Mobile
Policy
Case Studies

GSMA

Policy
in practice

March 2015
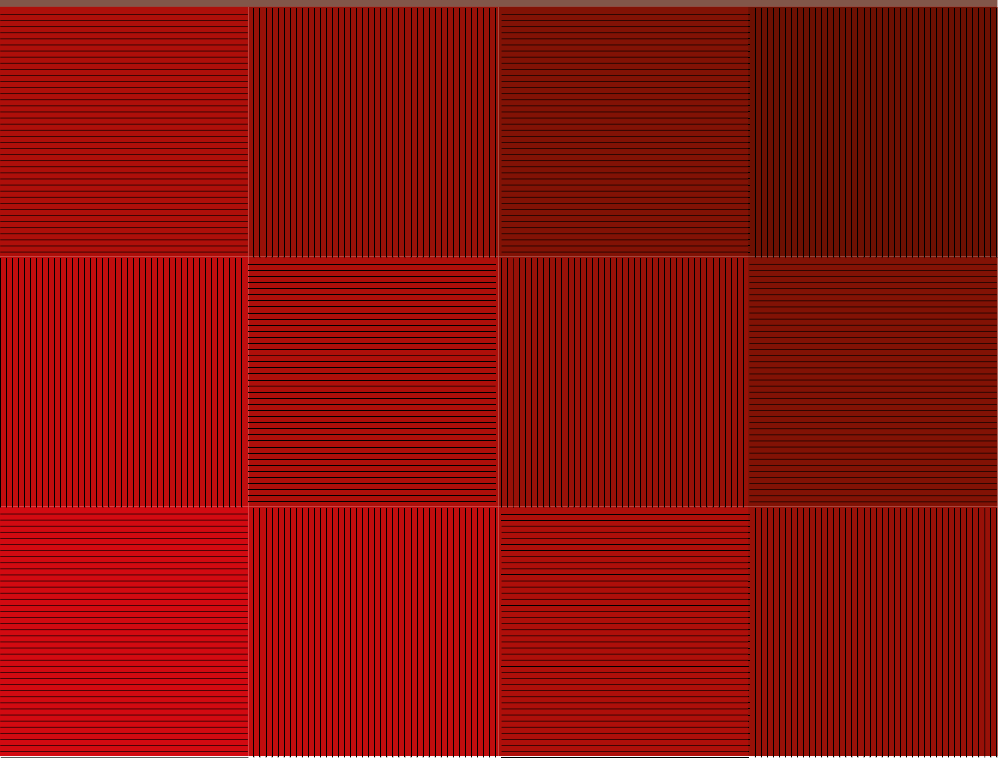
This book belongs to:

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Real-world initiatives
and outcomes

Solutions to key
regulatory challenges

Insights into the latest
industry trends

Mobile
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Foreword

The advance of mobile innovation has been so swift and steady that policymakers and industry regulators must continually evaluate regulatory policy to keep up with the sector.

New technologies, such as near-field communications in smartphones, are transforming how city dwellers pay for public transport. Mobile identity solutions are being implemented to create new levels of security and convenience for online transactions. Connected cars are offering improved safety, services and entertainment for drivers and their passengers. And in many countries, the original 2G spectrum licences are expiring, raising issues about technology neutrality and how to manage licence renewal.

Although market intervention is often unnecessary to ensure there is sufficient variety, safety and quality of mobile products and services, many of these advances do raise regulatory questions.

In addition to setting the rules for mobile operators, it is important that governments also play an enabling role by pursuing visionary policies that support the establishment of mobile solutions and services in health, education and 'mobile money', for example. And by adopting mobile solutions to provide better government services, the public sector can help amplify the benefits of mobile connectivity, expand the mobile economy, create jobs and reward innovation.

This volume is a companion to the GSMA Mobile Policy Handbook — our first collection of brief, incisive and illuminating case studies about regulatory policy, public-private collaboration and industry initiatives that align with government objectives. These real-world cases describe policy choices and public-private partnerships that are shaping how the industry delivers services to citizens. We hope you will find these stories useful and interesting, and that they spark new ideas about how to approach similar initiatives or regulatory challenges.

Tom Phillips
Chief Regulatory Officer, GSMA

Mobile Initiatives

Business Environment

Spectrum Management and Licensing

Consumer Protection

Europe and the US rev up M2M automotive innovation to drive richer consumer experiences

Policy Goal

Mobile technologies connect people, but also machines. In the automotive industry, wireless connectivity for vehicles can help deliver real-time vehicle analytics, live traffic alerts and mapping data, as well as faster response times during emergencies. As a result, innovation in machine-to-machine (M2M) technologies for the automotive sector is creating a launch pad for new businesses, high-tech jobs and social benefits.

Action

Mobile operators and the automotive industry are coming together to create innovative vehicles that offer whole new driving experiences. European mobile network operator Telefónica has partnered with trailblazing US electric vehicle manufacturer Tesla Motors to create vehicles that not only include pioneering, electric engines, but also innovative mobile technologies.

Enablers

- Regulatory incentives to encourage collaboration in the mobile and automotive sectors
- Flexible approaches to spectrum use, allowing the merging of mobile and automotive technologies
- Regulation that encourages innovation, while respecting privacy and personal freedoms

Outcomes

- A new innovation sector, growing in value globally from $22 billion in 2012 to an estimated $422 billion in 2022[1]
- M2M capabilities in 90 per cent of all new cars by 2020
- 1.8 billion M2M connected vehicles by the end of the decade
- Safer, richer and more efficient driving experiences for consumers; significant benefits for the environment; and improved commercial opportunities for the automotive sector

Strategic Challenge

M2M may not yet have entered the broader public consciousness, but by 2015 it is predicted that there will be over six billion 'machines' connected to the internet. As it gains traction, M2M will be increasingly used in new sectors and for new applications. The automotive industry is one of the sectors enthusiastically embracing M2M technologies, as in-vehicle connectivity promises a host of commercial and lifestyle benefits.

Today, the industry generates over $20 billion globally but, given the right business and regulatory environment, it is estimated that this could grow by over $400 billion within a decade. As with any disruptive technology, society must be prepared for change. Seizing both the opportunities and challenges of M2M demands close cooperation between governments, regulators, mobile operators and the automotive industry.

Driven by innovation

The GSMA's Mobile World Congress broke new ground in 2014 by including a stand that would more usually be found at the International Motor Show. Sitting alongside displays of new handsets, the stand showcased the pioneering Model S sports car, the result of a tie-up between Spanish operator Telefónica and US car manufacturer Tesla Motors. At the cutting edge of design and zero-emission engine technology, innovation runs deep in the Model S, as it is fundamentally a new kind of car, offering a new type of driving experience:

- A slotted SIM card provides the Tesla Model S with internet connectivity, allowing it to access services such as online mapping and digital radio.

- The SIM also allows the owner to remotely lock or unlock the car, flash the lights or sound the horn to make it easier to locate in a car park, and even adjust the level of air conditioning.

- Tesla can remotely solve problems that may arise in the car, such as electrical faults, and even inform the driver of possible failures before they become serious, helping to improve safety and reduce repair bills.

- Drivers can even locate the car remotely using their smartphone (adding an additional layer of security), receive diagnostic information and check fuel and battery levels.

Current M2M technologies offer a host of additional advantages:

- Congestion warnings, offering live information on traffic flows and the severity of traffic jams

- Access to games and on-demand music

- Access to remote computers and servers

- Better location services, offering everything from suggestions on restaurants to visit to a variety of route options

Making it happen — bringing industries, technologies and policy together

This was no ordinary project, as it involved bringing together two different companies from two different continents and two very different industries. Perhaps the most testing challenge was merging mobile and automotive technologies, which follow markedly different development and product lifecycles.

Clearly, future-proofing and allowing for retrospective upgrades

are important considerations in developing M2M automotive technologies, but policy and regulation are critical issues too.

In Europe, for example, the imminent 2G switch-off will have an impact, opening up the possibility that 2G-based M2M systems will become obsolete overnight. This has the potential to undermine consumer and business confidence in M2M, as expensive in-car functions suddenly become redundant. Clearly this is something that could have damaging ramifications, as it could potentially discourage both M2M investment and the creation of new businesses 'piggy-backing' on in-car platforms, such as apps and licensed services.

Get this right, however, and in just a few years M2M could herald massive changes in the ways consumers and businesses interact with their vehicles:

- Insurance costs could potentially be directly related to actual on-road behaviour. This would reward good drivers and penalise bad ones, helping to encourage better driving and reduce accidents.

"As we accelerate our transformation into a digital telco, we see lots of opportunities to empower consumers. Connected cars that provide drivers with more information and a better and safer driving experience is a perfect example of this."

Peter Rampling, Managing Director Digital, Telefónica Germany

- Emergency response systems, such as Europe's eCall and Russia's ERA-GLONASS, where the car immediately connects with a nearby emergency centre to request assistance in the event of an accident. Even if the vehicle's occupants are unable to speak, emergency services are automatically despatched as the car passes on its exact location — saving time and potentially lives.

- Connected vehicle fleets that provide real-time data such as load being carried, current position and fuel level — increasing the efficiency of each and every journey to cut the number of vehicles, and time spent, on the road. As well as delivering greater cost efficiency, such fleets would also offer significant environmental benefits.

It is also important to note that connected vehicles have the potential to deliver less desirable outcomes. Cars have long been a symbol of personal freedom, and the ability to pinpoint a car's location or to control its systems remotely, for example, has clear safety and privacy implications. Close collaboration between industry and regulators will ensure that innovation is encouraged, but also managed responsibly so as not to encroach on personal freedoms.

As new standards, such as LTE, and ever-more innovative M2M applications become available, policymakers, regulators and the M2M sector need to work together closely. In so doing, they will ensure that connected vehicles are here to stay, driving lasting social, environmental and economic benefits.

1 *Telefonica/Machina Connected Car Industry Report - P9: http://www.advancedmobilityproject. org/wp-content/uploads/2014/04/telefonica_digital_connected_car_report_english.pdf*

Mobile health services ensure that 'prevention is better than cure' in South Africa and Indonesia

Policy Goal

One of the most powerful applications of mobile network connectivity is in the field of healthcare. Mobile platforms create the opportunity for better, more consistent and more efficient healthcare provision. By increasing access to health services, mobile connectivity empowers individuals to manage their own well-being more effectively — even if they live far away from their nearest health facility.

Action

Hello Doctor, a mobile-based health platform, was launched in South Africa in 2010. Since its inception, the service has proved effective in the delivery of preventative healthcare advice and support to communities where medical services may be difficult to access. The GSMA mHealth programme engaged with the Hello Doctor platform in 2012 with the aim of helping it develop partnerships with mobile network operators and map areas of strategic opportunity. As a result, Hello Doctor now has partnership agreements with operators across Africa and Asia.

Enablers

- Ability of operators to offer instant reach and scale to the mHealth providers they partner with
- Willingness of stakeholders to work together to identify opportunities, challenges and solutions for maximising the reach and effectiveness of mobile health platforms
- Need for policymakers to remove regulatory barriers to mHealth services

Outcomes

- Over 600,000 users across all Hello Doctor platforms
- Health advice at no, very low and low cost — depending on need
- Services accessible via a variety of mobile channels, including mobile-optimised websites and smartphone apps, to achieve the broadest reach

Strategic Challenge

Healthcare systems around the world are under ever-greater strain as they are asked to do more with less. The main issues are the cost of delivering healthcare services and the level of access to, and quality of, those essential services.

One way that health providers are actively trying to address the increasing burden on health systems is by focusing on preventative care. This covers prevention of disease and severe illness as well as actively trying to reduce re-admission levels to healthcare facilities (e.g., hospitals) and other critical intervention points.

To this end, they are actively encouraging people to do more to help themselves. As many conditions can be treated successfully before they become serious, for example, they are targeting earlier intervention. This allows healthcare services to reduce the incidence of avoidable health problems, improve efficiency, and potentially save more lives. The challenge is to deliver these preventative medical measures to individuals and communities that may face geographic or economic barriers to access.

The GSMA Mobile for Development mHealth Programme currently focuses on 11 countries in sub-Saharan Africa and works with GSMA mobile operator members, governments and development stakeholders to create sustainable mHealth services that can help address these issues. It supports operators and their partners in launching these services and advocates the integration of mHealth into health systems in a more scalable and sustainable way.

Reaching out — prevention can be the best medicine

There is a growing body of evidence that certain mHealth interventions can have a positive impact when it comes to changing health behaviours, especially in areas such as increased adherence to antiretroviral therapy, improved diabetes control and smoking cessation[1]. These interventions can help people become less dependent on expensive medical interventions, and as a result reduce the strain on healthcare services. The problem has been that the most vulnerable — often people living in remote areas or those lower down the economic scale — have been the hardest to reach.

In 2010, the Hello Doctor service was launched in South Africa. One of the country's first mobile-based health platforms, Hello Doctor gives users the chance to chat to a doctor or access the latest healthcare advice 24 hours a day, seven days a week, while also offering advice on how to follow a healthier lifestyle.

It is a 'freemium' business model that takes into account both the needs of users and their economic situation: general, healthy living advice is provided for free via an app; very low cost Q&A text consultations are available (typically for less than the price of a box of matches); and in-depth telephone medical consultations are charged at less than $4. It is a service that brings peace of mind to many thousands of people for whom a doctor is traditionally inaccessible — due to cost, geography or both.

Hello Doctor has proved so popular that it is now spreading throughout Africa and Indonesia, led by operators Vodacom, MTN and Telkomsel. These three networks have a combined subscriber base of around 350 million people and as more networks join, the reach of the service is growing rapidly. This clearly highlights how mobile health platforms can provide access and reach that other channels cannot match.

Making it happen — healthy cooperation for cooperative health

Hello Doctor could not have achieved this success without cooperation between operators, healthcare providers and the GSMA.

In delivering Hello Doctor:

- Industry bodies, communications companies and healthcare providers are working together to optimise the benefits of mHealth.

- Operators and healthcare providers are creating services that are accessible via a variety of mobile channels, including mobile-optimised websites and smartphone apps, so they can reach the broadest range of consumers.

- Patients are benefiting from more convenient access to healthcare advice due to the true cross-platform nature of the service, which ties together mobile apps, websites and

"MTN is continually looking at ways to brighten the lives of customers through innovative and relevant mobile solutions. We are excited by the partnership with Hello Doctor as the service brings essential healthcare information to our customers' fingertips."

Pieter Verkade, Group Chief Commercial Officer, MTN

social media (Facebook pages, for example) for maximum reach.

▪ Medical professionals have the opportunity to reach much greater numbers of people than previously possible. For example, in South Africa, where the service currently has just over 100 doctors trained and on-call, it is serving over 600,000 users. Similarly, in Indonesia, where Hello Doctor launched in March 2014, an initial 50 trained doctors will rise to more than 500, providing capacity to serve more than 10 million people.

The regulatory environment in the markets where Hello Doctor is currently operating has not been particularly enabling, and in South Africa regulators have actually created barriers to the implementation of the service. These regulatory struggles are symbolic of a clash between two cultures. Those on the healthcare side favour a conservative, safety first approach, while those on

the communications side tend to believe that market competition can produce innovative solutions to help fight common medical issues.

These regulatory pressures mean that Hello Doctor has had to clear a number of hurdles in order to realise its current level of success. Nevertheless, this also means it provides a strong illustration of what can be achieved when mHealth service providers work closely with operators and industry groups to deliver on wider public health objectives.

The service is already helping large populations access the health advice they and their families need, while preventative healthcare advice can potentially lead to a reduction in avoidable health problems, especially among poorer populations. In the longer term, there is a possibility that these types of services could lead to substantial savings in the provision of national healthcare services.

1   http://www.plosmedicine.org/article/info%3Adoi%2F10.1371%2Fjournal.pmed.1001362
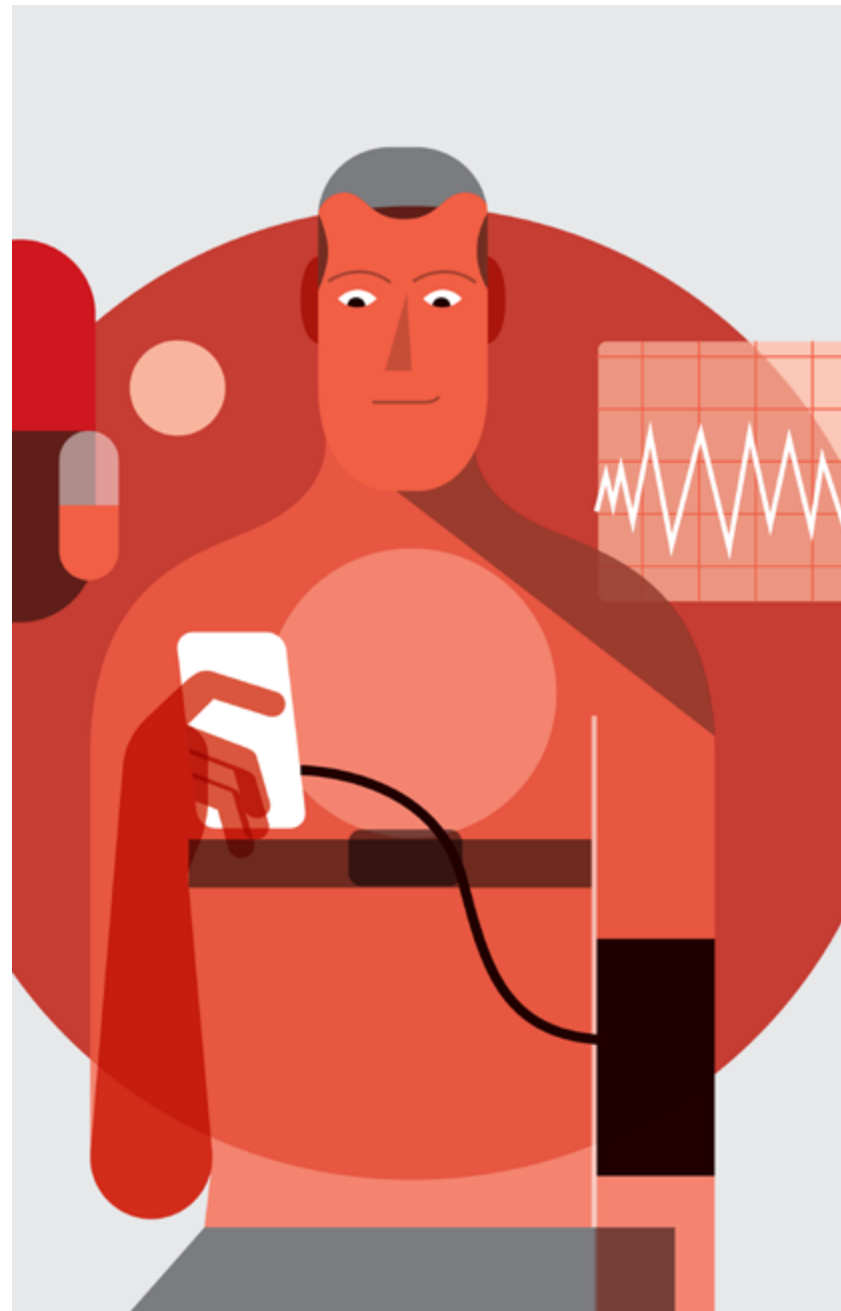
Dubai opts for NFC payments to provide passengers with seamless city transport

Policy Goal

Greater numbers of people are moving to cities, attracted by the abundant economic and social opportunities they offer. As cities grow, they become ever more complex, and managing them effectively is a pressing issue for governments. Mobile technologies deliver simplicity from this complexity through, for example, their ability to integrate with transportation systems to speed up fare payments and ease travel bottlenecks.

Action

In 2013, the government of the United Arab Emirates (UAE) and mobile network operators collaborated to create a mobile-based transport ticketing system. Passengers simply tap their mobile device against a reader to buy a ticket. It eliminates ticket queues, makes travelling on the metro easier, removes the need for a separate and environmentally damaging plastic travel card and provides transport operators with real-time data for more effective planning and provision.

Enablers

- A single standard, to ensure all enabled handsets work with the payment systems
- Forward-thinking transport planning and technology adoption, to anticipate changes in populations and behaviours
- Government and mobile operator collaboration, to identify and deliver the potential of mobile connected cities

Outcomes

- A mobile-based transport ticketing system able to handle 440 million passenger journeys a year, integrating Dubai's road, rail and water networks
- Contribution to the government's goal that 20 per cent of all journeys be made via public transport by 2020

Strategic Challenge

In 2008, for the first time, more people lived inside urban centres than outside them, and this trend is set to continue with the number of city dwellers expected to reach around 5 billion by the 2030s[1]. As cities become bigger and more crowded, they also become more complex to manage. One of the most pressing challenges for national and metropolitan governments is providing effective transportation systems to carry people and goods across densely populated areas.

Transport is clearly an economic and social issue: the cities that succeed, by attracting new businesses and skilled workforces, will be those that can move people quickly, easily and efficiently.

Integrated transportation for efficient city living

Dubai, one of the world's fastest growing cities, has a strong commitment to maintaining an efficient transport network. The Roads and Transport Authority (RTA) was established by the government in 2005 and is responsible for both public transport and the road network in the Emirate of Dubai, as well as between Dubai and the other emirates in the UAE.

The RTA aims to increase the share of journeys made via public transportation in Dubai from 13 per cent in 2013 to 20 per cent by 2020[2]. To help achieve this, it is creating an integrated mass transit infrastructure to ensure that policies anticipate and meet the population's transport needs. This is important both economically and socially: people need to travel to and from work with the minimum of fuss, goods must

be moved into and around the city efficiently and the transportation system needs to contribute to, not detract from, residents' quality of life.

The RTA has worked with UAE-based mobile operators du and Etisalat on creating a more effective payment system, launching the Smart Nol service in 2013. Using Near Field Communications (NFC) technologies, it allows passengers to open ticket barriers simply by tapping an enabled mobile handset against a reader. Credit is stored on a virtual Smart Nol account hosted on the SIM card inside their handset, rather than on a separate plastic card.

Smart Nol delivers a seamless public transport experience, working on buses, the metro, taxis and water taxis. Passengers no longer have to queue for tickets, have the correct change or juggle different payment systems for different modes of transport.

The metro's 75 km of track carried over 33 million people in Q1 2013 alone, and by improving ease of travel it is likely to attract yet more users. In addition, the RTA can now collect real-time data on public transport use, informing its day-to-day travel provision and identifying long-term trends for effective future planning.

Making it happen — common standards for the greatest returns

The advantages of using mobile phones for public transport ticketing are compelling, demonstrated by a report from Juniper Research[3] that predicts smartphone usage will triple by 2018 and account for the delivery of 16 billion transport and event tickets annually.

The research, however, also uncovers a potential obstacle to cities reaping the benefits of smartphone transactions, suggesting that a lack of implementation standards will hinder interoperability.

In Dubai, however, the RTA, du and Etisalat initially ran a pilot of the Smart Nol service to allow issues to be identified before going live. For both operators, choosing the right SIM card supplier was a critical success factor. Both also had to overcome inconsistent implementations of the NFC standard by handset manufacturers. Actions included extensive integration testing and the development of optimised applications for different types of smartphone.

Both Etisalat and du see the Smart Nol service as part of a wide range of smart city services that are underpinned by mobile connectivity. Khaled El Khouly, Chief Marketing Officer of Etisalat, said: "The launch of the latest NFC technology solution will be the beginning of a new era in how we empower our customers as well as service providers in the country."

1 http://www.unfpa.org/pds/urbanization.htm
2 https://www.zawya.com/story/440m_passengers_used_public_transport_in_Dubai_in_2013-ZAWYA20140222074215/
3 http://www.juniperresearch.com/viewpressrelease.php?pr=388

"We believe our role goes beyond providing telecom services — to be a catalyst for society's advancement, through our involvement in projects such as this, which revolutionise the public transport experience and support the Dubai Smart Government vision."

Fahad Al Hassawi, Chief Commercial Officer, du
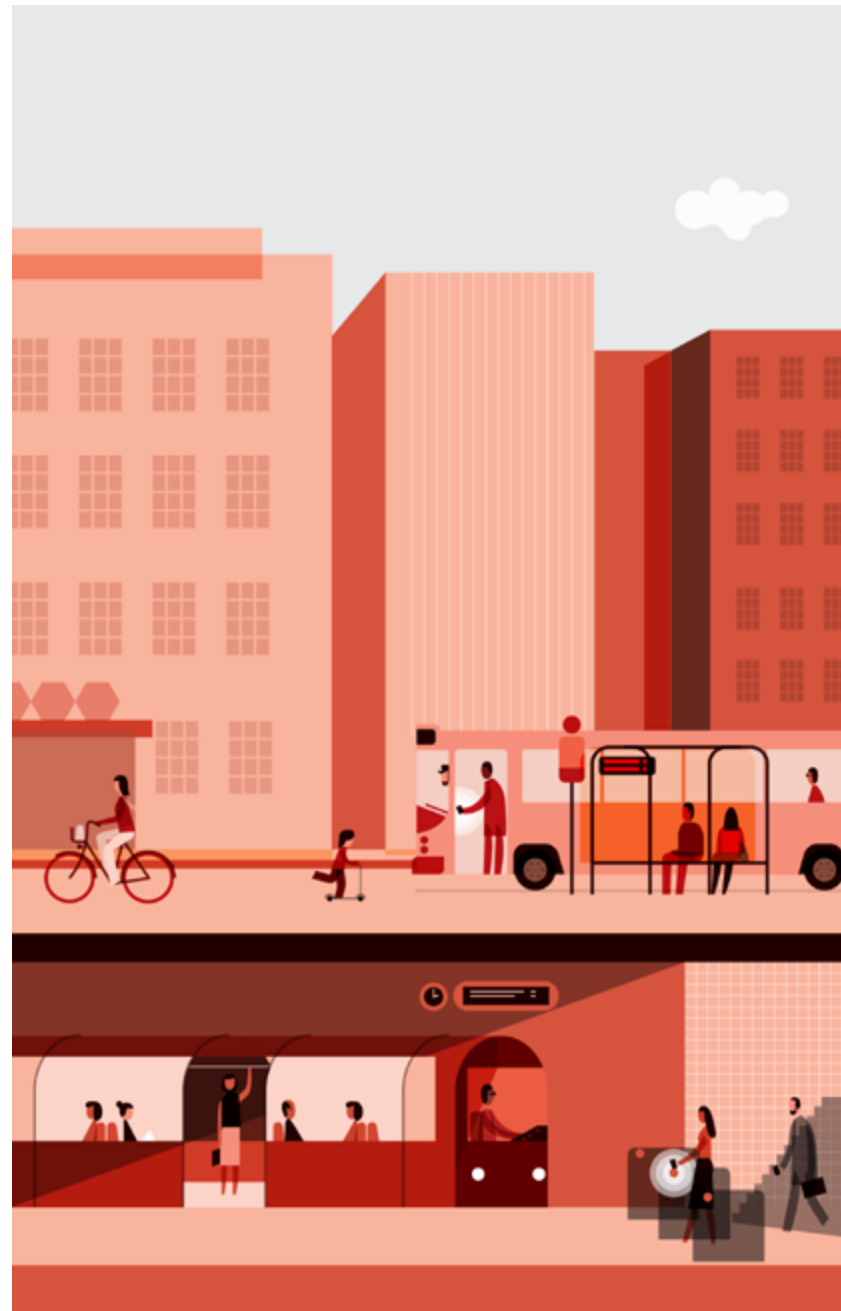
Latin America's mobile operators are recycling e-waste into economic opportunity

Policy Goal

As mobile handsets and other electronic devices proliferate, the challenges of disposing of end-of-life devices and network equipment grow. Electronic waste — also known as Waste Electrical and Electronic Equipment (WEEE) — is the fastest-growing waste stream in the world, and has the potential to cause significant environmental harm if not handled properly. To help negate this threat mobile network operators are working together to develop programmes that encourage responsible recycling and disposal of obsolete network equipment and mobile devices.

Action

In Latin America, where e-waste regulation is at an early stage, operators such as Telefónica Movistar Ecuador and Claro Perú are taking the lead on a range of e-waste initiatives. The aim is not only to reduce the impact of waste mobile devices and network equipment, but to generate value from what was once just thrown away. These operators are also now looking to work with governments to develop stronger approaches to e-waste regulation that will deliver even more significant environmental and economic benefits.

Enablers

- Early stages of e-waste regulation in Latin America
- Recycling infrastructure to extract valuable materials and process hazardous ones
- Proactive e-waste initiatives to encourage greener design and disposal

Outcomes

- Metals reclaimed from used electronic devices potentially worth as much as $21 billion a year
- Consumer campaigns that bring social and environmental rewards
- Mobile handsets saved from landfill used to make a range of products, from new electronic devices to jewellery

Strategic Challenge

Electronic waste is on the rise. According to the United Nations University, in 2012 the world generated 48,894 kilotons (kt) of e-waste and, by 2015, estimates suggest this will have increased to more than 57,000kt. Latin America's e-waste levels will reach close to 5,000kt by that date, over eight per cent of the global total. Mobile handsets and network equipment form part of this waste stream, and their disposal presents both challenges and opportunities.

For example, when dealing with hundreds of thousands, or even millions, of obsolete handsets, they become a valuable source of often scarce commodities, such as gold, aluminium and platinum. On the other side of the equation, they also contain materials that, in large quantities, can be hazardous to the environment and demand careful handling.

Despite the importance of the issue, some regions lack robust e-waste frameworks. As a result, there is a need for regulators — with input from operators, mobile device manufacturers and the waste industry — to develop stronger extended producer responsibility regulations that promote safe disposal and responsible recycling of devices and equipment.

Recycling schemes turn e-waste into new wealth

By 2017, it is estimated that more than 58 per cent of the Latin American population (around 374 million people[1]) will use a mobile phone. Market intelligence company IDC expects the region's smartphone shipments alone to exceed 150 million in the same year[2].

As consumers buy new devices, however, what happens to those they replace?

In Latin America, it is a question that is being answered by operators through proactive e-waste initiatives that have often needed to anticipate regulatory requirements, rather than respond to them.

The region's operators have been ahead of the e-waste curve for many years, with Telefónica Movistar Ecuador and Claro Perú voluntarily establishing recycling schemes and running public awareness campaigns between 2010 and 2013.

Operators have also recognised the potential value of old handsets. An old mobile phone can contain a treasure trove of recyclable materials, including plastics and precious metals. A ton of gold ore, for example — mined at great environmental and financial cost — contains just five grams of gold, but a ton of readily

available, but outdated handsets, can contain as much as 400 grams.

Estimates suggest that if the metals used in electronic devices could be extracted at the end of the lifecycle, the market value would be around $21 billion a year[3]. Recycled elements from mobile devices can also be used to make everything from jewellery to pet food containers. And yet, in a country such as the US, close to nine in 10 end up in landfill sites[4].

Early and far-sighted adoption of e-waste initiatives by operators in Latin America has resulted in the region having many advanced schemes in place. In Mexico, the national telecommunications association (ANATEL) encourages operators to combine their efforts to audit and improve the reverse logistics needed to manage the e-waste created by the industry. In 2013, Telefónica Movistar Ecuador processed 112,321 obsolete mobile phones, accessories, batteries and chargers from its users, while in

Brazil the operator Oi is investing $10 million in five recycling plants belonging to waste management specialist Descarte Certo. It has already collected 43,782 mobile devices, batteries and chargers from Oi customers. Also in Brazil, the combined efforts of operators TIM, Vivo and Oi meant 90.6 tons of e-waste were collected in 2012 alone.

Mobile operators have also taken very creative approaches to encouraging consumers to recycle their obsolete tech — in some cases offering social rewards to improve recycling rates. In Uruguay, for example, when a person or institution gathers 25kg of e-waste, operator Antel donates a wheelchair to a beneficiary named by the collector. As part of another initiative in Panama, Telefónica Movistar collected 44,500 obsolete pieces of mobile equipment and planted 52,000 trees in return.

"Over the past two decades, the proliferation of technology and widespread adoption of electronic devices has led to an unprecedented amount of electronic waste. The GSMA is proud to see that mobile operators are already working to address this issue in Latin America, a region that will produce nearly nine per cent of the world's e-waste by 2015."

Sebastian Cabello, Head of GSMA Latin America

Making it happen — responsibility, commitment and consistency

Setting the pace on e-waste represents a major investment by operators in their environmental, sustainability and corporate social responsibility programmes. It involves the creation of reverse logistics schemes for collecting, storing, categorising and disposing of e-waste, as well as investment in recycling plants and the establishment of reforestation programmes.

In addition, mobile operators are forging ahead with awareness-raising initiatives, both at the front and back end of the mobile lifecycle. At the design and manufacturing stage, for example, operators are promoting International Telecommunication Union (ITU) guidelines that recommend new handsets be designed to be more easily and cheaply recycled and have a longer useful life; and that peripherals such as chargers are universally compatible. Operators are also educating consumers on the part they can play in ensuring their device is safely recycled.

In Latin America, however, this commitment has left operators at a two-fold disadvantage:

1: Responsibility. Requirements for e-waste management in Latin America are relatively new and,

unfortunately, governments have created rigid legal frameworks without seeking input or consent from the affected parties.

This has created some significant issues. For example, most countries around the world accept the concept of extended producer responsibility, which makes the manufacturer responsible for the entire lifecycle of the product, right up to how it is recycled. This type of requirement incorporates comprehensive WEEE management schemes and operators are included in these schemes to ensure responsibility is balanced across all the parties involved in the product's lifecycle. However, the particular characteristics of regulation in the Latin American market mean that operators have to assume the role of manufacturers for the purpose of WEEE compliance and as a result have been burdened with excess costs and obligations related to e-waste management. In effect, operators are being punished for taking a proactive e-waste stance.

2: Infrastructure. This issue is compounded by an existing recycling infrastructure that can't cope with the sheer volume of mobile handsets that need to be processed. According to Waste Management World, for example, a lack of capacity for coping with solid waste management costs Brazil around $13 billion a year.

Also, most Latin American countries do not have the recycling plants needed to process hazardous materials such as mobile phone batteries — meaning they need to be sent overseas for disposal.

The particular characteristics of regulation in the Latin American market mean that operators have to assume the role of manufacturers for the purpose of WEEE compliance and as a result have been burdened with excess costs and obligations related to e-waste management. In effect, operators are being punished for taking a proactive e-waste stance.

By taking a proactive approach to dealing with e-waste, the mobile industry in Latin America continues to deliver major social and environmental benefits. However, these weaknesses in regulation mean the industry is currently shouldering disproportionate responsibility for processing e-waste.

Ultimately, what's needed is fairer regulation that promotes integrated e-waste management, encourages the creation of transparent audit processes and places equitable financial responsibility on all the parties involved. The best way to achieve this is for governments to initiate discussions with all stakeholders, including manufacturers, importers, service providers and the recycling industry, as this is the path recommended by a range of global institutions, including the ITU, the StEP Initiative, EMPA and RELAC.

The right regulatory environment would not only encourage best practices for reuse and recycling, but also bring significant economic advantages. According to the experts from the e-Waste Academy, 320 tons of gold and 7,500 tons of silver per year are required to produce electronic devices, such as mobile phones and PCs, and if this material could be efficiently extracted from end of lifecycle devices, such as mobile phones, it would have a market value of $21 billion.

1 *Article based on GSMA figures: http://www.emarketer.com/Article/Latin-America-See-Steady-Growth-Mobile-Users-Connections-Through-2017/1010474*
2 *http://www.idc.com/getdoc.jsp?containerId=prUS24461213*
3 *Figure quoted from EWA in 'e-waste in Latin America — Exec Summary': GSMA 2014.*
4 *http://www.electronicstakeback.com/wp-content/uploads/Facts_and_Figures_on_E-waste_and_Recycling.pdf*

Mobile birth registration in Uganda helps bring people living in rural communities closer to the government

Policy Goal

In most countries, proof of identity is a prerequisite for gaining access to basic services, such as education and healthcare, or even for claiming rights to an inheritance. In remote areas, however, poor communication between local villages and administrative centres means obtaining something as fundamental as a birth certificate is often a challenge. Thankfully, innovative use of mobile technology is now making it easier to extend the reach of government registration services to these areas.

Action

Mobile network operator Uganda Telecom has developed the Vital Records System (VRS), which allows the safe and rapid transfer of birth registration information from remote communities to central government. It is raising registration rates in some of the country's hardest to reach regions, ensuring that these children are much less likely to have issues accessing government services in the future.

Enablers

- Support from government for the creation of a mobile-based birth registration system
- Novel application of existing mobile infrastructure to deliver low-cost access to a vital Ugandan government service
- A flexible solution that recognises variations in local expertise and technology sophistication
- A sustainable model that delivers societal advantages and business benefits

Outcomes

- Increase in birth registrations in the remotest areas from 25 to 80 per cent
- Technology that works across 2G and 3G networks and with all mobile handsets
- Airtime stores act as official registration hubs, allowing citizens to access central government services in local communities

Strategic Challenge

Figures from the World Bank and the Uganda Health Demographic Survey estimate that around 1.4 million children are born in Uganda every year, but just 21 per cent of infants aged five and below have had their births officially registered[1].

The lack of a birth certificate can affect these children throughout their lives. A key benefit of registration is the ability to prove identity, which in turn opens up access to services such as welfare, health and education. Ensuring that births are properly recorded is also essential in protecting citizens against crimes that include human trafficking, child abuse and early marriage. In fact, the importance of birth registration and proof of identity is so important that it is enshrined within the UN Convention on the Rights of the Child[2].

In Uganda and countries across sub-Saharan Africa, mobile operators are working to apply mobile technologies in new ways to ensure a child's right to an identity is respected, so children can benefit from all the opportunities this brings in the future.

Mobile boosts Uganda's birth registration rate

Uganda is the second most populous landlocked nation on earth. As with many countries, government services in Uganda are concentrated in urban centres. However, with a largely agricultural economy and a population spread across its 146,000 square miles, these services can often be remote from the people who need to access them.

As a result, birth registrations are often complex and prone to delay. Unfortunately this means many births go unregistered at the national level — potentially denying government services to millions of citizens.

In 2012, Uganda Telecom recognised that its mobile infrastructure could provide the secure links needed to bring the right of an identity to all of Uganda's children. Working with UNICEF and the Uganda Registration Services Bureau, it has developed a mobile-based birth registration service known as the Vital Records System (VRS), rolling out a pilot project that has already proved itself across much of the country.

VRS has been designed to work in both healthcare and non-healthcare environments. For example, in a healthcare setting where a child is born in a hospital, local administrators simply enter and upload birth details to a web-based registration portal — with connectivity delivered through Uganda Telecom's existing 3G network. Data is transferred almost instantaneously, and it cuts the uncertainty about whether records will reach the national registration office, which plagued the paper-based process in the past.

To cover non-healthcare settings — where births take place in the home or outside a hospital — SIM cards have been provided to a network of registration agents (usually village chiefs). The SIM is mapped to the registration agent's name and allows them to send information on births from their mobile phone using an Unstructured Supplementary Service Data (USSD) application — which acts as a secure gateway to a central database. This information is then uploaded to the same web-based registration portal used by local hospitals.

Receiving information from these mobile sources, Uganda's Registration Office then verifies the births and sends back a web-based certificate that can be printed at the hospital or registration agent's office — typically, this whole process takes a single day. As an additional bonus, with digital records always accessible online, a lost paper birth certificate can be rapidly replaced.

Making it happen — mobile technologies that turn complexity into simplicity

VRS is designed to be adaptable to a range of on-the-ground variables. To test whether the system would work even in the most challenging circumstances, the pilot targeted areas with the lowest registration rates in the country. Even in these hardest to reach regions, VRS drove a rise in birth registrations from less than 25 per cent to over 80 per cent. It is a system that doesn't rely on expensive new technologies, but instead uses existing handsets and networks in new ways to overcome what was once considered to be a very difficult problem.

For example, VRS relies on Uganda Telecom's standard network

"Before [VRS], it would take a month to register a birth. Now it just takes a day. Most of the institutions — like schools — now require children to have these certificates, so it's really had an impact and people appreciate it."

Rwebuga Kizito, District Population Officer, Kiboga District

infrastructure to deliver its benefits. As a result, the platform can be rolled out quickly. Furthermore, as users of the system are dealing with a piece of equipment they probably already own and are thoroughly familiar with — the mobile phone — costs are kept low and training needs are minimal.

VRS also uses the right technology in the right place for the right people. In a country with variable coverage, it takes a 'lowest common denominator' approach to technology. For example, VRS can take advantage of greater 3G functionality where it is available, but it is still designed to operate on 2G connections. Similarly, the application is USSD, rather than Java-based, so older and less complex phones — which are common in remoter regions — can be used.

Alongside the clear societal benefits, VRS offers business advantages too. It makes more and better use of Uganda Telecom's data networks, while the company also encourages people to announce births using SMS and voice services. As an example, hospitals in the pilot that didn't already have a 3G connection were provided with one — increasing the range of institutions using Uganda Telecom's network and the hospitals' web capabilities.

To build on the success of VRS, there are plans to expand the system to support other operators' networks. UNICEF is already working with another Ugandan mobile operator, MTN, on a USSD menu that will allow its users to send birth information to the VRS server. As well as expanding the service it will improve usability, with registration agents who are not Uganda Telecom customers able to register births without having to swap their SIM.

With interest growing across sub-Saharan Africa, VRS promises to revolutionise registration of not just births, but also other major events such a marriages and deaths. Uganda Telecom is now working towards using its network of airtime sales agents to act as physical hubs at the end of the digital services chain — with people able to print their birth certificate in the local store, for example, rather than having to retrieve them from their nearest hospital, which could be many miles away.

VRS in Uganda demonstrates how mobile communication is opening up new and unexpected opportunities — bringing governments ever-closer to the people they serve.

The mobile phone unlocks trusted and secure digital services in Switzerland and around the world

Policy Goal

Secure user authentication is essential to the success of the digital economy, but managing multiple usernames and passwords has become unwieldy for most consumers. What's needed is a simple, secure system that can be used across a range of websites and services.

Action

Mobile network operators around the world are working to deliver on the mobile phone's potential to act as a key for secure digital services without requiring users to share personal data to authenticate themselves. In Switzerland, Swisscom's Mobile ID system is already demonstrating how a range of challenges can be overcome to create an easy-to-use, highly secure system for accessing personal, business and government services.

Enablers	Outcomes
▪ SIM card-based digital key that leverages the popularity and personal nature of the mobile phone	▪ Convenient, secure and trustworthy access to digital services for individuals, businesses and governments
▪ Mobile operator investment in technologies and systems that act as the building blocks for national and global authentication solutions	▪ Potential savings to governments of $50 billion[1] by 2020
▪ Security offered by cryptographic coprocessors on the latest SIM cards	▪ Further eCommerce growth, helping to boost digital economies
▪ Governments increasingly providing online access to key services	

1 http://www.mobilevrs.co.ug/home.php
2 https://www.unicef.org.uk/Documents/Publication-pdfs/betterlifeleaflet2012_press.pdf

Strategic Challenge

People, governments and businesses are increasingly interacting online, as modern life becomes more digital, mobile and global. The revolution in mobile connectivity offers compelling advantages, including faster commerce, increased and more efficient access to a range of services (such as e-commerce and e-government) and greater convenience.

If the social and economic opportunities are to be fully realised, however, being able to quickly and accurately establish identity online is critical. Research suggests the benefits will be compelling. For example, governments could potentially shave as much as $50 billion off costs associated with citizen engagement, while transaction times could be cut by as much as 65 per cent[2]. The challenge is to strike the right balance between simplicity, privacy and security.

Establishing authenticity — Swisscom and Mobile ID

Digital services have the potential to transform lives, but only if robust authentication systems can be used to secure them. Healthcare providers, for example, need to know that a request to see confidential health records is authorised, businesses need to be sure of an online buyer's identity and governments must know exactly who is trying to access their online services.

The key to securing digital access is finding a tool that virtually everybody owns, but that is also uniquely personal to its users. The mobile phone fits these requirements perfectly and, as a result, operators are placing it at the heart of flexible and robust authentication solutions.

In early 2013, mobile operator Swisscom introduced Mobile ID, a mobile authentication system developed for use by both businesses and consumers. The key to Mobile ID's effectiveness is its use of a secure encryption technology tied to the user's SIM card.

Mobile ID removes the need for users to remember an increasing number of passwords and codes to access social networks, banking services and more. Instead the mobile phone becomes the key that unlocks these online services, with each unique SIM card acting as the authentication mechanism. It is a compelling solution for businesses, governments, consumers and citizens.

For example, in business and government, Mobile ID has the potential to be used as a replacement for other measures, such as the use of security tokens, for providing authenticated access to remote workstations, virtual private networks, or customer relationship management and enterprise resource planning systems. And for individuals, Mobile ID can act as the key to online government, banking, health and retail services.

Mobile ID has been widely recognised in the security community for combining EAL 5+ levels of security (an internationally recognised security benchmark) with excellent ease of use that makes the service appealing to consumers and business users.

Making it happen — securing access to the digital world

Swisscom's solution differs from most other mobile signature services, as although it uses public key infrastructure (PKI) technology for authenticating the user, the only identity elements employed are the individual's PIN number and mobile telephone number. So, rather than seeking to verify that 'John Smith is accessing this account at this exact moment' (which requires a complex and rigid in-person identification process for the user), Mobile ID simply states to the querying party that 'the same user who established an account with service X (e.g., a personal insurance account) is the same individual who is trying to access this account now'. This system also allows the user to maintain a higher level of privacy, as they remain anonymous to the service that is requesting to know whether or not they are entitled to have access.

Although this method simplifies the authentication process, it doesn't compromise security. In fact, Mobile ID conforms to the highest standards of security — EAL 5+ — due to its reliance on both PKI technology and the cryptographic hardware found in the latest SIM cards. Part of the service runs as a SIM Toolkit applet on this hardware and is only accessible by the mobile operator 'over the air' using the correct identification key.

> *"Mobile ID can be used anywhere secure authentication is required. Digital identities can be uniquely determined, and access and interaction are effectively protected."*
>
> Adrian Humbel, Head of Identity and Access Management, Swisscom

To help spur adoption of the system, Swisscom provided web developers with a standard interface that made it easy to connect their platforms to Mobile ID. And on the user side, it first tested the service with its own internal employees, so it could perfect the system before offering it to customers. This careful preplanning has paid dividends, as the Mobile ID user base reached 25,000 users shortly after launch, and adoption continued to increase at a rate of around 10 per cent per month.

Mobile ID shows that a mobile phone-based authentication system that takes advantage of cryptographic hardware on today's SIM cards can really deliver in the market. However, if mobile phone-based authentication

systems are to truly achieve their full potential, they will need to work seamlessly across different countries and operators' networks.

This is the aim of the GSMA's Mobile Connect project. It is bringing together the technical and operational expertise of mobile operators such as China Telecom, Etisalat, Orange, Telefónica, Telenor and Telstra to develop a single, interoperable system for mobile-based authentication. Mobile Connect promises a security system that will simplify people's lives by freeing them from having to memorise multiple different passwords and PINs. Instead, a single, mobile phone-based authentication solution will provide the only verification tool they need.

1, 2 *http://www.secureidentityalliance.org/files/13-11-19-SIA_eGov_Study.pdf*

South Korea glides into a leadership position on contactless payments thanks to NFC

Policy Goal

Near Field Communications (NFC) contactless technology promises to revolutionise lives around the world. NFC-enabled mobile devices offer people a fast, simple and safe way to pay for goods and services. As well as facilitating commerce, leadership in NFC can lead to the creation of significant numbers of new jobs and open up fresh revenue streams in national economies. But its potential goes even further than that, as NFC can potentially act as a secure digital key, granting authorised access to everything from buildings to sensitive personal data.

Action

The Republic of Korea is realising its ambition to be a global leader in NFC technologies. This has been made possible by a model alliance between the country's mobile network operators, regulators, handset makers, payment card providers and point-of-sale suppliers. South Koreans can now simply tap their handset against a reader to complete a host of everyday tasks.

Enablers

- Government, mobile industry, regulatory and business cooperation acts as global model for mobile technology implementation
- Clear leadership from the national telecoms regulator ensures that South Korea is best placed to benefit from new mobile technologies
- Significant operator investment, driven by confidence in the regulator and a clear understanding of its goals

Outcomes

- Widespread network of NFC readers allows a range of transactions to be completed via mobile devices
- Broad NFC adoption by businesses and consumers
- South Korean global leadership in NFC, ahead of European and US markets
- Economic benefits including world-leading South Korean handsets and a substantial number of new jobs supporting NFC and related technologies

Strategic Challenge

A cashless society has been a goal that many have pursued over the years. In trying to realise this dream, most now agree that credit cards have come up short, as 'plastic' isn't suited to all types of transactions. The result is that consumers currently feel they must simultaneously carry around cash and cards, both of which risk financial loss if they are mislaid or stolen.

What's more, as consumers' lives have become increasingly digital, they are required to use ever more passwords and PINs to access their home, places of work and electronic records. These barriers can stifle personal freedoms and commerce, and also cause significant inconvenience for consumers and businesses. The challenge is to create a system that gets around these issues by providing simple and, importantly, secure access to goods, services and information.

Korea pioneers NFC — and reaps substantial rewards

In 2011, the Korean Communications Commission (KCC), the country's telecoms and media industry regulator, set a clear goal for South Korean companies to lead the global rollout of mobile NFC technology.

Some cafes and restaurants allow diners to order by tapping an NFC tag.

NFC is a contactless technology that allows people to simply tap their mobile handset against a reader to complete a range of tasks, such as making payments, validating tickets and gaining access to buildings or data. NFC is being implemented to a global standard supported by the GSMA to ensure seamless contactless payments, no matter where customers are in the world.

In just three years, South Korea has achieved the KCC's original objective, bringing valuable benefits to the country's economy and citizens as well as reinforcing the nation's standing as a technology leader.

- **Economic benefit.** The KCC estimates that NFC will generate around $1.2 billion for the South Korean economy every year. This is likely to increase as use of the technology expands globally and the country starts to export its NFC expertise.

- **Employment opportunity.** The KCC estimates that by 2016 around 5,700 jobs will be created in South Korea to support NFC.

- **Technological advantage.** South Korean handset manufacturers are well ahead of the game in the development and sale of NFC-capable mobile devices. To date, operators have sold in excess of 10 million NFC handsets within South Korea alone.

- **Comprehensive coverage.** With support from providers such as MasterCard and Visa, there are an estimated 200,000 NFC readers in South Korea, and there are more than 22,000 NFC tags deployed at bus stops and railway stations. In shops without a dedicated reader, users can still initiate NFC payments by scanning QR codes or entering a shop's special membership code, which then transfers funds to the shop owner's handset. This means NFC payments can be made virtually anywhere.

- **Widespread adoption.** NFC payments for travel services have proved particularly popular — 2 million people have used NFC to pay transit fares (reducing queues and delays at stations). On one service in 2011 alone, it was used 30 million times to pay $9.5 million in fares.

Making it happen — South Korea's Grand Alliance

NFC's broad adoption in South Korea is the result of model cooperation. The KCC encouraged collaboration by setting up what it called the Grand Alliance. This brought together South Korean mobile operators — KT, SK Telecom and LG U+ — with a range of card partners including Hana SK Card, BC Card, Shinhan Card, MasterCard and KB Kookmin Card. Naturally the alliance also includes device manufacturers, such as Samsung, LG, Pantech, UbiVelox, KEBT, MtekVision and 3A Logics; and telecoms billing service providers, including Danal, Mobilians, KCP and Galaxia.

Central to its success has been the adoption of the global standard, which is backed by the GSMA. This stipulates that sensitive data relating to the NFC service is stored in a secure domain on the handset's UICC (commonly known as a SIM or USIM card). It also mandates the use of the 'Single Wire Protocol' to connect the UICC to the handset's NFC chip.

By working together, it has been possible to coordinate the simultaneous rollout of compatible handsets, UICCs, point of sale equipment and transport validation systems. It has given each link in the NFC chain the confidence to proceed without the paralysis that often afflicts major projects as one group of stakeholders waits on the actions of another.

The active support of the KCC underlines the potentially pivotal role of regulators in the successful deployment of mobile NFC services.

On an operational basis, it has also resulted in wide-ranging compatibility where, for example, a vendor's discount coupons will work across different operators and handsets. It is precisely this comprehensive coverage and ease of use that is encouraging consumers and businesses to adopt NFC for daily transactions.

The alliance has also been innovative in its efforts to showcase the benefits of NFC to consumers. It has, for example, created special zones such as the one in Myeong-dong, Seoul's busiest shopping district. NFC services include payments, loyalty programmes, digital receipts and smart posters, where customers tap the advertising to receive coupons, discounts and free products. More than 200 district merchants accept payments made with NFC handsets, with some cafes and restaurants allowing diners to order by tapping an NFC tag.

South Korea is building on its lead in NFC by expanding services internationally. South Korean operators have been working in Japan to roll out NFC-compatible services, initially in Tokyo, but with plans to go nationwide. Work in China is helping to build a pan-Asian network, while South Korean expertise is also supporting projects in France, Germany, Italy, Spain and the UK — bringing a global NFC network closer to reality.

The active support of the KCC underlines the potentially pivotal role of regulators in the successful deployment of mobile NFC services. By putting together the Grand Alliance, the KCC has set the benchmark in collaboration and established a precedent that can help to replicate the economic, employment and social benefits of speeding up the adoption of innovative mobile technologies around the world.

"The right regulatory framework is very important. Government regulation actually sets the role of stakeholders in the ecosystem. It also influences the business model and market activation."

HyeYun Chung, NFC Business Development Manager, SK Telekom

Twinning loyalty schemes with an innovative mobile wallet brings a wealth of opportunity to South Korea's operators and retailers

Policy Goal

The ubiquity and 'go anywhere' nature of the mobile phone is driving businesses to develop innovative ways for consumers to use their handsets to discover and purchase goods or services. But mobile wallets can offer consumers much more than just convenient ways to pay, they can also support loyalty card schemes and location services, allowing users to redeem discount vouchers via their handset or quickly find their nearest store. All this has been made possible through cross-industry cooperation between mobile operators, payment networks and retailers.

Action

South Korea is realising the potential of mobile commerce with world-leading mobile wallet technologies that support loyalty schemes as well as cross-network payments. South Korean mobile operator Korea Telecom (KT) launched its MoCa mobile wallet system in 2012 to bring consumers new levels of convenience and value, and businesses ever more effective and profitable ways of engaging with their customers.

Enablers

- Cooperation between the regulator, banks and business to build the environment and infrastructure for a feature-rich mobile wallet
- Mobile and payment technologies that support interoperability
- Front-end investment to deliver long-term returns

Outcomes

- A feature-rich mobile wallet solution attracting 2 million users in just two years
- A comprehensive network of 55,000 NFC-enabled Point of Sale terminals across South Korea
- Discount offers and coupons delivered directly to customers' handsets to encourage commerce

Strategic Challenge

The technology to use a mobile phone as a wallet is now available, but building the ecosystem to make sure mobile payments are widely accepted is still a challenge in many countries, mainly because it requires the alignment of several complex technologies, systems and processes.

For example, a regulatory environment that promotes and rewards both cooperation and innovation is needed, as well as a willingness on the part of operators and handset manufacturers to support interoperable technologies.

Banks and payment networks must also play their part to ensure these technologies can support safe and secure transactions, while businesses must be encouraged to update point-of-sale (PoS) terminals so they support mobile payments. And customers also usually need educating on the benefits of mobile wallets.

It is a big challenge, but one that operators around the world are accepting. Working with all the relevant players, they are creating mobile payment platforms that will ultimately mean the end of bulky wallets, plastic cards and the need for consumers to remember multiple PINs.

MoCa means business — simplicity that improves the customer experience

In 2011, South Korean operator Korea Telecom (KT) set about working with regulators, banks and businesses to build the environment and infrastructure needed to create a feature-rich mobile wallet. The result is MoCa, a wallet system that launched in 2012, offering much more than just the ability to make payments via a phone.

By downloading the MoCa app for Android or iOS handsets, customers of any South Korean operator (not just KT) can simply enter their personal details, as well as a verification number sent via SMS, to link their phone to the wallet. Once this step is completed they can join loyalty schemes from a wide range of companies with just one click, rather than having to go through repetitive sign-up processes for each one. As soon as they've joined a loyalty scheme they can download reward points, discount offers and coupons directly to their handset.

Using a secure digital verification process, customers can also link their traditional 'plastic' credit and debit cards to the MoCa wallet, with payments authorised via a single PIN. Once their cards are linked to the

wallet, consumers can use it to both make payments and take advantage of money-off offers, saving them the inconvenience of having to juggle multiple plastic cards.

MoCa has recruited the most popular payment providers, including the big three credit card companies in South Korea – Visa, MasterCard and BC Card. The wallet also supports the T-money and eBCard transport ticketing schemes.

Widespread adoption means there are already over 55,000 Near Field Communications (NFC)-enabled PoS terminals across South Korea, allowing MoCa users to pay for items and redeem money-off coupons in-store. Even when a compatible terminal isn't available, shopkeepers can scan a barcode displayed on the customer's mobile device manually. It means MoCa has the potential to be used in virtually every store in the country.

MoCa is also making life easier for consumers in other ways. For example, travellers on South Korea's mass transport networks no longer have to carry a travel card — instead they can pay via the MoCa wallet on their phone using contactless NFC technology. With ticketing demanding faster validation than other forms of payment (as customers quickly pass

through automatic barriers), MoCa was designed to be able to authorise payments at almost the same speed as a contactless travel card.

MoCa also offers the potential for greater security. Today, if a consumer loses his wallet, he must contact a host of companies to cancel bank cards, credit cards, travel tickets and loyalty schemes. Should a customer lose his MoCa-enabled mobile device, however, one call cancels the whole mobile wallet.

Simplicity is the key to MoCa's success. Customers need to carry fewer (if any) plastic cards and can validate a range of actions with a single PIN. In addition, the system keeps track of every loyalty scheme, showing the coupons, offers and points available, as well as directing consumers to their nearest store.

Making it happen — regulation, technology and partnerships

Creating the right environment for MoCa to be successful demanded cooperation between regulators, technology companies, retailers and payment providers.

Regulation. While MoCa is an undoubted triumph of technology and inter-industry working, it would never have been possible without a secure regulatory foundation. The Korean Communications Commission (KCC) has provided

that platform, supporting initiatives such as a three-month promotional trial of mobile wallet services in one of Seoul's major shopping districts. This 2011 government-driven pilot allowed operators and credit card issuers to test and demonstrate the system, ensuring the successful integration of all the components before a full roll-out.

Technology. The success of MoCa has been driven in large part by the fact it is available across different mobile networks and operating systems. This has demanded a lot of innovative thinking and cooperation from operators and other technology providers. For example, the ability for NFC-enabled services to work across different networks was achieved by the operators coming together to create the Korean Standard (KS) Payment Applet Specification. The operators also worked together on a standard specification for handling digital vouchers and loyalty schemes, as well as a common interface for NFC-enabled point of sale terminals.

Retailers and payment providers. To date, 33 retail brands are using the MoCa wallet to support their loyalty programmes and deliver

coupons. MoCa has also recruited the most popular payment providers, including the big three credit card companies in South Korea (VISA, MasterCard and BC Card), debit and credit cards from 10 issuers and four major banks, and KT's MoCa Pay and ZooMoney payment services. The MoCa Wallet also supports the T-money and eBCard transport payment/ticketing schemes. Operator-led standardisation is acting as a springboard for cross-border cooperation, with the participation of China Mobile and NTT DOCOMO meaning that MoCa can now be used in China and Japan.

In countries such as South Korea, where innovation in mobile technology is actively encouraged and supported by significant investment, the mobile phone is becoming even more of an essential tool for life, thanks to its ability to make travel and shopping so convenient. What's more, these new mobile payment technologies are driving new business models and opening up fresh avenues for growth, all while delivering an ever-improving customer experience.

Tanzania's pioneering 'test and learn' mobile money regulation drives financial inclusion

Policy Goal

Mobile technology has the power to connect millions of people around the world to financial services that were previously out of their reach. This means that mobile network operators can now work in collaboration with governments, regulators, banks and merchants to bring digital financial inclusion to those who have, in the past, struggled to access traditional financial services. By working closely with mobile operators and banks — and allowing regulation to follow innovation in mobile money services — the Bank of Tanzania (BOT) has seen the popularity of mobile money services in the country soar.

Action

The Bank of Tanzania (BOT) has adopted a highly successful 'test and learn' approach to mobile money regulation that allows both banks and non-banks to deploy the latest mobile payment services, while it applies safeguards for customer's funds and carefully monitors developments. As a result, Tanzania is today a mobile money and digital financial inclusion success story. It is the first country in Africa to have interoperable mobile money services as well, and is one of the few countries is the world where a mobile money service is distributing profits from the returns generated by its trust account back to its customers.

Enablers

- Innovative application of banking regulation allowing for rapid, risk-assessed deployment of mobile money services
- 'Test and learn' regulation from the BOT that allows the market to flourish while protecting consumers
- Highly collaborative relationships between government and industry

Outcomes

- One-third of Tanzanian households has at least one mobile money user
- More than 31 million registered mobile money accounts by December 2013
- The cumulative value of mobile money transactions surpassed $27 billion in December 2013
- Interoperability among mobile money services

Strategic Challenge

For most people today, access to formal financial services is taken for granted, but for over a billion people it is a luxury that simply isn't accessible. This can have a profound impact on their life. How can entrepreneurs build a business that creates economic independence for them and their community? How can people send money securely to friends or family who live miles away? Where can people who are saving for a brighter future put their money so it is safe?

Effective mobile money regulation reaps rich rewards

In 2008, the BOT began its mobile money regulatory journey when a visit from one of the country's mobile operators introduced the idea that a simple mobile handset could do much more than make calls. From this first meeting, the BOT was keen to engage with the mobile industry to learn more about the potential of digital financial inclusion — a new and unfamiliar topic to the bank. In December 2013, Tanzania launched its National Financial Inclusion Framework that set out a clear goal to reach 50 per cent of the population with formal financial services by 2016. Its definition of financial inclusion has been updated to include mobile money services.

In Tanzania, a high proportion of the population remain unbanked, but the country has experienced huge growth in mobile, and by 2014 there were over 17 million unique mobile subscribers. Consequently, the BOT quickly saw the potential of mobile payment

services. It also made a progressive decision: to let regulation follow innovation and support financial inclusion while managing risks.

As a result, it introduced an innovative 'test and learn' regulatory system that speeded up mobile money deployment, provided the legal certainty that service providers needed to justify investment and brought citizens vital financial inclusion and consumer protection. The results speak for themselves. As of December 2013[1]:

- 35 per cent of Tanzanian households had at least one mobile money user

- 11 million mobile money accounts were active

- The cumulative value of mobile money transactions surpassed TZS 53 trillion ($27.1 billion)

- 87 per cent of users found mobile money cheaper than any other service available to them, and over 80 per cent find it both quicker and easier to use than alternatives

Making it happen — pragmatic regulation for rapid deployment

Mobile money offered an ideal route for bringing access to financial services to Tanzania's unbanked, but a significant barrier stood in the way: the country lacked national payment systems legislation.

The BOT closed the regulation gap by advising mobile operators to partner with a commercial bank to deliver services. Banking regulation is up to date, and this link allowed appropriate governmental oversight of mobile money services without the need to wait for new regulations to be passed into law.

Mobile operators and their partner banks were issued with 'letters of no objection', which allowed the BOT to see how markets developed before introducing appropriate and mobile money-specific regulation.

The BOT has mitigated risks through close engagement with mobile operators and their partner banks. Mobile money

providers have to adhere to a range of safeguards, including:

- Presenting plans to BOT before approval

- Obtaining a Tanzanian Communication Regulatory Authority (TCRA) licence for the provision of value-added services

- Providing a risk management plan to BOT

- Establishing safeguards for customer funds

- Building in consumer protection mechanisms

- Implementing Know Your Customer (KYC) standards

- Imposing maximum transaction limits

- Imposing restrictions on the use of interest

This progressive approach supports the country's mobile money market and allows it to flourish. By engaging closely with mobile operators (and their respective partner banks), the BOT has been able to offer the

"I use my phone for communication, but also for financing. Tigo Pesa has reduced my costs for sending money — I don't need to go to the bank now. Everything is easier after getting a phone."

Rachel, Nurse, Morogoro in Tanzania

private sector a degree of freedom in rolling out new products, responding with sufficient safeguards where necessary. The result is the emergence of four highly competitive mobile money providers — ensuring the market remains very dynamic.

Now, as long as Tanzanians have access to a mobile phone and can get a signal, they can connect with banks to access their accounts via a mobile money wallet. Similarly, village savings and loan associations are piloting mobile money services to perform loan disbursements, insurance products are becoming available, farmers are receiving payments and other information services through the Connected Farmer Alliance, and energy companies use mobile payment services to help finance, manage and receive payments for solar power systems.

One of Tanzania's mobile money providers, Tigo Pesa, has now also introduced a new initiative, called Tigo Wekeza (Swahili for 'Tigo Invests'), that makes profit-share distributions from returns generated on the Tigo Pesa Trust Fund. The pay-out takes place every quarter and will be calculated as a proportional share based on the average of the customer's Tigo Pesa daily balance. It is an exciting development that represents a unique long-term addition to the mobile money value proposition.

The move follows a circular issued by the Governor of the BOT in February 2014, which states that interest accrued on the trust accounts of mobile money services should directly benefit mobile money customers and agents.

Tanzania now leads the way in Africa when it comes to interoperability between mobile money platforms, with the first interoperable service having gone live in October 2014.

According to Tigo, for the past three and a half years the Tigo Pesa Trust Account has achieved a return of between five and 12 per cent, and aims to continue to achieve a competitive return in the future. Tigo plans to pay all of this money back to its customers. With inflation in Tanzania running just over six per cent, this represents a significant return on customers' investment in mobile money. It will not only create a powerful loyalty incentive for customers, but the strategy is also expected to result in a substantial increase in money held in customers' wallets, as the effective rate of return is attractive relative to market rates.

Tanzania now leads the way in Africa when it comes to interoperability between mobile money platforms. Following an

agreement on interoperability signed between three of the country's mobile money providers — Tigo, Airtel and Zantel — the first interoperable service went live in late October 2014.
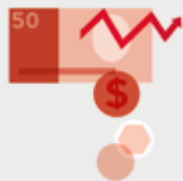
Interoperability allows subscribers on different mobile money platforms to directly send and receive funds between their mobile money wallets. Previously, if value was being transferred between different operators' services, the funds had to be cashed out first.

The introduction of interoperability is important, not just because it is convenient for users, but also because it is likely to increase the volume of digital transactions

and money flowing through the system, improve the sustainability of mobile money services and ultimately create a ubiquitous digital financial ecosystem.

All of these developments have been made possible due to the supportive regulatory environment created by the BOT. Its approach, of allowing regulation to react to the market, has proven so successful that today the Tanzanian regulator deals with mobile operators directly as a trusted party, without their bank partners. This one-to-one dialogue generates a positive, mutual understanding that balances the needs of the mobile operators with the regulatory objectives of the BOT.

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1   http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2014/03/Tanzania-Enabling-Mobile-Money-Policies.pdf

The DRC's competitive mobile money market helps widen financial inclusion

Policy Goal

A lack of access to financial services hampers growth in some of the world's poorest regions, denying millions of people the chance to transfer funds safely and securely, take out loans or buy insurance products. However, widespread access to mobile services and supportive financial regulation have the potential to deliver a wealth of financial products and services — literally into people's hands.

Action

Introduced in the Democratic Republic of Congo (DRC) in 2011 by the Central Bank, new and future-facing financial regulations have made it possible to extend economic inclusion and opportunity to those underserved by traditional financial services. Working with four mobile operators, the DRC has rapidly built a competitive mobile money market that offers a range of secure financial services — accessed via mobile handsets — to Congolese households and businesses.

Enablers

- Strong awareness by the government of the benefits of mobile money
- Clear commitment from the government to the rapid delivery of mobile money services
- Inclusive and transparent regulatory environment that ensures maximum value for all stakeholders

Outcomes

- Reliable and safe financial services delivered to 2.8 million Congolese citizens
- Mobile money transactions in the DRC totalling more than $30 million in December 2013
- Four mobile money providers offering competitive services to DRC's unbanked population
- An estimated increase in financial inclusion of 22 per cent in just two years

Strategic Challenge

An inability to access financial products represents more than an inconvenience — it can limit the economic opportunity of millions of people and stifle growth.

Traditional financial services often fail people who live in remote, less populated or unstable regions. For example, in the DRC many factors have made it challenging to develop a solid and functioning financial sector, not least the exceptionally low population density (29.3/km^2) in sub-Saharan Africa's largest country (by area), and widespread public distrust of banks after many people lost their deposited savings during the national crises of the 1980s and 1990s.

Therefore it is clear that new methods and technologies are needed to provide financial services to the underserved. If the right regulatory environment can be created by policymakers, mobile money platforms have the potential to bring financial services to everyone who has access to a connected device — irrespective of geography, demographics or political environment.

Creating competitive mobile money services

Most people living in the DRC have little or no access to traditional financial services. In fact, less than 4 per cent of the population hold an account at a formal financial institution. Mobile penetration, however, is much higher, at just under 44 per cent and rising[1].

In 2011, the Banque Centrale du Congo (BCC) moved to harness the growing reach of mobile networks in the country to expand financial inclusion. Key to achieving this was the creation of a pragmatic and effective regulatory environment — one that would allow new mobile money services to succeed in extending services to those currently underserved by traditional financial institutions.

A mobile banking task force was established, known as Le Comité Mobile Banking Task Force (CMTF), with the aim of putting in place enabling regulation that would create a competitive mobile money market. The CMTF brought together key stakeholders, including the finance industry, non-governmental organisations (NGOs) such as the Bill & Melinda Gates Foundation, mobile operators, government agencies and telecoms regulators.

The combined expertise of all these groups delivered rapid results, with

a new legal framework for mobile money services — known as Directive #24 — approved by the BCC in December 2011 just 10 months after the task force was established.

The move from regulation to realisation was equally swift. Between February and November 2012, mobile operators Bharti Airtel, Tigo-Millicom and Vodacom all launched mobile money services in DRC. Orange joined the market — bringing yet more choice for consumers — in 2014.

By the end of 2014, mobile money in the DRC had developed into a highly competitive and diverse market, bringing new opportunities and choice to citizens and businesses. As of December 2013, there were around 2.8 million people signed up to mobile money services, with each of the three original providers having attracted approximately a third of all transactions. Of the 1.2 million customer transactions carried out in December 2013, the average value for each transaction equated to $24

and the total value of all transactions added up to more than $30 million.

This rapid growth has been helped by the creation of an extensive network of 32,000 mobile money agents across the country.

Making it happen — transparent and inclusive regulation

Collaboration between stakeholders proved critical in the development of the DRC's mobile money market. For example, the formation of the collaboratively-driven CMTF facilitated the creation of effective regulation within a tight timeframe in a number of ways. For example, it helped the BCC assess different scenarios and gain a common understanding of the opportunities and challenges. At the end of the project, it also allowed the BCC to identify the best solution for the benefit of the entire ecosystem.

It is this pragmatic, transparent and inclusive approach that has

allowed the BCC to issue a single, consistent and coherent regulatory framework to mobile operators — with compliance made easier owing to the fact that rules have been discussed and agreed in advance.

The Central Bank hosts regular meetings with providers to ensure the market is operating properly and to identify opportunities to fine-tune regulation.

In opening up the market for financial services to non-traditional providers, building customer trust was clearly important, so a number of safeguards were put in place. For example, Directive #24 allows for banks, other financial institutions and special legal entities called 'electronic money (mobile money) institutions' to obtain licences to issue e-money. However, mobile operators must establish an incorporated e-money subsidiary that holds a minimum of $2.5 million in capital. Stringent checks are made both into the company and the products it plans to offer.

What's more, the BCC monitors mobile money providers closely and has stipulated monthly reporting requirements. The Central Bank also hosts regular meetings with the providers, either jointly or separately, to ensure the market is operating properly

and to identify opportunities to fine-tune regulation.

A number of other measures to protect customer funds have also been put in place. For example, all licensees must maintain a ring-fenced account of capital that matches the value of e-money they have issued. This provides customers with the confidence that their e-money is always backed up by sufficient funds.

The DRC has also taken a proportional, risk-based approach to transaction limits and Know Your Customer checks. This safeguards the administration of mobile money services, but at the same time ensures that poorer users, who often lack official ID, are not excluded from the benefits of these services. For example, low volume users can self-certify their identities, but are not allowed to exceed a transaction value of $100 a day. In comparison, higher volume users, who face tougher identity checks, have an increased daily transaction limit of $500.

The Central Bank has also mandated minimum levels of customer service and protection that providers need to adhere to. These include a call centre to deal with customer issues, 'lost PIN' services, systems to deal with allegations of agent fraud, and a cash reversal service that

"The financial inclusion rate in the DRC is very low, and building the payment and banking networks in a country with this extension and infrastructure gap is not feasible using the traditional bricks-and-mortar approach. But, today, mobile technology gives us the opportunity to connect people and financial providers at a fraction of that cost."

Jean-Claude Masangu Mulongo, Governor, Banque Centrale du Congo, January 2011

allows the rapid recovery of lost or misdirected transactions.

The mobile money market that has grown out of Directive #24 is expected to have increased access to financial services for DRC's citizens by 22 per cent in just two years, according to estimates by the BCC. This is all the more impressive considering the fact that mobile money is still a young market in the DRC.

1 *GSMA Intelligence*

As this young market matures, however, there is real opportunity for growth. For example, future services from mobile money providers could include loan and insurance products. Using the pragmatic, transparent and inclusive regulatory model pioneered by the BCC and its CMTF, it is clear that the DRC is well placed to ensure responsible, secure and rapid growth in its mobile money market.

Mobile brings crowdfunding and social lending to Turkey's women entrepreneurs

Policy Goal

Mobile phones provide women with a stronger sense of security, greater independence and increased economic opportunity, yet women are 21 per cent less likely to own a mobile phone than men. Estimates suggest that in low to middle income countries alone, this gap equates to 300 million women who might otherwise be connected. In economic terms, it adds up to around $13 billion of lost revenue for mobile operators[1], but its negative economic impact for the wider economy is far greater. Now operators are working to bridge this gender gap through innovative programmes that are not only helping women gain access to mobile technology, but also encouraging them to become entrepreneurs.

Action

In Turkey, mobile operator Turkcell is working with non-governmental organisations, government and innovative finance providers on the 'Women Empowerment in Economy' initiative. Launched in 2012, this project uses a combination of technological, financial, educational and business levers to start tens of thousands of women across the country on the road to founding and expanding their own business.

Enablers

- Access to crowdfunding and micro-finance during the critical start-up phase of a business
- Education to encourage effective business practices
- A thriving e-commerce platform to bring products and services to a wider market
- Recognition of gender in Turkey's National Broadband Plan

Outcomes

- On target to reach 100,000 women by 2016
- Over one million Turkish Lira raised through crowdfunding to support female entrepreneurs by 2014
- More than 2,700 products brought to market from women across 81 cities

Strategic Challenge

Turkey is one of the world's fastest growing economies, with GDP in the region of $820 billion. However, Turkish women make up only 29 per cent[2] of the country's labour force. This compares to a global average of more than 57 per cent — placing Turkey in 120th place (out of 135) in the World Economic Forum's Global Gender Gap Index[3].

Global studies suggest this gender divide could be having a significant negative impact on the wider Turkish economy. For example, in a 2013 discussion note from the International Monetary Fund[4] on the worldwide situation, experts reported that per capita GDP losses resulting from the gender gap may be as high as 27 per cent in some regions.

To help close the gap, mobile operators in Turkey and around the world are working in partnership to use the power of mobile to connect women with technology, business opportunities and markets — unleashing their potential in the workplace.

Realising the potential of Turkey's businesswomen

In Turkey, the penetration of feature phones has reached 59 and 62 per cent among men and women, respectively, whereas smartphone penetration among women lags behind at 17 per cent compared to 21 per cent for men[5]. The problem is hardly unique to Turkey, as 21 per cent fewer women than men, globally, have a mobile phone. However, Turkey is one of the few countries to recognise the importance of gender in its National Broadband Plan[6], and in 2012 Turkish mobile operator, Turkcell, started an ambitious programme to help women — and women entrepreneurs, in particular — benefit from the power of mobile communications.

In partnership with The Turkish Foundation for Waste Reduction, the Ministry of Family and Social Policies and the Turkish Grameen Microfinance Programme, Turkcell has developed the 'Woman Empowerment in Economy' programme.

The project recognises that starting any new venture can be demanding, but challenges are amplified when that business is run by women in a traditionally male-dominated environment. As a result, it aims to deliver the right support, through the right channels at precisely the right time to help women make a success of their new business.

The programme provides women entrepreneurs with access to small loans — from around $220 to $6,600 — via a platform built by Turkcell. These loans can be a huge help during the challenging start-up phase of business development. Borrowers pay back the loans in small, affordable instalments over 46 weeks[7], with monies fed back into the system to help yet more budding businesswomen.

The loans are funded through crowd-sourcing, the first example of a mobile operator partnering with a microfinance institution to offer a social lending product. People can lend money via online and mobile payments, with the micro-loan model overseen by the Turkish Foundation for Waste Reduction, the Turkish Grameen Microfinance Programme — an extension of the innovative micro-finance initiative started by Nobel Prize-winning Professor Muhammad Yunus in Bangladesh.

The programme also provides women with invaluable education in effective business practices so they're equipped with the skills to make the most of every business opportunity.

Education resources include videos as well as face-to-face training sessions.

Alongside finance, banking and education, the project also provides these businesswomen with an online 'shop window', opening up access to bigger and potentially more lucrative markets.

Making it happen — mobile makes the right connections

For the Women Empowerment in Economy project, Turkcell is using its mobile communications expertise and infrastructure to connect project partners with Turkey's female entrepreneurs.

One of the key elements of the project is the platform the operator has built to underpin the crowdfunding and social lending services provided by Turkish Grameen Microfinance. It allows donations or loan capital to be paid in a number of ways, including by mobile phone via online payments or wire transfer.

It is the first time a mobile operator in Turkey has collaborated with a

"Meeting women's organisations in all parts of the world, I was impressed to see how the use of a mobile phone can improve women's access to literacy, health, banking, employment and business opportunities, to mention just a few."

Cherie Blair, Founder, The Cherie Blair Foundation for Women

social lending organisation to deliver micro-finance. Also, Turkcell doesn't just provide the platform for others to make and receive payments, it also uses it to donate its own funds into the project. As of October 2014, the lending platform had crowd-sourced over one million Turkish Lira to help female entrepreneurs.

The operator's expertise has proved instrumental in delivering the project's banking services, too. Turkcell has ensured that microcredits can be dispersed and collected easily via mobile phones that have contactless Near Field Communications technology built-in. Since July 2013, all micro-credit transactions have been delivered in this way. In some instances, however, these businesswomen need quick access to cash. As a result, Turkcell has also distributed over 65,000 ATM cards to women on the programme.

As technical and financial literacy was identified as a key issue for many of the businesswomen being targeted by the programme, it was decide it should also include educational elements. These have taken the form

of mobile, video and face-to-face training sessions. Courses on sales and marketing, communication and personal development have been designed and provided in association with the Turkcell Academy and Özyeğin University. So far the sessions have been delivered to around 500 women across six Turkish cities.

The final major element of the programme was the e-commerce platform, known as the 'Mobile Bazaar'. Created by Turkcell and delivered through the operator's online infrastructure, it has already brought more than 2,700 products from women in 81 cities to a wider buying public.

The Woman Empowerment in Economy project demonstrates how the combination of NGO know-how and mobile communications expertise brings real benefits to — and levels the playing field for — socially and economically disadvantaged groups. In Turkey, where one in five women live on the verge of poverty[8], it will see 100,000 female entrepreneurs gain access to new economic opportunities by 2016.

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The Philippines prepares for the worst to deliver the best mobile communications when disaster strikes

Policy Goal

In the event of a disaster, access to timely information is as critical as the need for food, shelter and medical assistance. Mobile networks play a critical role in disaster response efforts, helping to mobilise and coordinate local, national and international relief efforts when people, governments and humanitarian agencies need robust and reliable communications the most.

Action

The Philippines is a country familiar with devastating natural disasters such as Typhoon Yolanda (Haiyan), which caused huge destruction in 2013. Despite the existence of some strong coordination between mobile network operators and government, it showed that the Philippines needed to raise its benchmark for disaster response preparedness. It prompted government, mobile operators and aid agencies to develop an even more coordinated communications response — ensuring that during an emergency mobile networks continue to help mobilise and coordinate emergency responses.

Enablers	Outcomes
▪ Supportive regulatory environment encouraging the creation of resilient networks	▪ Rapid, comprehensive mobile communications, delivering time-critical emergency messaging
▪ Strong government/mobile operator relationships to improve the effectiveness of mobile disaster response messaging	▪ Robust mobile networks that are better able to withstand disasters and more easily repairable when damage occurs
▪ Regular investment in disaster response systems by operators, as well as the creation of dedicated disaster response teams and protocols	▪ Coordinated local, national and international responses

Strategic Challenge

The United Nations' first General Assembly in 1946 recognised freedom of information as a basic human right. Resolution 59(1) called it 'the touchstone of all the freedoms to which the United Nations is consecrated'. This is no more powerfully demonstrated than in the event of natural or man-made disasters.

Mobile networks that are resilient during a disaster, and that can be quickly repaired when damaged, are invaluable during times of emergency. Not only do they facilitate the coordination of national and international efforts, they also provide people on the ground with the ability to self-organise local relief efforts before outside help arrives.

As a result, over a relatively short space of time, mobile communications have become a critical component of any emergency response. Success depends upon the integration of mobile operator resources and know-how with government and humanitarian bodies — establishing the rules, processes and mechanisms needed for effective cooperation.

The Philippines — integrating mobile networks for effective disaster response

The Philippines sits within both the Pacific's geologically volatile 'ring of fire' and the region's typhoon belt. Consequently, it is subject to a range of natural threats including earthquakes, volcanic activity and severe weather events. Long experience of these phenomena is spurring a coalition of government, non-governmental organisations (NGOs) and industry to help the country deal with disaster in the most effective way possible.

This coalition is based on the internationally recognised concept of Information and Communication Technology for Development (ICT4D), promoting the idea that more and better communication helps a society grow in a range of areas such as education and health, as well as disaster response. The country recognises that robust and well-functioning mobile networks make a significant contribution to effective disaster response.

The Philippines Government has taken a collaborative approach to this private sector partnership through its Natural Disaster Management Law. In addition, ICT4D has acted as the foundation of the Philippine Digital Strategy 2011-2016, embedding private sector organisations, such as mobile operators, into the preparedness strategies from the very beginning.

The Philippines is ideally placed to harness the power of mobile networks due to the high levels of mobile phone usage among the population, despite relatively low per capita incomes. As a result, the government's disaster response systems use text, internet and social channels in times of emergency to reach as many people as possible, as quickly as possible.

One of the Philippines' leading wireless providers, SMART Communications, has tightly integrated itself into both governmental and NGO disaster relief services, including the National Disaster Risk Reduction and Management Council and the Philippine Red Cross. SMART has launched a range of services including free disaster updates, links to which are available on official government websites. Furthermore, it has developed good relations with national meteorological institutes, which have co-located weather monitoring equipment at SMART's base stations, ensuring that it has virtually real-time access to severe weather warnings.

Similarly, another leading operator, Globe Telecom, has put in place its Disaster Risk Reduction and Management program. It has provided municipalities with an SMS broadcast facility so mayors can have direct contact with local leaders for faster coordination during emergencies, and has also partnered with the WeatherPhilippines Foundation so it can provide localised, real-time weather updates to help the public prepare for typhoons, heavy rains and severe flooding.

Making it happen — to ensure the best, prepare for the worst

Mobile networks are an important channel in helping government and NGO agencies share warning messages and other vital information to help mitigate the impact of adverse events.

> *"The pervasive use of the mobile phone has made it an ideal communications tool before, during, and after disasters. With the increasing vulnerability of the country to extreme weather events and other hazards brought on by climate change, we at Smart continue to work on utilising mobile technologies for disaster preparedness."*
>
> Ramon R. Isberto, Head of Public Affairs, SMART Communications

Successful mobile-based disaster response approaches demand comprehensive government and mobile operator pre-planning and cooperation across a range of areas.

For example, regulation can help encourage operator investment in building resilient infrastructure designed to withstand all but the most severe shocks. And should communications failure occur, it can help ensure that operators, in concert with government and NGO agencies, act swiftly to restore communications links. What's more, regulation should enable operators to aid relief efforts during a crisis by permitting them to increase cell power in order to expand coverage and compensate for damaged cells. It may also be necessary to streamline customs and immigration procedures during a crisis, so operators can quickly get expert personnel and replacement equipment into the country. Often minimum service agreements need to be relaxed to take into account extensive damage to networks.

Cooperation on messaging is also key. Governments and mobile operators should cooperate to ensure that messages originate from a legitimate agency, complement messages issued through other channels and, ultimately, that they are trusted by and useful to the people they are intended to help. What's more, cooperation also

helps ensure that messages suit the channel. SMS, for example, is usually most suited to short, concentrated bursts of information and is best used in conjunction with other channels — such as the web, TV and radio — that can provide more detailed instructions.

There also needs to be agreement on the technology used for sending and receiving these emergency messages. For example, cell broadcasts and SMS messages may be dependent on specific handsets and settings. In Japan, NTT DOCOMO offers free disaster response messaging via cell broadcast and the government has mandated that all handsets sold since 2007 must be able to receive them.

It is important to note, however, that emergencies can be political as well as natural, and mobile communications can be used to share messages and data that limit personal freedoms and privacy. Cooperation, therefore, must also extend to clear protocols between governments and mobile operators detailing how mobile networks can and should be used.

Responsible and effective cooperation — delivering the best of mobile communications by preparing for the worst of disasters — will ensure effective pre- and post-emergency response and help to save millions of lives.

Turkcell's disaster management system sets the benchmark for mobile network emergency response

Policy Goal

Mobile communication is increasingly recognised for revolutionising the way governments, non-governmental organisations (NGOs), businesses and citizens cope with disasters. Thanks to their power to facilitate recovery efforts in remote locations, track displaced populations and channel aid rapidly to those in need, mobile communications are now a critical component of disaster response across the globe.

Action

Turkish mobile network operator Turkcell is leading the way in developing the systems, processes and technologies needed to deal effectively with disasters. It works with government and other partners to build a highly robust disaster response system — coordinating the capabilities of a host of organisations to ensure its network is better able to survive a disaster and can be rapidly repaired if damaged.

Enablers

- Detailed, preplanned disaster response systems to focus expertise on re-establishing damaged mobile networks
- Strong partnerships that combine and amplify the strengths of the government, mobile operators and NGOs
- Disaster-appropriate regulation that flexes to recognise dramatic changes in on-the-ground conditions

Outcomes

- Resilient networks better able to survive a disaster and that can be repaired quickly if damaged
- SMS, voice and mobile internet operational within 8, 12 and 24 hours, respectively
- Information services that help to ensure the well-being of customers caught in a disaster

Strategic Challenge

Mobile communications can play a crucial role when disaster strikes, providing a lifeline to regions where other communications and public infrastructure have been knocked out. When the fate of many may depend upon the speed of response, mobile networks have the ability to link local, national and international relief efforts with people on the ground — saving time and lives.

Most mobile networks, however, were never designed to provide this kind of disaster support — where call volumes can rise by as much as 6,000 per cent after a disaster. Coping with these types of spikes in the number of calls is difficult enough under normal network conditions, let alone when power sources have failed, infrastructure has been destroyed and non-emergency regulatory frameworks may be getting in the way of rapid action by mobile operators to restore connectivity.

Ensuring networks can cope more effectively with disasters demands careful planning and cooperation between mobile operators, NGOs and governments. Mobile operators are taking the lead around the world to not only build these key relationships, but also add resilience to their networks so they deliver the best possible communications in the worst possible conditions.

Turkcell — a model for mobile disaster response

Turkcell's first major disaster response initiative was created as a response to a severe earthquake that hit Turkey in 1998. It has since evolved into the Business Continuity Management System (BCMS), which is constantly updated to incorporate lessons learned from recent disasters, such as 2011's devastating earthquake in the eastern city of Van.

BCMS sets exacting targets for Turkcell's reaction when damage is inflicted on its mobile network,

demanding post-event responses that include: 100 per cent cell broadcast services within eight hours, low-quality calls within 12 hours, minimum-speed mobile internet services within 24 hours and the ability to deliver 99 per cent of SMS messages within 15 seconds with a 95 per cent success rate within 24 hours.

To achieve this, Turkcell has developed 27 internal business continuity plans (BCPs). They bring together the people, technologies and systems needed to rapidly re-establish communications in a crisis situation — calling on

know-how from across the business, including finance, ICT, network operations, consumer marketing and human resources.

For example, in the event of an earthquake, BCPs coordinate to establish emergency sites that are linked to form a standalone emergency cell before being connected to the rest of the network. Once this process has been completed, those affected on the ground, emergency responders and external relief agencies can coordinate to get aid to where it is needed as efficiently as possible.

BCPs ensure that Turkcell is able to meet a range of objectives during times of emergency. For example, Turkcell can be sure that equipment from blankets to helicopters will be available in crisis zones due to the 46 critical suppliers that have been pre-approved and the streamlined procurement processes put in place. Similarly, it knows it has power reserves on tap, including mobile generators and 200,000 litres of fuel.

What's more, meticulous planning, rigorous training, life-like simulation exercises — with internal and external partners — and resilient infrastructure combine to offer wide-ranging support to people caught up in a disaster. This includes the Earthquake Information Service, which sends text alerts to all Turkcell subscribers in an affected area and the Reach Me service, which

sends parents their child's location via SMS when an earthquake occurs.

Turkcell also helps customers involved in emergencies overseas, identifying and locating subscribers, offering them free calls and SMS, and even reactivating suspended accounts during an emergency. Incoming calls from disaster areas are also prioritised at Turkcell's call centres, and the company can make direct contact with its customers (known as Care Calls and Care SMS) to establish their well-being.

The results of Turkcell's efforts to help its customers involved in overseas emergencies were clearly demonstrated following an earthquake in China in 2013. The company identified over 1,000 customers in the disaster area within 21 minutes of the event and allocated them free calls and SMS messages within half an hour. Contact with these customers using Care Call and Care SMS was established in just over six hours. Suspended customer accounts were reactivated within 32 minutes and held open for 15 days. Thirty minutes after the earthquake, Turkcell was also using social media to share information with affected customers.

In 2013 alone, Turkcell's BCMP made 10,000 calls to customers, allocated half a million free minutes and reactivated 1,800 suspended accounts. It is now one of the few operators certified to international standard ISO 22301 — indicating that its systems

act as a standard for others to follow — and Turkcell's BCMS generated 1.8 million positive comments on social media in the same year.

Making it happen — planning, partnership and preparedness

Turkcell has set the benchmark for disaster response and Turkey's experience provides powerful lessons for other countries as they formulate their own approaches. Perhaps the most striking success factor is partnership. No single organisation can create an effective disaster response system — governments, NGOs and mobile operators need to work together in the event of an emergency.

Mobile operators face difficult challenges in the event of a disaster, with equipment damaged or destroyed, non-existent or unreliable supply of power, damaged transport infrastructure, loss of personnel, stress on engineering resources and increased service demand.

Good regulation is essential if these challenges are to be overcome, while poor regulation can exacerbate the situation during times of emergency. The best regulation is that which is flexible enough to reflect the dramatic changes in circumstances brought on by disasters.

Countries looking to create an enabling environment within which their mobile operators can develop effective disaster response systems should include pre-planned responses to:

Government interaction. Building strong relationships with government agencies in advance and knowing which agency is in charge of each regulatory area of concern in an emergency is critical, as it is not obvious once an emergency occurs. This should not only include guidelines on which is the right agency for each substantive area, but also information on specific personnel or contact mechanisms to use in emergency situations.

Power. Power levels and backup power often need to be altered during an emergency. This requires clear guidance from governments on rules governing the increase of the maximum power of a cell in order to enlarge its coverage area, use of directional antennas and how back-up power can be used at cell sites.

Frequency. In order to optimise networks after damage occurs, mobile operators should be able to quickly and easily secure permission to use a frequency for a different use or service from which it was licensed.

Siting. During a disaster, mobile operators need the flexibility to be able to quickly erect temporary transmitters, something which should not be hindered by non-emergency, tower-siting regulation.

Satellite backup. When normal backhaul links are damaged, mobile operators often rely heavily on satellite links (VSAT) to provide emergency backhaul connectivity. As a result, there may be a need for temporary relaxation of VSAT licensing for these types of links.

Minimum service obligations. Most mobile licences require operators to meet minimum service levels and report outages. However, these rules may not be workable during a crisis situation.

Immigration and customs. Subject matter experts and emergency equipment may need to be moved rapidly into affected countries, which could require streamlined immigration and customs procedures.

Data laws. Big data, such as analysis of anonymised call detail records (CDR), can be useful in disaster response for tasks such as predicting population displacement and disease outbreak. The benefits of big data can be better harnessed if there is clarity from governments on how and when this type of analysis can be performed legally.

In countries such as the United States, the Philippines and Japan, these lessons are already being learned with regulation that flexes as appropriate to accommodate crisis situations. While no-one can foresee all the implications of a disaster, the impacts can be mitigated by careful planning and the creation of strong partnerships between key stakeholders. As Turkcell has proved, effective disaster management — based on long-standing experience, strong internal and external relationships and meticulous scenario planning — can rapidly re-establish communications, focus relief efforts and help protect the well-being of citizens.

"Turkcell is preparing for disaster and emergency situations across its entire business. We have identified our critical suppliers, those which could affect Turkcell's delivery of its key product and services. To this end we have put some liabilities for business continuity in the critical suppliers' contracts."

Tamer Demir, BCMS Manager, Turkcell

M2M and mobile money enable affordable solar power to energise Kenya's poorer communities

Policy Goal

Mobile network operators are joining forces with innovative energy services companies to bring clean and affordable power to those who need it most. By combining solar power systems with lease-to-own schemes that leverage mobile technologies, they are delivering affordable and life-changing green power to those who previously had to rely on expensive and harmful energy sources that suffer from fluctuating prices, such as kerosene.

Action

In Kenya, a ground-breaking collaboration between energy service company M-KOPA and mobile operator Safaricom is bringing clean, reliable and low-cost solar power — and ultimately energy independence — to tens of thousands of Kenyan households. The project's unique combination of a low-cost solar power system and a financing model that leverages both machine-to-machine (M2M) technology and mobile money payments is allowing it to energise many of Kenya's poorest and most remote communities.

Enablers

- Affordable solar power systems for safe and reliable energy
- A combination of M2M technology and mobile money services to enable asset finance of energy systems
- A regulatory environment supportive of mobile money services
- No VAT on solar products in Kenya, allowing prices to remain affordable
- Partnership with Safaricom covering distribution and revenue sharing

Outcomes

- 100,000 Kenyan households using M-KOPA solar as their energy source
- 12.5 million hours of kerosene-free lighting per month in rural communities
- $750 per year savings on each solar powered household's energy bill
- Increase in revenues for Safaricom

Strategic Challenge

Access to energy can bring huge benefits to some of the poorest people on the planet. It can provide heat and light for food and shelter, power pumps that bring water from deep wells and allow people to charge mobile phones so they can communicate with each other and access services such as education and healthcare.

Worldwide, however, 1.4 billion people struggle to access electricity, with 85 per cent of them living in rural, hard-to-reach, off-grid areas[1]. The communities that could most benefit from reliable and low-cost power usually depend on unreliable and relatively expensive energy sources such as kerosene, exposing them to fluctuating oil prices and uncertain supply. Perversely, it means that a middle class family in Europe can pay less for energy than a poor family in a country such as Bangladesh[2]. Kerosene is also a toxic source of energy, with the World Health Organization estimating that 4.3 million people a year die prematurely from the effects of kerosene fumes[3].

Today, M2M technologies and mobile payment systems are helping in the fight against energy poverty by enabling innovative business models that provide affordable, dependable power to mobile customers.

M2M and mobile money shed new light on an old problem

UNICEF estimates that 46 per cent of Kenyans live in poverty[4]. With energy costs swallowing up around 30 per cent of income for people at the bottom of the global economic pyramid[5], changes in price and supply have a significant impact.

Kenya enjoys more than six hours of sunshine a day[6], on average, so solar power offers an attractive solution. Yet costs and logistics have hampered adoption: how can users — many of whom live on low incomes and without a bank account — afford to cover the investment in solar equipment?

In 2012, start-up company M-KOPA Solar teamed up with Kenyan operator Safaricom to deliver affordable access to solar energy by using mobile technologies as the foundation of its financing system.

Customers purchase M-KOPA systems — which are currently based on an 8W solar panel with two LED lights, a portable lamp and a phone charging point with a standard USB connections — on a lease-to-own scheme. They start with a small down payment of KSh3000

($33) and then make affordable micro-payments of KSh40 ($0.45) for access to energy on a daily basis. After making 365 daily payments they own the system outright. They can also choose to pay off the cost of the unit faster if their cash flow allows. This approach allows them to manage their payments depending on their household finances and energy needs.

Credits are paid for via mobile phone using the M-PESA mobile money service. The GSM/GPRS M2M module embedded in the M-KOPA unit acts as a credit control mechanism, allowing M-KOPA to lock or unlock the unit over the air, based on customer credit.

M-KOPA's marriage between mobile technology and solar power allows it to overcome the issues that stopped poorer individuals and families from adopting solar energy in the past, while also offering additional benefits.

Asset finance. Many poorer Kenyans would find it impossible to afford the M-KOPA home energy system if they had to purchase it by making a one-off payment. However, the M-KOPA model brings it well within financial reach, as they can make a single $33 down-payment and repay the balance over time, until they own the unit outright.

Flexibility. Customers can now buy energy 'on demand' — accessing solar power when they need it and can afford it. Using a mobile phone as their payment system also means people who find themselves economically or geographically excluded from traditional financial services can still purchase the M-KOPA system.

Safety and reliability. Kerosene is not just harmful to people and the environment, it also suffers from fluctuating prices. In contrast, M-KOPA provides clean and reliable solar energy at stable cost,

making household budgeting much more predictable. The ability to buy credits in advance also means that customers can, in effect, bank energy reserves for future needs.

Viability. The success of M-KOPA has been driven through the viability of its business model. It has been able to scale the project through its partnership with Safaricom, with the additional reach of Safaricom's agents meaning M-KOPA is now available through a network of over 750 agents. As a result, by October 2014 it was being used to power more than 100,000 homes.

Low cost. M-KOPA energy costs are much lower than less reliable and non-renewable alternatives. Each day of solar energy credit costs about $0.45 — between 25 per cent and 75 per cent lower than the equivalent power provided by kerosene or batteries[7].

Energy independence. The total cost of the system is paid off over time — typically 12 months — and once the final payment is made, the solar energy equipment is wholly owned by the customer. From this point on, power is free, bringing energy independence to some of the world's poorest people.

Supports entrepreneurship. Phone charging is a business in most African countries, so M-KOPA customers can provide charging

services to their community, allowing them to earn additional income. For business owners, having access to lighting often results in an uplift in sales and can lead to other business opportunities, as shops and other business premises can stay open well after dusk.

Creates a credit history for unbanked customers. M-KOPA builds a credit history of its unbanked customers by tracking the regularity of their mobile money repayments. This allows it to produce a credit risk assessment that can be used to support future loan applications by unbanked customers for other assets or services.

Making it happen — solutions that reflect economic realities

M-KOPA shows that mobile technology can be a major enabler for pioneering services that have the power to transform the lives of some of the world's poorest people. Access to energy is a pressing development issue right now, and by hitching a ride on the rails of existing infrastructure and technology, the M-KOPA system has found a commercially sustainable way to deliver affordable energy to poor households.

M-KOPA is possible because of two critical mobile technologies — M2M and mobile money — which are the foundation of its asset financing and payment model.

> "M-KOPA Solar is designed around a game-changing technology — mobile money. We saw that being able to move a small amount of money around, at a low cost, could revolutionise energy access. We now offer world-class solar energy systems, collecting payments in small amounts and allowing customers to choose when and how much they pay."
>
> Jesse Moore, Co-Founder and Managing Director, M-KOPA Solar

However, similar uses of these technologies in other areas could potentially open up opportunities in a range of markets such as agriculture, health and education.

Operators can play their part by offering inexpensive data services targeting low bandwidth applications.

M-KOPA is currently gaining good traction in Kenya and Uganda; however, energy service companies still face challenges in deploying and expanding the reach of these types of mobile-enabled solutions. Although the cost of mobile M2M modules has decreased over recent years (they have now dropped to below $10 per module), the cost of integrating cellular technology into small home solar systems still represents a significant fraction of the final unit price. A continuous price decrease could further democratise the use of M2M modules for a range of equipment and services that could benefit poorer consumers.

Mobile operators could also play their part by offering inexpensive data services targeting low bandwidth mobile applications. Providing the tools that entrepreneurs need to better integrate mobile money and/or M2M platforms would also lead to a more reliable experience for end users and allow these types of services and products to be scaled-up more quickly to reach a broader audience.

Finally, the wider telecoms sector — including regulators and mobile operators — has a role to play in terms of exploring a range of issues including spectrum costs, taxation, licensing and pricing of M2M technology, so it can be supported and developed as an enabler for delivering next generation services to poorer consumers.

If this combination of wide industry cooperation, affordable hardware, innovative entrepreneurial services and appropriate data pricing can be effectively leveraged, there's a real chance to bring better opportunities to poorer communities — energising the lives of people at the bottom of the economic pyramid.

1   *2010 International Energy Agency figures quoted in Sustainable Energy and Water Access through M2M Connectivity: GSMA*
2   *2011 Endeva figures quoted in Sustainable Energy and Water Access through M2M Connectivity: GSMA*
3   *http://www.who.int/mediacentre/factsheets/fs292/en/*
4   *http://www.unicef.org/kenya/overview_4616.html*
5   *BOP500 figures quoted in Sustainable Energy and Water Access through M2M Connectivity: GSMA*
6   *http://www.bbc.co.uk/weather/184745*
7   *http://www.gsma.com/mobilefordevelopment/a-look-at-m-kopa-an-interview-with-nick-hughes*

Mobile information feeds agricultural development in some of India's poorest farming communities

Policy Goal

Globally, close to 900 million people below the poverty line live in rural areas, while the vast majority of the world's poor — 86 per cent — depend on agriculture for their income. The World Bank states that "a more dynamic and inclusive agricultural sector could dramatically reduce rural poverty". One way to improve the performance of the agricultural sector is to provide farmers with the information they need to increase crop yields, fight diseases, and get the best price for goods at market. New mobile services are equipping farmers with the necessary knowledge to achieve these aims. As a result, these services are transforming the lives of low-income smallholder farmers.

Action

In India, the mKisan initiative is one project that is bridging the information gap for farmers and agricultural workers. It is a partnership between non-governmental organisations (NGOs) and mobile value-added service provider (VAS) Handygo. It provides farmers with practical and timely advice on crops, animals, weather forecasts and market prices via mobile phone, with services tailored to the user's needs.

Enablers

- Cooperation between NGOs and the mobile industry to deliver effective and low-cost advice to farmers
- Tailored and refined agricultural content based on user need
- Regulators can help boost adoption of mAgri initiatives by avoiding legislation that makes it more difficult for users to sign up to VAS services

Outcomes

- Evidence of more effective and efficient small farms, helping to drive job and wealth creation in poor and remote regions
- Farmers equipped with the information they need to access the most lucrative markets and secure the best prices
- Continued development of the service despite a tough regulatory environment governing VAS activations

Strategic Challenge

Over two thirds of people living in India today rely on agriculture for their income, with many of the poorest earning their living from small farms[1]. As well as providing food, these farms create jobs and other economic opportunities. Development, however, is hampered by a lack of up-to-date agricultural information. More than a fifth of the country's GDP is generated through agriculture, but just 40 per cent of farmers have regular access to farming data[2].

Mobile information to feed India's poorest farmers

Agriculture is the primary source of income for more than two thirds of the Indian population[3] and 216 million out of the 269 million Indians existing below the poverty line live in rural areas[4]. It is clear that boosting agriculture is one of the most effective ways of alleviating poverty — the World Bank estimates that improvements within agriculture are, on average, at least twice as effective in reducing poverty as improvements outside agriculture[5].

The mKisan initiative is a mobile phone-based platform serving subscribers in six states across India. The service delivers a wealth of agricultural information to help agricultural workers improve farming techniques and maximise yields. Crop agronomy advice, for example, provides information on crops that are better suited to specific areas, seed variants that can deliver higher yields, and pesticides that

work more effectively. Similarly, information provided by the service on animal health highlights the most profitable breeds, latest animal husbandry techniques and most effective vaccinations. The service also includes weather forecasts to help farmers make better planning decisions, and up-to-date market prices to help them better negotiate prices for produce and maximise returns.

Farmers buy access to mKisan services in blocks of days (10, 20 or 30 days) at a cost of 1INR per day, with subscriptions set to auto-renew until the user chooses to unsubscribe. Information is delivered through a variety of channels, chosen so that as many farmers as possible can access the service, irrespective of their educational background, digital literacy or economic circumstance. These channels include:

- **Interactive voice response (IVR).** The IVR service provides users with access to a pre-recorded encyclopaedia of farming
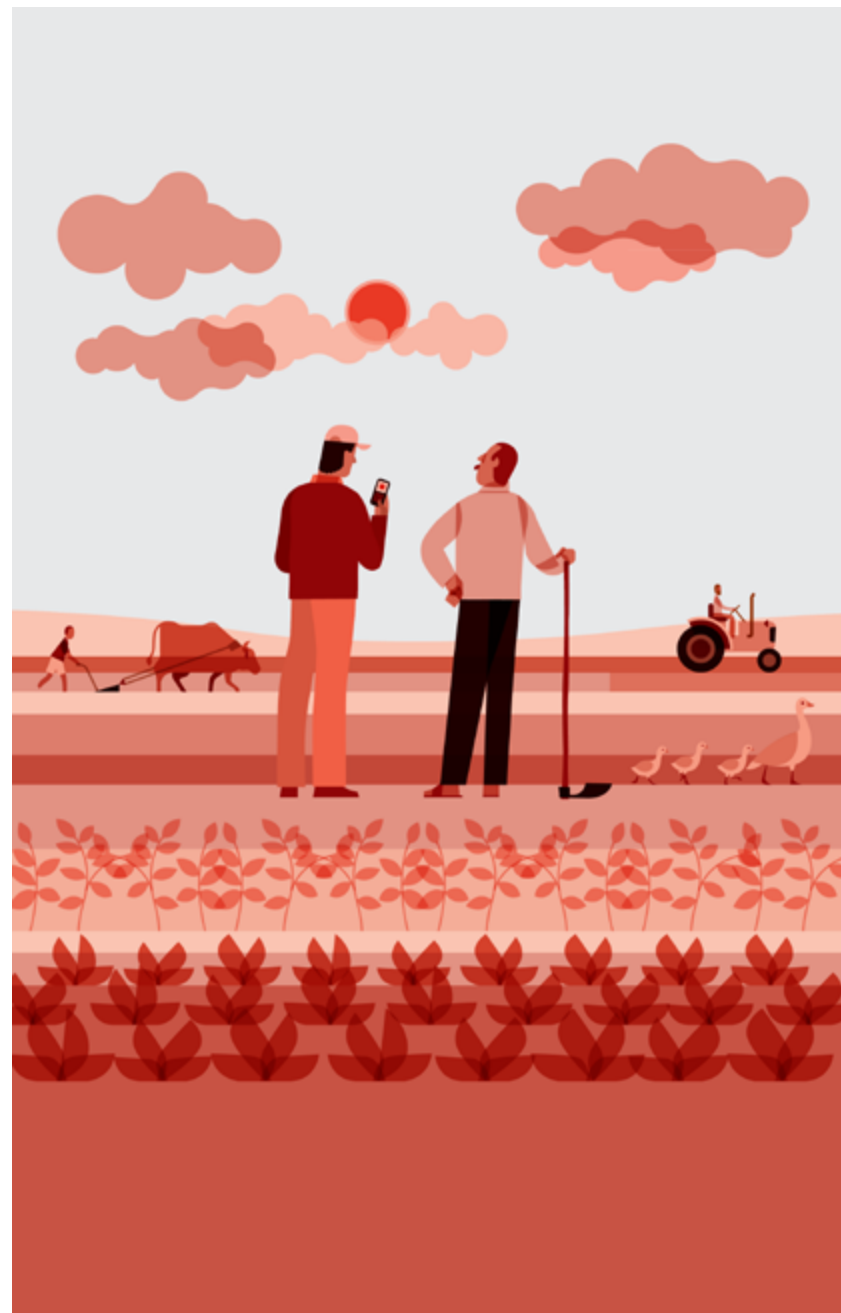
knowledge. It allows them to select a topic, such as a type of crop, and then drill down to find out about specific issues, such as pests and diseases. This content has been prepared by CABI.

▪ **SMS.** Short bulletins are broadcast to farmers alerting them to potential issues, solutions or weather events.

▪ **Helpline.** Farmers connect to subject experts directly and immediately for specific and time-sensitive queries.

▪ **Video.** Helpful tips and 'how to' guides for farmers are currently a small part of mKisan's services, but it is predicted that it will grow as more farmers adopt newer technologies, such as smartphones, and gain access to 3G or 4G mobile services.

A number of NGOs came together to make the service possible. CABI, for example, was a principal knowledge partner for the mKisan platform,

with the service using information drawn from its Direct2Farm database. The International Livestock Institute also provided information from its research into better animal husbandry to improve efficiency, while mKisan's video content came from Digital Green, which creates videos based on its work across the globe helping farmers to share and benefit from best practices. The service also received funding and technical support from the GSMA's mAgri programme between 2012 and 2014.

Making it happen — delivering education to build greater trust

Mobile technologies can help economically excluded and geographically remote farmers to benefit from the information age.

An evaluation of mKisan by the GSMA in April 2014 showed that over 800,000 unique mobile numbers had bought at least one subscription package, and almost 280,000 of these had used the IVR service since its

launch in mid-2012[6]. In total, over 2 million mKisan subscriptions have been sold during this period.

The average farm size of mKisan users is 5.5 acres, and those who only access the service's push content (SMS messages) generally own or work on smaller farms — averaging 4.8 acres in size. This suggests that the service is providing value to some of the poorest farmers in India.

Many farmers said that mKisan is helping them improve their farming techniques. The 2014 report found that a significant number of repeat users had changed their farming or marketing practices based on advice received from mKisan.

However, there's still room for improvement. By April 2014, a total of 279,494 farmers had used mKisan's IVR channel since launch, and the channel had an active monthly user base of around 15,000 farmers. It is an impressive number of users for a service that is still relatively young, but at the same time it represents a little more than two per cent of the estimated 13 million-strong potential market.

One of the challenges to growing the user base of mKisan is the changes put in place by the

Telecoms Regulatory Authority of India (TRAI) in July 2013. These new measures introduced 'double confirmation' guidelines aimed at protecting consumers from being wrongfully charged for content. As a result, customers now have to agree twice in order to be signed up to any VAS — once on the platform itself, and once through a third party channel. The regulations have had unintended consequences — they've drastically reduced the number of VAS activations in India. In fact, by August 2013 the number of VAS activations in the country had fallen by half. Unsurprisingly, mKisan also experienced blowback from these measures, with new customer acquisitions dropping by half after July 2013.

The service also needs to overcome several other hurdles. Even though its user base has more than doubled in size since March 2013, its most valued customer base — those who use the IVR service — has not seen the same level of growth. This is despite the fact that those who do access the IVR features are more likely to report satisfaction with the service and become repeat users. In fact, they're much happier with the quality of the information they receive than those who are just using the SMS service. This is in part due to a lack of awareness among farmers of the breadth of services on offer, as well as a

"With mKisan, I'm far more knowledgeable about farming than I used to be. I have learned about soil fertility, crop rotation and irrigation. We weren't as well-informed before we started using our phones. Most farmers, even if they're poor, use mobiles these days and, at one rupee a day, mKisan represents good value for money."

Jaipal, Farmer, Uttar Pradesh in India

common perception that services which add more value (i.e. voice channels) must be more costly, when in fact they are included in the standard package. It is also a symptom of mKisan's almost total reliance on one marketing channel — blast SMS — when other channels, such as face-to-face marketing, are also needed to educate potential customers about the depth of the service. Some users also report difficulty in tracking down the specific information they're after via the IVR channel.

Despite these issues, many farmers report that mKisan is helping them improve their farming techniques. For example, the 2014 report found that a significant number of repeat users (31 per cent) had changed

their farming or marketing practices based on advice received from mKisan. And of those customers who reported making changes, 33 per cent saw better yields.

mKisan has already brought better farming information to hundreds of thousands of farmers across India, but this is just the tip of the iceberg. India now boasts more than 300 million unique mobile phone subscribers and by 2017[7] this figure is expected to have grown to more than half a billion. By targeting this new wave of mobile users, listening to and learning from farmers, and refining marketing and education activity, services such as mKisan can continue to deliver compelling benefits to India's agricultural sector.

1, 2, 3 *http://www.cabi.org/projects/project/19242*
4 *http://www.rbi.org.in/scripts/PublicationsView.aspx?id=15283*
5 *http://web.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/*
   EXTWDRS/0,,contentMDK:21501332~pagePK:478093~piPK:477627~theSitePK:477624,00.html
6 *mKisan Baseline Report Executive Summary (2013), mKisan Midline evaluation (2014) - http://*
   www.gsma.com/mobilefordevelopment/programmes/magri/focus-areas/data-insights
7 *Source: GSMAi*

Short-lived tax gains from international mobile calls threaten long-term economic growth across Africa

Policy Goal

The mobile ecosystem has contributed $60 billion to GDP in sub-Saharan Africa, including $21 billion contributed to public funding via taxation. However, recent sector-specific taxes levied on mobile consumers and operators are acting as an inhibitor to mobile development. One such tax — the Surtax on International Inbound Call Termination (SIIT) — demonstrates the danger of pursuing short-term tax revenue at the expense of longer-term boosts in economic activity and related tax income.

Action

Between 2009 and 2014, a total of 15 African countries imposed SIITs on mobile network operators, often using third-party organisations to monitor international incoming calls (IICs) for these levies. A 2014 report from the GSMA and consultancy firm Deloitte on six of these countries reveals that despite providing a short-term boost to tax revenues, these measures have potentially damaging impacts on domestic and regional competitiveness, mobile usage and economic growth.

Barriers	Outcomes
▪ The mobile-specific surtax on international incoming calls dampens demand for mobile services	▪ Brakes were put on mobile development and trade, amounting to direct economic costs of $78 million
▪ Third-party international call monitoring is unnecessary, inefficient and intrusive	▪ 1.2 billion minutes (and associated revenue) were lost due to the resulting fall in demand
▪ This discriminatory tax is at odds with international trading norms, as promoted by the International Telecommunication Union (ITU) and World Trade Organization	▪ Up to 50 per cent of the government surtax was lost to third parties
	▪ Price hikes of up to 247 per cent were borne by operators, customers and businesses

Strategic Challenge

The mobile ecosystem brings great benefits not just by creating employment and economic opportunity, but also through the industry's contribution to public funds via taxation.

Nevertheless, taxation presents governments with a challenge. The law of demand dictates that, all things being equal, as the price of a product or service increases, demand will fall. The issue then, is for governments to strike the right balance between taxation and affordability, so they can raise revenues without significantly dampening demand for products and services. This is especially true of telecoms-related taxation because while new or increased taxes may generate short-term gains, they can ultimately undermine economic competitiveness, hinder growth and actually reduce tax revenues collected over the longer term.

SIITs — the long-term costs

Fifteen African countries have introduced SIITs, imposing a set charge on every incoming international call (IIC). Call volume monitoring is often carried out by third-party organisations, with revenues then shared between the third party and governments.

In 2014, a study by the GSMA and consultancy firm Deloitte[1] looked at the results of the introduction of SIITs on six African economies: Benin, Democratic Republic of Congo (DRC), Gabon, Ghana, Tanzania and Uganda.

Findings cover both the direct and — equally important — indirect outcomes of these surtaxes, including the impacts on consumer pricing, demand, business cost, economic activity, government revenues,

as well as the local and regional competitiveness of operators.

When introducing SIITs, governments are looking to increase tax revenues and reap economic and social benefits, but the cost/benefit analysis of this form of taxation reveals more complex consequences, providing greater insight into the long-term cost of this short-term gain.

Assessing SIITs — unforeseen, unintended and unwelcome outcomes

SIITs artificially increase incoming international call prices — distorting what was formerly a marketplace driven by competition. While some of the impacts of introducing the tax were predictable, there were also unforeseen, unintended and

unwelcome outcomes for the six African economies studied[2].

One of the most immediate outcomes of SIITs in the six countries has been a hike in international call prices. In Tanzania, these leapt by 90 per cent, closely followed Gabon (82 per cent) and Uganda (60 per cent). In Burundi and Rwanda, outside the scope of the study but part of the wider African economy, prices rocketed by 247 per cent and 145 per cent respectively. Across the continent, SIITs have driven prices up by an average of 97 per cent.

Higher prices have significantly dampened demand for mobile communications. Benin, for example, saw healthy growth in incoming international call volumes the year before introducing SIIT (+38 per cent) evaporate and turn into a 1.6 per cent drop the following year. All six countries saw falls in call volumes, with Gabon and Ghana experiencing 27 per cent and 57 per cent slumps, respectively. It is a phenomenon mirrored globally, with the OECD seeing demand cut by 53 per cent in countries that have introduced SIIT, such as El Salvador[3].

The use of third-party organisations that track incoming international calls and capture a share of the surtax receipts presents additional problems. Existing mobile operator practices allow for the monitoring of call volumes without impinging on an individual's privacy, and this calls

into question the need for third-party, often more intrusive, monitoring. In addition, there are no guarantees that the revenues recouped by the third-party organisations — often 50 per cent of the total surtax — will be spent in domestic or even African markets, potentially 'leeching' money from local and regional economies.

When prices rise rapidly, consumers look for alternatives — both legal and illegal.

When prices rise rapidly, consumers look for alternatives — both legal and illegal. The former often take the form of increased use of Voice over Internet Protocol (VoIP) calls, which are difficult to tax and deliver little in the way of government revenue. The latter encompass the use of illegal SIM boxes, which bypass terminations and, consequently, the surtax. A Ghanaian mobile operator saw a 279 per cent increase in the use of illegal SIM boxes between 2010 and 2013 and the Ghanaian government estimated revenues of $5.8 million were lost due to the practice in 2011 alone.

On average, the SIIT adds $0.14 to the price per minute of incoming international calls in the six study countries. Clearly, this acts as a disincentive for consumers and businesses to make international calls to the countries involved. It is estimated that Ghana has lost

in excess of 679 million minutes, Gabon 161 million minutes and Benin 147 million minutes. Across the six study countries, operators have lost approximately $86 million in potential termination revenue and it has cost these economies around $78 million in economic activity.

Beyond this, increased costs to local businesses are likely to reduce profits, further restricting government domestic tax income. The imposition of the SIIT generates significant extra costs to African businesses that trade with (and hence call) businesses in countries in the region where the SIIT has been imposed, and to consumers, including emigrants in neighbouring countries calling their home countries. This may represent a particular concern to policymakers in the region, given that a large proportion of international calls are to other countries within Africa. Evidence from operators suggests that on average across the five countries analysed, nearly 40 per cent of all international incoming traffic is from countries in the region.

Call and tax revenues are not the only casualties of higher international costs. There is a very real risk that SIIT is helping to make the six target countries specifically, and Africa generally, a less competitive global market. From 2009 to March 2014,

African businesses generated an estimated 1.6 billion minutes of intra-African calls to SIIT countries. Based on this volume of calls, GSMA research suggests that as a result of SIIT the direct cost to businesses in the six countries was $48.1 million, plus an additional $29.8 million of lost economic activity between 2010 and 2014 for the economies as a whole.

SIITs are also at odds with the guidelines from respected international bodies: the UN's International Telecommunication Union (ITU) states that taxes on international services should normally only be levied on customers inside the levying country, and the General Agreement on Trade in Services (GATS) requires governments to ensure reasonable and non-discriminatory conditions for all forms of access to network and public telecommunications services, including termination charges.

However, the most profound evidence against the introduction of SIITs is the numerous unintended negative impacts on local consumers, businesses, operators and governments that they produce — especially as most of these consequences do not respect borders, bleeding across boundaries with the potential for long-term economic damage for all of sub-Saharan Africa.

1 Surtaxes on International Incoming Traffic in Africa: Deloitte 2014
2 OECD Quote: http://oecdinsights.org/2014/06/13/time-to-terminate-termination-charges/
3 International Traffic Termination: OECD Digital Economy Papers No. 238

While many USFs struggle to achieve their mission, Colombia has bucked the trend

Policy Goal

Making telecommunications accessible to the widest number of people at affordable prices is a policy goal for many governments. This is understandable, as communications services — and mobile services in particular — bring a broad range of socio-economic benefits to citizens.

To drive this goal, some governments have created universal service funds (USFs), financed by levies on telecoms sector revenues. Unfortunately, USFs are usually ineffective, due to poor management and a lack of financial transparency.

One exception is Colombia's USF, known as FONTIC. Thanks to FONTIC's clear roadmap of planned projects, record of delivering projects in a timely manner and focus on financial transparency, it epitomises best practice in the administration of USFs.

Action

Colombia first introduced a USF in 1976, but the current structure of its fund is a reflection of the reshaping that took place in 1999. One of the fund's key aims is to finance projects that increase the provision of telecoms services to all unserved or underserved locales, particularly those in rural areas.

FONTIC sets itself apart from other USFs because it is financially autonomous, highly transparent about how funds are awarded and delivers projects in a timely manner.

Enablers

- Financial autonomy of the USF
- High levels of transparency across all the fund's activities
- Nearly full disbursement of fund contributions every year

Outcomes

- Strong USF management with a clear roadmap of future projects
- Prioritisation of infrastructure funding
- A public bidding process for USF-funded projects that is open to all interested parties

Strategic Challenge

While competition has succeeded in delivering telecoms services to the vast majority of the world's population, gaps still exist. As a result, governments have explored a number of regulatory options to increase access in these hard to reach areas, including USFs.

However, USFs usually struggle to produce effective results. They often accumulate large sums of money, yet fail to disburse some or all of these funds. Nevertheless, of the USFs in operation today, Colombia's management of its fund is a good example of best practice.

USFs rarely achieve their aims

The liberalisation of telecoms markets and the promotion of competition have succeeded in extending access to communications services to most of the world's population. Mobile has played a huge part in this. With the number of mobile subscribers currently standing at around 3.2 billion, nearly half of the people in the world now use mobile communications. It is expected that a further 700 million subscribers will be added by 2017 and the 4 billion-subscriber milestone will be reached in 2018[1].

However, there are still areas that lack coverage, due to a variety of factors. For example, it is often not economically viable for operators to build network infrastructure in areas that are geographically remote, sparsely populated, or where income levels are so low the local population would struggle to afford mobile services.

Given the huge benefits that mobile connectivity offers to citizens, it is understandable that governments still seek to extend coverage to these areas. Attempting to achieve the universal service goal, many have opted to create USFs. These funds usually require telecoms companies to contribute a portion of their revenues to the fund, with these contributions used to finance projects that aim to address access gaps.

Unfortunately, most funds do not achieve their aims. A study carried out for the GSMA in 2013 estimated that more than one-third of the 64 funds surveyed had yet to disburse any of the contributions they had collected[2]. As a result, more than $11 billion remains undisbursed — money that could otherwise be used to extend rural coverage or lower the cost of mobile ownership.

The report also unearthed a range of problems concerning how most of the funds were defined and managed. For example, financing for projects was not always allocated in a competitively and technologically neutral way, and the funds often prove to be counter-productive, as taxing commercial investors in this way can make rural investments less likely. The report recommended that regulators investigate alternative solutions, including public-private partnerships that have delivered more effective results in countries such as Finland.

However, of all the funds surveyed globally, Colombia stood out as an outstanding example of best practice.

Making it happen — Colombia focuses on transparency

So, what makes Colombia's management of FONTIC so exemplary? The success of the USF relies on a number of factors, not least of which is its strong focus on financial transparency.

Importantly, the fund was set up as an independent agency, working under the auspices of the Ministry of Information Technology and Communications (MINTIC), and is structured to be financially autonomous. It has also tended to make use of nearly the entire sum of contributions to the fund every year. This is uncommon, not only for USFs in Latin America, but around the rest of the world.

FONTIC also exhibits high levels of transparency across all of its activities. For example, it uses a four-year planning cycle for projects. This makes it clear which schemes are currently being financed, and where money will be spent in the near future. It also ensures that projects are delivered in a timely manner. What's more, projects are awarded via a public bidding process that is open to all interested parties.

The fund sponsors a range of initiatives; not just those aimed at improving access to communications services for the previously underserved, but also projects that educate these users in how they can make the most of the technology. However, the largest proportion of its spend has historically gone towards infrastructure schemes, such as the creation of a national fibre-optic backbone.

More recently, Colombia has also begun to attach coverage obligations to new spectrum licences and licence renewals, something which may ultimately reduce its reliance on the USF for extending coverage to underserved areas.

Nevertheless, there is room for improvement. For example, under the terms of the fund, operators are required to contribute 2.2 per cent of their gross revenues to FONTIC. This places a high burden on the telecoms industry and, according

to a recent OECD report, "may be in excess of MINTIC needs to promote ICTs in Colombia"[3]. In most other markets, operator contributions to the local USF are closer to one per cent of revenues.

Also, the proportion of the money from the fund used to finance infrastructure improvements, such as backhaul, backbone and fibre upgrades, has fallen over the past two years. As infrastructure improvements have long-tail benefits — operators and consumers continue to benefit from them years into the future — these projects should be prioritised over other developments.

The broad scope of the fund and variety of its programs also make it difficult to accurately measure its efficiency and effectiveness. As a result, there may be cases where money from the fund is being used for projects where private investment could achieve more impact at a lower cost.

Despite these issues, Colombia still serves as a commendable model of USF management, due to its clear roadmap of planned projects, tendency to deliver projects in a timely manner and transparency in how monies from the fund are spent.

1 http://www.gsma.com/newsroom/gsma-calls-for-re-evaluation-and-reduction-of-the-universal-service-fund-levy/
2 GSMA, Universal Service Fund Study (2013)
3 OECD, Review of Telecommunication Policy and Regulation in Colombia (2014)

Pakistan powers ahead with greener technology to generate annual cost savings of over $6 million

Policy Goal

As demand grows for mobile services, so does the demand for energy to power the network infrastructure behind those services. Providing energy at remote sites can be especially challenging, which is one of the reasons why many of them rely on diesel generators. Unfortunately these generators can be expensive, financially and environmentally. Mobile network operators see energy efficiency as a key priority, and by trialling and implementing innovative power solutions, as well as other energy-saving technologies, they are lowering their energy bills as well as their carbon emissions.

Action

In Pakistan, one operator is finding new, greener ways to reduce energy consumption and costs, while also making its network more reliable. Results of a trial by Warid Telecom published in 2014 show that innovative battery, cooling and electricity-generation technologies deliver cleaner, cheaper and more reliable results than traditional alternatives, providing new opportunities for mobile operators to make their networks more sustainable.

Enablers

- An industry push towards using new technologies to reduce emissions and costs
- Internationally recognised metrics, such as the GSMA's Mobile Energy Efficiency Benchmarking service, that help operators continually improve energy efficiency

Outcomes

- New battery and cooling technologies deliver more than $6 million in annual energy efficiency savings
- Use of fuel cell technology reduces exhaust CO_2 emissions by 40 per cent compared to diesel generators

Strategic Challenge

Global energy price volatility, unreliable grid, increasing demand for mobile connectivity and stiff price competition for mobile services means that minimising energy consumption is a clear priority for operators. Greater energy efficiency gives mobile operators the ability to reduce energy consumption, costs and the environmental impact of their network infrastructure. Operators spend about $15 billion on energy to power their networks every year, so improving energy efficiency is a strategic priority for them.

Mobile network operator brings power to the people

Abu Dhabi-based Warid Telecom is a major mobile operator in Pakistan. Since 2010, it has been comparing its energy usage against other operators using the GSMA's Mobile Energy Efficiency (MEE) Benchmarking service. This has helped Warid improve its energy efficiency by 15 per cent per connection over the past three years. The MEE Benchmarking service compares the network energy efficiency of an operator against that of its peers around the world. More than 40 mobile operators have participated in the benchmarking, accounting for over 200 networks worldwide. Greater energy efficiency is important because it allows operators to reduce their carbon emissions while reducing costs.

Pakistan is a particularly challenging market for power supply. It is not unusual for areas in Pakistan — even though they are on-grid — to experience daily outages lasting between 10 and 16 hours. Warid Telecom operates backup power generators at its mobile sites to cover these power outages and ensure high availability.

In 2013, the operator partnered with telecoms energy solution provider Cascadiant and the GSMA in a Mobile Energy Efficiency Optimisation (MEEO) project. The aim of the project was to identify the equipment consuming the greatest amount of energy in Warid's radio network and to trial equipment that could significantly reduce energy consumption and environmental impact, while offering improvements in performance. Launched in 2011, the GSMA's MEEO service helps mobile operators lower their energy costs and carbon footprint by trialling energy efficiency solutions on cell sites, and then analysing their technical and financial performance so the most effective solutions can be rolled out. MEEO is a follow-on service to the GSMA's MEE Benchmarking.
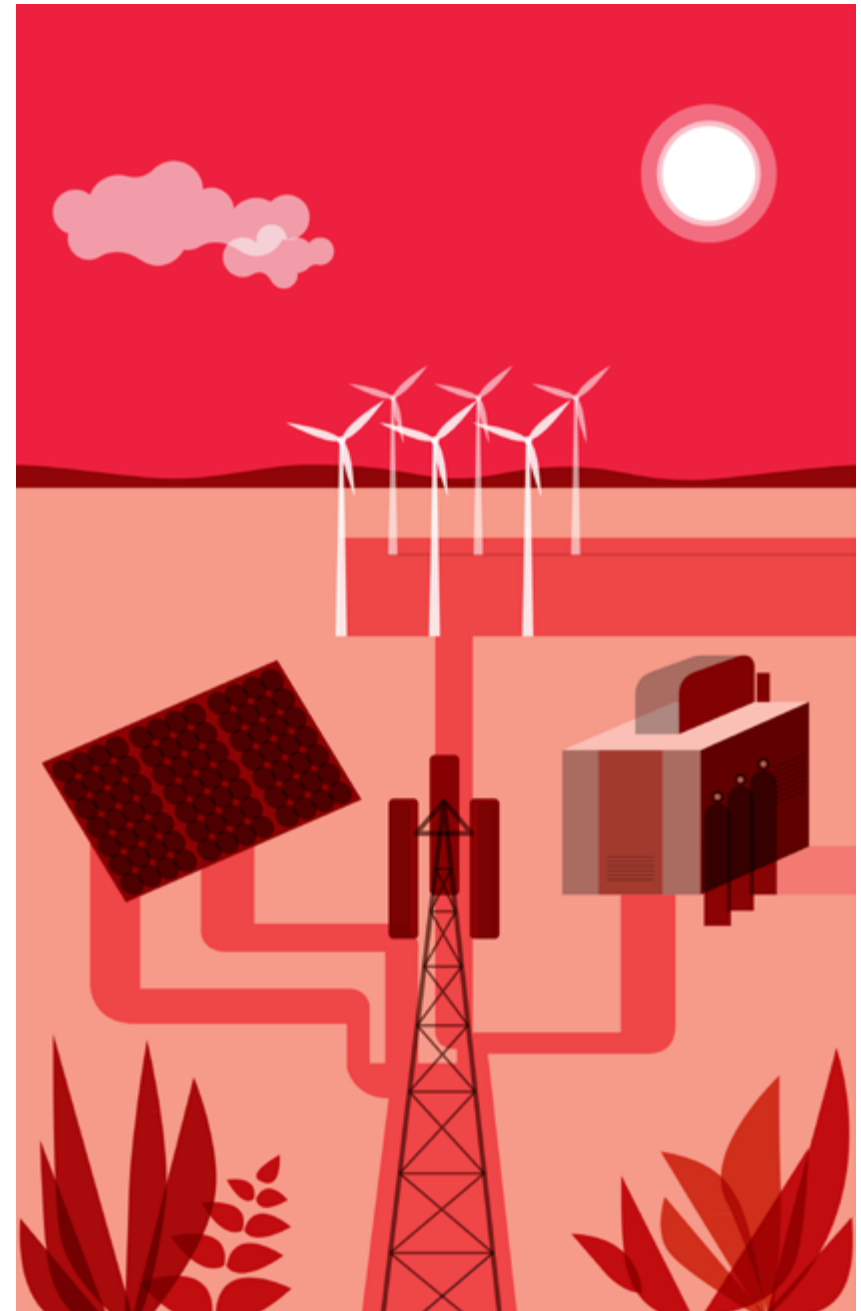
Warid and Cascadiant gathered data across 10 cell sites and trialled new, energy-efficient equipment at four cell sites. The first two sites were used to trial more efficient air-conditioning systems, the third used a new form of battery and the fourth replaced a diesel generator with a methanol fuel cell.

Making it happen — more effective and efficient power

The new technologies used across the various sites have produced impressive results. The **advanced battery trial** employed a General Electric Durathon E4810 battery at an outdoor cell site. This battery uses a sodium nickel chemistry and managed to halve the diesel generator running time, which would mean a third less fuel could be used compared to a continuously running 20 kilovolt-ampere diesel generator.

Extrapolating the results across Warid Telecom's network in Pakistan, the new battery would provide annual savings of $3.6 million in energy costs and cut 9,650 tonnes of carbon dioxide emissions per year. It would also repay the investment in the advanced battery technology within 18 months.

The **advanced cooling trial** used Coolsure UTS 55W air-conditioning units at two cell sites. It delivered a 58 per cent cut in cooling energy consumption at the Islamabad test site and a 57 per cent cut at the Lahore site. If rolled out to all suitable cell sites in Warid Telecom's network — 2,100 indoor cell sites in total — the advanced cooling technology would lead to $2.6 million in annual energy savings. It would also slash 10,000 tonnes of carbon dioxide emissions per year and repay the investment in the new cooling technology within just 14 months.

The **methanol fuel cell trial** employed a Ballard ElectraGen-ME fuel cell system. It delivered total cost of ownership figures on par with a traditional diesel generator when factoring into the business case both its increased reliability versus diesel generators and the reduced fuel thefts associated with methanol

compared to diesel. Also, while the reliability of diesel generators can be as low as 85 per cent, the fuel cell system achieved 99.5 per cent reliability in the trial. Another major benefit was that it led to a 40 per cent reduction in exhaust CO_2 emissions and close to 100 per cent cuts in carbon monoxide, oxides of nitrogen and particulate matter emissions.

When the results of using these three innovative technologies are combined and extrapolated across Warid Telecom's network, they have the potential to cut energy costs by $6.2 million per year and reduce emissions by over 19,500 tonnes of carbon dioxide annually (the equivalent of taking over 4,000 cars

off the road). Unsurprisingly, Warid has decided to roll out the technology to other sites on its network.

The combined work of Warid Telecom, Cascadiant and the GSMA to deliver more efficient network infrastructure highlights how investment by mobile network operators can support wider government objectives, including meeting increasingly stringent national and international environmental targets while providing more reliable connections to consumers and businesses.

To find out more about the GSMA's Mobile Energy Efficiency Programme visit www.gsma.com/publicpolicy/mobile-energy-efficiency.

"The MEE Optimisation project in Pakistan has already demonstrated significant cost savings and emission reductions, and is clearly showing the benefits of the service to our members."

Tom Phillips, Chief Regulatory Officer, GSMA

Brazil's tax reduction on M2M connections paves the way for the rise of the machines

Policy Goal

The Internet of Things (IoT) is built on machine-to-machine (M2M) communication, where electronics devices, vehicles, sensors and a whole host of other items communicate with each other, as well as automated services, over wireless connections. The GSMA forecasts that global M2M connections will hit a quarter of a billion this year. The popularity of the technology is hardly surprising, as M2M has the potential to reduce healthcare costs, lower carbon emissions, improve transportation safety and much more. To reap the rewards of this burgeoning market, policymakers need to ensure the right taxation frameworks are in place to encourage investment in the M2M ecosystem.

Action

Recognising that its existing taxation policy on M2M connections was stifling the growth of this potentially lucrative market, the Brazilian Government decided to significantly cut the levies it imposed on M2M SIM cards. The move took effect in 2014 and is providing a stimulus for mobile network operators to develop services such as smart metering, car tracking and remote health monitoring. As a result, adoption of M2M technology in Brazil is set to grow rapidly, with the number of M2M connections expected to increase from 7.8 million in 2013 to 23.8 million by 2016.

Enablers

- Forward-looking government policy designed to help a budding market grow in value
- Strong communication between mobile operators and the government on measures needed to boost the M2M market
- Significant reduction in tax on M2M connections

Outcomes

- Brazil set to lead the way in M2M adoption in Latin America
- Increased investment in M2M technologies and services by Brazilian mobile operators
- M2M market in Brazil predicted to grow from its current level of 7.8 million connections to 23.8 million by 2016

Strategic Challenge

The mobile ecosystem has, until recently, concentrated primarily on connecting people, but now its focus is widening to include connections between machines. Adding connectivity to machines allows them to make smarter, autonomous decisions, and support new services such as remote health monitoring and intelligent heating control for buildings. These machines rely on M2M SIM cards for their connectivity and, for the M2M market to grow, these connections must be priced at appropriate and affordable levels.

Prior to the reduction in the tax rate on M2M connections, the Brazilian Government's tax policy did not distinguish between M2M SIMs and traditional SIMs used by consumers for voice and data services. However, M2M connections produce a lower average revenue per unit (ARPU). Under certain circumstances, the high level of taxation meant operators would actually lose money on the provision of certain M2M connections. As a result, they had no incentive to support or invest in the market. Once the Brazilian Government recognised the risk, it decided to take action by introducing a tax cut.

Changing taxation policy to incentivise investment

Mobile operators, along with manufacturers and resellers of M2M devices, had long campaigned for a reduction in the M2M connection tax. They believed the combination of high levels of taxation and the low ARPU of M2M connections were putting the brakes on a market that otherwise had huge potential for growth.

In Brazil there are two taxes levied on mobile SIM cards under the Telecommunications Inspection Fund (Fistel). The first is the Installation Inspection Tax (TFI). This a one-off tax applied to all new connections. Before the tax cut, a TFI charge of BRL28.63 ($11.56) was charged on all new SIMs, including M2M SIMs, but following the reduction this fell almost 80 per cent to BRL5.68 ($2.29).

The second tax is the Operation Inspection Fee (TFF). This is applied on an annual basis to all active SIM cards. This has now been reduced by over 80 per cent, from a yearly fee of BRL8.94 ($3.61) to an annual rate of BRL1.89 ($0.76).

In a statement, Brazil's Communications Ministry announced that the new regulations would not have an impact on the 2014 fiscal budget[1]. In 2015, the government expects the loss of tax revenue will equate to around BRL110 million ($49.3 million). At the same

time, however, it also predicts the cut will hugely increase the take-up of M2M devices and services. This M2M growth has the potential to open up new streams of taxation revenue for the government, which will more than compensate for the loss.

Making it happen — new laws, pragmatic regulation and forecasts of huge growth

Due to the nature of the Brazilian legal system, the Fistel taxation rules could only be changed by a combination of a presidential decree and a new law. The Brazilian Minister of Communications recognised that a change was necessary, but the tax cuts weren't initially supported by the Minister of Finance.

Eventually, however, the Finance Ministry became convinced the move could have significant long-term economic advantages and so agreed to the changes, albeit with the proviso that mobile point-of-sale (PoS) connections would be excluded from the M2M tax breaks. The thinking behind this exemption was that PoS connections were already growing and didn't need tax reductions to stimulate their adoption.

The initial law authorising the M2M tax cut was passed in 2012, and the presidential decree, which stipulated the level of the tax break and the mechanics of

how it would be implemented, followed two years later.

The presidential decree contained a clause stating that a monitoring body for M2M devices should be established and should include representatives from the Ministry of Communications, the telecom regulator Anatel, and a number of other key stakeholders. This body, known as the Chamber of Management and Development of M2M Communication Systems, was officially created on October 2014, and its role will be to promote cooperation between members of the ecosystem and support policies for the development of the M2M market.

The regulator took a pragmatic view, allowing the market and mobile operators to decide what did and did not constitute an M2M connection, with the understanding it would perform an audit in the future to guard against abuse of the system.

The decree also included an initial definition of what constituted an M2M connection for taxation purposes, but there was an added clause stating that further regulation would be necessary to clarify this in the future. However, creating an extensive list of what is and is not an M2M device would have been problematic for the Brazilian telecoms

regulator, Anatel. In a market that is constantly evolving due to rapid innovation, the list would quickly have become outdated.

In the end, the regulator took a more pragmatic view. It decided to allow the market and mobile operators to decide what did and did not constitute an M2M connection, with the understanding that it would perform an audit in the future to make sure there was no abuse of the system.

The final piece of the jigsaw was the need for Anatel to update the online system used by operators to declare SIM card usage for tax purposes. This change was necessary to allow operators to stipulate whether a SIM card was being used for an M2M connection (which qualifies for the tax break) or any other form of connection (excluded from the tax break). Once this system was updated, the new M2M tax measures went live on 12 September 2014.

The tax cut has already had a significant positive impact on

the development of the Brazilian M2M market. For example, it has provided a positive stimulus for Brazil's operators to develop M2M services and strategies. Shortly after the tax cut was put in place, the country's operators announced plans to invest a total of BRL13 billion ($6 billion) in the development of M2M technologies over the next four years[2].

According to data from Machina Research, there are approximately 7.8 million cellular M2M connections currently active in Brazil, with this figure predicted to skyrocket to 23.8 million by 2016. Brazil's Communications Minister, Paulo Bernardo, has said that the Ministry's own figures project the number of M2M devices in Brazil to leap to 23.3 million by 2016[3] as a result of the tax cut.

The decision by the Brazilian Government to reduce this tax is a significant move to stimulate the growth of M2M services, but the Brazilian administration is not

"We need to better harness the creativity of Brazil in this area. When we look at the Brazilian market, there are important indications of growth. Yet, there is room for investment, because only 3.1 per cent of connections in the country are currently M2M."

Paulo Bernardo, Minister of Communications, Brazil (2011-2014)

resting on its laurels. It is continuing to take a lead in promoting IoT connected services by mandating the installation of vehicle tracking devices in new vehicles under the proposed SIMRAV scheme, and putting in place rules that are steering energy suppliers towards the use of smart meters to help with better grid management and to support more flexible, time-of-use tariffs for consumers[4].

M2M is a new market that can be encouraged to grow by government through policies of low taxation and light-touch regulation.

By introducing this tax cut, Brazil is not only encouraging the growth of M2M services, but ensuring that it will be the first to benefit from the social, environmental and economic opportunities of this important new sector.

1 http://m2mworldnews.com/2014/05/06/34989-brazil-cuts-taxes-on-m2m-services/
2 TelecomEngine, May 7th 2014, "Brazilian operators invest $6 billion in M2M", retrieved from http://www.telecomengine.com/node/87301
3 Data extracted as of October 2014
4 https://blogs.siemens.com/smartgridwatch/stories/525/

Swapping old for new gives Angola and Namibia a head start for mobile broadband

Policy Goal

Customer demand for high-speed data access is accelerating at a rapid space, but providing mobile network operators with new spectrum to service this demand can take time. As a result, it is important for operators to be able to repurpose frequency bands assigned for 2G services for newer, more efficient technologies such as 3G and 4G — a process known as spectrum refarming. By allowing operators to maximise the use of existing spectrum in this way, regulators pave the way for mobile broadband services to be delivered to citizens before additional spectrum becomes available.

Action

With the digital switchover (DSO) yet to be completed in Angola and Namibia, regulators in both countries supported the refarming of spectrum originally allocated for 2G services to be used for new mobile broadband services supported by 3G and 4G technologies. While more spectrum will be needed in the future to satisfy customer demand, refarming existing spectrum is allowing these operators to bridge the 'supply gap' until that extra spectrum is released.

Enablers

- Emergence of mobile as the technology of choice for internet access in Africa
- Support from regulators for the refarming of spectrum to support mobile broadband services
- Desire of mobile operators to move quickly to meet consumer demand for faster data access

Outcomes

- Mobile operators are free to maximise the potential and efficiency of available spectrum
- Consumers gain access to mobile broadband services before the DSO is complete

Strategic Challenge

The lack of fixed-line infrastructure for broadband access in sub-Saharan Africa (SSA), combined with the relatively high cost of such services where they exist, has resulted in very low fixed-line broadband penetration across the region. For example, in Angola the fixed-line broadband subscriber rate sits at just 0.22 per cent, while in Namibia it is approximately 1.3 per cent, according to figures from the World Bank[1].

As a result, mobile technology has emerged as the main medium for accessing the internet in these countries, as well as across the sub-Saharan region as a whole. But, with customers using more and more data, how can operators fulfil demand when new spectrum will take time to become available? In Angola and Namibia, operators have found the answer by utilising spectrum originally allocated for 2G services for faster 3G and 4G technology. This has enabled operators to bring mobile broadband to market sooner than would otherwise have been possible.

Accelerating mobile broadband using existing spectrum

Frequencies below 1GHz are ideal for mobile broadband as they offer good geographic coverage, improved in-building cover, reasonable capacity and availability in large blocks, usually, for the efficient delivery of services. However, this spectrum isn't always available to operators. For example, the 800MHz band is still being used for analogue television broadcasting in many African countries. This spectrum will be freed up once these countries complete their digital switchover. The International Telecommunication Union (ITU) has set a deadline of June 2015 for this to happen, but for a variety of reasons it is likely that many countries in SSA will not meet this target.

Worldwide, there are 42 countries that are likely to miss the ITU's deadline and, according to the African Telecommunications Union, both Angola and Namibia are on this list. Due to the scarcity of available spectrum, operators in these two countries have had to look at alternative frequencies to provide mobile broadband services, the demand for which continues to grow rapidly.

With falling demand for 2G services (based on older GSM and CDMA technologies), regulatory bodies in both countries have supported moves by operators to reuse the frequencies currently employed for these less utilised services —

upgrading the underlying technology to 3G and 4G to hasten the roll out of high-speed data services, a process known as 'refarming'.

Refarming 2G spectrum is providing the breathing space needed for mobile broadband services to take hold, but as demand for data continues to grow, operators will require additional spectrum in the future to adequately serve their customers.

Making it happen — refarming supports faster roll-out

The relatively slow pace of the DSO in Angola has resulted in a lack of sub-1GHz spectrum available to use for the launch of 4G Long-Term Evolution (LTE) services. Despite this, with the blessing of the Institut Angolias des Communications (INACOM) — the Angolan telecoms regulator — operators in the country have been able to reuse the 1800MHz and 2100MHz bands that were traditionally allocated to 2G technologies (voice and messaging services only).

In 2008, Unitel (the country's second largest mobile operator) began to refarm the 2100MHz band for 3G technologies, while in April 2012 the country's largest operator, Movicell, launched Africa's first commercial LTE service using the 1900MHz band. Unitel then followed up in December 2012 with the launch of its own LTE service, which reused spectrum in the 2100MHz band.

These higher bands offer good capacity, but they're not as effective in achieving coverage as sub-1GHz spectrum. Because of the propagation characteristics of higher-frequency spectrum, both operators chose to first provide services in the Angolan capital of Luanda followed by other cities, rather than rural areas.

Nevertheless, the use of the 1900MHz and 2100MHz bands has provided a good short-term solution to the lack of available new spectrum for mobile broadband services. Refarming these bands has had a significant impact on the communications landscape in Angola and has been successful in providing millions of Angolans living in urban areas with access to mobile broadband services years earlier than would otherwise have been possible.

Angolans will soon also benefit from LTE-A technology, as Unitel has struck a deal with Ericsson to upgrade its network to support this more advanced form of LTE. This followed a successful demonstration of the technology being used on both the 900MHz and 1800MHz bands.

In Namibia, a positive stance by the telecommunications regulator — the Communications Regulatory Authority of Namibia (CRAN) — enabled the country to become just the second nation in SSA to launch an LTE service, despite the fact it has a relatively small population of 2.1 million people.

With the blessing of CRAN, Namibia's largest mobile operator, Mobile Telecommunications Limited (MTC), introduced the country's first LTE service in May 2012 by refarming the 1800MHz band, previously used for 2G services, to support 4G mobile broadband[2].

In common with other markets where the 1800MHz band is being refarmed for this purpose, MTC's service currently only targets urban customers. The company is waiting for spectrum in the 800MHz band to become available before it rolls out LTE to rural areas, as the propagation characteristics of this sub-1GHz spectrum make it much more suitable for providing wide coverage in rural areas.

In contrast, Namibia's second largest mobile operator, Telecom Namibia, does have access to 800MHz spectrum. It was already using the 800MHz band to offer 2G CDMA services, and planned to refarm it for 4G use.

However, before Telecom Namibia could refarm the 800MHz band for 4G mobile broadband use, it needed to move a small number of customers still using its CDMA service to a higher band. Telecom Namibia acquired the higher frequency spectrum it needed to do this through

its take-over of another Namibian operator called Leo. Once the switch was complete, the CDMA 800 service was decommissioned and a new LTE network was built to replace it.

The experiences of Angola and Namibia show that by allowing spectrum licence holders to change or upgrade the underlying technology of their service — in these instances by refarming spectrum from 2G to 3G and 4G use — governments can generate positive outcomes for consumers. Refarming underutilised spectrum also allows operators to bridge the mobile broadband supply gap by delivering 3G and 4G services far sooner than would have been possible had they waited for the digital migration process in broadcasting to be completed.

Refarming existing spectrum also illustrates why regulators should amend any licences that have been issued under technology-specific conditions in the past, as it enables operators to deploy the latest technologies more quickly. This approach makes it possible for operators not only to serve more subscribers, but to provide each subscriber with better, more innovative services.

1   http://data.worldbank.org/indicator/IT.NET.BBND.P2
2   https://lteconference.wordpress.com/2014/10/13/interview-ceo-mtc-namibia-in-terms-of-maintaining-business-mobile-sustainability-into-the-future-the-price-per-gigabyte-is-critical/

Rapid adoption of the APT700 band plan will help mobile operators connect the unconnected

Policy Goal

There are now over 3.6 billion unique mobile subscribers worldwide, but despite this a large proportion of the world's population remains unconnected. To connect the unconnected operators really need access to sub-1GHz spectrum, as it is most effective for extending coverage affordably to remote regions. What's more, if this spectrum is harmonised around the world, it can lead to economies of scale that drive down handset prices and amplify the potential of sub-1Ghz spectrum to bring underserved populations online.

Action

The APT700 band plan details how Asia Pacific countries can make harmonised use of the 700MHz band for mobile services. Widely adopted in the Asia Pacific region, the plan is also being taken up in Latin America, while the Europe, Middle East and Africa (EMEA) region is aligning technical elements of its second digital dividend with APT700.

The combination of the excellent coverage provided by the band and its huge addressable market will reduce connectivity costs. However, adoption is only the first step. By accelerating both digital switchover and spectrum awards to mobile operators, regulators can help speed up the deployment of services to the digitally excluded.

Enablers

- Close collaboration between government and industry, ensuring the APT700 band plan makes very efficient use of spectrum
- Commitment from national regulators to adopt a harmonised APT700 plan, creating a vast 4G ecosystem

Outcomes

- Adoption of the APT700 band plan in Latin America, as well as the Asia Pacific region
- Likely future compatibility with the 700MHz band plan for the EMEA region
- Economies of scale, helping equipment manufacturers drive down costs for consumers

Strategic Challenge

The mobile industry has brought connectivity to billions of people around the globe, delivering substantial socio-economic benefits in the process. Nevertheless, over half of the world's population remains unconnected.

Due to the lack of fixed-line infrastructure in many developing countries, mobile will be the enabling technology for getting the vast majority of these people online in the future. Bridging this digital divide will remain one of the key goals of the mobile industry over the coming years, with GSMA research showing that affordability of services will be crucial to achieving this aim[1].

Creating a 4G ecosystem

The APT700 band plan was developed over a period of two and a half years through close collaboration between governments, operators, equipment manufacturers and trade associations. It is generally accepted to be a technically robust plan, and an excellent platform for connectivity in the years to come.

The plan was designed to support the needs of countries in the Asia Pacific region, including Australia, India, Japan, New Zealand, Malaysia, Singapore and South Korea. However, because it makes very efficient use of spectrum, it has also drawn interest from other regions. For example, a large number of countries in Latin America have committed to using the plan, including the four most populous nations — Brazil, Mexico, Colombia and Argentina. As a result, a regional consensus is now developing that will most likely see South America harmonise on APT700.

The EMEA region is also working on a plan for a second digital dividend using the 700MHz band, and it has been proposed that this will have technical alignment with APT700 — based on the reuse of the lower duplexer of the APT plan — to enable roaming and handset interoperability. In fact, the United Arab Emirates announced in May 2013 that it would use the APT700 plan in this way.

Due to this growing momentum, it now looks likely that APT700 will form the biggest harmonised ecosystem for 4G services around the world.

Making it happen — driving down costs via spectrum harmonisation

For early adopters, choosing the APT700 plan was not without risk. The United States had already chosen its own plan, known as US700, and despite the fact that it was highly fragmented,

manufacturers already had network equipment and devices under development. However, they hadn't started developing hardware compatible with APT700, and some were even worried that APT700 might never achieve scale.

The network infrastructure requirement for operating in the 700MHz band can be up to 70 per cent lower than in the 2100MHz band.

Nevertheless, Australia and New Zealand decided that APT700 was the best option for their markets and became the first two countries to adopt the plan. Japan soon followed, scrapping its own band plan in favour of APT700. It also became the first country to license part of the 700MHz band to mobile operators, while Taiwan became the first country to have a live 4G network based on APT700, when mobile operator FarEasTone launched its service in June 2014.

With countries in Latin America now also lining up behind the plan, the addressable market is estimated to be around 2.1 billion people, but in the future this market could grow to over three billion people.

While all the countries involved will gain benefits from alignment with APT700, such as reduced

cross-border interference and the promotion of international roaming, the release of the 700MHz spectrum may have an even bigger impact in developing nations such as Afghanistan, Bangladesh, India or Pakistan, where large portions of the population remain unconnected.

Sub-1GHz spectrum has the potential to help these people get online in two key ways. First, the propagation characteristics of the 700MHz band make it ideal for providing mobile services to rural areas. Fewer base stations are required to provide coverage using this band, compared to higher frequency bands. This has significant impact on the levels of investment need by operators to establish coverage in rural areas. For example, research by the GSMA found that the network infrastructure investment requirement for operating in the 700MHz band can be up to 70 per cent lower than in the 2100MHz band, and a report by the Boston Consulting Group found that halving capital expenditure requirements to establish network coverage can lower service costs by between five and 10 per cent[2].

Second, because APT700 will have an enormous addressable market, it will allow manufacturers to achieve economies of scale when producing network hardware and handsets. For example, handsets designed to work in Asia will also work in Latin

America, Europe and Africa. This puts downward pressure on the prices of these devices, making them more affordable. In fact, research shows that harmonisation of spectrum can lead to a reduction of 10 per cent in the bill of materials for handsets[3].
This is an important factor when trying to connect the unconnected, as mobile services in developing countries are particularly sensitive to higher handset prices.

The speed at which the APT700 band has succeeded in getting buy-in from several regions around the world is astonishing.

When it was standardised in 2012, there were questions about whether the ecosystem could become large enough to drive down the costs of infrastructure and devices, yet today the large number of countries committed to using the plan mean it has the potential to touch the lives of well over three billion people, many of whom will be going online for the first time.

It is now up to governments and regulators to accelerate the release of this spectrum, so mobile operators can begin to deploy the types of services that overcome digital exclusion.

1 http://asiapacific.gsmamobileeconomy.com/GSMA_ME_APAC_2014.pdf
2 http://www.gsma.com/spectrum/wp-content/
   uploads/2012/03/27796700asiapacificimpact2loct10egsin.pdf
3 http://www.gsma.com/spectrum/wp-content/uploads/DigitalDividend/DDtoolkit/importance-of-
   harmonisation.html

Industry alliance helps halt the spread of abusive imagery

Policy Goal

Mobile networks not only offer traditional voice and messaging services, they also provide access to virtually all forms of digital content via the internet. Unfortunately this means they are inevitably used by some to access illegal content, including images of child sexual abuse (child pornography). Mobile network operators use a number of technical and legal measures to fight against this. To further back up these measures, the industry has also come together to form a strong alliance focused on preventing the spread of child sexual abuse content (CSAC).

Action

The Mobile Alliance Against Child Sexual Abuse Content was founded by an international group of mobile operators and the GSMA to work collectively on obstructing the use of the mobile environment by individuals or organisations wishing to consume or profit from CSAC. By combining co-operation and information-sharing with a range of technical procedures, it has put in place significant barriers to the misuse of mobile networks and services for hosting, accessing or profiting from this type of content.

Enablers

- Willingness of the mobile industry to work together to combat the spread of CSAC
- Collaborative working between a worldwide network of groups with shared aims
- Co-operation between law enforcement agencies, regulators, voluntary organisations and industry groups

Outcomes

- An alliance of mobile operators taking proactive action against the spread of CSAC
- A knowledge-sharing culture that draws on, and adds to, the collective expertise of a range of groups with similar aims
- An industry body that acts as a model of self-regulation thanks to its robust policies and record of delivering real-world results

Strategic Challenge

Mobile networks bring enormous benefits to people around the world, connecting them to friends and family, putting information at their fingertips and boosting employment opportunities. However, like any medium, mobile networks also have the potential to be used for illegal activities by unscrupulous individuals. Unsurprisingly, a big concern for operators is the possibility of their networks being used to disseminate CSAC.

The industry's response was the creation of the Mobile Alliance Against Child Sexual Abuse Content. Although a relatively young organisation (it was formed in 2008), by taking a collaborative approach to the issue, the Mobile Alliance has been successful in creating significant barriers to the misuse of the mobile environment for spreading this type of content.

Stronger together

With growing worries surrounding the potential use of mobile networks to disseminate CSAC, mobile operators were united in their desire to put in place measures to help combat the threat.

In 2007, the GSMA started discussions with mobile operators and key stakeholders to decide on the approach it would take to tackle the issue. These discussions took place in a climate where several other industries were already forming action groups.

For example, the Financial Coalition against Child Pornography was founded in 2006, with a mandate of tackling the commercial exploitation of child sexual abuse images. It included key players in the credit card and online payment industries, such as Visa, Mastercard, American Express, Google and Paypal.

Soon after the formation of the Financial Coalition, a group of technology companies including Microsoft and Google came together under the banner of the Technology Coalition. This coalition aims to use technologies such as digital fingerprinting of known CSAC to stop these images from being uploaded and shared on their networks. The founding of both of these coalitions represented positive steps in the fight against the spread of this type of content, but they also raised questions for the mobile industry.

For example, if payments to sites dealing in CSAC were blocked by credit card or online payment systems, was there now a possibility that this economic activity could be displaced onto mobile payment systems? And although data showed the majority of abuse content was being shared and consumed through the fixed internet, with mobile broadband growing at such a rapid rate, wasn't it likely that issues such as the spread of CSAC would transfer into the mobile sphere?

It seemed obvious that the global nature of the crime required a response that was also global in reach. With this in mind, the GSMA, with its worldwide membership of mobile operators, formed the Mobile Alliance Against Child Sex Abuse Content in early 2008.

Making it happen — working collaboratively to close down opportunities for criminality

The members of the Mobile Alliance were very keen that the group would not become a 'toothless tiger' — the consensus was that it needed to have real bite, with strong, defined and deliverable goals that would be effective in stemming and reversing the spread of CSAC.

As well as working closely with law enforcement as required by local legislation, members agreed that they would make three specific commitments:

- Implement processes to deal with notices and take downs for removing CSAC.

- Work with local national hotlines on processes to enable removal of CSAC.

- Restrict access to URLs known to contain CSAC.

Although these principles sound straightforward, putting them into action was not. For example, most European countries have national hotlines, but there are several regions around the world where they are relatively uncommon. As a result, the Mobile Alliance works closely with the INHOPE Foundation, which develops national hotlines worldwide to increase the number of countries with effective hotlines. For example, Mobile Alliance member

"The Mobile Alliance is a prime example of the proactive action industry can take and, together with government and law enforcement support, we can make significant progress in the global fight against child sexual abuse content online."

Hamadoun Touré, Secretary General,
International Telecommunication Union (2007–2014)

Telefónica is currently working to get hotline organisations set up in Latin American markets where they have not yet been established. Also, the third principle was a politically sensitive area for mobile operators to navigate. At the time the Mobile Alliance was formed, there were discussions, particularly in Europe, around the possibility of legislation being introduced to require mobile operators to block some types of content, such as copyrighted material that was being shared illegally.

As with any type of criminal activity, conditions on the ground can change rapidly, so the Mobile Alliance takes a proactive approach to monitoring areas that could potentially develop into trouble spots in the future.

Mobile operators were understandably worried that if they blocked one type of content — child sexual abuse images — scope creep could mean they would be asked to police all kinds of traffic travelling across their networks, which would be unworkable. Despite the sensitive nature of the task, the members agreed there was a very specific need to block this particular type of abuse content and that this should have no bearing on discussions surrounding how other types of content should be dealt with in the future.

From the beginning, the Mobile Alliance also realised it needed to establish strong links with a number of external stakeholders in order to succeed in its goals. For example, the GSMA became a member of the Internet Watch Foundation (IWF) so that the Mobile Alliance could take advantage of the IWF's existing list of child sexual abuse URLs as well as its technical support and cutting-edge research. It also engaged with Interpol, so members could opt to implement the Interpol 'worst of' list of child sexual abuse URLs.

Furthermore, the Mobile Alliance works collaboratively with groups such as the International Centre for Missing and Exploited Children and United Nations Children's Fund (UNICEF), which seek to ensure an appropriate legislative backdrop is put in place countries where it is not clear that this type of content is illegal. Without strong local legislation, mobile operators cannot take an effective stand against this type of crime.

As with any type of criminal activity, conditions on the ground can change rapidly, so the Mobile Alliance takes a proactive approach to monitoring areas that could potentially develop into trouble spots in the future. For example, it keeps on top of the question of whether mobile payments are at risk of being misused to monetise CSAC by seeking feedback and input from national hotlines, the Financial Coalition and law enforcement agencies. It has also produced guidelines for mobile operators on preventing abuse of mobile payments services and has completed research into current levels of misuse.

This research found that it is still rare for mobile payment mechanisms to be implicated in the commercial exploitation of this type of content.

The results achieved so far, and the continued important work carried out by the Mobile Alliance, demonstrate how effective the industry can be when it unites behind a common cause, while also drawing on the knowledge and expertise that external stakeholders have to offer. As such, the Mobile Alliance stands as a model of effective self-regulation, showing that the industry can be trusted to come together, do the right thing and put in place effective measures to protect children from being exploited.

Arbitrary EMF limits threaten Europe's mobile communications evolution

Policy Goal

The mobile industry in Europe provides services that touch the daily lives of almost every citizen. To continue to provide faster connection speeds and greater coverage, the industry constantly needs to enhance existing base stations or build new ones. Rightly, base stations must meet a range of criteria, including radio frequency/electromagnetic field (RF/EMF) exposure limits. However, inconsistency in national regulatory limits in the region adversely affects network upgrades, increases costs and can ultimately stifle innovation.

Action

In 2014, the GSMA released a report on how strict regulations covering RF/EMF exposure limits within the European Union are affecting the deployment of new mobile technologies. The study — focusing on Belgium, France, Italy, Lithuania and Poland — found potentially damaging variations in approach across these countries. The mobile industry is working with the EU to close this gap. Ultimately, the onus is on member states to adopt harmonised exposure limits based on international scientific recommendations to ensure that certain regions within Europe don't continue to lag behind in terms of mobile network investment.

Enablers

- Harmonised EMF levels based on international guidelines
- Regulatory support for EMF levels that protect public health and allow optimisation of existing and emerging mobile network technologies
- Europe-wide, rather than national and intra-national, compliance with EMF regulation

Outcomes

- A globally competitive Europe fully able to exploit the €235 billion market opportunity offered by mobile communications
- Europe-wide 4G/LTE network coverage bringing mobile broadband connectivity to EU citizens
- High-speed connectivity supporting investment, jobs and innovation in the EU

Strategic Challenge

Europe boasts an innovation-led economy that has embraced the benefits of mobile communications. It has the highest level of mobile penetration in the world, and estimates suggest that the number of mobile connected devices across Europe will surpass 1 billion by 2020. Connectivity brings huge economic benefits: by 2020, for example, mobile communications will represent €234 billion worth of market revenue opportunity for the European economy.

Europe, however, is in danger of falling behind in the connectivity race. For example, at the end of 2013 one in five mobile connections in the US were made using super-fast 4G/LTE technology, according to a recent industry study[2]. The same study found that in Europe this figure was just one in 50. Furthermore, European connection speeds are falling, with US subscribers predicted to be enjoying connections that are 100 per cent faster by 2017[3].

One reason for Europe's poor performance against global competitors is a lack of consistency on key areas of mobile policy — including RF/EMF exposure limits applicable to mobile base stations. The mobile industry is working for the adoption of harmonised limits and to ensure that all European citizens, businesses and organisations can benefit from the latest and most feature-rich mobile services.

Multiple limits damage the single market

While Europe aspires to a single, unified and globally competitive market, European policy on acceptable base station RF/EMF limits is far from consistent across member states.

This is despite the fact that the European Council recommends harmonised limits based on 1998 guidelines (Recommendation 1999/519/EC) set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and recommended by the World Health Organization (WHO).

The ICNIRP recommends an exposure level of 41 V/m (equivalent to 4.5 W/m2) at 900 MHz in all public places, but a recent GSMA report on five target EU countries illustrates the level of variation faced by mobile network operators when upgrading existing network infrastructure.

Belgium. In 2009, responsibility for setting RF/EMF limits was devolved to the regions, which resulted in policy fragmentation.

In Flanders, for example, antennas are limited to just 3 V/m in residential areas, while a general cumulative norm of 20.6 V/m is applicable to all RF/EMF sources — four times stricter than the ICNIRP guidelines expressed as power density limits.

In Brussels, overall levels are set at 3 V/m — about 200 times more stringent than the ICNIRP power density limits — with each operator subject to an individual quota of 1.5 V/m. A 2011 study[4] found this left operators needing an estimated 400 additional base stations to cover the same area, and also demanded technical modifications and upgrades to 10 per cent of existing base stations. What's more, it led to increases in energy consumption by as much as 40 per cent, and limited coverage and connectivity, particularly at indoor locations. In April 2014, the total allowable level was increased to 6 V/m, however, this still represents a level that is 50 times stricter than ICNIRP recommendations. The operator Base has stated that the standard will need to be raised in two to three years to enable operators to meet the expected 4G demand.[5]

France. France presents a mixed picture. The regulatory limits are based on the ICNIRP guidelines — an approach that was vindicated by a comprehensive four-year review of exposure limits that included 300 million base station exposure simulations. The findings showed that levels at 99 per cent of the exposure simulation points were less than 1/10th of national safety limits. It concluded that further reductions in EMF levels would lead to a sharp deterioration in coverage. As a result of the country's adherence to ICNIRP guidelines, 4G/LTE roll-out has accelerated.

In the capital, however, the situation is more complicated. The City of Paris (as a major landlord) has negotiated separate agreements with mobile operators covering RF/EMF levels. Working to the terms of these agreements there is a risk that existing networks could become saturated, threatening the deployment of 4G/LTE services. These agreements can also cause delays in the roll-out of base stations, as operators are required to present and then gain additional approval for computer simulations from the City of Paris before any new installation can be put into operation.

Italy. Since 1998, the Italian Government has imposed a blanket 6 V/m public exposure limit across all frequencies. It means that operators must try to reconcile coverage and quality of service issues against the requirements of compliance with RF/EMF exposure limits, while also navigating a strict and long authorisation process that varies among municipalities.

It is an often impossible balancing act, with coverage and quality frequently suffering as a result. Regulation has recently been updated with a slight easing of restrictions, but implementation of the new guidelines has been delayed because the technical rules to assess compliance have not been published.

Lithuania. Limits in Lithuania are set at 6.1 V/m — between 30 and 50 times stricter than ICNIRP recommendations, depending on frequency. Perversely, this saw mobile operators forced to close base stations as they attempted to improve connectivity by rolling out 3G networks between 2005 and 2010.

The roll-out of 4G/LTE services is, once again, exacerbating the problem of restrictive RF/EMF limits: operators have had to close around 10 per cent of their base stations and redesign the remainder to cope with the loss of capacity. As new technologies arrive, such as LTE-Advanced, problems will multiply, as it is estimated that between 30 and 50 per cent of city sites will not meet requirements.

Poland. The permitted RF/EMF exposure levels in Poland (7 V/m for frequencies from 300MHz to 300GHz) are too low to allow optimal network deployment in numerous frequency bands in one location. This means that in large urban areas, for example, a base station using 2100MHz equipment cannot also use the recently awarded 1800MHz band for 4G/LTE. Operators must build an entirely new base station and, even then, cannot optimise potential services.

In light of the upcoming 800MHz/2.6GHz auction and the investment obligations announced in the consultation process, there are serious doubts as to the ability of operators to fulfil the targets set out by the national regulatory authority.

Making it happen — a level and scientifically supported playing field

The arbitrary RF/EMF limits have a severe impact. They reduce flexibility in terms of network deployment and lead to a decrease in coverage (particularly indoors). They also reduce site sharing opportunities and, consequently, force operators into using more base stations and compromising service levels.

In Italy, for example, a study into the implications of expanding 3G sites together with 4G/LTE deployment has shown that between 44 and 77 per cent of existing base station sites would be unusable for new LTE services. Were Italy to follow ICNIRP guidelines, however, all sites would be LTE-capable.

The problem of inconsistent and unscientific RF/EMF limits is

hugely damaging to Europe's communications infrastructure, and the solution lies with the member states. The European Commission can help the region to regain its mobile communications competitive advantage by promoting good practice in member states through the harmonisation of RF/EMF exposure limit policies based on existing international guidelines.

The problem of inconsistent and unscientific RF/EMF limits is hugely damaging to Europe's communications infrastructure.

Furthermore, member states should follow the EC 1999 recommendation and the latest opinion of the European Commission's Scientific

Committee on Emerging and Newly Identified Health Risks (SCENIHR) — specifically, that policies governing exposure limits should be based on international science-based guidelines. By working together and following evidence-based policies, the European Commission and its member states can promote the rapid deployment of mobile broadband technologies that benefit citizens.

It is clear that, in countries where EMF exposure limits are significantly below ICNIRP guidelines, the roll out of next-generation mobile services will be severely hampered. However, by adopting internationally recognised standards, these regions would benefit from high-speed connectivity that helps boost investment, creates new jobs and drives innovation.

1 http://www.gsma.com/publicpolicy/wp-content/uploads/2014/03/Arbitrary-Radio-Frequencyexposure-limits_Impact-on-4G-networks-deployment_WEB.pdf
2 http://www.gsmamobilewirelessperformance.com/
3 Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2012–2017, Cisco, February 2013
4 AMEC Earth & Environmental GmbH for the GSMA
5 http://www.kpnbasefacts.be/network/4g-in-brussels-an-agreement-that-does-not-resolve-everything/

GSMA Contacts

Through direct engagement with governments, the GSMA's advocacy team strives to shape the regulatory agenda in ways that benefit the mobile ecosystem, as well as mobile-using citizens and businesses. The team comprises the association's government and regulatory affairs organisation, whose policy experts are distributed around the globe, as well as Mobile for Development, which provides technical assistance through a number of programmes to maximise the socio-economic benefits of mobile in developing countries.
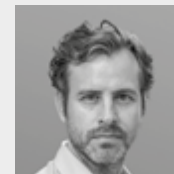
Please e-mail **handbook@gsma.com** with any questions or comments about the Mobile Policy Case Sudies.

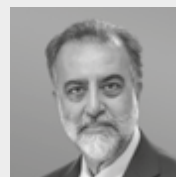**Tom Phillips**
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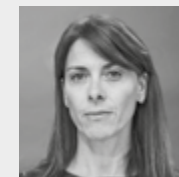
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