



# The Mobile Economy 2016



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

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# Executive Summary

## **Subscriber base set to reach almost three-quarters of world's population**

2015 has been a year of continued growth in the mobile industry, with more than 7.6 billion mobile connections<sup>1</sup> (representing 4.7 billion unique subscribers) and operator revenues of more than \$1 trillion. The acceleration of 4G has been a major highlight; the global 4G connection base passed the 1 billion mark in late 2015. 4G networks are now available in 151 countries across the world.

The global subscriber penetration rate now stands at 63%, with regional penetration rates ranging from 43% in Sub-Saharan Africa to 85% in Europe. However, overall subscriber growth rates continue to slow, due to saturation in developed markets and the difficulties of connecting low-income populations in developing markets. The global subscriber base will reach 5.6 billion by the end of the decade, by which point over 70% of the world's population will have a mobile subscription.

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## **Developing region drives growth**

Mobile growth is increasingly focused on the developing world: more than 90% of the incremental 1 billion new mobile subscribers forecast by 2020 will come from developing markets. The number of smartphone connections globally will increase by 2.6 billion by 2020, and again around 90% of that growth will come from developing regions. China is already the largest smartphone market, but India will be the real growth driver; it is set to add almost half a billion new connections over the next five years.

Total mobile revenues reached more than \$1 trillion in 2015. However, slowing subscriber growth, coupled with an increase in competition and a challenging macro-economic climate in many developing markets, means growth over the next five years will be modest. The annual average growth rate of just under 2% forecast for the period between 2015 and 2020 is less than half the rate of the previous five years, with converging growth rates between developed and developing regions a particular feature.

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1. Including M2M connections

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## Global economic footprint of mobile sector continues to grow

Operator investments totalled around \$880 billion between 2011 and 2015, with mobile broadband and LTE network deployments a key driver. Investment levels rose sharply over this period and peaked in 2014, with a global total of \$195 billion. Looking forward, mobile operators across the globe will face continued pressure on cashflow margins and a slowdown in new LTE deployments, leading to modest annual declines to 2020. Total capital investments over the period to 2020 will reach \$900 billion – broadly stable with the previous five-year period.

In 2015, the mobile ecosystem generated 4.2% of global GDP, a contribution that amounts to more than \$3.1 trillion of economic value added. In addition, the mobile ecosystem directly provided employment to nearly 17 million people across the

world, and indirectly supported an additional 15 million jobs in other sectors of the world economy. The industry also contributed \$430 billion in general taxation, with a further \$90 billion paid through spectrum auctions.

In the period to 2020, the global economic footprint of the mobile sector will continue to grow, reaching a total economic value of \$3.7 trillion by 2020. General taxation of the mobile ecosystem is expected to raise \$480 billion by 2020, while more than 3 million new jobs will be directly created within the mobile ecosystem in the next five years, bringing the total number of jobs in the mobile ecosystem to more than 20 million by 2020. Indirect employment in the broader economy is also expected to grow further, reaching almost 16 million by 2020.

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## Impact of digitisation spreading across more sectors

The near ubiquity of high-speed broadband access and high levels of smartphone ownership are the foundations of the new digital ecosystem. New internet giants have emerged and scaled rapidly, with market capitalisations that often dwarf those of the established mobile companies. Platform business models are a major feature of these new companies, with mobile companies disrupted as many of these new ventures target core operator services.

The third quarter of 2015 showed the largest amount of venture-capital activity on record into the mobile sector, with a particular focus on mobile commerce and software and services. The high levels of investment into the mobile ecosystem will further fuel the rapid pace of technological and

service innovation, with new companies continuing to emerge and scale rapidly. A growing range of industry sections are now ripe for digitisation, creating opportunities as well as challenges for incumbents and new entrants alike.

Operators are responding to these challenges and continue to look to drive innovation and launch new services, with particular success in areas such as mobile money and machine-to-machine (M2M) services. Convergence has been a common strategic response from mobile operators to the disruption, with a number of M&A deals over recent years. Operators are pursuing scale and the goal of offering an enhanced consumer experience, with content and services available across a range of devices and networks.

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## Mobile plays key role in socio-economic development

Mobile technology plays a central role in addressing a range of socio-economic developmental challenges across the developing world, particularly digital and financial inclusion. This will drive economic and infrastructure development, increasing productivity and employment across the economy, as well as improving access to vital services such as education and healthcare.

The mobile money industry is now widely established, bringing financial inclusion to a growing number of previously unbanked and underbanked populations across the developing world. Mobile money services are now available to 1.9 billion people globally. As of December 2015, there are 270 live services in more than 90 countries, with over 100 planned new service launches. There are now

60 markets with at least two mobile money services, and many have three or more.

At the end of 2015, 2.5 billion individuals across the developing world were accessing the internet through mobile devices, a figure that will increase by more than 1.3 billion by 2020. However, more than 40% of the population in the developing world will still lack internet access by the end of the decade. Improving the affordability of mobile services and extending network coverage to rural areas are particular challenges, given the high levels of poverty and the large proportion of the population living in rural areas. Operators, other ecosystem players, governments and regulators all have a role to play in addressing these challenges.

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## Benefits of technological progress should be safeguarded by well-designed regulation

Although digital convergence is benefitting consumers, it also creates regulatory challenges. Rapid innovation in terms of both technology and business models is blurring the boundaries between once-distinct markets and regulatory regimes. The net result is a complex and dynamic digital ecosystem in which both consumers and businesses face regulatory uncertainty. Regulation can easily distort digital markets, harming competition, slowing innovation, and ultimately depriving consumers of the benefits of technological progress.

Recognising these challenges, policymakers all over the world are working to implement reforms that will protect competition and consumers without impeding social and economic progress. In most markets, regulatory policies and institutions need to be reviewed, and potentially overhauled. Policymakers should apply three specific principles:

- Regulation should be technology-agnostic and achieve its objective in the most efficient way regardless of the technologies, industry structures or legacy regulatory regimes.
- Regulation needs to be flexible: it needs to accommodate rapid changes in markets, technologies and business models, while ensuring sufficient regulatory confidence for companies to take risks.
- Regulatory reform should follow a bottom-up approach that takes entirely new approaches into consideration.

Following these principles should ensure a new regulatory framework will apply consistently to all elements of the digital ecosystem, regardless of the technology or business model in use. As well as being cost-effective, it will be flexible because it will allow markets and technologies to evolve while preserving and enhancing regulators' ability to achieve their objectives.





The digital transformation we are witnessing across most industry sectors and throughout the world presents a clear opportunity for players from across the mobile ecosystem. The challenge is to seize the opportunity and to respond through service innovation. Against the backdrop of a renewed and flexible regulatory environment, consumers and society as a whole will reap the benefits of significant technological and socio-economic development.



# GLOBAL MARKET

## UNIQUE SUBSCRIBERS



2015

4.7bn



2020

5.6bn



2015 - 2020

3.9%  
CAGR

2015

63%

2020

72%

PENETRATION RATE

## GLOBAL CONNECTIONS\*



2015

7.3bn

99% PENETRATION RATE



2020

8.9bn

114% PENETRATION RATE



CAGR

3.9%

2015 - 2020

\*EXCLUDING M2M

## MOBILE OPERATOR REVENUES

Data growth driving revenues and operator investments



2015

\$1.1tn

2020

\$1.2tn

OPERATOR CAPEX  
OF UP TO

\$900bn

FOR THE PERIOD  
2016-2020



2015 - 2020

1.9%

CAGR

## ACCELERATING MOVES TO MOBILE BROADBAND NETWORKS AND SMARTPHONE ADOPTION

Mobile broadband connections to increase from 47% of total in 2015 to

71%

by 2020

By 2020, there will be

5.8bn

smartphones, growth of 2.6bn from the end of 2015

Data traffic to grow by a CAGR of

49%

over the period 2015-2020



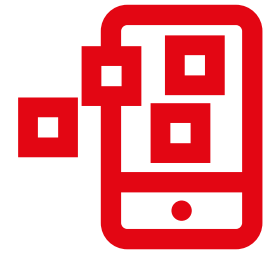
# MOBILE CONTRIBUTING TO ECONOMIC AND SOCIAL DEVELOPMENT ACROSS THE WORLD



**Delivering digital inclusion to the still unconnected populations**  
 Mobile internet penetration  
**2015: 44%**  
**2020: 60%**



**Delivering financial inclusion to the unbanked populations**  
 270 live services in 90 countries as of December 2015



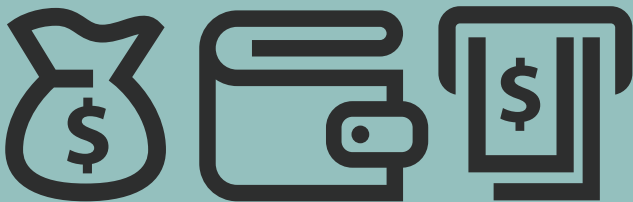
**Delivering innovative new services and apps**  
 Number of M2M connections to reach **1bn by 2020**

## MOBILE INDUSTRY CONTRIBUTION TO GDP



### PUBLIC FUNDING

Mobile ecosystem contribution to public funding (before regulatory and spectrum fees)



**\$430bn** **2015**

**\$480bn** **2020**

### EMPLOYMENT

Jobs directly supported by mobile ecosystem



**17M JOBS** **2015**

**20M JOBS** **2020**

Plus an additional 16M indirect jobs supported by 2020

# 01 / Industry overview

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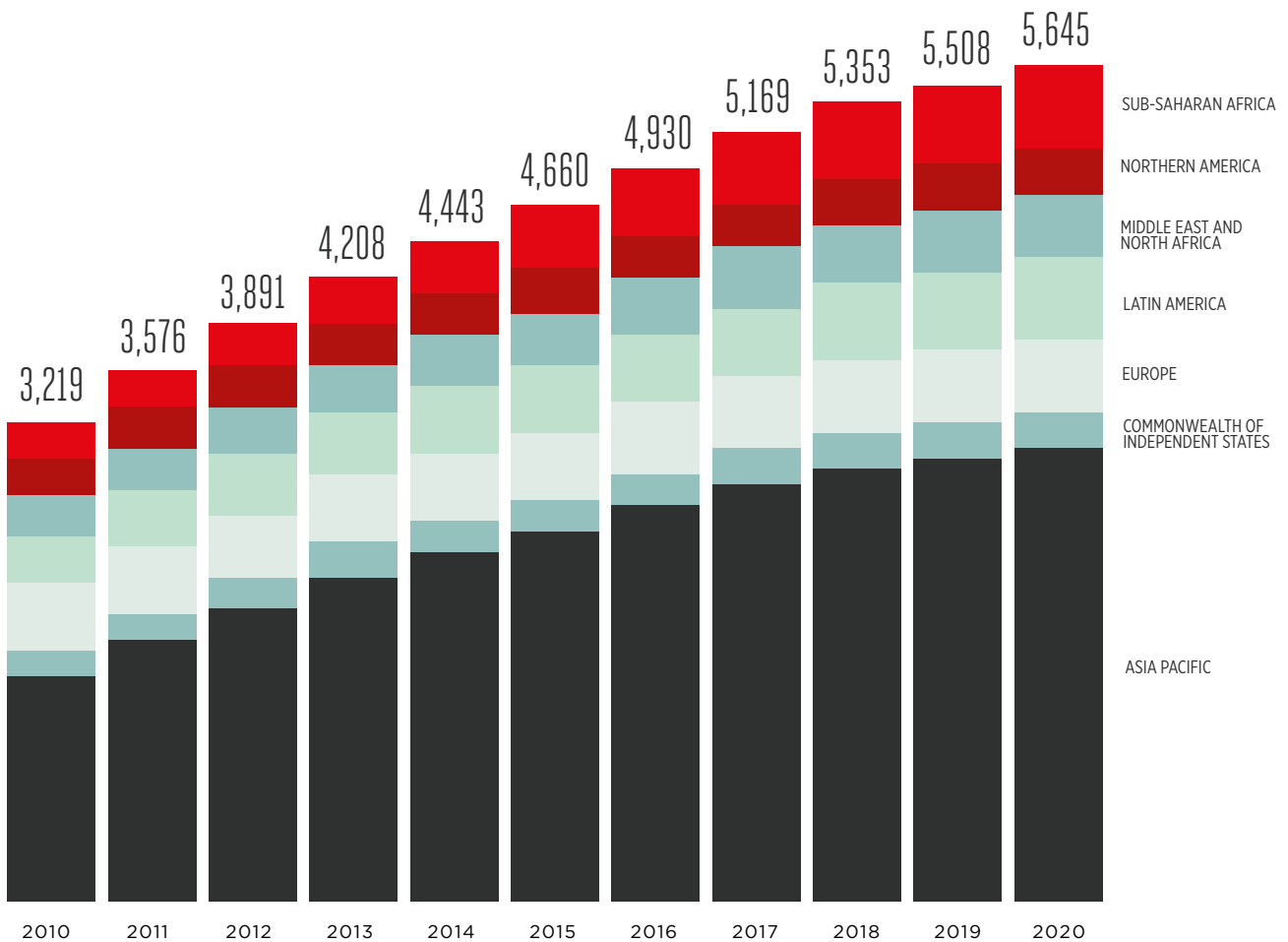
## 1.1 Mobile growing, but at a slowing pace

At the end of 2015, there were 4.7 billion unique mobile subscribers globally, equivalent to 63% of the world's population. By 2020, almost three-quarters of the global population will have a mobile subscription, with around 1 billion new subscribers added over the period. 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 1.5% and 3.0% between 2010 and 2015 respectively. At the other end of the spectrum, Sub-Saharan Africa – still the world's most under-penetrated region – saw an annual subscriber growth over the same period of more than 13%, and Asia Pacific – the world's largest region in terms of subscribers – grew at an annual average of more than 10%.

Source: GSMA Intelligence

## Unique subscribers by region

(Millions)



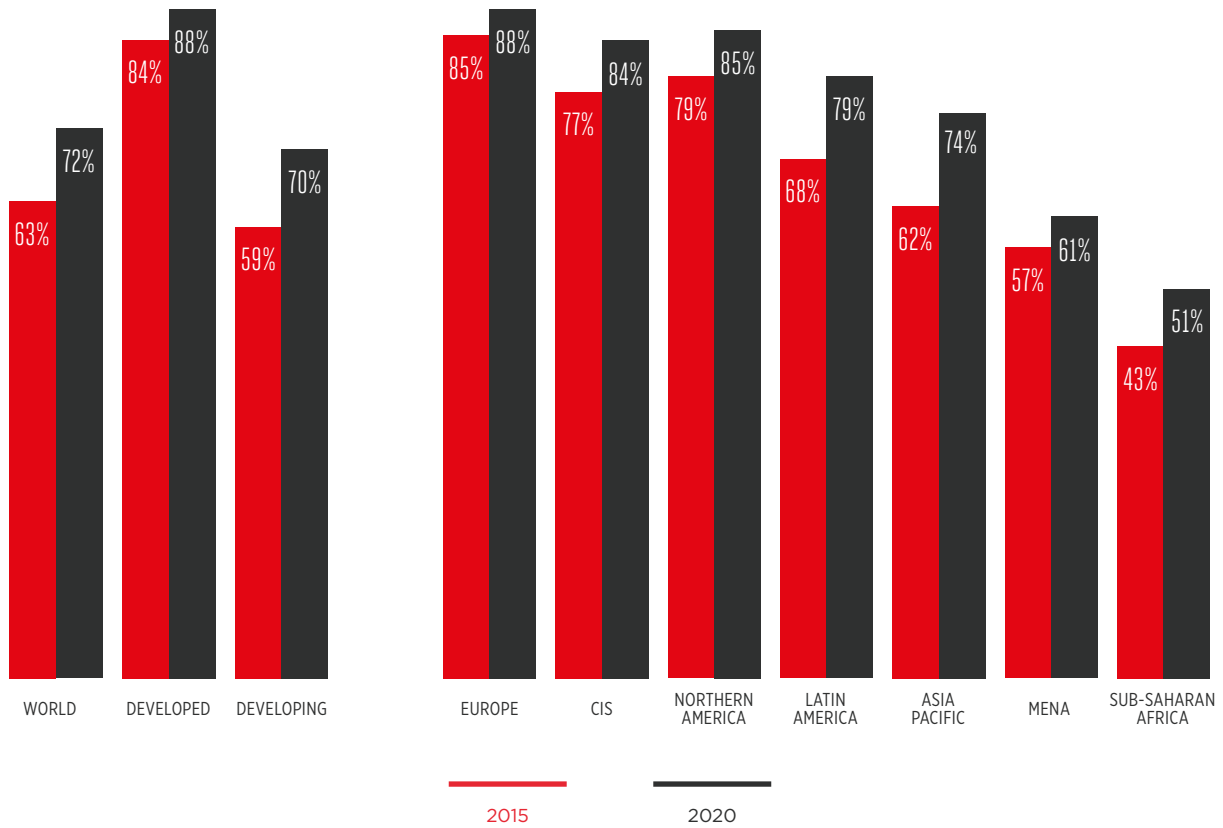
Looking out to 2020, there will be a further slowdown in the subscriber growth rate, with an average annual growth rate of 3.9% compared to 7.7% over the last five years. Developed markets are becoming saturated, with only marginal subscriber growth to 2020. As a result, the developed world will add only four percentage points of penetration by the end of the decade, reaching 88% of the population.

In developing markets, the 59% penetration rate suggests significant room for further growth. However, various factors will affect the rate of growth over the short to medium term. These include challenging economic conditions, the

lower income and purchasing power of the still unconnected populations, uneven distribution and quality of infrastructure, and social and political instability in a number of markets. Coupled with the challenge of providing coverage to sparsely populated areas, this will limit subscriber growth in developing countries for the foreseeable future. As a result, subscribers will grow at an annual rate of 4.5% across the developing world in the next five years, down from 9.2% over the last five years, reaching 70% penetration. Despite this, the developing world will account for more than 90% of the 1 billion incremental subscribers expected over the next five years.

Source: GSMA Intelligence

## Unique subscriber penetration by region



Multiple SIM ownership is common across all regions, with a global average of 1.6 SIM cards per unique subscriber. The rate varies significantly by region, with an average of nearly two in many developing regions, where prepaid plans are the norm and subscribers are most price-sensitive. At the end of 2015, there was almost one SIM card for every person, with global connection penetration standing at 99%.

Broadly in line with underlying subscriber trends, developing regions will drive connections growth for the next five years as developed markets slow. Developing markets will see annual connections

growth of 4.3% to 2020 (down from 7.7% over the last five years), while connections across the developed world will grow by 2.0% annually over the same period. Sub-Saharan Africa has historically been the fastest growing region, but annual growth will halve over the next five years. Meanwhile Europe is the only region that will see growth increase, returning to growth in 2015 after two years of decline. Globally, connections will grow at an annual rate of 3.9% to 2020, leading to an increase in connections penetration to 114%.

## 1.2 Technology migration underway

### 1.2.1 Mobile broadband gaining dominance

There is an accelerating technology shift to mobile broadband networks across the world. Mobile broadband connections (3G and 4G technologies) accounted for almost 50% of total connections at the end of 2015, and are set to increase to more than 70% by 2020. The factors driving this migration are greater availability and affordability of smartphones, more extensive and deeper network coverage, and in some cases operator handset subsidies.

The greatest impact of this technology migration to date has been in the developed world. Here, mobile broadband already accounts for more than 80% of connections and, by 2020, this will reach 92%. In contrast, around 40% of connections are currently on mobile broadband networks in the developing world. However, this is projected to reach two-thirds of connections by 2020. An additional 2.5 billion people will be connected by a mobile broadband network across the developing world over the next five years.

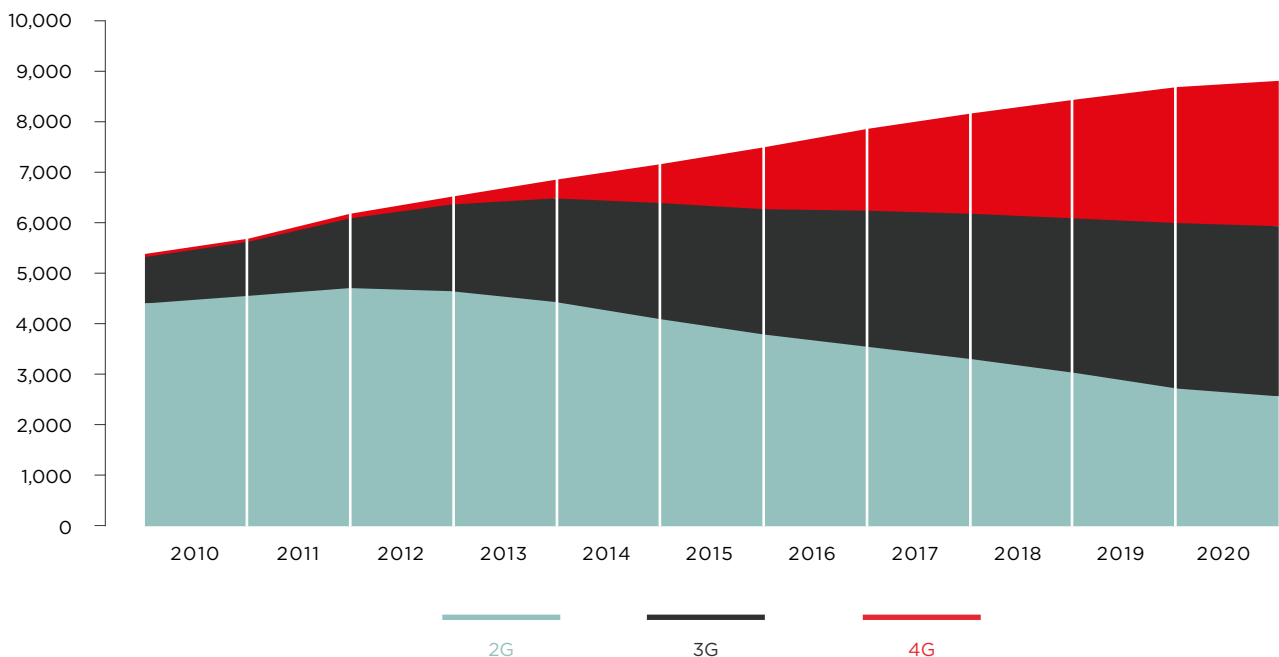
There are further regional differences when looking at the share of mobile broadband connections. 3G will have a greater share than 2G in all regions by 2020. 4G will be the dominant technology in Europe and Northern America, accounting for 84% and 58% respectively. 4G will also account for around a third of connections in Asia Pacific, CIS and Latin America, but will lag behind in MENA and Sub-Saharan Africa (with only 13% and 7% of connections by 2020 respectively).

The acceleration of 4G has been a particular highlight over the last year. 4G connections doubled in 2015, surpassing 1 billion. Most of this growth came from developing markets, where 4G connections more than tripled, and the developing world will overtake the developed world in terms of 4G connections by the end of 2016.

Source: GSMA Intelligence

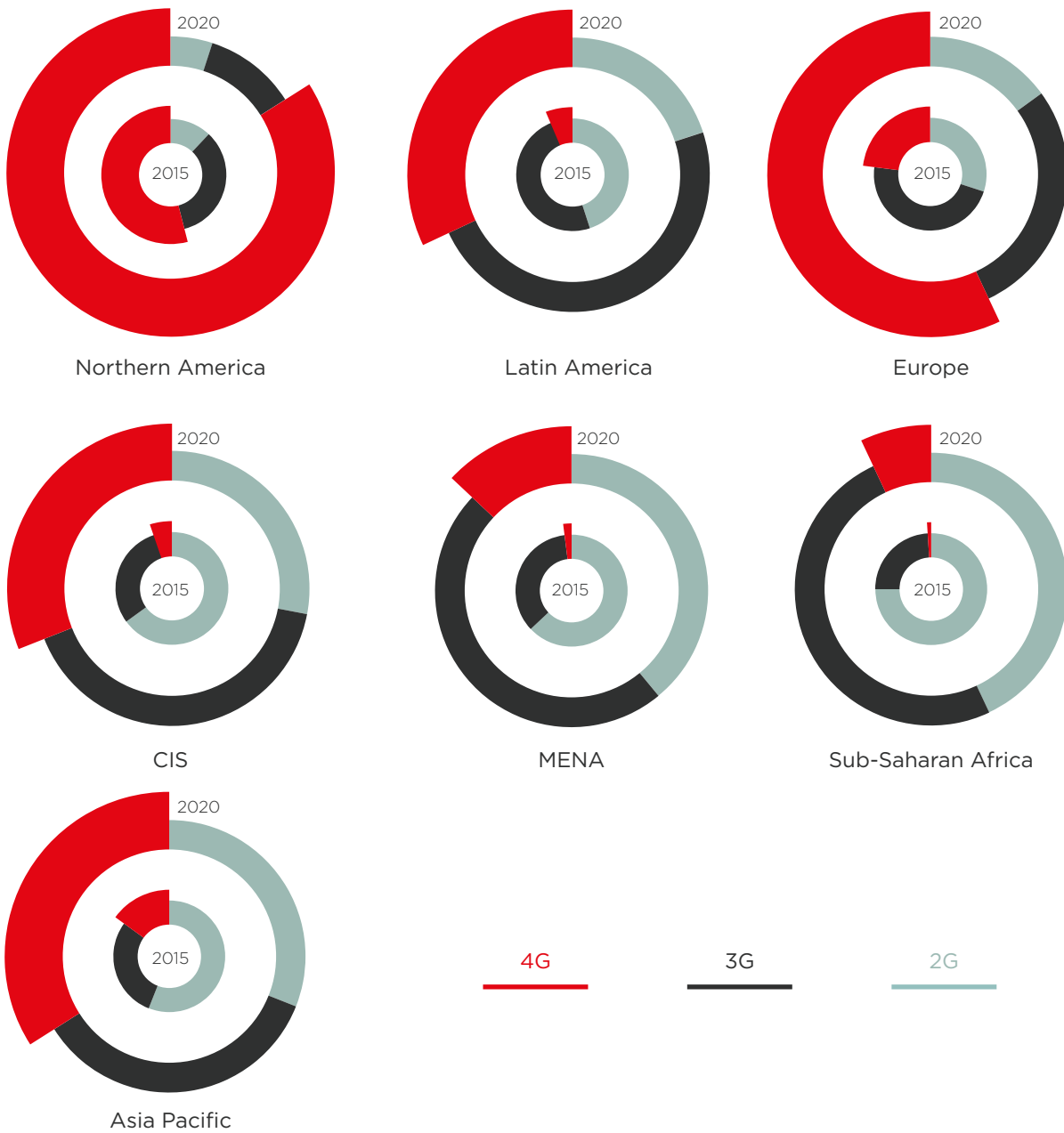
### Global connections by technology

(millions, excluding M2M)



Source: GSMA Intelligence

## Regional connections technology split



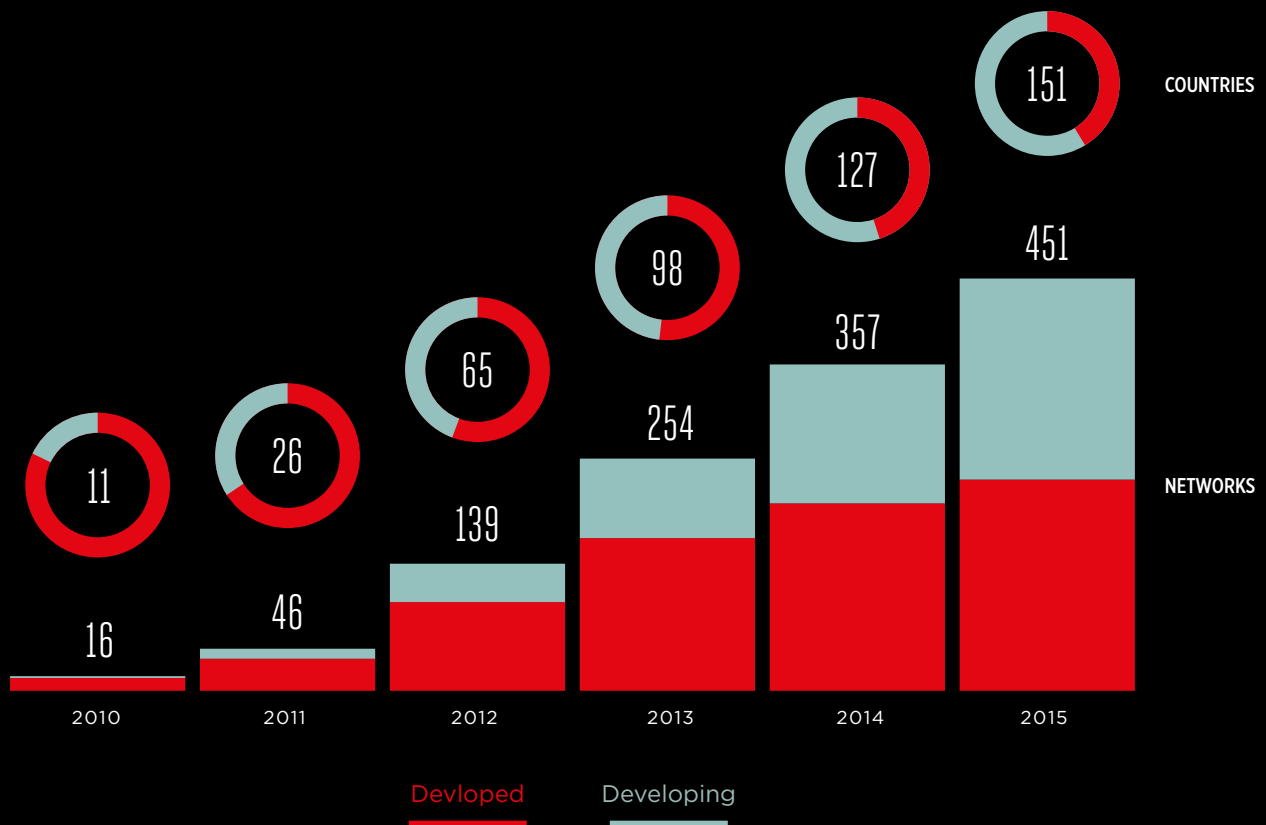
### 1.2.2 LTE network rollouts continuing

LTE network rollouts have been instrumental in driving 4G adoption, and have continued to grow in 2015. A total of 451 networks have been deployed in 151 countries. In recent years, the majority of 4G network launches were in developed markets, such as the US and Europe. However, the developing world is now seeing an acceleration of network rollouts: just under half of total live networks are now in developing markets, up from a third in 2013. In addition, more than half of the countries with a live 4G network are in the developing world. The growing number of LTE rollouts in these markets is driving rapid migration to mobile broadband in the developing world.

Source: GSMA Intelligence

## Global live 4G networks

(Cumulative)



### 1.2.3 Spectrum to enable 4G networks and coverage

A key factor behind increasing coverage and adoption of 4G across the world is spectrum allocation. In Asia Pacific, 4G has been adopted in Japan and South Korea, and is now being adopted in China, at a much faster rate than in either North America or Europe. The transition to 4G is underpinned by adoption of the APT700 (MHz) band plan in many countries in Asia Pacific. This has also allowed for a large quantity and variety of devices to be developed that meet the region's particular needs.

In Europe, most countries have now auctioned the 800 MHz "digital dividend" spectrum, which was freed up by the switchover from analogue to

digital broadcasting. Of the EU28, 24 have already auctioned and allocated these frequencies; Poland, one of the four outstanding, has recently completed its multi-band auction that included the 800 MHz spectrum.

However, there are still challenges in some parts of the world. The move to 4G is still relatively nascent in Sub-Saharan Africa, for which there are a number of factors, including the lack of relevant spectrum. Many countries in the region have allocated far less spectrum to mobile services than their counterparts in the EU and the US, even though the region is heavily dependent on mobile networks for internet access.



## 1.2.4 Smartphones expanding beyond the developed world

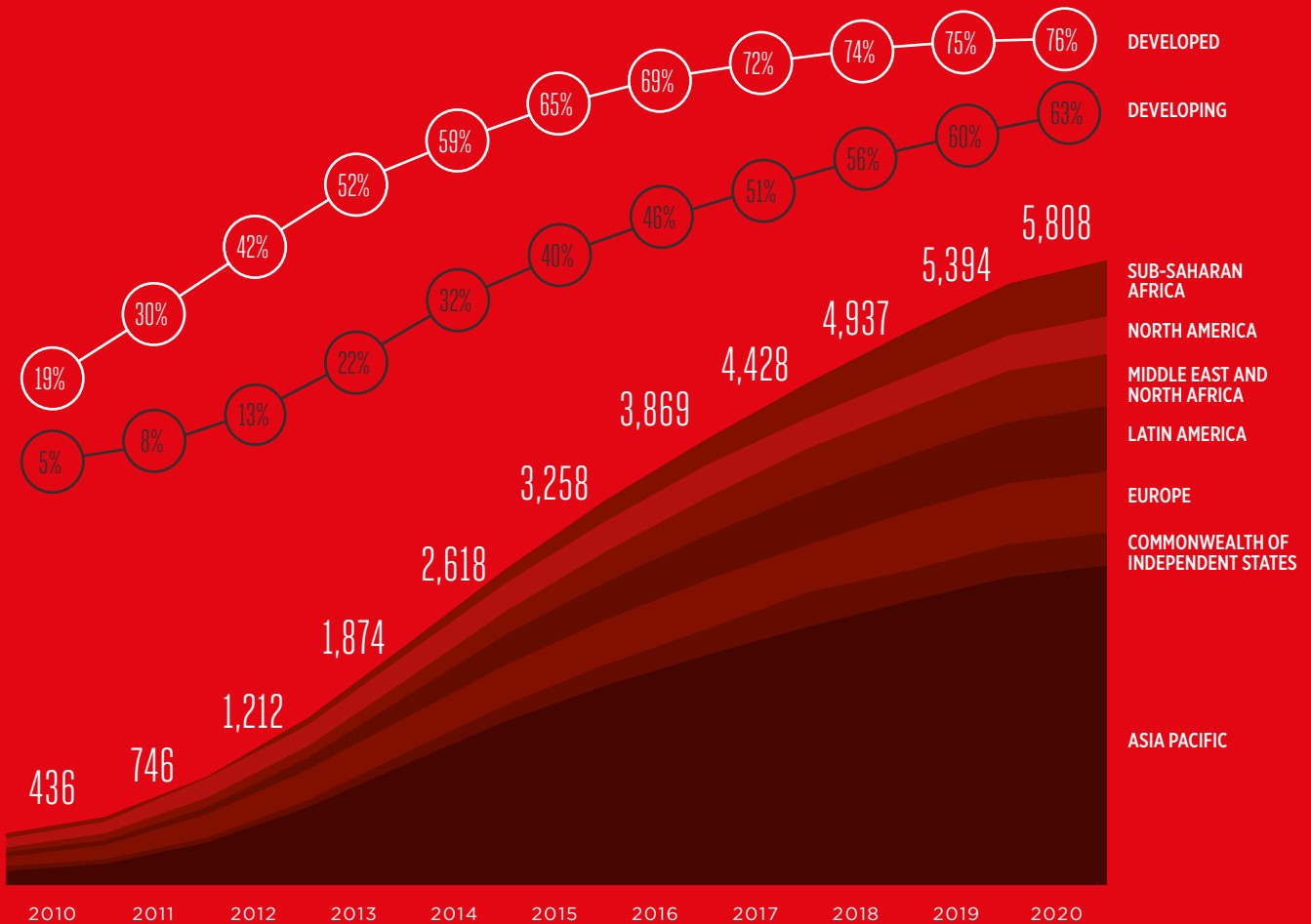
The increasing proportion of higher speed connections and proliferation of 3G and 4G networks largely reflects the accelerating rate of smartphone adoption. Adoption rates reached 65% of the connection base in the developed world at the end of 2015, ranging from 59% in Europe to 74% in North America. Smartphone adoption is accelerating across the developing world; smartphone connections reached 40% of the total connections base by the end of 2015 (up from 5% in 2010), largely due to growth in Asia Pacific and Latin America.

The number of smartphone connections will increase by 2.6 billion by 2020, with more than 90% of that growth from developing regions. China is already the largest smartphone market, but India will be the real growth driver; it is set to add almost half a billion new connections over the next five years.

Source: GSMA Intelligence

### Global smartphone connections and adoption

(Millions)



Many factors are contributing to the growth of the smartphone market, but a key ingredient is the growth of supply from local smartphone manufacturers, including Xiaomi, Huawei, Gionee and OnePlus in China, and Micromax in India. This is providing a greater variety of devices more tailored to local needs and preferences and, crucially, a wider range of price points. In the third quarter of 2015, Chinese OEMs accounted for 7 of the top 10 vendors globally, and 35% of total shipments – an increase from 26% in Q3 2013. Indian OEMs have also grown strongly over the last two years, doubling share to 2% in Q3 2015.<sup>2</sup>

## 1.2.5 Data growth and the age of IP messaging

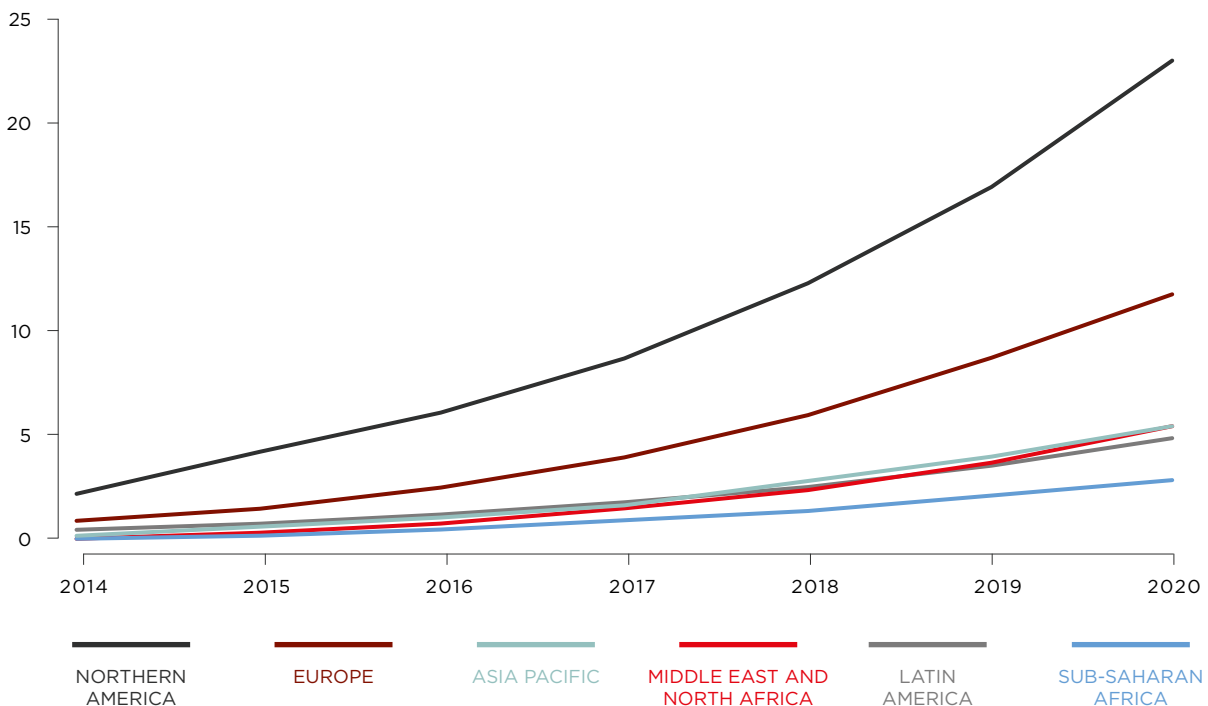
The growing number of smartphones and other advanced devices is increasing the use of data-intensive applications, particularly video streaming, on mobile networks. This is resulting in an explosion of data traffic, with volumes forecast to grow at a CAGR of 49% over the next five years – a more than seven-fold increase – approaching 40 EB per month by 2020. This is equivalent to a global average of 7 GB per subscriber per month.

Regional variations in data usage are significant, with the majority of data usage coming from North America and Europe, where subscribers on average today consume 4.4 GB and 1.8 GB per month respectively, compared to around 0.5 GB per subscriber across Africa. By 2020, the average subscriber in North America and Europe will consume around 22 GB and 12 GB of mobile data per month respectively. By contrast, subscribers in Sub-Saharan Africa will consume 3 GB per month on average.

Source: Ericsson, GSMA Intelligence

### Data traffic per subscriber per month

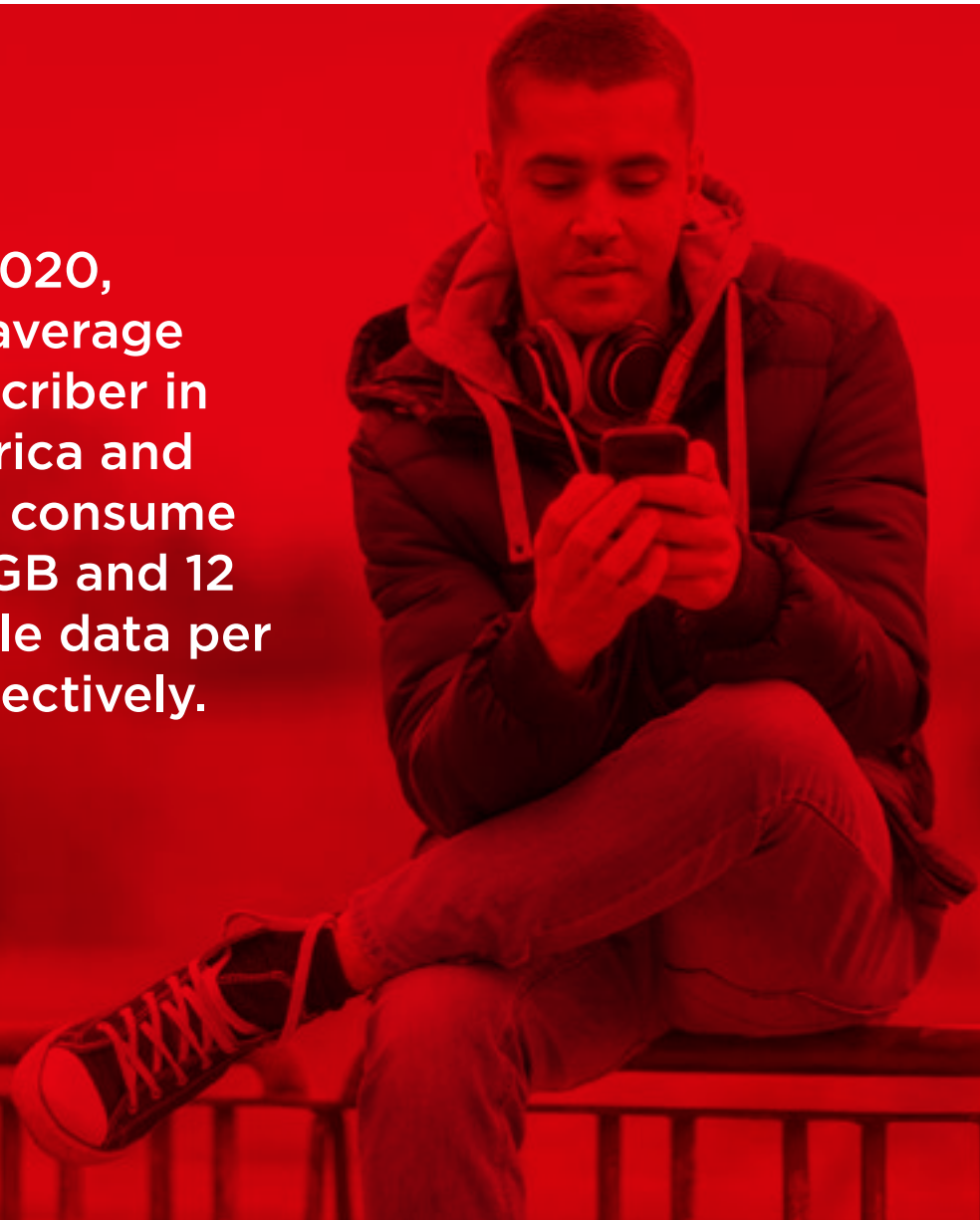
(GB)



2. Source: Strategy Analytics



**By 2020,  
the average  
subscriber in  
North America and  
Europe will consume  
around 22 GB and 12  
GB of mobile data per  
month respectively.**



IP messaging apps are continuing to gain popularity across the globe. For example, leading online messaging player WhatsApp has increased in size from 200 million users in April 2013 to 900 million in September 2015, and continues to grow. Facebook Messenger meanwhile has 700 million users, and QQ Mobile and WeChat have more than 600 million users each. According to app analytics firm App Annie, total messaging app downloads in 2014 were 53% higher than in the previous year.

The GSMA recently conducted a survey of consumers in 23 countries globally, asking “Do you use OTT messaging services more than traditional text messages?” Within Europe, there was wide variation, from less than 10% answering “more” in Denmark to more than 80% in Spain.

On average 35% of respondents in Europe used online messaging more than SMS – more than twice the level of respondents using it less frequently. In the US, where prepaid plans are less common and where tiered and shared data plan adoption is higher, 18% of respondents used online messaging more, which was only slightly higher than the percentage of respondents using online messaging less frequently than SMS. In Latin America and Asia meanwhile, price-conscious consumers are particularly avid users of IP messaging apps; in Brazil, the largest market in Latin America, and in China, where WeChat is extremely popular, 59% and 67% of respondents respectively said they use IP messaging more than traditional text messaging.

## 1.3 Revenue and investment trends

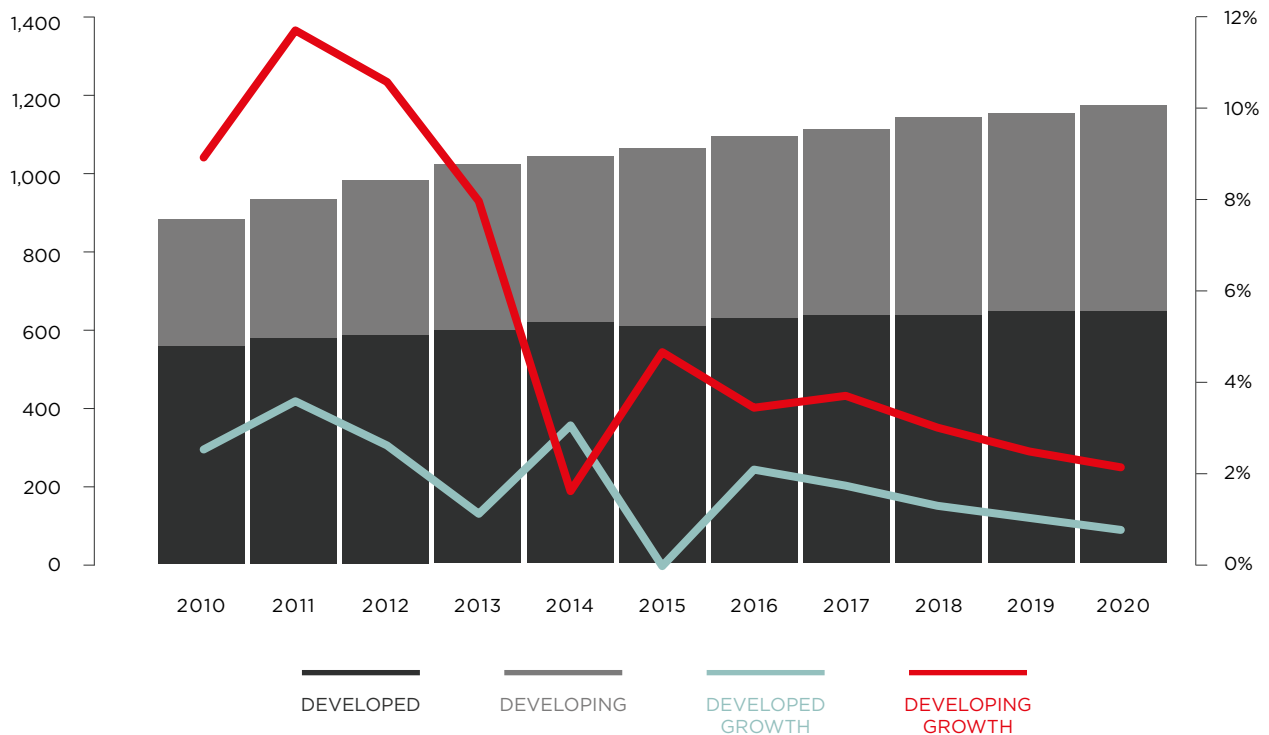
### 1.3.1 Revenue: modest growth over the next five years

Total mobile revenues reached more than \$1 trillion in 2015, an increase of 1.8% on 2014. However, this represents a significant slowdown over growth rates of the last five to ten years, with the increasing convergence of growth rates between developed and developing markets a particular feature of recent years. With limited scope for subscriber growth in developed markets, coupled with an increase in competition and a challenging macro-economic climate in developing markets, growth over the next five years will be relatively modest, at an annual average rate of just under 2% to 2020.

Source: GSMA Intelligence

#### Total global revenues

(\$ billion)



Mobile operators in markets across the world are showing signs that they are able to monetise the strong growth in data traffic. This is key at a time when revenues from more traditional services are under pressure and operators have significant investment commitments as they roll out mobile broadband networks. Mobile operators are increasingly bundling video and audio streaming apps with their tariff offers, usually focused on 4G data and LTE-capable devices. In Europe, Vodafone is among operators including Netflix and Spotify Premium at no extra charge in offers, a clear method of encouraging customers to increase data consumption. In the US, Verizon recently launched a mobile-first video service and has signed a multi-year contract with Vice Media to provide content for the service. AT&T has also begun offering DirecTV video content over mobile to subscribers of some of its home pay-TV packages.

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Revenue growth in the developed world has been fairly stable over the last six years following the global economic downturn, consistently running at low, single-digit rates. However, 2015 will see a decline of 0.2%, largely due to increased competition in the US and challenging economic conditions in Canada and Australia. In contrast, European revenues are now returning to growth; data monetisation, consolidation and the ability of converged operators to leverage ownership of fixed networks and content to support mobile will promote a more sustainable mobile environment. This will form the basis of a return to growth across the developed world from 2016, followed by compound annual growth of 1.2% to 2020.

In the developing world, the last five years have seen a rapid slowdown in revenue growth from double to low single digits, falling behind that of the developed world for the first time in 2014. Weak economic growth in many of the developing world's largest and hitherto strongest growth markets, compounded by the drop in global commodity prices, will serve as a constraint on revenues in the short to medium term. Brazil and Russia are two key examples of former high-growth developing mobile markets whose economies have recently entered

into recession, and whose economic outlooks remain poor. In addition to macro-economic issues, India and China, together accounting for more than 40% of the developing world's revenues, are facing growing market saturation and intensifying competition, leading to downward pressure on revenues.

Nonetheless, revenue growth across the developing world will stabilise in 2015, seeing an increase of 4.5% on 2014, driven mainly by markets in Sub-Saharan Africa and Latin America. Looking forward, revenue growth, though muted compared to that seen over the last five to ten years, will be ahead of that expected in developed markets at least to 2020, with a compound annual growth rate of 2.8% over the next five years.

There is potential upside to these forecasts if mobile operators can continue to monetise the growing uptake of data-centric services and benefit from launching innovative new services and applications. Consolidation has already played a role in the revenue stabilisation evident in Europe, and is likely to be a feature in some of the more competitive developing markets over the coming years.

## 1.3.2 Capex: near-term reductions ahead of 5G

Over the last five years, mobile operators globally have invested more than \$880 billion in capex as they look to increase capacity and deploy mobile broadband networks. Annual capex totals increased during the period and peaked in 2014, at around \$195 billion globally. For the first time since the financial crisis, the majority of spending came from developing markets, particularly in Asia Pacific and Latin America. Most notably, operator investments in China and Brazil saw double-digit growth annually between 2010 and 2015, the former overtaking the US as the largest market in terms of capital investment.

This trend reversed in 2015 however, with global capex declining modestly by 1.5% compared to 2014. The decline will continue in the short term, with total investment levels only

returning to growth by the end of the decade. Capex levels fell in several developed markets, ranging from Europe to South Korea and Japan. Much of this is due to the fact that most mobile operators in these regions (particularly those that moved to 4G early) have finished their network improvements. Overall, capex across the developed world declined by 7.7% in 2015, and will only see modest growth of less than 1% annually to 2020.

Capex across the developing world peaked in 2015 at \$106 billion, just under half of which came from China. All three Chinese mobile operators have now launched 4G, and have collaborated in the creation of a spin-off company, China Tower. This new company is planning to build 1 million new towers by the end of 2016 for shared use, leading to significant cost savings for the mobile

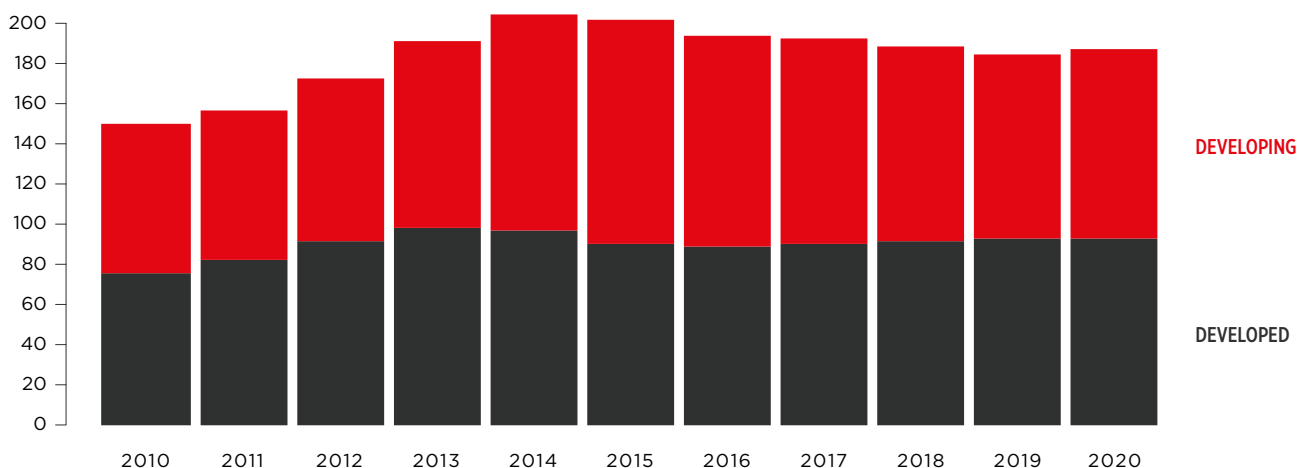
operators, with capex levels set to fall over the period to 2020.

Brazil will also see a material decline in capex over the coming years, as the five largest mobile operators will have launched 4G and completed the first phases of network rollouts. Economic conditions are also likely to remain difficult in the short to medium term across the developing world, particularly in Latin America and Africa, leading to a tightening of capex budgets. Overall, developing market capex will decline by 3.6% annually between 2015 and 2020. However, the overall long-term trend is stabilisation of investment levels, as capital investments over the next five years will reach \$900 billion – broadly stable compared to the previous five years.

Source: GSMA Intelligence

### Global mobile operator capex

(\$ billion)



# 02

# Mobile driving growth and innovation across the world

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## 2.1 Mobile industry delivering growth and jobs

In 2015 mobile technology added \$3.1 trillion in economic value added terms to the world economy, a contribution of 4.2% to global GDP. This figure comprises four elements:

- the direct contribution of mobile operators
- the direct contribution of the rest of the mobile ecosystem
- the indirect impact on the broader economy
- the increase in productivity brought about by the use of mobile technologies.



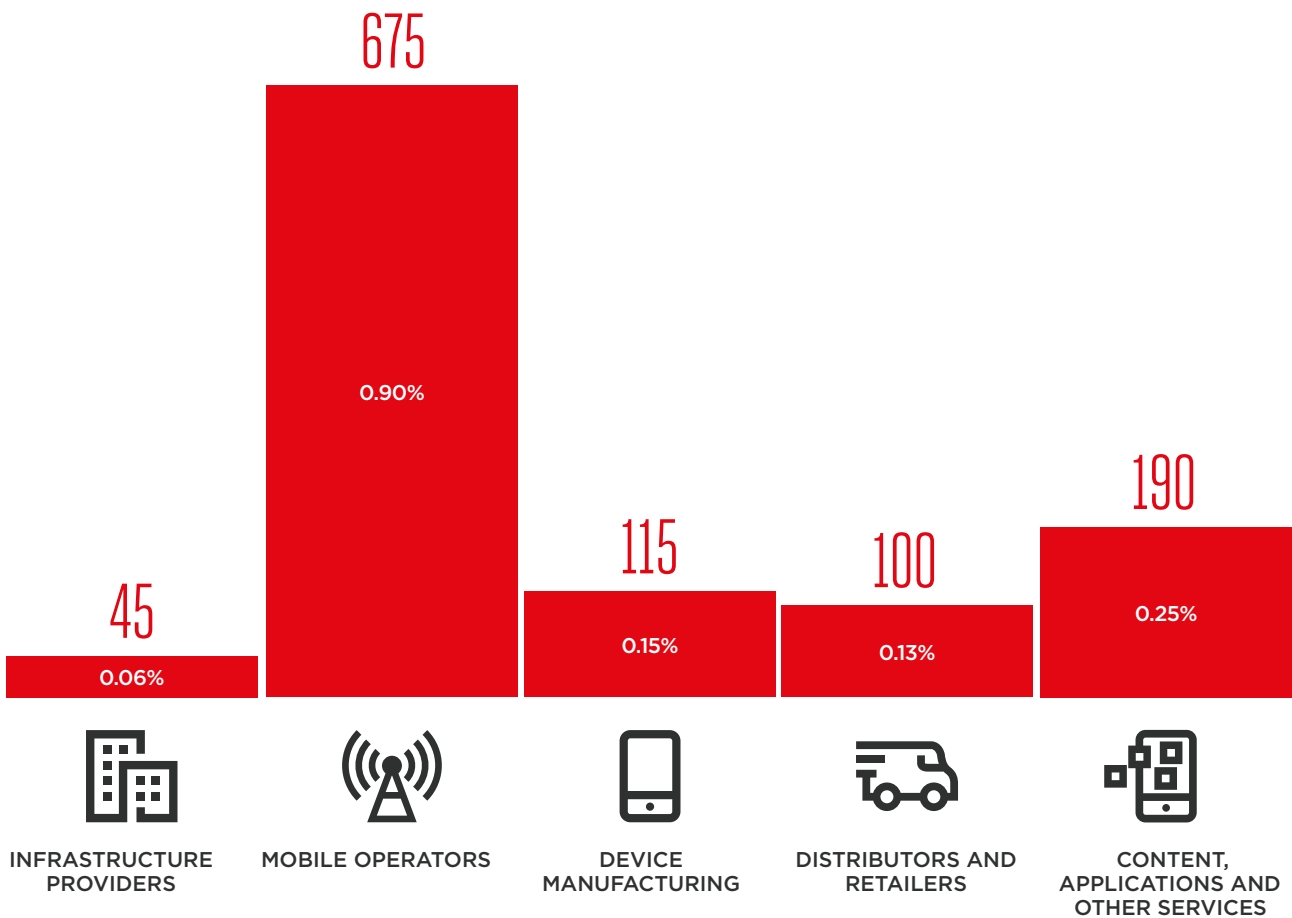
The direct contribution from mobile operators in 2015 was \$675 billion in economic value added terms, or 0.9% of the world's GDP. We calculate the direct economic contribution to GDP of mobile operators and the mobile ecosystem by adding the economic value added generated by companies operating in the sector across 236 countries and territories. Economic value added is calculated as the difference between the value of sales made by the sector and the direct cost of making those sales<sup>3</sup>.

Beyond mobile operators, our definition of the mobile ecosystem includes infrastructure service providers, retailers and distributors of mobile products and services, device manufacturers (mobile phones, tablets and wearables), and providers of mobile content, applications and services. The mobile ecosystem generated an additional economic value added of more than \$450 billion, or approximately 0.6% of global GDP.

Source: GSMA Intelligence analysis

## Direct GDP contribution of the mobile ecosystem

(\$ billion, % 2015 GDP)



3. Economic value added by the sector can also be approximated as the total income generated by the industry to its employees (through the payment of wages and other compensation), to government (through tax contributions) and to shareholders (in the form of business profits).

As mobile operators and the ecosystem purchase inputs and services from their providers in the supply chain, there is also a multiplier effect on the rest of the economy, generating sales and economic value added in other sectors and industries. We estimate that a global value added of just under \$400 billion in 2015 (0.5% of GDP) was generated through these effects.

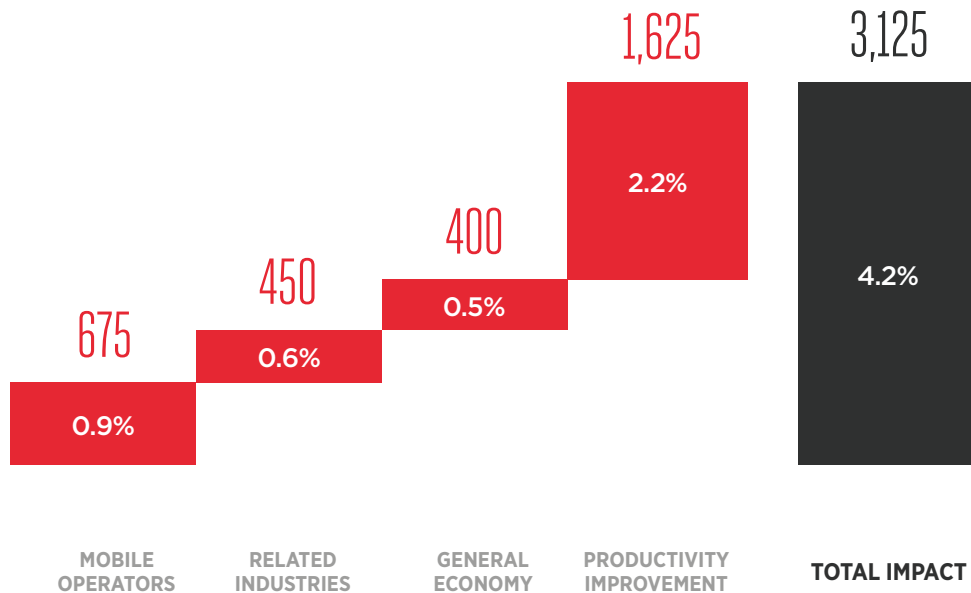
In addition to the direct and indirect contribution to GDP by mobile operators and the mobile ecosystem, an estimated 2.2% of 2015's global GDP can be attributed to the increased productivity brought about by the widespread use of mobile technology. This effect varies significantly by country and sector and has generated in total a \$1.6 trillion contribution to global GDP in 2015.

Overall, considering direct, indirect and productivity impacts, in 2015 the mobile industry generated \$3.1 trillion to the world economy in economic value added terms, a contribution of 4.2% of the world's total GDP.

Source: GSMA Intelligence analysis

### Total contribution to GDP

(\$ billion, % 2015 GDP)



## 2.1.1 Employment and public funding contribution in 2015

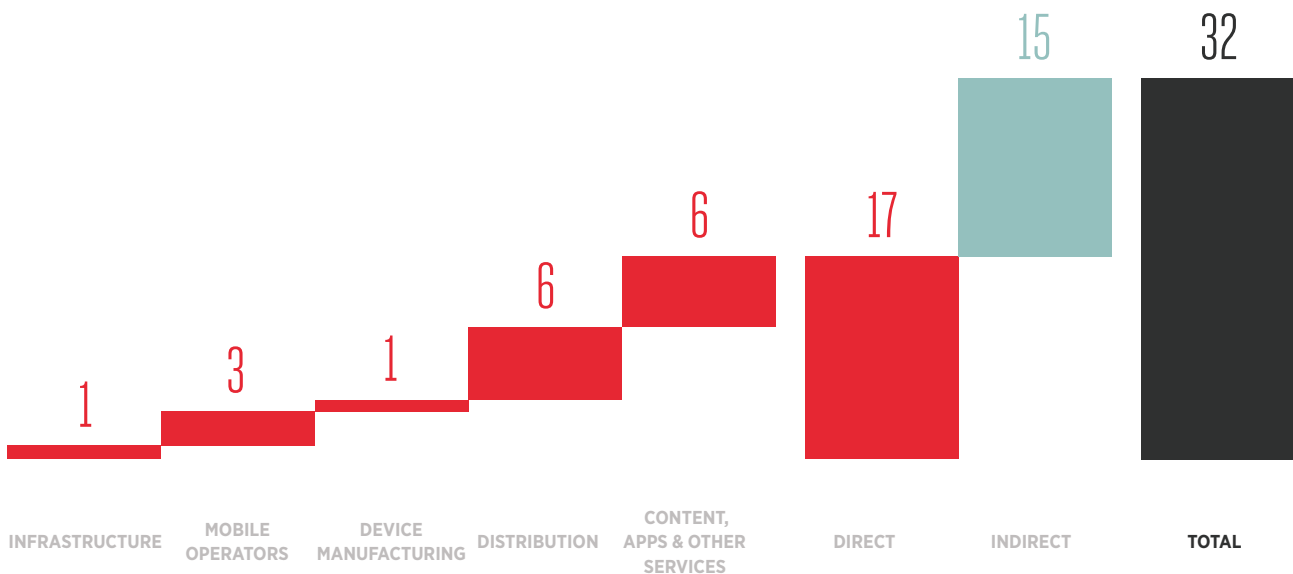
In 2015 mobile operators and the ecosystem provided direct employment to nearly 17 million people across the world. The largest employment contributions came from the content, applications and services sector, with approximately 6 million jobs, and from the distribution and retail of mobile technology, which generated similar amounts of employment, with nearly 6 million jobs globally.

Further to the employment that is sustained within the ecosystem, additional jobs are also indirectly supported as the economic activity in the ecosystem generates demand and jobs in other sectors, in particular in the direct supply chain of the mobile ecosystem. We estimate that in 2015 approximately 15 million jobs were indirectly supported in this way, bringing the total impact (both direct and indirect) of the mobile industry to almost 32 million jobs globally in 2015.

Source: GSMA Intelligence analysis

### Employment impacts

Jobs (millions)

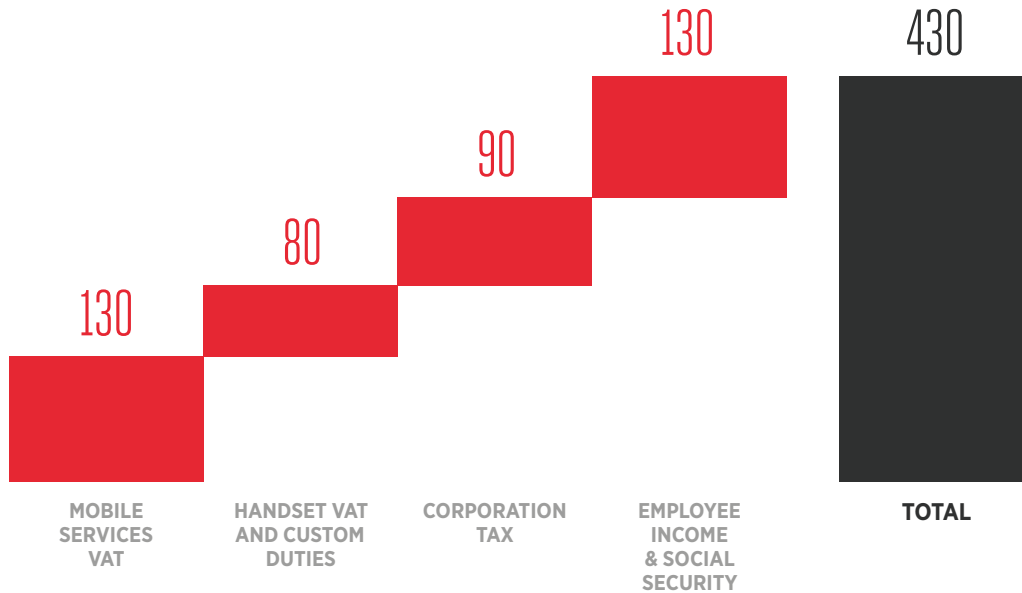


In 2015, the mobile industry also made a very significant contribution to the funding of governments through taxation. For most countries in the world this includes value added or sales tax, custom duties, corporation tax, and income tax and social security from mobile ecosystem employees. Globally, we estimate that the sector made a total contribution to the public finances of governments of \$430 billion in 2015.

Source: GSMA Intelligence analysis

## Contribution to public funding by the mobile industry

(2015 \$ billion)



Mobile operators made further contributions to the world’s public finances through the payment of fees for the licence of spectrum bands required for the deployment of mobile broadband services. In 2015 spectrum auctions generated revenues of more than \$90 billion globally. In some countries, further contributions occurred through mobile specific taxes<sup>4</sup>.

### 2.1.2 Outlook and key trends for 2016–2020

The economic value added generated by the mobile sector will continue to grow in the next five years. By 2020, we estimate that a total economic value of \$3.7 trillion will have been generated in the form of salaries, profits and tax payments, up from \$3.1 trillion in 2015.

By 2020 mobile technology will connect an additional 1.4 billion people to the internet compared

to 2015, most of which will be in developing markets. These additional users will be able to enhance their economic and social prospects, driving the generation of further economic value added in those economies. At the same time, businesses in developing countries have scope to introduce mobile solutions that can further increase productivity, generating additional economic value added.

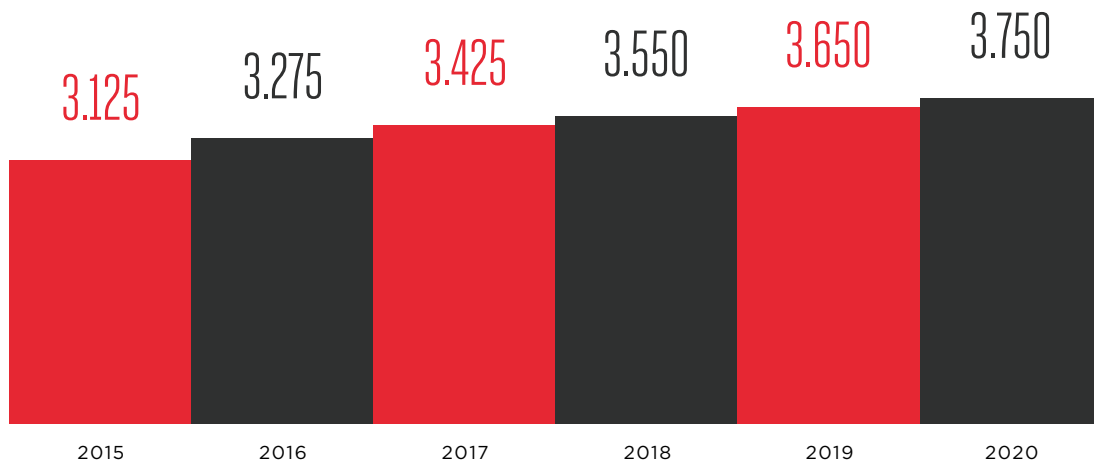
The growth potential through productivity improvements is more limited in developed economies, though there is a significant upside to our projections if the development of the Internet of Things and faster networks can start delivering tangible increases in productivity as well as lower costs for businesses during this period.

4. Digital inclusion and mobile sector taxation 2015, GSMA, June 2015

Source: GSMA Intelligence analysis

## Outlook to 2020, economic value added

(\$ trillion)



The total number of jobs both directly and indirectly generated by the ecosystem will also grow significantly in the period to 2020. The number of jobs directly and indirectly generated by the industry worldwide will reach 20 million and 16 million respectively by 2020. At the same time, the public funding contribution of the mobile ecosystem (excluding spectrum and other regulatory fees) will reach \$480 billion by 2020 if tax rates remain at current levels, up from \$430 billion in 2015.

## 2.2 Mobile driving innovation across the world

The mobile industry continues to drive innovation across the world, with its impact felt in both developed and developing markets. Mobile has allowed individuals, companies and governments to innovate in new and unexpected ways, with consumers across the globe showing a ready appetite to adopt new technologies.

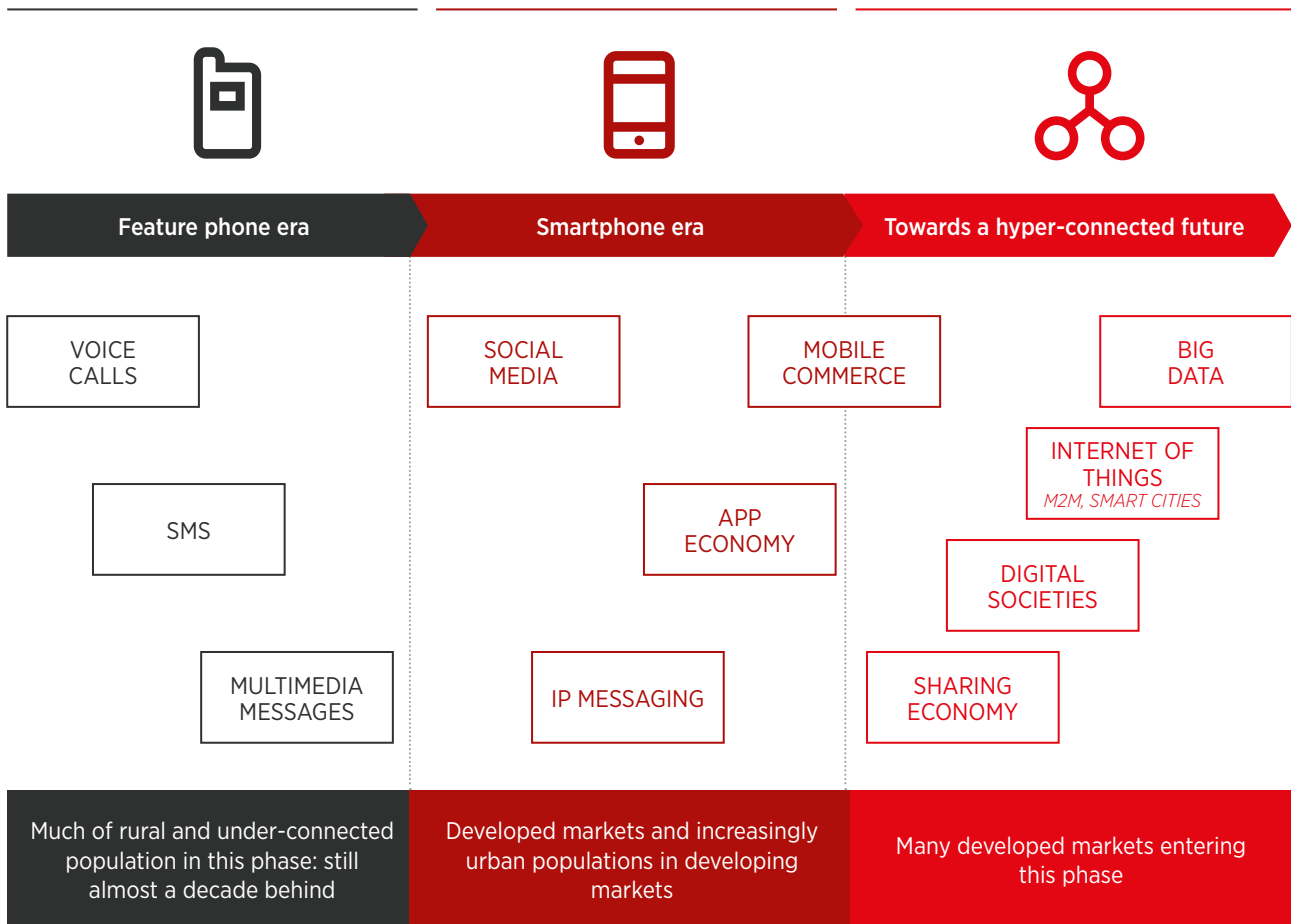
Developed markets are beginning to realise the benefits of the connected society. Consumers are seeing tangible benefits in their daily lives from the growing adoption of both wearable devices and new 'smart home' services. Rapid growth in the number of connected devices and data traffic means the mobile ecosystem will play a central role in realising the potential of big data analytics. Ubiquitous mobile broadband connectivity and the mass adoption of increasingly powerful smartphones are

the key enablers of the rise of the sharing economy, which is changing the way many people consume goods and services.

In developing markets, affordable smartphones running on mobile broadband networks are bringing many individuals their first computing devices and first experience of internet access. This has encouraged the development of new services, applications and use cases that have rarely been seen in more developed western markets. Mobile is playing a central role in delivering digital and financial inclusion, key challenges that must be addressed if the world's growing population is to be empowered to share in the benefits of the rapidly developing digital economy.

Source: GSMA Intelligence

## Evolution of the mobile industry across the world



The global app economy continues to show rapid growth, with forecasts suggesting that by 2016 the revenues from apps and related products and services could total more than \$140 billion.

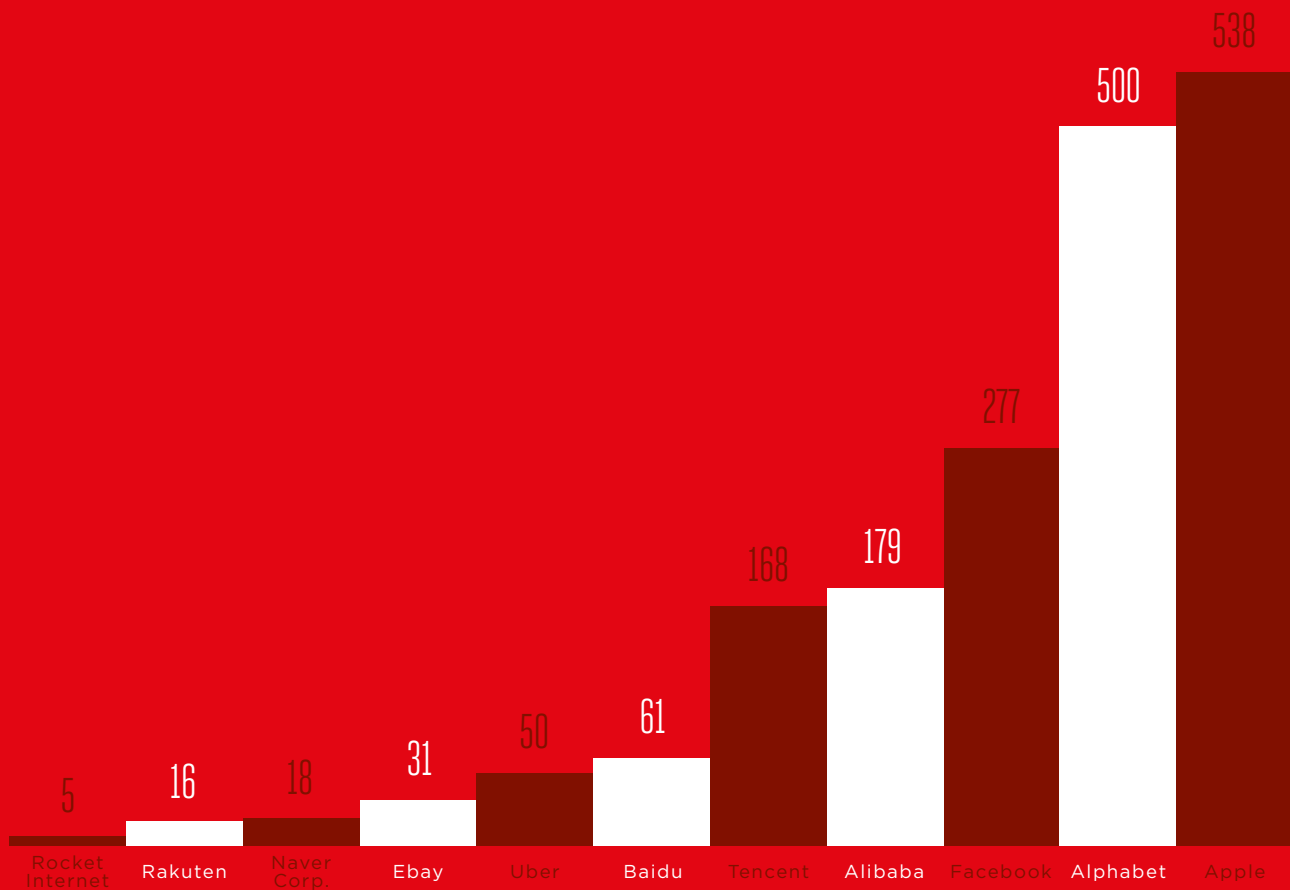
### 2.2.1 New platforms and services scaling globally

A number of internet giants have emerged and scaled rapidly over recent years. Many of these are mobile-focused in their business models and user interactions. Although the largest companies are based in North America, new players have emerged from other parts of the world, particularly Asia Pacific. With little fixed infrastructure in place in these regions, companies such as Alibaba and Tencent have built broad-based mobile platforms on which users can access a growing range of services.

Source: Bloomberg, CB Insights

## Leading global internet companies

(Market capitalisation \$ billion, January 2016)



The rise of the internet companies has seen their value increasingly outstrip that of mobile operators over recent years. It is important to note that this does not imply a simple value transfer, as the internet has allowed the growth of new companies and new ways of doing business. However, many of these companies rely on mobile broadband networks and smartphones as the key access technologies for their user bases. In some cases, these new internet

companies are either competing directly with mobile companies or at least disrupting the operator business model through commoditising the pricing of core operator services.

Investor attention is increasingly focused on the opportunities in the mobile sector and broader digital economy. Data from CB Insights showed that the third quarter of 2015 saw the largest amount of investor activity on record into the mobile sector,

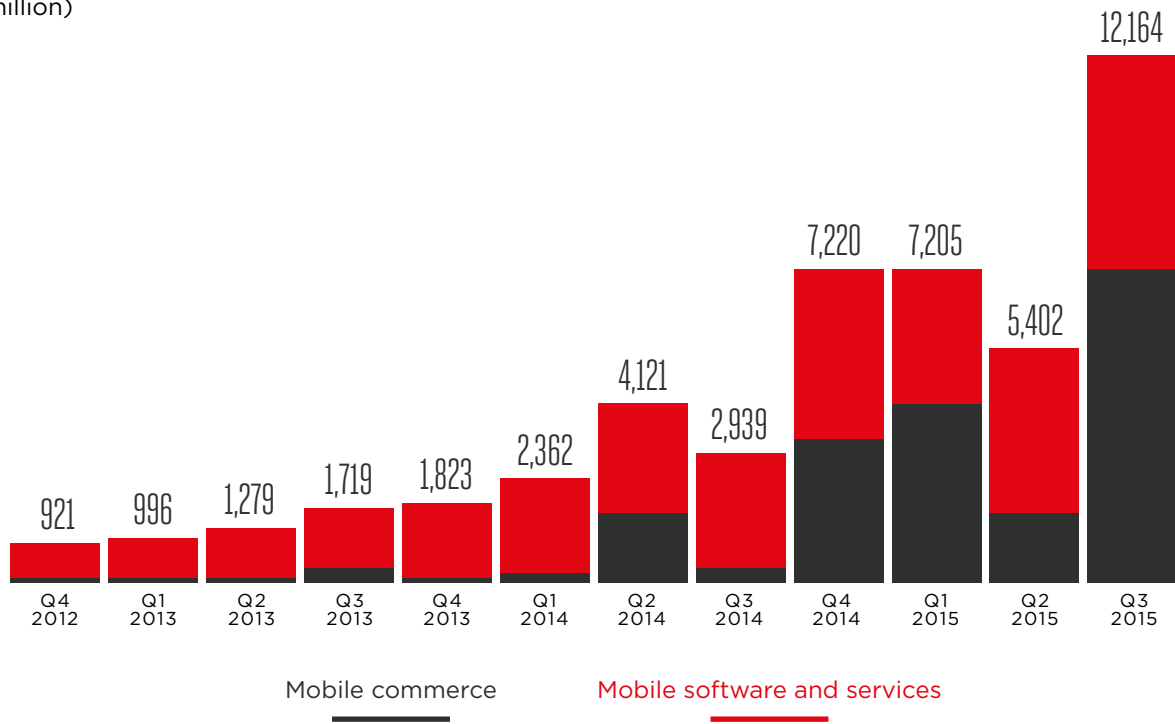
with a particular focus on mobile commerce and software and services. With almost \$25 billion invested in the first nine months of 2015, this figure is already higher than the aggregate total for the previous two years. Ongoing high levels of investment into the mobile ecosystem will further fuel the rapid pace of technological and service innovation, with new companies continuing to emerge and scale rapidly.



Source: CB Insights

## Mobile venture funding

(\$ million)



### Geographic focus of mobile ecosystem shifting towards the developing world

North America remains the epicentre of the technology industry and responsible for many of the innovations now taken for granted. Despite a host of new emerging challengers, operating systems originating in North America continue to dominate the global smartphone market, accounting for around 95% of global sales in 2014. New services originating in the region continue to scale rapidly, both domestically and internationally, particularly those based on the new sharing economy, such as Uber and Lyft.

Europe has seen its once dominant position in areas such as handset manufacturing and equipment eroded over recent years. There are though still a number of areas

of particular success in Europe; for example, four of the global top five mobile app-based gaming companies are European – an area of genuine market-leading expertise in the digital arena. Data from Vision Mobile indicates that in the first quarter of 2015 there were more than 1.3 million app developers in the EU28, equivalent to around 23% of the total global developer base

However, the momentum of innovation is increasingly swinging towards developing markets, which are set to see the vast majority of growth in terms of new subscribers and smartphones over the next five years. Innovative mobile ecosystems are developing in many countries. China, for example, is already home to almost 900 million mobile internet users, with high levels of mobile app usage. The country has seen a

number of innovations in the app economy, with local developers helped by the relative absence of some of the more established global internet players such as Google. Several players have listed on the public markets and now have market capitalisations that are beginning to rival those of the more ‘established’ internet giants in the West.

India is now among the top three markets globally for app downloads from the Google Play Store, according to App Annie. The domestic Indian app economy is developing rapidly with apps that address a variety of topics, from basic information and entertainment services to e-commerce and e-government applications, published by local developers and content providers.

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## 2.2.2 New business models emerging and driving the digital giants

Companies from the digital economy now rank as among the largest companies in the world, with Apple, Google and Microsoft among the top five by market capitalisation. There are a number of common factors behind the business models of many of the new internet companies:

- **network effects<sup>5</sup> and the importance of scale in building digital ecosystems**
- **two-sided platform business models with asymmetric pricing**
- **mobile as a complement in many asymmetric business models.**

The importance of network effects in the mobile ecosystem has been demonstrated by the emergence of the two globally dominant mobile operating systems, iOS and Android. Both Apple and Google have succeeded in attracting a broad range of developers to their mobile ecosystems, which in turn has helped drive end-user uptake of devices running the world's two dominant operating systems. The benefits of the network effects have also been demonstrated by the new internet giants, from Facebook to more recent companies such as Alibaba and Tencent. They have also played a central role in the rise of the new 'sharing economy' and success of companies such as Uber and AirBnB, where the growth in the number of vehicles/rooms for rent increases the attraction for end users. The important consequence of scale is that it attracts investment and innovation, which acts virtuously with consumer take-up to further grow the market.

Scale and the importance of network effects in building broad ecosystems have in turn been key factors in the growth of platform-based business models. Two-sided networks typically attract a range of customers and a range of suppliers, who interact across a platform. A key factor in these two-sided networks has been the asymmetry of pricing, with one service offered at a discounted price (or for free) to attract users, who then pay for other services. This asymmetry generates demand in one market but then captures profits in another.

Online messaging services that have appeared in many regions of the world, but particularly those in Asia such as Line and Tencent, are good examples of this trend. Both Line and Tencent offer free mobile messaging in order to grow their user bases, but then look to monetise this user base through the provision of other services. The services started with emoticons (or emoji), music and video content with associated advertising revenues, and have since evolved into a wider array of functions from built-in search to recommendation (such as taxi or restaurant booking) and, most recently, payments.

Many traditional industries have been, and will continue to be, disrupted by the rise of these asymmetric business models. A particular challenge for mobile operators is that many of the new internet players position certain aspects of the traditional mobile operator services as the 'complement' in their offerings – a service that is effectively commoditised or even given away for free. For some internet companies the focus has been on messaging, as described above; for others (including Google), the complement is the basic provision of connectivity.

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5. Where the value of a product or service is dependent on the number of others using it

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## 2.2.3 Digitisation impact now spreading across all sectors

The widespread availability of increasingly powerful smartphones and near-ubiquitous mobile broadband networks is allowing the influence of the digital economy to spread into almost every aspect of everyday life.

Digitisation has affected or is likely to affect a broad range of industries – an impact that will be increasingly prevalent through automated machines, sensors, improved analytics capability and cost rationalisation pressures. Underpinning all of this is the growth in network and internet access, connected devices (smartphones, tablets, wearables) and the Internet of Things. As economies across the world move towards digitisation, consumer time and data traffic will increasingly run over mobile networks. This creates clear opportunities for mobile operators as well as other ecosystem players, though one implication is that business models need to be adapted so that the network is used more as a strategic platform.

Value in the digital economy comes from attracting complementary participants, so it is important to catalyse the formation of new ecosystems and partnerships as opposed to going it alone. Health, education, financial services, home automation and energy services are all examples of sectors ripe for disruption. For mobile operators there is an opportunity to play a role using the industry's unique assets – the network, identity, location and billing, for example. Partnerships with industry players to integrate technology into everyday business operations represent a further strategy for mobile operators.

The benefits that can be realised from digitisation are real and significant. This is reflected in the large volumes of venture-capital funding that continue to flow into mobile and related sectors, as well as the high valuations with which public markets are rewarding the new Internet pioneers.

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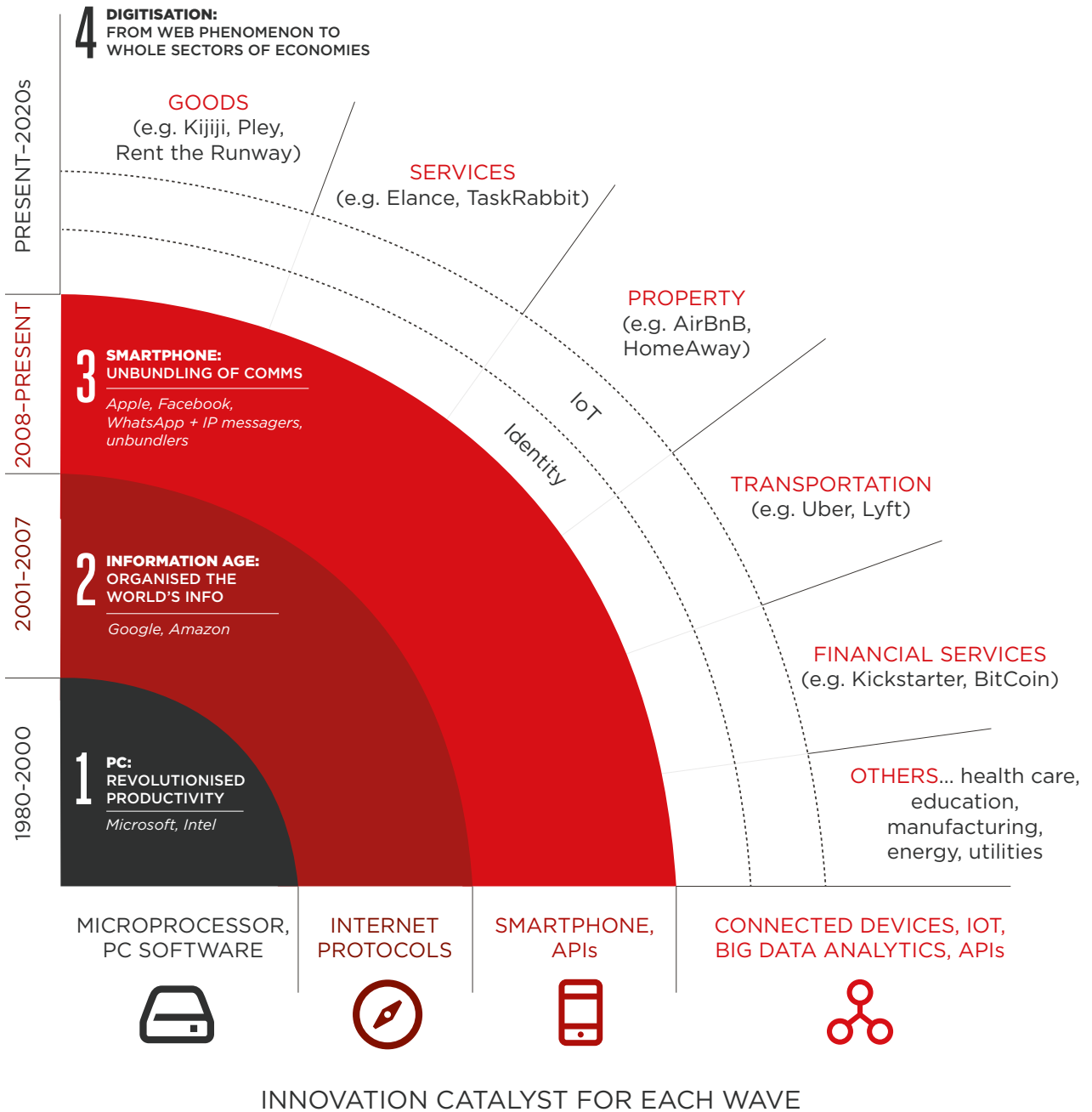
## 2.2.4 Operator role in innovation

The rise of the new internet players and their disruptive asymmetric business models highlights the challenges that mobile operators face across the world as they look to invest in expanding mobile broadband coverage and providing the capacity to cope with the growth in data traffic. However, operators themselves continue to look to drive innovation and develop new applications and services.

By exploring opportunities to expand their portfolio to services beyond the provision of connectivity – into areas such as data management, service delivery and customer management – mobile operators can aid the development and delivery of digital services, and in turn benefit from an increased number of connections on their network and the potential for additional revenue through value-added services.

Source: GSMA Intelligence

## The fourth computing era: digitisation of wider economies





## Funding tech innovation and start-ups

Mobile operators have followed a broad range of approaches to foster innovation. These have included forming innovation hubs and accelerators across the world; funding venture-capital arms and R&D centres; developing partnerships with equipment vendors and other ecosystem players; and supporting developer programmes.

- In early 2015 Orange launched Digital Ventures, a funding vehicle for start-ups in their early stages of development.
- Telefónica announced in 2015 that it would invest up to \$200 million in a strategic partnership with Coral Group, a venture-capital firm that invests in innovative start-ups. Telefónica will work with Coral Group to expand the activities of Telefónica Open Future, an online platform that focuses on helping start-ups accelerate and mature.
- In November 2014, Safaricom launched the \$1 million Spark Venture fund to support technology start-ups in Kenya. More than 200 start-ups had submitted enquiries and applications as of June 2015.
- AT&T has established a network of Foundries across the US to support innovators and entrepreneurs, and has set up Advanced Technology Labs to invest in its own technology.
- Deutsche Telekom has its Hub:raum incubator that invests in a range of new start-ups, while Telekom Innovation Laboratories focuses on new technologies that can be launched within a five-year timeframe.





## Convergence and new service launches

Convergence has been a common strategic response from mobile operators to the ongoing disruption, with a number of M&A deals over recent years. The rationale for this current wave of convergence has been the pursuit of scale and the goal of offering an enhanced consumer experience, with content and services available across a range of devices and networks. Mobile networks themselves are playing a central role in these new convergent strategies, reflecting the increasing amount of time that users spend on their smartphones. Europe and the US are the most advanced regions in this regard but convergence is also happening in the CJK (China, Japan, Korea) triangle. SK Telecom is in the process of acquiring the largest Korean cable company, CJ Hellovision. This acquisition will broaden the range of content available to its subscribers and further develop the company's media platform. It is only a matter of time before this industrial shift reaches other markets, especially in other parts of Asia and Latin America.

Content is playing a growing role in these new convergent strategies, with companies bidding for sports rights or in some cases creating new online platforms to compete directly with some of the more disruptive new entrants. Verizon acquired AOL in early 2015, which brought the company's online content assets such as the Huffington Post, and has more recently launched its 'Go90' video app as part of its growing digital strategy. As well as offering

a range of owned content on Go90, the company has entered into a number of partnerships to offer a broader range of content. The app itself is free, but Verizon aims to generate revenues from data usage and advertising revenues.

Mobile operators are also playing a leading role in realising the potential of the Internet of Things and big data analytics.

- AT&T was one of the first movers with the launch of its Digital Life services, which are focused on the connected home and connected car markets. Telefónica has been trialing a home security and monitoring service based on AT&T's Digital Life platform, and recently launched a service for its Movistar customers in Spain.
- UK operator EE has announced its own push into connected devices, with the company's Connected Strategy focused on the connected home, as well as cars and business.
- Reflecting the growing role of platforms in connecting a wide range of devices, SK Telecom has launched an open platform, OnePlug. The goal is to create a platform that attracts a wide range of service providers and equipment vendors in what is currently a fragmented market. The company is also launching smart home services, as well as a number of wearable devices under its Lifeware brand.



# Mobile identity: the scaling of Mobile Connect

The challenges of authentication in a digital world have been well documented, with consumers unhappy with the challenge of remembering multiple log-ins and lengthy registration processes that demand a range of personal details. A number of high-profile online security breaches have increased consumer concerns around security and data privacy. There is clear demand from consumers for a secure and convenient way to access online services, but one that also ensures security and privacy of personal data.

One such solution is the GSMA-backed authentication solution, Mobile Connect. The solution provides simple and secure access to online services such

as e-commerce, banking, health and entertainment, as well as e-government portals. It works by combining the user's mobile number and unique PIN to verify and authenticate everywhere they see Mobile Connect.

Mobile Connect has scaled rapidly over the last year and will soon be available to mobile subscribers in countries across the globe. Such a large-scale potential user base is almost unique in the digital world. Mobile Connect will evolve from its initial use case around authentication to, for example, authorising transactions (in mobile commerce or banking) and to provide increasing insights into consumer behaviour or to reduce fraud.

The success to date of the Mobile Connect initiative is an example of genuine collaboration, with operators in many markets coming together to help overcome the challenges of implementing Mobile Connect (whether technical or those related to clarifying the business model for partners, for example) and in the process grow the associated ecosystem. An expanding range of service providers are now looking to use the Mobile Connect solution to identify and interact securely with the large number of mobile subscribers who can now use Mobile Connect.

## MOBILE CONNECT AND EU REGULATIONS

Mobile Connect has been specifically designed to comply with the European Union's eIDAS Regulation (regulation on electronic identification and trust services for electronic transactions in the internal market), which is currently being implemented by the 28 member states. A trial was recently launched in two EU member states to establish proof-of-concept for cross-border authentication to e-government services. The pilot, launched on 16 November, demonstrates how Mobile Connect can be used to identify an EU citizen of one member state to gain access to a public service of another.



## Delivering higher speed network access

Following the broad deployment and uptake of LTE networks in many developed regions, operators are continuing to invest heavily and play an active role in delivering innovation in network access. Operators in most regions of the world are in the process of launching LTE-Advanced (LTE-A), which offers faster speeds for users and is achieved through carrier aggregation. There were more than 100 LTE-A commercially deployed networks in approximately 50 countries as of the end of 2015. Operators in many markets have also launched voice over LTE (VoLTE) and new IP-based Rich Communications Services (RCS).

The development of 5G is likely to be a further catalyst for innovation and collaboration across the mobile ecosystem. Operators, equipment vendors and other ecosystem players are playing an active role in the development of the next generation of

mobile network standards, namely 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 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 (SDNs) and heterogeneous networks (HetNets). These technologies are regularly bundled under the banner of '5G', despite the fact that vendors are already bringing these to market and operators are investing in them.



## 2.3 GSMA activities to support the developing mobile ecosystem

The GSMA has identified key growth areas that present both significant opportunities and benefits for consumers, as well as providing clear opportunities for mobile operators to collaborate and in doing so play an active role in delivering these future opportunities and benefits.

### Connected Living

The GSMA, through its Connected Living programme, aims to further develop the IoT market, both regionally and at the global industry level. 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 developing key enablers to support the growth of M2M in the immediate future. The ultimate aim is to enable the IoT, a world in which consumers and businesses enjoy rich new services, connected by an intelligent and secure mobile network.

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

- Remote SIM provisioning for M2M: the GSMA's vision is to unite all stakeholders behind a single, common and interoperable global embedded SIM specification to help accelerate the growing M2M market.
- IoT business enablers: the GSMA is working to create a sustainable M2M regulatory and policy environment that enables operators to unlock the consumer and business benefits of the IoT.
- Secure IoT networks: the GSMA is working to establish security requirements for how machines should communicate via the mobile network in the most secure way.
- Mobile IoT: the GSMA is working with mobile operators and ecosystem partners to assess solutions for low-power, wide-area connections to enable further scaling of the IoT.

## Network 2020

The GSMA's Network 2020 programme is designed to help mobile network operators in the move to an all-IP world and help them deliver global interconnected all-IP communications services to consumers such as voice over LTE, video over LTE (ViLTE), voice over Wi-Fi (VoWi-Fi) and RCS. Operators are in a unique position to offer secure, ubiquitous all-IP solutions with reach, reliability and richness. The transition will allow them to deliver an enhanced customer user experience that when interconnected with other operators offers truly global reach and scale. The programme is already helping operators from around the world to migrate from circuit-switched technology to an all-IP infrastructure while helping them to maintain service continuity.

The first phase of the programme focuses on helping networks deploy VoLTE and conversational video calls over LTE, VoWi-Fi and encouraging the RCS ecosystem to help operators prepare for and launch RCS-based interoperable solutions and VoLTE roaming architectures 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.

## Personal Data

The GSMA's Personal Data programme is working with mobile operators that have launched identity services across the globe. The mobile industry needs to deliver common and consistent interfaces to a range of digital 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 application programming interfaces (APIs). The GSMA is working closely with operators to establish a uniform set of APIs to underpin key mobile identity services.

Mobile Connect is a secure login solution that enables individuals to access their online accounts with just a single click or, where appropriate, automatically. Mobile Connect can provide different levels of security, ranging from low-level website access to highly secure bank-grade authentication. Mobile Connect promises to make passwords a thing of the past. To use the service, individuals subscribing to a participating operator simply need to click on a website's Mobile Connect button.

A new standard in digital authentication, delivered by a global network of mobile operators, Mobile Connect is well on the way to securing 1 billion enabled users for services ranging from access to content and services on the Web to more secure e-government and banking services.

# 03

# Mobile addressing social challenges in the developing world

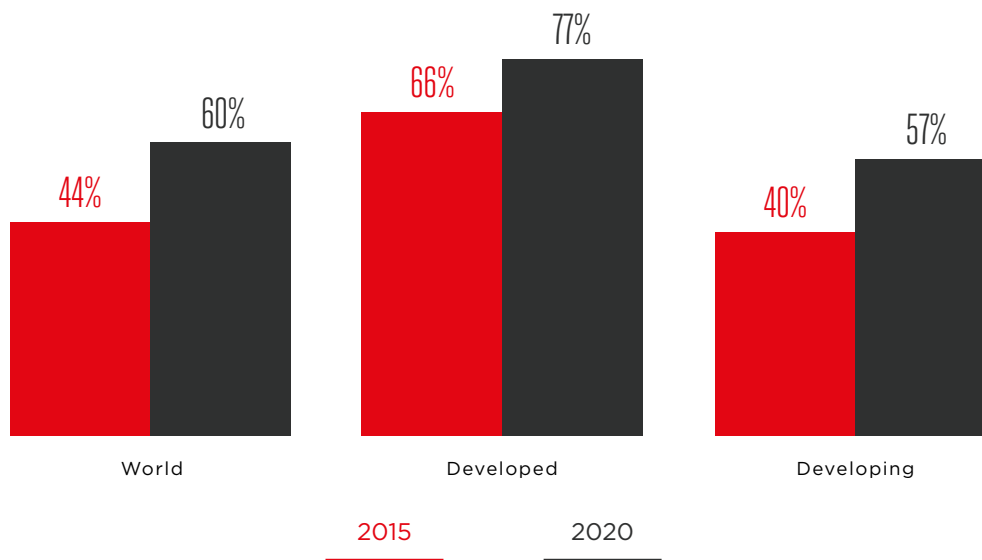
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## 3.1 Addressing the barriers to digital inclusion

Mobile technology is already the dominant platform for internet access in many parts of the world given the lack of alternative infrastructure. The number of individuals accessing the internet over mobile devices across the developing world has grown from around 870 million subscribers in 2010 to nearly 2.5 billion at the end of 2015. The penetration of the mobile internet has seen an almost threefold increase over this period, reaching 40% of the population by the end of 2015. Over the next five years, an additional 1.3 billion people across the developing world are expected to gain access to the mobile internet, bringing the total to 3.8 billion, and accounting for just under 60% of the population.

Source: GSMA intelligence

## Mobile internet subscriber penetration



However, despite the impressive progress, this will still leave a huge digital divide in many parts of the developing world. By the end of the decade, more than 40% of the population will still lack internet access, with most of the excluded population living in rural areas.

Digital inclusion – defined as the expansion of global connectivity and mobile Internet adoption – can extend these economic and social benefits to previously unconnected populations, fuelling a virtuous circle that reduces poverty, improves infrastructure and services, and further increases internet access and usage. By extension, unconnected and underserved communities risk falling further behind, widening the digital divide, if the barriers to digital inclusion remain unaddressed.

The GSMA Connected Society programme works with and on behalf of the mobile ecosystem to address the four key challenges to increasing digital inclusion:

- Network coverage: expanding the commercially sustainable coverage of mobile broadband networks to underserved population groups (typically in rural or remote communities) by promoting infrastructure sharing, regulatory best practice and technical innovation.
- Affordability: addressing key issues such as mobile-specific taxation to help make internet access more affordable, especially for “bottom of the pyramid” citizens.
- Digital skills and awareness: providing training to people so they understand the benefits and opportunities of being online and have the skills to use the mobile internet.
- Locally relevant content: encouraging and promoting the development of content and services that are relevant to underserved population groups.

Examples of recent research and projects carried out by the GSMA across each of these areas are summarised below.

### 3.1.1 Infrastructure economics – closing the coverage gap in Latin America

Network coverage is critical for access to mobile services, particularly higher speed mobile broadband networks that allow consumers to use a range of new services and applications. As highlighted in a recent GSMA report<sup>6</sup>, Latin America has already seen extensive mobile broadband network build-outs, with capital investments by operators in the region totalling around \$80 billion between 2009 and 2014. This is an average of \$129 person – the highest of any developing region. There is, however, considerable diversity in mobile broadband coverage (3G or higher) across the region. Some of the larger and richer countries, such as Brazil, Chile, Mexico and Peru, have coverage levels of more than 90% of the population; some of the poorer and/or smaller countries, such as Haiti, Honduras and Venezuela, have coverage levels of 75% or less; and Cuba has no mobile broadband coverage at all.

Overall, 10% of the population – 64 million people – still has no access to a mobile broadband network in Latin America. For mobile operators, the market-led business model has so far proven effective in expanding coverage to current levels. However, moving further into remote areas (where the majority of the unconnected lives) through traditional network deployment is a much greater challenge, owing to the sparsely populated unconnected areas, the difficult economic situation in many countries, the high cost of investment with limited potential for return, and a challenging market environment that often makes coverage expansion uneconomical. As a result, mobile operators are increasingly adopting alternative methods, notably infrastructure sharing and partnerships with other ecosystem players, to complement traditional network deployments.

Governments in the region want to make access to and use of mobile broadband universal, a goal shared by mobile operators. This requires a multi-dimensional approach and collaboration between governments and the mobile industry, with the former supporting industry-led initiatives with policies and programmes that create the right incentives and an enabling environment for extending connectivity to underserved areas. In many cases, mobile operators' efforts to improve coverage are hampered by inefficient and arduous regulation from governments and policymakers, including onerous coverage obligations, strict quality-of-service expectations, and restrictive planning laws around new infrastructure deployment which, together, make for a tough regulatory environment.

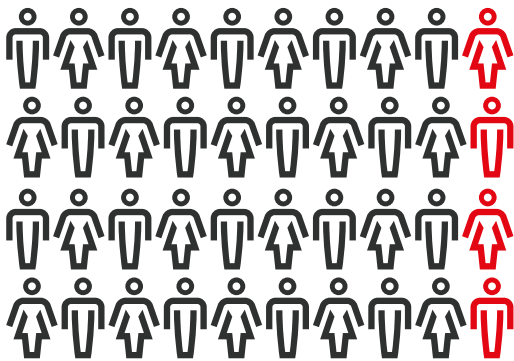
To realise the goal of universal access to mobile broadband, governments need to move away from mandatory regulations on coverage and QoS, and allow competition in a free and open market to guide mobile operators' investment decisions. Governments also need to provide incentives to complement mobile operators' efforts; for example, offering financial support (such as subsidies and tax incentives), reducing municipal red tape, creating an enabling environment for infrastructure sharing, making harmonised spectrum available and simplifying access to infrastructure. Government policies should be designed to encourage, rather than curb, investment in mobile broadband infrastructure. Underpinned by unrestrictive regulation, cross-industry collaboration can help close the coverage gap and address one of the key barriers to digital inclusion in Latin America.

6. Closing the coverage gap: Digital inclusion in Latin America, GSMA, December 2015



Source: GSMA intelligence

## Closing the coverage gap in Latin America



# 90%

coverage achieved by network competition and mobile operator investments

**BUT THIS ALONE WILL NOT LEAD TO COVERAGE UBIQUITY**

Infrastructure sharing, ecosystem partnerships and government support will help connect the remaining

# 10%

### 3.1.2 Affordability – focus on Sub-Saharan Africa

Mobile remains the key platform to bring internet access to populations across the globe, particularly in developing regions where fixed broadband services are prohibitively expensive and fixed line infrastructure is limited. The ITU estimates that the cost of fixed broadband services is higher than the target level (a maximum of 5% of GNI per capita in 2015<sup>7</sup>) in most developing countries. Mobile broadband costs are 1–4% for most of the countries, indicating the central role mobile plays in including more of the unconnected in the digital economy.

The cost of ownership of a mobile phone (which covers all the costs associated with both owning a phone and accessing mobile services<sup>8</sup>) is a key factor in mobile internet adoption, particularly in Sub-Saharan Africa where 43% of the population (416 million people) lives on less than \$1.90 per day<sup>9</sup>. The declining average selling price (ASP) of smartphones has played an important role in improving the affordability of mobile services. Sub-\$100 smartphones are increasingly available, though have yet to reach mass-market adoption. In June 2015, Chinese-based vendor Xinwei Telecom launched mobile phones in the sub-\$20 range in

Malawi supporting voice calls, videos and internet browsing. Similarly, mobile operators have helped improve the affordability of mobile services, particularly with regards to mobile data and internet access, and tackling the challenge of making these services available to low-income consumers on prepaid tariff plans.

Among the biggest barriers to greater digital inclusion are taxes levied specifically on the mobile sector, such as airtime excise and SIM taxes. Such taxes run counter to the widely recognised principles of taxation outlined by the International Monetary Fund and other expert organisations. Mobile-specific taxes place a disproportionate burden on people across the developing world, particularly low-income segments, as well as women who tend to earn less than men, excluding them from the benefits of digital and financial inclusion. By pushing up prices, mobile-specific taxes artificially lower consumption of mobile services. In many countries, particularly across Sub-Saharan Africa, taxes account for an excessive proportion of the total cost of owning a mobile device and mobile services.

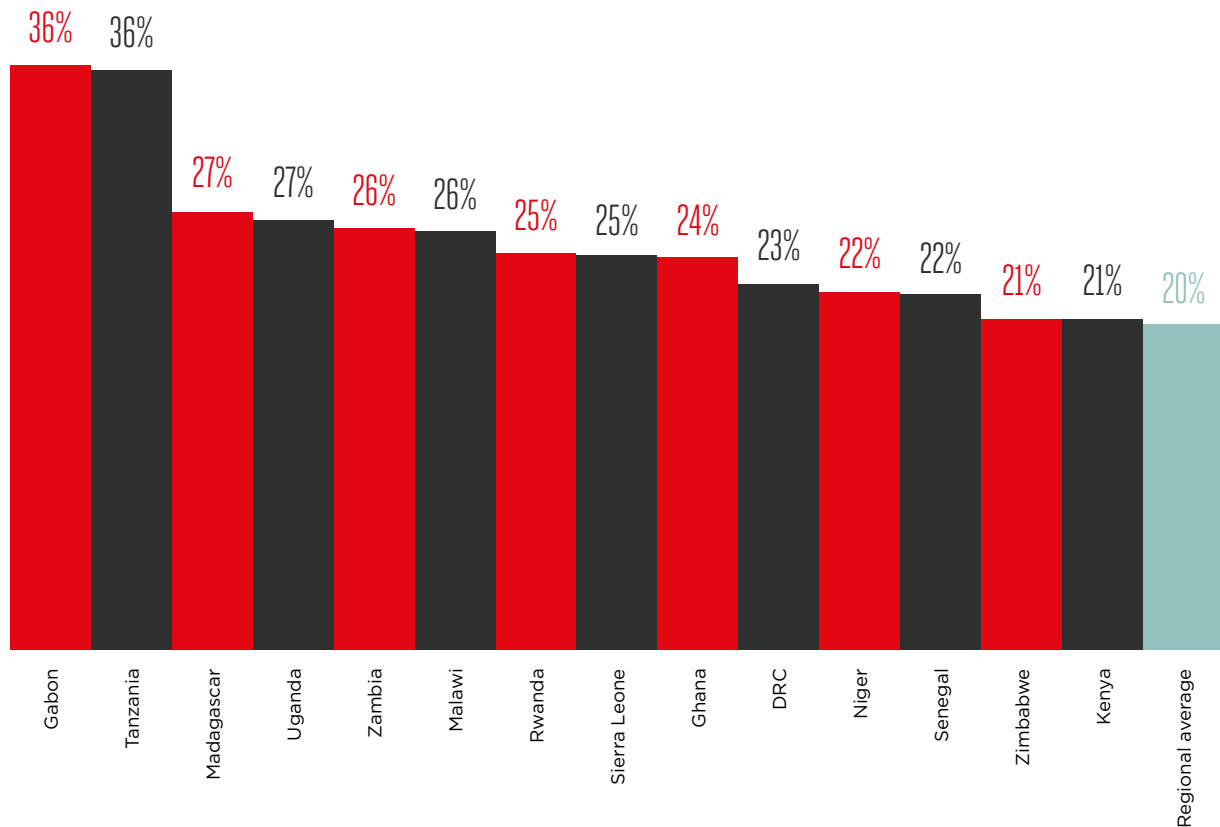
7. GNI: gross nation income per capita, which is GDP plus the income received from overseas

8. These cost components include handset costs, connection costs and average costs for calls, SMS and data usage, including the taxes levied on them

9. Source: World Bank

Source: Digital inclusion and mobile sector taxation 2015

## Consumer taxes as a proportion of total cost of mobile ownership (2014)



A recent study conducted for the GSMA by Deloitte<sup>10</sup> has looked in detail at how the tax system could be reformed to make mobile affordable for the average Tanzanian. The study shows the following:

- Mobile is one of the most heavily taxed sectors in Tanzania, accounting for more than one-third of the cost of mobile ownership in Tanzania, significantly above the regional average
  - First, consumers need to purchase a device, which is subject to VAT and customs processing fees
  - Consumers then need to activate their devices, which in 2013 incurred an additional tax of TZS1000 (\$0.50) per month on SIM card activation and use. Although this tax has since been removed, there is a possibility that it may be reinstated
  - Mobile services such as calls, SMS, data usage and airtime vouchers are subject to VAT of 18% and an additional excise tax of 17%
  - Mobile money services are subject to an excise tax of 10% on money transfer fees, on top of VAT
- By rebalancing mobile-specific taxes, the Tanzanian government can improve the affordability of these services and promote digital inclusion, economic growth and fiscal stability.

10. Digital inclusion and mobile sector taxation in Tanzania, GSMA, February 2015

### 3.1.3 Digital skills and locally relevant content – insights from Asia

Recent research by the GSMA Connected Society programme highlighted that a lack of awareness, digital literacy and locally relevant content are intrinsically linked barriers to the adoption and usage of mobile internet services, particularly in rural areas of developing countries, among the poor and female communities.

Consumer literacy and awareness play an important role in mobile internet adoption and empowering people with knowledge and information. Literacy in particular (basic, digital, internet and mobile internet) is essential for understanding the mobile phone user interface, reading its display and using its keyboard. Generally, regions with high levels of illiteracy are those that lag in take-up of the mobile internet. Bangladesh and some of the Pacific Island states (such as Papua New Guinea and Vanuatu) are among the least literate nations in the world with youth literacy rates as much as 30% below the global average. Digital literacy<sup>11</sup>, which is not formally evaluated in most countries, is an even bigger barrier to mobile internet adoption affecting a person's ability to navigate a handset's functionality, and consume and create content.

Locally relevant content is a key driver to increase consumers' participation in and consumption of mobile internet services, whether that is localised versions of global services, local entertainment packages, or hyper-local information such as bus timetables or commodity prices.

However, even though nearly half of the world's population speaks languages that are native to the Asia Pacific region (Mandarin, Hindi and Bangla among the most widely spoken), the majority of digital content is in English and focused on data-heavy smartphone apps. This limits the accessibility and usefulness of the content for local populations.

Mobile operators, internet players, handset manufacturers and other players in the mobile ecosystem are working to address this problem. For example, Google announced the creation of the Indian Language Internet Alliance, partnering with news and media companies in the country to attract Hindi speaking users to the Web.<sup>12</sup> YouTube launched a fully localised platform in Thailand in May 2014, to work more closely with local content producers and to encourage more Thai talent to come online.<sup>13</sup> Similarly the Indian local handset manufacturer Micromax launched 10,000 apps in Indian local languages in May 2015.<sup>14</sup> And in Myanmar, the start-up Bindez has developed an information search engine and discovery platform that connects users to relevant and understandable information relating to local news (politics, business, sport and entertainment) and real-time information in a range of areas, with the objective to connect Myanmar people worldwide with information and content in their own language.<sup>15</sup>

Creating content locally is equally important to increase its relevance to users. An example is Webmaker, an Android app recently launched by Mozilla with the aim of teaching users how to create simple web content. With Mozilla, the GSMA is exploring how individuals in developing countries are currently using the mobile internet, including initial testing of the Webmaker tool.<sup>16</sup>

A lot of content is also being produced using social networking sites such as Facebook and Twitter, with small and medium-sized enterprises (SMEs) in the region increasingly using these channels to market their products and services. For example, there are about 900,000 SMEs in India actively using Facebook for advertising purposes and communicating directly to customers.

11. A set of skills that allows a user to not only access the internet, but to navigate websites, and evaluate and create information through digital devices

12. "Google announces Indian Language Internet Alliance, aims for 500 million internet users by 2017", The Economic Times, November 2014

13. "YouTube taps into Thailand's content producers with localized site and partner program launch", TNW, May 2014

14. "Micromax announces 10000 local language apps for users", tech2, May 2015

15. Case Study: Bindez, GSMA Mobile for Development Impact, GSMA, November 2015

16. Approaches to Local Content: Realising the Smartphone Opportunity, GSMA, September 2015



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## 3.2 Delivering financial inclusion across the world

The mobile money industry is now widely established, bringing financial inclusion to a growing number of previously unbanked and underbanked populations across the developing world. With mobile money services now available to 1.9 billion people globally, previously unbanked customers can benefit from the choice, security, convenience and affordability often missing with cash-based operations.

As of December 2015, there are 270 live services in over 90 countries, with over 100 planned new service launches. There are now 60 markets with at least two mobile money services, and many have three or more.

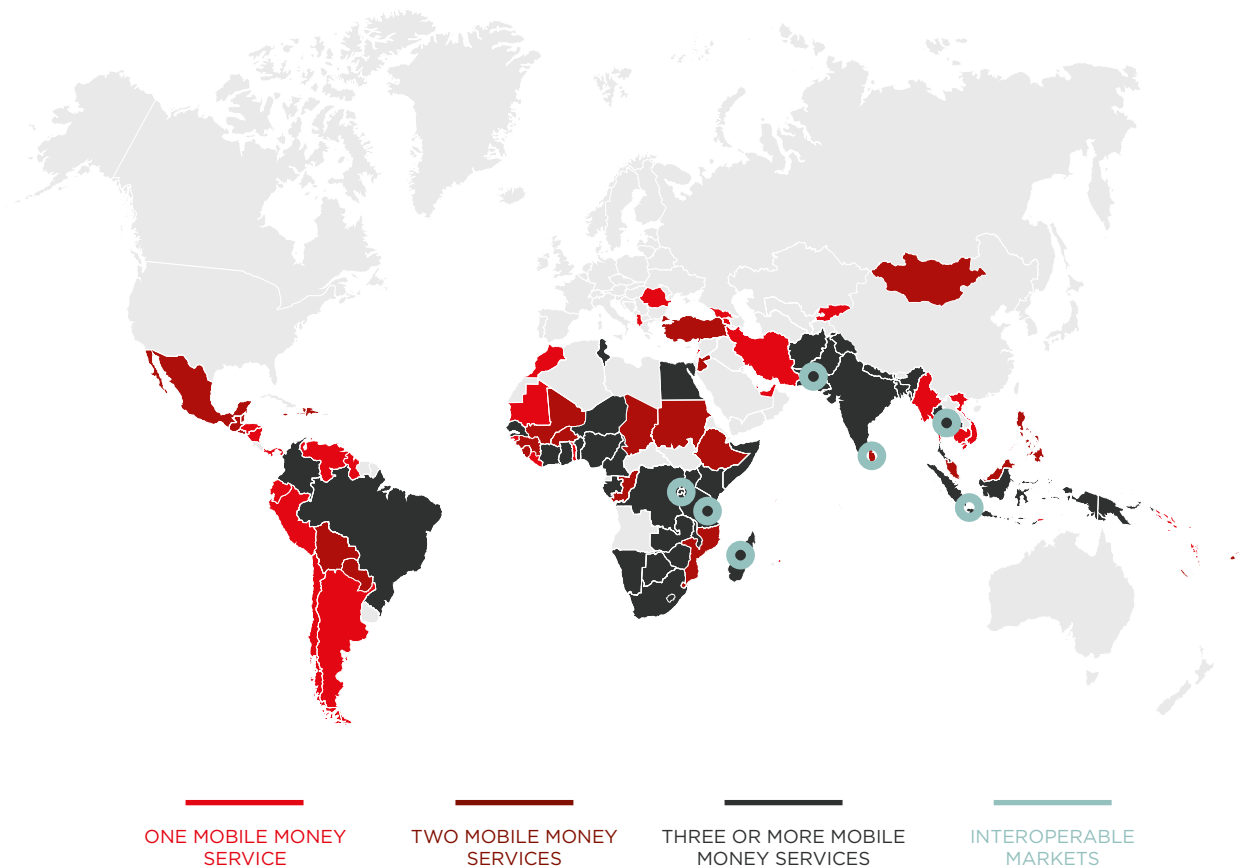
### 3.2.1 Opportunities for growth

More than half of the live mobile money services are in Sub-Saharan Africa, where it has become a popular service not only for fund transfers but also other transactions such as airtime top-ups and bill payments. Despite the progress to date, there remains a significant unmet opportunity, with more than 2 billion people across the world still lacking access to any form of financial services.

Source: GSMA intelligence

#### Number of live and interoperable mobile money services

December 2015



The opportunity for mobile money to contribute to financial inclusion and economic growth exists far beyond what the industry has achieved today. Recent data shows that digitising payments through mobile money helps to decrease the velocity of money, weakens the informal economy and improves the economic circumstances of the poor. By empowering women and farmers, for example, mobile money has the potential to profoundly and positively strengthen social cohesion and reduce inequality.

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### 3.2.2 Realising the potential of mobile money

There are a number of enablers that need to be in place to fully realise the potential of mobile money services:

- Overcoming regulatory barriers and establishing an enabling regulatory environment that supports the growth of mobile money services and the realisation of increased financial inclusion.
- Committing to long-term investment and building strong operational foundations to support the sustainability and scale of mobile money.
- Driving industry collaboration, including delivering interoperability.
- Delivering a broader range of digital transactions to make mobile wallets more central to the lives of users.

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### 3.2.3 Interoperability and its impact

As the mobile money industry becomes more competitive, the opportunity for industry collaboration and interoperability grows. There are 60 markets globally that have two or more live mobile money services and 36 markets that have three or more live mobile money services. Account-to-account interoperability between mobile money deployments has already been implemented in five markets (Indonesia, Sri Lanka, Tanzania, Pakistan and Rwanda) and will be implemented in at least one more market in early 2016. Interoperability needs to happen between mobile money providers, and between mobile money providers and banks.

#### **DELIVERING AN ENABLING REGULATORY ENVIRONMENT: GHANA**

The Bank of Ghana published new and progressive guidelines for e-money issuers in July 2015, effectively replacing the 2008 guidelines for Branchless Banking. The new regulatory framework has changed the landscape for e-money issuance and mobile money services in the country by providing a proportionate, risk-based approach to regulating the industry while allowing mobile operators to participate fully through wholly owned subsidiaries.

The previous bank-led model for mobile money services did not prove to be very effective due to the lack of a compelling business case for extending services to the bottom of the pyramid, leading many providers to focus on services for large institutional customers and individuals with regular incomes.<sup>17</sup> However, the new approach allows mobile operators to take the lead in rolling out innovative services. As a result, many new products are already being launched.

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17. Regulatory reform: A conversation with the Bank of Ghana on the journey towards the new Guidelines for E-Money Issuers, GSMA, August 2015

## THE GROWING IMPORTANCE OF CROSS-BORDER REMITTANCES IN WEST AFRICA

Cross-border remittance models are gaining popularity in East and West Africa. For example, Orange operates an international money transfer service that links Côte d'Ivoire, Mali and Senegal. By the second half of 2014, the value of cross-border remittances on Orange Money accounted for nearly a fifth of all remittances reported by the World Bank between these three markets. The success of this initiative indicates the readiness of consumers in mature mobile money markets to send and receive cross-border transfers using their mobile money account. In April 2014, MTN Côte d'Ivoire and Airtel Burkina Faso signed an agreement to interoperate their mobile money services to facilitate cross-border transfers. Orange Cote d'Ivoire and Airtel Burkina also signed a similar agreement in March 2015. These examples show that operators from different telecoms groups are ready to interconnect their mobile money services across borders.

Mobile money crosses borders: New remittance models in West Africa, GSMA, March 2015

## THE DIGITAL COMMERCE OPPORTUNITY IN PAKISTAN

A recent report by GSMA Intelligence highlighted the longer term potential for growth in digital commerce in Pakistan. Pakistan remains a largely underserved market in terms of digital access and digital payments. With a unique mobile subscriber penetration of 31%, mobile broadband penetration of 5%, and bank/mobile money account penetration among adults of 13%, Pakistan still has a lot of room for growth. The recent award of 3G licences (which led to rapid growth in the number of mobile broadband connections) and the growth of branchless banking services has led to clear signs of improvement. Half of Pakistan's adult population, approximately 60 million people, have access to a mobile phone but remain unbanked.

To harness the full potential of digital commerce in Pakistan, mobile operators have a crucial role to play across digital commerce, digital access and digital payments. The branchless banking operators continue to increase the number of digital account holders through various products and customer outreach plans including remote account opening facility for biometrically verified SIMs. Government payments is one area where the potential for digitisation of payments is substantial and could impact the number of financially included citizens. In Pakistan, providers and stakeholders are evaluating the feasibility of digitising this use case to reduce costs of delivery and drive use of branchless banking accounts.

Building digital societies in Asia: Making commerce smarter, GSMA Intelligence, November 2015

## 3.3 Disaster response: the central role of mobile technology

Mobile communications play a critical role prior to, during and following disasters, through a range of activities from supporting early-warning systems, to facilitating access to emergency services and as a tool through which to access potentially life-saving information. Mobile's role in disaster response has continued to grow over the last year, both in dealing with the aftermath of natural disasters and helping to address the humanitarian challenges presented by the growing number of displaced populations.

- Asia Pacific is home to some of the most environmental disaster prone countries in the world. The Pacific Islands includes some of the most vulnerable states, particularly due to the incidence of hydrological disasters such as tropical cyclones and floods.<sup>18</sup> Other countries in the region such as Philippines, Tonga, Bangladesh and Cambodia also face a very high risk of natural disasters.
- In 2014, more than 48 million people worldwide were forcibly displaced as a result of conflict and persecution<sup>19</sup>. Syria became the country with the greatest number of people displaced, with Iraq and Afghanistan also in the global top five countries. The number of people displaced in Syria represents more than 50% of the country's total population.<sup>20</sup>

Mobile communications is a critical lifeline for those living in disaster-risk countries. Collaboration between mobile operators, government bodies and humanitarian agencies can increase societal resilience. This might be through enabling access to awareness campaigns or providing the channel for early-warning messages to vulnerable communities. Many international organisations are looking to the potential of 'digital aid', and use of mobile phones as a channel for cash transfers and delivery of aid. Meanwhile, the relatively simple ability to send an SMS to a loved one remains critically important to affected populations.

### CYCLONE PAM, VANUATU - MARCH 2015

In March 2015, Vanuatu was hit by tropical cyclone Pam, causing widespread devastation and a number of fatalities. The mobile operator Digicel responded to the disaster by restoring connectivity in the capital within a few days, deploying public phone-charging stations across the islands and providing a total of \$250,000 of free credit to its customers to allow them to continue to communicate with their families despite difficulties topping up prepaid accounts.

18. The Mobile Economy Pacific Islands 2015, GSMA, April 2015

19. This includes refugees, internally displaced and asylum seekers

20. Source: UNHCR

## NEPAL EARTHQUAKE – APRIL 2015

In April 2015 a 7.8 magnitude earthquake hit Nepal, followed by a series of powerful aftershocks. The mobile operators in Nepal worked to restore critical services after hundreds of sites across the country were reported down either due to infrastructure damage or a lack of power. Ncell (TeliaSonera) supported rescue and emergency response teams and members of the media through the provision of SIM cards and data connectivity. Operators also provided their subscribers with free SMS and credit to ensure people could connect with their loved ones.

Members of the GSMA community around the world also responded to the disaster. Both the Ericsson Response and Vodafone Instant Network teams were deployed in Kathmandu to provide communication support for relief efforts. Ooredoo Group provided free or subsidised calls to Nepal under the banner of the GSMA Humanitarian Connectivity Charter<sup>21</sup>, demonstrating their commitment to their customers during this crisis. Indosat (Ooredoo Group) also sent back-up equipment to support connectivity on the ground. A number of operators worldwide, including Verizon and AT&T in the US, offered free SMS and international long-distance calls to Nepal.

A recent report by the GSMA looked at some of the key actions taken by GSMA members and their partners responding to the earthquake. It highlights areas of innovation, identifies challenges and gaps, and outlines high-level recommendations from lessons learned in the hope that these will assist other GSMA members in preparing for earthquakes and other emergencies<sup>22</sup>.

## SYRIAN REFUGEE CAMPS

In the Syrian refugee camp in Jordan, Souktel worked on a mobile supply management system as it was becoming increasingly difficult to get food, water and medical supplies to the right people. The system included a mobile inventory management tool that records incoming and outgoing shipments, and smartphone applications to track packages via satellite and report back on their status and GPS coordinates in real time. The end result is a faster, more efficient aid supply chain<sup>23</sup>.

21. The Humanitarian Connectivity Charter, an initiative launched by the GSMA Disaster Response programme, is a set of principles aimed at maintaining access to connectivity and communication for affected populations in times of crisis. A number of operating groups with footprints in the region have signed the charter.

22. Mobile Industry Earthquake Preparedness; A focus on best practise and partnership development in Nepal, GSMA, April 2015

23. Disaster Response: Mobile Money for the Displaced, GSMA, January 2015

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## 3.4 Mobile addressing social challenges in developing markets

Countries across the developing world face a range of social and developmental challenges. Rapid population growth and youthful populations create challenges in providing access to basic infrastructure and services, including education and healthcare. Urbanisation rates vary across many developing regions, but urban growth has translated into both increased congestion and air pollution, as well as an increasing number of people living in informal settlements, increasing poverty and inequality. Common challenges around ensuring access to basic services such as clean water and electricity can be exacerbated in countries with large rural populations, often living in geographically remote and inaccessible areas.

In 2015, there were 1.2 billion people without basic energy access<sup>24</sup>, 663 million without access to improved water services and 2.4 billion with no access to sanitation<sup>25</sup>. The challenges to providing universal access to utility services include last mile distribution, operation and maintenance costs and payment collection. Mobile technology can help to deliver cost-effective solutions to address many

of these social challenges. This report has already highlighted the central role that mobile-enabled services are playing in addressing the key challenges of delivering digital and financial inclusion. However, recent years have seen a growing range of mobile-enabled products and services in markets across the developing world aimed at addressing many of the challenges.

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24. Mobile for Smart Solutions: How Mobile can Improve Energy Access in Sub-Saharan Africa, GSMA, November 2014

25. Progress on sanitation and drinking water – 2015 update and MDG assessment, UNICEF, June 2015



### CONNECTED WOMEN: ACCELERATING DIGITAL AND FINANCIAL INCLUSION FOR WOMEN

Across the developing world, there is notable and persistent gender inequality in mobile access and usage. There are 200 million fewer women than men who own a mobile phone in low- and middle-income countries<sup>26</sup>. Even where women own mobile phones, there is a significant gender gap in usage.

Ensuring digital and financial inclusion for women can deliver significant socio-economic benefits to women and society. Mobile phones can empower women and help them benefit from the life-enhancing opportunities that mobile can bring, such as access to health information, financial services and employment opportunities.

To draw attention to this issue, the GSMA has launched the Connected Women Commitment initiative. Operators are invited to make a formal commitment to increase the proportion of women in their mobile internet and/or mobile customer base by 2020, across one or more markets. This initiative will be formally launched at Mobile World Congress 2016.

### MOBILE FOR DEVELOPMENT UTILITIES

In 2015, M4D Utilities awarded £3.4 million in grants to 21 organisations across 14 countries that are testing and scaling the use of mobile to improve or increase access to energy, water and sanitation services. This brings the total amount committed through the M4D Utilities Innovation Fund to £5.6 million

These grants have delivered proofs of concept, encouraging significant investment, particularly into the energy sector.

As reported by Bloomberg Energy Finance, more than \$250 million has been invested in the off-grid energy sector in the last two years. Of this, more than \$180 million has been channelled into start-ups offering solar under a pay-as-you-go model, often enabled by mobile money and GSM remote monitoring.

M4D Utilities has expanded its scope to include sanitation in order to drive mobile-enabled innovation in this space.

### ENCOURAGING WOMEN TO USE MOBILE: PROJECT SAMPARK

Uninor (now Telenor India) launched Project Sampark in August 2014 with a pilot phase covering up to 370,000 people in the Aligarh district. It aims to address the barriers that discourage women from accessing mobile phone services. The project includes marketing and awareness campaigns, and using women promoters to sell mobile services.

The Bandhan pack includes two SIM cards. Recharging either SIM adds credit to the other, so that when a male member of the family tops up this can also benefit a female member. Telenor India is now evaluating rollout of the project to other circles with similar challenges.

### ENTREPRENEURSHIP AND WORK: LABORVOICES

LaborVoices helps employers identify and solve problems in their supply chains before they become critical by enabling them to instantly poll workers on their safety and working conditions through their mobile phones. The users (workers) can call into the LaborVoices SmartLine and answer a series of questions about issues that interest the supplier, such as wages, health, safety, child labour and abuse.

Users can call into the system 24x7 free of charge and leave feedback using their mobile phone keypad. This data can be translated into meaningful insights for the employers. LaborVoices is active in several countries in Asia-Pacific, including India, Bangladesh and China.

### WAZAZI NIPENDENI, TANZANIA

The Wazazi Nipendeni service offers reminders and informative text messages in Swahili to pregnant women and mothers with new-born babies. The objective is to promote healthy pregnancy and early childhood care behaviours. In addition, the service seeks to assist health professionals in the dissemination of information typically shared during antenatal care visits. For instance, nutritional messages include information on timely iron and folic acid intake, maintaining a healthy, well balanced diet and drinking clean water. These messages can include simple instructions on how to treat early pregnancy nausea, information on the importance of breast milk and how to monitor milk intake by babies.

Wazazi Nipendeni has scaled significantly since its launch in November 2012. The Healthy Pregnancy, Healthy Baby text messaging service has sent out more than 44 million messages to its 556,813 total registrants (as of the first quarter 2015). Of this total, 408,000 registrants enrolled in the service themselves.

### FIGHTBACK, INDIA

Innovative mobile services can help women perceive mobile phones as a tool for improving safety and peace of mind. In India, the app FightBack enables users to instantly send an alert in an emergency. By pressing a button (and then confirming), SOS SMS and emails, GPS coordinates and location maps are automatically sent to preselected contacts. The app has had more than 100,000 downloads and is now available in 22 Indian states and 81 countries worldwide.

26. Bridging the gender gap: Mobile access and usage in low- and middle-income countries, GSMA, October 2015



# 04 / Rethinking regulation

Digitisation is driving rapid technological progress and growth, generating tremendous benefits for consumers. Prices for digital services are falling rapidly, more than 3 billion people are now connected to the Internet, and the mobile revolution is rapidly bringing connectivity to remote areas.

Although digital convergence is benefitting consumers, it also creates regulatory challenges. Rapid innovation, in terms of technology and business models, together with the growing importance of economies of scale and scope, is blurring the boundaries between once-distinct markets and regulatory regimes. The net result is a complex and dynamic digital ecosystem in which both consumers and businesses face regulatory uncertainty<sup>27</sup>.

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27. Competition Policy in the Digital Age, GSMA, October 2015

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This fast pace of change means regulation can quickly become obsolete, irrelevant or, in some cases, harmful. Regulation can easily distort digital markets (for example, by deterring entry or skewing the path of technological progress), harming competition, slowing innovation and ultimately depriving consumers of the benefits of technological progress. Today, there are essentially two main weaknesses in the way that digital markets are regulated in most countries:

### **Discriminatory regulation:**

There are major disparities in the way different sectors of the digital economy are regulated. Today, services provided by Internet companies, such as Amazon, Facebook, Google, Microsoft and Netflix, are directly competing with services provided by telecoms and media groups, such as AT&T, Comcast, Bharti Airtel, CBS, Fox, NTT, Sky, Telstra and Vodafone. Whereas Internet companies are typically subject to general antitrust and consumer protection regimes, telecoms and media companies generally have to comply with industry-specific rules and institutions. In particular, regulation of communications services and service providers is far more intrusive and prescriptive than regulation of other elements of the digital ecosystem. Both substantive and procedural regulatory discrimination can harm competition and reduce consumer welfare.

### **Static regulation of dynamic markets:**

The rapid pace of innovation means prescriptive, ex-ante regulatory regimes (based on forecasts, rather than effects) tend to be less effective. This kind of regulation has traditionally been used to govern communications markets. With today's increased competition, the need for such regulation is diminishing fast. The persistence of such outdated rules can not only harm competition and slow innovation, but can also fail to achieve regulatory objectives.

## 4.1 New era, new approach

Recognising these challenges, policymakers all over the world are working to implement reforms that will protect competition and consumers without impeding social and economic progress. In most markets, regulatory policies and institutions need to be reviewed and potentially overhauled. In doing so, policymakers should apply three specific principles:

- Regulation should achieve its objective in the most efficient way regardless of the technologies, industry structures or legacy regulatory regimes. Regulatory policies and institutions designed around obsolete definitions of products and markets need to be replaced with more holistic approaches and should be implemented by institutions with the jurisdiction and expertise to consider all the alternatives. Regulation should be technology-agnostic: it should consider all technological means for achieving the desired objective. For example, a voice call to the 911 or 112 emergency number and an SMS from a push-button emergency device for elderly people both ensure people can communicate with emergency services providers. Moreover, the regulation should be designed to protect consumers from potential harms associated with a particular service, regardless of the type of firm or technology used to provide it. For example, consumers using a VoIP service should benefit from the same level of privacy protection as consumers using conventional PSTN voice services.
- As markets in the digital ecosystem are dynamic and complex, regulation needs to be flexible. It needs to accommodate rapid changes in markets, technologies and business models, while ensuring sufficient regulatory confidence for companies to take risks. A dynamic model focused on an assessment of the market's performance against a set of objectives is better suited to the pace of innovation than a prescriptive set of up-front rules. Following this principle gives scope for the regulatory approach to evolve over time, while keeping the regulatory objectives largely stable.
- Regulatory reform should follow a bottom-up approach that takes entirely new approaches into consideration, and is willing – where appropriate – to jettison old ones. In many cases, intense competition in the digital ecosystem means that regulation of the communications sector is no longer needed, or can be significantly scaled back. In other areas, such as privacy and cyber security, new regulatory challenges are emerging. The goal should be to apply a consistent set of criteria to assess market power throughout the Internet ecosystem, and focus regulatory attention on areas where market power currently exists or is likely to exist in the future, rather than where it may have existed in the past.

Following these principles should ensure a new regulatory framework will apply consistently to all elements of the digital ecosystem, regardless of the technology or business model in use. It will be cost-effective, and flexible because it will allow markets and technologies to evolve while preserving and enhancing regulators' ability to achieve their objectives. Most importantly, consumers will continue to enjoy the benefits of technological progress and be protected by well-designed regulation.

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## 4.2 Safeguarding competition

Competition is the best way to deliver economic growth, investment and innovation. Excessive regulation can stifle innovation, raise costs, limit investment and harm consumer welfare through the inefficient allocation of precious resources, such as spectrum.

However, in many jurisdictions around the world, competition policy has failed to keep pace with the digital convergence outlined in this report. As the mandate of many communications sector regulators does not extend to Internet players, they often fail to take wider market dynamics into account during the evaluation and decision-making process. Equally, a failure to understand the complex value chain can affect how competition law is applied.

Both regulators and competition authorities need to fully recognise the breadth and dynamic nature of competition in the digital age. Internet players use different business models (such as advertising-supported services that make use of sophisticated Internet analytics) to offer services to customers. Many of these Internet players are offering consumers seemingly free communication and entertainment services in direct competition with services where upfront prices are charged, imposing a formidable competitive constraint on mobile operators seeking to charge a price to the end user. Similarly, users can choose to switch to Wi-Fi for data or voice services instead of using a mobile network.

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### 4.2.1 Multi-sided markets and platform competition

The rise of the digital economy and the new internet giants has seen the emergence of new business models, in particular those based around two- (or indeed multiple-) sided platforms with asymmetric pricing.

Competition authorities and telecoms regulators should fully recognise that consumers of a seemingly free service may pay a price in other ways – for example, by sharing their personal information with a provider of the services. Market analysis needs to consider the competitive dynamics relating to usage of data, which can be monetised through advertising and marketing. It also needs to account for the existence of multi-sided markets and strong network effects, as well as the coexistence of closed systems alongside open ones.

Both regulators and competition authorities need to fully evaluate the new competitive dynamics before imposing regulatory obligations or competition law remedies. Otherwise, players that adopt traditional business models may unfairly be subject to greater restrictions than competitors using new business models not fully understood by regulators.

In a similar vein, mergers between Internet players should be scrutinised under competition law even if the characteristics of their business model mean they are below the revenue thresholds required to trigger such scrutiny. In this market, arguably the purchasing price is likely to be a better indication than revenues, of the significance of a proposed merger.

Market assessment reviews that fully account for the impact of Internet-based service models are likely to show that there is a much greater level of competition in communication services than is currently recognised by regulatory and competition authorities. This type of analysis could demonstrate the potential for regulatory policy goals to be achieved through competition law, so that ex-ante regulation could be lessened or eliminated.

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## 4.3 Consolidation benefitting consumers

Healthy competition drives innovation, delivers benefits to consumers and offers wider societal gains. In the highly dynamic digital ecosystem, market mechanisms should remain the key instrument to determine the level of competition that can support long-term growth and benefits for consumers.

As consolidation can impact innovation, the use of spectrum, investments and quality of service, as well as prices, in both the short and longer term, competition authorities need to take a holistic approach to evaluating a proposed merger. For example, they need to recognise that a merger may improve the business case for investment in new networks, creating a better quality of service for end users, improving productivity and fuelling economic growth. The fast-growing demand for bandwidth means constant investment in new capacity and technology is needed.

Policymakers must avoid creating or maintaining artificial and uneconomic conditions that enforce untenable market structures that do not support those long-term policy goals. Recent economic theory suggests markets have an inflexion point at which adding further competitors will actually reduce market performance. National regulatory authorities need to allow market mechanisms to determine the optimal mobile market structure, rather than distorting market forces through unnecessary interventions, such as reserving spectrum for new entrants.

As the volume of traffic on mobile networks rises exponentially, there is a need for greater economies of scale to economically put in place the infrastructure required to meet the growing demand, and drive unit costs down. More concentrated market structures than in the past are therefore emerging as a result of market dynamics, as operators strive to achieve greater economies of scale and scope. In this context, competition authorities tasked with assessing the impact of proposed mergers between mobile network operators must take full account of the dynamic efficiencies (and accompanying wider societal benefits) that can arise from such mergers, and avoid imposing remedies that cancel out the economic benefits associated with greater scale and scope.





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