



# The Mobile Economy 2015



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### About the GSMA

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

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[www.gsmaintelligence.com](http://www.gsmaintelligence.com)

[info@gsmaintelligence.com](mailto:info@gsmaintelligence.com)

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# Executive Summary

The mobile industry continues to scale rapidly, with a total of 3.6 billion unique mobile subscribers at the end of 2014. Half of the world's population now has a mobile subscription—up from just one in five 10 years ago. An additional one billion subscribers are predicted by 2020, taking the global penetration rate to approximately 60%. There were 7.1 billion global SIM connections at the end of 2014, and a further 243 million machine-to-machine (M2M) connections.

The world is seeing a rapid technology migration to both higher speed mobile broadband networks and the increased adoption of smartphones and other connected devices. Mobile broadband connections will account for almost 70% of the global base by 2020, up from just under 40% at the end of 2014. Smartphone adoption is already reaching critical mass in developed markets, with the devices now accounting for 60% of connections. It is the developing world—driven by the increased affordability of devices—that will produce most of the future growth, adding a further 2.9 billion smartphone connections by 2020.

Fuelled by the growing range of new services and applications, data traffic is expected to see an almost ten-fold increase by 2019. Slowing subscriber numbers, as well as competitive and regulatory pressures, have led to a slowdown in industry revenue growth in recent years. Revenue growth is forecast to slow further over the coming years, with a compound annual growth rate (CAGR) of 3.1% per annum through to 2020, down from 4% in the period 2008-2014. More encouragingly, operators are showing an increasing ability to monetise the explosive growth in data traffic.

Operators have invested heavily in their infrastructure over the past three years, with capital expenditure (capex) set to increase further to support mobile broadband network deployments. Capex is forecast to total US\$1.4 trillion for the period out to 2020, with 3G coverage set to reach 86% of the population by 2020. Additionally, 4G is now being built out more rapidly than was the case with 3G. However, this magnitude of investment will be dependent on operators continuing to diversify their revenues, and developing new and more sustainable business models.

The mobile ecosystem is a major driver of economic progress and welfare globally. In 2014, the mobile industry generated 3.8% of global gross domestic product (GDP), a contribution that amounts to over US\$3 trillion of economic value across 236 countries. This figure captures the direct, indirect and productivity impacts of the mobile ecosystem, but does not include broader socio-economic effects. In the period to 2020, mobile's contribution will grow at a faster rate than the rest of the global economy, contributing 4.2% to the world's GDP by the end of the period.

\*GSMA Intelligence estimates that the total number of active SIM connections at end 2013 was 6.3 billion.

The mobile ecosystem directly employed nearly 13 million people in 2014, rising to over 15 million by 2020. The sector also indirectly supported nearly 12 million jobs in the broader economy in 2014 and this figure is predicted to rise over 13 million by 2020. The industry also makes a very large contribution to public funding in the form of general taxation. In 2014, approximately US\$410 billion was contributed globally, with spectrum auctions generating additional revenues of over US\$14 billion.

Mobile is at the heart of the new digital ecosystem. It is driving innovation and the development of new services in areas such as digital content, social networking and online commerce. Mobile is delivering a new and vibrant ecosystem, based on mobile broadband networks, advanced smartphones and tablets, and a growing range of other connected devices and objects.

Mobile has already redefined consumers' experiences in many aspects of their daily life, as well as created a range of new business opportunities and services. New technologies, imaginative use cases and business models are likely to generate even more profound innovations, with mobile increasingly linking the digital and physical worlds. Rapid smartphone adoption allows for new products and services to be created, whether they are based on apps or on the development of low power components that are the building blocks for new connected devices. Consumers are beginning to realise the transformative potential of the Internet of Things (IoT), with an increasing number of services and launches focused on, for example, wearables and the smart home.

The benefits of the new mobile ecosystem are not limited to the developed world. Innovative mobile solutions are helping to provide underdeveloped, underserved and poverty stricken regions with the opportunity to overcome socio-economic challenges, particularly in the areas of financial inclusion, health, education and disaster response.

For the full potential of mobile to be realised, populations across the world need access to mobile broadband networks, and affordable devices and services. At the end of 2014, the number of people using the mobile internet reached 2.4 billion. This is expected to rise to 3.8 billion by 2020, driven by growth in developing countries. The unconnected

population is predominantly rural, with low incomes and high levels of illiteracy creating barriers to mobile internet adoption. Operators, other ecosystem players, as well as governments and regulators all have a role to play in addressing these barriers and improving the reach and affordability of mobile services.

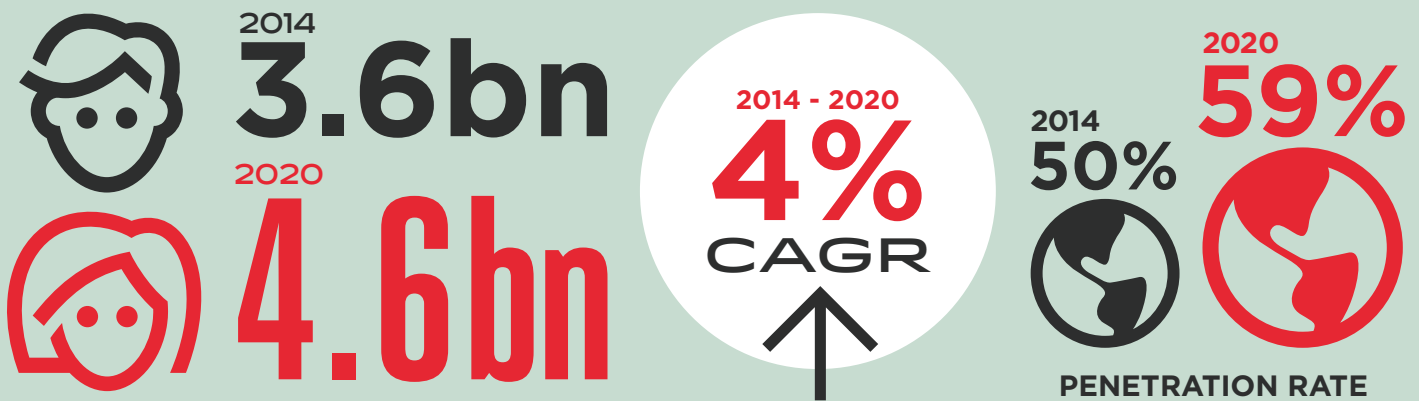
With a supportive regulatory framework, the mobile sector will continue to drive socio-economic progress, benefiting individuals, companies and governments alike. While regulatory frameworks will differ from market to market, there are some general principles that apply across the globe. There are a number of steps that policymakers can take to encourage investment. These include reducing constraints on market-driven restructuring as operators seek to gain the necessary scale, while also ensuring there is a solid business case for deploying mobile technologies and services. Governments also have a role to play in encouraging innovation, and policymakers can help the mobile industry build the necessary trust and confidence in the digital economy. If policymakers and regulators encourage investment, competition and innovation, both the mobile sector and the wider digital economy will expand, creating prosperity and new jobs.

A precious and finite resource, radio spectrum is fundamental to the delivery of mobile services. The International Telecommunication Union (ITU) estimates between an additional 1340MHz and 1960MHz of spectrum will be required to meet the anticipated demand in 2020. The next opportunity to identify additional harmonised spectrum for mobile broadband is at the World Radiocommunication Conference in 2015 (WRC-15) in Geneva. The outcome of WRC-15 will determine whether the telecoms industry can continue to meet the growing demand for affordable, ubiquitous, high-speed mobile broadband services.

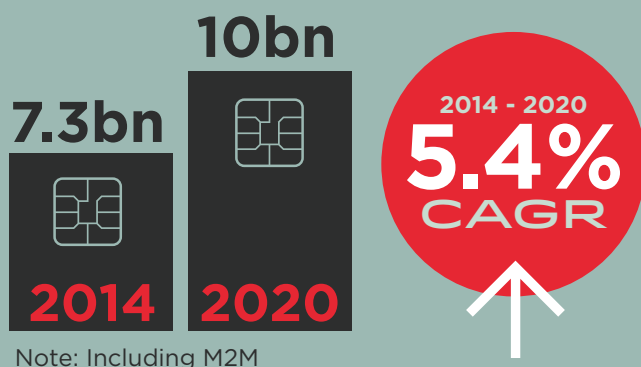
As mobile disrupts and affects more areas of consumer and business life, the potential for collaboration also grows. Players from across the digital ecosystem, ranging from mobile operators to new entrants and existing players in adjacent industries, will increasingly recognise the need for collaborative innovation, rather than competition, if they are to realise the full potential of mobile.

# GLOBAL MARKET

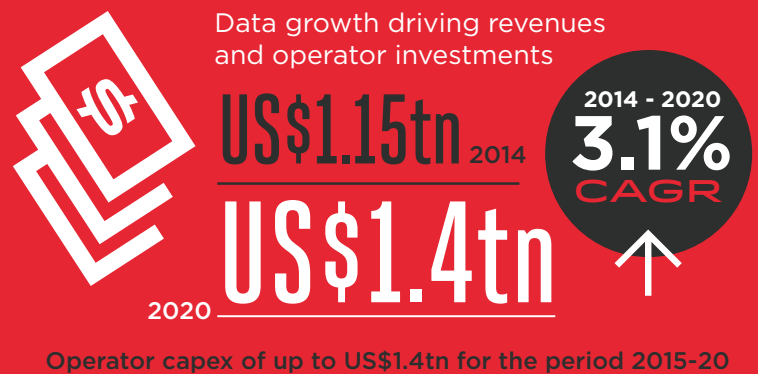
## Unique subscribers



## Global SIM connections

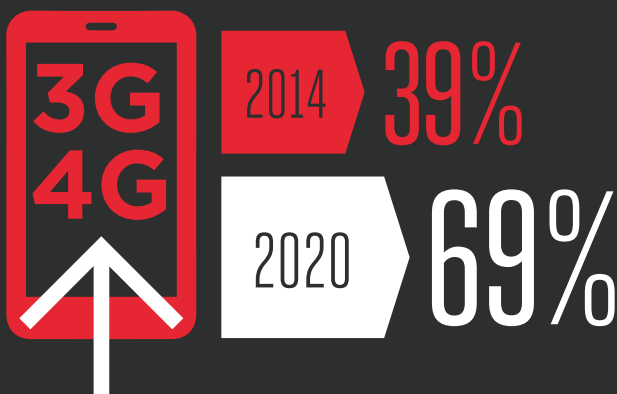


## Mobile operator revenues

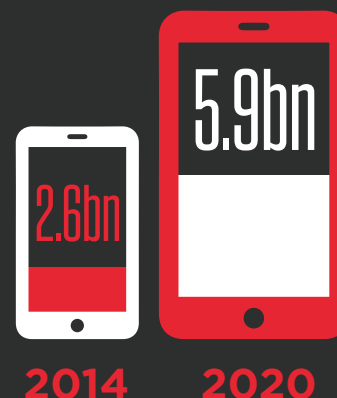


## Mobile broadband networks and smartphone adoption

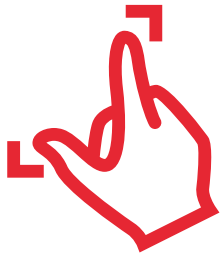
### 3G/4G CONNECTIONS



### SMARTPHONES



## Mobile contributing to economic and social development across the world



**Delivering digital inclusion to the still unconnected populations**  
Mobile internet penetration  
2014: 33%  
2020: 49%



**Delivering financial inclusion to the unbanked populations**  
255 live services across  
89 countries as of  
December 2014



**Delivering innovative new services and apps**  
Number of M2M  
connections to reach  
1bn by 2020

## Mobile industry contribution to GDP



## Public funding

Mobile ecosystem contribution to public funding before regulatory fees



**US\$411bn** 2014

**US\$465bn** 2020

## Employment

Jobs directly supported by mobile ecosystem

**13M JOBS** 2014

**15M JOBS** 2020



Plus an additional **11.8M**  
indirect jobs supported in 2014

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# 1 Global market overview

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## 1.1 Mobile continues to scale rapidly

At the end of 2014, half of the world's population had at least one mobile subscription, totalling over 3.6 billion unique mobile subscribers. By 2020, around three-fifths of the global population will have a mobile subscription, with close to one billion new subscribers added over the period.

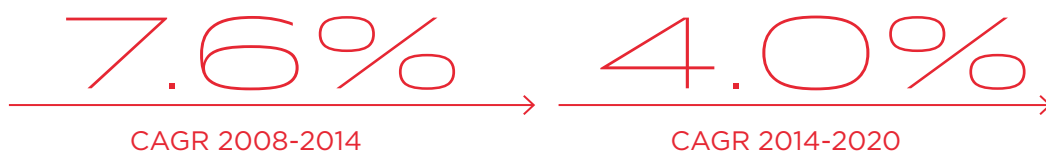
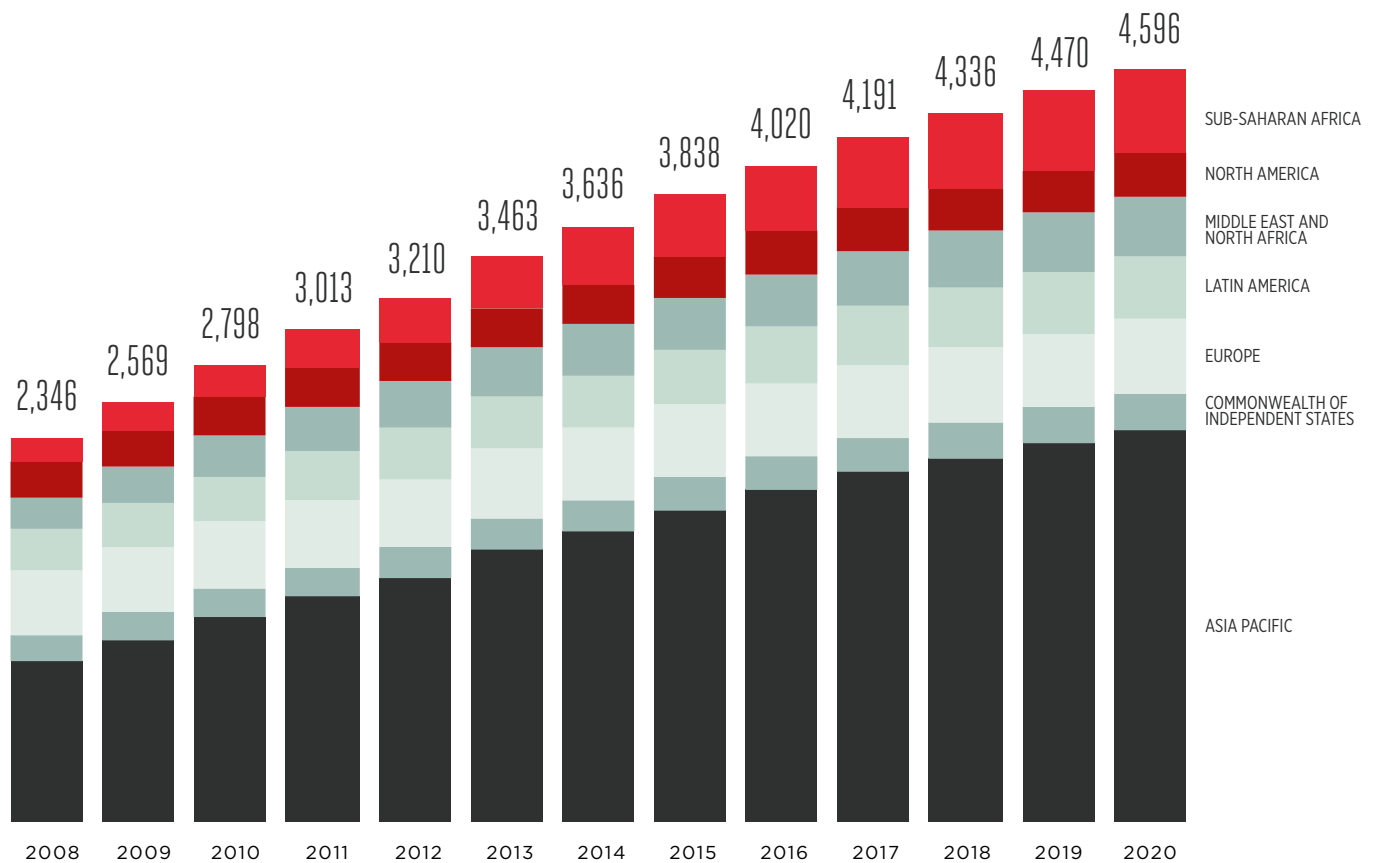
The global mobile subscriber base increased by just over 5% in 2014. Developed markets are growing more slowly as penetration rates approach levels close to saturation. For example, in Europe and North America, unique subscriber growth was below 1% in 2014. At the other end of the spectrum, Sub-Saharan Africa was still the world's most under-penetrated region with subscriber growth at nearly 12%.



Source: GSMA Intelligence

## Unique subscribers by region

(Millions)



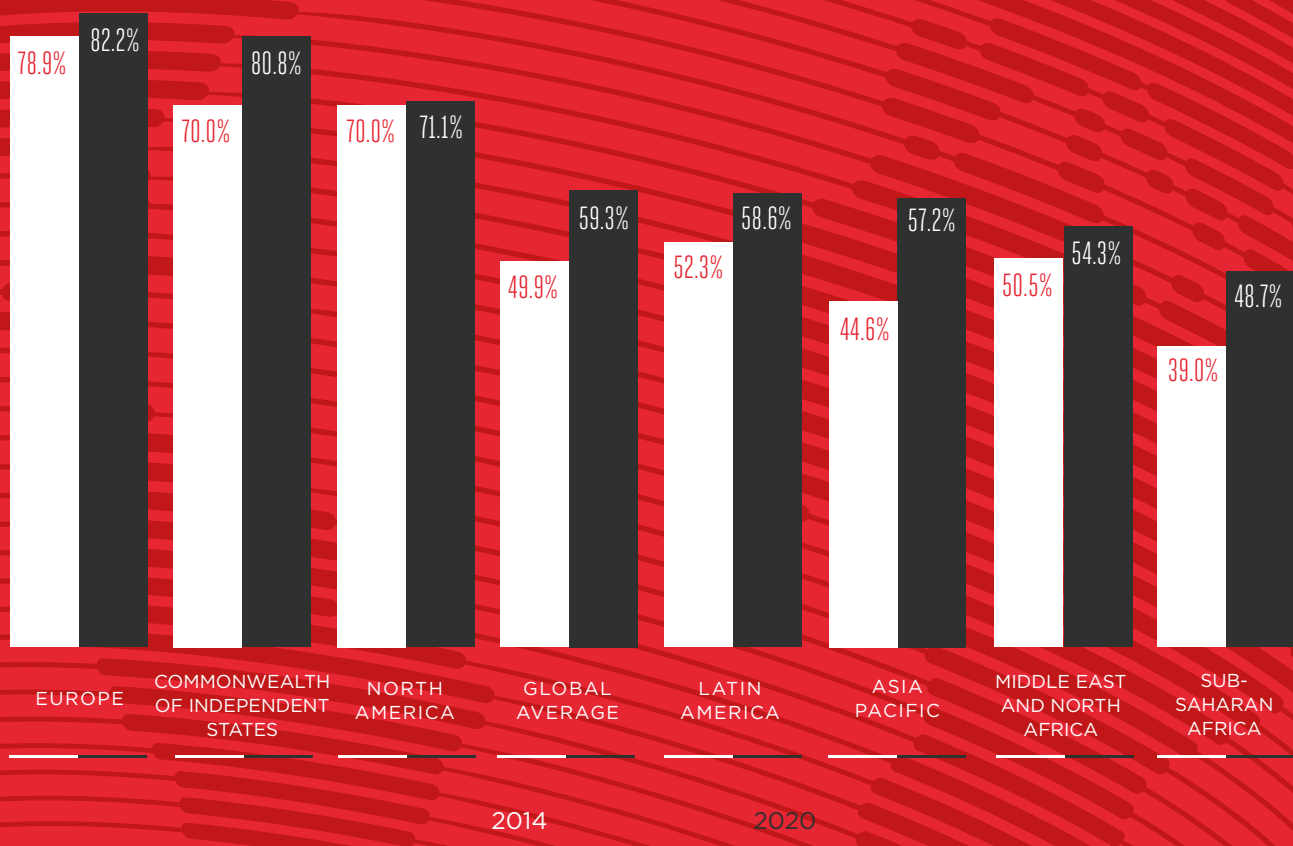
Unique subscriber penetration in the developed world is already very high and approaching saturation, standing at 79% at the end of 2014. The penetration rate will climb only modestly to around 81% by the end of the decade. In contrast, less than half of the population in developing markets currently has a mobile subscription, with the penetration rate at 44.6% at the end of 2014. This leaves significant room for growth, with the penetration rate expected to rise by about 11 percentage points by 2020 to 56%. The major

challenge facing mobile operators and other industry stakeholders is to connect the still unconnected populations in these developing regions.

The increasing level of maturity in developed markets, combined with the recent strong growth in developing markets, means that there will inevitably be a slowdown in global subscribers. Over the six years to 2014, unique subscribers grew at a CAGR of 7.6%. This figure is forecast to slow to 4.0% over the period out to 2020.

Source: GSMA Intelligence

## Unique subscriber penetration by region



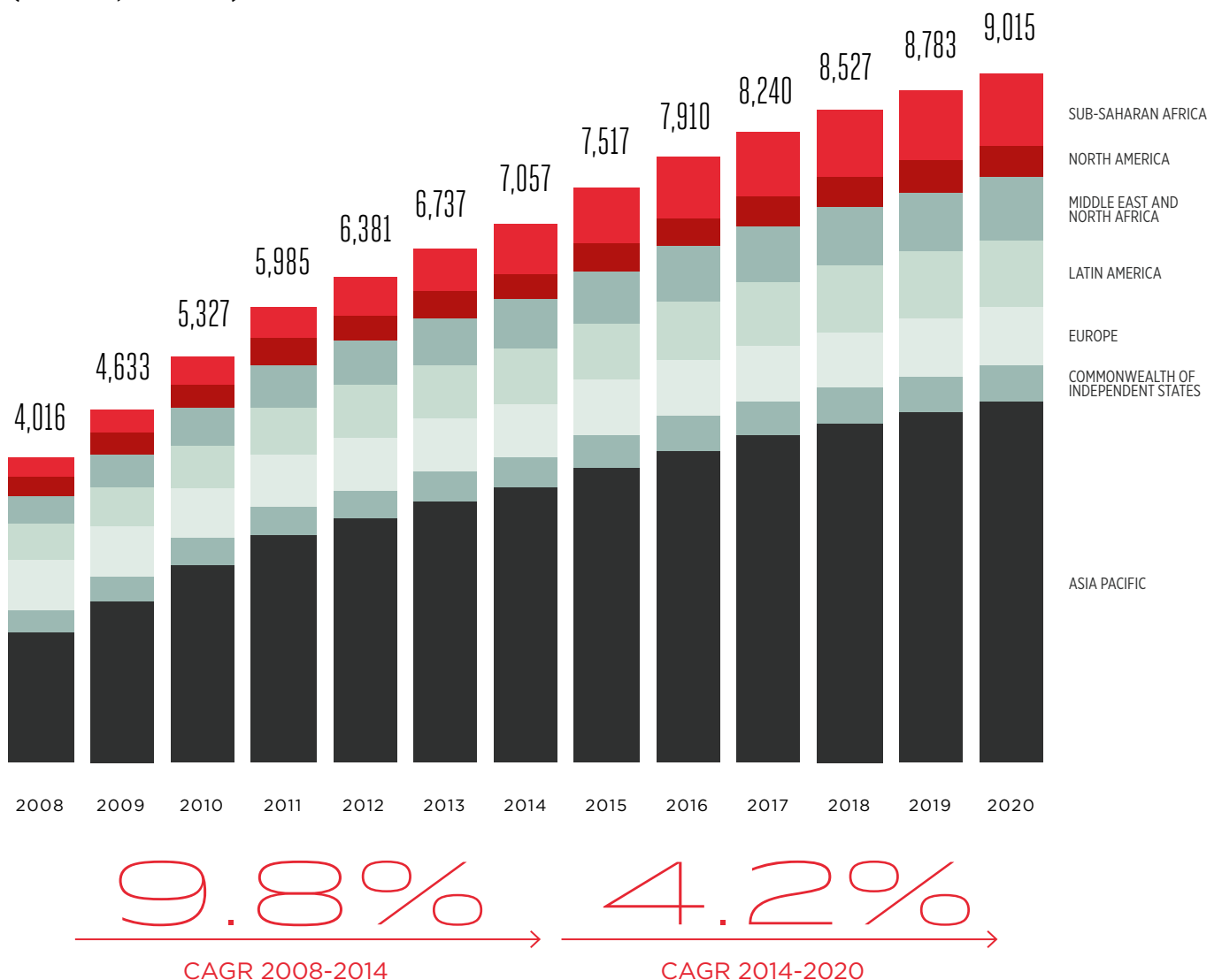
Multi-SIM ownership is common across all regions, with a global average of 1.8 SIM cards per unique subscriber. The rate varies significantly by region, with an average of nearly two or even slightly higher in many developing regions, where prepaid plans are the norm and subscribers are most price-sensitive. At the end of 2014, there was almost one SIM card for every person, with global connection penetration standing at 97%.

With the average number of SIMs per subscriber expected to be broadly stable over the next six years, the growth rates of connections will closely correlate with underlying subscriber growth. Compared with just under 10% annual growth in the past six years, only a 4.2% annual increase is expected, taking global connection penetration to 116% by the end of 2020.

Source: GSMA Intelligence

## Mobile connections by region

(Millions, ex-M2M)



## 1.2 Rapid shift to mobile broadband underway

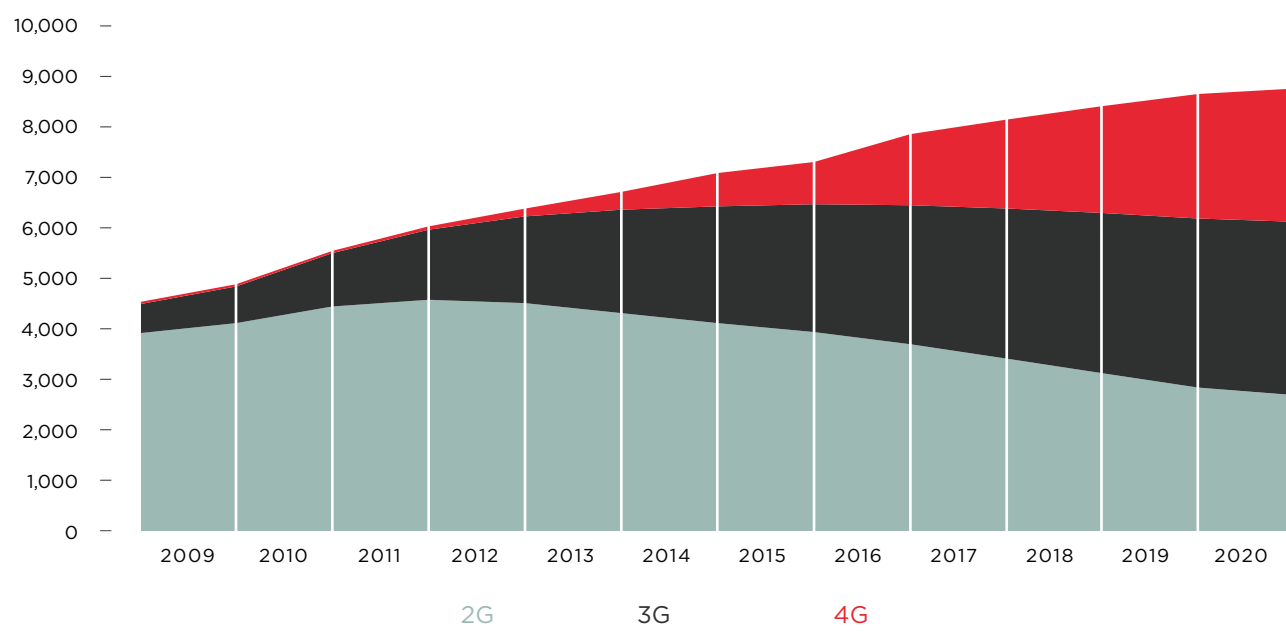
There is an accelerating technology shift to mobile broadband networks across the world. Mobile broadband connections (i.e. 3G and 4G technologies) accounted for just under 40% of total connections at the end of 2014, but by 2020 will increase to almost 70% of the total. This migration is being driven by greater availability and affordability of smartphones, more extensive and deeper network coverage, and in some cases by operator handset subsidies.

While 2G remains the dominant network technology globally today, its position has already declined materially. 2G connections accounted for 90% of the total in 2008, but this had fallen to around 60% at the end of 2014. In absolute terms, the number of 2G connections peaked in 2013 and fell by 6% during 2014.

Source: GSMA Intelligence

### Global connections by technology

(Millions, excluding M2M)



The greatest impact of this technology migration is now taking place in the developing world. Mobile broadband already accounts for over three-quarters of connections in the developed world and, by 2020, the figure will reach 92%. In contrast, less than a third of connections are currently on higher speed networks in the developing world. However, this is projected to nearly reach two-thirds of connections by 2020. In absolute terms, the number of mobile broadband connections in developing markets will increase by 3.1 billion over the period.

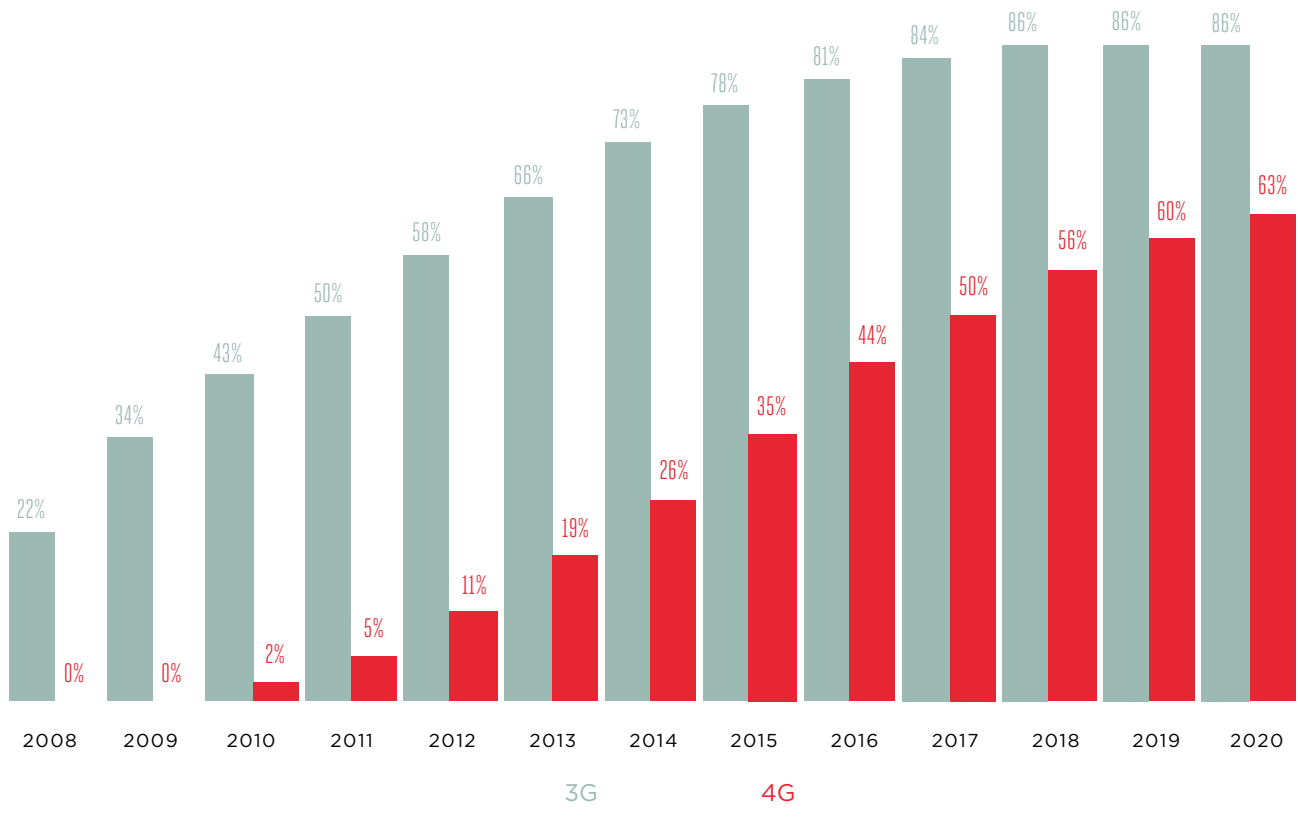
## 1.2.1 Mobile broadband coverage expanding rapidly

The ongoing technology migration to higher speed networks is also facilitated by significant operator investments. Recent research from GSMA Intelligence<sup>1</sup> predicts that more than four out of five people will have access to 3G networks by 2020, up from 70% today. The report also highlights that 4G networks

are being rolled out at a faster pace than was the case with 3G. While it took 10 years for 3G network coverage to reach half of the global population, it will take 4G networks eight years after launch to reach the same milestone, therefore reaching this level in 2017.

Source: GSMA Intelligence

### Global mobile broadband population coverage



1. <https://gsmaintelligence.com/analysis/2014/12/mobile-broadband-reach-expanding-globally/453/>

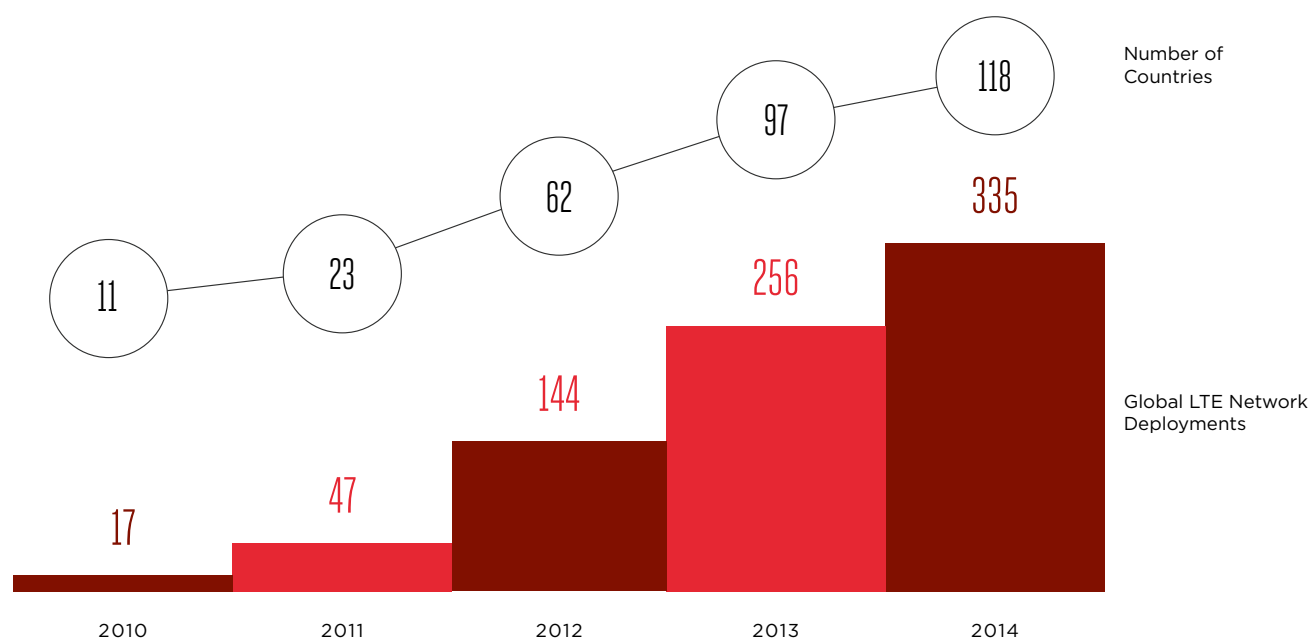
## 1.2.2 4G networks becoming dominant in developed world

The build out of LTE networks continued apace in 2014, with 335 networks having been deployed in 118 countries. 4G network coverage is expanding rapidly and now reaches 26% of the world's population, although there is a clear bias towards developed

markets. In December 2014, 4G coverage reached 90% of the population across developed markets and 15% in the developing world. Deployments across countries in Latin America and Asia Pacific will drive global 4G coverage over the next five years.

Source: GSMA Intelligence

### Increasing access to LTE networks globally



North America has the world's highest 4G coverage at 97%, as well as the largest proportion of 4G connections (over 40% against a global average of just over 7%). The early allocation of spectrum in the Digital Dividend band (700MHz) and programmes to expand coverage in rural areas, helped to position the US as one of the most advanced 4G markets in the developed world. Europe is now also seeing an increasing migration to 4G, with the majority of EU countries (24 out of 28) having had spectrum auctions and assigned the 800MHz band. With operators rapidly building out network coverage

(reaching 63% at the end of 2014), 4G now makes up 10% of the connection base and will account for over half by 2020.

By the end of the decade, developed countries are expected to reach 'full' coverage (defined as 95% of the population); while LTE networks in developing countries will reach the majority of their population by 2019 and 60% by 2020. This will facilitate an increasing migration to LTE connections, with close to one quarter of connections forecast to be 4G by 2020.

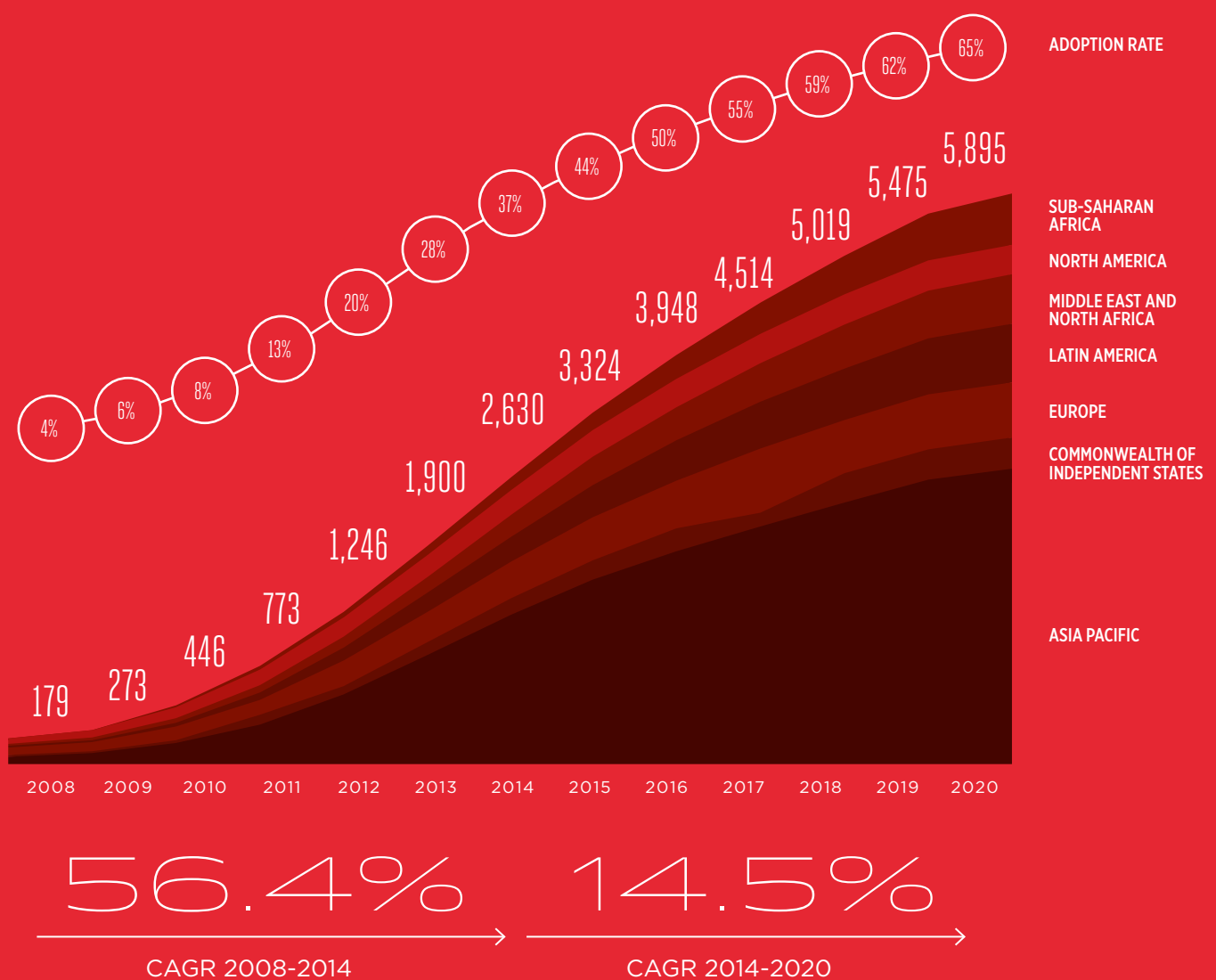
## 1.2.3 Smartphone adoption extending beyond developed markets

The increasing proportion of higher speed connections largely reflects the accelerating rate of smartphone adoption. Adoption rates have already reached 60% of the connection base in the developed world, ranging from 51% in Europe to 70% in North America at the end of 2014. Over the next

four years, smartphone adoption in the developed world is expected to reach the 70-80% ceiling, the level at which growth tends to slow.

Source: GSMA Intelligence

### Smartphone connections (millions) and adoption

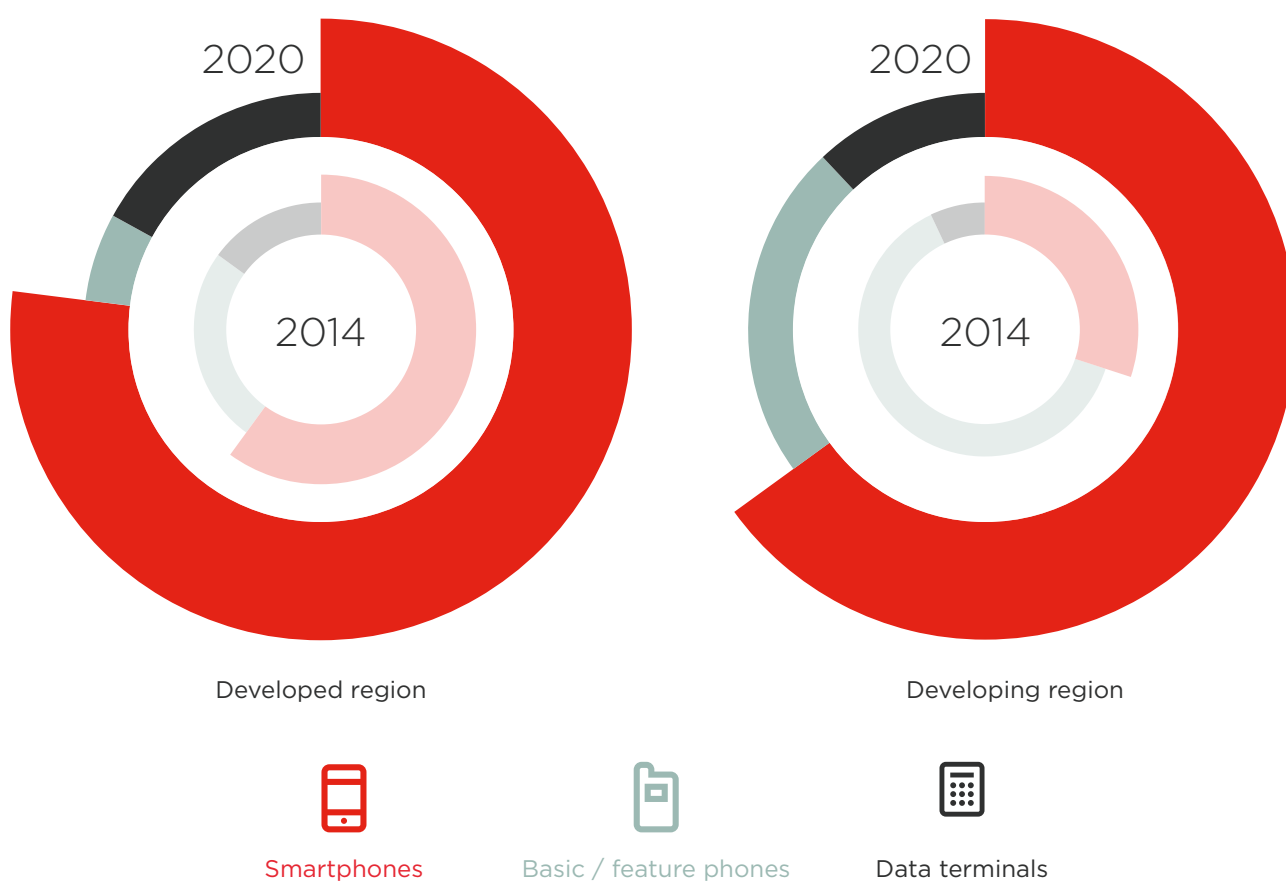


Driven by the increased affordability of devices, the developing world will lead most of the growth in global smartphone adoption, reaching 63% by the end of the decade. The number of smartphones across the developing world will increase by 2.9 billion out to 2020 and nearly all of these will

be running on mobile broadband networks as highlighted above. Given their relatively high levels of maturity, Europe and North America will likely see an average annual growth rate in the single digits over the coming six years, while all other regions will grow by double-digits.

Source: GSMA Intelligence

## Proportion of smartphone connections by region



Affordability has been the key restraining factor in developing markets, but this constraint is rapidly abating. GSMA Intelligence estimates that smartphone average selling prices (ASPs) are now 30% below their 2008 levels in Asia, 25% in Latin America and 20% in Africa.<sup>2</sup> The majority of smartphones in the developing world are still priced above US\$100, but the 'sweet spot' for these regions is considered to be in the US\$25-50 range.

In 2013, Mozilla announced plans to bring a low cost smartphone in the sub-US\$50 range to developing countries through collaboration with a number of handset manufacturers and operators. The company also recently announced that it will begin marketing a device priced as low as US\$25 in a number of markets including India and Indonesia before the end of 2014.<sup>3</sup>

2. <https://gsmaintelligence.com/files/analysis-subscription/?file=141203-smartphones-emerging-markets.pdf>  
 3. <http://online.wsj.com/articles/mozilla-to-sell-25-smartphones-1402466959>



Google has also been active in the low-end smartphone market, using its Android One operating system. The company is working with local manufacturers in India to provide a good quality handset at a price point below US\$100, and has already launched several devices. Android One has now been launched in Sri Lanka, Nepal and Bangladesh, with other launches in the Asia Pacific region expected over the course of 2015.

Price declines have also been driven by local handset manufacturers who focus specifically on

these markets and develop products that are both affordable and meet their specific needs. This includes differentiating offers with local content, apps and language support. A number of national champions previously unknown on the global stage (such as Micromax in India) have had much success with this strategy. Xiaomi is the most notable internationally, with strong sales growth in China allowing the company to now become the third largest smartphone maker globally behind Samsung and Apple.

## 1.2.4 Video a key driver of data traffic growth

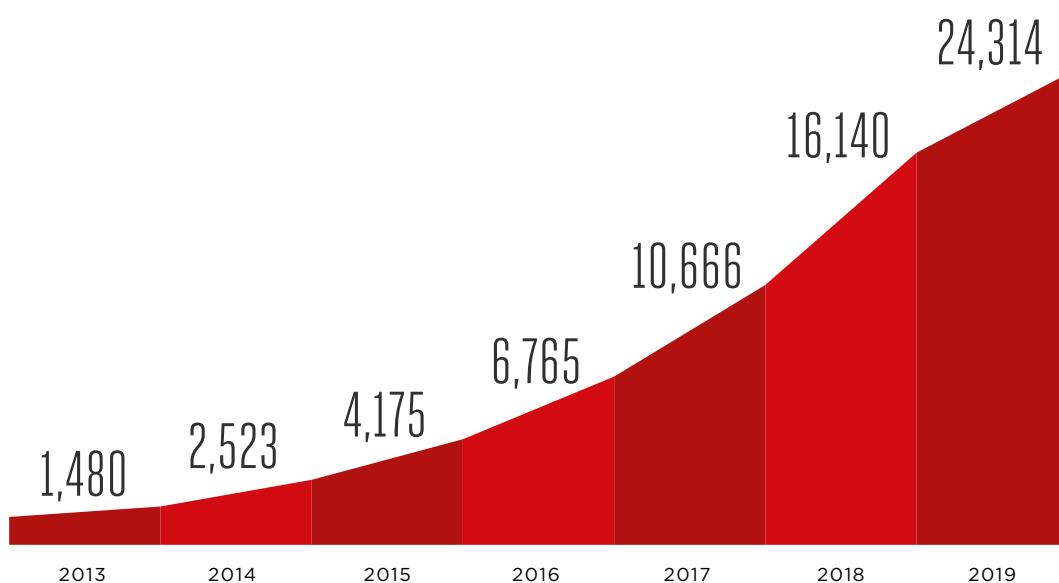
The growing number of smartphones and other advanced devices (e.g. tablets) are increasing the use of data-intensive applications, such as video streaming, on mobile networks. Cisco estimates that smartphones generate 37 times more data traffic than feature phones, while 4G smartphones

generate almost three times as much data traffic as 3G smartphones. The increasing use of mobile broadband-enabled smartphones will generate an explosion of data traffic, with volumes forecast to grow at a CAGR of 57% out to 2019, an almost ten-fold increase.

Source: Cisco VNI Mobile 2015

### Global mobile data traffic

(Per month, PB)

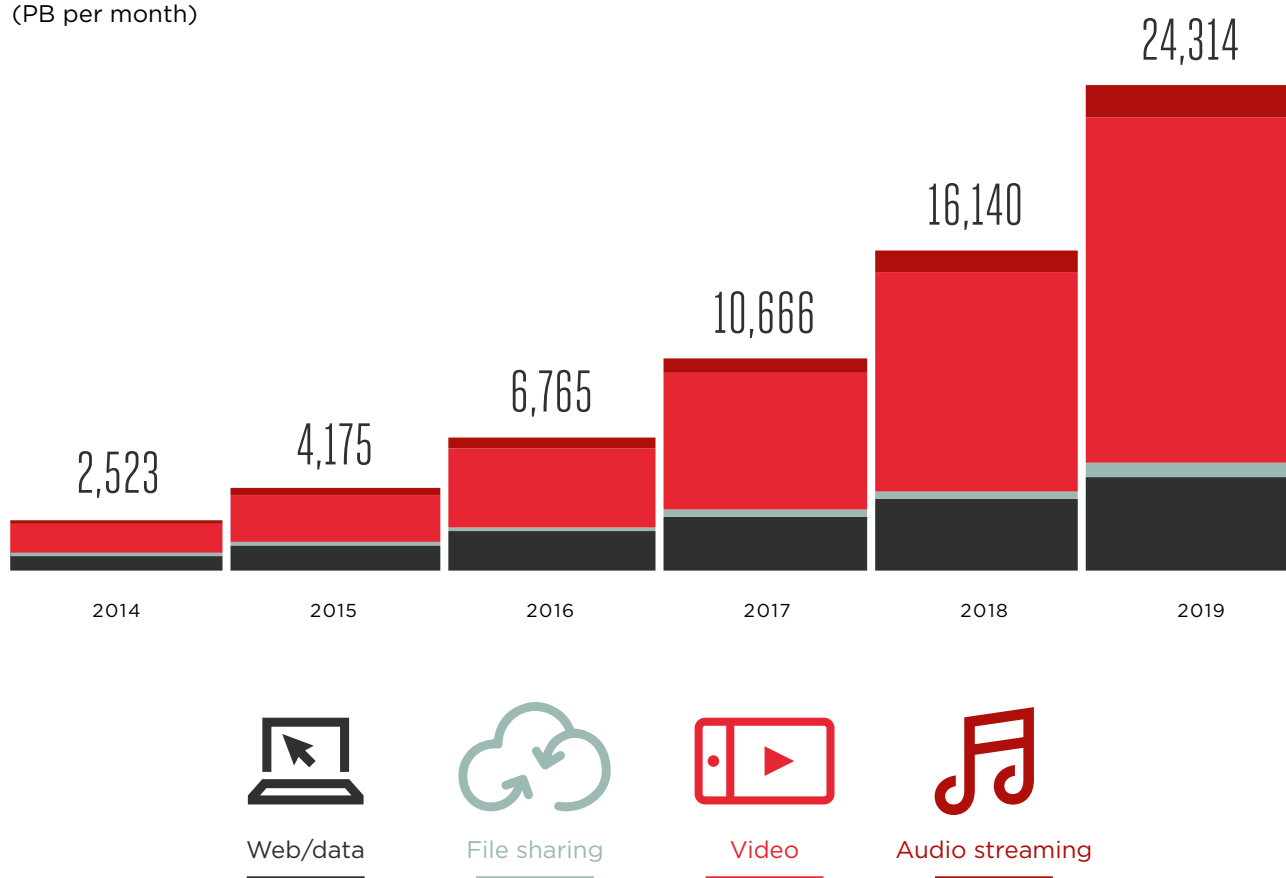


On-demand video on mobile devices has become increasingly popular. It is the key driver of mobile data growth, with a 66% annual increase through to 2019 compared with 57% for data as a whole. Ericsson's consumer research into active TV and internet users shows that 27% of Germans use a mobile device to watch TV or video on a weekly basis. This is a typical level for Western Europe, but the figure is even higher in Sweden. Sweden also has the highest 4G penetration rate in Europe, where TV viewing via a mobile device is 42%. YouTube stated in October 2014 that mobile devices now generate 50% of its global traffic, up from 41% in 2013.

Source: Cisco VNI Mobile 2015

## Video fuelling strong mobile data growth

(PB per month)



## ON-DEMAND VIDEO ON MOBILE IS THE KEY DRIVER OF MOBILE DATA GROWTH



YouTube stated in October 2014  
that mobile devices now generate  
50% of its global traffic

## 1.2.5 Monetising data growth

Operators in markets across the world are showing signs that they are able to monetise this strong growth in data traffic. This is a key factor at a time when revenues from more traditional services are under pressure and operators have significant investment commitments as they roll out high speed networks.

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

Cisco looked at the impact of such plans in its 2015 VNI Mobile white paper. It found that tiered plans now represent more than half of all offers, up from only 4% three years ago. Unlimited data plans have decreased proportionately over the same period. Despite the drop in unlimited data plans, data usage has continued to grow. In the previous year, average usage per device on a tiered plan grew 17%, from 922MB to 1,081MB per month. This is an encouraging sign for operators as they look to monetise increasing data use at a time when revenues and profitability from traditional voice and messaging services remain under pressure.

In Sweden, the first market to launch 4G in December 2009, market leader TeliaSonera now has 40% of its mobile base on a data-centric plan. The company has seen average revenue per user (ARPU) rise from SEK180 when it launched the first such plan (in the first quarter of 2013) to SEK191 by the third quarter of 2014. This has supported a doubling of data volumes to nearly 1GB per month for consumers, as over 15% now reach their data limit and close to 80% of those go on to purchase a top-up package.

However, some markets are also seeing the return of unlimited plans. South Korea, one of the most advanced 4G markets with 100% population coverage and over two-thirds 4G adoption at the end of 2014, has matured to the point that it is seeing a greater number of users upgrade to unlimited plans. In the case of SK Telecom, which introduced an unlimited LTE package in April 2014, data use increased from 2.2GB in the first quarter of 2014 to 3GB as of October. ARPU rose correspondingly from KRW35,300 (US\$32.70) in the first quarter to KRW36,400 in the third quarter, an increase of over 3%. The unlimited plans are priced at KRW80,000, so increasing demand for data is likely to continue to provide an ARPU uplift.

## 1.3 Competition, regulation and the impact on margins

Increasing competition and regulatory intervention have been consistent themes across most global mobile markets over recent years. In addition to the impact of new entrants in certain markets, regulatory measures to increase competition have included the introduction of mobile virtual network operators (MVNOs) and mobile number portability.

IP-based services have continued to grow 'mindshare' over recent years, at the expense of mobile operators, with clearly negative implications for traditional voice and messaging revenues. The impact has been most evident in Europe, where WhatsApp has gained particular traction. However, IP-based messaging services are seeing rapid adoption in most markets of the world. A range of regional providers are now looking to gain global scale and offer a growing range of services to their user bases (including voice calls in many cases).

These factors have impacted mobile operator profitability over recent years. Between 2008 and 2013, Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA) margins at the global level fell by 350 basis points. Margin declines have been a particular feature in Europe, where revenue losses and a weak economic backdrop have further combined to reduce operator profitability.

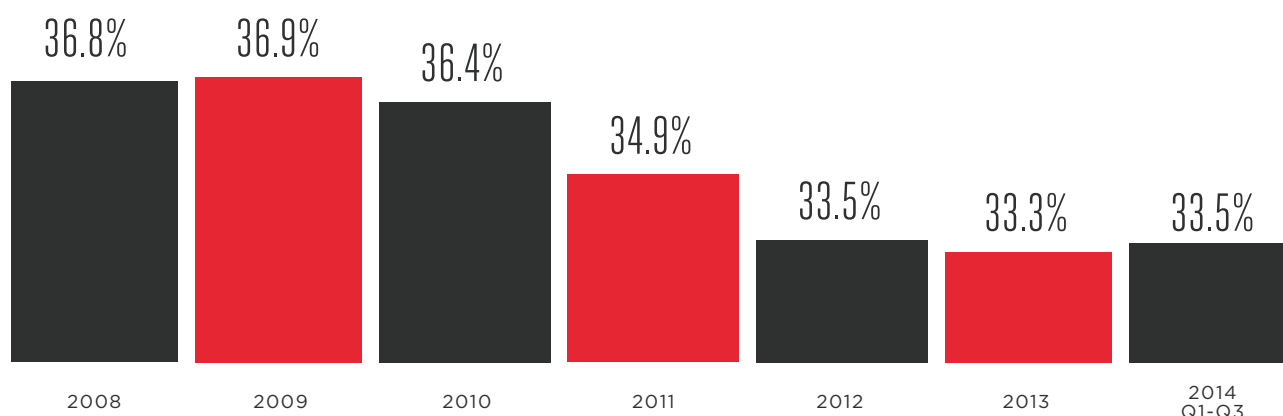
There were some signs of a stabilisation in the margin trends in 2014. This reflects in part some moves towards market consolidation, especially in Europe, which have helped ease competitive pressures. Operators across many developed markets have also been taking steps to rationalise their cost bases, as well as move away from handset subsidies. Research from GSMA Intelligence highlighted that the move away from handset subsidies was a clear trend across multiple developed regions, with subsidies limited increasingly to high-end 4G devices, and further introducing flexible device upgrade and financing facilities.<sup>4</sup>

This trend has been most pronounced in North America, where T-Mobile was one of the first operators to move away from traditional handset subsidies and develop new financing and device upgrade packages. These moves have now been followed by all the main network operators. These plans explicitly separate the monthly payment for services from that of the handset device, giving consumers the option of keeping their existing handset or paying for a new one through an instalment plan.

Source: GSMA Intelligence

### Global profitability beginning to recover from competition and regulation

EBITDA Margin



4. <https://gsmaintelligence.com/files/analysis-subscription/?file=140911-smartphones.pdf>

## 1.4 Revenue trends and outlook

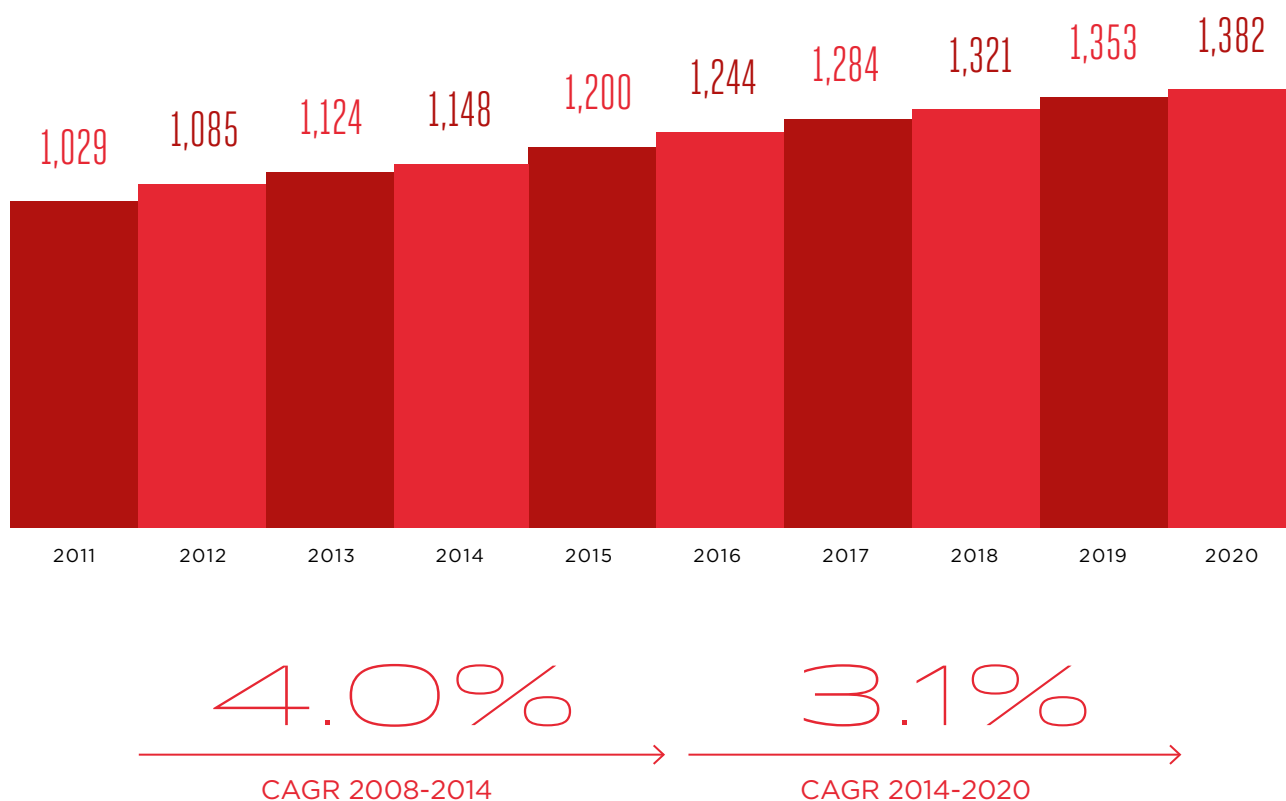
There have been significant variations in revenue growth between regions over recent years, with rates slowing across most parts of the world. Developing markets such as Sub-Saharan Africa and parts of Asia Pacific have seen mid to high single digit revenue increases, reflecting ongoing strong subscriber growth in the regions with the lowest penetration rates. In contrast, overall revenues have been declining in Europe. There are signs in recent quarters of a convergence in growth rates between developed and developing regions, with slowing subscriber growth, competition and regulatory action common themes to many markets.

Revenue growth is forecast to slow further over the coming years, with a CAGR of 3.1% per annum through to 2020, down from just over 4% in the period 2008-2014. This reflects the ongoing impact of factors such as market maturity, competition and regulation. Partly offsetting these pressures are signs that operators are increasingly monetising data traffic. Combined with an accelerating migration to 4G networks and devices, these are factors that are supporting the current recovery in revenue trends in Europe. After several years of decline, revenues in Europe are now expected to reach a stabilisation on a two to three year view. In contrast, revenue growth in North America appears to be slowing due to increasing competition and market saturation.

Source: GSMA Intelligence

### Total global revenues

(US\$ bn)



## 1.5 Investment in capacity and next-generation networks

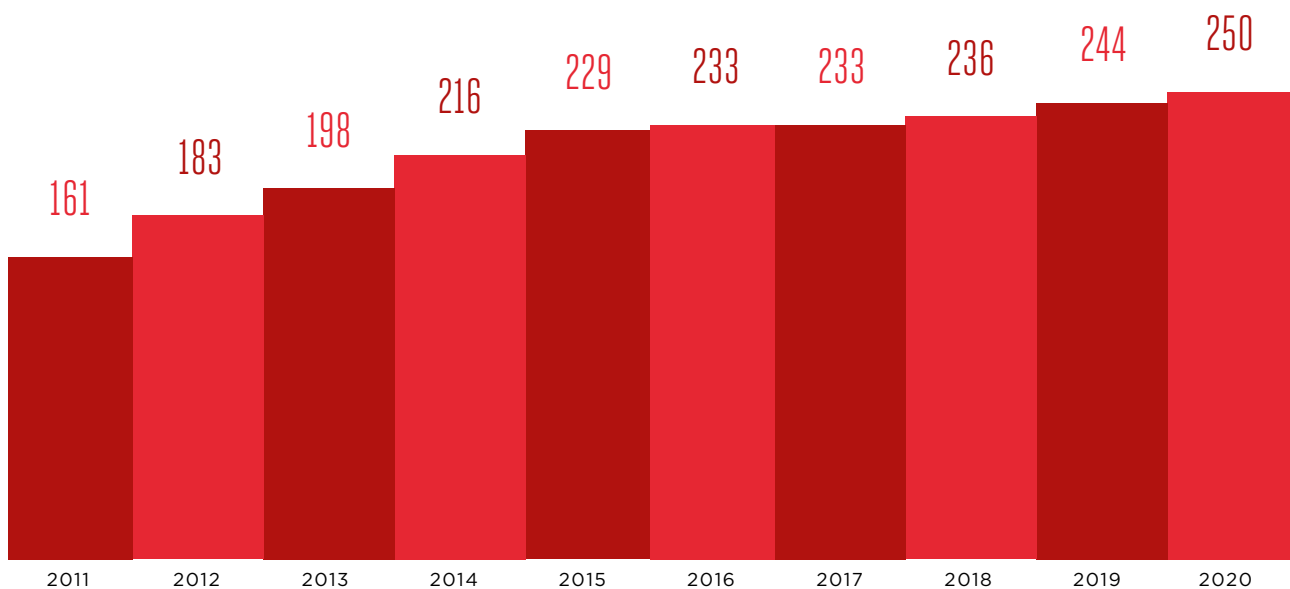
After reducing spend during the height of the financial crisis in 2009 and 2010, capital investment began to rise again at the start of the current decade, reflecting the need to increase capacity and deploy mobile broadband networks. Globally, operators have invested heavily in their networks in the past three years. In 2014, the figure was around US\$216 billion, an annual increase of more than 9%.

Going forward, the rate of growth is likely to moderate as 4G networks are near completion in some regions and the cost of equipment tends to decline as technologies become more mature. Investment levels globally are forecast to grow at a CAGR of 2.5% through 2020, with cumulative future investment over this period totalling over US\$1.4 trillion. Developing new revenue streams and moving to more sustainable business models will be key if operators globally are to fund the significant investment levels required to support future data growth.

Source: GSMA Intelligence

### Global mobile operator capex

(US\$ bn)



4.7%

CAGR 2008-2014

2.5%

CAGR 2014-2020



# 2 Mobile empowering people and society

Mobile has had a profound impact on national economies worldwide, particularly in the areas of job creation and economic growth. Increasingly ubiquitous and higher speed mobile networks contribute to many aspects of economic, political and social life in both developed and developing regions.

Mobile is the predominant infrastructure in emerging markets and is available to a larger proportion of the population than many other basic services, such as electricity, sanitation and financial. As a result, mobile is already helping to address a number of pressing social, economic and environmental challenges. These challenges are often particularly acute in developing regions, given factors such as high levels of poverty, rapid population growth, and in some areas, the impact of political instability.

## 2.1 Mobile is a cornerstone of the global economy

In 2014, the mobile industry contributed a total of US\$3 trillion to the world economy in value added terms, equivalent to around 3.8% of global GDP. This contribution can be broken down into four elements:

- 1 The direct contribution of mobile operators;
- 2 The direct contribution of the rest of the mobile ecosystem;
- 3 The indirect impact on the broader economy; and
- 4 The increase in productivity brought about by the use of mobile technologies.

The direct economic contribution to GDP of mobile network operators and the wider ecosystem is calculated by combining the value added generated by companies operating in the sector across 236 countries. Value added is calculated as the total income generated by the industry to its employees (i.e. wage and other compensation payments), to governments (i.e. tax contributions) and to shareholders (i.e. business profits)<sup>5</sup>.

The direct contribution from mobile operators in 2014 was US\$776 billion in value added terms. The broader mobile ecosystem generated a total value added of over US\$300 billion.

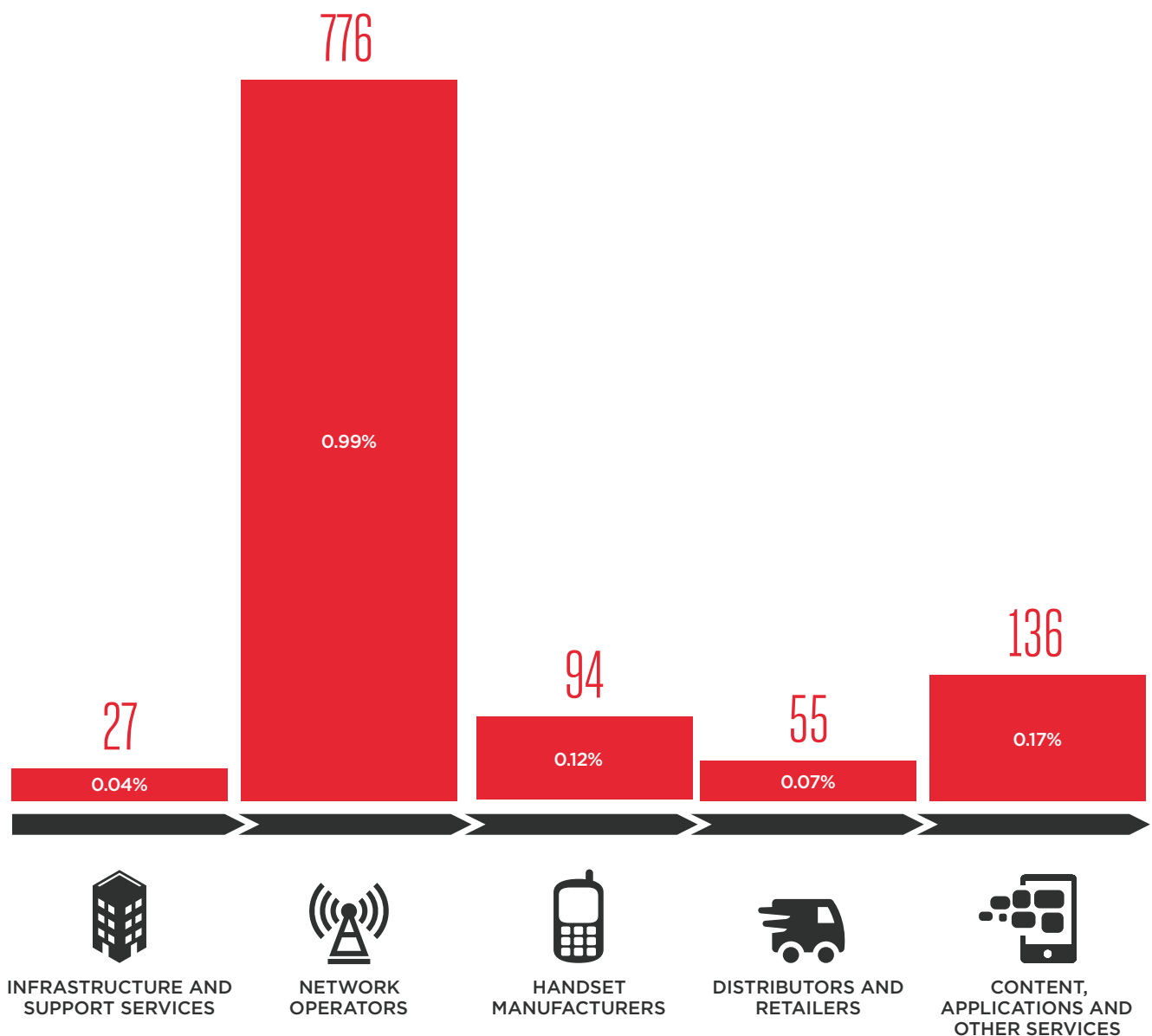
5. Value added by the sector can also be approximated as the difference between the value of sales made by the sector and the direct cost of making those sales.



Source: GSMA Intelligence

## Direct GDP contribution of the mobile ecosystem

US\$ bn, % 2014 GDP



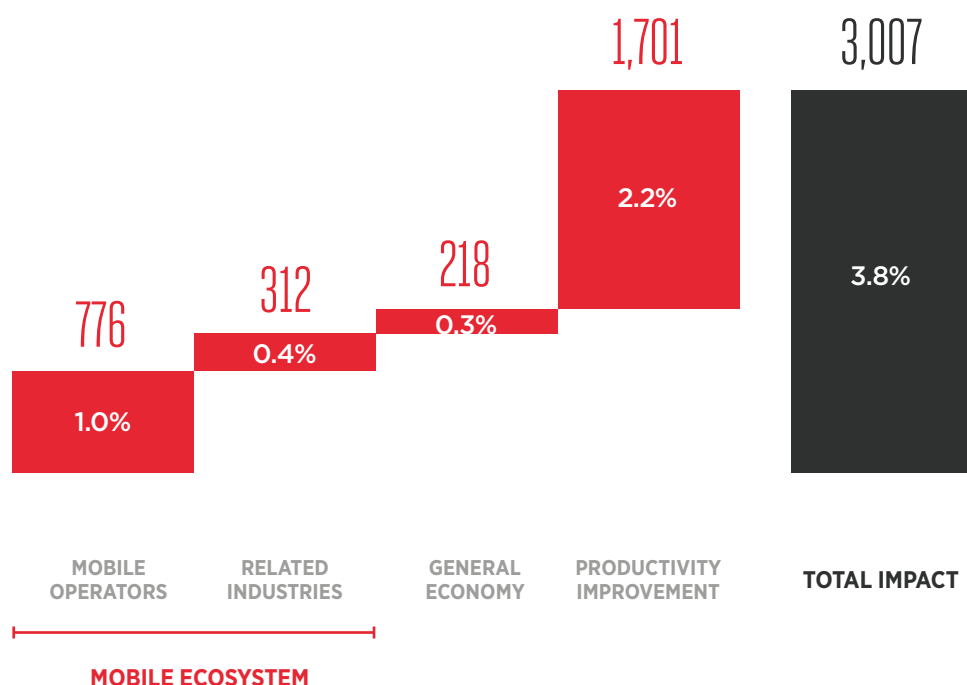
As mobile operators and the ecosystem purchase inputs and services from their providers in the supply chain, a multiplier effect on the rest of the economy is created, generating sales and value added in other sectors and industries. This benefit was conservatively estimated at a global value added of approximately US\$220 billion in 2014.

In addition to the direct and indirect contribution to GDP by mobile operators and the wider ecosystem, an estimated 2.2% of global GDP can be attributed to the increased productivity created by the widespread use of mobile technology. Mobile technology has transformed the way in which economic activity is carried out in virtually all the sectors of the global economy, allowing more efficient ways for workers and businesses to communicate and access information. This effect varies significantly by country and sector, and contributed US\$1.7 trillion to global GDP in 2014. The mobile industry overall made a total contribution of US\$3 trillion to the world economy, equivalent to 3.8% of the total GDP.

Source: GSMA Intelligence

## Total (direct and indirect) contribution to GDP

(2014 US\$ bn)



## 2.1.1 Employment and public funding contribution in 2014

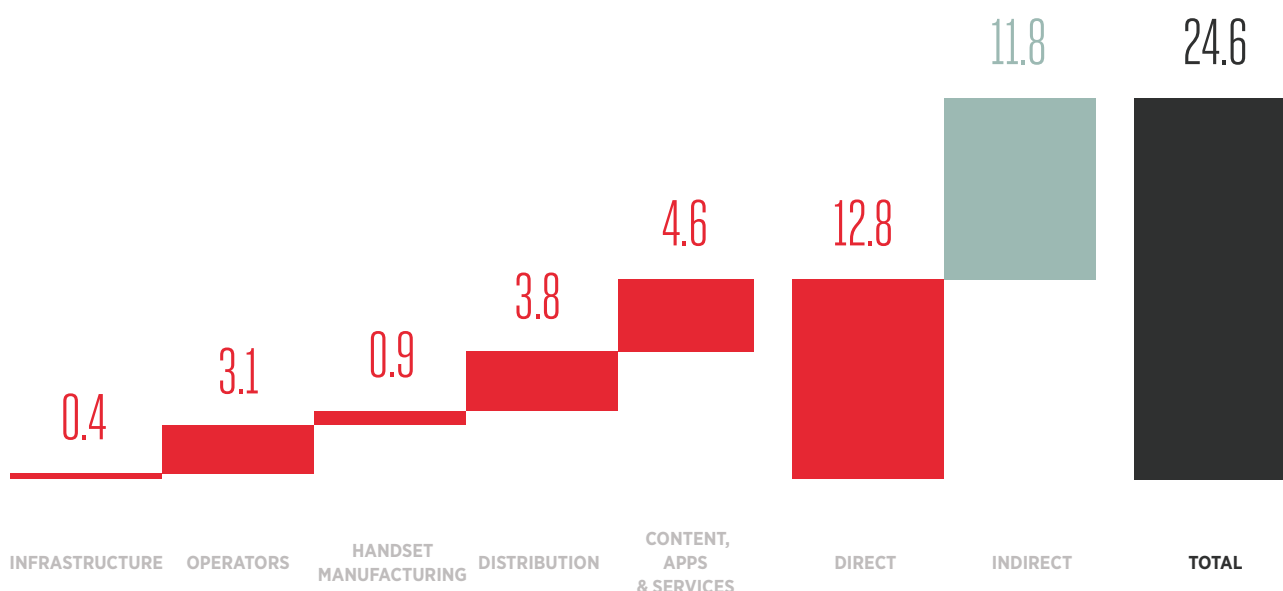
In 2014, mobile operators and the broader ecosystem directly employed 12.8 million people globally. The largest employment contribution came from the content, applications and services sector, with approximately 4.6 million jobs. However, it should be noted that a number of jobs in this sector were part-time or on a self-employment basis. Large numbers of jobs were also directly supported by distributors and retailers (3.8 million) and mobile operators (3.1 million).

Jobs were also indirectly supported as the industry's economic activity generated demand and jobs in other sectors, in particular, in the direct supply chain of the mobile ecosystem. In 2014, it was estimated that approximately 11.8 million jobs were indirectly supported, bringing the total impact (both direct and indirect) of the mobile industry to just under 25 million jobs.

Source: GSMA Intelligence

### Global mobile ecosystem employment impact

(Millions)

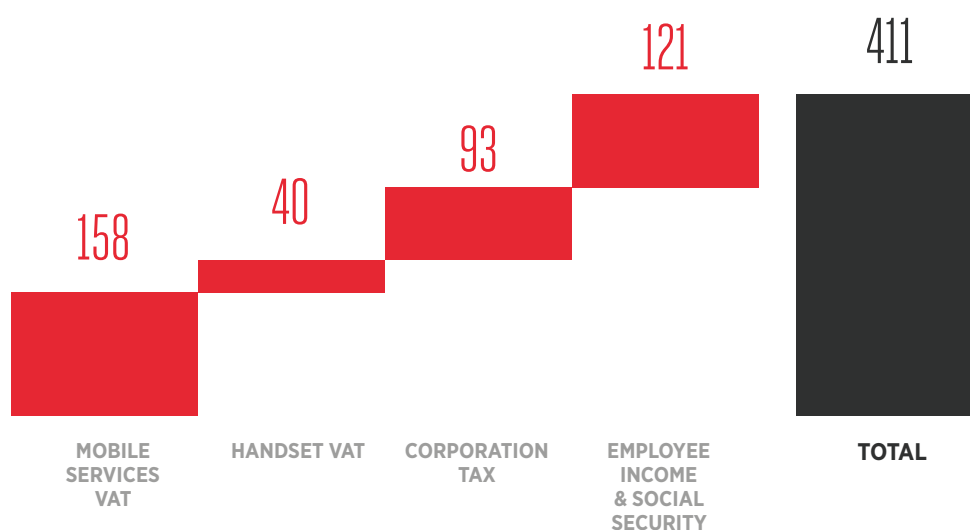


The mobile industry also makes a very significant contribution to public funding. For most countries, this includes value added, corporation and income tax, and social security from mobile ecosystem employees. It is estimated that the sector contributed more than US\$400 billion to public funding in 2014, before considering regulatory and licence fees. Additionally, spectrum auctions generated revenues of over US\$14 billion for governments globally.

Source: GSMA Intelligence

### Tax contribution by the mobile ecosystem

(2014 US\$ bn)



## 2.1.2 Outlook and trends in the period 2015-2020

By 2020, mobile technology is predicted to generate a total economic value of nearly US\$4 trillion, increasing the sector's global GDP contribution to 4.2%.

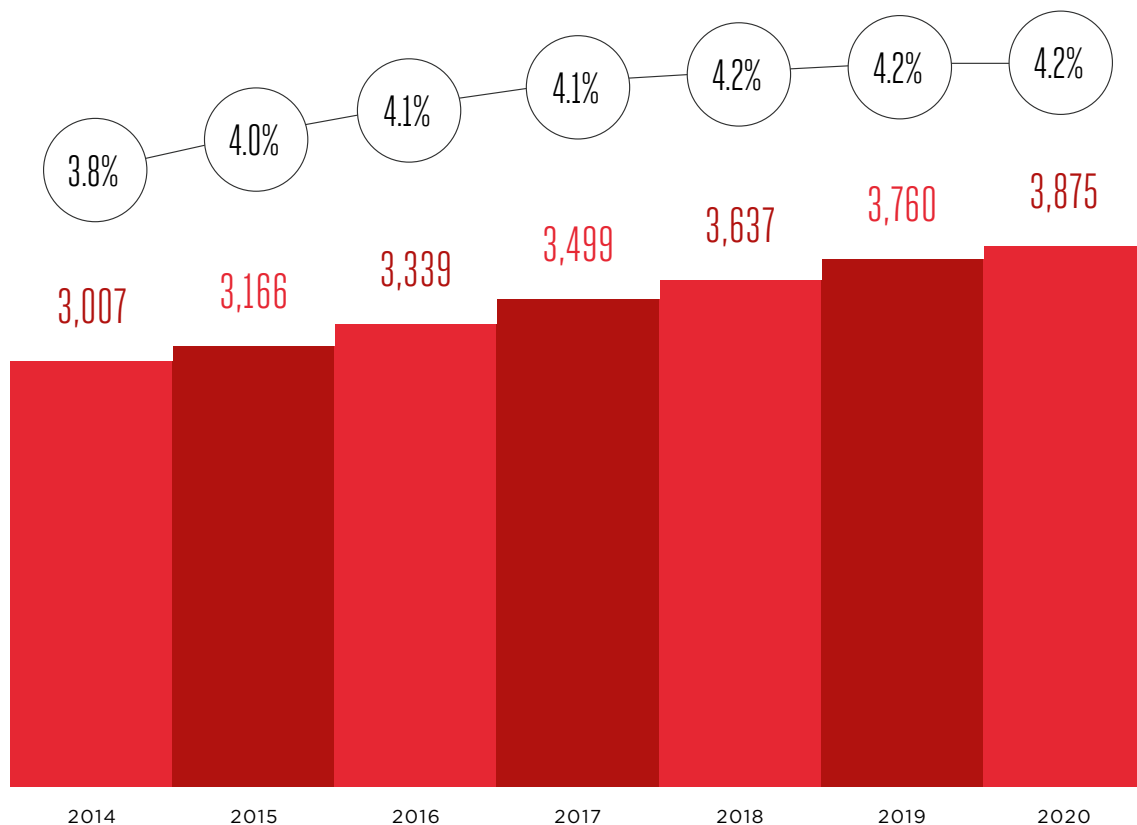
This growth will be driven by both demand- and supply-side effects. On the demand side, mobile technologies will connect previously

unconnected populations to the internet and enable a more efficient use of resources in those economies. Supply-side effects will also make a significant contribution as the number of subscribers grows and new value added services are brought to market, generating revenue and value added growth in the ecosystem.

Source: GSMA Intelligence

### Total mobile contribution to GDP out to 2020

Value Added (US\$ bn, bars) and as a % of GDP (top)



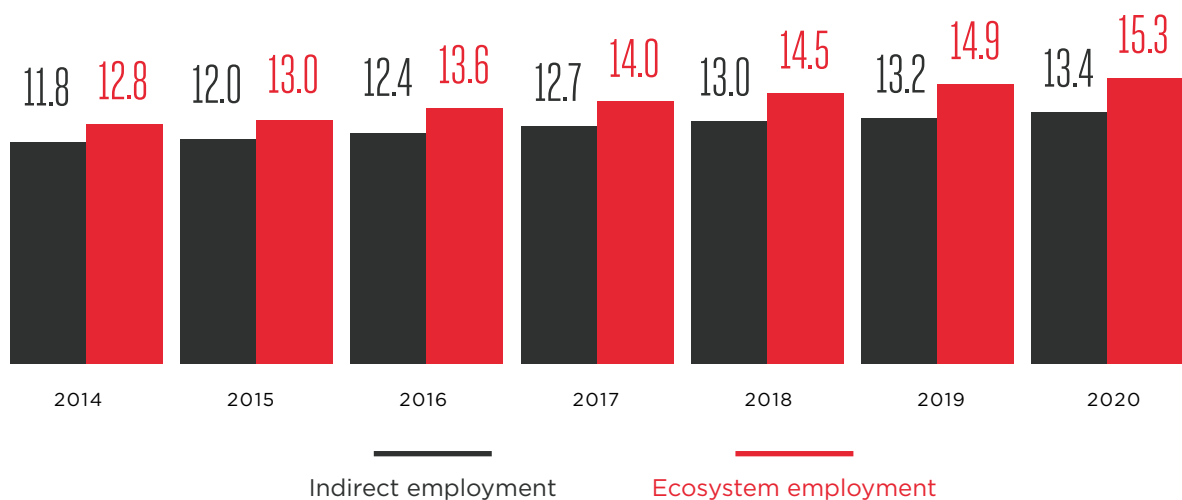
The total number of jobs both directly and indirectly generated by the ecosystem will also grow significantly in the period to 2020, reaching 15 and 13 million people respectively. At the same time, the

public funding contribution of the mobile ecosystem (excluding spectrum and other regulatory fees) will reach US\$465 billion by 2020 if tax rates remain at current levels. This is up from US\$410 billion in 2014.

Source: GSMA Intelligence

## Employment projections to 2020

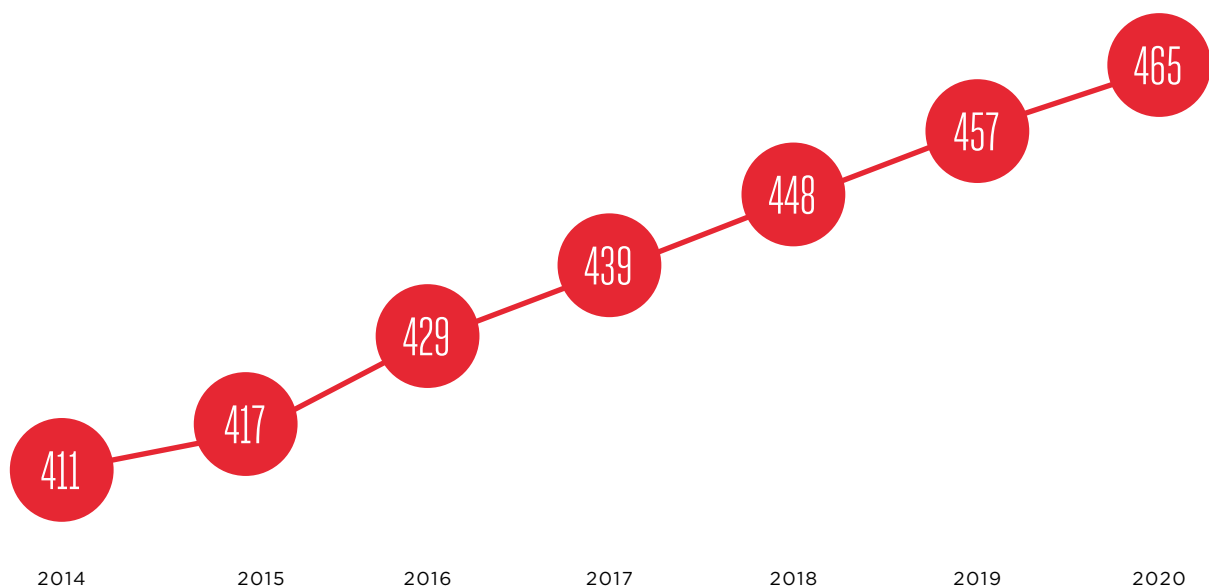
(Millions)



Source: GSMA Intelligence

## Outlook for global public funding contributions to 2020

(US\$ bn)





There are 12.8 million jobs supported directly by the mobile ecosystem across the globe



In 2014, the mobile ecosystem contributed more than US\$400 billion to public funding

## 2.2 Mobile delivering digital inclusion to the still unconnected populations

Mobile phones are bringing internet access to populations across the developing world. Many markets are also now seeing an increasing migration to smartphones and mobile broadband networks, with the potential to bring access to a broader range of apps and services.

For the full potential of mobile to be realised, populations need access both to mobile broadband networks and affordable devices and services. Despite the progress to date, there remains a significant proportion of the global population who do not have access to the internet. The ITU estimates that global internet users grew from 1.6 billion in 2008 to 2.9 billion by the end of 2014, accounting for approximately 40% of the global population.<sup>6</sup> This leaves 60%, or approximately 4.4 billion people, still unconnected. This lack of internet access has the potential to hinder opportunities for economic and social development in many developing countries, preventing the unconnected populations from truly engaging in the information age.

The current global gap in internet access will largely be addressed by mobile networks, which already provide access to billions across the world. At the end of 2014, there were 2.4 billion individuals using mobile devices to access the internet across the globe, of which 1.8 billion were in developing markets. While globally around one in three people have mobile internet access, there is a major difference between developed and developing markets. Around 60% of the population in developed markets have mobile internet access, while in developing markets the figure is only 28%.

The unconnected population in these markets is predominantly rural, with characteristics such as low incomes and high levels of illiteracy that create barriers to mobile internet adoption. By 2020, mobile internet penetration rates in developing markets will have reached 45% of the population, although in both Sub-Saharan Africa and the Middle East and North Africa region, the penetration rates will remain below 40%.

6. [http://www.itu.int/net/pressoffice/press\\_releases/2014/23.aspx#.VDKPgfIdV9y](http://www.itu.int/net/pressoffice/press_releases/2014/23.aspx#.VDKPgfIdV9y)



Source: GSMA Intelligence

## Mobile internet subscriber penetration



Mobile internet access can create a virtuous cycle in developing countries. In the first instance, mobile connectivity using simpler feature phones can provide communications and basic services to currently disadvantaged populations. Mobile can act as an enabler when other more traditional delivery mechanisms fall short, and is already being used to provide underserved populations with access to information and services. McKinsey has suggested that if internet access achieves an impact on the same scale as mobile telephony has in Africa, it could account for as much as 10% of total GDP by 2025, up from only 1% today. This would be equivalent to over US\$300 billion,<sup>7</sup> due to the internet's transformational effects on sectors such as retail, agriculture, education and healthcare.

The GSMA launched its Digital Inclusion programme in April 2014 to expand global connectivity and increase mobile internet adoption. The programme will collaborate with mobile operators, governments, internet players and non-government organisations to address four key barriers to mobile internet access.



### Network infrastructure and policy

Increasing network coverage to currently unserved areas.



### Affordability and taxation

The combination of low incomes, the cost of the device, charging fees, and data plan payments creates an affordability barrier to accessing the mobile internet. This issue is compounded by government taxes and fees, such as airtime taxes and handset taxes.



### Consumer barriers

Illiteracy, digital illiteracy and lack of internet awareness are consumer barriers to mobile internet adoption.



### Local content

The availability of content that is both local language and locally relevant can play a vital role in the adoption of mobile internet.

7. [http://www.mckinsey.com/insights/high\\_tech\\_telecoms\\_internet/lions\\_go\\_digital\\_the\\_internets\\_transformative\\_potential\\_in\\_africa](http://www.mckinsey.com/insights/high_tech_telecoms_internet/lions_go_digital_the_internets_transformative_potential_in_africa)

## 2.2.1 Network infrastructure and policy: Extending coverage to currently underserved areas

Network coverage is critical for access to the mobile internet. At the end of 2014, mobile operators reached approximately 85% of the global population with 2G and around 55% with higher speed mobile broadband (3G) networks. Despite the progress to date, there are significant populations across the world who still do not have access to mobile services. A large proportion of the

still unconnected population live in rural and in some cases geographically remote areas. These areas have additional challenges such as a lack of electricity infrastructure and low road density, which can provide extra obstacles to extending network coverage. The economic case for mobile operators to expand networks in these areas is often challenging.

### Industry solutions to extending coverage

Infrastructure sharing is a solution that can help reduce the cost of extending network coverage, particularly into remote or geographically challenging areas. Network sharing can also significantly increase capacity in urban areas particularly, for example, where operators are looking to deploy small cell technology. It has the potential to strengthen competition and reduce the carbon footprint of mobile networks, while reducing costs. Several operators in conjunction with the GSMA, announced an agreement in early 2014 to “cooperate on network sharing initiatives” and “to help provide mobile broadband access to unserved rural communities and drive down the cost of mobile services for all sections of the population.”<sup>8</sup>

Mobile operators in many developing regions are employing a wide array of solutions to tackle the challenge of off-grid connectivity, including the growing use of ‘green’ options such as solar, wind, water, biomass and fuel cells. Operators have built approximately 43,000 renewable energy sites globally since 2008<sup>9</sup> using a range of technologies. Such alternatively powered cell sites can significantly decrease diesel costs (which is often the primary power source in areas off the main electricity grid) and therefore reduce operating costs and maintenance burdens of rural cell towers.

### Government solutions to extending coverage

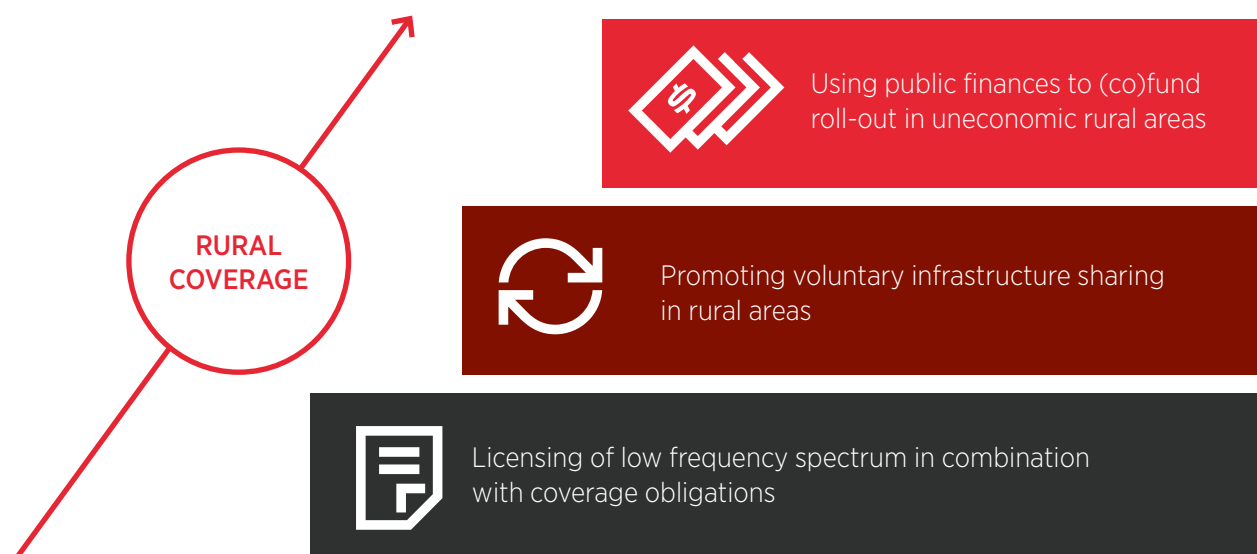
Recent research by Frontier Economics examined the role of network competition in promoting rural mobile coverage.<sup>10</sup> Evidence from more than 200 countries over a 15 year period shows that network competition has driven mobile coverage further and faster than has been achieved by single networks. There are also complementary measures that governments can take to promote mobile coverage in rural areas. For example, there may be some rural areas where the economics are too challenging for network competition to deliver coverage, which may require some form of government intervention.

8. <http://www.gsma.com/newsroom/gsma-and-operators-mobile-access-affordability-across-africa-and-the-middle-east/>

9. <http://www.gsma.com/mobilefordevelopment/programmes/green-power-for-mobile/tracker>

10. <http://www.gsma.com/publicpolicy/benefits-of-network-competition-and-complementary-policies-to-promote-mobile-broadband-coverage-3>

## Complementary government policies to promote rural coverage



## 2.2.2 Affordability and taxation

Unconnected populations in developing regions often have low income levels. According to the World Bank, over two billion people live on less than US\$2 a day, which represents the poverty line in developing nations. This highlights the particular challenge of raising levels of digital inclusion amongst lower income populations.

The mobile sector in many countries is the target of excess taxation that creates additional barriers to digital inclusion, especially in developing countries. Even though mobile is an essential service, it is often taxed at a substantially higher rate than other sectors. While these taxes are often imposed to meet short-term fiscal targets, they come at the cost of immediate and long-term benefits from increased access to mobile internet, and ultimately greater government revenue.<sup>11</sup>

Mobile taxation includes taxes on handset purchases, subscriptions and consumption of services, as well as a number of sector-specific levies on operators. In a recent survey of 19 markets, taxes accounted for more than 30% of sector revenue in over half the markets surveyed, and more than 40% of sector revenue in Jordan, Tunisia, and Brazil. In Bangladesh and Turkey, taxes accounted for almost 60% of sector revenue.

Taxes on mobile consumers restrict access and usage by reducing affordability, while taxes on operators limit incentives for investment, for example into expanded network coverage. As a result of these negative impacts, high levels of taxation have caused some communications ministers (e.g. Nigeria and Brazil) and international institutions (e.g. the ITU and the Broadband Commission) to call for reduced mobile taxation.<sup>12</sup> For the sector to achieve its potential, governments should harmonise mobile taxes to the general tax level.

11. Mobile Taxes and Fees: A toolkit of principles and evidence, GSMA/Deloitte, 2014

12. Nigeria: <http://www.punchng.com/business/business-economy/taxes-levies-gulp-70-of-telecoms-investment-minister>

Brazilian: <http://www.marketwatch.com/story/brazilian-official-phone-taxes-are-excessive-2012-08-27>

ITU: [http://www.itu.int/net/pressoffice/press\\_releases/2012/11.aspx](http://www.itu.int/net/pressoffice/press_releases/2012/11.aspx)

Broadband commission: <https://itunews.itu.int/En/506-Broadband-Commission-for-Digital-Development-delivers-report.note.aspx>

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## Measures to improve affordability

There have been considerable efforts over recent years both by mobile operators and other ecosystem players, including device manufacturers, to improve the affordability of mobile services. Operators have also played a role in improving the affordability of mobile services, particularly with regard to mobile data and internet access, and the challenge of making these services available to low income consumers on prepaid tariff plans.<sup>13</sup> For example, a range of flexible tariffs are now available from operators focusing on mobile data. These allow users to access the internet for a period of time or alternatively allow access to a particular web property.

Smartphone adoption will be enabled by ongoing reductions in handset pricing. As discussed earlier in this report, a number of smartphones in the US\$25-50 price range were launched over the last year, with new models from several handset manufacturers. These launches only mark the start of a price expansion trend towards low-cost levels that will spread to more developing economies.

Recent research by the GSMA's Connected Women programme has found that cost remains the greatest barrier overall to owning and using a mobile phone, particularly for women, who often have less financial independence than men. Improving affordability, especially of handsets, will disproportionately benefit women and help to close the gender gap in mobile phone ownership.

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## 2.2.3 Consumer barriers: Literacy and awareness

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In 2011, there were 774 million illiterate adults across the world. In developing countries illiteracy is most prominent across rural areas and marginalised groups. This causes a major challenge for these individuals when looking to access internet content which is predominately text based. Combined with an overall lack of awareness about the internet and its potential uses and benefits, these factors create a significant barrier for mobile internet adoption, even where coverage and affordability issues have been addressed. Building awareness of the internet and needed skills in the developing world will require help from multiple stakeholders to deliver awareness building campaigns and literacy training programmes.

## Measures to address consumer barriers

Mobile operators have been at the forefront of the drive to improve awareness of the internet and technical literacy amongst their subscriber bases. This is being achieved through a range of measures, including direct marketing or by holding regional events and exhibitions to showcase new data products and services. For example, MTN in Uganda launched the 'MTN Internet Bus' to deliver information and communications technology (ICT) education to rural populations. The bus has computer work stations linked to MTN's 3G and LTE networks, and aims to provide training in basic computing skills and e-learning.

Governments also have an important role to play in funding and supporting initiatives in areas such as general education and promoting the use of ICT as a medium for learning in schools and colleges. For example, the South Africa government launched its 'South Africa Connect' strategy in 2013. This broad programme aims to focus on a range of issues that impact on digital inclusion. The strategy specifically includes plans to introduce an e-readiness campaign in schools as well as more widely focused e-literacy campaigns.

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13. <https://gsmaintelligence.com/files/analysis-subscription/?file=131205-prepaid-data-tariffs.pdf>



## 2.2.4 Local content

A recent GSMA report highlighted that content and services that are relevant, accessible, and available to the users in their own language will be crucial in bringing the full benefits of the mobile internet to users.<sup>14</sup> However, the majority of content is currently in English and is largely focused on data-heavy smartphone apps. Smartphone penetration is still low in the developing world and English is not the primary language for the majority of the population, thereby limiting accessibility and usefulness of the content. In order to reach the widest audience, content needs to be available on as many devices as possible in languages users understand, as well as being relevant to their local needs and interests.

### Measures to provide more local content

There are encouraging signs of progress in developing content that is both more relevant to consumers and also more accessible by being produced in the local languages. There are also growing moves to develop content for feature phones as opposed to smartphones, recognising that feature phones will remain a primary device in many developing markets for a number of years to come.

Services like the below are helping address the local content gap in developing countries, with the aim to introduce feature phone users to the benefits of the mobile internet, and instil in them a use pattern that will continue once they transfer over to smartphones.

- **HiviSasa:** A free online newspaper in Kenya that engages local users, especially young people, to come online and contribute as citizen news reporters.
- **Every1Mobile:** A South African-based company that builds and manages online communities that offer young people opportunities to discuss topics related to health, education, jobs and entertainment with their peers and subject matter experts on mobile. The company has a strong presence in seven countries across the region, and with a growing presence in twelve more.<sup>15</sup>
- **Mxit:** A South African social networking app for feature phones with over seven million users<sup>16</sup> offering functionality in areas with a weak 2G signal.
- **biNu:** An Australian start-up company offering a Java app that can emulate the functions of a smartphone on a feature phone such as updating Facebook and Twitter, reading news and searching the internet.<sup>17</sup>

14. <https://gsmaintelligence.com/analysis/2014/09/local-world-content-for-the-next-wave-of-growth/445/> "Local world — content for the next wave of growth"

15. <http://www.africabusinesscommunities.com/index.php/rss-abc-interviews/202864-interview-with-ceo-of-every1mobile-impact-of-mobile-tech-on-african-youth>

16. <http://qz.com/172012/an-african-messaging-app-could-beat-out-whatsapp-line-and-wechat-in-india/>

17. Mobile Internet for the Next Two Billion, biNu, May 2014

## 2.3 Delivering financial inclusion across the world

Mobile money is a rapidly maturing industry that is bringing financial inclusion to a growing number of previously unbanked and underbanked populations across the developing world. Mobile money services are now available in over 60% of the world's developing markets, providing unbanked customers with choice, security, convenience and affordability that are often missing in cash-based operations.

Mobile money providers are working hard to increase the quality, reach and sustainability of their services. Through industry-led initiatives, including partnerships with banks and other third parties, providers are building a broader payments ecosystem, enhancing the customer experience and reaching scale to evolve the sector to a new phase of maturity.

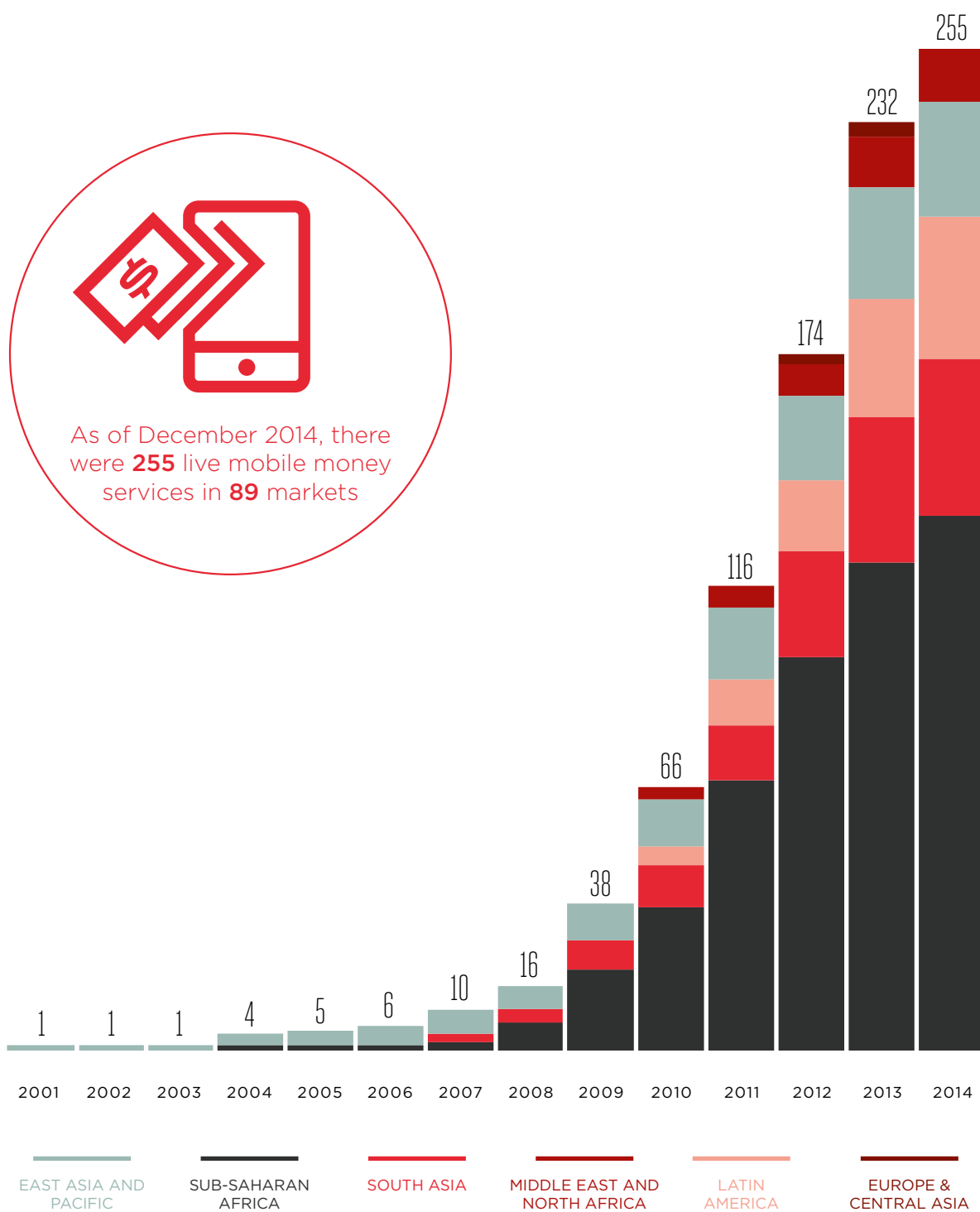
### 2.3.1 Rapid growth of mobile money services

In the past five years, mobile money services have spread across much of Africa, Asia, Latin America, Europe and the Middle East. As of December 2014, there were 255 live mobile money services in 89 markets compared with 233 live services across 83 markets at the end of 2013.

Whilst Sub-Saharan Africa still accounts for the majority of live services globally (53%), half of all new launches in 2014 occurred outside the region. In 2014, 22 new services launched compared with 60 in 2013 and 58 in 2012. Mobile money was rolled out in six new markets in 2014—Dominican Republic, Myanmar, Panama, Romania, Sudan and Timor-Leste—compared to 11 new markets in 2013 and 14 in 2012.

## Number of live mobile money services by region

(2001-2014; year-end)



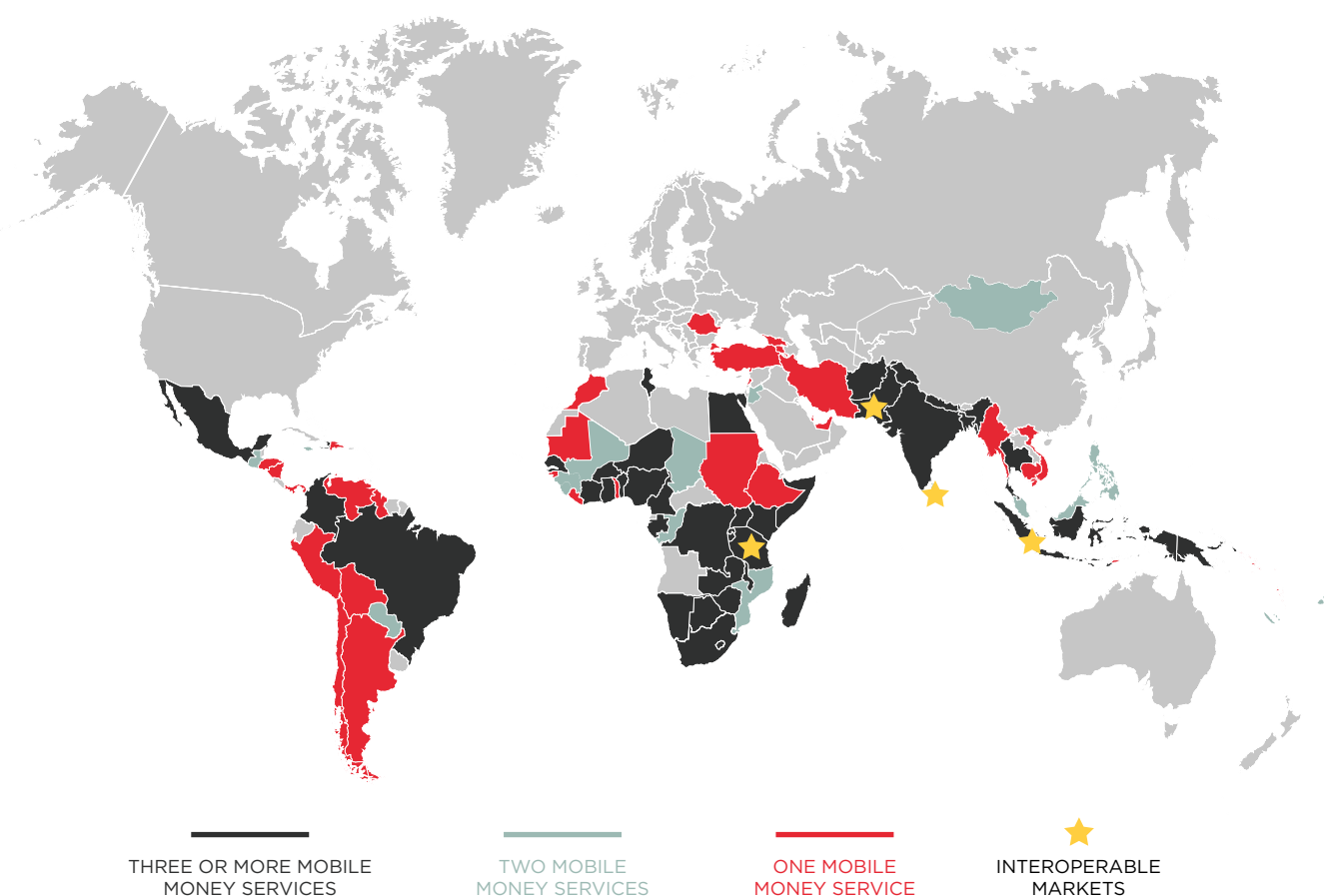


Globally, as the number of players in individual markets increases, competition is intensifying. Worldwide, 56 markets now have at least two live mobile money services, and 38 of these markets have three or more live services. As markets become increasingly competitive, mobile operators are showing a growing interest in the development of interoperable solutions.

In 2014, operators interconnected their services in Tanzania, Sri Lanka and Pakistan. In addition, operators in six other markets have already committed to interconnect their services. It is expected that account-to-account interoperability will increase transaction volumes and revenues by making it easier for consumers and businesses to send money domestically across networks.

## Number of live mobile money services for the unbanked by country

(December 2014)



The number of registered mobile money accounts grew to reach 299 million globally at the end of December 2014. Sub-Saharan Africa still has the majority of mobile money accounts and, in East Africa, one in two mobile connections is linked to one. Globally, there are 103 million active mobile money accounts, a 41% increase on 2014 figures.

The size and reach of mobile money agent networks are increasing fast, and now out-size traditional financial and remittance service networks. The size of the global mobile money agent network grew by 46% in 2014 to a total of 2.3 million outlets globally. In three-quarters of the markets where mobile money is available, agent outlets outnumber bank branches.<sup>18</sup>

18. Data on bank branches come from the IMF Financial Access Survey (FAS) Database. Available at <http://data.imf.org/>

## 2.3.2 Building a payments ecosystem

The range of payment services offered by mobile money providers is increasing, enhancing the attraction of mobile money propositions and delivering even greater benefits to customers. These new services include international remittances, merchant payments, and bulk payments such as salaries and government to people transfers. Just

over 23% of all the value moving through mobile money systems globally in December 2014 was processed in transactions involving an expanding ecosystem of institutional and business users. In December 2014, mobile money users transacted a total of US\$16.3 billion through 717.2 million transactions globally.

## 2.3.3 Impact of regulation on the development of the industry

The full potential of mobile money deployments remains untapped in some regions, such as Latin America and South Asia, in part due to regulatory barriers. Major markets such as Egypt, Indonesia and Nigeria are also awaiting for reform that would unleash the potential of mobile money. Nonetheless, an increasing number of regulators are recognising the major role that non-bank mobile money

providers can play in fostering financial inclusion and economic growth and are establishing enabling regulatory frameworks for mobile money. In 2014, new regulations were issued in Colombia, India, Kenya and Liberia.<sup>19</sup> Today, in 47 out of 89 markets where mobile money is available, regulation allows both banks and non-bank to provide mobile money services in a sustainable way.

## 2.3.4 Mobile insurance, credit and savings: A growing range of services

The development of other mobile financial services including mobile insurance, savings and credit will allow service providers to deepen financial inclusion by offering services beyond money transfer and payment.

- **Mobile credit services** became much more widely available in 2014 fuelled in part by new partnerships between mobile operators and banks. Of the 32 live services across the globe, 12 launched in 2014. Mobile credit services are now available in 15 countries globally.
- **Mobile insurance services** are now scaling, as the industry appears to have found the right partnership and commercial models. Sixteen new mobile insurance services were launched in 2014, taking the total to 100 live services, and as of June 2014, 17 million policies had been issued.
- **Financial services** companies and mobile operators are increasingly making use of the mobile money infrastructure to offer saving facilities: 10 million dedicated mobile savings accounts have been opened worldwide. Some service providers are beginning to pay out interest accrued on the trust or escrow account, thereby incentivising customers to use their mobile wallet.

19. <http://www.gsma.com/mobilefordevelopment/is-regulation-holding-back-financial-inclusion-a-look-at-the-evidence>

## 2.4 Mobile addressing social challenges in developing markets

Affordable mobile phones and the opportunities they provide for the poor is already becoming one of the most dramatic game changing technologies the world has ever seen. Mobile can deliver cost effective solutions to address a range of social challenges in areas such as access to basic healthcare and education. These are particular challenges in many developing markets where there is limited funding available for government services and with a large proportion of the population living in rural and often inaccessible areas.

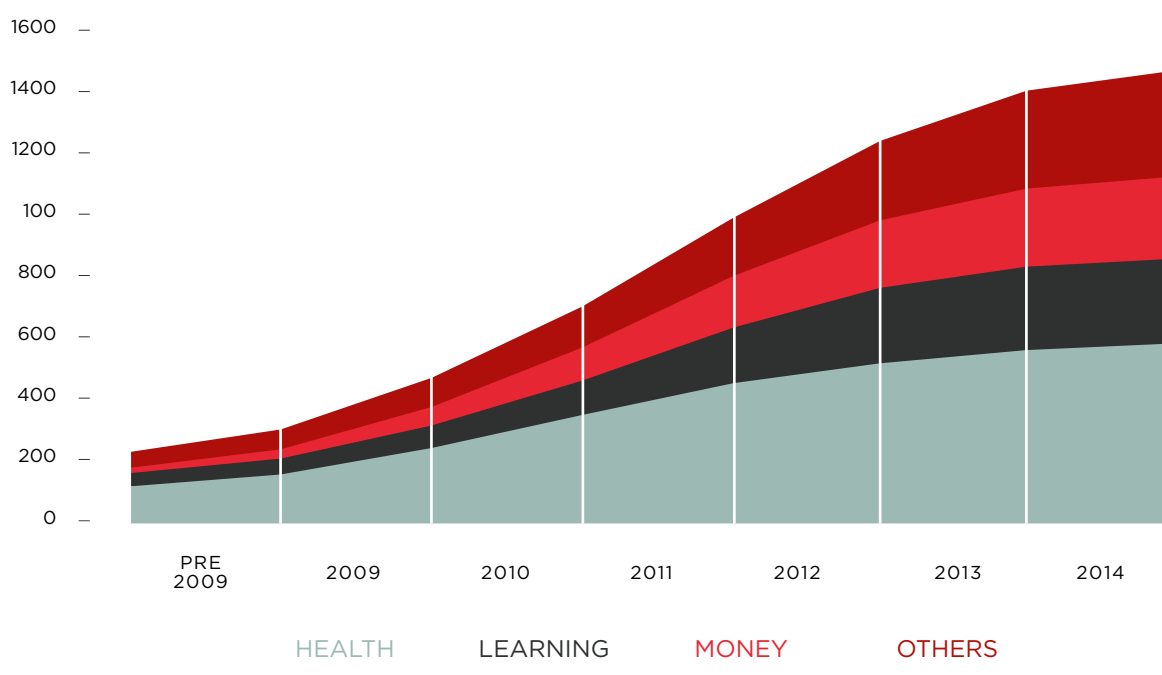
Countries across the developing world face multiple social and environmental challenges today. Those that have large rural populations in particular face difficulties providing access to basic infrastructure and services such as electricity, education,

healthcare and banking. Urbanisation rates vary across many developing regions, though urban growth has translated into an increasing number of people living in informal settlements, increasing poverty and inequality.

A diverse range of players, including mobile operators, entrepreneurs, corporates, governments, investors and non-profit organisations have together driven an explosion in mobile-enabled products and services across the developing world, aimed at addressing the challenges outlined above. The following chart shows that the number of new service launches has increased consistently over recent years, with a particular focus on mobile health and mobile money.

Source: M4D Impact Tracker, GSMA Intelligence

### Mobile-enabled products and services in the developing world



Note that 'others' includes Disaster Response, Energy Access, Green Networks, mIdentity, NFC and Smart Cities

A diverse range of players, including mobile operators, entrepreneurs, corporates, governments, investors and non-profit organisations have together driven an explosion in mobile-enabled products and services across the developing world



## mHealth: Facilitating health service delivery

Mobile is already facilitating the delivery of basic health services to underserved populations, by successfully addressing challenges such as reducing maternal and infant mortality rates, combatting infectious diseases, creating awareness of HIV and delivering nutritional health and treatment for a variety of health conditions remotely.

- 'Mobile-baby' is an mHealth service being implemented in Nigeria and Tanzania (known as 'Safer Deliveries' in Tanzania). This service is the result of a partnership between Etisalat, Qualcomm, D-Tree International and Great Connection. The service is aimed at reducing mother and child mortality by helping pregnant women in rural areas reach hospital. 'Mobile-baby' allows medical practitioners to send ultrasound images, video clips and 3D scans directly from ultrasound machines to mobile phones via SMS, MMS and email, providing real-time remote medical diagnostics.

## mAgriculture: Empowering smallholder farmers

One billion people in the developing world are engaged in agriculture, 40% of the total workforce. Mobile services now give farmers the opportunity to stay abreast of pricing movements, gain access to current market information, take advantage of financial services and supply chain solutions thereby helping them to increase their yield, cost crops or livestock more competitively and grow their business.

- Tigo Kilimo was launched in 2013 by the Tanzanian mobile phone operator Tigo. The service aims to increase productivity for farmers through providing a range of information covering for example weather forecasts, best practices tips and market prices for the major crops grown in the country.

## Disaster Response

Mobile networks can play an important role in disaster response and crisis management, given their resilience and ability to facilitate critical communication between humanitarian agencies, affected populations and the international community.

- The GSMA is assisting Ministries of Health in Nigeria, Senegal, Guinea, Liberia and Sierra Leone to mobilise the required support of mobile network operators in formulating a timely and effective response to the Ebola outbreak. These coordinated efforts will also involve collaboration with the World Health Organization and ECOWAS.

## Green Power for Mobile

In 2008, the GSMA established the Green Power for Mobile (GPM) programme with an objective to 'Extend the coverage, reduce the cost and minimise the environmental impact of mobile networks by championing renewable energy'. The programme, in partnership with the International Finance Corporation, supports operators to resolve these challenges by developing a body of knowledge and insight, supporting a thriving vendor ecosystem, hosting working group forums, assessing latest technologies and resolving financing challenges.

- There are about 640,000 off-grid sites globally, primarily powered by diesel generators. GPM has to date catalysed the adoption of green power of almost 43,000 live and planned green sites, details of which can be found on the Green Deployment Tracker.<sup>20</sup>

## M4D Utilities

Globally, it is estimated that 411 million people have access to a mobile network before they have access to energy and 165 million people have access to a mobile network before they have access to an 'improved' water source. The extensive reach of mobile infrastructure, combined with the increasing take-up of mobile financial services and the growing range of M2M services is generating new ways to bring access to reliable energy and clean water.

- A key trend is the development of low cost GSM-enabled smart meters for water and electricity. These in turn allow the development of pay-as-you-go (PAYG) solutions that allow access to water and electricity to be controlled remotely depending on a customer's credit. These solutions have gained particular traction in East Africa, with for example PAYG solutions sold to more than 60,000 customers in 2013.

## Mobile for Employment

Millions of young people in developing countries are out of employment, with some unemployment rates reaching up to 27%, for example in North Africa. Some of the main reasons for youth unemployment include lack of appropriate skills and experience, communication barriers, lack of knowledge of jobs available, and inability to travel to work. Many of these challenges can be addressed by mobile technology.

- Duma Works is a mobile-based networking and recruiting tool in Kenya that connects employers and job seekers, with a particular focus on small and medium-sized enterprises. Job seekers also have the ability to recommend friends and colleagues for other jobs, and receive referrals themselves, building on the power of personal and professional networks. Since its founding in 2012, Duma Works has dealt with over 10,000 jobseekers and generated over 5,000 job matches.

20. <http://www.gsma.com/mobilefordevelopment/programmes/green-power-for-mobile/tracker>

## 2.4.1 Connected Women: Addressing issues of gender inequality

Gender inequality in the mobile industry remains an issue across both developing and developed countries. Women tend to be left behind, not only as consumers of mobile services, but also as employees and leaders in the mobile industry.

Research in low- and middle-income countries indicates that there are notable and persistent gaps in women's access to mobile and its services which meet their needs. Recent research by the GSMA Connected Women programme suggests women in low- and middle-income markets are 14% less likely to own a mobile phone than men, which translates approximately into 200 million women. While substantial progress toward phone ownership for women is evident on an aggregate level, certain regions, such as South Asia, have made little progress in closing the gender gap in mobile ownership (women of the region are in fact 38% less likely to own a phone than men). Other regions, such as Sub-Saharan Africa, have a 13% gender gap in mobile phone ownership overall, but certain countries exhibit high gender gaps in mobile phone ownership. For example, Niger and the Democratic Republic of Congo had gender gaps in mobile phone ownership of 45% and 33% respectively.

A mobile gender gap also exists at the usage level—even when women own mobile phones, they tend to use mobile services less frequently or less intensively than men. Closing the usage gender gap will enable women to gain access to the life-enhancing services of mobile, including mobile internet. Additionally, closing the gender gap in terms of mobile ownership and usage in low- and middle-income countries could unlock an estimated US\$170 billion market opportunity for the mobile industry in the next five years.

Cost was identified as the greatest barrier overall to owning and using a mobile phone, particularly for women, who often have less financial independence than men. Security and harassment also emerged as an important barrier to mobile phone ownership and usage, and is a key concern for women. Other barriers include service delivery issues (network quality and coverage and agent or operator trust) and technical literacy and confidence. Finally, it was found that social norms tend to influence women's access to and use of mobile technology, and often contribute to women experiencing barriers to mobile phone ownership and use more acutely than men.

If the mobile ownership and usage gender gaps are not closed, women are at risk of falling further behind as new mobile services are developed, and particularly as mobile is the main means of accessing the internet in many developing countries. According to the UN E-Government Survey in 2014, 'the causes of this gender divide can stem from disparities between men and women in terms of a lack of education, lack of income, social attitudes towards female usage of technology, women having to balance their roles of mother and worker and lack of Internet content relative to women's needs.'<sup>21</sup>

Women are critical to realising the potential socio-economic benefits in the areas of health, education and agriculture, and have the most to gain in terms of financial inclusion via mobile services. As a result, closing the gender gap in mobile ownership and use, including for mobile internet, as well as developing mobile services which meet the needs of women, is a key consideration for operators and policymakers to realise the potential contribution of mobile services.

The issue of gender inequality in the mobile industry extends beyond female consumers in developing markets. For example, across the world women are less present in many high-growth fields like science, technology and engineering which are important to countries' innovation, connectedness and competitiveness in global market. Similarly, women are underrepresented in senior management roles in the technology sector. Women today comprise 40% of the global workforce and account for more than half of university graduates, and yet only 4.8% of Fortune 500 CEOs and five FTSE 100 CEOs are women.<sup>22</sup> This is an important issue and there is a consistent body of

research asserting that gender diversity in the workplace is key to foster growth and innovation, as well as to improve performance. For instance, a study by Catalyst, which focused the Fortune 500, found that companies with the highest representation of women board directors achieved a 53% higher return on equity, 42% higher return on sales and 66% higher return on invested capital than those with the lowest representation.<sup>23</sup>

There are a number of examples from across the developing world of services focused at addressing these issues.

- Ooredoo specifically targeted women and the potential for mHealth services when launching its 3G services in Myanmar in 2014.<sup>24</sup> In a generally under penetrated market, the company found that family and personal health were major concerns for the local population, in a country with high maternal mortality rates. With the support of both local and international partners, Ooredoo has launched a maternal health app, 'maymay', to help attract users and address a key need in the community.
- In Togo and Benin, 61% and 54% of the population lives in rural areas, respectively, half of which are women. Etisalat received a grant by the GSMA Connected Women programme to develop a bespoke brand aimed directly at rural women: Weena. The holistic mobile offering comprises a tariff plan, a loyalty mechanism, value added services, a distribution network and marketing and communication specifically aimed at the rural women segment. The Weena proposition will not only yield social benefits to the rural women of Togo and Benin, but will also help to increase Etisalat's female customer base in these two markets.

21. [http://unpan3.un.org/egovkb/Portals/egovkb/Documents/un/2014-Survey/E-Gov\\_Complete\\_Survey-2014.pdf](http://unpan3.un.org/egovkb/Portals/egovkb/Documents/un/2014-Survey/E-Gov_Complete_Survey-2014.pdf)

22. "Fortune.com assessment, June 2014"

23. The Bottom Line: corporate performance and women's representation on boards, Catalyst, 2011

24. <http://www.gsma.com/connectedwomen/wp-content/uploads/2014/09/Connected-Women-Myanmar-Snapshot-v3.pdf>

# DELIVERING THE DIGITAL FUTURE

## Connected Living: Mobilising the Internet of Things



**M2M CONNECTION GROWTH** WILL COME FROM A RANGE OF SIGNIFICANT VERTICALS INCLUDING AUTOMOTIVE, HEALTHCARE, UTILITIES AND SMART CITIES



GSMA INTELLIGENCE FORECASTS THE NUMBER OF GLOBAL CELLULAR M2M CONNECTIONS TO REACH ALMOST **1 BILLION BY 2020**



**ASIA PACIFIC** WILL ACCOUNT FOR OVER **50%** OF CELLULAR M2M CONNECTIONS BY 2020

THE GSMA SUPPORTS THE ACCELERATION OF M2M ADOPTION VIA:

**GROWTH**



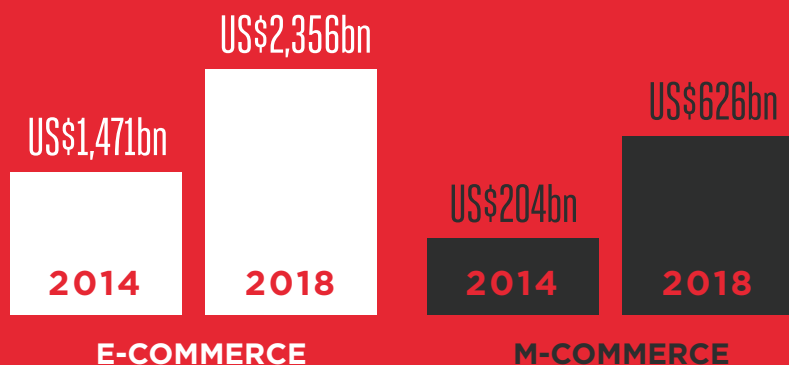
**COST**

LONGTERM PLANNING AND HIGHER RETURNS FROM BUSINESS MODELS

IMPLEMENTING INDUSTRY LEADING SECURITY STANDARDS TO MAINTAIN CONSUMER CONFIDENCE

## Mobile is at the heart of future commerce

### MOBILE TO TAKE GROWING SHARE OF DIGITAL COMMERCE



BY END 2014

 **150+**

SIM-based NFC launches with over 60 operating as commercial services around the world



# Mobile identity: Unlocking the potential of the digital economy

## PROBLEM

The password is broken, with multiple login details, lengthy registration processes demanding personal information and high profile security breaches, consumers are growing wary of online safety and privacy



**86% OF PEOPLE HAVE LEFT A WEBSITE WHEN ASKED TO REGISTER**



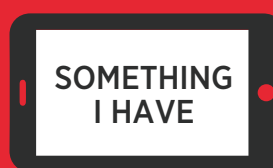
**40% ADMIT TO USING THE FORGOT PASSWORD FEATURE ONCE A MONTH**



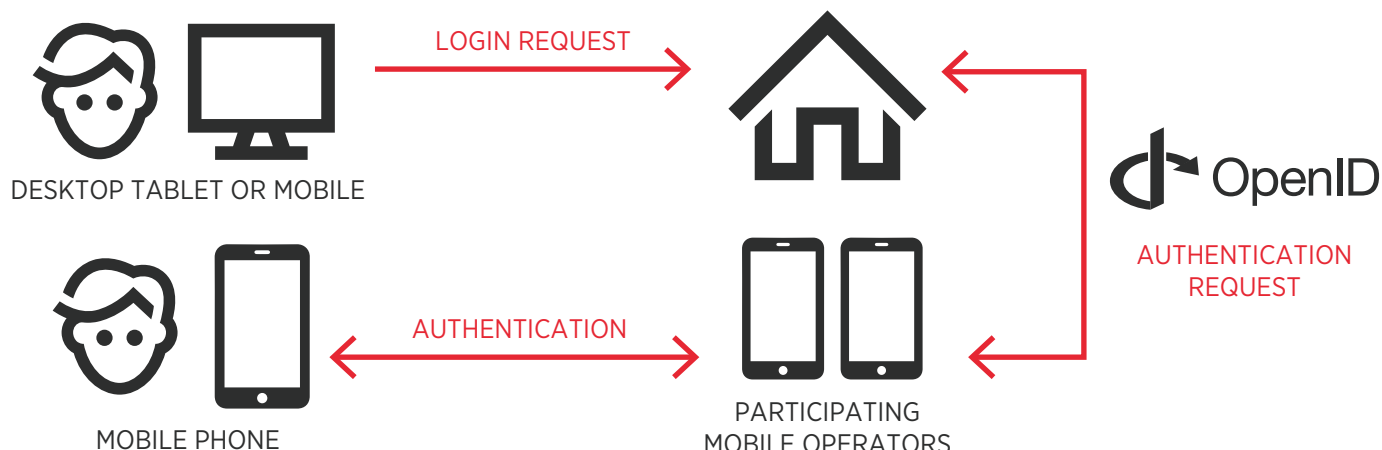
**78% OF CONSUMERS STATE ITS HARD TO TRUST COMPANIES WITH THEIR DATA**

## SOLUTION

By using the internet security of the device thats always with customers; the mobile phone, secure and convenient access to digital services can be unlocked



**= MORE SECURITY**



## Network 2020: The IP Communications landscape in 2020

Voice & video calls over LTE

**360** 

Commercially launched  
LTE Networks in  
124 countries

Rich Communications

**41**   
OPERATORS

 LAUNCHED IN  
**32 COUNTRIES**

HD Voice

HD VOICE NOW COMMERCIALY AVAILABLE ON

**125** 

HD Voice Mobile Networks  
IN 77 COUNTRIES

# 3 Delivering the digital future

## 3.1 Mobile at the heart of the new digital ecosystem

Mobile has already redefined consumer experiences in many aspects of daily life, as well as creating a range of new business opportunities and services. As technology and the broader mobile and digital ecosystems continue to evolve, the impact of innovation and disruption will be felt ever wider. New technologies, imaginative use cases and business models are likely to generate even more profound mobile innovations, increasingly linking the digital and physical worlds.

As mobile disrupts and affects more areas of consumer and business life, the potential for collaboration also grows. Digital ecosystem players, ranging from mobile operators to new entrants to existing players in adjacent industries, will increasingly recognise the need for collaborative innovation rather than competition if they are to realise the full potential of mobile.

The global app economy is growing rapidly, with revenues from apps and related products and services reaching US\$86.3 billion in 2014,<sup>25</sup> representing a 26% increase from 2013. Much of this growth is coming from developing markets such as India and China, and out of a total global mobile developer population of 2.3 million in 2013, Asia is home to around a third.<sup>26</sup>

In 2014, Google more than doubled the number of apps in its Google Play store, ending the year with more than 1.4 million and overtaking Apple with 1.2 million. Amazon, while a long way behind with 293,000 apps, also enjoyed impressive growth, albeit from a much smaller base.<sup>27</sup> These three platforms and their broader ecosystems currently dominate the global market, accounting for over 90% of smartphone sales worldwide. However, these platforms originated in developed markets, such as the US, Europe and parts of Asia. The developing world poses new challenges to the industry as customers are mostly prepaid, handset subsidies are less prevalent, and the use of mobile data is rising despite smartphone penetration being low. There is also an added importance to customers of brand value and locally relevant content, so importing established content models from developed markets is unlikely to drive customer acquisition to mobile platforms.

25. The European App Economy 2014, VisionMobile, August 2014

26. <http://www.developereconomics.com/report/q1-2014-68-billion-app-economy/>

27. <http://blog.appfigures.com/app-stores-growth-accelerates-in-2014/>

In the face of these differing market dynamics, there are a number of budding ecosystems attempting to use the web itself as their platform, for example, Mozilla (Firefox), Samsung (Tizen), Canonical (Ubuntu) and Jolla (Sailfish). These all support HTML5, which has the advantages of strong developer support, open standards, the ubiquity of the internet and access to services. However, operator support is key if these platforms are to achieve scale and meaningfully compete against Android and iOS. While some operators are

showing support and positioning these as low cost alternatives to Android, uptake of these platforms to date remains relatively slow.

Mobile operators themselves are moving beyond traditional core voice, SMS and data propositions to embrace new technologies and business models, and are continually expanding their product portfolio for consumers. Additionally, operators are investing in content to leverage their network assets and commercial presence in support of innovation.

### **Operators have formed a number of hubs and partnerships across the world to promote innovation and the development of new technologies:**

- In May 2014, Orange established a new incubator partnership in Niger, its third in Africa. The project, called CIPMEN, is an incubator for small-to-medium enterprises that will encourage innovation in Niger. It offers support from their launch phase, up to when they are mature and stable enough to make enough profit to sustain themselves.
- In June 2014, Vodafone announced it is moving its research facility from Silicon Valley to London. The Vodafone xone hub in London will provide a wide range of incubation and investment services for start-ups, and will be responsible for developing mobile technologies. The focus will be on building and testing prototype devices, as well as developing apps and services tailored for the group's biggest markets in Europe, Africa and India, in order to 'bring our product development team closer to the customers it serves'.<sup>28</sup> The company already has a number of existing xone bases in Europe, including both Dusseldorf and Milan.
- In early 2014, Telefónica announced it was expanding its Wayra Accelerator Network to Asia via a collaboration with China's VIV incubator. This will be the 14<sup>th</sup> Wyra Academy globally, the other being mostly concentrated in Latin America and Western Europe, each of which incubate a yearly crop of tech start-ups in the hopes of spotting the next big thing.<sup>29</sup>

According to CB Insights, the final quarter of 2014 saw the largest amount of investor activity (including venture capital, private equity, angel and other investments) in the mobile and telecommunications sector. There was a total US\$12.5 billion of funding and 623 deals in the quarter alone. This was up from a previous high of US\$5.2 billion of funding in third quarter of 2012, and 583 deals in the final quarter of 2013. Additionally, the mobile, telecommunications and internet sectors combined accounted for 36% of funding across all sectors in 2014, up from 28% in 2013.<sup>30</sup>

28. <http://www.theguardian.com/technology/2014/jun/03/vodafone-shut-silicon-valley-tech-incubator-boost-london-hub>

29. <http://techcrunch.com/2014/02/18/wayra-reaches-into-china/>

30. CB Insights

## 3.2 Connected living: Mobilising the Internet of Things (IoT)

The M2M market has seen rapid growth globally over recent years as operators and governments recognise the potential of the IoT, and the number of active deployments is beginning to accelerate. The IoT has the potential to play a significant role in realising the potential of the digital future, with positive impacts on both the economy and the broader society.

There were 243 million cellular M2M connections globally as of December 2014, and growth is set to accelerate over the next few years. The total number of cellular M2M connections will grow at a CAGR of 26% between 2014 and 2020, bringing the total to just under one billion. However, these forecasts are based on known and tangible deployments, opportunities and barriers for each operator and M2M sector. They may well prove conservative if both industry players and governments successfully enable a number of growth factors, as highlighted in recent research by GSMA Intelligence.<sup>31</sup> This could lead to growth rates similar in the future to those witnessed over the past few years, resulting in an uplift over the current trajectory forecasts of up to 50%.

Such growth factors include low power network roll-out, increased standardisation, improved regulation, and greater assurance of end-to-end security. A further requirement is the development of new operator business models in the M2M space, particularly those that move beyond simply providing the mobile connectivity.

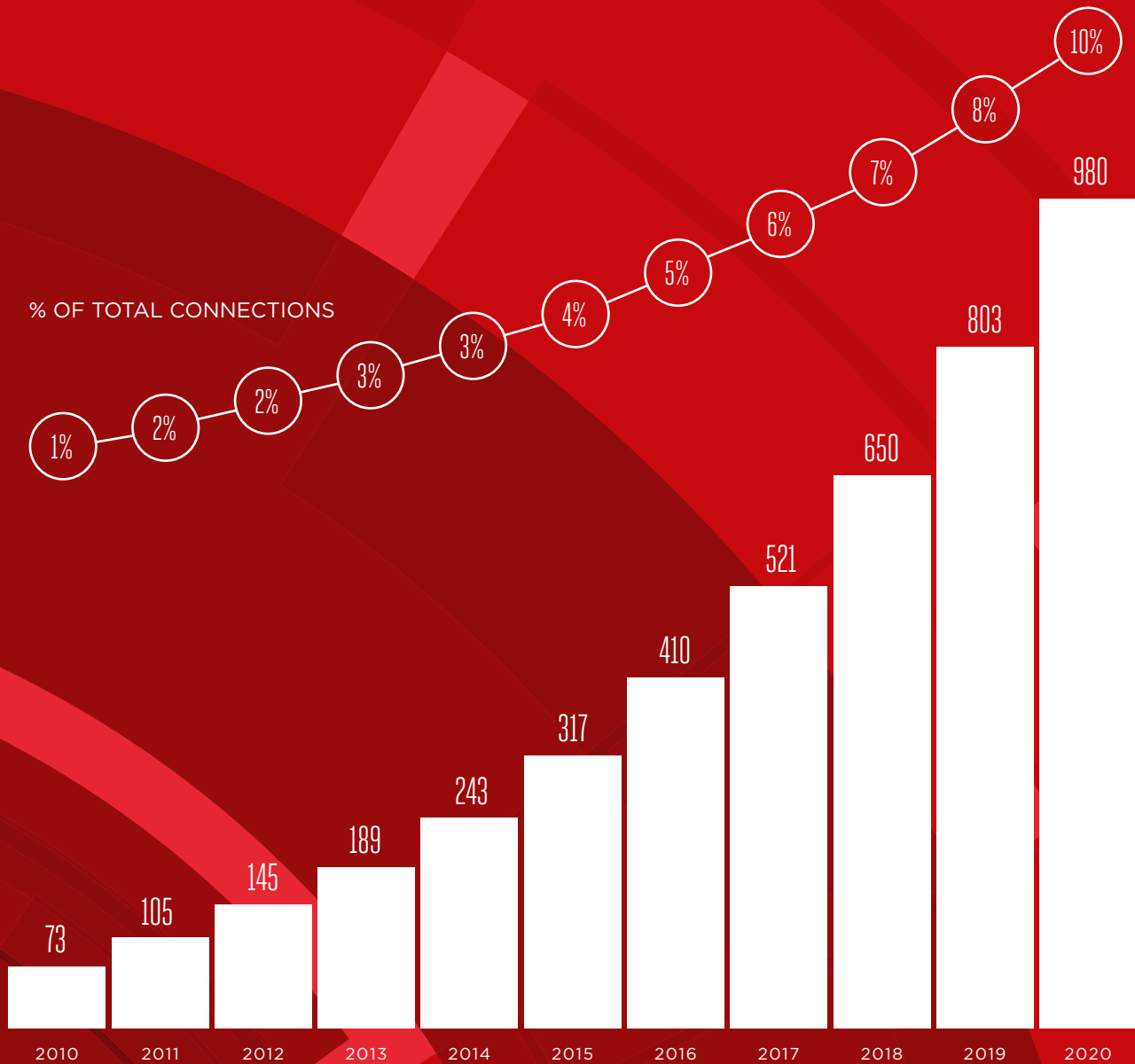
By the end of 2014, China was the largest cellular M2M market with 73 million cellular connections, or 30% of the global total. The US is second with 42 million connections, followed by Japan with 11 million. Overall, the top 10 markets accounted for 73% of global connections. By 2020, China will have increased its share to 36%, with 355 million cellular M2M connections.

31. <https://gsmaintelligence.com/analysis/2014/9/cellular-m2m-forecasts-and-assumptions-2010-2020/446/>

Source: GSMA Intelligence

## Global growth of cellular M2M

(Connections M)



## The IoT is beginning to transform everyday activities

There are increasingly tangible benefits for consumers from the growing range of new connected services, with a strong focus on both wearable devices and the potential of the 'Smart Home'. A number of new wearable devices launched over the last year, including the Samsung Gear and the LG Lifeband. Connected devices and sensors could deliver a smarter, more efficient home, with smartphones and tablets interacting with various connected objects and devices, from lighting to basic security systems. Additionally, some of the IoT's key players are connecting everyday items like home security systems and kitchen appliances to networked devices like PCs and smartphones, giving consumers greater control and management of their everyday lives. Samsung recently announced that by 2020, all of its products, from smartphones to refrigerators, would be internet connected.<sup>32</sup> Additionally, Qualcomm announced its intentions to act as an 'enabler', not only supplying the hardware, but also driving standards and providing an entire, interoperable umbrella platform from base-level connections to sophisticated processing and big data gathering, right up to the applications layer.<sup>33</sup>

Many of the connected devices that will deliver IoT services in the smart home will use short-range wireless technologies, rather than cellular connectivity. However, mobile will continue play a crucial role as an enabling technology, acting as an aggregator or hub to connect a range of devices, and offering wide-area connectivity.

The fastest growing industry M2M sectors are in the areas of automotive, security, compliance reporting, utilities and health.

In the automotive sector, operators in both North America and one or two other markets (including for example Australia) are now deploying 4G-LTE devices, whilst most other regions are still working with 2G/3G. In-vehicle technology is an increasingly important differentiator in North America with a range of new services on offer. There have been a number of recent announcements across the global automotive market.

32. <http://www.cnet.com/news/samsung-co-ceo-in-5-years-all-our-products-will-be-internet-connected/>  
 33. <http://www.rethink-wireless.com/2015/01/06/ces-qualcomms-iot-ambitions-clear-display.htm>

- AT&T, keen to make it easier to connect multiple devices to a shared data plan, launched its Mobile Share Value tariff, where existing customers can add a 4G LTE-equipped vehicle, cellular smart watch, or communication and location devices for US\$10 per month – the same cost as a connected tablet.<sup>34</sup>
- In June 2014, Vodafone announced plans to take over Italian based telematics firm Cobra Automotive Technologies as it looks to move up the M2M value chain. The operator is offering €145 million for Italy-based Cobra, which provides security and telematics solutions to the automotive and insurance industries.<sup>35</sup>
- In October 2014, China Mobile and Deutsche Telekom signed an agreement to establish a joint venture (JV) in the field of Connected Cars to address the Chinese automotive market, which reached 137 million units in 2013. The JV will be established in China, and each partner will hold a 50% stake, with Deutsche Telekom providing telematics expertise, the Connected Car platform technology and customer insights, and China Mobile its growing LTE network.<sup>36</sup>

There have also been a number of developments in the area of home automation. AT&T's Digital Life is a security and home automation offering, which is now available across the country. The service is managed through a smartphone app and includes home security monitoring, a smart thermostat and moisture detection. Operators in other regions are launching similar home automation services with, for example, Telefónica in Europe launching a trial service in late 2014. Orange has launched its Homelive service in France, which allows users to manage a range of connected devices.

As M2M solutions are becoming more complex, operators are looking to deploy more advanced communication platforms and middleware that enables a smooth integration of devices, networks and applications, simplifying business processes such as billing and subscription management to scale down costs and optimise performance. Due to the demand for M2M interoperability and the growth of operator alliances, operators are moving towards a multiplatform approach, adding more standardised platforms from the key vendors.

In order to implement such an approach, the majority of operators have entered into partnerships with specialised global providers such as Jasper, Amdocs and Ericsson, allowing them to offer similar user experiences across geographies. A few operators, namely Vodafone, Telefónica, Orange, Deutsche Telekom, Telecom Italia and Verizon Wireless, have also developed proprietary, in-house M2M operating platform, deploying solutions provided by Ericsson and Jasper on top. This multiplatform approach often comes from the fact that some of their larger enterprise clients are used to working with certain platforms, and do not want to integrate with a proprietary platform.

34. [http://about.att.com/newsroom/new\\_connected\\_audi\\_model\\_and\\_mobile\\_share\\_value\\_pricing\\_coming\\_soon.html](http://about.att.com/newsroom/new_connected_audi_model_and_mobile_share_value_pricing_coming_soon.html)  
 35. <http://www.vodafone.com/content/index/media/vodafone-group-releases/2014/cobra-offer.html>  
 36. <http://www.telekom.com/media/company/253196>

## 3.2.1 The GSMA's role in realising the potential of M2M

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

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

- Creation of fully interoperable specifications for remote SIM provisioning of M2M devices and evaluation of convergence between M2M and smartphone/tablet solutions.
- Evaluation of the viability of existing networks to meet the low power, low data rate and low mobility use cases, as well as an assessment of the viability of alternative complementary networks including integration with macro network & spectrum/policy issues.
- Deployment of a GSMA sandbox platform to demonstrate how to monetise IoT Big Data.
- Device security requirements and an accompanying accreditation process for operators to demonstrate that solutions utilising their networks are secure.

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



## 3.3 Digital commerce

Mass-market smartphones, fast connections and feature-rich applications are extending the convenience and interactivity of online commerce into the physical bricks and mortar world. Customers are able to look up product and service information, download and store vouchers, search for merchants, explore transport options, run price comparisons, buy tickets, purchase products and order services, all while on the move. At the same time, retailers, transport operators and other service providers are increasingly using mobile technology to improve the experience for their customers, while infrastructure rollouts of contactless point of sale (POS) terminals are no longer holding back service adoption.

Digital commerce continues to show strong growth across most regions, with the industry forecast to grow significantly over the next three years, from US\$1.7 trillion in 2014 to US\$3 trillion in 2018,<sup>37</sup> a CAGR of 16%. Over the last 12 months there have been signs that the increasing availability of services and enabled-devices, supporting infrastructure and consumer readiness have led to a 'tipping point' in the global migration towards mobile payments and commerce. A recent survey of users in the US and Europe found that nearly twice as many consumers started to use mobile payments in 2013 compared with 2012,<sup>38</sup> and that their use for in-store payments is growing rapidly. Mobile commerce is now forecast to account for 21% of total digital commerce by 2018, up from 12% in 2014.

Mobile operators continue to lead the field in terms of new launches, building on the knowledge of their customer base and existing capabilities that allow them to enable bank-grade secure services. However, retailers and other stakeholders are becoming increasingly active by embracing mobile technologies to merge their online and physical stores into a distinctive consumer proposition to boost their revenues. This includes mobile apps, digital walk-in stores, social shopping (using social media to enhance the shopping experience), and interactive in-store services.

Starbucks offers a mobile app that allows consumers to assign their credit card number and then simply scan the phone to pay, which has proved very successful. The company announced in its latest results that 15% of its US transactions, or around seven million mobile payments per week, took place via a mobile device.<sup>39</sup>

Square is a financial services, merchant services aggregator and mobile payments company that allows users to take credit card payments on their mobile phones via a card reader and an app, announcing in November 2014 that it will start accepting payments via Apple Pay sometime in 2015.<sup>40</sup> Moreover, PayPal has a mobile app that offers a broad range of services, including allowing users to transfer funds to others and make online purchases. The app can also be used for in-store purchases and has seen wide acceptance from merchants, with the company reporting that 1.9 million merchant locations across the US already accepted its payments at the start of 2014.<sup>41</sup>

37. Source: eMarketer, Goldman Sachs and GSMA Intelligence

38. [http://www.bain.com/Images/BAIN\\_BRIEF\\_Mobile\\_payments\\_Finally\\_ready.pdf](http://www.bain.com/Images/BAIN_BRIEF_Mobile_payments_Finally_ready.pdf)

39. Starbucks Mobile Dashboard, Q4 FY14

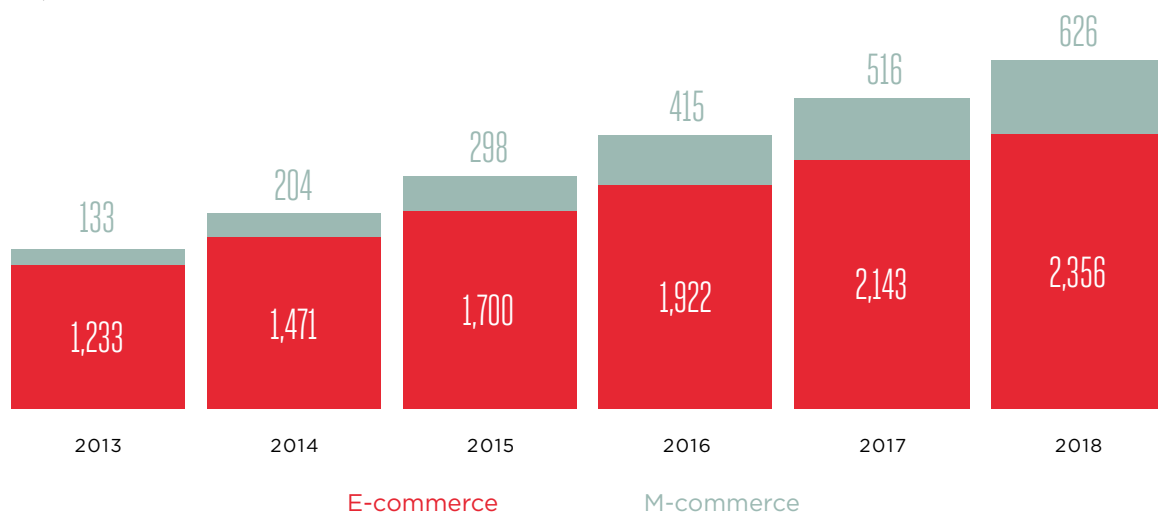
40. <http://money.cnn.com/2014/11/21/technology/mobile/apple-pay-square-payments/index.html>

41. <https://www.paypal-community.com/t5/PayPal-Forward/PayPal-Now-at-18-000-Retail-Locations-in-the-U-S-Including/ba-p/780485>

Source: eMarketer, Goldman Sachs, GSMA Intelligence

## Growth of the global digital commerce market

(US\$ bn)



There has been substantial momentum in making mobile payment services available to consumers worldwide in the last year. There were 43 commercial launches of near-field communication (NFC) mobile commerce services during 2014, which brings the total number of commercial and pilot services to more than 300 to date. In addition, there were nine Host Card Emulation (HCE) pilots and commercial launches. NFC is still by far the most established technology for mobile payments, supporting secure element services such as the 300 operator services and ApplePay, as well as HCE services. There have been a number of interesting product and service launches in the past 12 months.

- Samsung collaborated with China UnionPay to launch an NFC payment service on 3.6 million of its smartphones in China, including the Galaxy Note 4, Galaxy Note 3 and Galaxy S4. Samsung is the first company to cooperate with UnionPay for an NFC payment service.
- Billing provider Boku has made the move into physical world payments after securing an e-money license that enables it to operate outside of the European Union's Payment Services Directive (PSD) regulations (which limits carrier-billing purchases to digital content). Following this move, Boku has partnered with UK mobile network operators O2, EE and Vodafone to allow customers to charge public transport tickets, takeaway food, cups of coffee, and other 'click and collect' physical world purchases to their mobile phone bill.
- US telecoms firm AT&T announced that it will use technology from CorFire to power NFC Connect. This is a new platform that will enable it to offer a wide range of NFC-enabled services outside of the Softcard mobile commerce venture it co-owns with Verizon and T-Mobile.
- Banco do Brasil has partnered with mobile network operator Oi and Visa to offer NFC mobile payments in Brazil. Users will be able to make payments with an NFC phone at any of the 1.6 million contactless POS terminals available throughout the country.

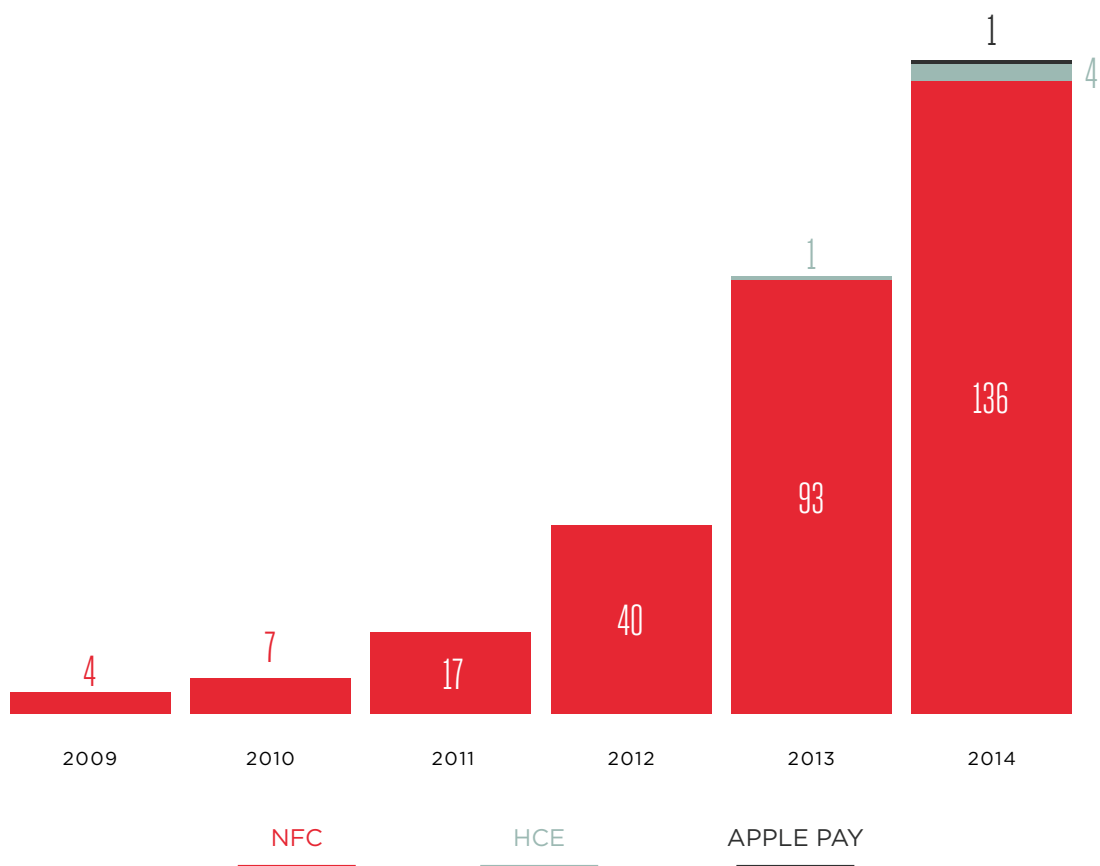
Last October, Apple introduced its Apple Pay service in the US, providing a boost to the mobile payments market. It has increased the overall size of the mobile commerce market, created strong consumer interest, and has stimulated competition between the mobile payments and wallet service providers and traditional cash, physical credit cards, and other payment mechanisms. Apple Pay activated one million cards within first 72 hours of launch. In November 2014, three weeks after launch, Whole Foods announced it had processed more than 150,000 Apple Pay transactions, McDonald's said Apple Pay accounted for 50% of its tap-to-pay transactions, and Walgreens said its mobile wallet payments had doubled.<sup>42</sup>

The Apple Pay service uses the card schemes' tokenisation platforms, enabling banks to digitise their customers' account details for a range of mobile wallets through a single and simple entry point. The GSMA is working closely with mobile operators, card schemes and banks to provide a similar single entry point to the card scheme tokenisation platforms, using the SIM to secure payments, which will expand the reach of banks to their non-Apple customers.

Source: GSMA Intelligence

## Global commercial NFC-based mobile payment service launches

(Cumulative)



42. [http://www.nytimes.com/2014/11/15/technology/apple-pay-gives-glimpse-of-mainstream-appeal-for-mobile-payments.html?\\_r=1](http://www.nytimes.com/2014/11/15/technology/apple-pay-gives-glimpse-of-mainstream-appeal-for-mobile-payments.html?_r=1)

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### 3.3.1 The GSMA's role in developing digital commerce

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

As the number of commercial mobile commerce services around the world rises, the GSMA continues to promote the use of common standards to enable the global interoperability of services and generate economies of scale, liaising with other relevant stakeholders to ensure the consistency of the overall set of specifications involved in mobile commerce deployments. Covering many topics, these specifications set out a common framework of requirements to ensure interoperability and an efficient and consistent development and deployment of mobile commerce services.

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## 3.4 The personal data opportunity

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As more people access the mobile internet, and as online commerce, social media, gaming and other activities gain popularity; consumers are increasingly voicing privacy concerns and demanding better protection of their data.

In the last year, there have been several high profile internet security breaches, highlighting potential serious flaws in the way personal information and data is currently protected online. eBay announced in March 2014 that its database containing encrypted passwords and other non-financial data had been hacked.<sup>43</sup> In April 2014, researchers announced a flaw in encryption standard used by many websites, the 'Heartbleed' bug. This flaw left approximately 17% (around half a million) of the internet's secure web servers certified by trusted authorities vulnerable to the attack,<sup>44</sup> leaving them open to theft of private keys and passwords. A typical consumer has around 26 different online user names but only five different passwords,<sup>45</sup> leading to serious questions regarding the suitability of the current password model for online safety and privacy.

Therefore, there is a growing need for individuals to be able to manage and authenticate their identities online in a more secure and convenient manner. For example, 70% of European consumers surveyed by Orange in 2014 agreed that there are few trusted ways to find out about personal data management and online protection.<sup>46</sup> One solution that is now gaining popularity is mobile authentication. The SIM card and the mobile platform can act as a frontline identity management service provider, meaning that secure and convenient access to digital services can be unlocked using the inherent security of the mobile phone. Mobile operators are well placed to provide identity services given their strong customer relationships, with the provision of other trusted services such as mobile banking further enhancing this relationship.

### Concerns around mobile identity and personal data

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

Source: GSMA<sup>47</sup>

43. [http://www.ebayinc.com/in\\_the\\_news/story/ebay-inc-ask-ebay-users-change-passwords](http://www.ebayinc.com/in_the_news/story/ebay-inc-ask-ebay-users-change-passwords)

44. <http://news.netcraft.com/archives/2014/04/08/half-a-million-widely-trusted-websites-vulnerable-to-heartbleed-bug.html>

45. Experian, 17 July 2012

46. <http://www.orange.com/en/content/download/21358/412063/version/5/file/Orange+Future+of+Digital+Trust+Report.pdf>

47. Mobile Privacy: Consumer research insights and considerations for policymakers, GSMA, February 2014

Mobile identity offers the potential to extend access to a range of different services, including banking, commerce, retail and other identity based digital services. One area of particular focus concerns access to public and government services. In some developing regions, there may be a lack of basic infrastructure to allow individuals to establish and manage their identities, whilst in more developed economies governments increasingly need to develop new and secure ways of engaging with their citizens. There are a growing number of examples of services and deployments aimed at addressing these issues.

- **E-government and public services:** Mobile identity is transforming how citizens and governments interact. For example in Finland, the City of Helsinki<sup>48</sup> has launched a new tax receipt app which allows citizens to calculate the total amount of direct or indirect taxes they pay monthly. In Africa, Orange's mobile birth registration solution in Senegal and Uganda Telecom's Mobile Vital Records System platform have shown how mobile operators can use existing technology to solve a previously intractable social problem.<sup>49</sup>
- **Cross border services:** Mobile identity solutions are making it possible for citizens and businesses to deal with public administrations in other countries. In Europe, the recently launched electronic identity, authentication and signature (eIDAS) Regulation<sup>50</sup> is expected to enable and foster seamless electronic transactions across borders. This is making it easier and safer for individuals, businesses and public administrations in different EU countries to identify and authenticate themselves, sign documents and check the authenticity of documents online.

48. [http://www.gsma.com/connectedliving/wp-content/uploads/2012/12/cl\\_forum\\_virium\\_12\\_12.pdf](http://www.gsma.com/connectedliving/wp-content/uploads/2012/12/cl_forum_virium_12_12.pdf)

49. <http://www.gsma.com/personaldata/wp-content/uploads/2013/05/Mobile-Birth-Registration-in-Sub-Saharan-Africa.pdf>

50. eIDAS Regulation (EU) No 910/2014 of 23 July 2014 – OJ L257, 28 August 2014 [http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L\\_.2014.257.01.0073.01.ENG](http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2014.257.01.0073.01.ENG)



### 3.4.1 The GSMA's role in further developing personal data and mobile identity services

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

The use of standards and interoperability are therefore key, in particular the need to create a common, industry-wide set of identity-related APIs (application programming interfaces). The GSMA is working closely with operators to establish a uniform set of APIs to underpin key mobile identity services. To help realise this goal, the GSMA has launched its 'Mobile Connect' identity management service (supported by Axiata Group Berhad, China Mobile, China Telecom, Elisa, Etisalat, KDDI, Ooredoo, Orange, Tata, Telefónica, Telenor, Telstra and VimpelCom) which aims to

facilitate broad interoperability across a range of mobile operators and service providers.<sup>51</sup>

Mobile Connect is a fast secure login system that enables people to access their online accounts with just one click or less, and provides different levels of security from low-level website access to highly secure bank-grade authentication. People subscribed to a participating operator know that when they click on a website's Mobile Connect button they will be able to log in to any service or activity without the need to remember complicated username and password combinations.

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51. <http://gsmamobileeconomy.com/gsmamc/>



## 3.5 Network 2020

Consumer appetite for mobile data and richer services is growing rapidly, and as a result new IP-based communications services such as Skype, WhatsApp and Facebook Messenger are becoming increasingly popular. These services will continue to gain traction with the growth of LTE networks and devices, meaning operators will need to consider which type of partnership or over-the-top integration models will allow them to drive revenue and sustain their business models in the longer term. Embracing an all-IP future solution is vital for operators if they are to retain customer relevance and have a network capable of meeting the ever-growing customer demand for data services and increasingly richer communications.

One response to these challenges is for operators to develop a rich IP-based communications proposition for their customers. Rich Communication Services (RCS) offer voice and messaging, video-based calling, as well as Voice over LTE (VoLTE), and HD Voice services. RCS is the platform that enables the delivery of communication experiences beyond voice and SMS, providing consumers with instant messaging or chat, live video and file sharing across all devices, on any network. For operators, deploying RCS allows them to offer competitive solutions with alternative applications, which can lead to new revenue streams through the creation of apps and business-to-business services. RCS has been launched by 41 operators in 32 different countries, with a commitment from a further 87 operators to launch by the end of 2015.

VoLTE offers operators many potential cost and operational benefits. It eliminates the need to have voice and data on separate networks, and can unlock new revenue potential through deployment in parallel with video calls over LTE and RCS multimedia services. As demand for video calls grows, deploying VoLTE will ensure that services are fully interoperable across the operator community. Six countries have launched VoLTE services as of December 2014, and 56 are in the planning stages. HD Voice meanwhile provides customers with high quality, clear and more natural voice calls with reduced background noise on mobile and fixed terminal networks. HD Voice services are rapidly expanding, and 125 mobile operators in 77 countries have commercially launched HD voice services as of February 2015.



4G is still a relatively nascent technology on a global scale, with just under 7% of total connections by the end of 2014. Although the rate of migration is accelerating sharply, there is already growing speculation and analysis around the next generation of mobile services, generally referred to as '5G'. Discussions centre on whether 5G will be a true generational shift in connectivity technology or the consolidation of existing 2G, 3G, 4G, Wi-Fi and various other technologies to provide vastly greater network coverage and always-on reliability. Considerable advancements towards the hyper-connected society have already been made. Examples include technologies such as network function virtualisation (NFV), software defined networks (SDN) and heterogeneous networks (HetNets). All of these technologies are regularly bundled under the '5G' banner, despite the fact that they are already being brought to market by vendors and invested in by operators. These technologies will continue to have a significant impact on the mobile industry over the coming years. However, placing too much focus now on a future, over-arching vision of a new technology generation could adversely affect progress in these areas between now and the anticipated launch of 5G as a commercial service. This latter point is especially true given the early stage of 4G adoption in many countries, particularly across the developing world.

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### 3.5.1 The GSMA's role in developing next generation networks

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

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

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

# GLOBAL ENABLERS TO SPUR INVESTMENT AND GROWTH

## Spectrum a scarce resource



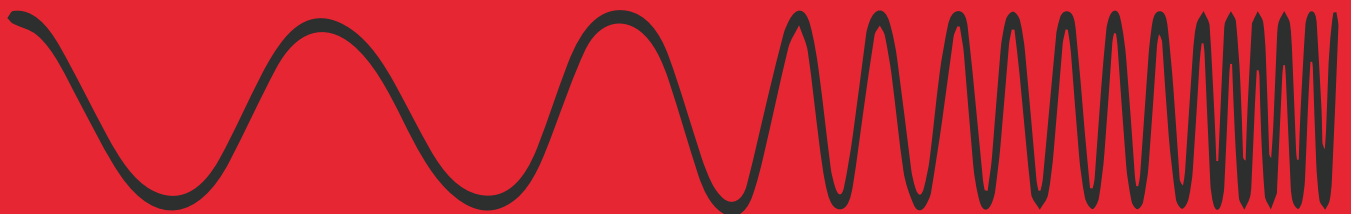
Mobile data traffic is growing so rapidly that new mobile broadband spectrum will be essential to prevent a network slowdown

GLOBAL MOBILE DATA  
EXPECTED TO INCREASE



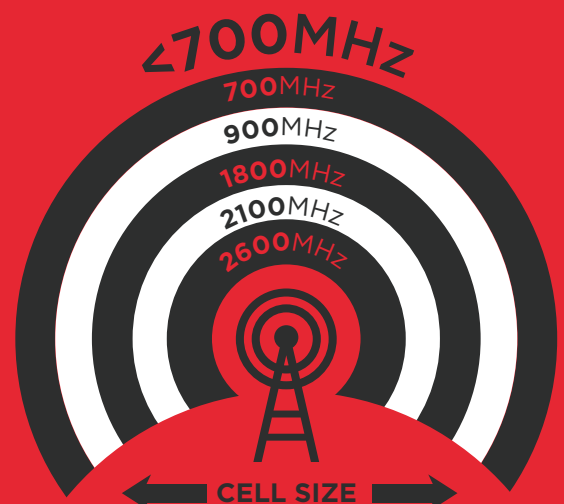
# 1340-1960MHz

THE ITU ESTIMATES  
1340-1960MHz  
NEEDED BY 2020 TO  
MEET DATA DEMAND



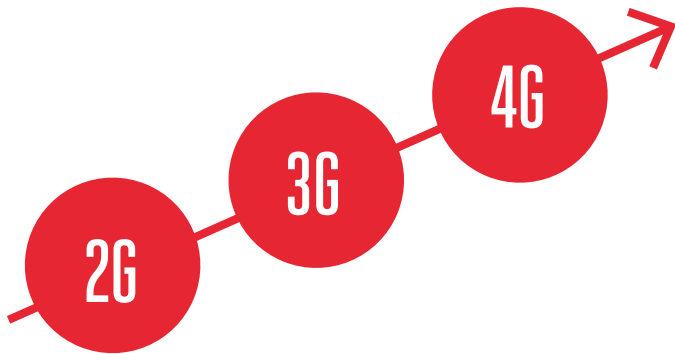
Coverage bands (like 700MHz and 800MHz) will ultimately reach capacity putting mobile broadband at risk in emerging markets, rural areas and inside buildings

**LOW FREQUENCY MOBILE BANDS TRAVEL  
FURTHER BUT HIGH BANDS HELP FOR  
CAPACITY ISSUES IN URBAN AREAS**



# European mobile network operator mergers

## WHY IS CONSOLIDATION IMPORTANT?



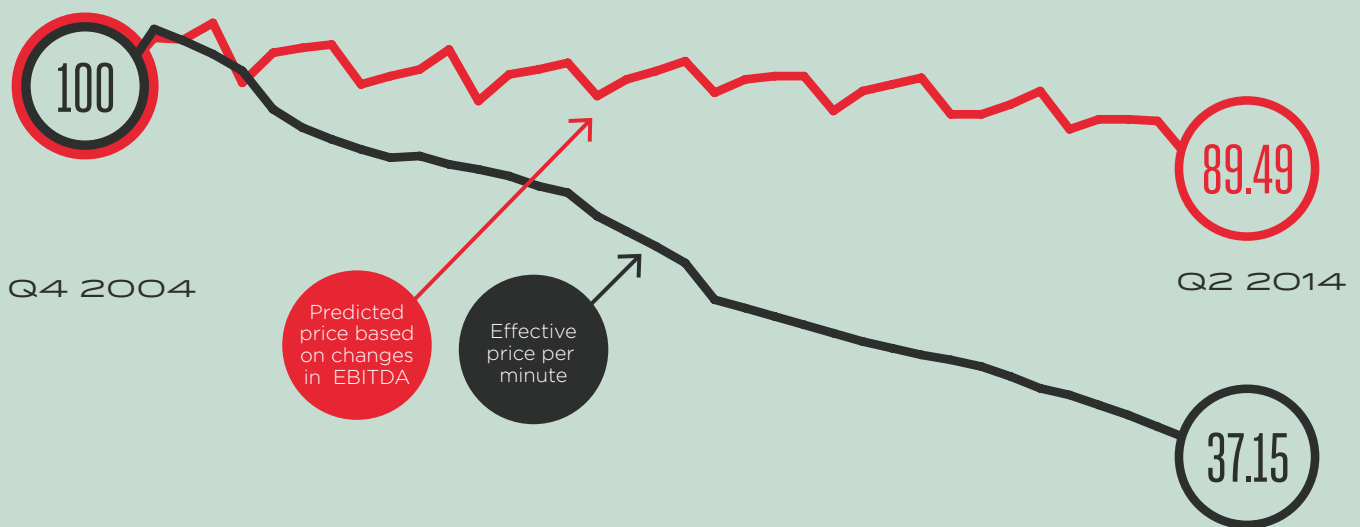
**CONSOLIDATION CAN BOOST INVESTMENT IN NEXT-GENERATION MOBILE INFRASTRUCTURE**

## WHAT'S HAPPENING?



**MERGER REVIEWS FOCUS ON SHORT-TERM PRICE IMPLICATIONS RATHER THAN LONG-TERM CONSUMER BENEFITS**

Consumers benefit from increased investment through new technologies that improve quality and reduce unit prices



## WHY IS CONSOLIDATION GOOD FOR THE MARKET?



CONSUMER COST



QUALITY AND SPEED



INVESTMENT AND ROLL-OUT OF NETWORK AND SERVICES

**MERGERS CAN DRIVE INVESTMENTS REQUIRED TO PROVIDE LONG-TERM SOCIO-ECONOMIC BENEFITS FOR CONSUMERS AND BUSINESS**

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# 4 Global enablers to spur investment and growth

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The mobile industry is increasingly helping governments across the world achieve their goals. Mobile technologies and services are fuelling economic growth and entrepreneurship, while yielding major social benefits by improving social cohesion, education, financial inclusion and healthcare. With a supportive regulatory framework, the mobile sector will continue to drive socio-economic progress, benefiting individuals, companies and governments alike.

Although local factors mean that regulatory frameworks will differ from market to market, there are some general principles that apply across the globe. If policymakers and regulators encourage investment, competition and innovation, both the mobile sector and the wider digital economy will expand, creating prosperity and new jobs.

## 4.1 Enabling and encouraging investment

Entrepreneurs, enterprises and entire countries can benefit greatly from advanced mobile technologies, but only if mobile operators continue to upgrade their existing networks and deploy new networks. Mobile operators need to build a robust business case for new investment that will convince investors to provide the necessary finance. Investor willingness to fund the rollout of advanced mobile broadband networks depends in part on the applicable regulatory framework. Spectrum policy, restrictions on base station siting and network sharing, the tax and incentive regime and the extent to which operators can consolidate their mobile operations are all important factors in determining the business case for investment.

### 4.1.1 Spectrum: A scarce resource requiring careful management

A precious and finite resource, radio spectrum is fundamental to the delivery of mobile services. Without sufficient spectrum, mobile calls will not connect, web pages will not load, apps will not update and videos will freeze. In many countries, sparse fixed-line networks mean the majority of the population is solely reliant on mobile connectivity to access the vast repository of information and services available over the Internet. Traffic on mobile networks is growing exponentially as more people get online and businesses go digital. Avoiding damaging congestion and realising the enormous socio-economic potential of mobile broadband connectivity will depend on the timely release of suitable spectrum. While management of this scarce resource is primarily the role of national governments, international coordination is crucial. Spectrum allocations need to be harmonised internationally to enable the industry to realise economies of scale and deliver services that work across national borders. Governments should, wherever

possible, adopt internationally agreed band plans, thereby reducing the cost of developing and manufacturing a wide range of mobile equipment, from network base stations to handsets and tablets. Although mobile devices can support multiple bands, each additional band increases the device cost, reduces the receiver's sensitivity and drains the battery. Operators require large blocks of contiguous spectrum in order to provide mobile broadband connectivity on a cost-effective basis.

Moreover, spectrum needs to be licensed in a way that does not curb mobile operators' ability to invest in new networks and services. Using spectrum licenses to raise as much cash as possible can be counterproductive in the mid-term. Levying excessive license fees on mobile spectrum will reduce the money available for network deployment, increase consumer prices and limit the potential economic benefits of mobile broadband.

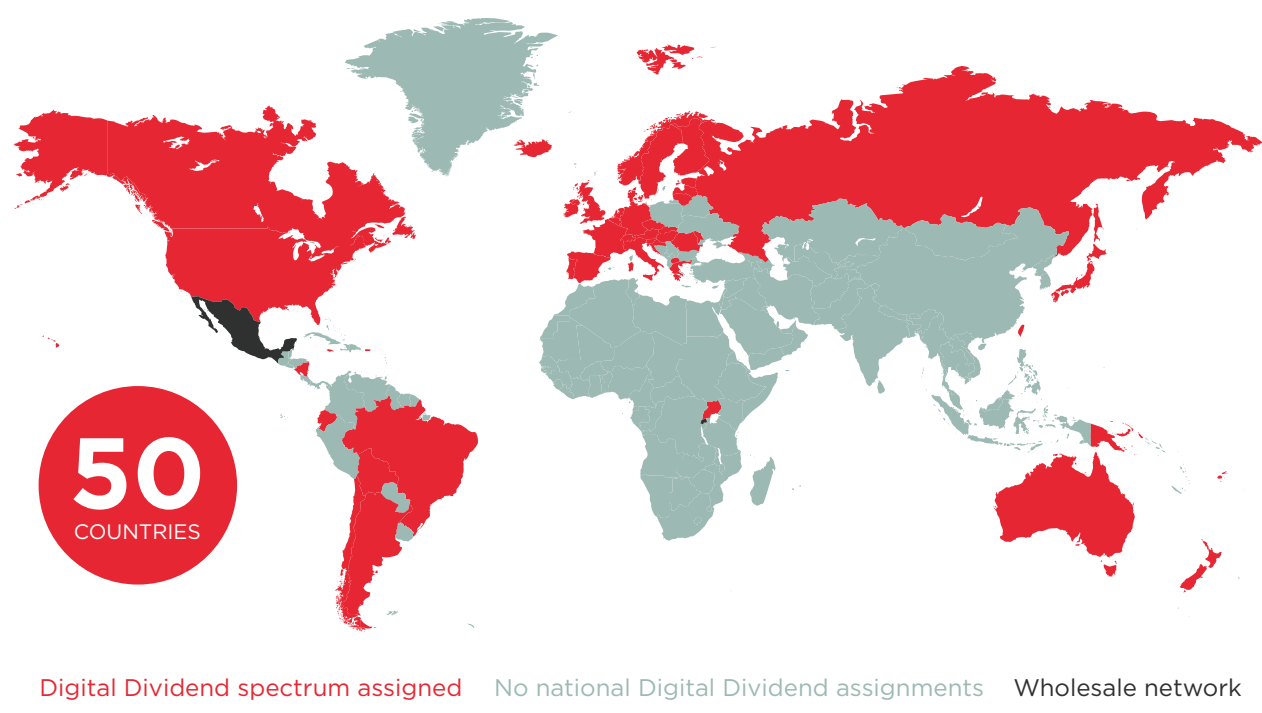
## 4.1.2 The Digital Dividend is a high priority

With mobile traffic rising rapidly and governments' objective to bring coverage to most of their citizens, governments around the world urgently need to accelerate the switchover from analogue to digital television and deploy the spectrum being freed up in the process. This so-called Digital Dividend spectrum (700MHz and 800MHz frequency bands) is well suited to cost-effectively expand mobile broadband coverage into suburban and rural areas, while providing connectivity deep inside buildings.

The ITU's deadline for countries to switchover from analogue to digital television is the 17 June 2015. However, to date, only 50 countries have allocated some of the digital dividend spectrum to mobile services.

Source: GSMA Intelligence

### Digital Dividend spectrum assignments



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To prevent the process from becoming bogged down by bureaucracy, local and regional policymakers need to play a leadership and proactive role, facilitating dialogue between the key stakeholders, including broadcasters, the mobile industry, set-top box manufacturers and consumers.

As with other frequency bands, the allocation of Digital Dividend spectrum should be harmonised internationally as much as possible. At the World Radiocommunication Conference (WRC) in 2012, regulators paved the way for global harmonisation

of this band, and over the last two years there has been real progress on regional harmonisation. A majority of countries in Latin America and Asia Pacific have adopted the APT (Asia Pacific Telecommunity) band plan. If governments in Africa, Middle East and Europe adopt a band plan that reuses the lower duplexer of the APT band plan, equipment makers would achieve greater economies of scale, lowering prices for consumers and businesses.

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### 4.1.3 Meeting future demand for spectrum

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The data traffic on mobile networks around the world is set to continue growing rapidly over the next decade. The ITU predicts that mobile broadband networks will need between 1340MHz and 1960MHz of spectrum to meet the anticipated demand in 2020. In most countries, that equates to an additional 600–800 MHz beyond today's allocations. Ideally, this new spectrum should comprise a mixture of coverage (i.e., lower frequency) and capacity (i.e., higher frequency) bands harmonised globally, or at least regionally. The next opportunity to identify additional harmonised spectrum for mobile broadband is at the WRC in 2015 (WRC-15) in Geneva, where it is set to be the top agenda item.

The outcome of WRC-15 will determine whether the telecoms industry can continue to meet the growing demand for affordable, ubiquitous, high-speed mobile broadband services.

In the absence of new spectrum allocations at WRC-15, governments will find it difficult to release enough spectrum to accommodate the ongoing rise in mobile traffic, resulting in a poorer experience for end-users and potentially more expensive mobile services. It takes about eight to 10 years to re-allocate, re-assign and re-license spectrum, so WRC-15 will play a pivotal role in avoiding a capacity crunch in the next decade.

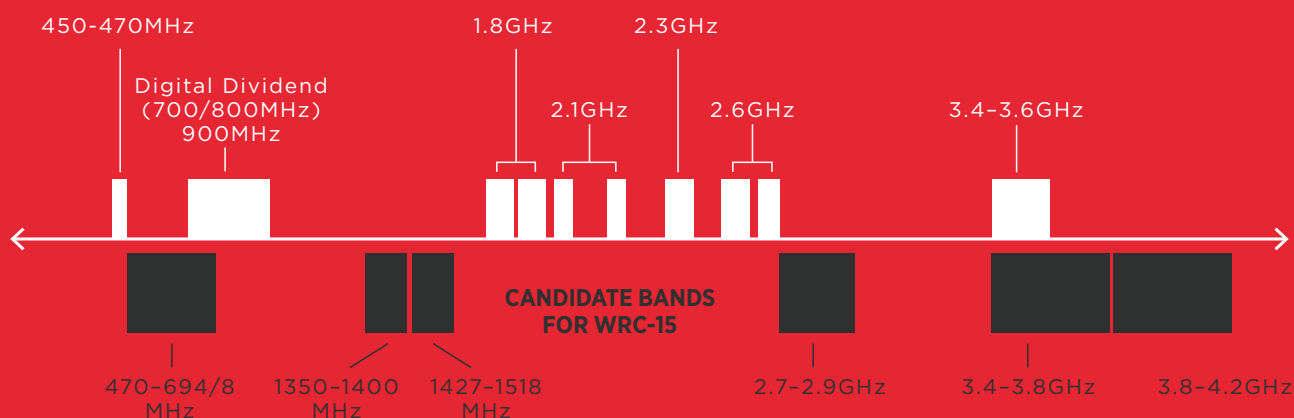




Through the GSMA, mobile operators are calling for four new bands to be allocated to mobile services and harmonised worldwide:

1. Sub-700MHz UHF (470-694/8MHz)
2. L-Band (1350-1518MHz)
3. 2.7-2.9GHz
4. C-Band (3.4-4.2GHz)

#### RADIO SPECTRUM: IDENTIFIED MOBILE BANDS



Together, these new bands will provide the mobile industry with the means to improve both coverage and capacity.



## 4.1.4 Consolidation versus fragmentation

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Facing both rapid growth in data traffic and increasing competition from online service providers, mobile operators need sufficient scale to invest in network infrastructure and the development of new services. In overly fragmented markets, individual operators have limited economies of scale and scope, impacting their ability to develop sustainable business cases for additional investment. Many emerging markets, in particular, are highly fragmented. A recent study by Frontier Economics for the GSMA highlighted the fact that in some countries there are five or more players with a market share of at least 5%. In markets with sub-scale operators, policymakers should review the antitrust framework and take steps to reduce constraints on market-driven restructuring. In some cases, policymakers may need to streamline the merger review process and impose less onerous remedies on those mergers that gain approval.

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When reviewing proposed mergers involving smaller operators, Frontier Economics recommends that competition authorities assess the role of these players across technology cycles, as technology upgrades are likely to be the main driver of consumer benefits in the longer-run. Whereas smaller operators may be willing to compete aggressively in the short-term to build up market share, they are likely to find it difficult to compete in the longer term. Of the emerging market operators that had a market share below 5% five years ago, only 10% have now managed to achieve a market share above 5%, according to the Frontier study. There are several ways in which consolidation gives operators greater incentives and capabilities to invest. Firstly, operators are

likely to benefit from a larger customer base leading to economies of scale, which are widely recognised to be significant in mobile markets. Economies of scale improve the business case for expanding coverage to new areas and upgrading the capacity of networks in existing areas. Merged operators can spread any fixed investment costs over a greater number of subscribers and/or higher levels of usage.

Secondly, mergers may enable parties to combine assets to open up investment opportunities. For example, by combining the spectrum holdings of the two merging parties, the combined entity may be able to offer better quality or faster services than its rivals or than either party would have been able to do on its own.

## 4.1.5 Gauging the impact of mergers on prices

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

Frontier Economics recently conducted a cross-country review of market performance in the EU. Covering more than a decade, this study found no evidence that unit prices in three player mobile markets are systematically higher than those in four player markets.<sup>52</sup>

A different study by New Street Research

concluded that both prices and overall returns on capital are actually lower in markets that have consolidated than those that are fragmented, implying that consolidation benefits consumers. The study noted that the high fixed costs involved in running mobile networks means that consolidating companies can achieve major cost savings by eliminating overlapping networks. Returns on capital typically improve as fixed costs are reduced, but then decline again as price competition continues.

## 4.2 Enabling and encouraging innovation

As outlined previously in this report, mobile connectivity has become a powerful platform for innovation. However, this potential for innovation should not be taken for granted. It depends on a flexible, consistent and fair regulatory environment, which encourages experimentation and differentiation.

If regulators can help to maintain such an environment, entrepreneurs and enterprises will continue to use mobile technologies and services to deliver many more socio-economic benefits. While cultural and market differences mean there is no one-size-fits all regulatory framework, it is important that regulators establish high-level principles, rather than prescribing detailed requirements that could quickly become obsolete in a fast moving digital economy.

52. <http://www.gsma.com/newsroom/press-release/gsma-report-highlights-benefits-of-mobile-mergers/>

## 4.2.1 The importance of an open internet

The internet in particular, and IP networks in general, provide rich and open platforms for innovation. Policymakers need to safeguard the vibrancy of these platforms by ensuring regulatory frameworks provide appropriate freedom and flexibility for the development and delivery of innovative services, alongside general Internet access, rather than imposing detailed, rigid and constraining provisions.

At the same time, regulatory frameworks need to recognise the consumer benefits of traffic management, irrespective of the level of congestion. In order to deliver a high quality ‘best efforts’ service, mobile operators need to be able to manage their limited resources by optimising video traffic, prioritising voice and video services and using other reasonable and proportionate traffic management

methods. In particular, an open internet policy framework should enable mobile operators and other companies to develop and deliver innovative services that require enhanced levels of connectivity, such as telemedicine, e-education, virtual private networks for businesses, IP-TV and telepresence.

Policymakers and regulators also need to ensure that operators have the regulatory freedom to support the IoT by offering differentiated services tailored to the needs of new applications and customer segments. For example, a connected ambulance relaying images to a hospital will need a different level of connectivity to an environmental monitor in a field or a smart advertising hoarding.

## 4.2.2 Transparency and competition are key

If regulators are too prescriptive, they will hold back the development of the digital economy, resulting in a lower quality of service for consumers and businesses, while negatively impacting a wide range of players across the digital value chain. Moreover, rigid rules could limit service providers’ ability to offer internet access to the widest range of consumers via a variety of different offers, curbing the internet’s ability to fuel creativity and entrepreneurship.

Healthy competition fuels innovation that meets end users’ needs. Underpinned by a

high level of transparency, competition has a track record of delivering the connectivity consumers and businesses require and expect. Where there are low barriers to switching service providers, a high degree of transparency will enable customers to easily find the right service for them. Policymakers should aim to nurture a vibrant market for Internet access, in which service providers are seeking to differentiate themselves with distinctive services, presenting consumers and business users with many different options.

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## 4.2.3 Avoiding digital lock-in

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Both consumers and businesses want to be able to access their data, information and applications regardless of their mobile device type or platform. However, when individuals try to switch mobile devices or operating systems, they can face numerous barriers. For example, applications they are using on one device might not be available on another or they cannot transfer their personal profile data or content to a new service provider. These barriers can create lock-in effects that ultimately restrict choice and competition.

A potential remedy is to develop an open and non-discriminatory regulatory framework that ensures interoperability and portability without hindering the development of the fast moving digital economy and creating an excessive administrative burden, especially for small companies. Furthermore, regulators could consider conditions of use that are transparent and help to ensure that providers of pivotal online services do not abuse their dominant positions.

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## 4.2.4 Good internet governance

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With the Internet Governance Forum's mandate up for renewal in 2015, stakeholders around the world continue to debate the best way to govern the internet, which now plays a fundamental role in the modern global economy. If there are any changes to the current governance model, it is crucial that the internet remains open, safe, secure, stable, trustworthy and interoperable.

The best way to safeguard these vital attributes is to continue with the decentralised development of the internet, ensuring it is not controlled by any particular business model or regulatory approach. In particular, policymakers should support the existing multi-stakeholder model, encouraging a collaborative, diverse and inclusive approach to internet governance decision-making.

## 4.2.5 Driving digital identification and commerce

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In the digital economy, reliable authentication of individuals is crucial. Mobile technologies and services can help to securely authenticate people in a wide range of contexts, enabling access to buildings, vehicles and public services, as well as supporting digital transactions. Governments should consider creating a digital identity plan that taps the potential of mobile services to provide a straightforward and secure authentication mechanism.

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

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

## 4.3 Building trust and confidence

Real-time data is fast becoming the lifeblood of the digital economy. It is used to inform decisions and ensure the efficient allocation of resources, driving substantial productivity gains in almost every sector of the economy from healthcare and education to manufacturing and agriculture.

But for individuals, the growing use of data by organisations and businesses raises legitimate concerns about privacy and whether sensitive information could fall into the wrong hands. Such concerns need to be addressed if the global economy is to create the climate of trust that is required to effectively harness the potential of big data. Policymakers can help guide citizens towards digital services that are secure and safe, while working with the private sector to ensure that children, in particular, can use the internet and other online services without endangering their safety.

### 4.3.1 Safeguarding personal data and protecting privacy

The widespread take-up and use of mobile-enabled digital services depends on a robust and effective framework for the protection of personal data and privacy. Policymakers need to work with the private sector to develop data protection rules that deliver consistent safeguards for citizens, while promoting innovation and ensuring a level playing field for service providers. In this regard, the proposed EU General Data Protection Regulation is an important piece of legislation that could yield significant socioeconomic benefits in Europe. Similarly, in the US, the National Strategy for Trusted Identities in Cyberspace, a White House initiative to work collaboratively with the private sector, advocacy groups, public sector agencies, and other organisations, could also lead to significant improvements in the

privacy, security, and convenience of online transactions.

Ideally, policymakers should seek to develop a data protection framework that is both future-proof and flexible enough to allow the development of new services, while providing robust protection of personal data and privacy. Given the enormous diversity of applications, a policy framework needs to adopt a risk-based approach that recognises the context in which data is captured and used, and the associated risks, and supports measures to address any such risks. Identified risks can be mitigated by adopting privacy-by-design principles, impact assessments, and by the use of anonymisation and pseudonymisation and other accountability measures that consider the user experience and that facilitate understanding and choice.

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

As the digital economy cuts across national borders, there is a need for greater international co-operation on data protection. It should be straightforward for companies to transfer data between countries and regions. There have been some important steps in this direction. For example, members of the Association of Southeast Asian Nations (ASEAN) have agreed to develop 'best practices/guidelines' on data protection by

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2015. This initiative needs to be followed up by a real commitment to harmonise legislation at a regional level. Ideally, ASEAN policymakers will establish cross border standards within the region that create minimum standards for consumer privacy, transparency and choice rather than mandating prescriptive rules that could hinder innovation and economic development.

Both international bodies and individual governments need to ensure that there is regulatory consistency and clarity around data protection and privacy. Communications and online service providers, for example, need to be governed by the same clear rules - legislation should be technology-neutral and treat functionally equivalent services and data equally. Contradictory and confusing regulations breed uncertainty and inaction, damaging the development of the digital economy.

## 4.3.2 Supporting and protecting children

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Across the world, mobile services are improving the lives of children. With a mobile handset a young person can easily contact parents and friends, access music, videos and games, and find information and knowledge that will help them with their studies.

Mobile devices can significantly enhance both formal education and informal learning, enabling students to benefit from interactive lessons, textbooks and multimedia materials.

Policymakers should look to encourage mLearning, the use of mobile technologies and services by educational institutions and students both inside and outside the classroom.

However, both the public and private sectors need to be mindful that mobile devices, like any tool, can be used in ways that cause harm, so children require guidance and a safe, secure environment to benefit from mobile technologies. The mobile industry has taken steps to protect children online, developing self-regulatory initiatives addressing the need for parental controls, education and awareness. The GSMA also takes part in international initiatives related to child online protection, including the ITU's Child Online Protection programme, and proactively engages with governments and regulators looking to address this issue.

In November 2014, the GSMA signed an agreement with Child Helpline International (CHI) that establishes a roadmap for promoting child helplines across the globe, including measures to strengthen relationships between national mobile operators and their in-country helplines and foster collaboration to make the Internet safer for children. The GSMA is also working with the United Nations Children's Fund (UNICEF) to promote industry guidelines to safeguard children online in Latin America and the Caribbean.







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**GSMA HEAD OFFICE**

Floor 2  
The Walbrook Building  
25 Walbrook  
London EC4N 8AF  
United Kingdom  
Tel: +44 (0)207 356 0600  
Fax: +44 (0)20 7356 0601