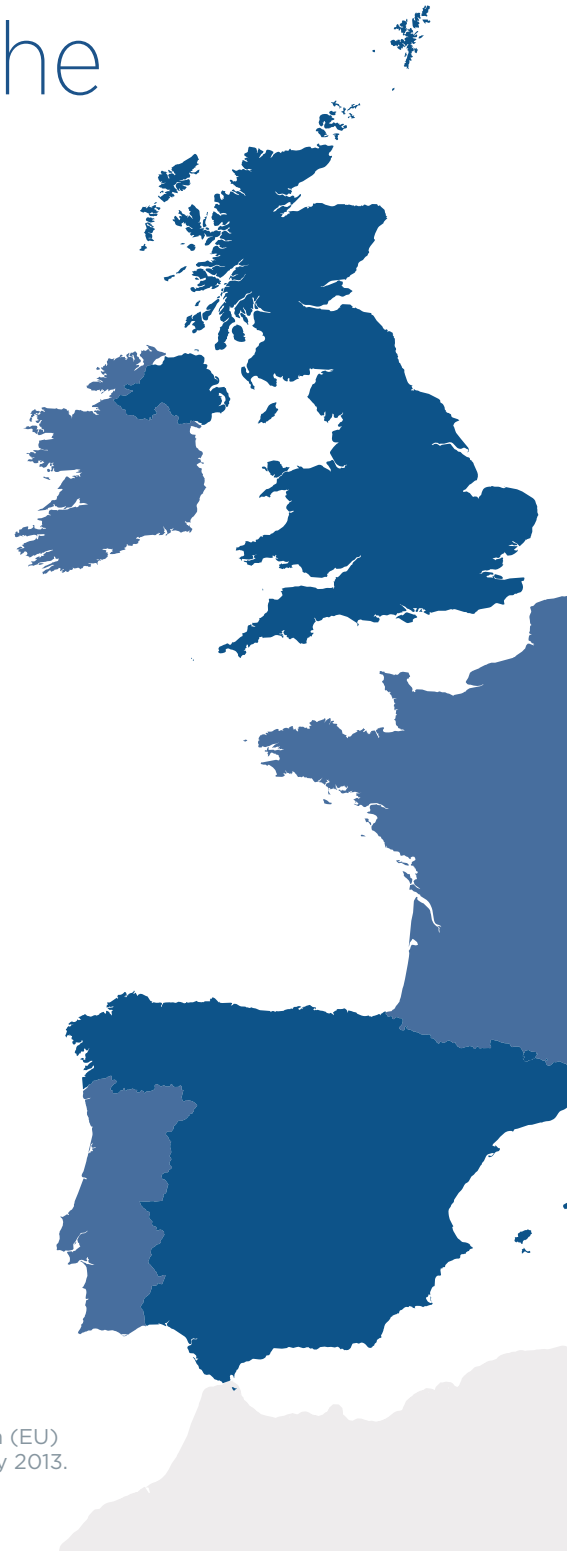
This report focuses on markets within 27* Member States of the European Union (EU) and does not focus explicitly on Croatia which joined the European Union in July 2013.
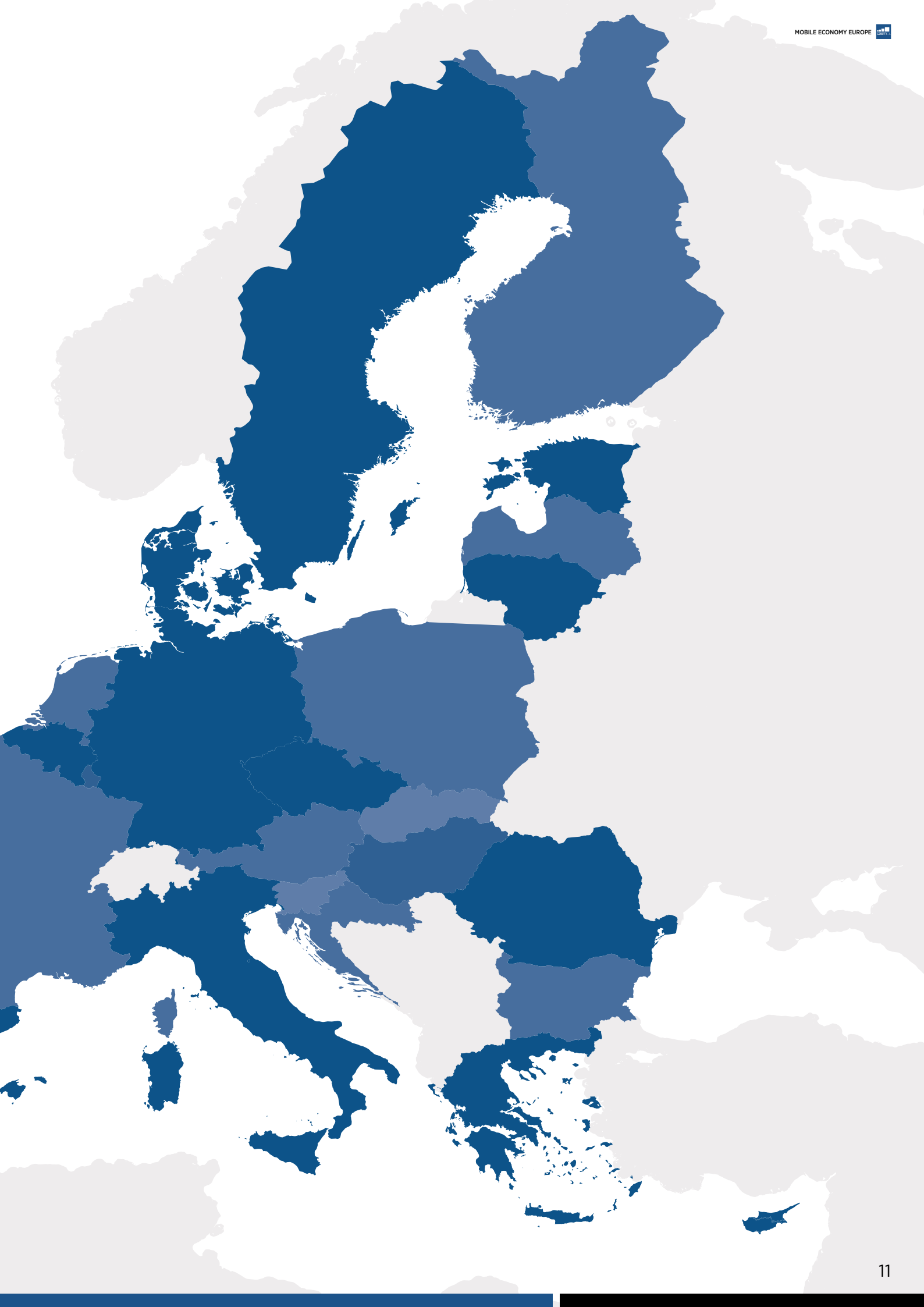
INDUSTRY AT A CROSSROADS

Unique Subscribers

403M SUBSCRIBERS IN 2013 (2013)

417M SUBSCRIBERS IN 2017 (2017)

79% SUBSCRIBER PENETRATION

SUBSCRIBERS   CONNECTIONS

The phenomenon of multiple-SIM ownership continues to distort penetration rates

Unique Active SIM Penetration

EUROPE **125%**

GLOBAL **82%**

With multiple SIM ownership common in Europe as in other regions, the number of real subscribers is significantly lower than the number of SIM connections. Multi SIM ownership in Europe and other developed markets tends to reflect the trend to multi-device ownership.

Smartphone Penetration

Smartphone penetration in Europe is already amongst the highest in the world.

49% AVERAGE SMARTPHONE PENETRATION 2012

4G
2G
3G
2012 SIM CONNECTION BY TECHNOLOGY

MBB Connections

284M — 2012
573M — 2017

15% CAGR
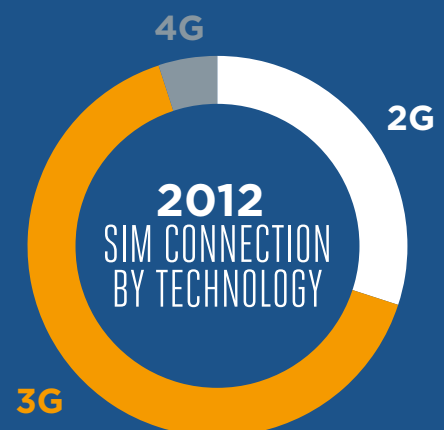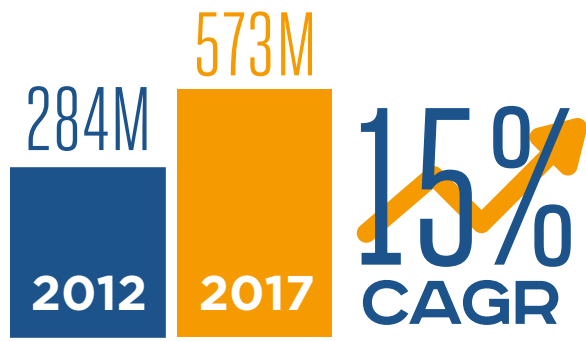
Mobile Broadband Penetration

Europe is lagging.

59% EU
78% DEVELOPED MARKETS
82% US
108% SOUTH KOREA
112% JAPAN
128% SWEDEN
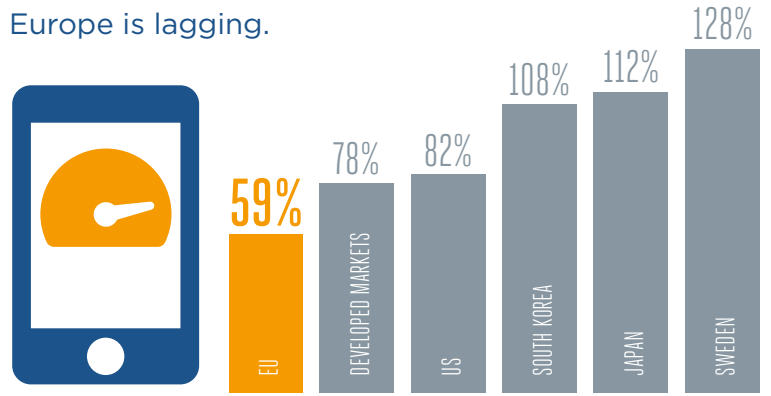
Mobile Data Volume

Substantial increase for Western Europe

54%

2012
181,397 TB PER MONTH

2017
1,384,072 TB PER MONTH
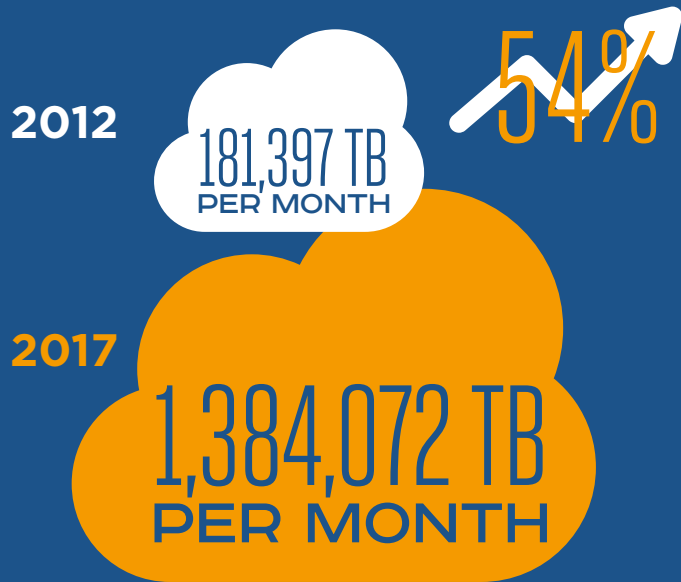
M2M Connections

52M 2012

295M 2017

50% CAGR

Industry revenue trends

-2% CAGR 2012-2017

UK
Spain
France
Italy
Germany
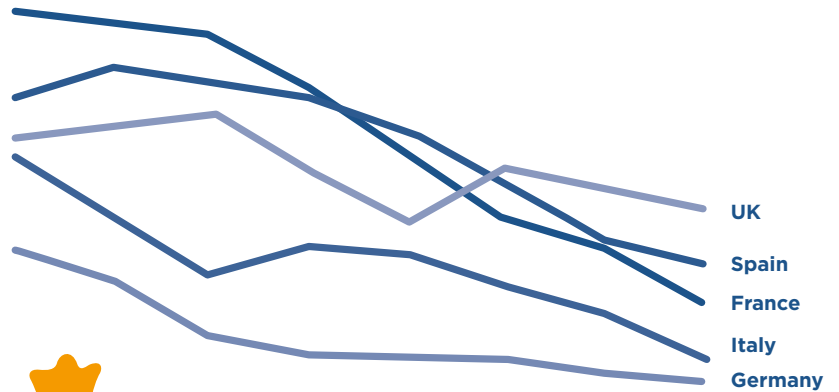
REV/MIN TRENDS
€ PER MINUTE

Areas of concern include: Competition, Economic Recession
Regulation Overload, Fragmentation

01.

European Mobile: an industry at the crossroads

The European mobile industry is one of the most successful in the world and has a strong track record in innovation and developing new services. Competition and price cuts have increased the affordability of mobile services for consumers, leading to penetration rates of both unique subscribers and smartphones that are amongst the highest in the world. Mobile plays a pivotal role in the European economy, both as an industry in its own right and as an enabling platform for an increasing range of adjacent industries and services.

Europe is by some way the most highly penetrated region in the world for mobile connections, and remains ahead of other advanced economies in areas such as 3G and smartphone penetration. Four out of five individuals have subscribed to mobile services in Europe, while many countries have reached the unique subscriber penetration ceiling (90%) above which mobile growth tends to stall. The widespread adoption of more affordable data services and attractively priced offers in most markets mean that mobile broadband is being positioned as a commercial substitute to fixed line, especially in those markets where fixed broadband penetration is relatively low or where fixed networks have not been fully upgraded to offer higher data speeds.

However, since our last review[5] of the industry, market conditions have continued to worsen across the European mobile market with market saturation and more intense competition exacerbating pressure on revenues and margins. This reflects several factors including intense price competition between operators; regulatory action; the impact of new online messaging applications; and a weak economic backdrop. The strong growth in mobile data volumes and the new revenue opportunities around higher data speeds, new forms of content and advanced communication services have proved insufficient to offset the declines in traditional revenues. Competitive pressures in Europe remain intense and have driven significant price declines for both voice and data services, with both voice and mobile broadband pricing in Europe now materially cheaper than the US. These factors have in turn pressured industry profitability, with EBITDA margins down by seven percentage points over the last four years.

The financial pressures on European operators, (as well as delays in allocating the Digital Dividend spectrum in the 800MHz band) have contributed to falling investment levels in European mobile, with capex declining in recent years. This is in sharp contrast to the position in the US, where operators have significantly increased investment levels since 2008. The higher capex levels in the US (and faster LTE deployments) means that US data speeds are now on average faster than those in Europe, and the gap is expected to grow. Despite seeing the world's first LTE deployments, at the end of 2012 LTE accounted for well under 1% of total devices in Europe, compared to a figure of 11% in the US and 28% in South Korea..

The European mobile industry is now beginning to lag its peers in other developed regions in a number of key areas. Mobile networks have both direct and indirect effects on the productivity and competitiveness of economies, with the result that both consumers and the economic outlook in Europe will continue to suffer unless steps are taken to address some of the challenges facing the industry.

As the Vice President of the European Commission Neelie Kroes stated:

"there is tough global competition. Other parts of the world are racing ahead, and giving themselves the wireless advantage. The right policy decisions matter to our future. Mobile traffic is predicted to grow at over 60% per year, and our networks are straining. Not providing that capacity means higher prices and less choice for users, less revenue opportunities for businesses, and a European economy that stutters on the world stage"[6].

5. http://www.gsma.com/gsmaeurope/european-mobile-observatory-2011
6. Neelie Kroes; February 20th 2013

1.1

European mobile today: a highly penetrated market

At the end of 2012, Europe had close to 400M unique mobile subscribers (i.e. people) actively using 629 million mobile connections (i.e. SIM cards). This brings unique subscriber penetration in Europe to 79% compared to the 125% when based on connections. The phenomenon of multiple-SIM ownership continues to distort penetration rates based on connections as European consumers use 1.6 SIM cards each on average. Unlike connection penetration, subscriber penetration cannot exceed 100% and reflects more realistic market maturity or saturation levels. This compares to the global average subscriber penetration figure of 45%, 71% in the US and a figure in Japan of 89%.

UNIQUE SUBSCRIBERS & ACTIVE SIM PENETRATION
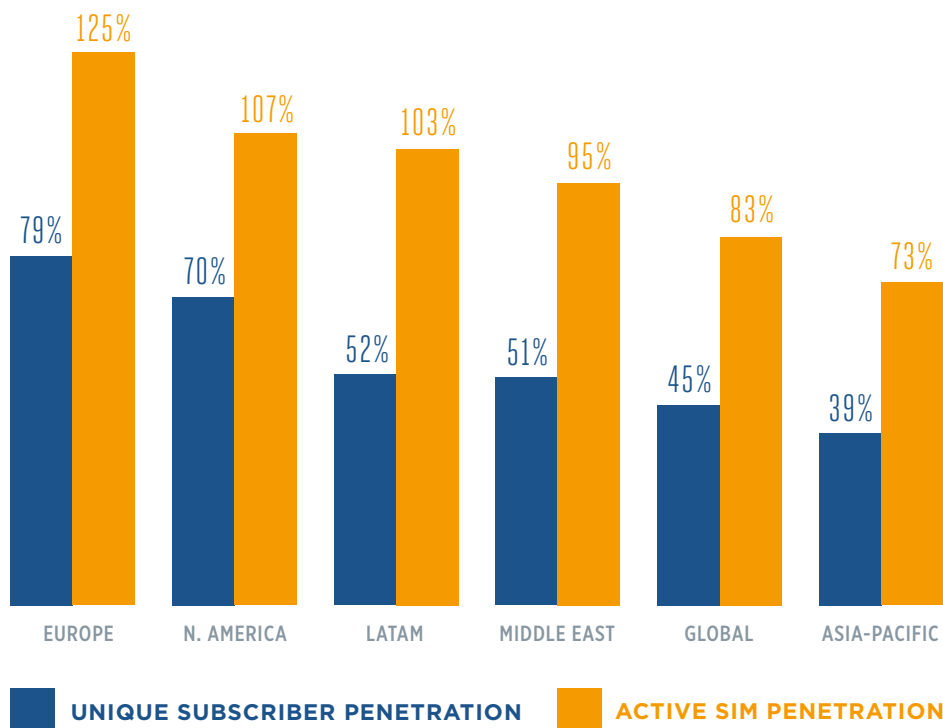
Source: GSMA Intelligence

The total unique subscriber base in Europe is expected to reach 417 million by 2017, with close to 700 million active connections by the same date. The rate of growth going forward is likely to be somewhat slower than in recent years, as the high absolute penetration rates means that the market is becoming increasingly saturated. A number of countries in Europe have reached the subscriber penetration ceiling of 90% above which mobile growth tends to stall. Globally, 45% of the global population has subscribed to mobile services in 2012 which shows that there is still room for growth outside of Europe which, with 79% subscriber penetration, is on track to reach the subscriber penetration ceiling.

EUROPE UNIQUE SUBSCRIBERS (M)

CAGR 2012-2017

1.4%

417 MILLION BY 2017

2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
377	384	389	393	398	403	407	411	415	417
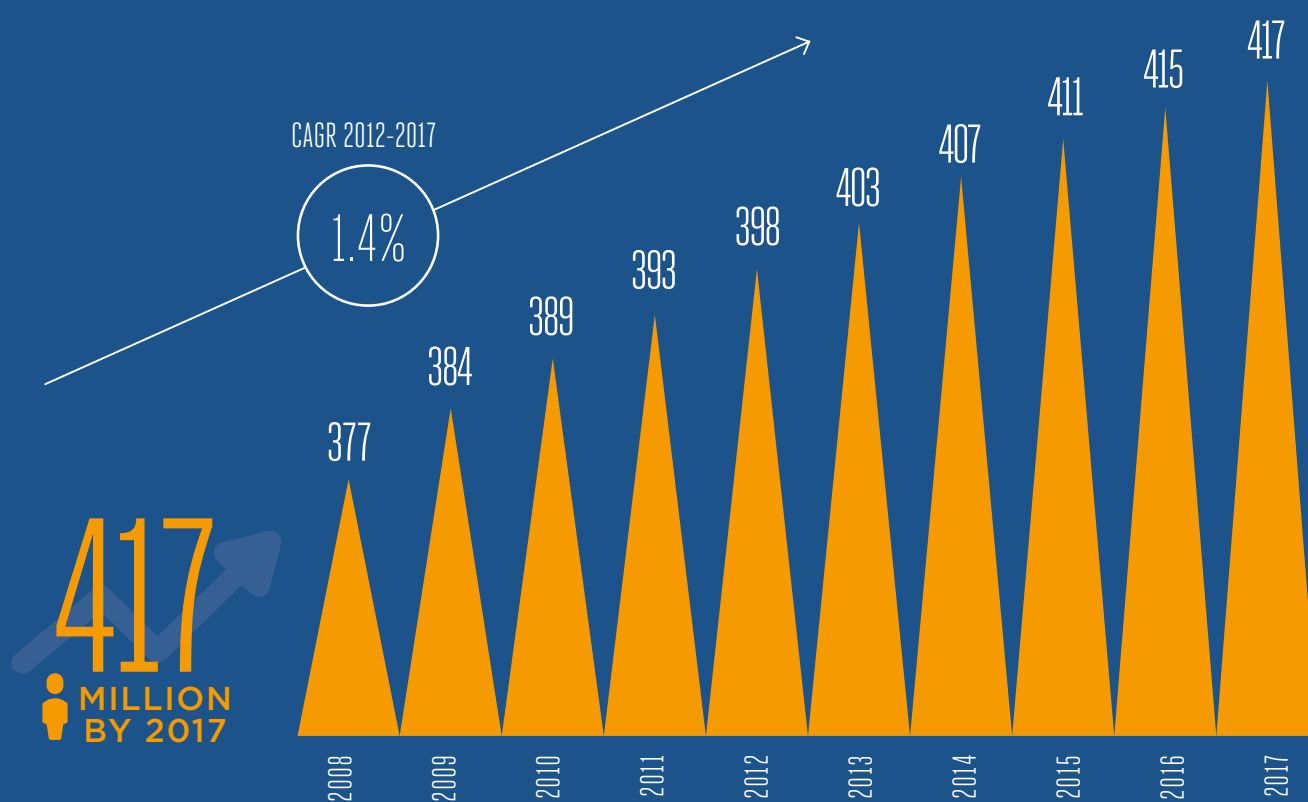
Source: GSMA Intelligence

With multiple SIM ownership common in Europe as in other regions, the number of real subscribers is significantly lower than the number of SIM connections. Multi SIM ownership in Europe and other developed markets tends to reflect the trend to multi-device ownership. Many subscribers have separate private and business mobiles, while the trend towards tariff optimisation is also a factor, particularly in the more prepaid orientated markets. There is also the increasing ownership of a range of connected devices, including USB dongles and connected tablets and laptops. Finally, the growth of SIM cards used for connecting machines (machine-to-machine, or "M2M"), although a trend that is still in its relative infancy, is also beginning to impact SIM penetration rates (though to date there is some difference between operators with some including M2M data in the headline connection numbers, and others choosing to report the number separately).

ACTIVE SIM PENETRATION RATE

EUROPEAN UNION
JAPAN

SOUTH KOREA

NORTHERN AMERICA
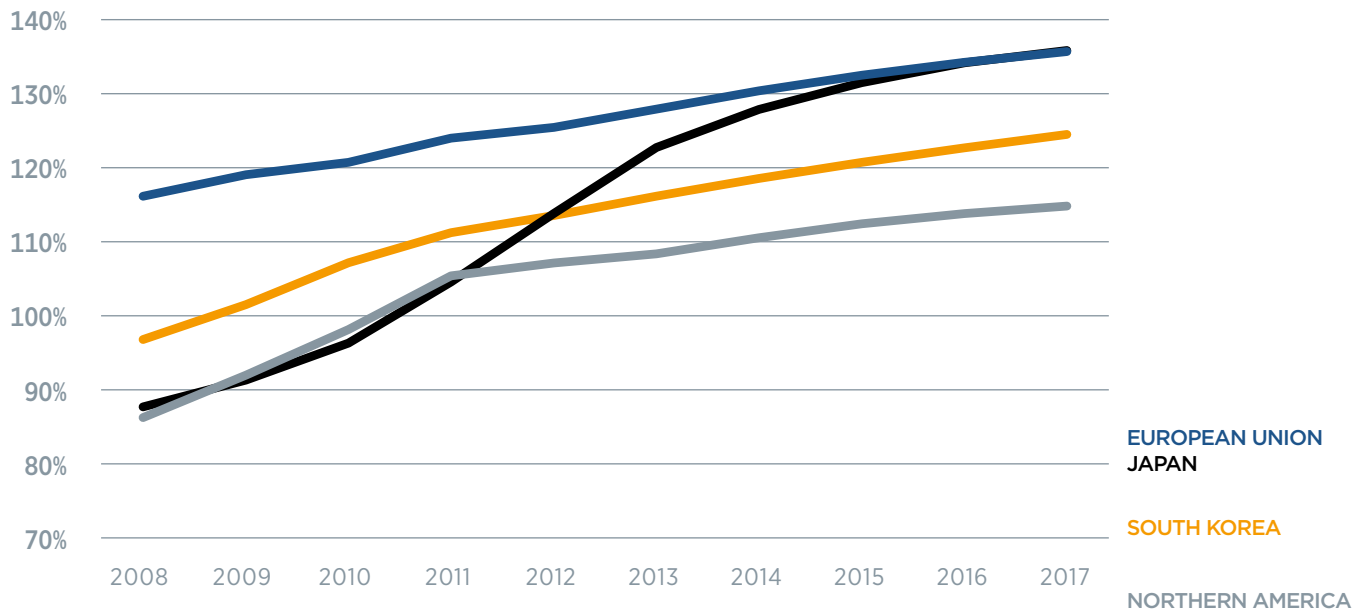
Source: GSMA Intelligence

There are still significant variations in penetration rates across Europe, although some of the historical differences in penetration across the region have narrowed sharply over recent years. In fact, it is difficult to make generalisations about penetration based on either geography or income levels. Estonia is now one of the highest SIM penetrated market in Europe, whilst the likes of France and Spain are amongst the lowest penetrated. The total number of SIM connections has grown in nearly every market in Europe over recent years, although Spain is the one market to see a clear decline in the number of active SIM cards. This appears to be driven by the economic environment and high levels of unemployment, as well as significant competition and reductions in handset subsidies by several operators. Other factors in Spain included moves by some of the operators to switch their reporting styles to active connections rather than registered connections, therefore eliminating the effect of inactive SIM cards.

ACTIVE SIM PENETRATION BY COUNTRY

2012

Slovenia 102.4%
France 105.5%
Belgium 106.4%
Hungary 107.9%
Netherlands 109.8%
Ireland 110.4%
Spain 112.7%
Slovakia 113.6%
Latvia 114.8%
Romania 1014.7%
United Kingdom 116.8%
Cyprus 121.8%
Czech Republic 123.1%
Europe 124.9%
Germany 132.0%
Greece 133.8%
Portugal 134.8%
Lithuania 137.4%
Luxembourg 137.7%
Malta 138.3%
Austria 138.4%
Bulgaria 140.6%
Poland 141.0%
Italy 141.9%
Sweden 143.7%
Estonia 144.8%
Denmark 148.0%
Finland 180.3%

Source: GSMA Intelligence

Operators across Europe have generally encouraged users to move from prepaid to contract tariffs, both as a response to competitive pressures and as a method of boosting customer ARPUs (contract customers typically spend more than those on prepaid plans, sometimes as much as six times more). The growth in contract tariffs is also tied to the growing popularity of smartphones, as the vast majority of these devices are held on contract tariffs. While contracts have advantages for the operators, there are also clear benefits for consumers. These include the advantage of offsetting the cost of the handset device itself though subsidies, as well as the typical inclusion of set amounts of voice and messaging into the contract bundle. This results in per minute or per message pricing that is substantially cheaper than the rates available to prepaid customers.

More recently, the increasing prevalence of SIM only contracts (which offer lower tariffs for consumers as well as better economics for operators through the absence of handset subsidies) is further supporting the trend towards contract tariffs. In certain markets there have also been regulatory factors at play, with SIM registration programmes in several markets in an effort to combat fraud. One example of this is Greece, where the proportion of prepaid subscribers fell by 8 percentage points between 2009 and 2011 following the introduction of such a programme.

Generally the introduction of new prepaid offers is falling in the region. Free Mobile, which launched last year in France in 2012, is 100% contract, and the brands launched in the country in 2012 by Orange, 'Origami' and 'Sosh', are both contract-based. Vodafone's 'Red' contract tariff, which launched late 2012, had 4.1 million customers across 14 markets as of May 2013 and is helping to drive contract uptake across the group's European footprint.

As a result of these factors, the proportion of prepaid connections in Europe overall has fallen slightly in the last few years, standing at an average of 50% today against 52% in 2011. The proportion of prepaid connections has now fallen by over 13 percentage points over the last 10 years, a trend that is likely to continue going forward for the reasons described above.

There does remain significant variation at the country level in terms of prepaid mix, though it is difficult to generalise on the factors behind this. For example, Italy has one of the highest levels of prepaid connections in Europe, reflecting the lack of handset subsidies in the market and a general consumer preference for attractive offers without material contract commitments, in a market that has seen significant price competition in recent years.

CONTRACT / PREPAID MIX
(%) 2012

Country	Contract	Prepaid
MALTA	18.8%	81.2%
ITALY	20.5%	79.5%
PORTUGAL	27.3%	72.7%
ROMANIA	30.4%	69.6%
GREECE	30.8%	69.2%
CYPRUS	39.4%	60.6%
IRELAND	41.4%	58.6%
LITHUANIA	44.0%	56.0%
POLAND	45.8%	54.3%
GERMANY	46.8%	53.2%
SLOVAKIA	48.8%	51.2%
BELGIUM	49.4%	50.6%
HUNGARY	52.0%	48.0%
UK	53.8%	46.2%
CZECH REPUBLIC	58.4%	41.6%
LATVIA	58.8%	41.2%
BULGARIA	61.5%	38.5%
NETHERLANDS	62.4%	37.6%
ESTONIA	63.4%	36.6%
LUXEMBOURG	64.9%	35.1%
SWEDEN	65.5%	34.5%
SPAIN	66.7%	33.3%
SLOVENIA	69.8%	30.3%
AUSTRIA	73.4%	26.6%
FRANCE	73.8%	26.2%
DENMARK	84.4%	15.6%
FINLAND	90.0%	10.1%

CONTRACT   PREPAID

1.2

Devices and access: high levels of 3G and smartphone adoption

Network coverage in Europe for 2G is effectively ubiquitous, while more than 90% of the population live within 3G coverage areas. There are more active 3G SIMs per capita in Europe on average than any other developed region in the world, with a number of countries showing 3G SIM penetration rates in excess of 100%. 3G SIM penetration for Europe at the end of 2012 stood at 68%, up from 51% in 2011 and a rate of only 36% in 2009.

Further improving network coverage and bringing higher speed mobile services to rural areas and those with lower population densities is a key factor in meeting elements of the EU 2020 agenda and ensuring that residents in such areas are not left behind. For example, Vodafone UK is deploying their "open-femto" system in rural locations in order to address the issue of "not-spots". These devices effectively project a 3G (and later 4G) signal across remote areas that currently lack mobile coverage. Combined with appropriate spectrum allocations, these projects can help to address the digital divide currently experienced in some rural areas.

Europe has seen a significant technology shift in recent years, with the proportion of 3G handsets increasing sharply. From around a fifth of total handsets in 2008, 3G devices now account for over half of all devices in Europe, a figure that we expect to peak at almost 61% in 2015. The proportion of 2G-only devices should continue to decline, to a little over 20% by 2017. LTE devices today represent only a small proportion of devices, at just 0.3% at the end of 2012. However, as LTE network coverage slowly improves and the price of 4G devices declines further, LTE should account for 20% of total devices by 2017.

EUROPEAN SIM CONNECTIONS BY TECHNOLOGY
(M)

Year	4G	3G	2G
2008	-	135	497
2009	0	187	460
2010	0	235	418
2011	0	291	382
2012	2	341	337
2013	9	385	301
2014	25	420	266
2015	51	441	233
2016	94	442	201
2017	152	421	173

CAGR 2012-2017: 139%, 4%, -13%

4G **3G** **2G**
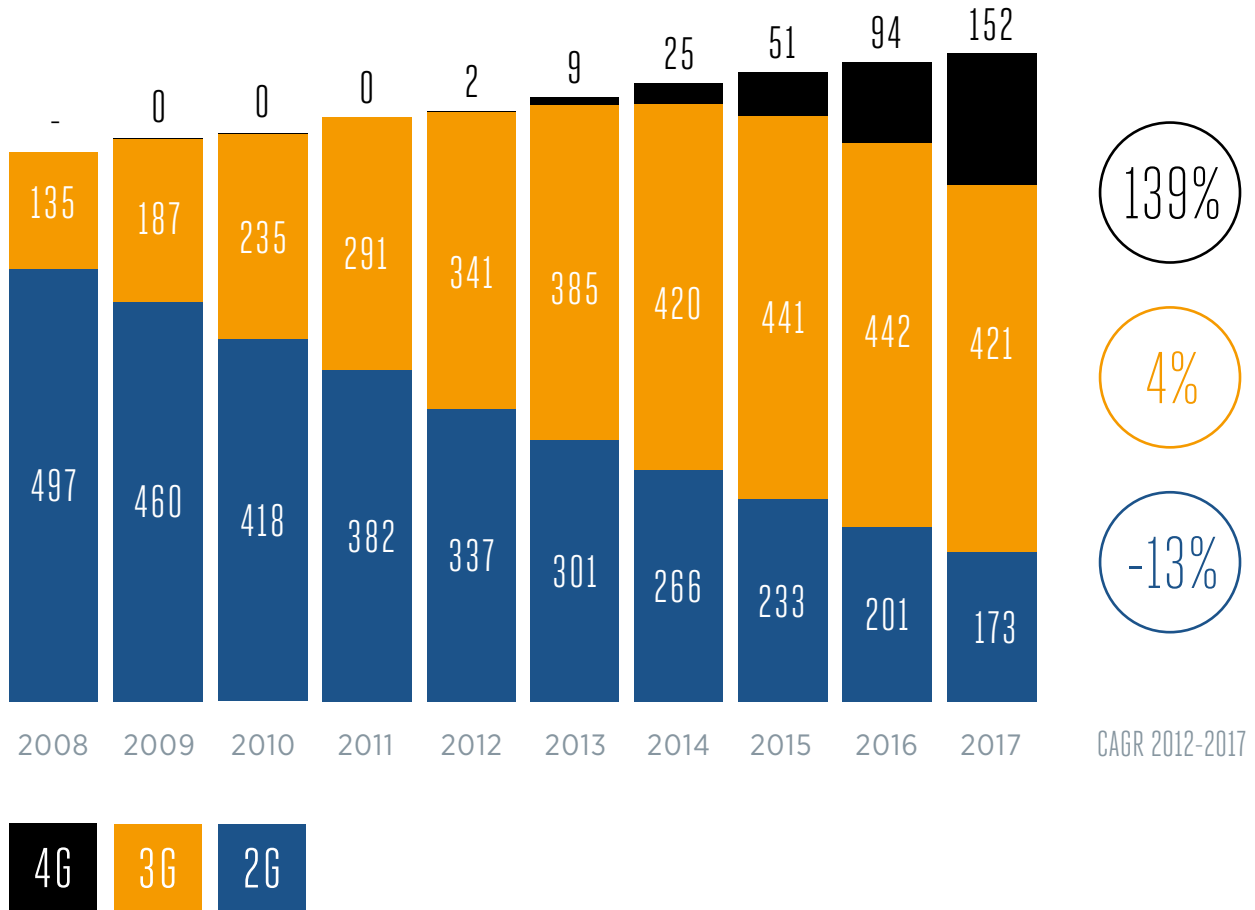
Source: GSMA Intelligence

Smartphone penetration in Europe is already amongst the highest in the world, with western European countries showing an average penetration of 49% at the end of 2012 according to Strategy Analytics. The larger markets in Europe (the EU5 of UK, Spain, Germany, France and Italy), have smartphone penetration standing on average at over 55% at the end 2012. Whilst at present the smartphone market is almost entirely 3G devices, the increasing availability of VoLTE capable handsets is likely to see a growing proportion of LTE smartphones over the coming years.

SMARTPHONE PENETRATION

WESTERN EUROPE

NORTH AMERICA

C & E EUROPE
C & LATIN AMERICA
ASIA PACIFIC

AFRICA & MIDDLE EAST
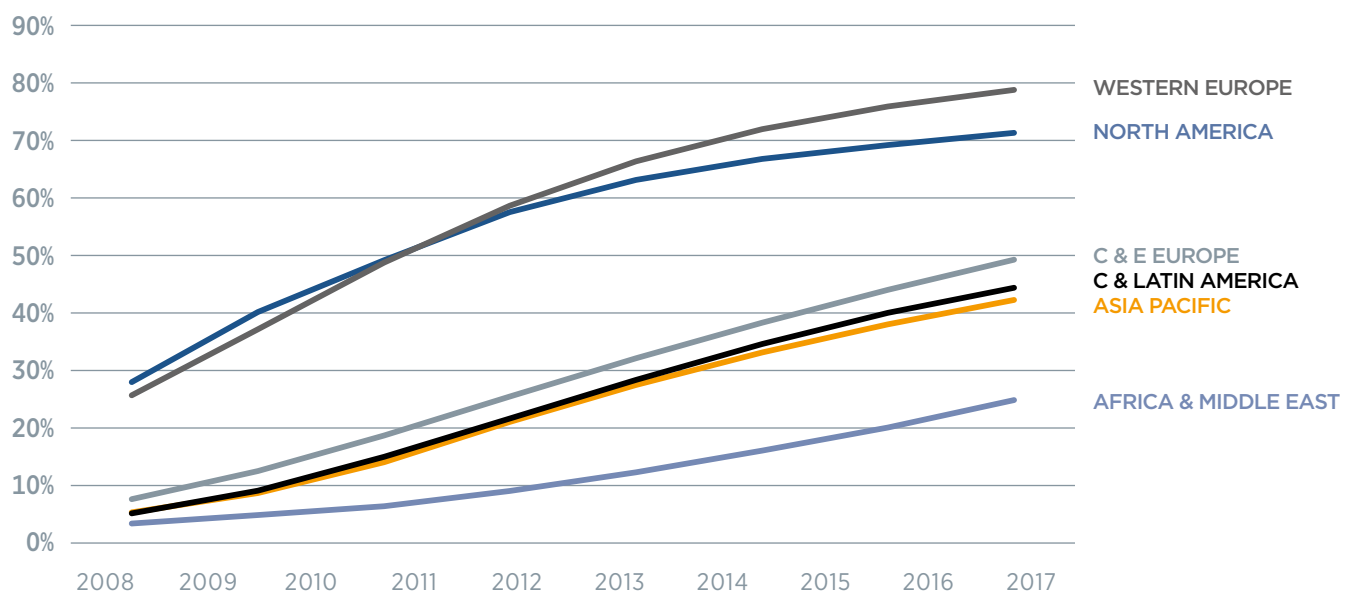
Source: GSMA Intelligence

Operators are increasingly positive about tablet devices, which appear to offer a greater prospect for 4G growth than other data devices. Vodafone CEO Vittorio Colao noted on a recent conference call that 4G will become "increasingly more important [in 2013/14], as new handsets and commercial offerings enter into the market, and the tablet adoption [reaches] the mass market."

1.3

Increasing affordability and rising usage: a consumer story

There have been significant price reductions in European mobile over recent years, a trend that has increased the affordability of mobile services and helped drive increasing penetration rates. ARPUs (average revenue per user) across Europe have fallen by an average of 5-6% over the last six years, although there are significant variances in trends at the country level. Declines have been driven by range of factors, including competition; regulatory action (such as cuts to termination rates and roaming price caps); as well as the trend towards multi-device and multi-SIM ownership that dilute reported ARPU per connection.

ARPU TRENDS
€ PER MONTH

UK
SPAIN
FRANCE
ITALY
GERMANY
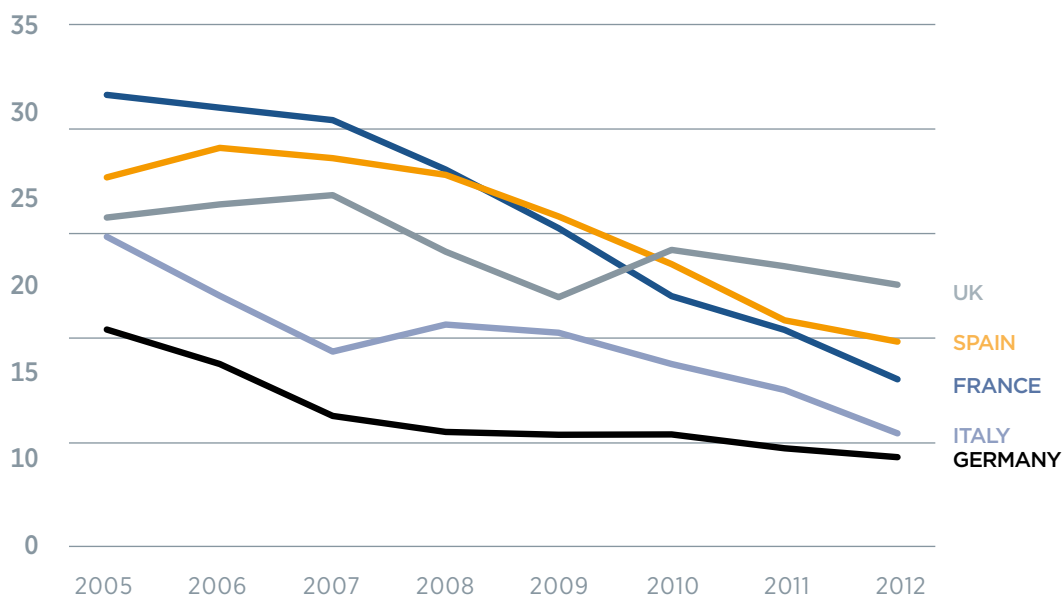
Source: GSMA Intelligence

Falling ARPUs have gone hand in hand with rising mobile usage, both in aggregate and on a per user basis. The following chart shows that SMS volumes have grown sharply over the five year period from 2005 in several of Europe's largest markets. In the UK, the increased availability of tariffs with large or unlimited bundles of SMS contributed to an average annual rise of 26.4% in SMS volumes over the period, although the fastest growth was in France (with a growth rate of 52%). Similarly, the average number of minutes of use (MOUs) per subscriber in Europe has grown steadily in recent years, to an average figure of 165 minutes in 2012.

SMS VOLUMES
B PER ANNUM

2005   2010

	SPAIN	GERMANY	ITALY	FRANCE
2005	13	20		13
2010	9	41	85 / 103	103

MINUTES OF USE
(MOUs)

2008	2009	2010	2011	2012
143	150	160	163	165
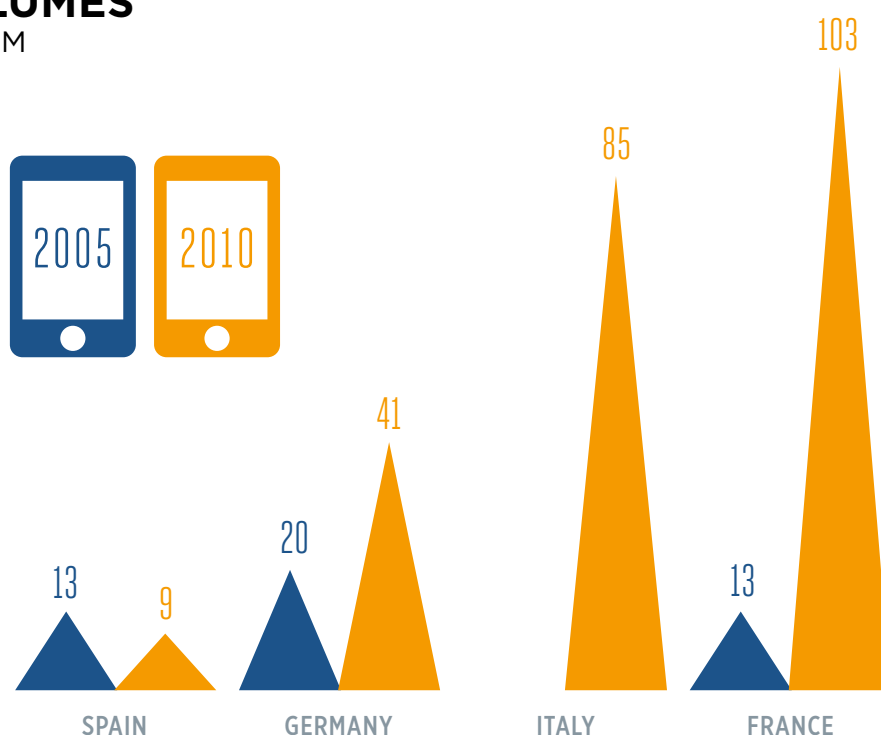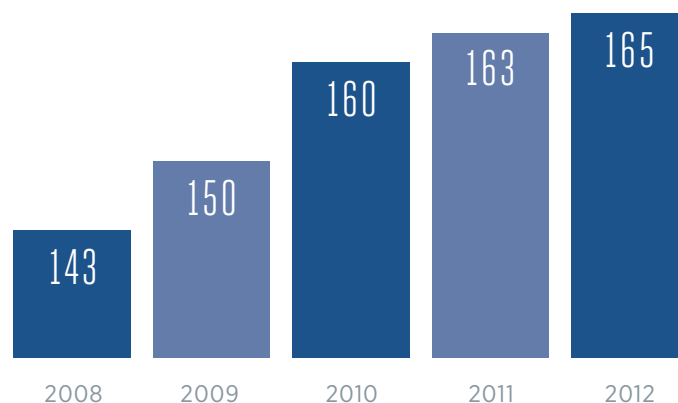
As a result, it is clear that underlying pricing has fallen sharply in Europe. Revenue per minute has been falling at a high single rate per annum for a number of years, with pricing currently converging around the 10 cent per minute level. Pricing is likely to continue to fall as we see on-going pressures from regulation and competition - although the increasing move to flat rate pricing plans (which include unlimited voice minutes) is likely to make the simple analysis of per minute trends less relevant.

EFFECTIVE PRICE/ MINUTE (€)
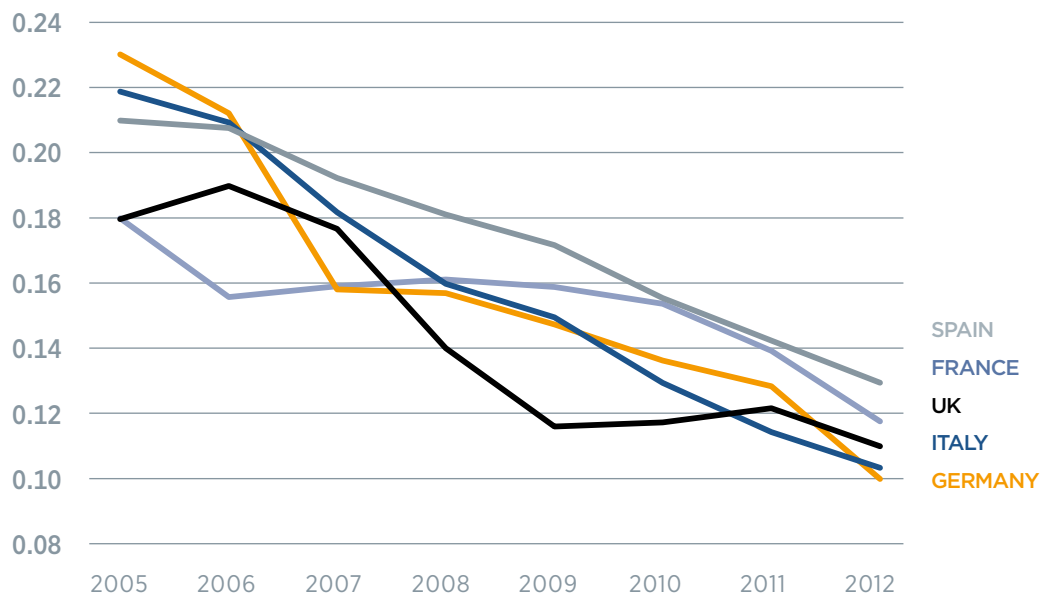
Source: GSMA intelligence

OFCOM produces an annual review of mobile phone usage costs[7], looking at a range of nine different usage baskets. These range from a high usage, advanced handset to a low usage prepaid basket with a basic phone. On average the EU5 are significantly cheaper than the US, and there is also significant variation between markets in Europe. However, markets with higher than average pricing levels, such as Germany and Spain, saw significant declines in most basket costs between 2011 and 2012, while France saw the largest declines (down 25% year-on-year) following a period of aggressive competition related to the launch of the fourth network in the country.

MOBILE MONTHLY COST BY USAGE BASKET (£)
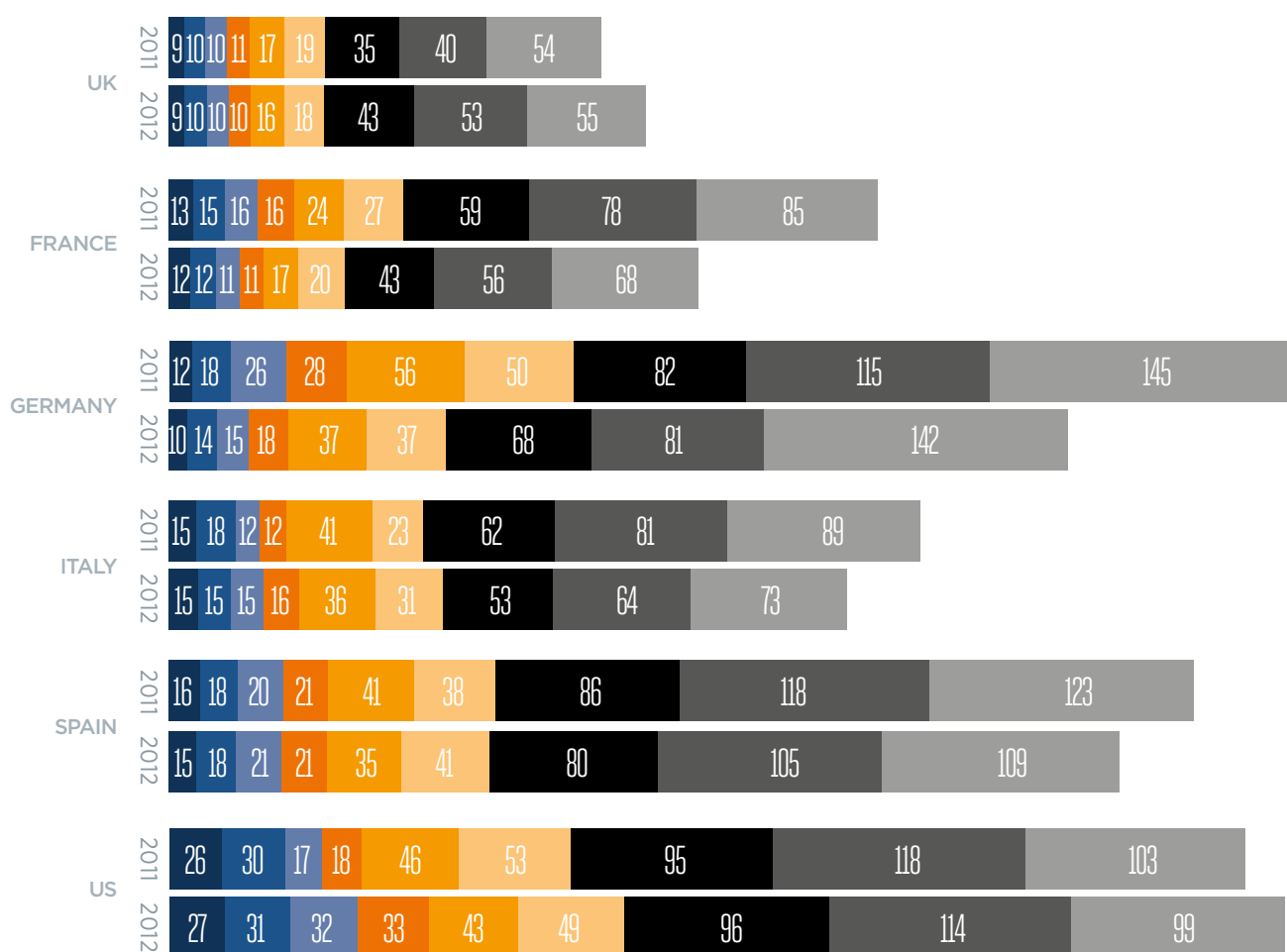
Source: OFCOM using data supplied by Teligen
Note: weighted average of best-value tariff from each of largest three operators by market share in each country

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7. OFCOM International Communications Report 2012

OFCOM also looks in the same report at trends in mobile broadband pricing in 2011 and 2012, using three different baskets based on 1MB, 3MB and 5MB of usage. Again, the EU5 compare favourably with the US, with the UK and Italy in particular offering low pricing points.

MONTHLY COST FOR MOBILE BROADBAND (€)
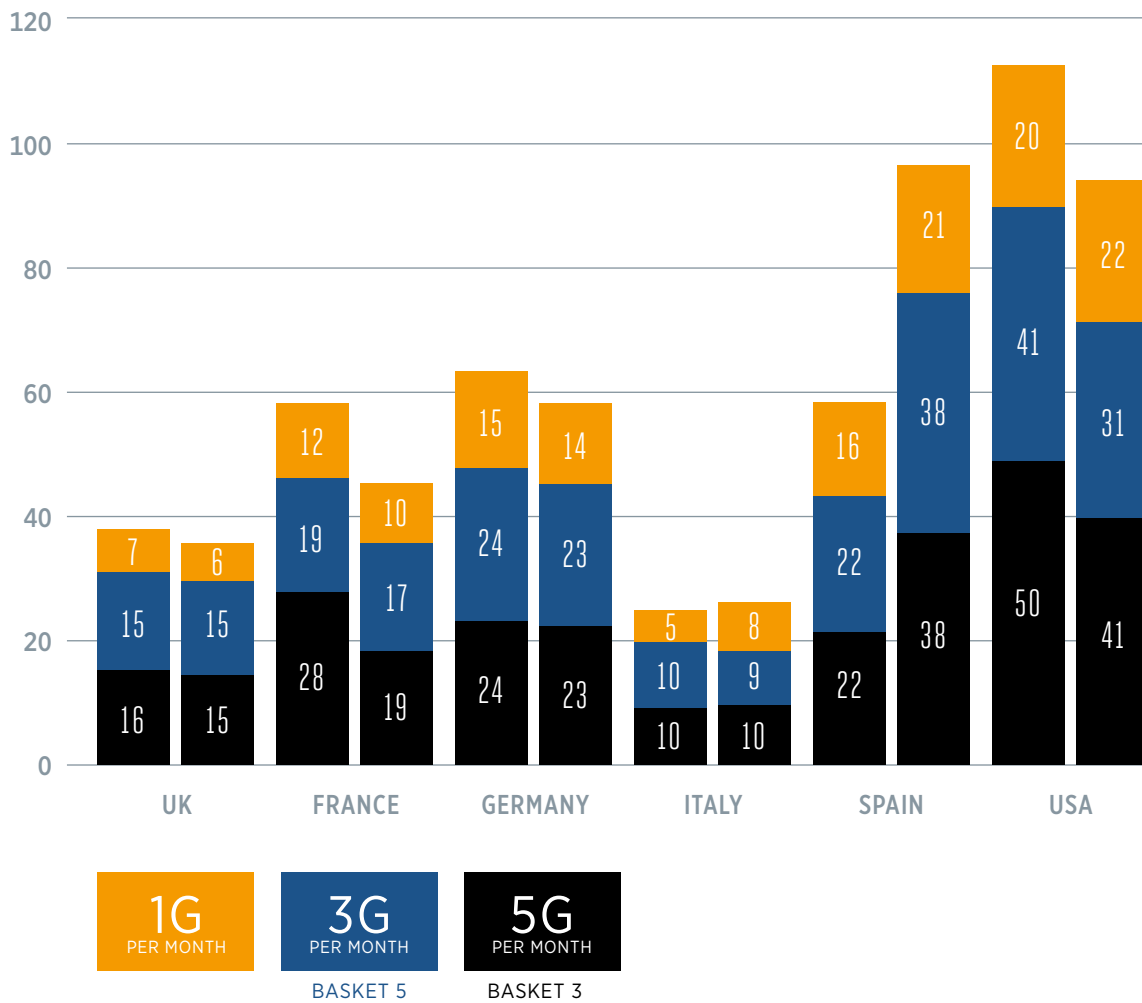
	1G PER MONTH	3G PER MONTH	5G PER MONTH
		BASKET 5	BASKET 3

Source: OFCOM using data supplied by Teligen
Note: weighted average of best-value tariff from each of largest three operators by market share in each country

1.4

Mobile broadband and data: explosive growth in volumes

With near ubiquitous 3G coverage in Europe and following network upgrades to offer higher speeds (with the deployment of HSPA and more recently HSPA+), customers can now benefit from high speed access to the internet over mobile devices, as well as a range of other services. There have been moves to allow spectrum refarming in a few markets which has enabled operators to deploy 3G in the 900 MHz band, which offers larger cell radius and better coverage than the 2.1 GHz band (as well as better indoor coverage). For example, data from OCFOM[8] in the UK suggests that at the end of 2012, only 0.9% of premises in the UK could not receive a 3G signal.

As a result, what was initially positioned as a high end business service has become a mass market product, allowing always on connectivity and helped by Europe offering some of the cheapest mobile broadband pricing in the world (as we saw in the previous section). Mobile broadband can be accessed by a range of devices, including smartphones, laptops and tablets. Within the device mix, tablets are becoming increasingly important, and driving increasing volumes of data, whilst in a number of markets it appears that the number of data cards/ dongles is now declining.

The total number of mobile broadband devices has seen significant growth in recent years, with the total penetration in Europe now approaching 60%. However, penetration rates overall in Europe lag behind markets such as the US and Japan, although there are several European countries with penetration rates over 100%.

8.   OFCOM Infrastructure Report. 2012 Update

MOBILE BROADBAND PENETRATION
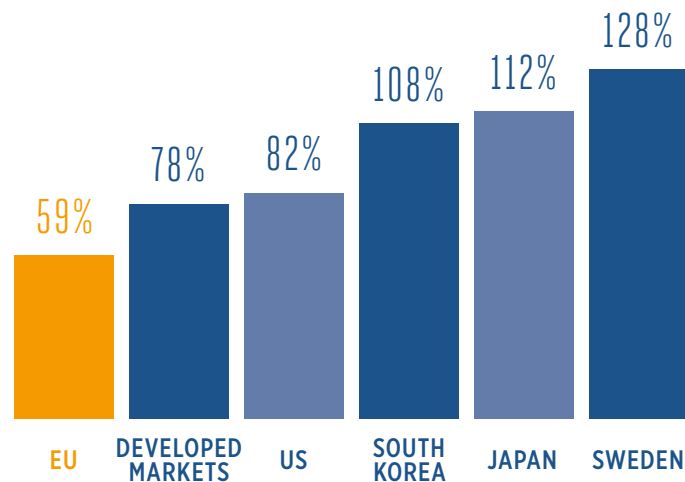
Source: GSMA Intelligence

HSPA allows operators to offer download speeds of over 14MBps, and HSPA+ offers significantly higher speeds. Attractively priced propositions in many countries mean that mobile broadband offers consumers a viable substitute for a fixed broadband connection, especially in those markets where fixed broadband penetration is relatively low or where fixed broadband networks have not been fully upgraded to offer higher data speeds. Operators have also encouraged adoption at the lower end of the market for price-conscious consumers, by offering bite-sized data plans.

EUROPE MOBILE BROADBAND CONNECTIONS
M, INC LTE
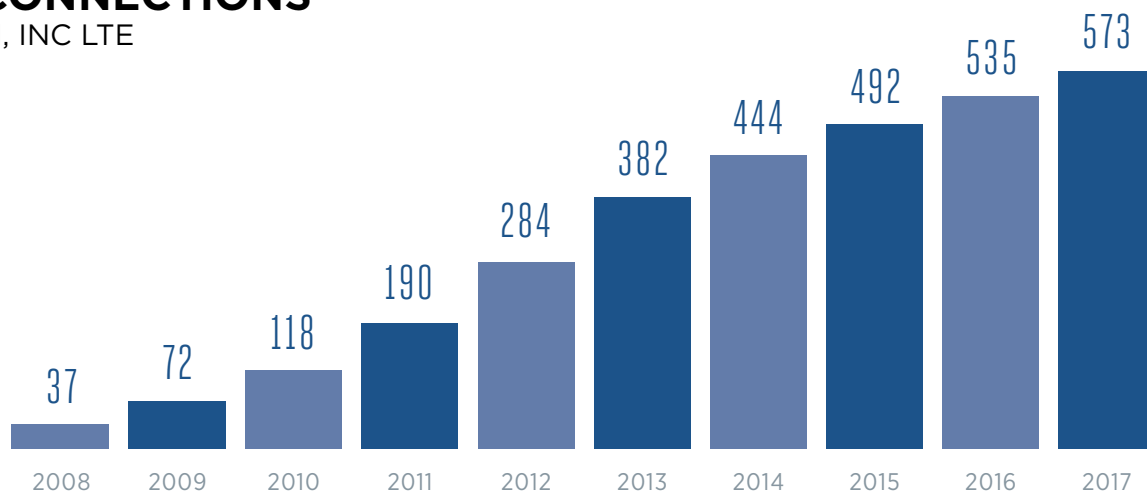
Source: GSMA Intelligence

Mobile data traffic is expected to continue to grow sharply over the coming years, fuelled by the growth in mobile broadband connections, a trend that is likely to receive a further boost as LTE deployments increase in Europe. Vodafone recently disclosed that on their networks in Europe, LTE smartphones generated twice as much traffic as a non-4G smartphone. Both laptops and tablets generate significantly higher data volumes than smartphones. OFCOM found that in the UK the volume of mobile data doubled over a twelve month period, even before the launch of 4G services in the UK[9].

MONTHLY USAGE BY DEVICE (EUROPE)
MARCH 2013

x2

| 350MB | 640MB | 640MB | 1.6GB | 13GB |
| SMARTPHONE | 4G LTE SMARTPHONE | TABLET | LAPTOP | FIXED MOBILE SUBSTITUTION |
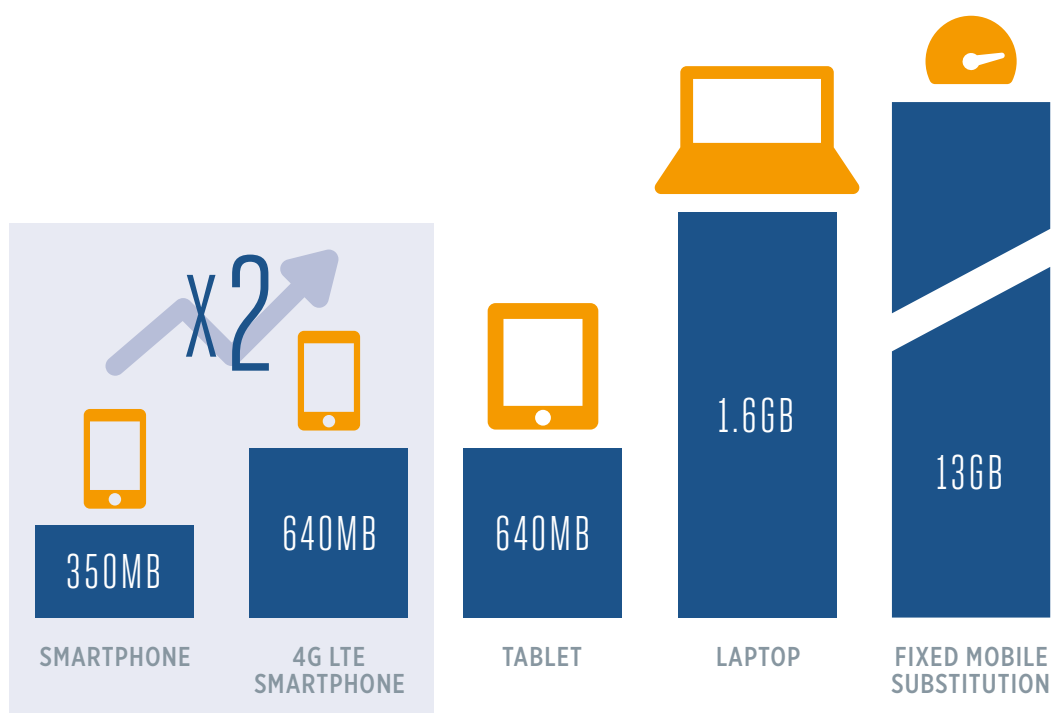
Source: Vodafone

With LTE network build outs across an increasing numbers of countries, operators in Europe are now embracing tablet devices, given the greater prospect for data growth than other data devices. On average, the 4G operators recently surveyed by GSMA Intelligence[10] offered seven tablets in their data devices portfolio. Operators such as A1 Telekom (Austria), Polkomtel (Poland), and Telenor (Sweden) were found to be offering twice the number of tablets they were a year ago.

9. OFCOM Infrastructure Report. 2012 Update
10. "Smartphones dominating mobile operators' device portfolios"; April 2013

The latest forecasts from Cisco[11] show that Europe overall is forecast to see traffic grow at 54% over the next five years, compared to an overall global growth rate of 66%. As well as offering operators the scope to grow data revenues, these high levels of data volume growth underline the need for operators in Europe to continue to invest in their networks, and especially to improve LTE network coverage.

MOBILE DATA VOLUME GROWTH
TB PER MONTH

	WESTERN EUROPE	CENTRAL & EASTERN EUROPE
2012	181 397	66 084
2013	276 405	116 012
2014	276 405	210 841
2015	655 201	365 498
2016	975 681	577 265
2017	1 384 072	844 887
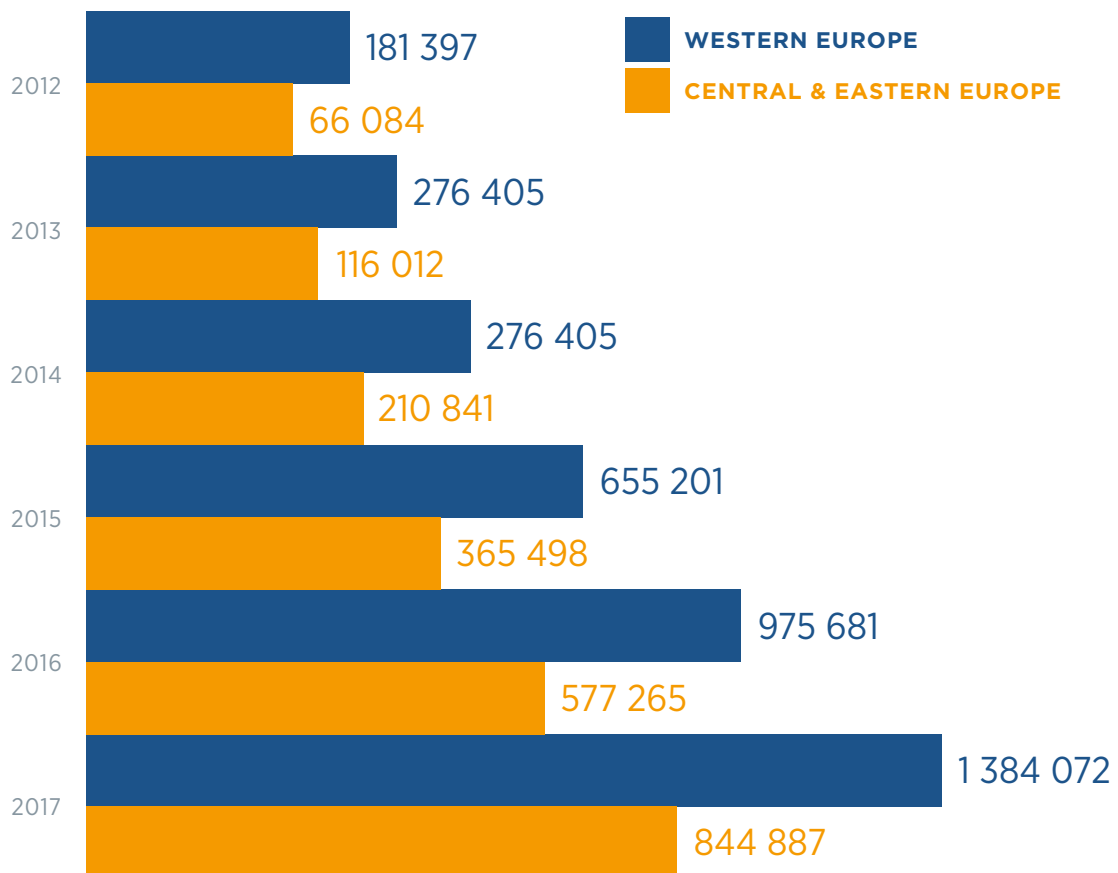
Source: Cisco VNI Mobile Forecast, 2013

11.   Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2012–2017

54%

The latest forecasts from Cisco[11] show that Europe overall is forecast to see traffic grow at 54% over the next five years

1.5

Revenue trends: from low to negative growth

Europe is the only region to see mobile revenue declines in recent years, at a time when total revenues at the global level grew by an average of 4%. Total operator revenues in Europe in 2012 were around €165 billion, making Europe the second largest region globally in terms of overall market size.

A small number of European countries saw revenues grow over the period, including Sweden and Germany. Mobile growth in Sweden, which has been far the strongest in Europe, has been driven by strong growth in mobile data revenues and the high penetration rates of mobile broadband, with Sweden one of the first countries to launch 4G services. Countries that have seen the most significant declines include the southern European markets (Spain, Portugal, Greece and Italy) and Ireland, countries that have been particularly impacted by the current economic slowdown.

EUROPEAN MOBILE RECURRING REVENUES
€ B

	ITALY	SPAIN	UK	GERMANY	FRANCE
2008	21.8	17.8	22.6	19.4	23
2012	17.9	13.3	21	19.6	21

2008 2012
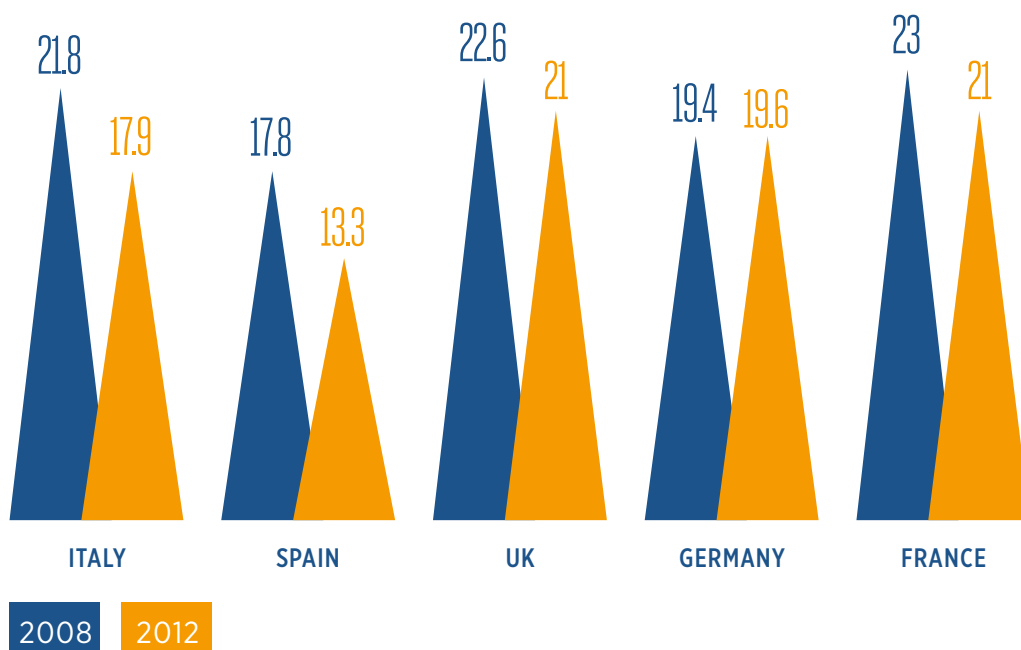
Source: GSMA Intelligence

A number of factors have contributed to revenue declines in Europe

REGULATION

The impact of regulation, including cuts to termination rates and roaming price caps

REVENUE MIX

Market maturity and the changing revenue mix, meaning that future revenue growth is more dependent on growing ARPUs from selling new services (or connecting more devices) for existing subscribers, rather than from simply adding new subscribers

PRICING REDUCTION

High levels of competition and the significant reduction in pricing

ECONOMIC CRISIS

The global economic crisis and rising unemployment in a majority of European markets

NEW ONLINE MESSAGING SERVICES

The increasing erosion of legacy revenue streams (such as voice and SMS) by new online messaging services

We look at each of these factors in turn in the rest of this section.

1.5.1

REGULATION A DRAG ON REVENUES

The impact of regulation on mobile revenues in Europe should not be understated. Roaming price caps are estimated by the European Commission to have saved consumers of €15B by the end of 2012[12], a positive for consumers (at least in the short term) but also a challenge to industry profitability at a time when operators are facing a number of challenges to their top lines. Mobile termination rates (MTR) have seen significant declines since 2006, as the European Commission has pushed for an increasing cost-based orientation in setting MTRs. The glide path for MTRs has tended to steepen on average in recent years, reducing revenues in a number of markets by several percentage points.

AVERAGE MTR (€)

H1 06	H2 06	H1 07	H2 07	H1 08	H2 08	H1 09	H2 09	H1 10	H2 10	H1 11	H2 11	H1 12
0.114	0.111	0.104	0.100	0.090	0.087	0.078	0.071	0.065	0.061	0.049	0.044	0.0357
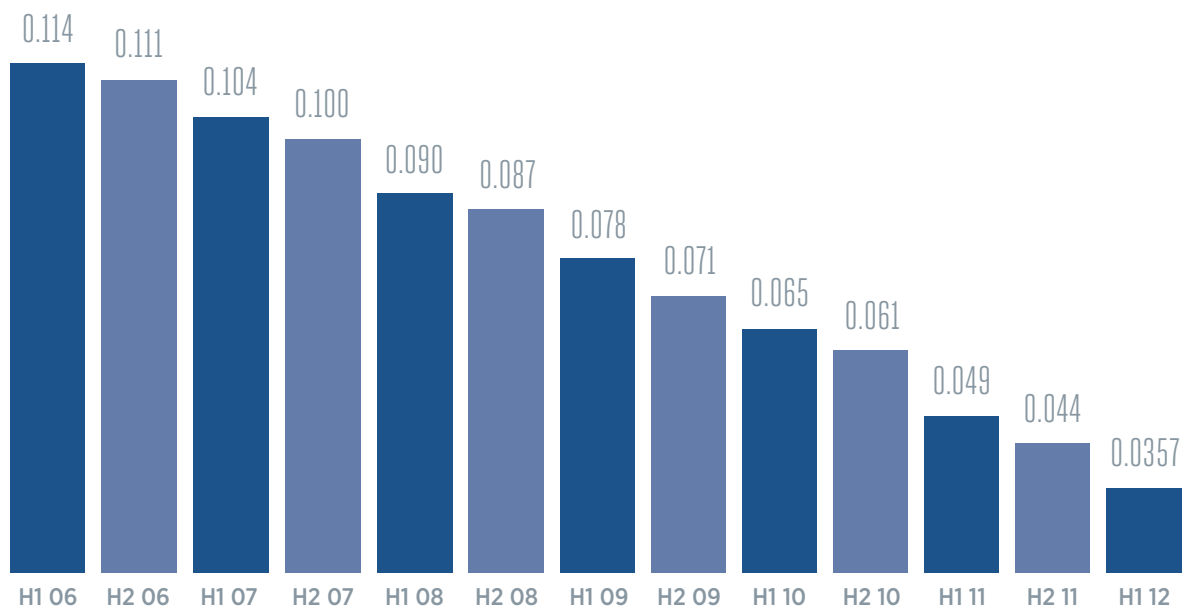
Source: BEREC/ ERG

12. "Digital Agenda: New price caps for mobile data roaming expected to save families over €200 each year and business travellers over €1000"; May 2013

The impact of MTR cuts is reducing recurring revenue growth by 2-3 percentage points across Western Europe. Revenue trends are also worsening over the course of the last two years, with an increase in the MTR effect in recent quarters but with the on-going backdrop of high levels of competition and the erosion of traditional voice and messaging revenues by new on line applications. There is also a clear geographic difference in revenue trends, with the worse revenue declines in southern European markets (Greece and Italy reported declines approaching 20% YoY in recent quarters), while Sweden remain the only European market reporting growing revenues.

EUROPEAN SERVICE REVENUE & MTR EFFECT
(W. EUROPE)

- **EUROPEAN SERVICE REVENUE GROWTH**
- **SERVICE REVENUE GROWTH EX-MTRS**
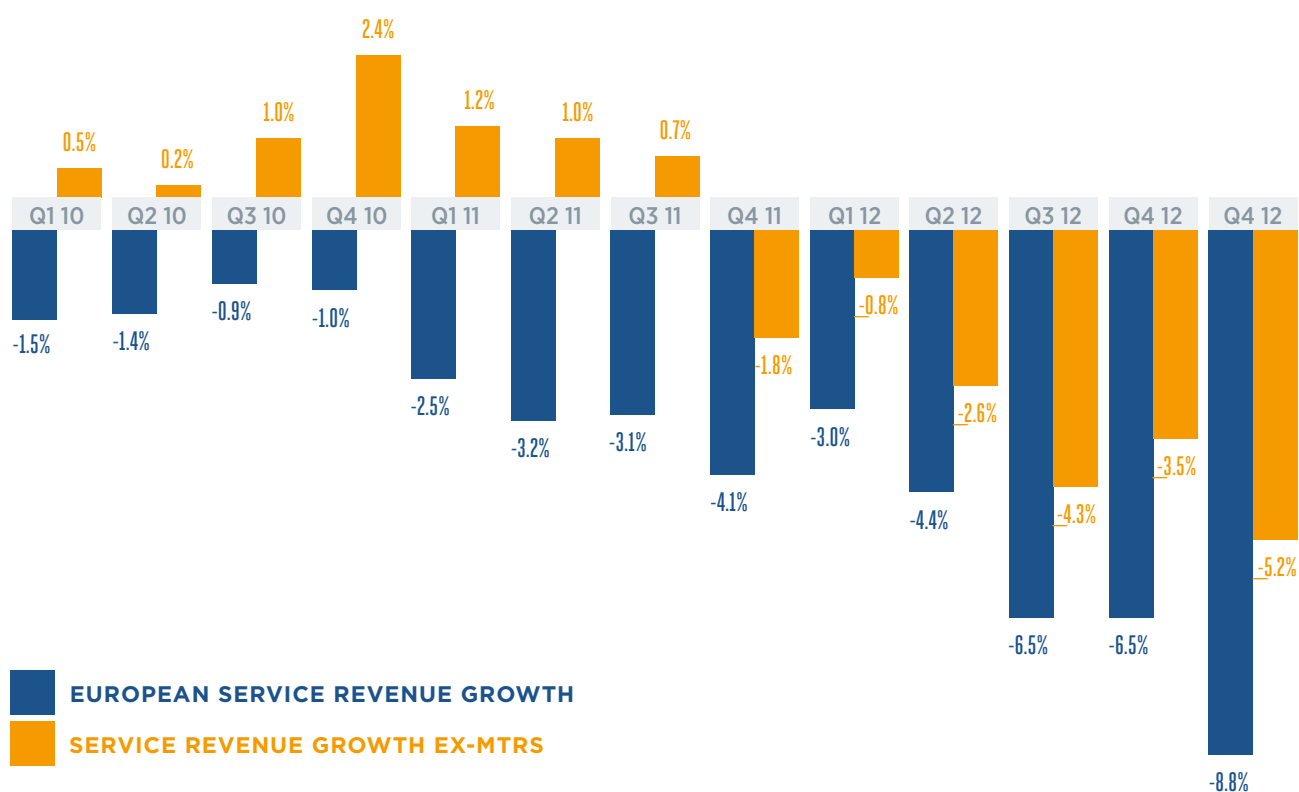
Source: Credit Suisse Research

1.5.2

REVENUE MIX: VOICE DECLINING; DATA GROWING

The traditional revenue model for mobile operators in Europe is under pressure from a range of factors as discussed previously. As a result, and against a background of generally falling ARPUs, the contribution of voice to overall mobile revenues has been falling for a number of years.

EUROPEAN SERVICE REVENUE SPLIT: VOICE & DATA

	Q1 10	Q2 10	Q3 10	Q4 10	Q1 11	Q2 11	Q3 11	Q4 11	Q1 12	Q2 12	Q3 12	Q4 12	Q4 12
Data	12.2%	12.6%	11.0%	9.5%	12.0%	13.6%	15.0%	12.1%	10.1%	7.4%	3.1%	3.7%	1.6%
Voice	-5.6%	-5.5%	-4.5%	-5.0%	-8.2%	-9.8%	-10.4%	-11.4%	-9.7%	-10.7%	-11.9%	-12.3%	-15.0%

■ **VOICE REVENUE GROWTH**

■ **DATA REVENUE GROWTH**
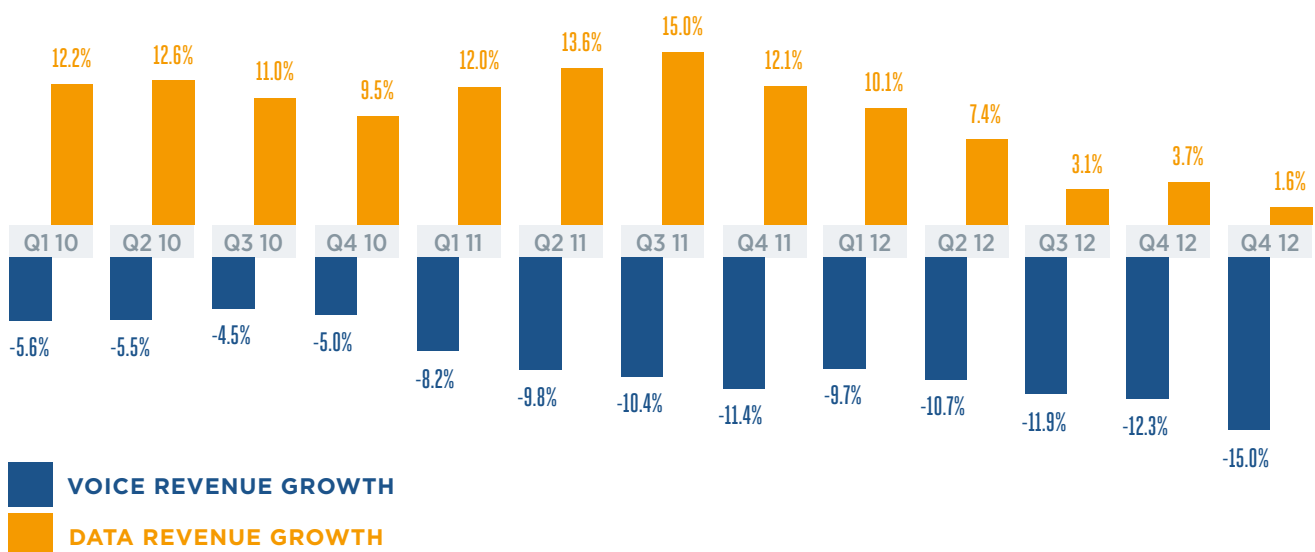
Source: Credit Suisse Research

Increasing smartphone penetration and the growth in the number of data devices such as laptops and tablets has driven strong growth in data revenues in Europe. However, the rate of growth in data revenues has also begun to decline, partly as new instant messaging applications have begun to erode "legacy" data revenues from SMS messaging. Connectivity-based data revenues are still showing double digit growth but have also come under pressure with the trend towards "all you can eat" data pricing. Operators are now looking to improve revenue trends by moving to tiered data pricing, and the advent of higher speed LTE services could provide a further opportunity to offset declining revenues in other areas. However, with competition still tough there is an increasing trend for operators to bundle flat rate voice and SMS into some of their higher end data packages (for example O2 Germany introduced this with four of its data packages earlier this year, a move that has been followed by several other operators including Telenor).

1.5.3

REVENUE OUTLOOK: ONGOING DECLINES IN EUROPE

Going forward a similar range of factors is likely to continue to weigh on operator revenues, suggesting little prospect of a return to growth in the foreseeable future. Forecasts for the region as a whole suggest ongoing revenue declines out to 2017, although the rate of decline should be more modest than over the past four years

EUROPEAN MOBILE REVENUES
(US$ B)

Year	Revenue
2008	247.8
2009	240.9
2010	242.2
2011	228.3
2012	215.8
2013	207.5
2014	201.9
2015	197.7
2016	196.3
2017	193.5
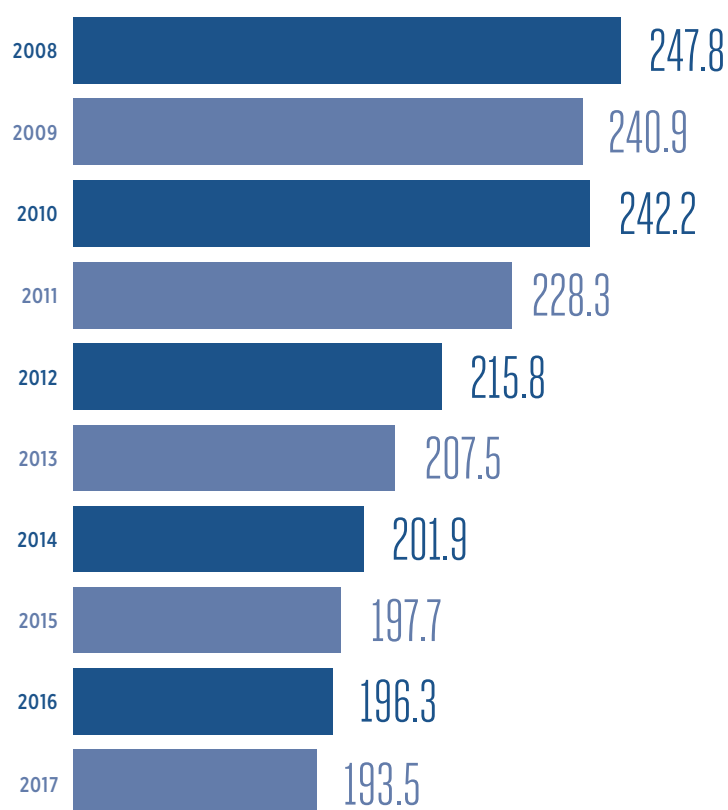
Source: EIU, Wireless Matrix, IDC, Gartner, A.T. Kearney analysis

We look in more detail at some of the issues that will impact revenues going forward in the rest of this section.

1.5.4

COMPETITIVE INTENSITY ON THE RISE

European mobile markets remain highly competitive, with a number of markets such as the Netherlands, Spain and France having seen new entrants in recent years.

NUMBER OF OPERATORS BY COUNTRY
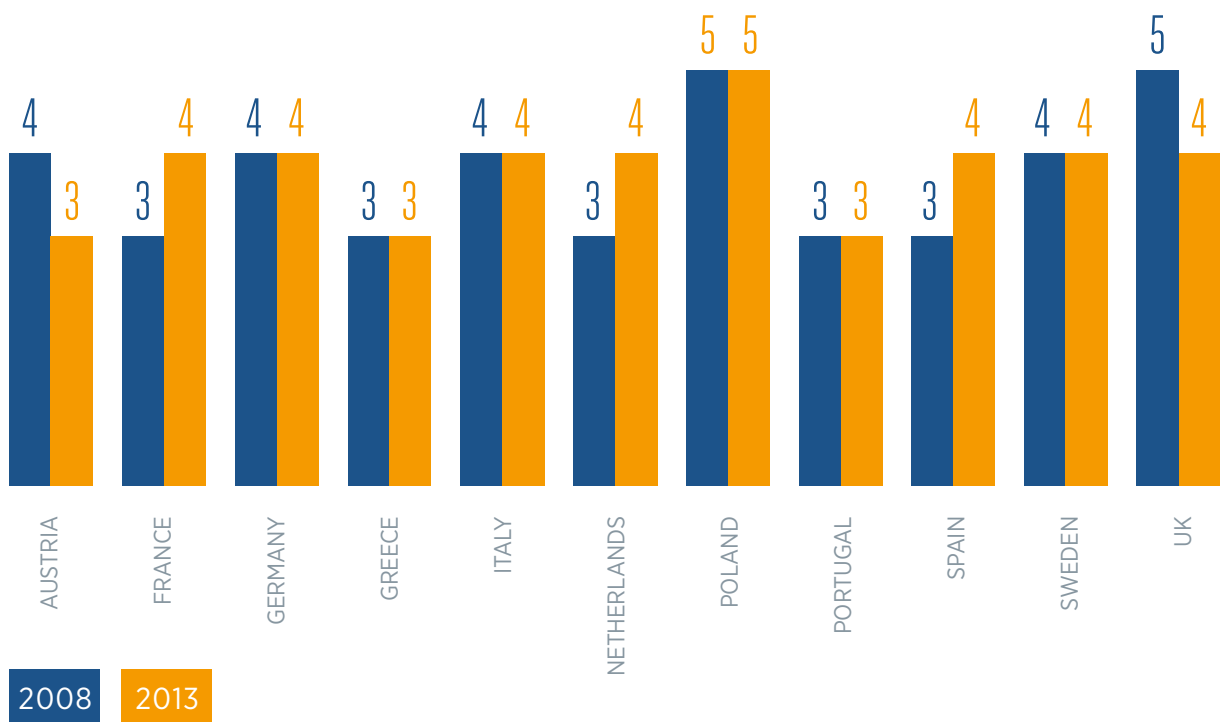
Source: GSMA Intelligence

The average number of operators across a selection of European markets is four, although the fragmentation and relative small size of many national markets in Europe is an issue, especially in terms of the lack of scale benefits for operators. The following chart shows that only three of the world's ten largest developed market operators are based in Europe; with many potentially sub-scale operators in Europe's smaller countries. Even the larger mobile operators in Europe are relatively small compared to some of the global peers, again limiting the economies of scale that European operators are able to realise.

CONNECTIONS BY OPERATOR
(M) Q1 2013

Operator	Connections (M)
VERIZON (US)	114.1
AT&T (US)	106.9
NTT (JAPAN)	70.9
SPRINT (US)	55.6
KDDI (JAPAN)	36.8
T-MOBILE (GERMANY)	36.6
VODAFONE (GERMANY)	33.9
T-MOBILE (US)	33.9
TIM (ITALY)	32.2
SOFTBANK (JAPAN)	32.04
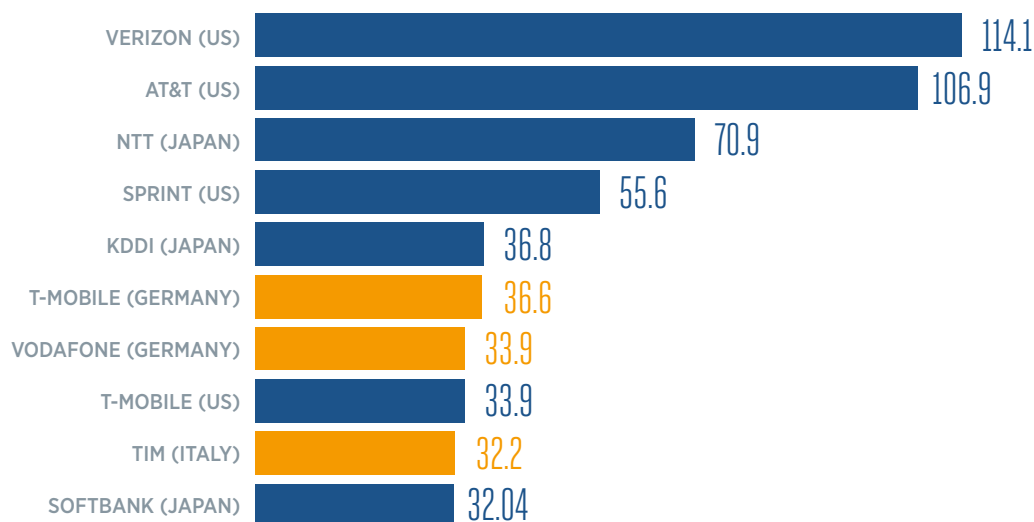
Source: GSMA Intelligence

However, the number of network operators is only part of the story, with Europe also having a large number of MVNOs (this includes both branded MVNOs, operated by an MO; and independent MVNOs). Research by GSMA Intelligence in 2012[13] showed that Europe was home to two-thirds of global MVNOs. The following chart shows that the UK has the highest number of MVNOs in Europe, with over 80 MVNOs, followed by Germany with close to 60.

NUMBER OF MVNOS

Country	Independent	Branded
AUSTRIA	7	7
FRANCE	52	7
GERMANY	43	15
GREECE		3
ITALY	19	
NETHERLANDS	49	12
POLAND	23	7
PORTUGAL	5	3
SPAIN	29	2
SWEDEN	12	5
UK	83	3

■ INDEPENDENT ■ BRANDED
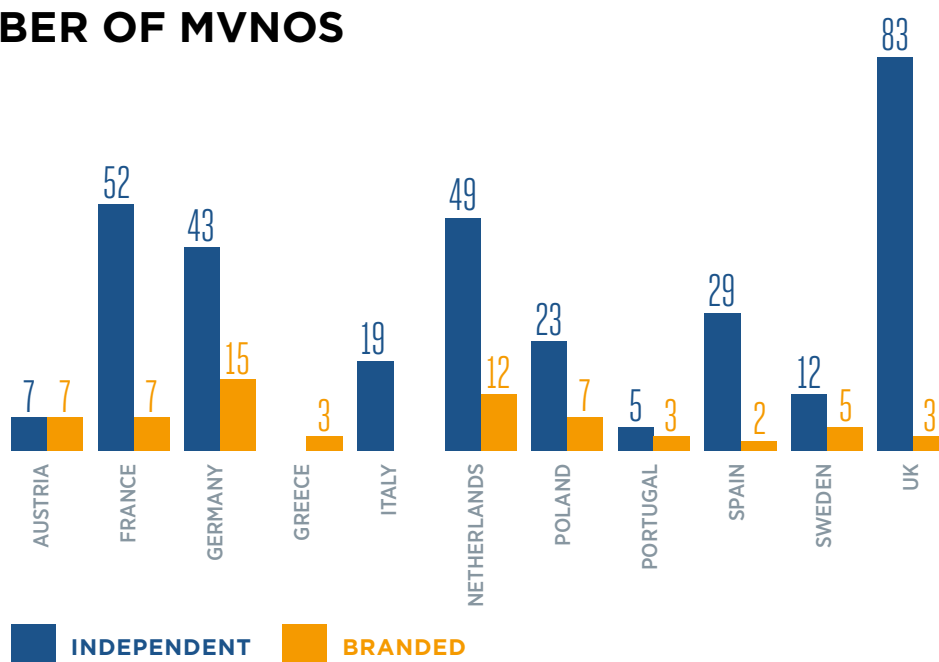
Source: GSMA Intelligence

13. "The MVNO model, global footprint and outlook"; May 2012

MVNOs are generally more prevalent in highly penetrated markets (for example those with SIM penetration over 100%). The specific development of MVNOs in Europe has had more to do with operator decisions to generate wholesale revenues (or revitalise market positioning in the case of MO brands) and competitive factors other than with regulation, though in a few cases (such as France with the award of both 3G and 4G spectrum), licences were awarded with specific requirements for MVNO access. The overall impact has tended to be to increase competition in more mature and highly penetrated markets where there is limited incremental growth.

The weak economic environment, with increasing pressure on household budgets and consumer spending, has also encouraged customers to look for more value-orientated offers. These are most often available from the "challenger" (i.e. smaller) operators and from MVNOs, rather than the market leaders in particular countries. The same study from GSMA Intelligence referred to above found that the majority of MVNOs in Europe fell into the "discount" category i.e. that focused on low-cost services and low prices. For "challenger" operators that had previously struggled to gain market share, MVNOs have proved an effective route to gaining share.

The Herfindahl-Hirschman Index (HHI) can be used to measure levels of competition in national mobile markets (the lower the index figure, the more competitive the market). For the EU5, the HHI has generally shown a steady decline over the last seven years, indicating that competitive pressures have tended to increase. This reflects the success of smaller operators, and indeed MVNO brands, in attracting customers and stimulating price competition in the market. The average market share for MVNOs in Europe is now approaching 10%, with particular success in markets such as the UK and Germany (where the figure is approaching 20%). The most dramatic change in competitive pressures is evident in France. Having long ranked as the least competitive of the major markets, France has seen a sharp fall in its HHI index with the launch of the fourth mobile network in early 2012.

HHI INDEX EVOLUTION
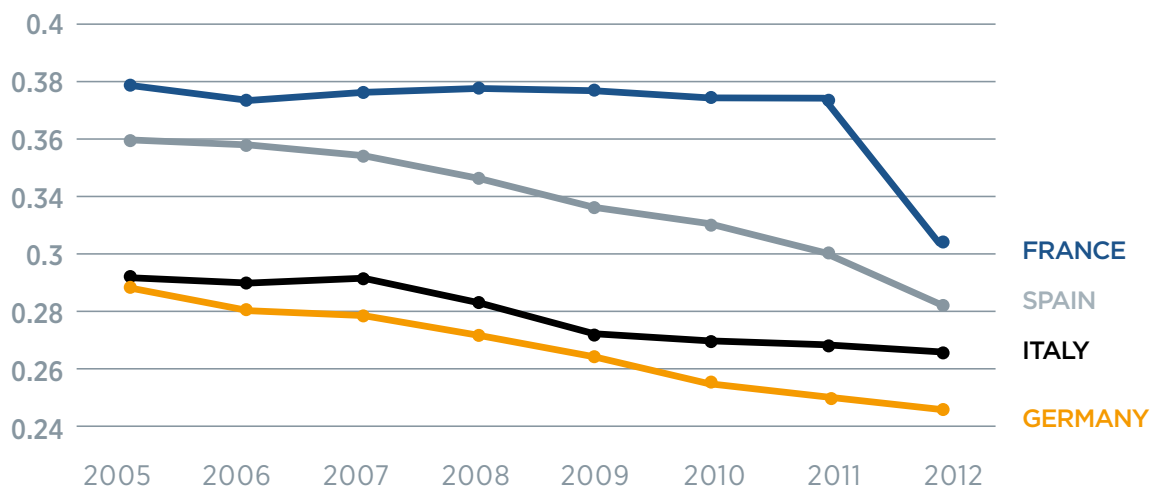
Source: GSMA Intelligence

1.5.4.1

EUROPE: A FRAGMENTED MARKET

Consolidation has become an increasing topic in European mobile, as operators react to on-going competitive pressures, the challenging economic backdrop and increasing revenue declines and margin erosion. A number of operators have explicitly highlighted the need for consolidation if the industry is to invest in new technologies such as 4G.

However, there have been limited moves towards consolidation in Europe in recent years, beyond the recent consolidation in Austria (where the acquisition by 3 Austria of Orange Austria was finally cleared by the European Commission in December of 2012). In contrast to Europe, the US market has seen significant consolidation over recent years, including amongst the larger players. As a result, the market share of the two largest players (Verizon and AT&T) has increased sharply over the last five years. At the same time, four out of the five largest markets in Europe have seen the market share of the largest two operators decline, a trend that appears to be ongoing.

MARKET SHARE OF THE LEADING TWO OPERATORS (%)
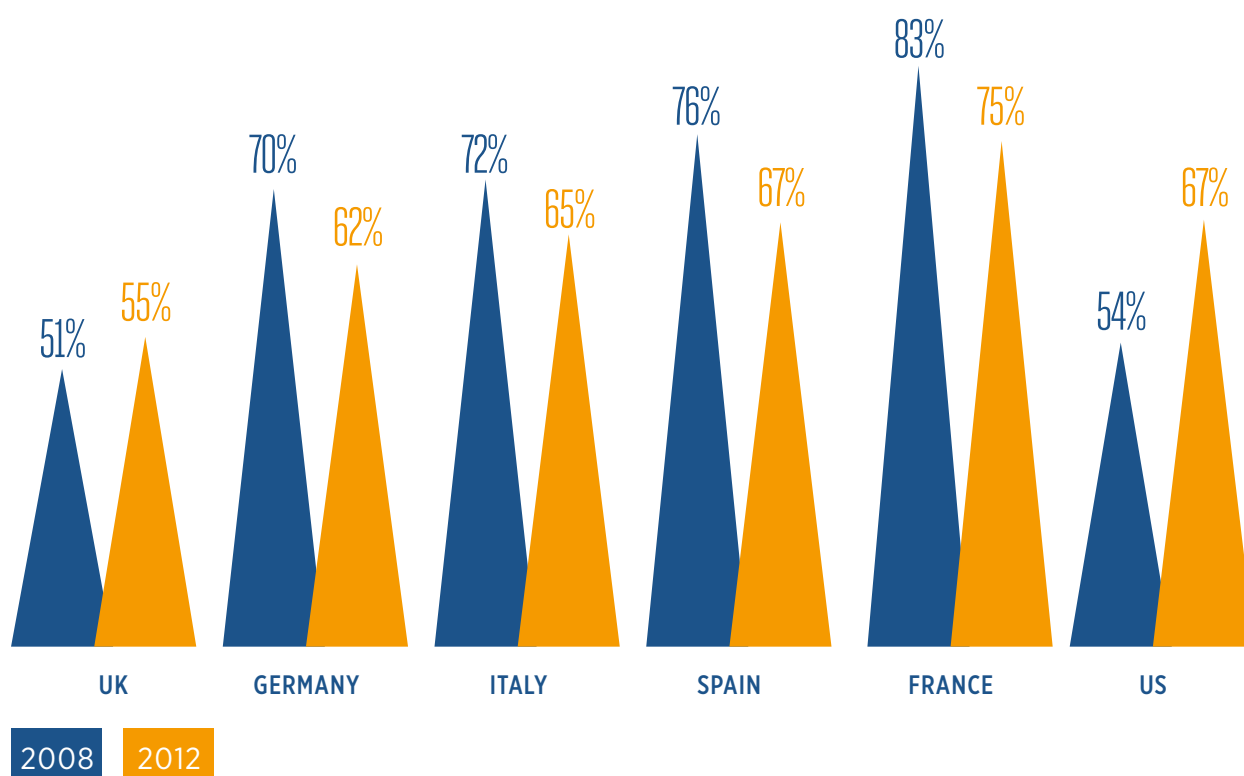
Source: GSMA Intelligence

The recent report "Mobile Wireless Performance in the EU and US"[14] highlighted a number of issues resulting from relative fragmentation in European mobile markets as compared to the US:

- Market fragmentation prevents EU carriers from capturing economies of scale and scope. America's two largest carriers are each larger than the three largest EU carriers combined.

- Efficient consolidation would provide incentives for investment, facilitate a more integrated mobile wireless ecosystem and improve consumer welfare.

The overall conclusion of the report is that the US appears to be a more "dynamic" and therefore innovative market as compared to Europe. This also has implications in terms of the fragmented nature of regulation of the European telecom market. With 27 separate national regulators, this creates a more complex structure that could reduce innovation and the introduction of new services.

The benefits of consolidation appear in general to be recognised by regulators in the US, for example in the recent merger between U.S. carriers T-Mobile and MetroPCS. The FCC justified its decision to approve the merger in part on its finding that the merger "would enable the deployment of a substantial LTE network nationally that would enhance competition and provide important benefits for consumers. By merging the two companies, and their network assets and spectrum, we find that the resulting Newco would provide for a broader, deeper, and faster LTE deployment than either company could accomplish on its own"[15].

14. Published May 2013 by Navigant Economics and the GSMA
15. FCC, In the Matter of Applications of Deutsche Telekom AG, T-Mobile USA, Inc., and MetroPCS Communications, Inc. for Consent to Transfer of Control of Licences and Authorizations, Memorandum Opinion and Order and Declaratory Ruling, WT Docket No. 12-301 (March 12, 2013)

1.5.5

ECONOMIC SLOWDOWN
A FURTHER DRAG

Historically there has been a clear correlation between GDP growth and mobile revenue growth in Europe, with a significant part of mobile revenues sensitive to changes in usage patterns. The recent economic crisis and ongoing slowdown in Europe has been one of the key factors contributing to the current revenue declines that the industry is facing. The economic outlook in Europe remains challenging, with the latest forecasts from the IMF suggesting a further modest contraction in growth in 2013 before a return to growth in 2014. Figures for Europe as a whole also mask the significant variation in growth rates across the region, with for example Greece seeing a 6.4% decline in 2012 and Italy a 2.4% decline. Similarly, private consumption, more closely correlated with consumer spending on mobile services, has been under significant pressure in markets such as Spain. It is these southern European markets that are seeing the greatest macro pressures, which are also seeing the most significant declines in mobile service revenues.

EU GDP TRENDS & RECURRING MOBILE REVENUE GROWTH
(YoY %)
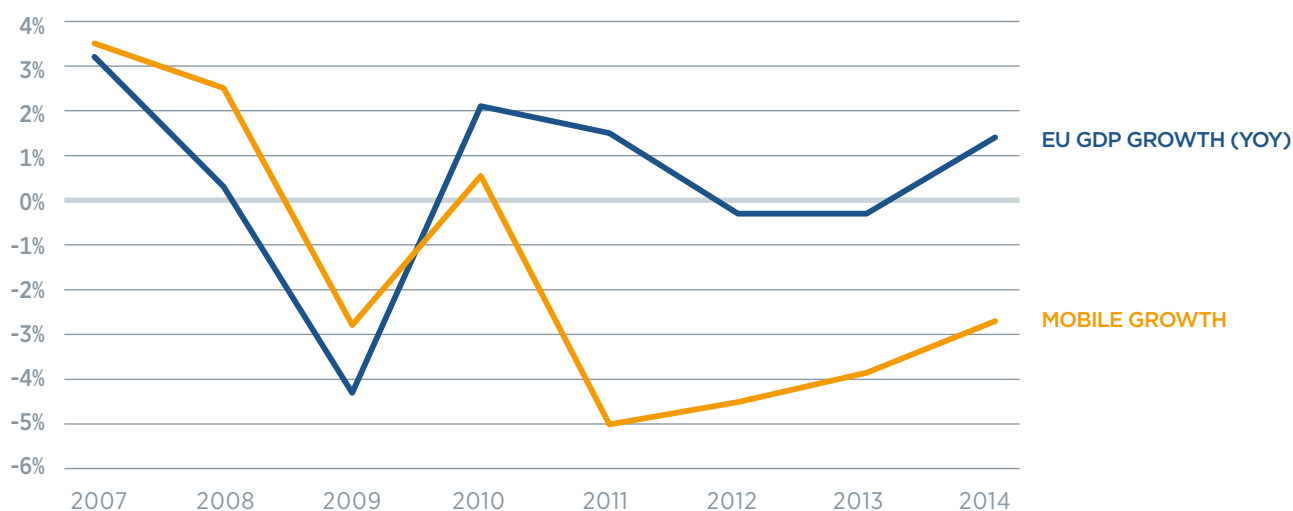
Source: Eurostat, GSMA Intelligence

However, the economy is only one of the factors contributing to revenue declines, and whilst an improvement in the economic outlook should reduce some of the revenue pressures facing the industry; it is unlikely in itself to allow a return to revenue growth for the mobile industry in Europe.

1.5.6

IMPACT OF ONLINE MESSAGING SERVICES

The European mobile market continues to evolve at a rapid pace, particularly with regard to the new opportunities and business models that mobile broadband and smartphones are providing. There have been a number of new entrants into the market that have moved rapidly to take advantage of the new opportunities, particularly with regard to new online messaging services.

With rising smartphone penetration in Europe, online messaging services such as Viber and WhatsApp have seen exponential growth in Europe over the last couple of years. Other applications such as iMessenger convert SMS to IP messages, while there are a growing range of VOIP applications (for both personal and business users) that are impacting call volumes.

In some markets we have seen material impacts on messaging volumes and ARPUs. One example is KPN in the Netherlands, where the company reported in 2011 a 13% decline in consumer mobile revenues, with the impact of new messaging and related services making a material contribution to this decline. The impact was also evident at the country level, with data from OPTA (the Dutch regulator) showing that in 2011 SMS total volumes fell by 5%, a sharp reversal from the 27.1% growth recorded in the previous year. One specific messaging application (WhatsApp) appeared to have a particular impact on KPN, with the operator stating that around 85% of its "Hi" brand subscribers were using the application.

Analysis by GSMA Wireless Intelligence[16] showed that for a sample of 19 developed market operators (16 of which were in Europe), revenues from messaging services began to flatten out in the second half of 2011, before beginning to decline in the first half of 2012. Ten of the European based operators reported messaging revenue declines in the quarter. There is a particular issue in Spain, where the two leading operators (Vodafone and Movistar) reported falling messaging revenues every quarter from 2010 until mid-2012.

16. "SMS and the challenge of over-the-top messaging"; November 2012

MESSAGING REVENUES
(€B)

4.04 Q3 2011

4.04 Q4 2011

4.03 Q1 2012

4.00 Q2 2011

4.00 Q2 2012

3.96 Q1 2011

Source: GSMA Intelligence
Note: data for 19 selected operators, rolling annual average

At the last Mobile World Congress in Barcelona, a number of MO CEOs raised the issue that online messaging services are able to benefit directly from operator investments in network quality and speed, without incurring any of their own costs. The CEO of Viber, Talmon Marco, has stated that the company incurs monthly running costs of just US$200,000, despite reporting over 175m users in the first quarter of 2013. This highlights the attractiveness of the business model for these new applications, but the mobile operators themselves still have the ongoing cost of maintaining and investing in the networks on which these applications depend.

However, the growth of these new services, which has gone hand in hand with rising smartphone penetration in Europe, has created a dilemma for the industry. The enormous growth in third party applications is one of the key drivers of increasing demand for mobile data services, and messaging services are just one facet of this growth in the broader mobile ecosystem. Rising smartphone penetration, which is the highest in Europe of any region, allows operators to continue to grow mobile connectivity revenues. However, operators need to respond to threat to legacy revenues in a slightly more creative manner than has happened to date.

While some operators have responded either by seeking to limit access to services on their networks, others have responded by launching their own messaging services, either on an individual or collaborative basis.

1.5.7

REVENUE DECLINES AND COMPETITION REDUCING INDUSTRY PROFITABILITY

With revenues declining, competitive pressures still high and a weak economic backdrop; it is little surprise that mobile operators in Europe are also seeing pressure on profitability. Margins across the sector have decline steadily in recent years, with an average decline of almost seven percentage points over the last six years. With top line and margins both under pressure, this means that the absolute industry EBITDA is falling in Europe, a trend that is apparent in almost every country (Sweden is one of the few markets to see EBITDA increasing). There are a number of countries currently seeing double digit declines in EBITDA, including most of the Southern European markets (with France seeing the largest decline at over 20% year-on-year in the second half of 2012).

MOBILE WEIGHTED AVERAGE EBITDA MARGINS (EUROPE)
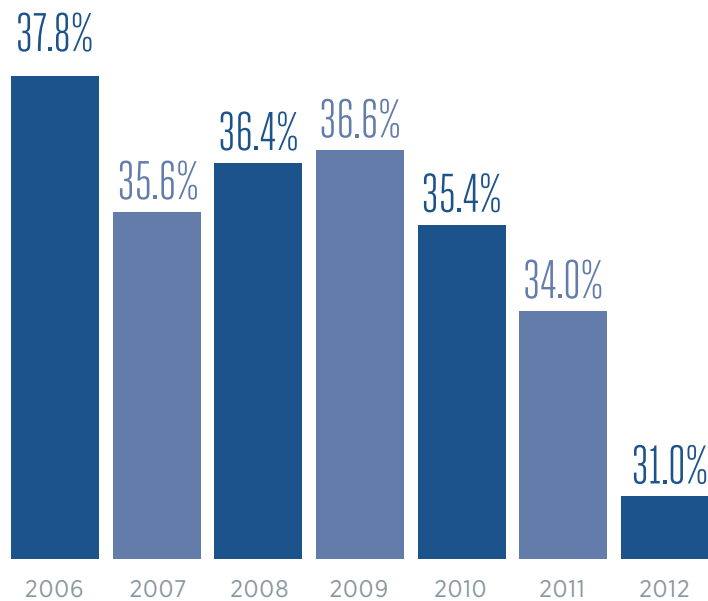
Source: Wireless Intelligence

Operators are responding to these pressures with a range of measures to reduce their cost base and to maintain profitability. These include a move to reduce subscriber acquisition costs (lower subsidies, including the trend towards SIM only contracts and rationalising shop networks); as well as moves to reduce operating costs (headcount cuts; outsourcing; and renegotiating contracts with key suppliers). However, to date such moves have proved insufficient to offset the impact of revenue declines and competition, with the likelihood that industry profitability will continue to decline, at least in the short term.

1.6

Europe beginning to lag other developed markets

As we have seen, Europe leads the world in terms of overall mobile penetration levels, whether viewed in terms of the headline number of SIM connections or unique subscribers. Europe has also been at the forefront of the take up of 3G services, with nearly 70% penetration of 3G services against 62% in North America. However, "the EU mobile wireless market is underperforming relative to other advanced economies, including the U.S. We find that the EU is lagging well behind the U.S. in deployment of next generation wireless infrastructures and the advanced services they make possible, and that EU consumers are worse off as a result[17]."

These concerns are not new, and have been recognised by policy makers at the European level. In May 2008, Commissioner Viviane Reding warned in an important speech that the EU was losing its lead in mobile wireless: "Growth [in mobile wireless] has been faster in the U.S., particularly in mobile services [which are] growing more than three times faster in the USA than in Europe. Despite our widely applauded leadership in rolling out the 2nd Generation services we seem to be lagging behind on moving to the mobile web."[18]

17.   "Mobile Performance in Europe and the U.S.", published May 2013 by Navigant Economics and the GSMA
18.   Viviane Reding, "Europe on the Way to a High Speed Internet Economy" (May 8, 2008)

1.6.1

OTHER IMPLICATIONS: HIGHER CAPEX AND USAGE LEVELS IN US VERSUS EUROPE

The deployment of new telecommunications infrastructures depends on investment, which in turn is largely a function of industry profitability and cash flows. With both revenues and EBITDA showing absolute declines in Europe, and the economic outlook uncertain, it is perhaps little surprise that capex has also been falling. Falling EBITDA translates into even larger percentage declines in operating cash flows for operators, at a time when a number of operators have also seen credit ratings under pressure which has obliged them to focus cash flows on debt reduction.

The following chart shows the divergence between the level of capital expenditures on wireless infrastructure in the US (North America) and Europe. Whilst capex in Europe declined for the period 2008-12 (the modest increase in 2011 mainly relates to the impact of spectrum auctions), capex in North America showed significant growth over the period. Going forward these trends are broadly expected to continue, with further near term declines in investment in Europe before a stabilisation (at lower levels), with North American capex remaining close to current levels.

MOBILE OPERATOR INVESTMENT
US$ B

EUROPE
NORTH AMERICA

Year	Europe	North America
2008	29.6	21.3
2009	26.2	20.99
2010	27.3	24.2
2011	30.2	25.9
2012	27.6	29.4
2013	26.3	28.5
2014	24.3	28.5
2015	23.8	29.1
2016	23.6	29.3
2017	23.3	29.5
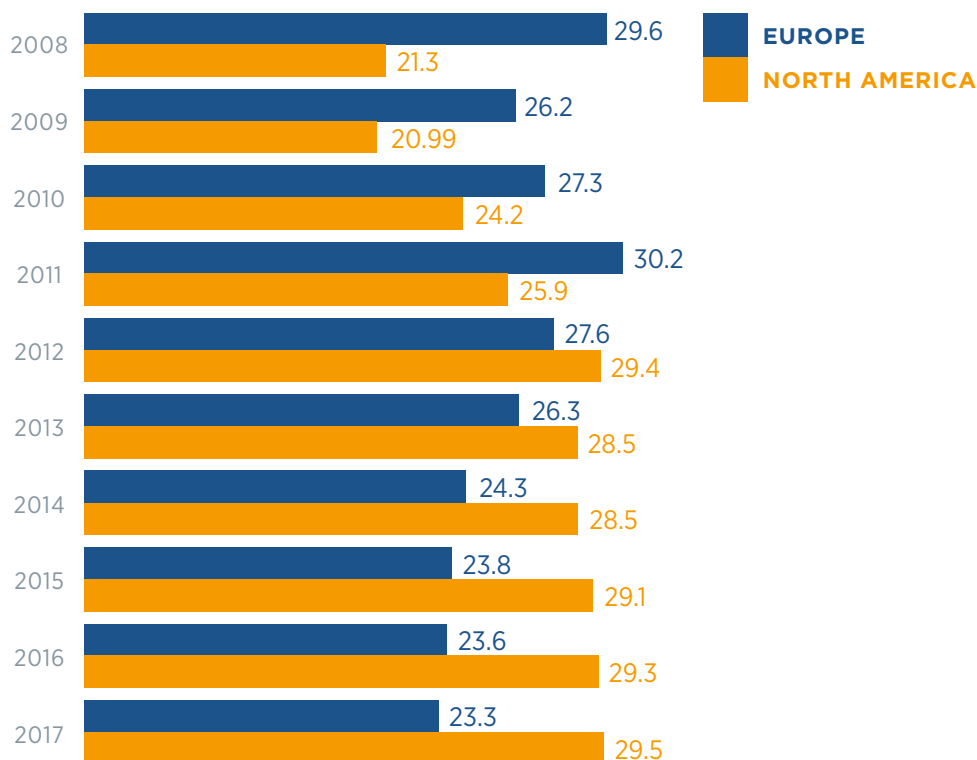
Wireless Matrix, A.T. Kearney analysis

The higher capex levels in the U.S. (and faster LTE deployments) means that U.S. data speeds are now on average faster than those in Europe, and the gap is expected to grow. Cisco reports that average mobile data connection speeds in North America in 2012 were about 75% faster than those in Europe (2.6 MBps versus 1.5 MBps), and projects that the gap will expand going forward. By 2017, average mobile connection speeds are projected to exceed 14 MBps in North America, compared to 7 MBps in the EU[19]. The data for Asia-Pacific region covers a diverse range of markets, including the technologically advanced markets of South Korea and Japan. Research by Akami has found that South Korea currently has the highest connection speeds at 14.7MBps, followed by Japan on 10.7MBp[20], which puts both markets well ahead of the European data speeds.

MOBILE DATA AVERAGE CONNECTION SPEEDS
BY REGION, 2012 AND PROJECTED 2013-2017

NORTH AMERICA
WESTERN EUROPE
CENTRAL & EASTERN EUROPE
ASIA-PACIFIC

14,399 kbps
7,013 kbps
4,760 kbps
3,036 kbps

2,622 kbps
1,492 kbps
551 kbps
316 kbps

2012 — 2017
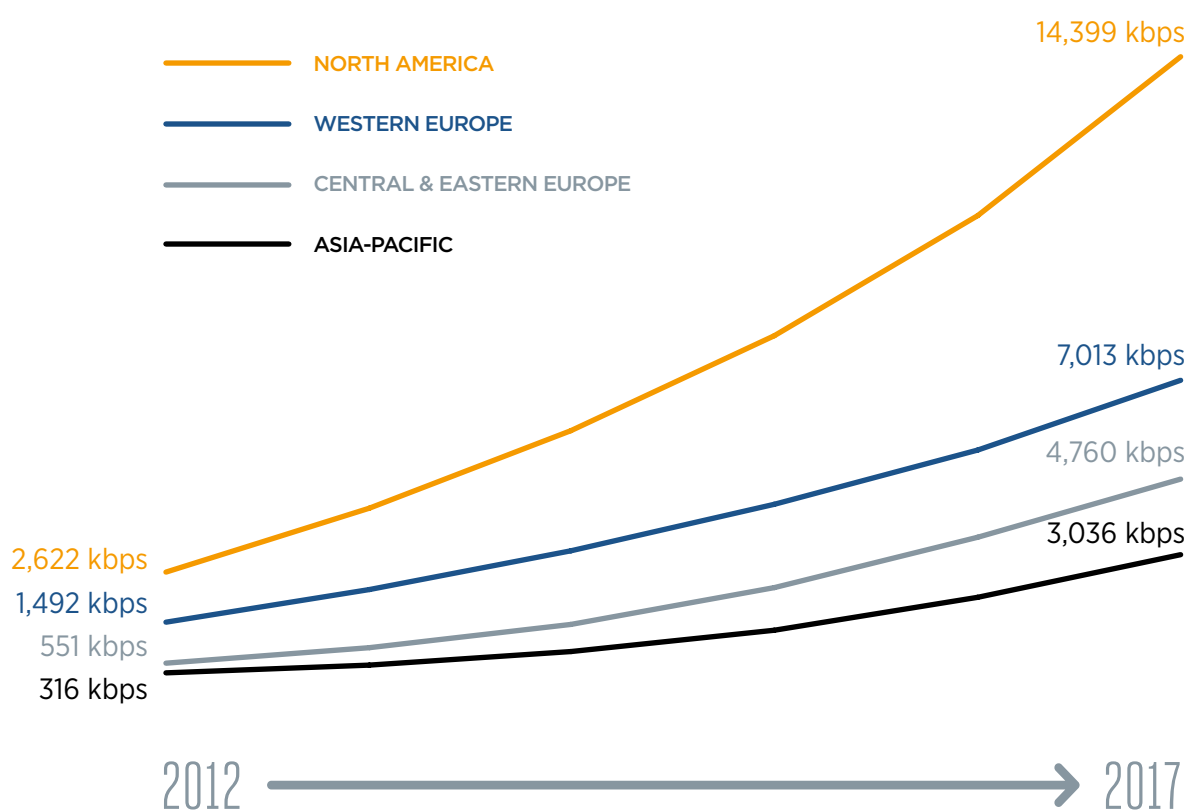
Source: Cisco VNI Mobile Forecast (2013)

19. Cisco VNI Mobile Forecast (2013)
20. http://www.akamai.com/stateoftheinternet/

While EU consumers pay less per month, U.S. consumers use mobile services more intensively, spending more time on the phone and downloading more data than in the EU. As shown in the chart below, U.S. consumers use 901 voice minutes per month, more than five times the European average of 170 minutes. Similarly, as shown in the chart below, data from Cisco's Visual Networking Index shows that mobile wireless data use per connection in the U.S. is significantly higher than in the EU: in 2013, Cisco projects U.S. customers will use nearly twice as much data per connection as customers in the EU[21].

VOICE MINUTES OF USE PER SUBSCRIPTION
2012

901 MINUTES

170 MINUTES

U.S. CONSUMERS USE MORE THAN 5 TIMES THE EUROPEAN AVERAGE

Source: Merrill Lynch Global Wireless Matrix 4Q12 (hereafter, "Global Wireless Matrix")

MEGABYTES OF DATA TRAFFIC PER CONNECTION
2011 - 2013

EUROPE   UNITED STATES

188MB 307MB 273MB 480MB 415MB 810MB

2011   2012   2013

U.S. CUSTOMERS WILL USE NEARLY TWICE AS MUCH DATA PER CONNECTION AS CUSTOMERS IN THE EU
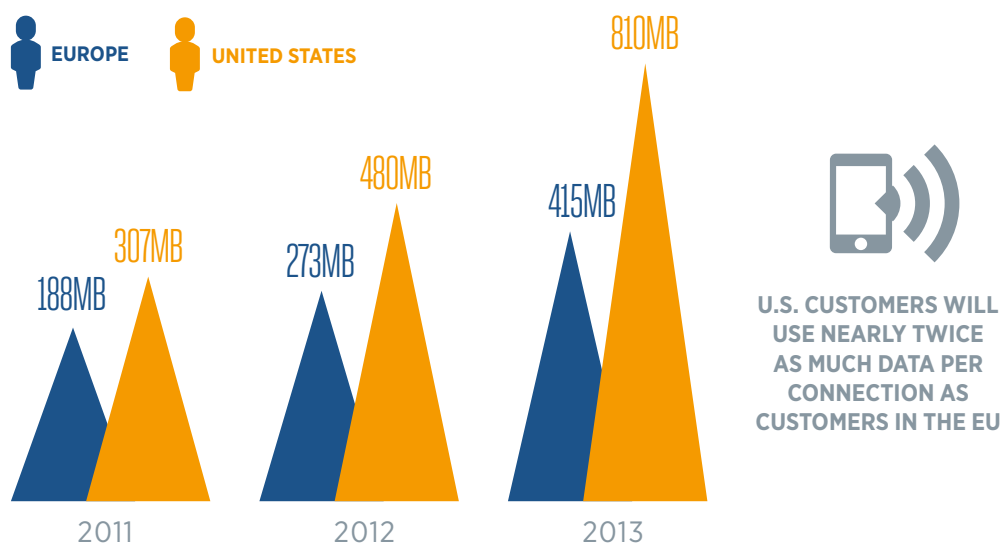
Source: Cisco VNI

21. Cisco's Visual Networking Index

1.6.2

LTE DEPLOYMENTS: EUROPE NOW TRAILING THE US AND OTHER DEVELOPED MARKETS

Despite Europe seeing some of the first LTE deployments globally, at the end of 2012 LTE to date accounted for less than 1% of total connections in the region. This is in contrast to the situation in the US, where 11% of connections are already LTE devices (a figure that is only surpassed globally by South Korea, where LTE accounts for 28% of total connections).

Today, the 800 MHz band is used in less than 10% of commercially launched LTE networks in the EU27 region (mainly in Germany and Sweden). Commercial LTE services will remain largely focused on the 1800 MHz and 2600 MHz bands in the region until 2015, which implies coverage limitations as these bands only allow operators to efficiently cover the main urban areas where data traffic is dense.

STATUS OF SPECTRUM ASSIGNMENT FROM THE DIGITAL DIVIDEND

- ALREADY ASSIGNED
- PLANNED H2 2013
- PLANNED H2 2014
- PLANNED H2 2015
- UNKNOWN
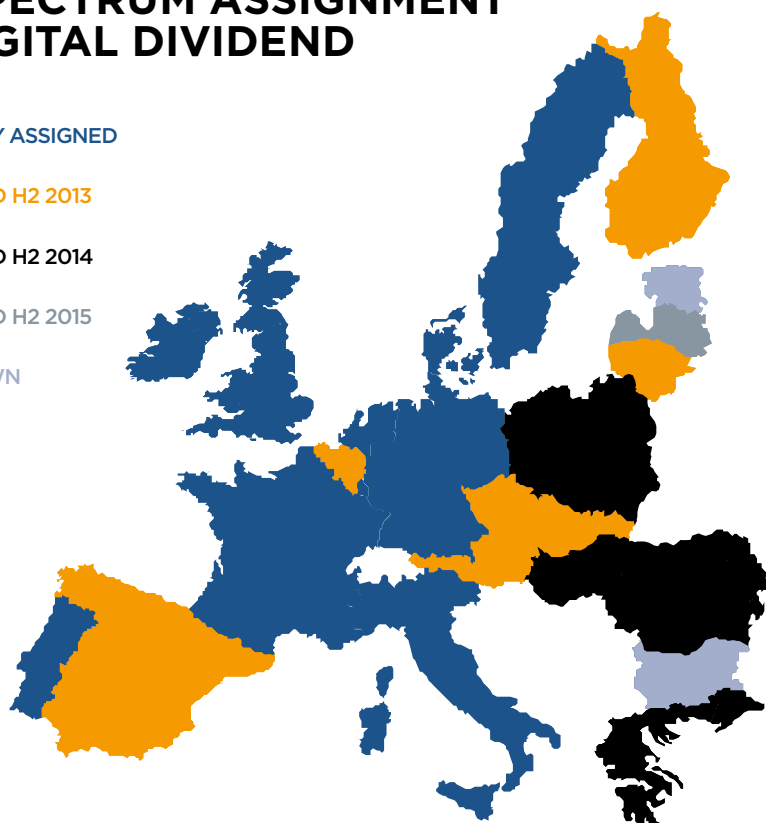
European Union (EU27) digital dividend assignment plan, as of 1 January 2013.
Source: European Commission, GSMA Intelligence.

LTE has the capability to drive further data demand and in turn, with the appropriate pricing models, to potentially address some of the revenue pressures facing the industry in Europe. This also brings benefit to consumers in terms of access to higher speed data, as well as adjacent industries that are able to offer new and innovative services on the LTE platform.

CONNECTED LIVING

GROWTH

2012 **261B**
Mobile contribution of **€261B** to GDP and **€53B** to tax

2020 **119B**
Potential with timely delivery of Digital Dividend spectrum to contribute an additional **€119B** to GDP by 2020

Smart City
2020 **4 Billion**
Revenue opportunity of **€4B**

mAutomotive
2018 **4 Billion**
€4B revenue opportunity

✚ mHealth
99 Billion
Scope to save **€99B** in healthcare costs

mEducation
2020 **6.9 Billion**
Market value of up to **€6.9B**

mCommerce
2017 **19 Billion**
Market revenues of **€19B**

JOBS

2020 **156 000**
Potential with timely delivery of Digital Dividend spectrum for mobile to support a further **156,000** jobs

2012 **390k**
Mobile industry supports **390k** direct jobs

mEducation
Improve eduational performance & reduce number of school drop outs

✚ mHealth
2017 **93 Billion**
Adding **€93** billion to EU GDP by 2017 by having a healthier and more productive workforce

Private investment, enterprise and innovation will be vital for building a Connected Europe, and this depends on a number of key partnerships.

INNOVATION

2012
28B

Mobile industry investment of **€28B**

Embedded mobile connectivity will create further opportunities for innovation across the economy

mCommerce

2017
19 Billion

mCommerce and NFC creating new and secure payment methods; market opportunity of **€19B**

mAutomotive
2500 Lives

eCall to reduce road fatalities saving upto **2,500** lives annually

mHealth
185 Million

Help **185m** people in Europe live healthier lives

mIdentity
270 Billion

Scope to reduce identity fraud and associated costs (global cost to business of **€270**B)

SUSTAINABILITY

20-25%

Mobile Energy Efficiency Network Benchmarking Service that provides a measure of network energy efficiency, emissions and energy savings of up to 20-25%

Smart meters to reduce emissions

Applications to manage congestion

Parking and city services (Amsterdam shopping centre cut CO2 emissions by a two thirds)

Fleet telemetrics improve fleet management and reduce fuel consumption and CO2 emissions

02.

Connected Europe: the third wave potential

The third wave of mobile communication – using mobile networks to bring connectivity to a wide range of devices – is fast becoming a reality. The mobile industry in Europe has evolved beyond the provision of basic voice and data services to offer high speed broadband internet access and data connectivity. We are now seeing a new wave of connectivity, beyond tablets and laptops; to connected cars and buildings, amongst others.

This creates the opportunity for a new form of connected living, connecting people and things across the world, both in our personal and business lives. Mobile networks enable a host of innovative products and services that benefit consumers and businesses across a growing number of sectors. This is what the GSMA refers to as the "Connected Life". This has the potential to further expand the mobile ecosystem in Europe; to develop new services and applications that will bring real benefits to consumers; as well as to make meaningful social impacts in areas such as health and education.

Despite the current challenges that we outlined in the previous section, the mobile industry remains a key pillar of the European economy; this is evident both through the direct impact of mobile industry ecosystem, and through the indirect role that mobile technologies are playing in adjacent industry sectors. The growth and the benefits of the mobile industry to date have been phenomenal, with European mobile now comparable in size to the aerospace industry, and larger than pharmaceuticals.

The mobile ecosystem (both directly and indirectly) contributed around 2.1% of European GDP in 2012. In addition, there are 390,000 jobs supported directly by the mobile industry, with a total of €53B contributed to public funding (even before considering regulatory fees, where receipts from spectrum auctions alone in the last two years have totalled over €17B). In addition, the industry delivers tangible social benefits across a range of other areas, including the environment, health, and education.

There is the scope to unleash much greater socio economic impact via mobile technology in the coming years, especially if issues around the timing of spectrum availability in the upper Digital Dividend band (the 800MHz band) are addressed. This spectrum could generate up to €119B of incremental GDP over the period to 2020, producing €23B of additional tax revenues and supporting up to 156,000 new jobs across the region (if all EU countries met the original 2013 deadline to release the spectrum for mobile data). However, these benefits will be substantially lessened if a number of countries delay releasing this spectrum until 2017, which could reduce the overall GDP benefit in 2020 by €16B and the number of new jobs by 67 000.

The mobile industry has the potential to deliver even greater benefits and play a leading role in helping the EU to meet the growth, jobs, sustainability and innovation objectives set out in the EU 2020 strategy. Unleashing the potential of the third wave becomes even more critical at a time when Europe is struggling with high unemployment and low growth. Machina estimates the total Connected Life market revenue opportunity at over €234B in Europe by 2020[22], which includes network improvements and innovative new applications, as well as the scope to make material cost savings. mHealth services alone have potential to deliver cost savings in healthcare delivery of up to €99B, whilst adding €93B to European GDP by 2017, as well as addressing issues around quality of life and mortality rates for millions of people. However, without continued investment and growth in mobile networks, facilitated by a supportive regulatory environment (as described in the following chapter), then the full range of socioeconomic benefits will not be fully realised.

22   http://connectedlife.gsma.com/the-connected-life-a-usd4-5-trillion-global-impact-in-2020/

2.1

The third wave of mobile

Europe has experienced successive waves of mobile connectivity. The first wave connected people on the move, with Europe leading the way with the success of the GSM standard. The second one brought mobile broadband at higher data speeds to hundreds of millions of individuals and businesses in Europe, with 3G services now available on a near ubiquitous basis. We are now seeing the third wave with mobile networks delivering connectivity to a broad range of devices, allowing the development of innovative new services and applications.

This is bringing a new wave of connectivity, beyond tablets and laptops; to connected cars and buildings; TVs and game consoles; smart meters and traffic control; with the prospect of connecting almost anything and anyone. Machine to machine ("M2M") connectivity is the ability of devices to communicate with each other independent of any human input (also referred to as the "internet of things"). M2M is a key facet and one of the largest components of the third wave, though the potential for new applications and services extend beyond M2M opportunities.

The number of connected wireless devices globally is forecast by Machina to increase from an installed base of 9 billion in 2010 to 24 billion by 2020, surpassing the number of mobile handsets[23]. Europe will play a leading role in this growth, with the number of connected devices in Europe reaching almost 6 billion by the same date, around a quarter of the global total. Machina estimates that the total "Connected Life" addressable market in Europe could be as large as US$305B by 2020[24].

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23. Includes non-cellular wireless connections
24. http://connectedlife.gsma.com/the-connected-life-a-usd4-5-trillion-global-impact-in-2020/

NUMBER OF CONNECTED DEVICES EUROPE
(M)

Year	Value
2011	1973
2012	2162
2013	2405
2014	2707
2015	3094
2016	3545
2017	4038
2018	4585
2019	5180
2020	5813
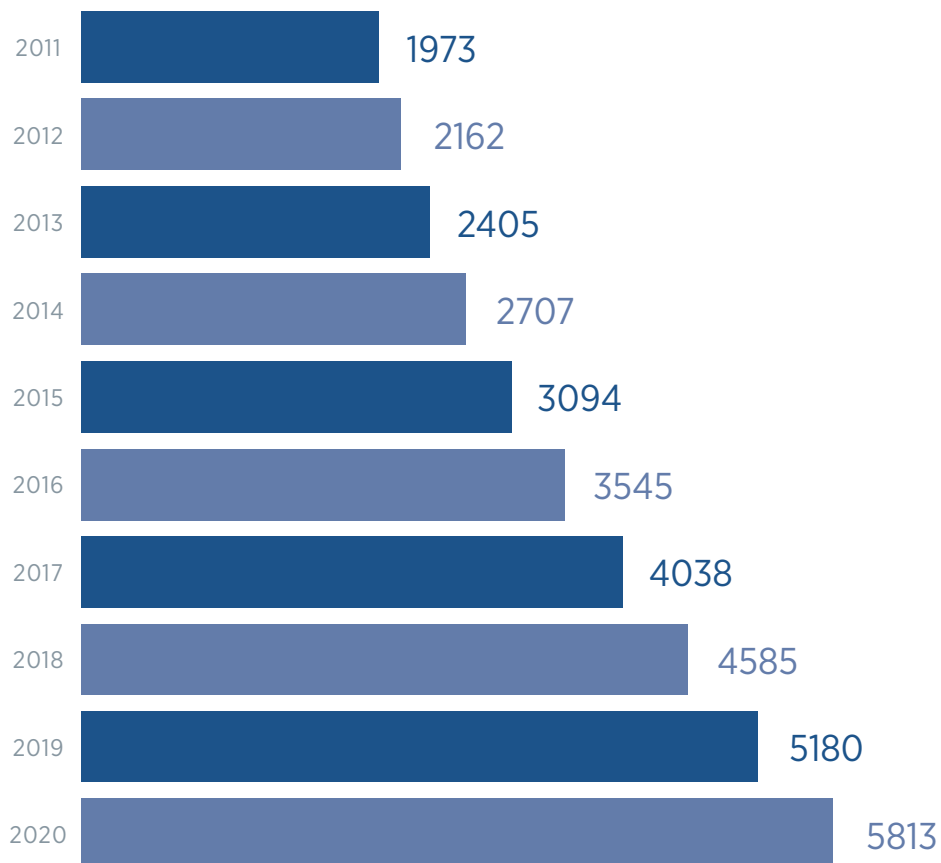
Source: Machina

A Connected Europe, based on eMBedded mobile connectivity, will fuel further growth by enabling new business models and providing new market and revenue opportunities across many sectors of the economy. The opportunity for mobile operators extends beyond basic connectivity, through stewardship services and platform innovations. Similarly, there are significant opportunities for new business models and revenue streams, across a range of vertical industries extending far beyond the current mobile ecosystem. As well as contributing directly to growth and employment, these can deliver a range of benefits to society, in areas such as healthcare and education.

2.2

Delivering the EU's Objectives

Europe 2020 is the European Union's ten-year growth strategy, originally proposed in 2010 in response to the economic slowdown in Europe -"it is about more than just overcoming the crisis which continues to afflict many of our economies. It is about addressing the shortcomings of our growth model and creating the conditions for a different type of growth that is smarter, more sustainable and more inclusive[25]." As part of the 2020 agenda, the EU also identified several key initiatives, one of which is the "Digital Agenda" for Europe.

The Digital Agenda for Europe recognises the key role for the ICT sector (of which the mobile industry is a key component) in driving growth and productivity in Europe. The potential of mobile to drive growth is of even greater relevance at a time when "unemployment is at unacceptable levels in many countries"[26] and where the Commission forecasts further contraction in the European economy in 2013. Implementation of the Digital Agenda is intended to be a key contributor to achieving Europe's 2020 strategy for smart, sustainable and inclusive growth.

25. European Commission: EU 2020 website
26. https://ec.europa.eu/digital-agenda/sites/digital-agenda/files

With the right support from policy makers, both at the national and European level, the mobile industry has the potential to help implement the Digital Agenda and to meet four of the key challenges facing Europe today:

GROWTH

Driving growth through network investment, job creation and contributions to public funding, including through taxes and licence fees, as well as by transforming other industries

JOBS

Generating further employment opportunities beyond the 390,000 direct jobs already created by the industry

INNOVATION

Providing a platform to spur innovation across all sectors and the economy as a whole

SUSTAINABILITY

Supporting sustainability by limiting its own carbon emissions and helping reduce the carbon footprints of other industries

Private investment, enterprise and innovation will be vital for building a Connected Europe, and this depends on a number of key partnerships. These include the partnership between the mobile industry itself and adjacent industries that use mobile as a platform to offer content and services; and between the mobile industry and government (at both a national and European level), to ensure a supportive policy approach that helps address the key challenges facing the industry.

2.3

Direct Impact of the Mobile Ecosystem on the European Economy

The mobile industry already makes a substantial contribution to the European economy in terms of employment, jobs, growth and its contribution to public funding. This includes the direct contribution of the mobile operators themselves, as well as the broader mobile ecosystem which includes other players such as handset and network equipment suppliers, as well as content and service providers. The growth of the European mobile industry has enabled the development of a number of global industry champions. Both Vodafone and Telefónica rank amongst the top five operators globally in terms of the total number of connections across their global footprints. Nokia remains one of the world's leading manufacturers of mobile handsets, while Ericsson in 2012 was the world's number one supplier in both the general mobile equipment market as well as LTE equipment specifically[27].

In addition, there is the contribution that mobile makes to a range of adjacent industries, both those that use mobile as a platform to offer a range of additional services, as well as those that use mobile services to drive improved productivity and growth.

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27. http://hugin.info/1061/R/1683948/551252.pdf

2.3.1

CURRENT CONTRIBUTION TO ECONOMIC GROWTH

Mobile already makes a material contribution to the economy in Europe. In 2012, mobile contributed 2.1% to overall GDP across Europe. This includes a direct contribution from the mobile ecosystem of €114B (0.9% of GDP), measured on the basis of "value add" (estimated as gross profit, or revenue less direct cost of sales).

2012 GDP CONTRIBUTION OF MOBILE ECOYSYTEM
[€ B]
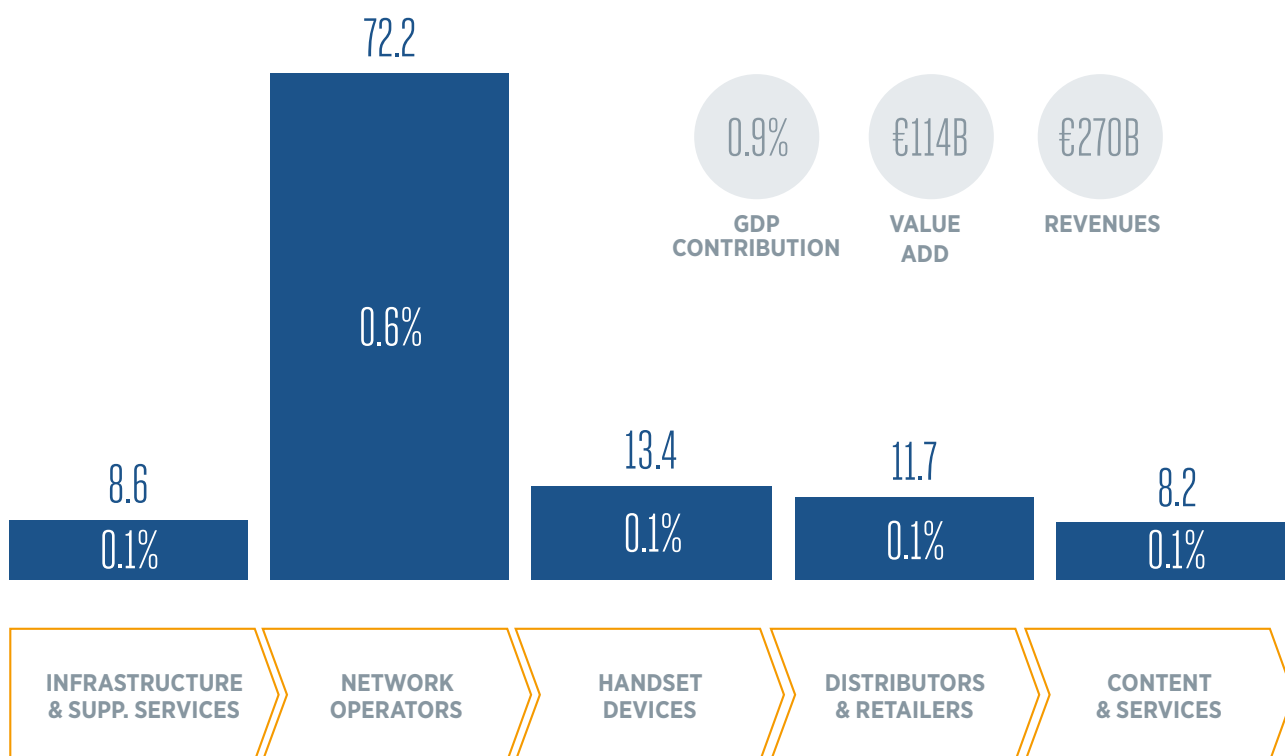
Source: GSMA Intelligence; Orbis; Gartner; IE Market research; Annual reports; BCG Analysis

An additional 1% in gross domestic product (GDP) accrues to European countries from the increased productivity for "highly mobile " workers (estimated at 25% of EU workers in 2012) which is brought about by their use of mobile technology, equivalent to a further €125 billion contribution to GDP. Finally, there is a 20% uplift effect from the mobile ecosystem, which accounts for the broader range of good and services in the economy used by the mobile ecosystem (such as office space, maintenance etc.). This translates to a total GDP impact from mobile industry of nearly €261 billion in 2012, which is 2.1% of Europe's GDP.

2012 GDP IMPACT
[€ B]

72	42	23	125	261
0.6%	0.3%	0.2%	1.0%	2.1%
MOBILE OPERATORS	RELATED INDUSTRIES	GENERAL ECONOMY	PRODUCTIVITY INCREASE	TOTAL IMPACT
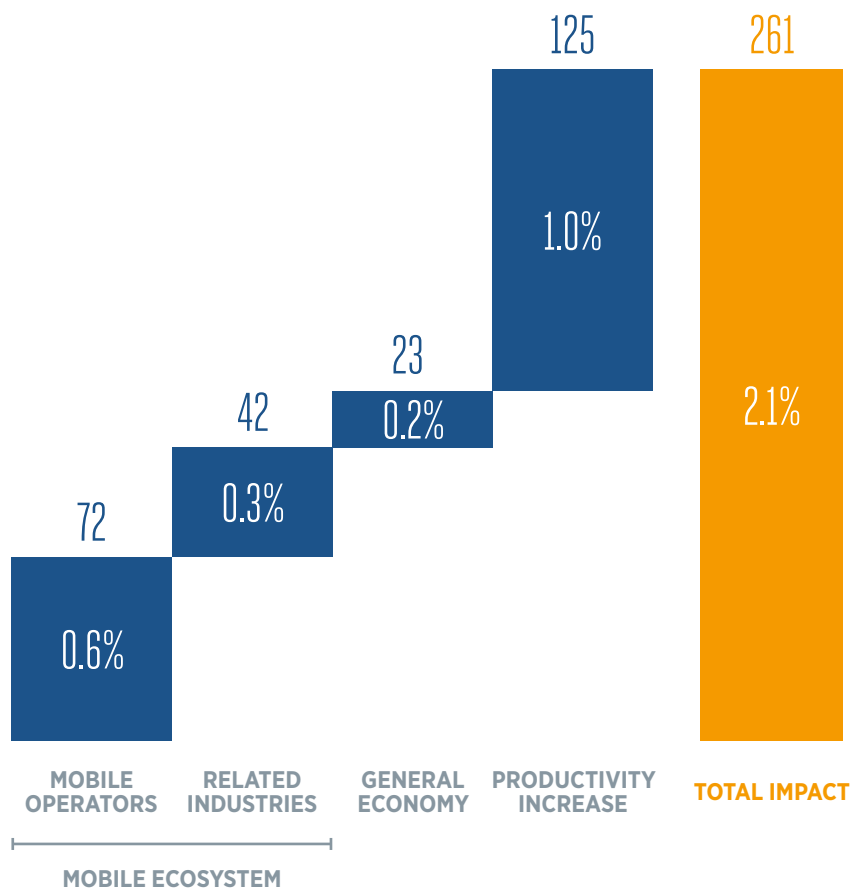
MOBILE ECOSYSTEM

Source: GSMA Intelligence; EIU; GSMA; BCG analysis

Total GDP impact from mobile industry of nearly

€261 BILLION

in 2012, which is 2.1% of Europe's GDP.

The mobile ecosystem contributed directly about 394,000 jobs across Europe in 2012. The main portion of this comes from the network operators themselves (which still supports 230,000 jobs despite recent cost cutting pressures in the mobile industry), and with significant contributions also from infrastructure and support services, as well as distributors and retailers.

2012 JOBS
[Thousand]
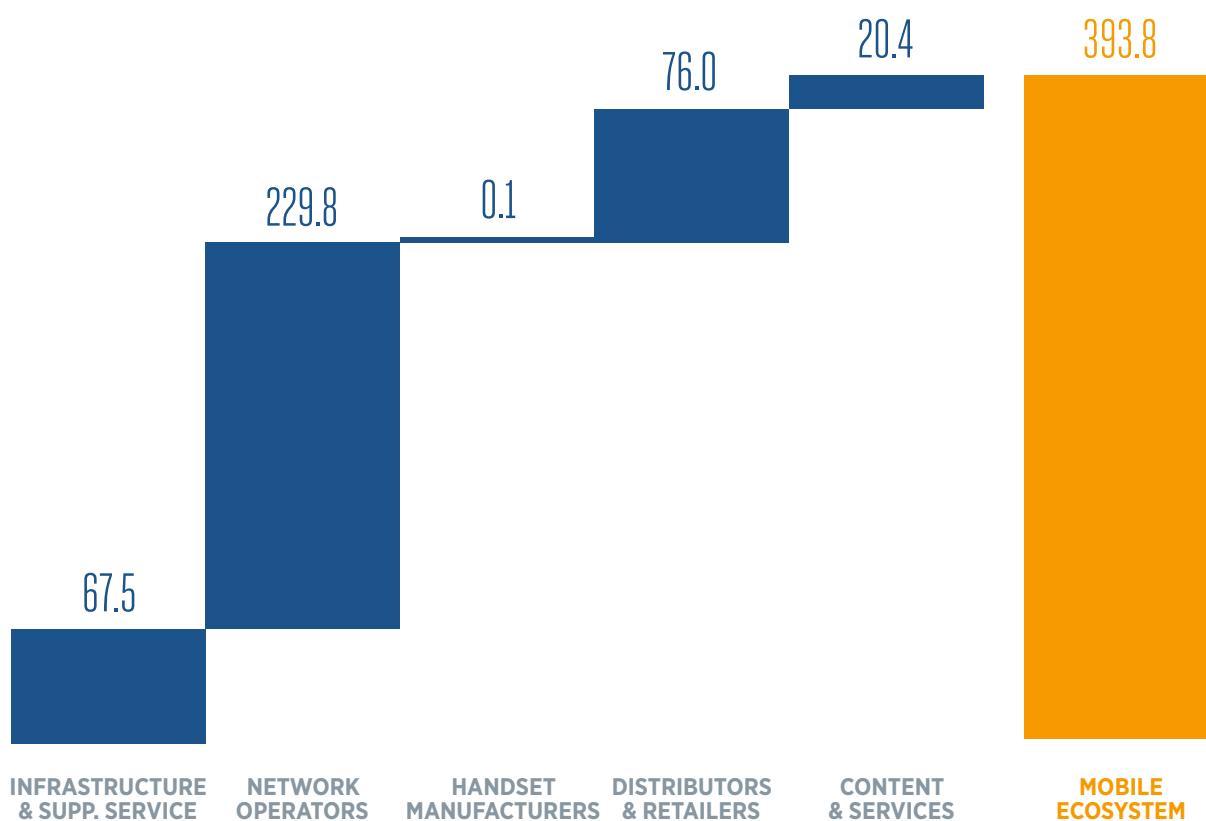
INFRASTRUCTURE & SUPP. SERVICE	NETWORK OPERATORS	HANDSET MANUFACTURERS	DISTRIBUTORS & RETAILERS	CONTENT & SERVICES	MOBILE ECOSYSTEM
67.5	229.8	0.1	76.0	20.4	393.8

Source: GSMA Intelligence

The mobile ecosystem contributed directly about

394,000
jobs across Europe in 2012.

The mobile ecosystem also contributes significantly to public funding in Europe, even when not considering spectrum and other regulatory fees. Payments come from a range of areas including VAT and other indirect taxes, corporation tax, social security and other employment taxes, as well as income taxes. The overall contribution in 2012 was around €53 billion. Mobile operators have also contributed substantially to EU public finances, with payments of over €100B for 3G license fees in the early 2000s. More recently, operators have paid over €17B, mainly for 4G licences, since the beginning of 2011.

2012 PUBLIC FUNDING
[€ B]
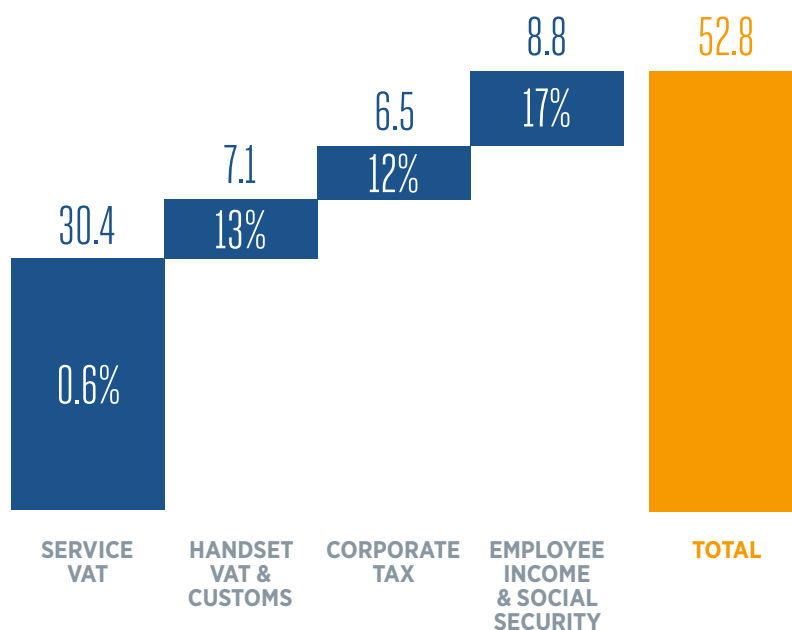
	SERVICE VAT	HANDSET VAT & CUSTOMS	CORPORATE TAX	EMPLOYEE INCOME & SOCIAL SECURITY	TOTAL
Value	30.4	7.1	6.5	8.8	52.8
Percent	0.6%	13%	12%	17%	

Source: GSMA Intelligence

The mobile ecosystem also contributes significantly to public funding in Europe. The overall contribution in 2012 was around

€53 BILLION

Going forward, the mobile industry will make a growing contribution to economic growth and job creation in Europe. By 2020, the mobile ecosystem is forecast to contribute €335B to the region's economy, equivalent to around 2.2% of the EU's GDP. In addition, by 2020 the mobile ecosystem will be contributing €61B to public finances in the EU, as well as supporting over 440k direct jobs. These forecasts are based on the assumption that mobile revenues and the contribution to GDP will grow in line with mobile penetration rates, but also that the ongoing substitution from 2G to 3G penetration increases GDP per capita growth rates[28].

GDP CONTRIBUTION OF MOBILE ECOSYSTEM WILL INCREASE FURTHER
[€ B]
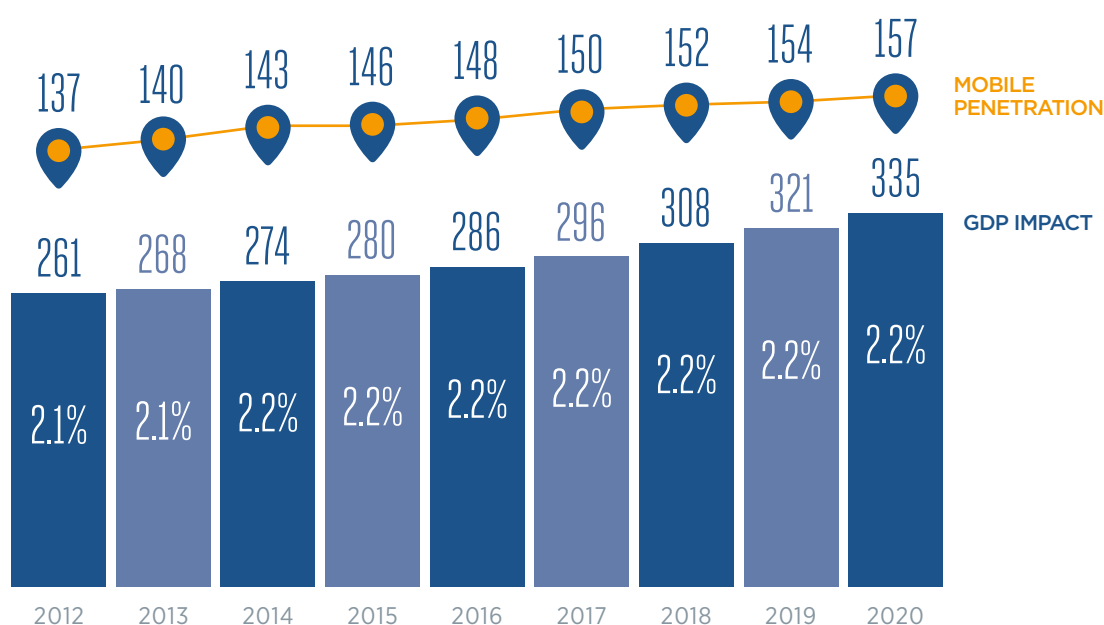
Source: GSMA Intelligence; EIU; OVUM; BCG analysis
Note: in constant 2012 GDP, discounted by Consumer Price Index

28. GSMA /Deloitte study (2012): "What is the impact of mobile telephony on economic growth"

2.3.2

POTENTIAL FURTHER CONTRIBUTION WITH FULL ACCESS TO UPPER DIGITAL DIVIDEND BAND

The expected strong growth in mobile data volumes in Europe (as we discussed in the first section of this report) will put increasing pressure on network capacity, meaning that operators will need access to additional spectrum. The 790-862 MHz band (the "800 MHz band") has particular characteristics that allow cost-efficient mobile broadband roll-out, particularly in rural areas. Given the importance of a timely and harmonized roll-out, the European Union committed to the Radio Spectrum Policy Programme, outlining the release of the 800 MHz band to mobile broadband across EU27 by January 2013.

However, fourteen of the twenty seven EU countries have asked for derogations (delays) in the release of this spectrum. The EU initially agreed to nine of these, with delays up to December 2015, with further delays to be potentially granted on an annual basis. For individual countries, these delays will further impair the development and rollout of LTE networks, while it may also cause interference with neighboring countries, and thus also hinder their development.

ALLOCATION OF DIGITAL DIVIDEND TO MOBILE

	DEROGATION DATE
CZECH REPUBLIC	31.12.2013
LITHUANIA	30.06.2013
AUSTRIA	31.12.2013
SLOVAKIA	REFUSED
FINLAND	01.01.2014
SPAIN	01.01.2014
ROMANIA	05.04.2014
GREECE	01.10.2014
POLAND	30.06.2014
SLOVENIA	30.06.2014
HUNGARY	31.12.2103
CYPRUS	31.12.2015
MALTA	31.12.2014
BULGARIA	~2017

ON TRACK

DELAY

NON-EU
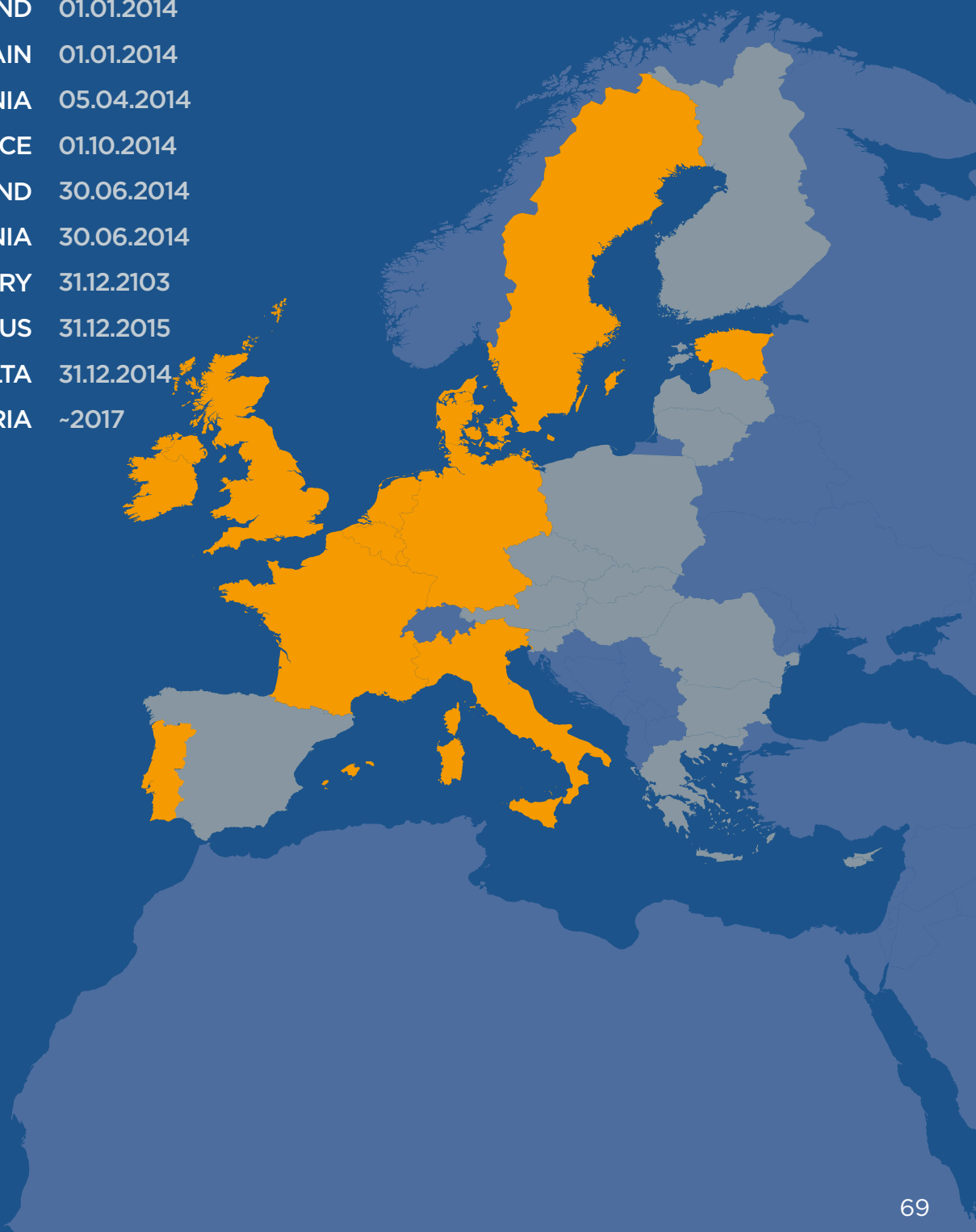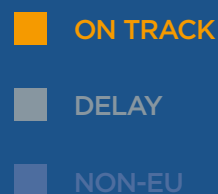
The countries with delays constitute a significant share of the EU's population, while at the same time having the most to gain. These countries have lower urbanization and mobile penetration rates than the on-track countries, as well as lower fixed broadband penetration rates. Due to its technical properties, the 800 MHz band is particularly suited for rolling out mobile broadband in rural areas, which could drive economic development from increased industrial and agricultural productivity, as well as provide an important means of communication for the rural population. The benefits of lower prices through economies of scale if everyone were to launch at the same time would also have a larger impact on adoption rates in these countries, given the generally lower incomes in most of them. Therefore, the benefit for the economy in the delayed countries would be greater.

DELAYED COUNTRIES HAVE MORE TO GAIN FROM DIGITAL DIVIDEND

POPULATION

RURAL POPULATION

URBAN POPULATION

NON MOBILE USERS

MOBILE USERS

171 — DELAYED COUNTRIES
330 — ON-TRACK COUNTRIES

33% / 67% — DELAYED COUNTRIES
22% / 78% — ON-TRACK COUNTRIES

27% / 73% — DELAYED COUNTRIES
23% / 77% — ON-TRACK COUNTRIES
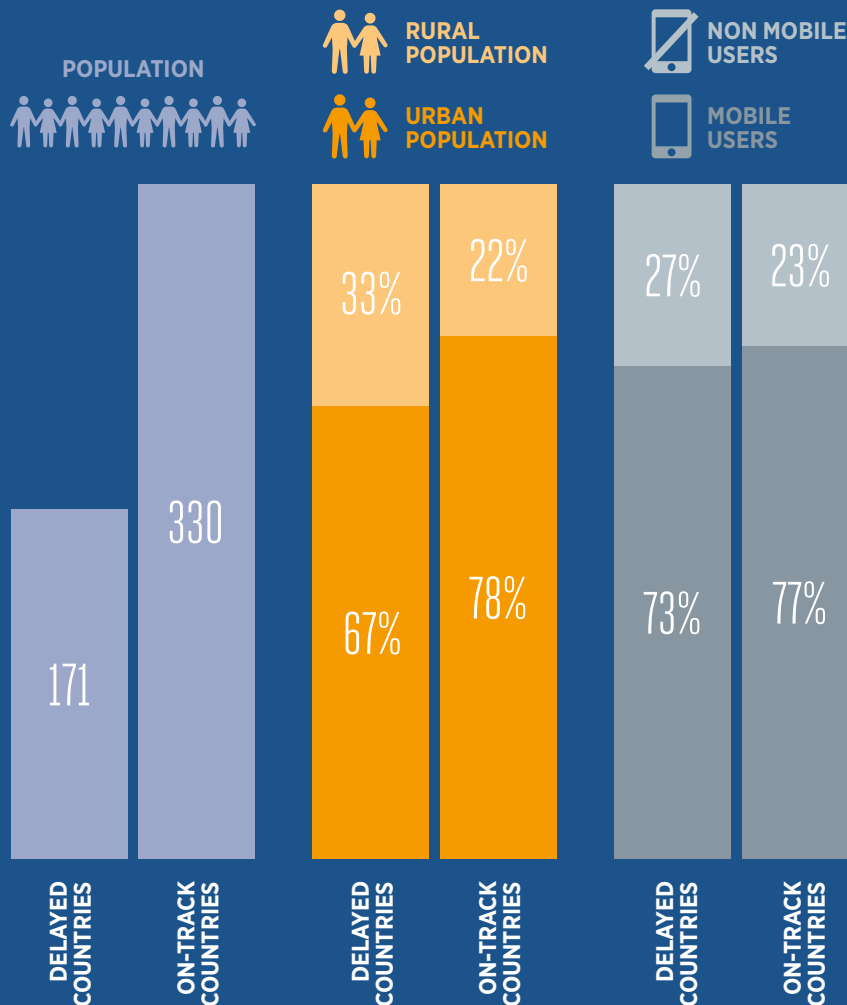
Source: World Bank; Eurostat; Economist Intelligence Unit; BCG Research

Rolling out mobile broadband in Europe using the 800MHz band will make a significant contribution to economic growth. Analysis by BCG suggests it could add €119B to EU GDP in the period out to 2020 (calculated in real terms), as well as contributing a further €23B to public funding during this period. The GDP impact comes from a range of factors including the creation of new business activities; improved productivity for businesses accessing and using the internet; as well as the revenues and network investment from the mobile operators themselves. In addition, the use of this spectrum for mobile broadband should help create 80,000 new business and 156,000 new jobs by 2020. There could be additional challenges with for example the potential for countries who delay the release of spectrum to cause interference in neighboring countries.

Evidence suggests a correlation between internet and broadband adoption and the rate at which new businesses are created. As more people use the internet, the attractiveness of online retail and advertising grows. In turn, this will drive demand for services such as web hosting, payments, website design, etc.

Rolling out mobile broadband in Europe using the

800MHz

could add €119B to EU GDP in the period out to 2020

GDP IMPACT
[€ B]

2013	2014	2015	2016	2017	2018	2019	2020
6.3	13.1	14.0	15.0	16.6	17.3	17.5	19.2
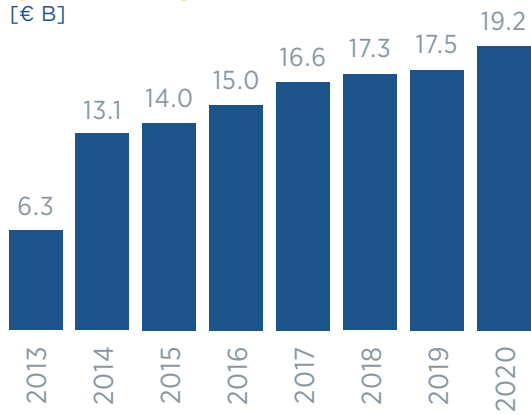
SUM: €119B | 0.9% OF GDP

NEW BUSINESS
[000]

2013	2014	2015	2016	2017	2018	2019	2020
4.7	14.8	25.0	35.6	47.8	59.4	68.5	78.3
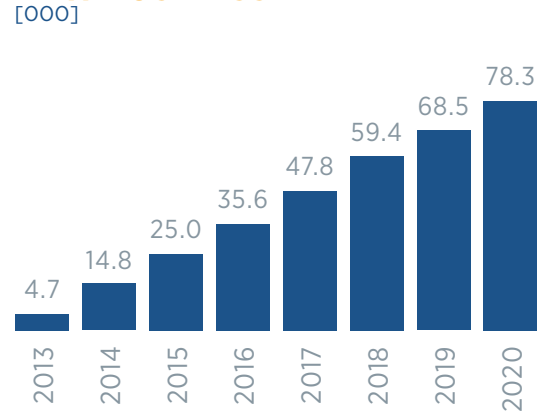
80K NEW BUSINESSES

TAX IMPACT
[€ B]

2013	2014	2015	2016	2017	2018	2019	2020
1.2	2.5	2.7	2.9	3.2	3.3	3.4	3.7
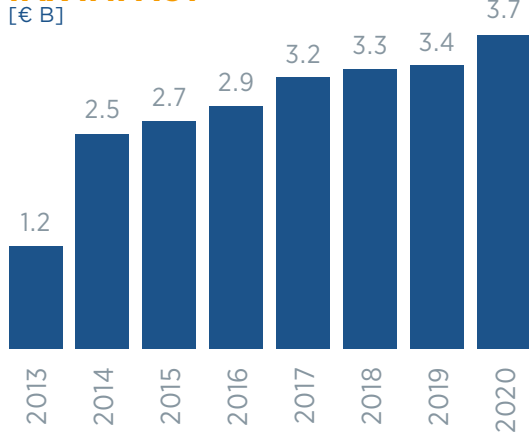
SUM: €23B | 0.2% OF GDP

NEW JOBS
[000]

2013	2014	2015	2016	2017	2018	2019	2020
9.4	29.7	50.0	71.1	95.4	118.4	136.4	155.7
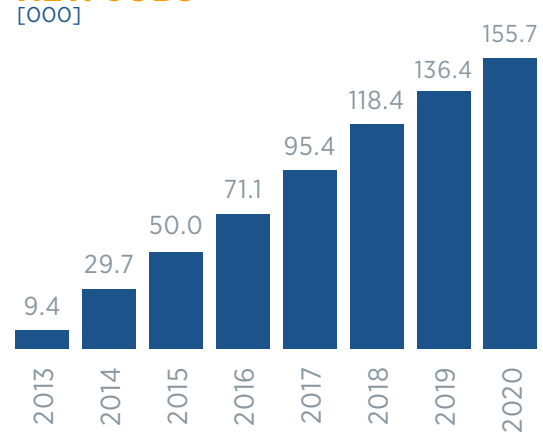
156K NEW JOBS

Source: OECD; Eurostat; GSMA Intelligence; World Bank; ITU; IEMR; Gartner; EIU; BCG Analysis

However, analysis shows that these benefits will be substantially reduced if the countries with derogations delay releasing this spectrum until 2017, which could reduce the overall GDP benefit in 2020 by €16B (a 13% reduction compared to the base case) and the tax benefit by €3B. Similarly, the number of new jobs created would fall by 67,000 and the number of number of new businesses by 26,000.

2.4

The Third Wave and impact of mobile on other sectors

The Third Wave opens up opportunities for a range of new services and applications that extend well beyond the boundaries of the mobile industry. It raises the prospect of connecting almost anything and anyone. M2M applications are one example of these new applications, involving the direct communication between devices without human involvement.

Europe is already leading the world in M2M deployments, with estimates from Machina Research suggesting that there 52M M2M connections at the end of 2012, almost a quarter of the global total. Going forward, Machina estimates that M2M connections will grow at a rate of 45% per annum out to 2017, ahead of the global average, with the rate of growth likely to accelerate. As a result, Europe is expected to account for almost 30% of the global installed base of M2M connections by 2017.

M2M CONNECTIONS EUROPE
[M]
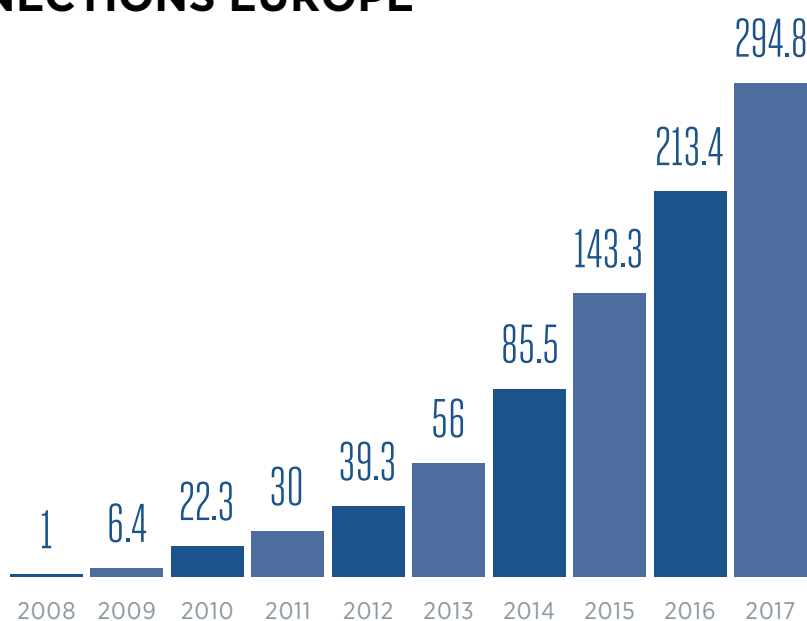
Source: Machina

The connected devices market will open-up critical new revenue streams, facilitate new business models, drive efficiencies and improve the way existing services across many different sectors are delivered. They will represent a very important demand-side stimulus that help finance the deployment of mobile broadband networks around the world. In total, the positive impact on the global economy could be worth as much as US$4.5 trillion per annum (with Europe accounting for 25% of that), according to research commissioned by the GSMA in partnership with Machina Research[29]. This would represent an uplift to the EU's GDP of more than 6%. Mobile operators will have a crucial role in working with a range of different vertical industries to launch these valuable new connected services.

The support of regulators, at both a national and European level, is vital to the successful development of new services. For example, regulations in Europe have enabled M2M growth for connected elevators and connected cash registers. As per European directive EN81-28, any company who manufactures and operates elevators for passenger transportation has to equip them with compliant emergency call and diagnostic functions. Telekom Austria Group and Urmet have entered into a partnership in this field and the service has already been deployed in Austria and Slovenia. Meanwhile, connected cash registers are driven by tax regulations in some South-Eastern European countries. For instance, in Bosnia and Herzegovina, connected cash registers feature a SIM card linking the cash register to the central server of the tax office in a closed network, so that data on turnover can be transmitted directly via a wireless connection. These are good examples of the partnership between policy makers and the mobile industry working to develop new services.

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29. http://connectedlife.gsma.com/wp-content/uploads/2012/02/Global_Impact_2012.pdf

52M

Europe is already leading the world in M2M deployments, with estimates from Machina Research suggesting that there will be 52M M2M connections at the end of 2012, almost a quarter of the global total.

The GSMA plays an active role in support of these developments. The Connected Living programme is a market development initiative whose mission is to help mobile operators accelerate the delivery of new connected devices and services. The GSMA's target is to assist in the creation of 800 million new mobile connections, whilst stimulating a number of service trials and launches. We focus in this report on the key opportunities around mCommerce, mEducation, mHealth, mAutomotive, Smart Cities and mIdentity.

🛒 mCommerce		🚗 mAutomotive
📖 mEducation		🏢 Smart Cities
➕ mHealth		👤 mIdentity

2.4.1

Smart Cities

Many cities and urban areas across Europe face a number of similar challenges, including increasing congestion, pressures on public expenditure and the need for sustainable development. These issues impact both major conurbations but also medium sized cities, where the majority of the urban population in Europe live.

Wireless solutions have the potential to help address a number of these issues. For example, there are a number of potential uses for connected devices that will drive efficiencies in the use of energy and improve travel and transport systems. These include monitoring the availability of parking spaces; managing traffic congestion; street lighting; and areas such as public safety and city resilience.

Examples of Smart Cities projects in operation today include the following:

- Amsterdam's Climate Street initiative has transformed a busy retail street into a sustainable shopping area by improving energy management and logistics and the efficiency of public services, such as waste collection. The city has connected electricity meters to help match energy supply and demand. It has also connected rubbish bins, so that waste is only collected when the bins are full. Business owners can view energy management information on their mobile handsets. As a result, Amsterdam has reduced the annual CO_2 emissions of the shopping area from 3,400 tons in 2010 to 1,276 tons in 2012.

- Madrid has introduced a new communications system for the fire brigade, the police, paramedics and its traffic management service. The system integrates information provided by each of these services to provide a holistic view of an incident, which can then be accessed by emergency services in real time using secure mobile and wireless networks. The unified view of incident data has enabled faster and better decision making, reducing average emergency response times by 25%.

The number of Smart City mobile connections is forecast by Machina (public and private opportunity in transport, energy, building security and municipal projects combined) to increase from 17 million in 2012 to more than 141 million in 2020.

SMART CITY MOBILE CONNECTIONS
[M]

SMART METERING & EV CHARGING

INTELLIGENT BUILDINGS

ENVIRONMENT & PUBLIC SAFETY; ADVERTISING

TRANSPORT
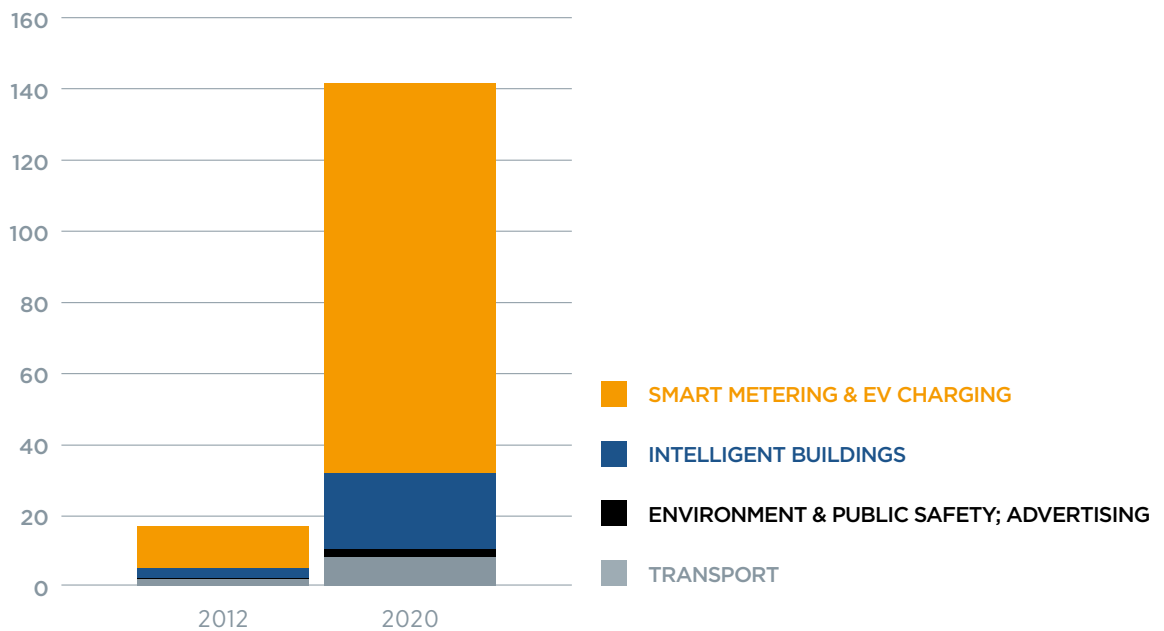
Source: Machina

Smart meters will account for a growing share of the total – up from 70% in 2012 (12 million connections) to 80% in 2020 (120 million connections), (see graphic). Intelligent buildings will account for nearly 15% of all smart city mobile connections (21 million) in 2020, while public safety, public transport, traffic management and public space advertising will account for a further 10 million connections in 2020.

In early 2013 the GSMA estimated that mobile enabled "smart solutions" were already deployed in over fifty cities across Europe[30]. Machina estimate the total revenue opportunity for Smart City applications at US$5.2B by 2020, up from US$1.3B in 2012.

To help drive forward investment and implementation of Smart City technology and build consensus on issues such as data privacy and the need for common standards, a wide range of stakeholders need to come together and co-operate. Through initiatives such as the GSMA's Smart Cities Index, events such as the 2012 Smart City Expo World Congress in Barcelona and the continued co-operation of stakeholders in rolling out pilots and sharing knowledge learned, the wide-scale implementation of Smart Cities is closer to becoming a reality.

Many of the challenges facing Smart City deployments, and indeed those for a number of M2M applications, are commercial rather than regulatory in nature, and as such there is no need for specific regulation to be enacted. The development of standards for the M2M needs to strike a careful balance between standardising areas that provide the ecosystem with economies of scale, and 'over-standardising', which could stifle innovation. Operators may need to consider jointly working with regulators and international organisations, such as the European Union's DG Connect, to develop privacy guidelines for smart city projects.

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30. GSMA Guide to Smart Cities, February 2013

2.4.2

mAutomotive

Connected devices can address a range of issues in the automotive industry, including improving vehicle security, lowering emergency response times to accidents and improving the performance of delivery fleets (with important implications both for fuel efficiency and wastage of perishable loads). Other applications range from the provision of on-demand entertainment services to low-cost pay-as-you-drive insurance.

Other innovations include providing drivers with access to real-time congestion, road works, accident and parking availability information. As well as increased convenience for drivers, the time and fuel saved has real economic and environmental benefits. Many players in the mobile ecosystem have already been working to develop solutions in these areas. Car manufacturers are creating mobile "apps" to improve the driving experience, such as Audi's "Roadside Assistance" app. This allows drivers to key in their car's identification number and then the app uses GPS to locate the car and allow users to explain the problem. The app then connects to an Audi "Roadside Assistance Dispatcher" and displays information including the estimated time of arrival for the assistance provide[31].

One example of pay-as-you-drive telemetrics is Italian-based Octo Telematics, which makes vehicle based recording systems for the insurance industry. The company has 1.4 million active paying customers and 55 client companies including Unipol in Italy, Mapfre in Spain, InsureTheBox in the UK and Groupama in France. Applications such as this one give consumers access to more affordable insurance services.

Road accidents are one of the top causes of fatalities in Europe; with many accident related deaths due to cardiac failure, respiratory failure or massive bleeding conditions. Emergency call services can dramatically reduce the time required to get help to an accident scene, estimated at 40% in urban areas and 50% in rural area[32]. The EU has mandated that all new cars sold after 2015 should be fitted with eCall services, with 15 countries that are participating in the HeERO project (Harmonised eCall European Pilot Project) set to implement the service by the end of 2014. The growth of the connected car market will be boosted by the European Commission's selection of 'embedded mobile' for its eCall services mandate, in place of alternative connectivity means such as smartphone integration or tethered solutions. The mandate's impact in Europe will be felt almost immediately, with eCall sales in 2016 expected to reach 7 million units.

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31.   Roadside Assistance App. Audi. January 2013.
32.   Clarification Paper BC1 - Overview of available studies on proven or assessed benefits of e-Call (August 2005) by the Safety Forum

EMERGENCY CALL

An emergency call (eCall) is made automatically by the car as soon as on-board sensors (eg: the airbag sensors) register a serious accident. By pushing a dedicated button in the car, any car occupant can also make an eCall manually.

PROVISIONING

Via satellite positioning and mobile telephony caller location, the accurate position of the accident scene is fixed and the transmitted by the eCall to the nearest emergency call centre. More information is given in the eCall, eg: the direction of travel and the vehicle type.

EMERGENCY CALL CENTRE

The eCall's urgency is recognised, the accident's location can be seen on a screen. A trained operator tries to talk with the vehicle's occupants to get more information. If there is no reaction, emergency services are sent off without delay.

QUICKER HELP

Due to exact knowledge of the accident's location, the emergency services (eg: ambulance, fire fighters, police) arrive much quicker at the crash site. Time saved translates into lives saved.

Automakers are planning to aggressively deploy connected car services: the GSMA forecasts that embedded solutions will be in more than 20% of new vehicles by 2015 and over 90% of vehicles in 2025[33]. Research by SBD places the total revenue opportunity in Europe at almost €4B by 2018 in the main telematics categories, with the main growth being in the area of navigation and infotainment.

EUROPEAN MAUTOMOTIVE REVENUE OPPORTUNITY
[€M]

Legend: INSURANCE — INFOTAINMENT — NAVIGATION — VEHICLE — SAFETY & SECURITY
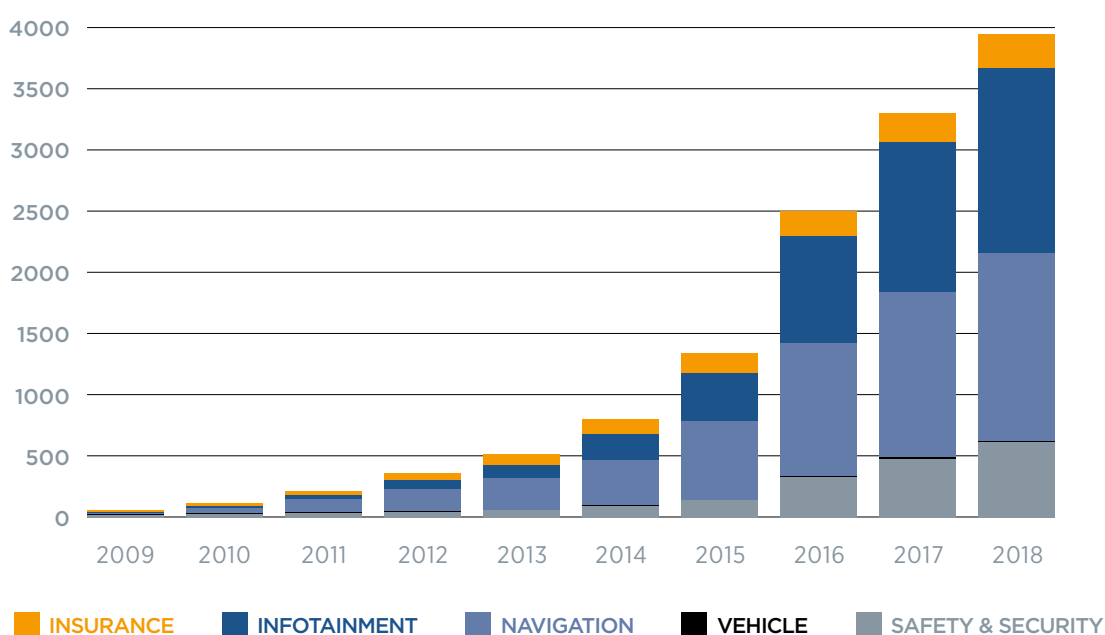
Source: SBD

33. Source: 2025 Every Car Connected: Forecasting the Growth and Opportunity, GSMA 2012

2.4.3

✚ mHealth

EU healthcare systems face significant challenges that are creating concerns about the sustainability of healthcare delivery. The prevalence of chronic disease and ageing populations continues to grow, creating a greater healthcare burden across multiple EU countries. However, well published budgetary constraints and a shortage of healthcare resources have created a scenario that inhibits these EU member states from meeting increased healthcare demand and dealing with rising costs.

With mobile technologies becoming more pervasive, mobile solutions are beginning to support the delivery of healthcare to address these challenges across the EU. These mHealth solutions can influence patient behaviour to improve lifestyles, enable remote treatment of chronic conditions and equip healthcare providers to make better clinical decisions. As a result, patients can stay healthier and the efficiency of resources can be increased, limiting the demand for healthcare and lowering the costs of care.

A recent report by the GSMA and PWC[34] identified a number of key areas in which mHealth solutions could play an important role:

DELIVERING CONTINUOUS CARE REMOTELY

mHealth applications help healthcare delivery systems to provide continuous care remotely by using mobile technologies. By keeping healthcare providers connected with patients while they are at home, these solutions can allow healthcare providers to monitor the health of patients and intervene when required. These solutions also motivate patients to improve their lifestyle and help increase their dietary and treatment compliance through SMS and call based reminders. They can also be made to feel safer by helping healthcare providers track their movements remotely and raising emergency alerts earlier;

ENHANCING WELLNESS AND PREVENTION

with 52% of the population in the EU overweight (and 17% of the population classified as obese[35]), and a further 37M deemed at risk of developing chronic conditions, there is a clear opportunity for lifestyle improvements to reduce the incidence of disease. A number of apps have already been developed that for example allow users to monitor calorie intake or to make healthier food choices;

IMPROVING CHRONIC DISEASE MANAGEMENT

by supporting chronic patients in improving their lifestyles through mHealth solutions, healthcare providers can encourage these patients to monitor their diet, physical activity and medications. The applications can help healthcare providers and patients track the impact of these changes on relevant health parameters, allowing doctors to customise and improve care. By doing so, 11.2 million chronic patients in the EU could manage their conditions better in 2017;

EXPEDITING DIAGNOSIS

mHealth solutions that enable remote diagnosis and self-assessment of symptoms can help healthcare providers detect diseases earlier and facilitate timely medical interventions. mHealth solutions reduce the burden on both diagnostic facilities and care facilities;

STRENGTHENING HEALTH CARE DELIVERY SYSTEMS

the use of tablet computers and other mobile devices could help doctors and paramedic staff to save significant amounts of their time that is currently spent on accessing and analysing information. Doctors and paramedics could for example update patient health records during consultations and plan their rounds better.

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34. http://www.gsma.com/connectedliving/socio-economic-impact-of-mhealth
35. OECD Health at a Glance: Europe 2012

Examples of mHealth applications

IBP BLOOD PRESSURE
A tool to track blood pressure (UK)
Developer: Leading Edge Apps

This smartphone application helps patients track blood pressure values and determine whether these are normal, high, or at hypertension. Using interactive graphs, it shows periodic trends of the user's blood pressure and indicates statistics such as lows, highs and averages over periods of monitoring. The application helps a hypertensive patient get more involved in managing one's condition better.

AIRSTRIP CARDIOLOGY
Remote diagnosis and treatment decision making tool for heart patients

This smartphone application enables physicians to view electrocardiograms on their mobile devices. It allows clinicians anytime and anywhere access to live and historical ECG data of patients on their iPad and iPhone, along with enhanced analytics. It helps clinicians to make faster, more informed diagnosis and treatment decisions. When treating cardiac patients, these extra minutes can help patients recover quickly by expediting medical intervention and prevent heart damage.

ONTRACKDIABETES
Or self management of diabetes (UK)
Developer: Gexperts Inc

This mobile application helps diabetics self manage their condition by tracking various relevant parameters such as blood glucose, blood pressure (BP), exercise, food, medication, pulse and weight. It produces a variety of graphs and reports, and creates a log book which can be shared with the doctor for analysis. Through active lifestyle management, the tool can help diabetics to take more control over their disease and delay diabetes induced complications.

TRAFFIC LIGHT FOOD TRACKER

A tool that helps people eat healthy food
(Various EU member states)

Developer: Cancer Council Victoria,
Obesity Policy Coalition
Language support: German, English, French, Dutch

This mobile application helps people eat more healthy food by using traffic light colours to rate the nutrition details of a food item listed on its packaging. The user types in the content details such as total fat, saturated fat, sugar and sodium content per 100 grams, and the app calculates a traffic light evaluation of unhealthiness of the food item – green for low, amber for medium, and red for high. It can help people take better control of their food and dietary choices to avoid many lifestyle diseases such as obesity and hypertension.

IBGSTAR

Remote and self management of diabetes iBGStar is a mobile phone application that uses a device plugged into the smartphone to view, store and track blood glucose levels. Additionally, the application matches blood sugars to a meal that an individual has just finished. It stores nutritional information about the meal and communicates that information to the doctor, allowing them to intervene early and make the overall treatment more effective.

SAPO FIT
AN APPLICATION TO CONTROL OBESITY
(Portugal)
Developer: SAPO, Portugal Telecom

This mobile application helps users to monitor in real time the calories eaten, by detailing the food intake, and the calories burned when physical activity is undertaken. SAPO Fit may be personalized to keep a daily Personal Health Record (PHR) of an individual's food intake and daily exercise, and to share this with contacts and communities on a social network to encourage optimization of one's wellness regime and motivating one to stay fit by encouraging a collective endeavour.

MEDIPLA
Doctor-patient communication application (Sweden)
Developer: Novatelligence AB, Sweden

This smartphone application improves doctor-patient communication by helping a patient answer questions that the healthcare provider wishes to ask. The healthcare provider creates a 'Medipal' account for the patient, enters into it questions about one's treatment and medical condition that the patient should answer. This interaction with the remotely located doctor not only increases the patient's involvement in one's own care but also helps doctors to stay engaged with their patient's treatment cycle even if the patient doesn't visit the hospital.

These mHealth solutions can influence patient behaviour to improve lifestyles, enable remote treatment of chronic conditions and equip healthcare providers to make better clinical decisions. As a result, patients can stay healthier and the efficiency of resources can be increased, limiting the demand for healthcare and lowering the costs of care.

99 B = **69 B** + **3.7 B** + **32 B** + **0.17 B** − **6.2 B**

| TOTAL HEALTHCARE COST SAVINGS IN EU (EUR) | WELLNESS & PREVENTION | DIAGNOSIS | TREATMENT & MONITORING | SYSTEM EFFICIENCIES | WORKFORCE TO SUPPORT M-HEALTH |
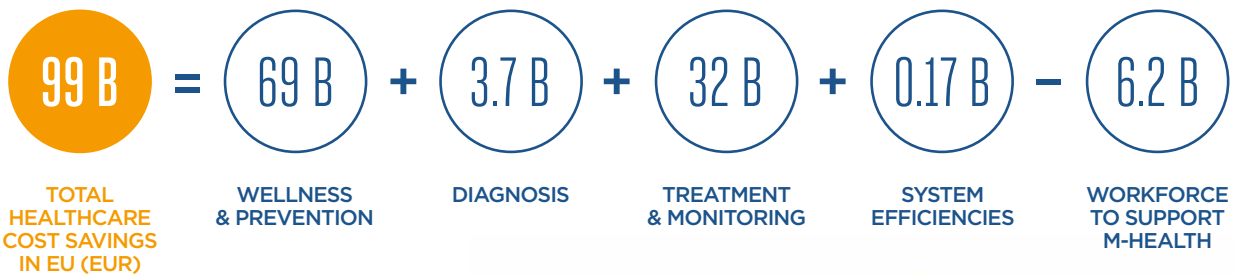
Source: PwC analysis

185M

mHealth solutions could help 185 million patients lead healthier lives

By using mHealth solutions to their potential, healthcare systems in the EU could:

Save €99 billion in total annual healthcare spend by 2017, even after funding the 211,000 jobs that would be needed to support mHealth deployment. These savings would mean that about €76 billion of public healthcare spend could be saved in 2017

Accommodate treatment of an additional 24.5 million patients without having to add a doctor or a healthcare facility

Help 185 million patients lead healthier lives and gain 158,000 years of life

Of the total 185 million patients that could benefit from mHealth, 141 million patients could improve their lifestyle to some extent and 61 million could successfully address one or more lifestyle disorders.

Although initial estimates of mHealth benefits provided by ongoing mHealth pilots and expert opinion have been promising, there is a strong possibility that these potential benefits will be limited - if the adoption of mHealth is not encouraged. Multiple barriers such as regulatory, economic, structural and technological are limiting the adoption of mHealth. If these barriers are not addressed, then only 10% of the potential users in 2017 could adopt mHealth and, as a result, only 5% of the potential benefits realised:

• Healthcare savings across the EU would be limited to €5 billion in 2017

• Only 18 million patients of the potential 185 million would be benefitted by 2017

• Only €5 billion will be added to EU GDP by 2017 as compared to the potential €93 billion

2.4.4

📖 mEducation

Developed countries are currently facing a considerable nuMBer of educational challenges where mEducation solutions could be of relevance. One in four Europeans under the age of 15 attains only the lowest level of proficiency in reading[36]. Across most developed countries, 20% of students do not attain an upper secondary degree and nearly 50% of the school drop-outs are between Grade 3 to Grade 6 (age 13-16). This results in a substantial employment disadvantage for these dropouts as they often lack the most basic job skills.

mEducation comprises technology-enabled learning solutions available to users anytime, anywhere. Any portable device, such as a laptop, tablet or mobile phone that provides access to educational content through a mobile connection (2G, 3G, or 4G complemented by mobile-based Wi-Fi) can be a tool for mEducation. The ability to learn regardless of time or location can help make education easier to access and use.

There is a lot of work being done towards improving student engagement and customising education for each student. mEducation simplifies access to content and experts, and also overcomes the traditional constraints of time and location. On eBook and audiobook stores, at least 15–17% of titles are mobile learning apps and there are now major digitisation efforts taking place in the UK school systems. Denmark is moving to provide mobile education access to all students by 2015.

Telecom Italia has developed "educ@TIon", a web application solution available to schools and designed to encourage sustainable collaborative and social learning. The prototype is being tested in several Italian schools and a teacher training university with trainee teachers at their school placements. Trials began with two schools in 2010/11 and based on high levels of approval, it has now been extended to ten schools with over 600 students taking part.

The GSMA published a study with McKinsey & Co in 2012[37] that estimated the European mEducation market could be worth €6.9B by 2020, representing a 29% CAGR from 2011. The same study suggested that over 90% of this revenue opportunity would lie outside the provision of basic connectivity, in areas such as the provision of content and related software and platforms.

36 http://www.gsma.com/connectedliving/wp-content/uploads/2013/02/GSMA-Connected-Life-PwC_Feb-2013.pdf
37. http://www.gsma.com/connectedliving/gsma-and-mckinsey-transforming-learning-through-meducation

TOTAL MEDUCATION MARKET SIZE
(EXCLUDING DEVICE SALES) US$ BILLION

CAGR
2011 - 20 %

~38	
2	1
6	31
6	50
9	54
	54
	23
	29
15	31

~3
1
1
1

2011   2020

MIDDLE EAST & AFRICA
LATIN AMERICA
EMERGING ASIA PACIFIC
DEVELOPED ASIA PACIFIC
EUROPE
NORTH AMERICA
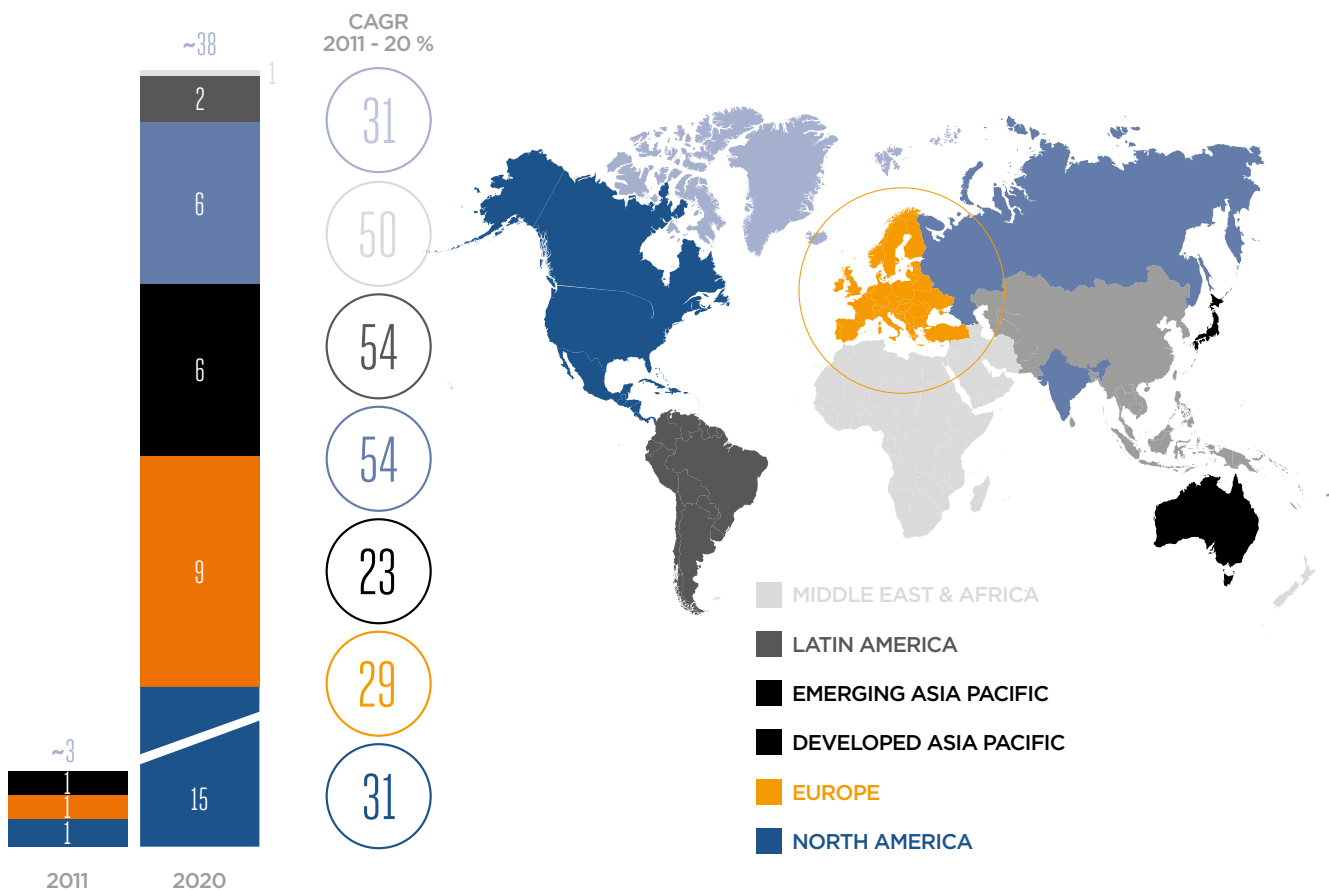
Source: Team analysis. Transforming learning through mEducation (GSMA, McKinsey & Co, 2012)

There are a number of barriers to the successful implementation of mobile learning initiatives, including the high costs associated with equipment, connectivity, maintenance, technical support and teacher training; and negative social attitudes about the use of mobile phones in schools.

2.4.5

mCommerce

Mobiles offer new, more convenient mechanisms for carrying out payments, transfers, ticketing and a range of other transactions. This can increase the convenience for users and reduce costs and potentially boost sales for businesses and other service providers. For example, banks are now offering mobile banking services, mobile ticketing and check-in is now widely used by airlines and the travel industry.

One of the key enablers of mCommerce will be SIM-enabled Near Field Communications (NFC) - a contactless radio technology that can transmit data between two devices within a few centimetres of each other. NFC chips are now being embedded into mobile phones, enabling an array of new digital services, such as:

TICKETING

replacing paper tickets on public transport systems, events etc.
This increases convenience for users, boost efficiency of transport, allow enhanced security and reduce fraud.

PAYMENTS

replacing cash and credit cards to purchase goods and services.
This increases the convenience for customers, improves sales processing efficiency for retailers and can reduce fraud.

ACCESS CONTROL

replacing traditional keys, enhancing security and increasing ease of use.

COUPONING

replacing paper-based vouchers and coupons, with the scope to integrate automatically with existing customer loyalty schemes.

Mobile devices that enable tap-and-go payments through NFC technology are starting to achieve widespread penetration, with almost one in four handsets shipped in 2012[38] estimated to be NFC-enabled and with strong potential for future growth as pilots begin to transition to wider rollouts. NFC m-payment technology has been available in Europe since 2011 and by 2017 it is estimated that 25%[39] of western European mobile phone users will pay for goods in-store using their NFC-enabled mobile phone.

The mCommerce opportunity is more than just the payments potential of NFC. A number of operators have launched mobile wallet applications (which may also offer an NFC payment option), with offers likely to be active in a majority of European countries by the end of 2013. One example is Telefónica "O2 wallet", which allows users to keep all of their mobile and debit cards on their mobile phones, and then to use these for online shopping, including items that have been scanned using the handset. Other applications include O2's "Money Message", which allows payments to be sent using just a mobile number.

There are a range of mCommerce and NFC trials and programmes underway in Europe:

NFC MOBILE SERVICES

NFC mobile services have already been deployed in a number of French cities, including Nice and Strasbourg. In Nice, users are able to buy tickets and validate them using contactless technology, whilst also using their mobile phones to manage their accounts or to access real time information on public transport services. Similar services are being rolled out to other French cities, with examples such as a project due to start in 2014 which aims at addressing interoperability in ticketing. The ultimate goal is to create a single "app" to allow the use of a single ticketing platform across all public transport services.

WY WALLET

Swedish mobile operators Telia, Tele2, Telenor and Three have launched "WyWallet", a mobile payments service that will provide mobile wallet services to 97% of Swedish mobile phone users and includes support for NFC.

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38. Forrester, Gartner. August 2012.
39. Press Release: More than 1 in 4 Mobile Users in the US and Western Europe will pay in-store using NFC by 2017. Juniper Research. May 2012

KPN

Dutch operator KPN is to work with leading local banks AB Amro, ING and Rabobank on a pilot of NFC mobile payments starting in the summer of 2013 in the city of Leiden. The pilot, which will also involve the city's municipality and MasterCard, will use 1,000 KPN subscribers who also hold an account with one of the three banks. The three banks have established a new group called Mobile Payment Netherlands for the pilot which will run until the end of 2013. The banks will then decide how they wish to proceed with NFC on an individual basis. During this year's trial, mobile payments will be possible in 50-80 shops, restaurants and bars around the city. Transactions with a value of up to €25 will be made without the need for a PIN. However, larger amounts will require the use of a PIN.

The mCommerce revenue opportunity is substantial:

European mCommerce revenues are set to rise from €1.7B in 2011 to €19.2B in 2017[40], according to a report from analyst firm Forrester. The forecast predicts that mCommerce, which currently accounts for 1 per cent of total web sales, will grow to 6.8 per cent over the next five years.

NFC-based commerce has the potential to benefit consumers, retailers and mobile operators alike. While progress has initially been modest as efforts to date have mainly focussed on agreeing standards, with the promotion of NFC technology by handset manufacturers and roll out pilots, the technology's long-term future is gaining industry confidence. René Schuster, CEO of Telefónica Germany, said earlier this year that eventually "children will only know from history books what a wallet and hard cash are".[41]

One of the biggest challenges facing the adoption of NFC, as a day to day technology, is how to drive the scale of service rollout across all service industries. Historically, the key to success and to ensuring future growth has been fully interoperable services and collaboration between both mobile and service industries. The GSMA believes that SIM-based standardisation of these services, and the creation of a common framework for implementation and product interoperability, can create market conditions that deliver indirect, non-financial value across a range of market stakeholders, including the end consumer.

"Children will only know from history books what a wallet and hard cash are".

40. European Online Retail Forecast: 2011 To 2016
41. Telefónica O2 to begin beta testing NFC payments in Germany. NFC World. January 2013.

€19.2B

European mCommerce revenues are set to rise from €1.7B in 2011 to €19.2B in 2017[40]

2.4.6

⊙ mIdentity

Identity theft and associated fraud have become an ever-greater burden on society and business. Criminals are becoming more sophisticated in their methods, whereas many users, regrettably, still take unnecessary risks. Today, a typical consumer has around 26 different online user names, but only five different passwords[42]. Worldwide, it is estimated that some 148,000 computers are compromised by hackers and malicious code every day[43]. The annual cost to businesses has been estimated at over US$270 billion[44], and that figure continues to rise.

Mobile Identity services provide customers with the ability to verify and authenticate themselves remotely and securely via their mobile phone. This opens up a range of opportunities for both mobile operators and consumer-focused service providers to build a rich suite of offerings. As mobile phones increasingly become the primary medium through which a wide array of digitised services are accessed, purchased or controlled - mobile identity ensures the user's private and confidential information is kept safe and authentication processes kept simple. Through a centralised, secure and efficient identity management system, businesses and service providers will be able to tailor their services more precisely to individual users' preferences. These could include more personalised banking and financial services, enhanced access to healthcare, education and eGovernment, and safer management of online social networking.

42. Experian, 17 July 2012
43. European Commission, 4 April 2012
44. Symantec, 7 September 2011

Mobile Identity services unlock a new range of opportunities, including:

- Accessing personal data securely;
- Banking and financial services;
- Signing documents on the go;
- Proving one's age online;
- Mobile voting;
- Enhanced access to eGovernment services (e.g. pensions, social security payments);
- Secure NFC access (e.g. to enterprise VPNs, buildings and other facilities);
- Mobile identity storage (e.g. health records, secure cloud, loyalty programmes);
- Birth/life events registration (e.g. birth, death, marriage certificates);
- Unlocking secure premises.

Estonia is swiftly gaining international recognition as one of the most digitally advanced societies on the planet. Mobile-ID was launched in 2007 as an extension of the digital ID scheme. Users must get a special SIM card (available from the mobile operators) and then activate the identity management system on a website using their ID card. The Mobile-ID can then be used on any compatible website for authentication and to provide a digital signature. Currently, Mobile-ID can be used with over 300 organisations in both the private and public sectors, ranging from electronic banking to applying for a driver's licence, to entering or accessing academic grades at University to changing a pension plan, all through the electronic signature function of the mobile which holds legal equivalence to a wet signature. According to e-Estonia.com, Mobile-ID users can legally register a new business in just 15 minutes[45].

It is arguably still too early to quantify the mobile identity opportunity; even the broader digital identity market is at a comparatively early phase of development, and is accordingly difficult to forecast. GSMA research in 2012 suggested that the value of the global market for mobile identity management solutions could reach US$15 billion by 2015[46]. This forecast, however, may represent only part of the opportunity. For example, there is also the market for mobile payments (driven in part by NFC and associated identity management). Even the nascent market for mobile cloud access is expected to be worth in excess of US$6 billion across the globe by 2016[47].

These and many other markets will likely rely in no small measure on the existence of universal, harmonised mobile identity management solutions. In other words, the capacity for the mobile medium to extend its reach into new markets and segments will likely depend, to some degree, on the extent to which mobile operators agree and deploy capable mobile identity management solutions that add value for service providers and end users alike.

45. http://e-estonia.com/components/mobile-id
46. Mobile Identity Market Sizing, GSMA / Greenwich Research, April 2012
47. Mobile Cloud Computing Outlook, Visiongain, January 2012

POLICY ENABLERS

① ENCOURAGING INVESTMENT IN MOBILE CONNECTIVITY

Spectrum Productivity

50% Mobile telecommunications
23% Civil aviation services
6% Terrestrial & satellite TV broadcasting
6% Satellite non-comminucations
15% Other

MOBILE RETURNS HIGHEST VALUE

Spectrum

Spectrum management is currently too complex with International, EU and National level all 'involved in spectrum policy.

Harmonisation

Harmonisation and early release of DD spectrum is vital – Europe is falling behind – we need bigger economies of scale and scope.

Policy

Europe needs to refocus on policy towards facilitating investment and innovation rather than on direct management of prices.

② ENABLING INNOVATION IN CONTENT AND SERVICES

Operators able to manage data traffic to deliver innovative services that work and provide the quality of service that consumers and businesses expect.

mHealth   mIdentity   mCommerce

Government and industry partnership to support new services underpinned by flexible regulation.

③ BUILDING CONSUMER CONFIDENCE

Protection

Consumers need and should be protected – but only with meaningful and consistent rules.

Consistency

Clear and consistently applied regulation across the entire Internet value chain.

03.

Policy Enablers to Spur Further Investment, Innovation and Growth

The previous chapter addressed the myriad ways that the mobile industry and the wider mobile ecosystem can help Europe address the challenges it faces, but realising this potential requires a supportive regulatory regime. The European mobile industry is now beginning to lag its peers in other developed regions in a number of key areas. Mobile networks have both direct and indirect effects on the productivity and competitiveness of economies, with the result that both consumers and the economic outlook in Europe will continue to suffer unless steps are taken to address some of the challenges facing the industry. There is a pressing need for the EU to adopt a policy and regulatory approach that:

1. Encourages investment in mobile connectivity;

2. Enables innovation in new content and services;

3. Builds consumer confidence in mobile services and applications.

There are a number of critical areas of regulatory and public policy that need to be addressed in order to create the right environment to attract and nurture investment in mobile connectivity. Investment in connectivity is dependent on the timely allocation of sufficient spectrum to allow operators to meet the expected growth in data traffic, both in the short and medium term. The EU has stated that a total of 1200MHz of spectrum should be released by 2015 to meet this anticipated demand, but with only around 600MHz released on average to date*, Europe is falling behind.

Note: refers to appropriate/ economically viable spectrum for use by mobile networks

As well as addressing issues around spectrum availability and harmonisation, the Europe Union needs to refocus its policies on facilitating investment and innovation rather than the management o f end user prices. European policy should allow the mobile industry to realise the economies of scale offered by a single telecoms market, in order to reduce operating costs and so help operators fund investment in network deployments and new services. Other issues to be addressed to encourage investment include those around improving the approval process for new base stations (which result in lengthy delays in network deployments), as well as eliminating sector specific taxes that can slow the take up of mobile services and reduce investment.

The mobile ecosystem needs an appropriate regulatory system if it is to deliver ongoing innovation around new content and services. Key issues include the need to allow operators to engage in service- and customer-orientated network management: mobile operators already have to prioritise between types of traffic and types of user in order to ensure the levels of service quality that consumers expect. Looking forward, in order to be able to maintain these service levels mobile operators need to be free to innovate and create pricing models that are better aligned with the services that the consumer is both wanting to use and willing to pay for, as in any business.

Appropriate and flexible regulation is required in a number of new service areas. In the case of mIdentity, as trust and reputation become more important assets within the economy, policy makers need to work together with the industry to encourage interoperability and innovation, while ensuring consistency between the different legal and regulatory instruments that affect digital identity management. In the developing field of mHealth there is no need for new medical device legislation, but there is a need to clarify existing

regulation as it applies to mobile health solutions. In the case of mPayments, market forces will converge over time on the most compelling solutions, so that a regulatory push for standardisation at this stage of their development could stifle innovation.

Finally, there are a number of key issues to allow the building of consumer confidence in mobile services and applications. Consumers should be provided with meaningful information by operators and service providers to help them make informed choices, while consistent rules should apply for functionally equivalent services. On the topic of data protection, policy makers need to ensure that consumers enjoy consistent privacy experiences across the mobile ecosystem, irrespective of the technologies, infrastructure, business models and data flows involved. The Commission should foster enhanced cooperation at the international level to improve the security of new networks, while all the actors in the supply chain should be subject to the same obligations to adopt risk management procedures and to report security breaches (at present only e-communications service providers are subject to these).

A successful partnership between the mobile ecosystem, the EU and related institutions will deliver the right regulatory framework to allow the operators to invest in new networks and services, whilst giving consumers the confidence to use innovative new services and applications. This can help secure the European mobile industry's position as a global leader, whilst maximising the potential social and economic benefits of the mobile industry.

3.1

Encouraging investment in connectivity

The mobile industry requires ongoing investment to support new technologies and services, as well as to scale networks in order to meet the growing demand for connections and overall traffic. Major investment is required to add network capacity and so that new services can be launched which bring greater economic benefits. There are a number of critical areas of regulatory and public policy which need to be addressed in order to create the right foundation to attract and nurture this investment. If these issues are not addressed, then it will not be possible to achieve the industry's full potential.

3.1.1

SPECTRUM AVAILABILITY AND MANAGEMENT

Spectrum management in Europe needs to be simplified and unified to ensure sufficient spectrum is available for mobile.

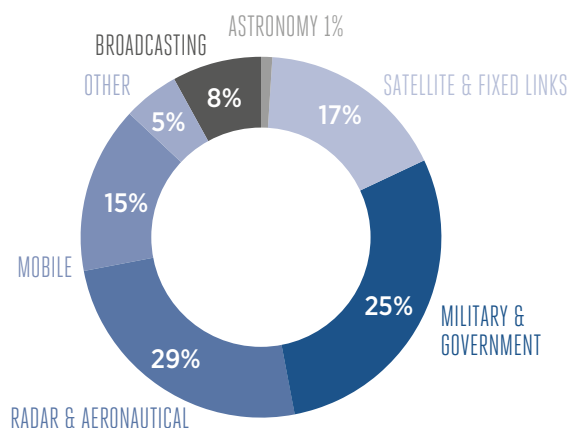Timely identification and release of spectrum for mobile operators.

Simplification of the currently complex arrangements for spectrum management in Europe, with a range of institutions at both the international, EU and national level involved.

The harmonisation of spectrum regulation across Member States, with standard licence terms and a clear presumption in favour of licence renewal.

One of the key issues to allow further investment in mobile connectivity is spectrum availability. This is a limited resource and governments and regulators face the challenge of assigning spectrum on a fair basis for the best use within that country. The GSMA and mobile industry advocate for the timely identification and release of spectrum for mobile. Mobile services already generate the greatest economic value by some margin - €269 billion in the EU27 in 2013[48]. The next most valuable application is civil aviation, with an economic value of €159 billion.

SPECTRUM PRODUCTIVITY: EUROPE

Relative share of radio spectrum in Europe between 400MHz and 5GHz, 2010

ASTRONOMY 1%
BROADCASTING
OTHER
SATELLITE & FIXED LINKS 17%
BROADCASTING 8%
OTHER 5%
MOBILE 15%
RADAR & AERONAUTICAL 29%
MILITARY & GOVERNMENT 25%

Relative economic value of spectrum-using sectors, 2013

TERRESTRIAL & SATELLITE TV BROADCASTING
SATELLITE NON-COMMINUCATIONS 6%
TERRESTRIAL & SATELLITE TV BROADCASTING 6%
OTHER 15%
CIVIL AVIATION SERVICES 23%
MOBILE TELECOMMUNICATIONS 50%
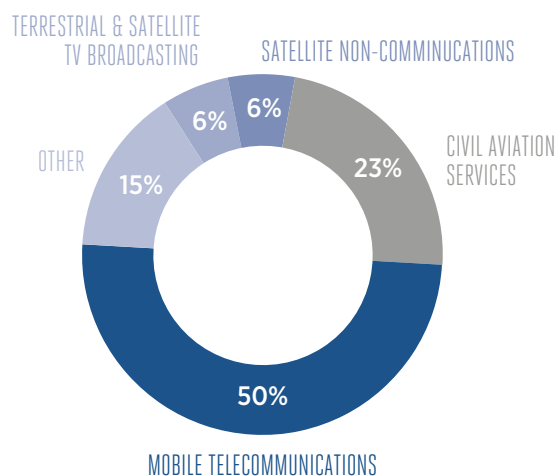
Source: Valuing the use of spectrum in the EU', Plum Consulting, June 2013

48. http://www.gsma.com/spectrum/valuing-the-use-of-spectrum-in-the-eu

3.1.1.1

RELEASE OF SPECTRUM
FROM THE DIGITAL DIVIDEND

Under the European Commission's Radio Spectrum Policy Programme ("RSPP"), all EU Member States committed to make the 800 MHz band available for mobile broadband services by January 1st, 2013. Despite attempts to co-ordinate spectrum release through the RSPP and other initiatives, there have been delays in the full release of the 800 MHz band for mobile broadband across Member States (as discussed in an earlier section of the report).

Only nine Member States met the initial deadline, with 14 countries requesting postponements of the deadline (of which the EU initially agreed to nine). The GSMA would like to see all Member States progress their release of this spectrum in order to align with the EU Decision and to support the rollout of broadband services utilising mobile technology.
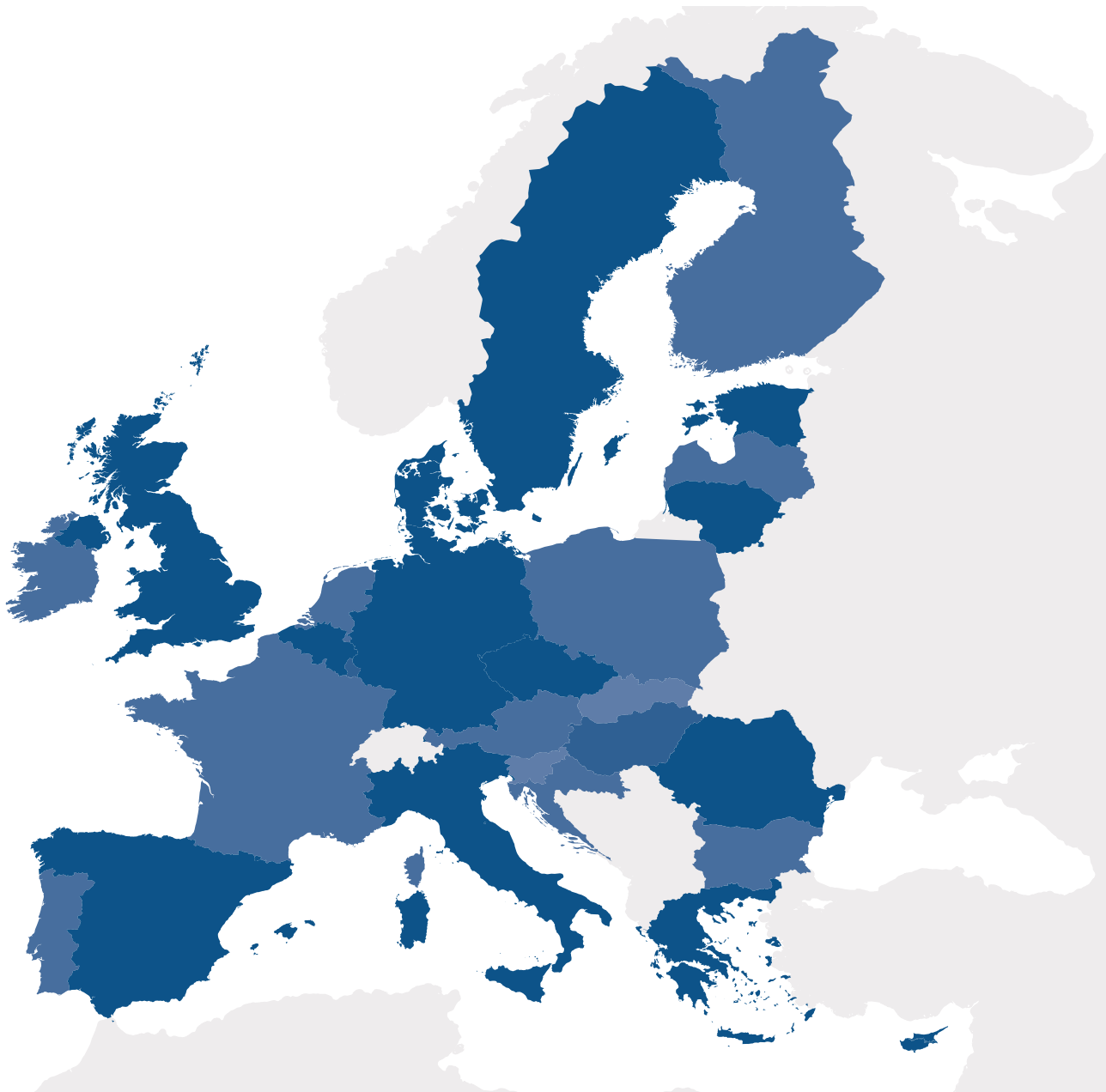
Further, and to meet the EU objective of 1200MHz by 2015, the 'Second Digital Dividend' band (694-790MHz) was agreed to be allocated to mobile broadband services in February 2012. Ideally, the GSMA would like to see this band harmonised with the existing 700MHz band plans from Asia and beyond.

For Europe, the GSMA recommends a 2x30MHz band plan for the 700MHz band, consisting of 703–733MHz (uplink) paired with 758–788MHz (downlink). This band plan is based on the reuse of the lower duplexer of the Asia Pacific Telecommunity (APT) band plan (i.e., 2x30MHz from the APT 2 x 45MHz, see the previous figure). The alignment and support of this band is crucial now as development of the wider ecosystem which importantly includes devices, takes a minimum of eighteen months to come to fruition and the GSMA would like to see a Europe wide agreement being taken forward from as early as 2014.

700MHZ BAND FOR EMEA
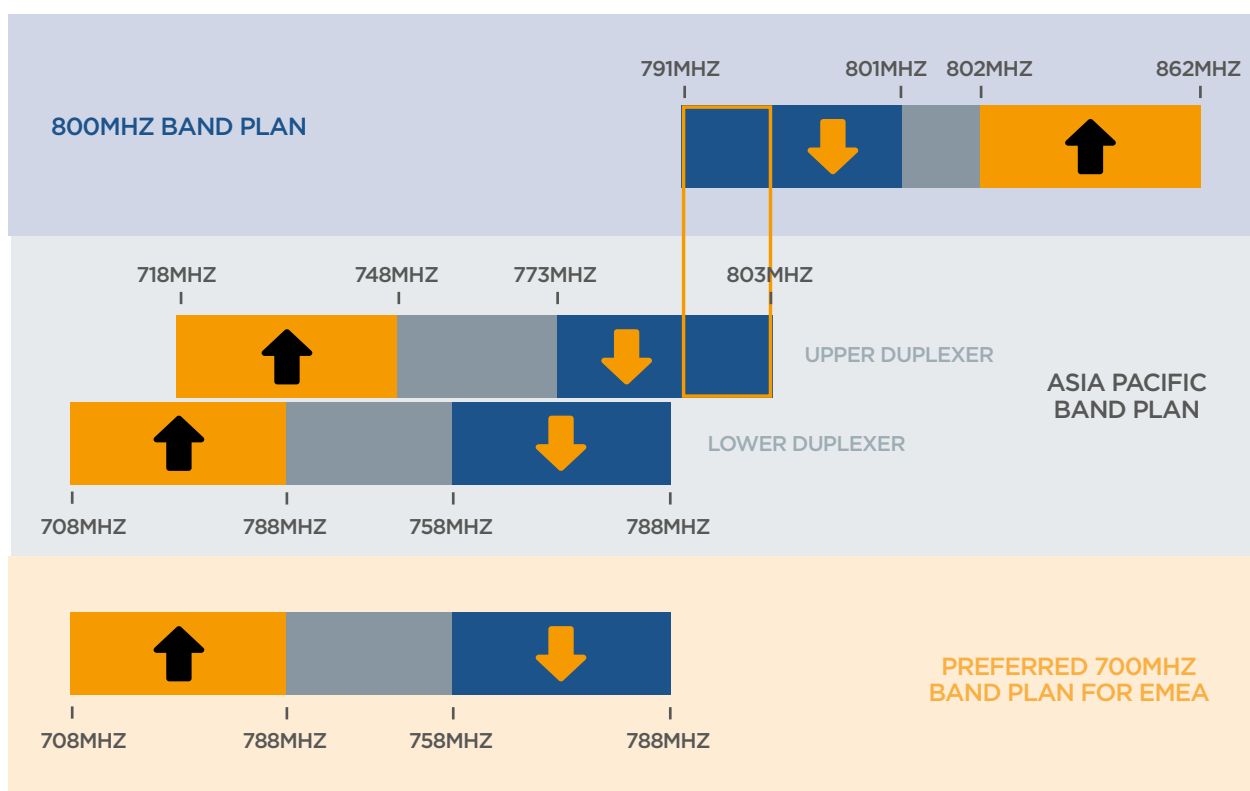
Source: GSMA Intelligence

MEETING CONNECTIVITY DEMANDS IN 2020 AND BEYOND

Forecasts for ongoing strong data traffic growth into the medium term mean an ongoing need for additional spectrum. The EU has already announced, through its RSPP programme that a total of 1200MHz of spectrum should be identified to meet the current and anticipated future demand. With only an average of 600MHz released at present, Europe risks falling behind. In readiness for the next WRC event in the autumn of 2015, the Member States need to agree a position on the spectrum bands proposed by the GSMA and member operators.

RADIO SPECTRUM

CANDIDATE BAND RANGES FOR WRC-15

Source: GSMA Intelligence

History teaches us that it takes between 3 and 13 years in some countries from a band being identified to it being made available for broadband services. With incumbents already using some of these suggested bands, the timescales will likely be at the longer end of this range, highlighting the need to address these issues with some urgency.

3.1.1.3

IMPLEMENTING A POLICY FRAMEWORK FOR SPECTRUM IN EUROPE

A stable, predictable and transparent licensing policy has a fundamental impact on the attractiveness of markets for investment. Given the rapid pace of technological and market developments, restrictive licensing requirements limit operators' ability to make the best use of their networks to supply services and risk delaying the investment required to introduce new broadband services.

There are a number of areas that the GSMA would highlight for attention, with the goal of delivering a harmonised framework for spectrum management across Europe:

REDUCING THE CURRENT COMPLEXITIES AROUND SPECTRUM MANAGEMENT IN EUROPE

as well as international regulations from the ITU, spectrum policy and regulation in Europe is managed both at an EU and nation member state level. In addition, there are a number of other bodies involved in the management of spectrum in Europe. These include Body of European Regulators for Electronic Communications (BEREC); the European Conference of Postal and Telecommunications Administrations (CEPT); the EU Radio Spectrum Committee (RSC); The EU Radio Spectrum Policy Group (RSPG) and the European Telecommunications Standards Institute (ETSI). An effective spectrum management policy in Europe requires a streamlined process with clearer responsibilities that will deliver economies of scale and a more responsive policy approach.

STRUCTURING LICENCE AUCTIONS TO REFLECT LONG TERM ECONOMIC VALUE OF SPECTRUM

Auctions are not the only option available to government for spectrum allocation, and consultation with mobile operators and other stakeholders is essential to work out the best strategy. The auctions should be designed to be fair, transparent and designed for the specific market conditions, with licence payments typically phased over the term of the licence. A one glove fits all strategy for Europe will not work and setting high reserve prices will stifle investment.

HARMONISING BEST PRACTICE LICENCE CONDITIONS

National regulatory authorities across the European Union have inconsistent approaches to spectrum licence renewal. Uncertainty about future rights to spectrum and their renewal can lead operators to reduce or delay investment in upgrading networks and deploying new services. There should be a presumption of licence renewal with only exceptional and well specified circumstances under which licences will not be renewed. Licensing authorities should clearly set out their approach to licence renewal in advance (a range between 2 to 4 years as a minimum should be adequate) of the expiry of the licence so as to avoid network investment being postponed. The authorities should publish the criteria that they will use to assess renewal as well as the terms and conditions that will apply to the renewed licence. Best practice would see a typical licence duration extended to 25 years.

REGULATORS NEED TO EXERCISE CAUTION AROUND ENCOURAGING OR MANDATING THE SHARED USE OF SPECTRUM

Europe has recently announced[49] a number of initiatives on shared use of spectrum. Some governments may see these as a solution to access spectrum for mobile broadband but this approach has to be done via public consultation and with the main objective of global or regional harmonisation in mind. A short-term fix on local spectrum needs might lead to a slow market with little or no ecosystem to support services. Effective spectrum management requires a mix of spectrum-use models, but exclusive licensing should remain the predominant approach.

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49. http://ec.europa.eu/digital-agenda/en/promoting-shared-use-europes-radio-spectrum

3.1.2

REFOCUSING EUROPEAN REGULATION ON INVESTMENT AND INNOVATION

Europe needs to refocus policy towards facilitating investment and innovation, rather than on the direct management of prices

Regulation should be refocused away from the short-term approach protecting competitors and enforcing low prices, trusting instead the longer term benefits of dynamic competition.

The European Commission should launch a major policy review in order to establish a light-touch, simplified approach to pan-European regulation.

Fierce competition, along with increased regulatory pressure, has resulted in reduced prices for consumers in Europe. While this increases accessibility to mobile services for consumers, mobile operators need to find ways to successfully monetise their investments, as operators will be less likely to repeat their investments for future technologies such as 4G.

A recent GSMA commissioned study which compares mobile wireless market performance between the U.S. and the EU, highlighted widening gaps between the mobile markets on the two sides of the Atlantic Ocean, particularly in areas such as LTE network deployments[50]. While there are many factors that have contributed to Europe's current position, it is clear that enlightened policy reforms could bring improvement, creating substantial benefits for EU consumers and driving economic growth. Fundamental regulatory reforms are needed to restore growth in the European mobile industry. In particular this requires a focus on facilitating investment and innovation, rather than on the direct management of prices.

The European Commission should complete a review of EU policies and propose changes that will create an attractive investment climate that can enhance dynamic competition and foster innovation, rather than preserving competition and achieving short-term price cuts. This review should aim to establish a light-touch, simplified approach to pan-European regulation. This should include a review of the way regulation is implemented at a national level and should identify areas that could be more effectively coordinated at a European level, such as consumer protection. Without a strong and confident European telecoms industry, consumers will not be well served and neither will the broader EU economy.

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50. http://www.gsmamobilewirelessperformance.com/

3.1.3

ENABLING INCREASED OPERATIONAL EFFICIENCY THROUGH GREATER ECONOMIES OF SCALE

European policy should enable the mobile industry to leverage single market scale economies and reduce network costs.

Impediments to the efficient consolidation of mobile markets should be reduced in Europe by streamlining merger reviews and taking a more cautious approach to the imposition of remedies.

Discrimination in favour of new entrants should be discontinued and market forces should be allowed to determine the optimum number of players.

The regulatory framework should also facilitate all types of infrastructure sharing arrangements.

Consolidation is often a feature of maturing industries that require high levels of capital investment. Consolidation can bring a range of potential benefits including significant cost savings through economies of scale in both operating costs and capital investment. While it is also important that regulation ensures healthy competition within the industry, a balance must be struck that allows for the natural evolution of the mobile industry – particularly in areas with a relatively high number of mobile operators such as in Europe. Getting this balance right is key to creating an industry that is able to reinvest in the services of the future from which the consumer will benefit. An A.T. Kearney report for ETNO identified that consolidation in Europe could deliver pre-tax savings of approximately €5 billion per annum by 2020[51]– savings that could be used to re-invest in the future of the industry.

In some countries, network sharing agreements or joint ventures are already enabling efficiencies but in many markets there will need to be a reduction in the number of network operators – ideally via consolidation or alternatively via exits.

The European Commission should develop and implement a plan to reduce barriers to efficient market consolidation by simplifying merger reviews and taking a more cautious approach to the imposition of remedies. The Commission should develop tools to effectively account for long term investment and innovation elements in its anti-trust and merger analyses.

The regulatory framework should also facilitate all types of infrastructure sharing arrangements, which can involve the sharing of various components of mobile networks, including both so-called passive and active sharing. While it may at times be advantageous for mobile operators to share infrastructure, network deployment remains an important element of competitive advantage in mobile markets. Network sharing should therefore be the result of commercial negotiation between the operators themselves and not mandated nor subject to regulatory constraints or additional fees.

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51. http://www.etno.be/datas/publications/studies/A%20Future%20Policy%20Framework%20for%20Growth%20Report.pdf

3.1.4

BASE-STATION SITING APPROVAL: AVOIDING DELAYS IN NETWORK DEPLOYMENT

Explicit planning approval processes for mobile base stations should be defined, to avoid lengthy delays in network deployment.

Member States should define explicit planning approval processes for mobile base stations to avoid lengthy delays in network deployment.

EMF exposure guidelines, such as ICNIRP, which are based on sound scientific evidence and are subject to ongoing expert review, should be respected, and roll-out restrictions related to environmental impact should be limited.

Member States should introduce mechanisms to avoid delays related to bureaucratic inefficiencies, including exemptions for small installations or certain site upgrades, 'one-stop shop' licensing procedures and tacit approval.

To ensure national coverage, mobile operators are required to install base stations across the country so that every user is able to benefit from the use of mobile services. Base stations are installed to provide geographic coverage and additional network capacity where needed. The introduction of new mobile services (such as LTE) requires additional, technology upgrades to base stations. Operators may also be required, as a condition of their licence, to install base stations to meet government or regulatory coverage targets.

Conditions for granting permits for base stations that mobile operators are required to install for national coverage currently vary considerably from one European country to another. This is exacerbated by a general trend across Europe towards increasing delays in securing base station licences. In many EU Member States, it still takes on average one year to receive all permits required to deploy the antennas of a single base station, due to excessive bureaucracy, lack of co-operation between governments and operators and politically driven localised barriers to installation.

Some regions or municipalities set exclusion zone requirements in their local regulations restricting the construction of mobile antennas near hospitals or kindergartens or even banning the roll-out inside cities. In some countries, some mayors set moratoria at a local level, thus preventing the mobile operators from deploying their networks locally.

The GSMA is calling for a consistent, streamlined approach to broadband policy for the deployment of high-speed internet facilities, including general and clear rules for granting base station permissions at national level. The uptake of digital technologies and services facilitated by fast internet is a prerequisite for growth. It is therefore essential for Europe to stay focused on all initiatives that aim to eliminate the current obstacles to high-speed broadband roll-out to make way for recovery and sustained growth across the region.

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52. "Base Station Planning Permission in Europe", July 2012.

3.1.5

TAXATION: SECTOR SPECIFIC TAXES LOWER CONSUMER DEMAND AND HINDER INVESTMENT

High, discriminatory, sector-specific taxes deter the take-up and use of mobile services and slow the adoption of ICT more generally. Lowering such taxes could benefit consumers, businesses and the socio-economic development of the EU.

While mobile operators recognise that governments apply taxes to finance spending and generate externalities in sectors where private investment is lacking, often these taxation models are not efficient. Fiscal policy that applies a special tax to the telecommunications sector are inefficient and cause distortions that crowd out private spending and, in the end, diminish welfare.

The GSMA encourages governments to lower or remove mobile-specific taxes because the long-term benefits of a vibrant mobile telecommunications sector outweigh any short-term contributions to the government budget.

The GSMA supports a best practice tax approach, encouraging governments not to impose taxes on the mobile industry/ consumer above and beyond the taxation levels for other commercial enterprises. While to an observer this might initially be seen as self-interest, it is clearly also in the interests of extending mobile connectivity to all sections of society, with all the benefits this brings to the individual.

Furthermore, it is also in the interest of the governments in question. By keeping the cost of ownership as low as possible, an increased number of citizens will be able to benefit from the ownership of mobile phones, which will in turn drive economic development – generating more tax than would have been collected under a high mobile tax scenario.

The GSMA has long argued that there is a clear link between the taxation of mobile services and the rate of growth of the mobile industry in a country. Excessive taxation on mobile services is ultimately counterproductive.

Telecom operators in Europe already contribute significant tax revenue to European governments – as we highlighted in an earlier section of the report the contribution to public funding in 2012 was €53B, even before considering spectrum fees. As a result of the European fiscal crises five EU Member States – Hungary, Greece, Spain, France and Slovakia – have levied sector specific taxes on the mobile industry. These taxes will hinder the growth of the mobile sector and the creation of a vibrant digital economy. These taxes should be removed at the earliest opportunity. Specific charges on the mobile sector, beyond the administrative costs of regulating the sector, are not in the spirit of the EU-wide telecoms policy framework.

€53B

The contribution to public funding in 2012 was €53B, even before considering spectrum fees.

3.2

Enabling innovation in content and services

Mobile operators are working to continually expand their product portfolio by delivering new products and services to the consumer. They are moving beyond their traditional core voice, SMS and data propositions to embrace new technologies and new business models and are investing in content to leverage their network assets and commercial presence in support of innovation.

Pervasive connectivity between people and processes will enable multiple services to be delivered automatically and contextually, whenever and wherever required. Supported by cross-industry collaboration, it will have a positive impact on many sectors of the economy. With a policy environment supporting the ecosystem and spurring continued innovation and investment, prospects for the industry, its consumers and the wider economy remain strong. Regulators should facilitate and support industry's efforts to collaborate in developing interoperable pan-European services that meet customers' expectations.

INNOVATION

The mobile industry is a strong supporter of an open Internet; the flexibility to manage traffic and innovate on the network and in customer propositions is required to meet the diverse needs of consumers.

3.2.1

NET NEUTRALITY AND OPEN INTERNET: OPERATORS NEED FLEXIBILITY FOR NETWORK MANAGEMENT

In order to avoid congestion and to provide consumers with access to a variety of applications that meet their requirements, investment in network capacity should be complemented by service- and customer-oriented network management.

Traffic management is an efficient and necessary tool for operators to optimise the delivery of services over their networks, in particular in the mobile context.

Operators need the flexibility to experiment and establish new business models that better align investment incentives with technological and market developments and create additional value for their customers.

Inappropriate over-regulation on traffic management and service differentiation would negatively impact innovation and consumer choice and would undermine the development of Europe's digital economy.

One argument is that legislation is needed to ensure that all data on the Internet is treated in the same way, but the reality is that traffic management is a necessary requirement where capacity constraints exist, as they do - especially in mobile networks. This is not the same as blocking access to content or restricting the freedom of speech on the Internet.

Mobile operators already have to prioritise between types of data (i.e. voice vs. data) and types of user (i.e. handset or application type) in order to ensure the levels of service that consumers expect. Looking forward, in order to be able to maintain these service levels mobile operators need to be free to innovate and create pricing models that are better aligned with the services that the consumer is both wanting to use and willing to pay for, as in any business. By creating pricing models that are based for example on the type of content downloaded, the time of day or the speed of access and by offering premium services such as prioritised downloads, mobile operators can more sustainably provide new services that increase consumer choice.

Mobile networks are different from fixed networks; mobile networks are more traffic-sensitive, making traffic management even more important in the mobile context. Mobile operators need to deal with continually changing traffic patterns and congestion within the limits imposed by finite radio-network capacity where one user's traffic can have a significant effect on overall network performance. These characteristics, combined with the fact that mobile users, by definition, move around, require mobile operators to have greater flexibility in choosing how to manage their networks in order to ensure an optimum consumer experience.

The mobile industry is a strong supporter of an open Internet; the flexibility to manage traffic and innovate on the network and in customer propositions is required to meet the diverse needs of consumers.

3.2.2

MOBILE IDENTITY: NEED FOR CONSISTENT AND HARMONISED REGULATION

Mobile identity is at the core of digital society and the mobile industry has a significant role to play to build trust in the EU digital economy and information society. But to unlock the potential policy makers should:

Ensure consistency and harmonization between applicable legal instruments.

Prioritise the implementation of user-friendly identity solutions that promote innovation and acknowledge the central role of mobile in the digital identity landscape.

Ensure transparency and the application of proportional and consistent rules for privacy and security.

Facilitate the interoperability of secure electronic transactions and services across borders and across industry sectors.

Minimise compliance costs for industry and address any other barriers arising from existing or new legislation.

The legal and regulatory framework for mobile identity management generally revolves around issues of authentication and/or identification. Given the wide variety of digital identity applications, it is difficult to formulate a common or single definition of digital identity on which policy and regulatory issues can be based. One approach, as adopted by the European Commission when considering its own "eID" regulation, is to take a 'process based' perspective. This incorporates the legal and regulatory framework around the processes of identification and authentication, and more specifically around the inherent data that is processed over electronic networks and through digital identity related electronic transactions.

In the European Union the regulatory framework is comprised of a number of separate directives and regulations that cover the following elements:

- Electronic identification, signature and trusted services for electronic transactions;

- Data protection and privacy regulations;

- Technical standards;

- Other sector regulations such as e-commerce regulation.

The extent to which these regulations are part of a harmonised and consistent framework is still being determined by EU policy makers. As markets develop and trust and reputation become more important assets within the economy, policy makers need to ensure consistency between the different legal and regulatory instruments that affect digital identity management. Such consistency and legal certainty will be required to ensure harmonisation across borders, to provide business efficiencies and fair competition across different platforms, and consistent experiences for users, thereby enabling innovation, competition and market growth.

Governments are playing a critical role in unlocking the potential benefits of mobile identity by providing a clear framework for eGovernment services and corresponding applications to the mass market, paving the way for wider commercial opportunities across many sectors of the economy.

Where required, this will also entail modifying the existing legislation and removing regulatory barriers for mobile identity deployments.

Standardisation is a key step to achieve interoperability. If identity solutions are to be used across national borders, applicable open standards and best practices for consumers and industry players must be adapted accordingly. There are various industry groups already working towards a common set of specifications but the market place needs standards that embrace business process issues around assurance, privacy, and liability.

Electronic, digital and mobile identity are intangible, which makes them difficult for governments, service providers and consumers / citizens to understand, use and manage. Legislation and regulations are important as a means of making sure that the identity authentication standards that are defined and solutions that are adopted are appropriate: they must be easy to use, fundamentally secure and private, and they must promote interoperability and the establishment of trust. This is, of course, no small matter, but it is essential that policy makers play their part, so as to ensure that individual countries' societies and economies benefit most from the continued emergence of online activities, whilst minimising risks.

3.2.3

MHEALTH: NEED TO CLARIFY EXISTING REGULATION

There is no need for new medical device regulation, but there is a need to clarify existing regulation.

The GSMA strongly embraces the adoption of global, consensual standards. The existing standards are broadly fit-for-purpose as they relate to mobile systems. We also support initiatives aimed at identifying potential gaps in consensual standards relating specifically to the mobile health industry.

There is a need to clarify the interaction and distinction between legislative frameworks for devices when developing and manufacturing mobile health solutions.

Greater clarity is needed with respect to quality system requirements, the need for compliance with the appropriate ISO standard and the requirement for Notified Bodies to approve both or either type of quality system for telecoms manufacturers under given medical device classification statuses.

In order to unlock the full potential of mHealth in Europe, the importance of innovation in healthcare needs to be recognised and some key challenges need to be addressed. Some of these challenges, for example the reimbursement of costs, will be discussed mainly at national or regional level. Other key issues touch upon a range of EU policy and legislative initiatives, such as data protection and privacy, patient mobility or skills needs for health professionals. In addition, mHealth solutions, based on rapidly developing innovative technologies, increasingly cross different regulatory frameworks. Clarity with respect to the application of different regulations is therefore urgently needed, in order to protect user safety, build trust and maximise effectiveness, while encouraging innovation and stimulating new deployment on the market.

In Europe, new mHealth devices are increasingly covered by two regulatory frameworks: the Radio Equipment and Telecommunications Terminal Equipment and the EU Medical Devices Directives – both are under review. Amongst other concerns, this leads to questions regarding the application and coordination between these different regulations.

GSMA is confident that the existing definition and classification of Device and Accessory can embrace the large spectrum of technological and scientific advances being incorporated in new mobile health systems. We believe there is no requirement for additional new device regulation, but rather a clarification of existing regulation. The current revision of the EU regulatory framework on medical devices offers an important opportunity in this respect.

One area for clarification is the definition of the boundary between general wellness and diagnosis or treatment of a disease or health condition: under what circumstances might a product intended to support self-awareness and well-being become subject to the medical device regulation? For example, the distinction between Mobile Medical Apps and Mobile Wellness Apps can become unclear as healthcare models become more patient-centric. Today, the impact on quality of life or health outcomes may be significantly improved through preventive and self-monitoring activities.

We acknowledge that in the light of the rapid rate of change of mobile technologies, such a review process may need to take place more frequently than is required or assumed in the broader medical device arena. In this respect, a risk-based approach to regulating medical devices and more particularly software will foster innovation while preventing potentially harmful devices from reaching consumers.

We believe that the establishment and use of international standards can have a high impact on the ability of the industry to create innovative and safe products and that existing standards are broadly fit-for-purpose as they relate to mobile systems. We also support initiatives aimed at identifying potential gaps in consensual standards relating specifically to the mobile health industry.

It is important for users (medical professionals or lay persons) to be clearly aware of the regulatory status of a mobile health solution and its different components. We would like to highlight the requirement, within the current EU regulatory framework on medical devices, for products to have an appropriate level of traceability and post market surveillance to ensure safety is maintained through the product lifecycle. The same should apply for all mobile health solutions.

3.2.4

MPAYMENTS: MARKET FORCES TO DELIVER SOLUTIONS, AVOID PREMATURE STANDARDISATION

The custodian of a mobile subscriber's identity, the SIM card is a very flexible, secure and resilient platform that can be used to authenticate users of digital financial services.

Open, transparent and non-discriminatory standards developed by the global ICT industry provide interoperability, enabling complex ecosystems to evolve. Market forces over time converge on the most compelling solutions, and standards will emerge automatically. A regulatory push for standardisation at this stage could stifle innovation.

The contradictory implementation of provisions of the Payment Services Directive and the Second Electronic Money Directive by Member States is increasing the complexity of cross-border payments and hindering the development of the single market.

Mobile operators recognise the importance of efficient, competitive and innovative payment systems for European consumers. "Mobile payments" is a broad concept and it can refer to different things including: premium SMS based transactional payments; direct mobile billing; mobile web payments (WAP); and contactless payments (Near Field Communication – NFC payments).

The GSMA believes that contradictory implementation of provisions of the Payment Services Directive and the Second Electronic Money Directive at Member State level increases the complexity of cross-border payments and hinders the development of the single market.

To achieve critical mass, mobile payments infrastructure needs to ensure interoperability between a number of key components including the handset; the service provider; infrastructure and the secure element management infrastructure.

At the same time, consumer take up is dependent on the ability of operators to put together attractive and innovative offers. This means a fine balance is needed between standardisation and allowing innovation while ensuring openness of the process to all market participants. To be successful, the timescale to achieve standardization must match – or be close to - the speed of innovation in the market. The processes required to achieve standardisation through formal standardisation bodies often lag market developments and can act as a brake on innovation.

There are already several global bodies racing to standardize the technical mechanisms that enable m-payment - such as OMA (the Open Mobile Alliance) and Global Platform, and industry bodies such as the GSMA. These bodies stand for an open and transparent discussion forum that takes different approaches into account. They are in extensive consultation and engagement with all the stakeholders that can bring m-payments to market. The involvement of further standardization authorities in the ongoing process would raise doubts about the work already completed and likely delay implementation.

The European Commission could further facilitate debate between different stakeholders and could also have a role promoting the use of interoperable contactless systems in other industries. For instance, the European Commission could set targets for the deployment of NFC enabled contactless readers for the transport industries throughout the EU with the intention of creating a critical mass of consumers for take-off of mobile NFC services. This would promote economic benefits in the area of transport ticketing, and a harmonised approach for consumers to access transportation regardless of country or city hence reducing the fragmentation of ticketing approaches.

3.3

Building consumer confidence and trust in mobile services and applications

Mobile connectivity has emerged as an important new enabler to help deliver trusted services to consumers. But the growth of mobile, like any new technology, has led to new risks for the consumer including those such as fraud, spam and concerns around privacy. In this section we explore these risks in more detail and discuss how the mobile ecosystem is working together with other industries and organisations to help mitigate these risks.

3.3.1

HELPING CONSUMER CHOICES: MEANINGFUL & CONSISTENT RULES FOR ALL SERVICES

Consumers should be provided with meaningful information and consistent rules should apply for functionally equivalent services

Providing meaningful information to increasingly technology-savvy consumers is the best way to ensure transparency.

However, regulators should not stipulate the information that should be provided to consumers by prescriptive rules.

Regulators should look at transparency across the entire Internet value chain and ensure that same rules are applied for functionally equivalent services.

Operators strive to fulfil diverse customer expectations in a very dynamic and innovative market by offering a variety of products to match the diverse needs of end users. The mobile industry agrees that consumer understanding of the complex Internet ecosystem could be enhanced by providing meaningful transparency to consumers regarding their ability to access or use Internet services, applications and content.

There needs to be a consideration of what information would actually empower the customer to make more informed decisions and what simply would add further complexity and confusion. Different consumers demand different types of information. It is important to ensure that the typical user is not overloaded with information, while enabling the more advanced user to get all the information he/she needs.

The speed of the connection is usually seen as an important parameter of the network quality. However, it is also the most difficult to define and to communicate to the user in the mobile context. Hence the differences that sometimes occur between advertised speeds and the speed delivered at any given moment in time. Quality is a multi-factor measure with several parameters contributing to the consumer experience.

It is affected by a number of factors including the usage environment: for example indoor or outdoor, lightly loaded or heavily loaded cell, or distance from the antenna. Similarly, meteorological factors, device type, application type, or other applications running on the device can all have an impact.

It is difficult to collapse these multiple, time-dependent drivers of quality and provide consumers with a meaningful and simple measure of the expected service level. However, this should not prevent the industry from developing innovative tools (e.g. smartphone applications) in this area. We believe that competition between operators will result in more creative solutions in this area as well. Regulators may wish to set general transparency objectives and develop general guidelines, but operators should be free to decide how they communicate that information according to their existing business practices, internal processes, branding and tone of voice with customers.

There are other elements outside the control of the access provider such as smartphone choice and applications residing on the device, therefore terminal manufacturers and key application providers should also be involved to improve the transparency of the features under their control. Regulators should ensure that same rules apply for providers of functionally equivalent services.

3.3.2

DATA PROTECTION: NEED FOR CONSISTENT PRIVACY EXPERIENCES ACROSS THE MOBILE ECOSYSTEM

Policy makers need to ensure that consumers enjoy consistent privacy experiences across the mobile ecosystem, irrespective of the technologies, infrastructure, business models and data flows involved.

Personal data should be protected in a consistent way across all technologies, types of infrastructure and business sectors.

Data protection and privacy rules should be clear and flexible enough to address potential future risks, while encouraging continued innovation in technology and information use.

The personal data of individuals in the EU should be governed by the consistent application of European data protection and privacy law, even if the service provider's location is in a third country.

The rules governing international data transfers need to be simpler and more efficient.

The revision of the EU's data protection rules should facilitate and enhance self-regulation to help users manage their privacy across the mobile ecosystem.

Privacy is something many people care deeply about across all aspects of their lives. In Europe, policy makers have sought to protect privacy by putting in place some of the most stringent data protection rules in the world. But these rules are being rapidly outpaced by changes in technology and business models, the globalisation of services and a world of apps.

Key concerns exist around the collection (without the users' awareness or consent) of device IDs, user behaviour and location data; access to contact lists and other user generated data.

The EU's existing data protection rules were developed in the mid-90s when the world was not so globally connected and when policy makers felt you could address privacy by regulating technology infrastructure, such as mobile networks. It was a time when the Internet was just taking off and people connected to the web via their desktop PCs. It is a very different world today where mobile is central to connectivity and where a complex ecosystem of different players capture and use a range of personal information about people and their devices in real time. However, in this new connected world, online privacy in the EU is still regulated by a co-existing set of rules that is in places contradictory and that can ultimately be detrimental to consumers and businesses.

In January 2012, the European Commission presented its proposal for an overhaul of data protection rules that have been in place since 1995. There would be one set of rules under one regulation. While this review was long overdue, and while one regulation is most certainly welcome,

policy makers are only now becoming aware that the proposed regulation is in many ways inconsistent with another set of existing e-Privacy rules. These e-Privacy rules do not apply in the same way to Internet services as they do to mobile communications services, which were viewed as presenting risks to privacy in the mid-1990s when they were first introduced. For example, the e-Privacy rules apply to cellular location data and traffic data processed by mobile networks, but not to equivalent GPS or WLAN location data, or VOIP or online traffic data processed by Internet players. Why should there be this discrepancy if one of the objectives of the current review is to make it easier for individuals to understand and manage their privacy?

It is clear that whatever rules are deemed necessary to help protect the privacy of individuals, they need to apply equally to all parties in a technology and service-neutral way. We should not expect users to understand that different rules apply to functionally equivalent services delivered via different technologies. Consistency in privacy experiences will help raise people's awareness that an app or service has privacy implications and that they need to make choices. Consistency in law will also make it easier for business to meet users' privacy interests as well as their legal obligations.

We believe that consistency in law is not only vital for users, but also in avoiding the competitive disadvantages of dual compliance regimes. Surprisingly, this discrepancy has so far not received much attention amongst policy makers, even though Europe's data protection watchdog, the Article 29 Working Party, last year issued an opinion on this gap in the existing legislation.

3.3.3

NETWORK AND INFORMATION SECURITY: FOCUS ON COOPERATION AT INTERNATIONAL LEVEL

While no technology is unbreakable, the barriers to compromising mobile technologies, particularly UMTS and LTE, are extremely high.

The GSMA plays a key role in coordinating an industry-wide response to security incidents. It cooperates with a range of stakeholders to ensure both a timely and appropriate response and to improve the security of networks.

The European Commission should foster enhanced cooperation at the international level, in order to avoid overlaps, rather than developing completely new structures.

All actors in the supply chain should be subject to the same obligations, namely, the requirements to adopt risk management practices and to report security breaches. Currently only e-communications service providers are subject to these obligations.

Building on the efforts of the industry, ENISA and other governmental bodies need to raise the level of security awareness among both consumers and companies.

The frequency of successful attacks against companies, across a diverse range of economic and societal sectors, is increasing. These attacks have led to a very diverse range of incidents, which differ depending on the affected sectors, the company size and the potential business impact. Threats that jeopardize mobile network operators in one country might also threaten the same type of businesses in another country.

All businesses that offer products and services via the Internet must be encouraged to apply security in their business processes and business environment and contribute to the global effort of raising the security awareness of key stakeholders in the economy, governments, and end users.

Raising security awareness among end users is an important activity in order to improve the level of security at a European and a global level. Even though many campaigns have been initiated internationally by governments and businesses, end user awareness for security still needs to improve. The GSMA would welcome the support of the European Network and Information Security Agency (ENISA) in this regard, since many attacks involve social engineering strategies – an attack which only the end-user can finally defend through the use of anti-virus software.

However, security awareness endeavours should always be combined with further security building measures, such as technical and organisational security controls and counter measures.

Targeted attacks, such as spear-phishing, brute-force-attacks and advanced persistent threats, are on the rise. Attackers are trying to gain access to end-user devices or the desktop systems of companies, which will enable them to access and manipulate sensitive company information, steal data or reduce the availability of services. In this context, vulnerabilities in hardware and software might be the first entry point for attackers, thereby posing threats to end users and businesses. Therefore, improving network and information security in the telecoms equipment supply chain is very important. The whole ICT industry must take responsibility for performing security tests and the provisioning of a vulnerability and security advisory information service to raise security at a European level.

3.3.4

CHILD PROTECTION

The mobile industry has taken active steps in the area of child online protection and broader issues such as illegal content. The GSMA has led the way in self-regulatory initiatives dealing with issues such as parental controls, education and awareness, and online child abuse images.

Mobile operators need to be vigilant in their work to protect and support younger customers, while ensuring the mobile experience for young people is positive and enriching.

The GSMA is engaged with international initiatives related to child online protection, including the ITU's Child Online Protection programme, and actively engaged with governments and regulators looking to address this issue.

Addressing child online protection is best approached through multi-stakeholder efforts.

The GSMA leads several initiatives related to young people's use of mobile services, such as the European Framework for Safer Mobile Use by Younger Teenagers.

The GSMA also runs the Mobile Alliance, a global mobile industry initiative to help combat child sexual abuse content.

Across the world, young people are embracing the opportunities that come with carrying a mobile phone. Mobile connectivity is enriching children's lives by providing them with a convenient and rich medium through which to interact with friends, access education materials, play games and learn about the world.

To help protect children from the risks that come with increased access to the Internet, mobile operators are working closely with governments and NGOs to ensure that both children and their parents are aware of the risks and to empower them to take appropriate action when required.

Through its mYouth programme, the GSMA supports mobile operators in both promoting the benefits of mobile technology to young people and raising awareness about how to use mobile services safely. The mYouth programme also works alongside the GSMA's mEducation and mLearning programmes, which are designed to help both adults and children use mobile devices and mobile connectivity to acquire knowledge and expertise. The programme also contributes to the ITU's child online protection working group, the Internet Watch Foundation's funding council, and participates in the European Safer Internet forum.

The GSMA works with the mobile industry to develop and adopt self-regulation, which is generally more effective than regulation in adapting to fast-evolving technologies and accommodating differences in cultural and societal standards. In Europe, for example,

83 European mobile operators have implemented the European Framework for Safer Mobile Use by Younger Teenagers and Children through the roll out of national voluntary agreements on child protection, known as codes of conduct.

In Europe, the GSMA, along with other leading trade associations, is supporting the ICT Coalition, which has launched a set of principles aimed at enhancing online safety for children and young people. The ICT Coalition and its principles mark a step forward in the evolution of industry self-regulation. The Coalition brings together for the first time many key industry players from across an increasingly diverse communications and Internet market. The GSMA and other members of the Coalition are urging more industry players across the value chain to demonstrate their support for child safety by joining the ICT Coalition and adopting its principles.

Run by the GSMA, the Mobile Alliance against Child Sexual Abuse Content, a voluntary initiative, aims to obstruct the use of the mobile environment by individuals or organisations wishing to consume or profit from child sexual abuse content. Many of the world's leading mobile operator groups are part of the Alliance, and all work towards stemming, and ultimately reversing, the growth of online child sexual abuse content.

The third wave of mobile connecting almost anything and anyone presents an opportunity for Europe to drive growth and innovation.
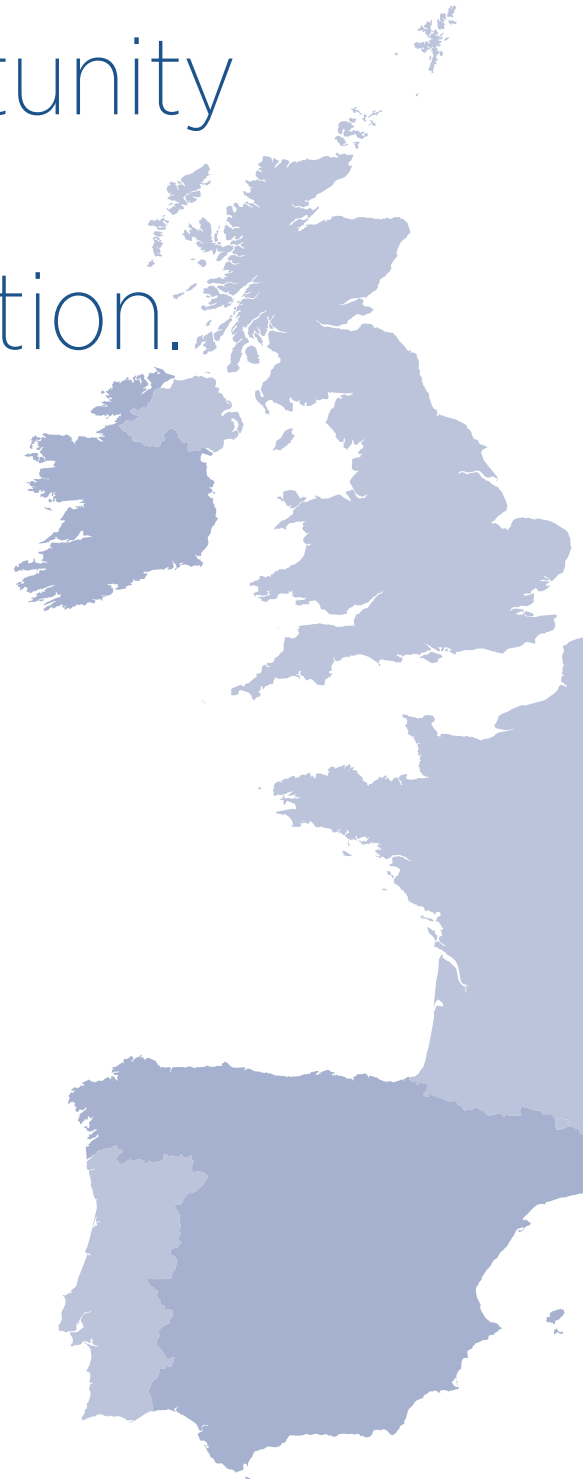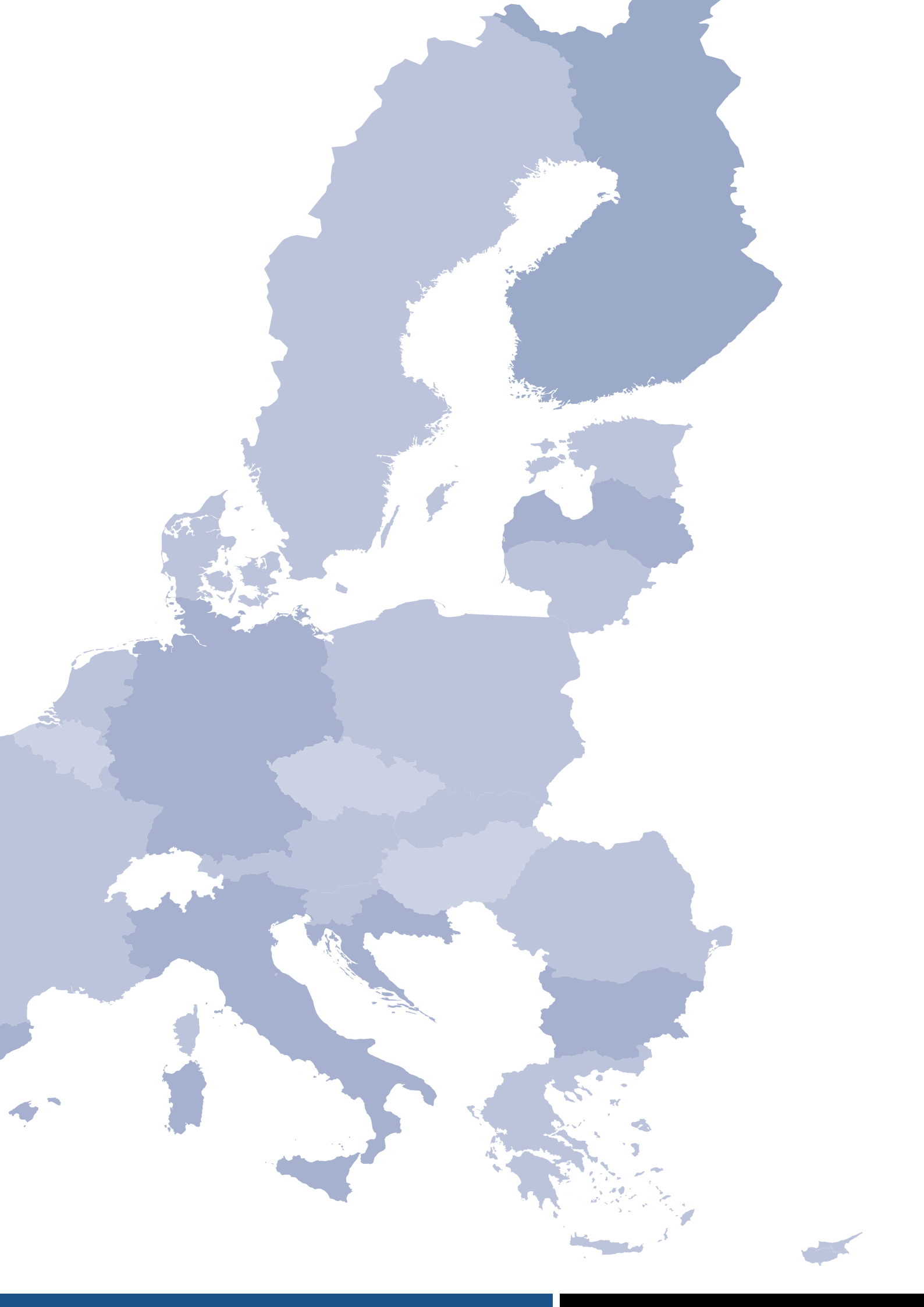
For the full report on Mobile Economy: Europe 2013
please visit the GSMA website at www.gsma.com/mobileeconomyeurope