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Mind the Digital Gap

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Mind the Digital Gap

Houlin Zhao, ITU Secretary-General

The last two months have been an extraordinarily productive time for ITU with the 2015 Session of Council, our 150th anniversary celebrations, WSIS Forum 2015, and the 15th Global Symposium for Regulators (GSR-15) on the theme, "Mind the Digital Gap". I am confident ITU emerges from Council reinvigorated, and well positioned to adapt to the further transformation of the ICT sector.

The 2015 Session of Council, held 12–22 May, saw the announcement of ITU's new *Global ICT Entrepreneurship Initiative*, as well as the approval of the budget and of ITU's strategic, operational and financial plans. It took a number of important decisions guiding the future direction of ITU, which I am confident will enable ITU to continue to deliver high-quality services in line with the expectations of our membership.

During Council, on 17 May, our 150th Anniversary celebration united nearly 1000 invitees to show their support for the principles embodied by ITU in a celebration of the Union's illustrious history as the oldest UN organization. The ceremony included interactive demonstrations, the ITU 150 Awards, and video expressions of support from UN Secretary-General Ban Ki moon and Bill Gates (co-founder of Microsoft). We commemorated ITU's longest-standing members, whom we thank for their commitment and dedication to ITU's work. On behalf of ITU, I should like to thank all our Partners for their generous support.

The World Summit on the Information Society (WSIS) Forum 2015 welcomed a large number of stakeholders, and was attended by some 70 Ministers and 1700 delegates from around the world. The Forum served to measure progress in the implementation of the WSIS Action Lines, with sessions aimed at brainstorming innovation in ICTs.

In June, the TSAG meeting achieved a number of outcomes, including the historic milestone of approving the creation of a new Study Group 20 on the Internet of Things and its applications, including smart cities and communities. June also saw H.E. President Luis Guillermo Solís of Costa Rica inaugurated as ITU Patron for Youth and ICT at ITU Headquarters, and the very successful GSR-15 in Libreville, Gabon, which brought together the global regulatory community to debate the latest regulatory hot topics, preceded by a number of events where participants shared views with leading industry figures. At the Symposium, ITU's ICT Regulatory Tracker Tool was launched as a powerful tool for the analysis of regulatory developments in ICT, which ITU is bringing to the service of its Member States and regulatory authorities. I personally gained many insights from this fascinating and lively event, which is examined in depth in this edition of *ITU News*.

We now look forward to a number of key events coming up in a turbo-charged fall, including the World Radiocommunication Conference 2015 (WRC-15) to revise the Radio Regulations, and Telecom World 2015. Whether you are involved with one ITU Sector or several, we look forward to working with you over the coming months at ITU.

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Mind the Digital Gap
Global Symposium for Regulators

15th Global Symposium for Regulators

ITU's flagship regulatory event, the Global Symposium for Regulators (GSR-15), took place on 9-11 June in Libreville, Gabon, and welcomed over 400 senior policy-makers from the world's information and communication technology (ICT) regulators and leading tech firms.

The event was co-hosted by Gabon's *Autorité de Régulations des Communications Electroniques et des Postes* (ARCEP) under the patronage of H.E. President Ali Bongo Ondimba, with the theme, *'Mind the Digital Gap — Regulatory Incentives to Achieve Digital Opportunities'*. Chaired by ARCEP President Lin Mombo, the packed programme addressed key topics facing regulators today, including: mobile payments; network sharing models; taxation; the 'Internet of Everything'; regulation and broadband uptake; and ways in which regulation can help promote accessibility for all.

GSR-15 also featured a lively pre-event programme hosted by partners including the GSMA and the Global VSAT Forum, along with a well-attended meeting of Chief Regulatory Officers from industry and representatives from regulators. This pre-event programme discussed the priorities in harmonizing cross-regional frameworks, as well as mechanisms to adopt relevant, flexible, and measurable policies and tools to enhance supply and demand-side investment strategies for creating an optimal regulatory environment. It also debated how to foster private sector investment, competition and innovation in boosting access to broadband.

High-level patronage

The GSR-15 opening ceremony on 9 June welcomed a number of distinguished guests, including: Séraphin Moundounga, Gabon's Minister of Justice; Pastor Ngoua N'Neme, Minister for the Digital Economy and Posts; Jean-Francois Ndongou, President of the National Council and of Communication; as well as Abdoulkarim Soumaila, Secretary-General of the African Telecommunication Union (ATU). The Chair of GSR-15, Mr Lin Mombo, praised the Government of Gabon for undertaking a vast programme for the roll-out and upgrading of infrastructure and broadband in order to achieve full connectivity of the country in the near future.

In his opening remarks to delegates, the Director of ITU's Telecommunication Development Bureau (BDT), Brahima Sanou, noted that "all countries need a solid base of ICT infrastructure, as well as appropriate legal and regulatory frameworks to foster investment and innovation".

The Leadership Debate on 'Funding an Inclusive Digital Society – from Infrastructure to Data' featured a panel with Lin Mombo; Bocar Ba, CEO, SAMENA Telecommunications Council; and Christian de Faria, CEO and Managing Director of Airtel Africa.

ITU's Kemal Huseinović set the tone by reminding the audience that 2.3 billion people still live outside 3G coverage zones – a level of 'digital exclusion' unacceptable in today's world. Airtel's Mr de Faria underlined the need for independent regulation, with fair and transparent rules applied equally to all players: "Right now there is an uneven playing field, with OTT players subject to different rules and operators seen as cash cows. Continued investment in infrastructure requires a supportive regulatory framework."

SAMENA's Mr Ba spoke about the oncoming revolution of the Internet of Things (IoT), which will create "a very complex digital future", and urged all players to focus on a common goal – best serving customers. In the ensuing discussion, the audience asked whether regulators needed to consider adopting a regional approach to OTT regulatory issues: "A single country cannot solve all the issues on its own, so there is a need for a critical mass of regulators to negotiate with operators. Such networks could be achieved through regional organizations," ventured Mohammad Al Taani, CEO of TRC, Jordan. Mr Sanou closed the debate by urging all players to strive towards an enabling environment founded on mutual trust that will help build and maintain resilient and affordable infrastructure for all.

In the session on Innovative Investment Strategies, Steve Collar, CEO of O3, stressed that consumers just want affordable, reliable connectivity – the type of infrastructure is unimportant. Facebook Africa's Ebele Okobi emphasized the multi-stakeholder nature of today's networks, telling the audience "every player has a role in the ecosystem…those who create demand [for services] also create opportunities for operators."

The ensuing Mobile Payment debate explored the regulatory implications of digital financial services. Panelists agreed that m-payments are on the verge of becoming a universally accepted means of conducting day-to-day business and a vital enabler of financial inclusion and a tool for empowerment, particularly for women. The panelists – representing regulators, telecom providers, donors and associations – discussed the roles of different stakeholders in this emerging ecosystem.

Dynamic dialogue and diverse views

Speaking to the audience on the morning of Day Two, ITU Secretary-General Houlin Zhao emphasized the need for a strong and flourishing ICT ecosystem to meet socio-economic development targets, including the new Sustainable Development Goals. He also stressed the importance of nurturing ICT-focused small and medium-sized enterprises, which can leverage strong global demand to become major contributors to the national economy. "Given the right tools and encouragement, today's youngsters can become tomorrow's ICT entrepreneurs, creating tech start-ups and providing the ICT skills that can help countries grow a flourishing new business community of small- and medium-sized enterprises focused on ICT goods and services," said Mr Zhao.

The session on Models for Network Sharing began with a strong and informative presentation by Malcolm Webb of WebbHenderson. "To share or not to share – that is the question!" quipped moderator Marufu Antony Chigaazira, with panelists agreeing that some form of sharing is inevitable, given the pressure for rapid roll-out of new

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services and high costs of infrastructure proving a common barrier. Mike Jensen of Association for Progressive Communications (APC) made the practical point that accurately mapping all infrastructure was essential to any effective sharing strategy.

Next was a compelling session on the complex issue of Taxation in the Digital Economy, led by Professor Raul Katz of the Columbia Institute for Tele-Information. Panelists grappled with the need to balance tax on manufacturers and operators with the need to make devices and services as affordable as possible. Moderator Serge Essongue of ARCEP noted the disparities between tax regimes for traditional telcos and newer OTT players, some of which are avoiding heavy tax burdens. Panelists agreed that any rebalancing nonetheless needed to protect services offered by OTTs, which, in the developing world in particular, are often the main user platform driving network traffic. The need for governments to put something back is a key priority: "Taxes collected from ICT goods and services should be used to develop each country's ICT sector," said Cynthia Reddock-Downes of TTAT, Trinidad and Tobago.

Another session addressed challenges of the emerging IoT. The increasingly interconnected world of IoT is removing physical barriers, yet regulatory regimes are still fragmented along old lines, panelists said. Shiv Bakhshi, Vice-President at Ericsson, urged African regulators to harmonize frameworks to drive service roll-out: "Like Europe, you have a market of hundreds of millions of people – but unfortunately also a market with dozens of different – and sometimes conflicting – sets of rules."

A fascinating presentation by Professor Urs Gasser of Harvard University outlined the ways interoperability can be used to promote consumer choice, avoid lock-in, and spur innovation and competition. "Different approaches to interop offer a rich set of tools for ICT regulators – the challenge is to identify the best tool for each job," he said, urging regulators to strive for "optimum, not maximum" interoperability.

A privileged space for expert debate

'Regulators' Day' kicked off with a special session on promoting e-accessibility, and a closing debate on how smart regulation can facilitate m-services and applications. The final session examined how regulatory frameworks can drive broadband uptake, featuring panelists from Cambodia, Costa Rica and Switzerland.

The adoption of the GSR-15 Best Practice Guidelines concluded an exceptionally successful symposium, with a Closing Ceremony presided over by GSR-15 Chair Lin Mombo, BDT Director Brahima Sanou, and Pastor Ngoua N'Neme, Gabon's Minister for the Digital Economy and Posts.

"Today, ICT is a strategic sector in the creation and distribution of national wealth, and contributes significantly to the improvement of socio-economic activity in Gabon," said Minister Ngoua N'Neme. "I reaffirm the commitment and will of my Government to support and assist the ITU in its mission to connect the world."

Trends in Telecommunication Reform Report 2015

Overview

The 15th edition of the ITU flagship report, *Trends in Telecommunication Reform,* is intended to help stakeholders and information and communication technology (ICT) regulators keep abreast of latest developments and prepare them for the arrival of the digital society. This year's report, launched shortly after the 15th Global Symposium for Regulations (GSR-15), held in Libreville, Gabon, introduces new data analysis tools developed by ITU and shows how policies and regulation may impact the uptake of ICT services.

The first chapter charts upcoming opportunities for governments, business players, and consumers alike through the transformations brought about by ICTs. It also considers new challenges for ICT regulators given the additional challenges posed by infrastructure development. It provides an overview of ICT market trends to give some indication of where regulation might be heading. It is now clear that the Internet is driving progress across different economies, and is increasingly invading different spheres of people's lives and changing economic, social and cultural patterns. However, large disparities remain between those who have access to ICTs and those who do not. In particular, the broadband divide between developed and developing countries remains large, at 82% versus 21% penetration for mobile broadband and 27.5% versus 6% for fixed broadband, respectively. Although 3 billion people worldwide were online and using the Internet by the end of 2014, at least 4.3 billion people were still not online, of whom 90% live in the developing world.

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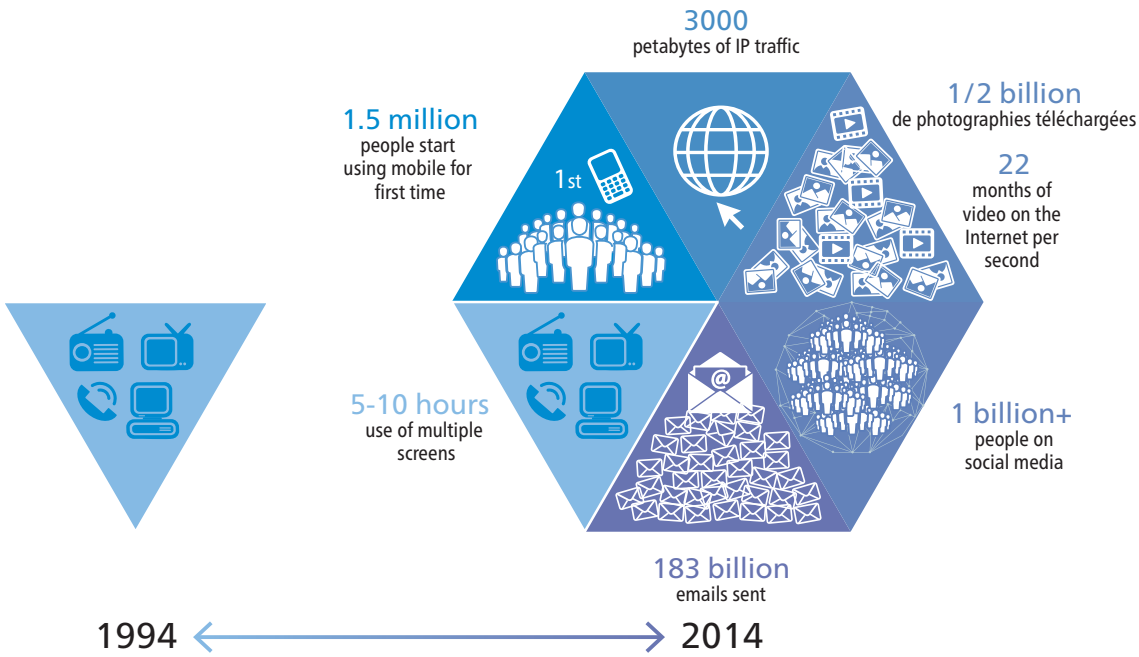
This opening chapter maps continuing and unprecedented growth in many different aspects of telecom/ICTs and the Internet — for example, on a typical day, an average of 1.5 million people start to use mobile telephony for the first time (see Figure 1).

Setting the conditions for ICT markets to flourish by attracting investment and fostering innovation, continues to be a high priority in most countries, alongside expanding universal access to the digital economy. This is why more than 140 countries have adopted national broadband policies, plans and digital agendas recognizing the cross-sectoral and pervasive nature of ICTs on all aspects of the digital economy.

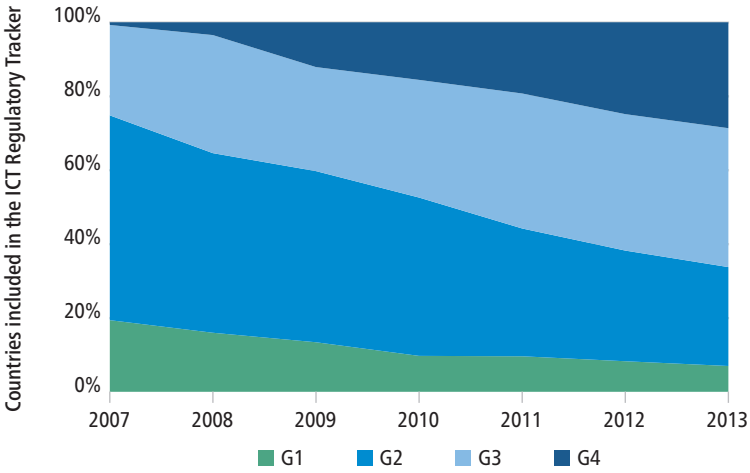
Chapter 1 introduces ITU's *ICT Regulatory Tracker,* a new evidence-based tool to help decision-makers and regulators make sense of the rapid evolution of ICT sector regulation. The Tracker reveals that fourth-generation (4G) regulation, characterized by agility and flexibility, has gained momentum rapidly over the past decade. The number of countries with 1G and 2G telecom regulation has halved in only seven years, reducing from three-quarters to just one-third of countries over that period. Indeed, today, one out of four countries surveyed now enjoys a 4G regulatory environment that allows for leveraging of the ICT sector to achieve economic growth and social development across the economy (see Figure 2).

1 *A typical day in the digital world*



Source: ITU.

2 *The Four Generations of telecom regulation, 2007–2013*



Score Breakdown		
1st Generation	>=0	<40
2nd Generation	>=40	<70
3rd Generation	>=70	<85
4th Generation	>=85	

G1 Regulated public monopolies — command and control approach.

G2 Basic reform — partial liberalization and privatization across the layers.

G3 Enabling investment, innovation and access — focus on stimulating competition in service and content delivery, and consumer protection.

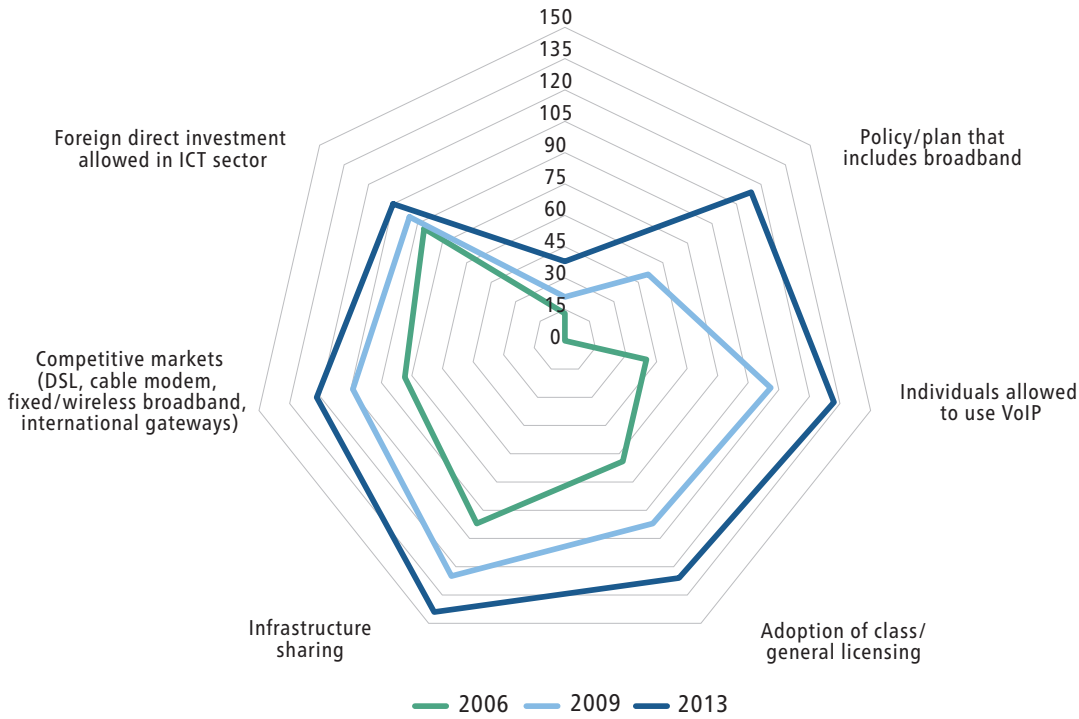
G4 Flexible and integrated regulation, led by economic and social policy goals.

Source: ITU.
Note: Analysis based on the ICT Regulatory Tracker for 156 countries.

Not all '4G regulation' countries have yet fully realized digital opportunities; however, they have opened the door to meaningful change and can expect tangible improvements in their ICT sectors — as well as in the rest of their economy — over the short- to medium-term. Overall, the regulatory environment has steadily enhanced in the great majority of countries worldwide, as countries have introduced reforms and aim for more flexible regulation. This positive outlook reflects the dynamic pace of technological and business innovation faced by telecom/ICT regulators — a reality that challenges them to adapt to the new digital world order.

The Tracker has achieved more than just a historical analysis of regulatory trends — it is a powerful analytical tool that helps pinpoint the strengths and weaknesses of regulatory interventions to provide a learning curve for achieving a vibrant and innovative ICT sector. For example, analysis of countries' specific regulatory practices shows that a growing number of countries have adopted a National Broadband Plan, and since 2006 have permitted the use of Voice over Internet Protocol (VoIP). Meanwhile, secondary trading of radio spectrum is still only permitted in a small number of countries (see Figure 3).

3 *Screening regulatory practices: Which regulations have helped shape the ICT sector from 2006 to 2013?*



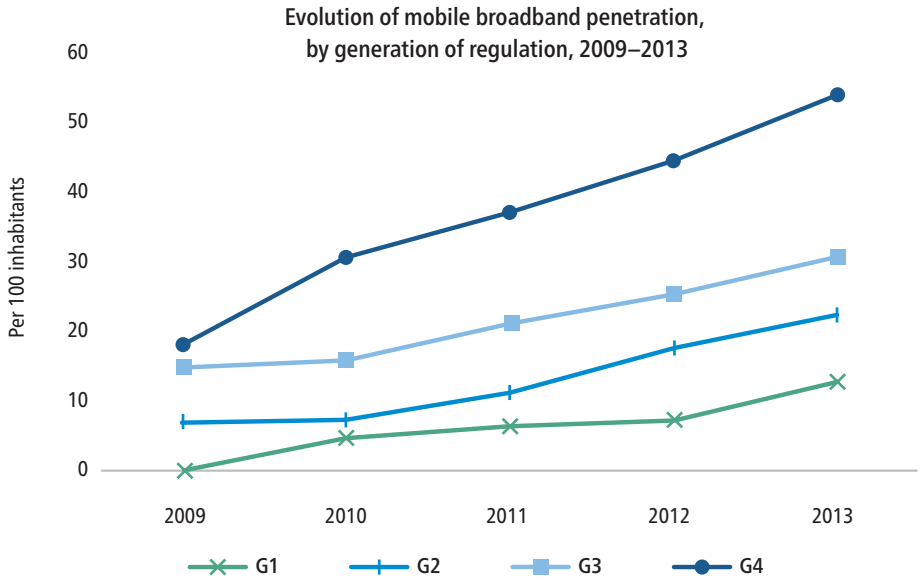
Source: ITU.

The Tracker provides insights into what fourth-generation regulation stands for, in real terms. Analysis of mobile-broadband trends in 122 countries using the *ICT Regulatory Tracker* shows that levels of mobile broadband penetration are higher and grow at a faster pace in countries with fourth-generation regulation (see Figure 4). Comparing the 'high' and 'low' performers clearly suggests that growth in services has happened most rapidly where regulatory enablers have been put in place to leverage latest technologies and innovations. Consistent and well-enforced fourth-generation regulation generally provides for a vibrant market and win-win opportunities for both service providers and consumers.

Conversely, slow, patchy or inconsistent regulation may inhibit innovation and business incentives. Further, the time-to-market, as well as the choice of services, are limited — which is the case in countries in the first generation of regulation, which have not yet embarked on reforming the sector.

The *Trends in Telecommunication Reform 2015 Report* also presents econometric research undertaken by ITU exploring the relationship between regulation (monitored by the *ICT Regulatory Tracker*) and fixed broadband and mobile cellular. This research suggests that a sound regulatory environment is significantly associated with a positive impact on ICT adoption. Econometric regressions

4 *The Four Generations of telecom regulation, 2009–2013*



Source: ITU.
Note: Based on data for 122 countries over the entire period.

suggest that a 10% increase in the *ICT Regulatory Tracker* score (corresponding to an incremental enhancement of regulatory frameworks) is associated with an increase of 7.7% in fixed-broadband penetration over the period 2008–2013. A country that has adopted some form of broadband development strategy (such as a national broadband plan or digital agenda including proactive regulatory measures such as infrastructure-sharing, VoIP services or a competitive environment) would have penetration levels 7.7% higher on average than a country without these measures in place, factoring out the impact of other conditions.

In summary, the first chapter of this year's Trends in Telecommunication Reform Report charts the latest trends in the sector, to help regulators understand the issues, and to be able to respond adequately, to facilitate the future growth of ICT around the world. It presents the most up-to-date research into telecom/ICT regulation based on ITU's annual survey.

Regulation and the Internet of Things

The *GSR Discussion Paper* by Professor Ian Brown of the Oxford Internet Institute, University of Oxford, United Kingdom, examines the implications of the Internet of Things (IoT) for individuals, businesses and societies, and especially issues that telecom and other regulators need to consider, as IoT systems proliferate in developed and developing economies.

It is estimated that between 20–50 billion "things" will be connected to the Internet by 2020, including mobile devices, parking meters, thermostats, cardiac monitors, tyres, roads, cars, supermarket shelves and many other types of objects and devices. Rapid growth in the IoT is being driven by rapid falls in the cost of sensors, processing and networking technologies.

The Discussion Paper describes a broad range of IoT applications for monitoring and managing health and wellbeing, improving energy efficiency, increasing the quality and reliability of industrial processes, reducing traffic congestion, and enabling the development of new products and services. Technology companies and consulting firms have estimated that IoT technologies could have a significant impact on the global economy amounting to several additional trillions of dollars within a decade.

IoT devices will have the biggest impact where they are used in large, interconnected systems, including smart cities, smart power and water grids. Closer to the individual, "connected cars" with hundreds of separate sensors will offer safer and more reliable transport. Devices such as insulin pumps and blood-pressure monitor arm cuffs can give warning signs of conditions such as diabetes and heart disease. Another major opportunity for the IoT lies in the use of data and Application Programming Interfaces (APIs) in interactions between the IoT and individuals. The Figure opposite shows the relationship between IoT devices and applications, and the types of data they can generate at the individual, community and social levels.

Professor Brown's Discussion Paper provides an excellent, brief overview of advances in several sectors. Examples of **smart city systems** using IoT technology include:

- buildings that save power by adjusting heating and lighting according to the movements of their users and the weather;
- networked traffic signals that dynamically manage traffic movement across cities in response to measured and predicted changes in congestion and accidents;
- infrastructure that senses wear-and-tear and issues repair alerts (including bridges, cables and water pipes);
- road lighting that dims during low traffic periods; and
- smart electricity and water meters that record real-time data about usage, can interact with other household devices, and provide information to help residents reduce consumption levels at peak demand periods and/or peak rates.

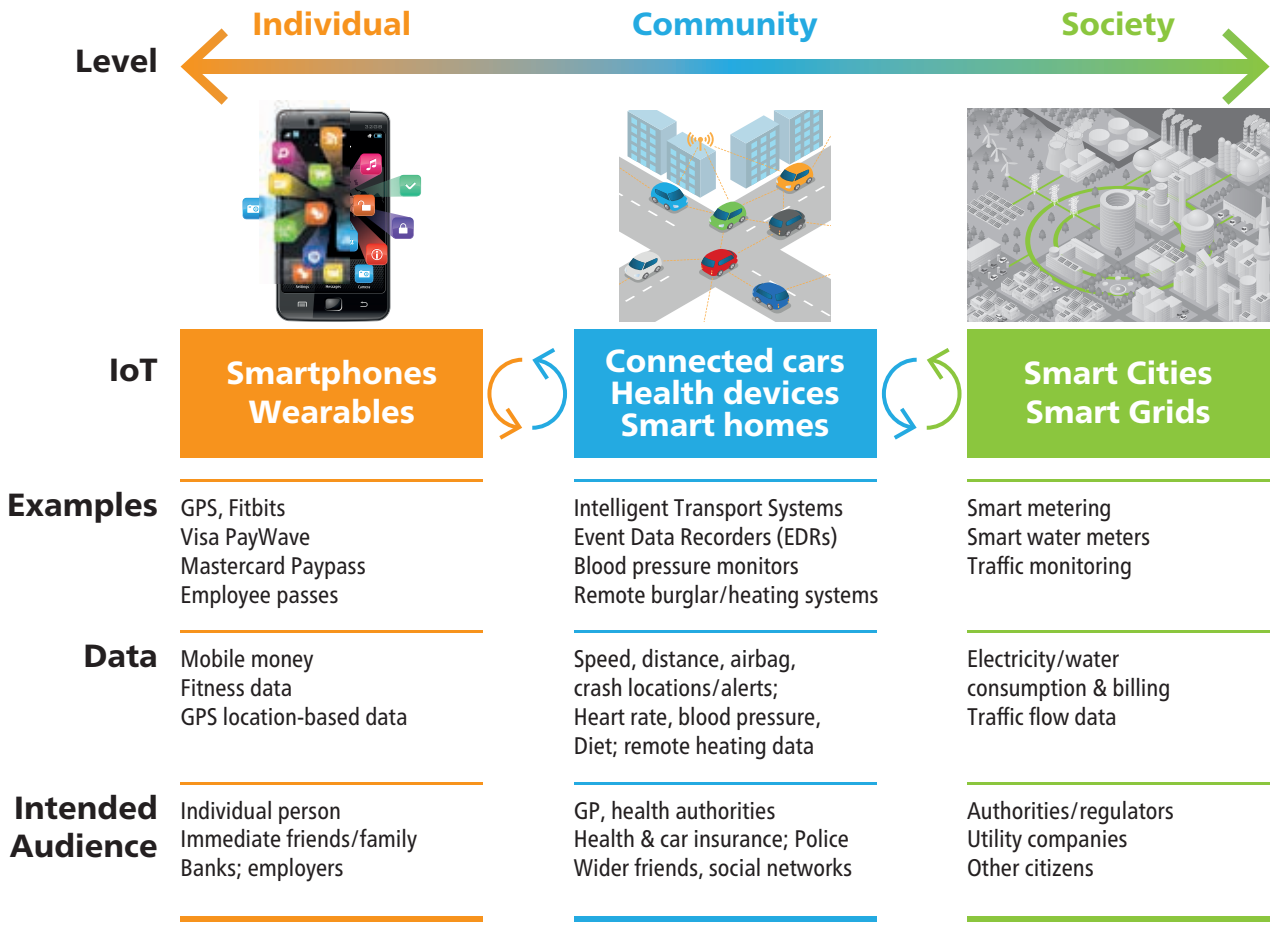
With respect to **connected cars**, the Discussion Paper notes that the European Union (EU) is close to agreeing a requirement for all new cars and small trucks sold in the EU to feature a system that will automatically transmit vehicle data to public or private emergency response services following an accident. The top 14 car manufacturers in the world, which account for 80% of the global market, all have connected car strategies.

In the healthcare sector, the IoT can improve health and wellbeing by:

- increasing efficiency and care in existing healthcare settings;
- enabling greater use of remote telehealth provisions; and
- letting individuals monitor their own health condition on a daily basis, potentially promoting earlier diagnosis and/or encouraging compliance with treatment regimes.

The public and private sectors are continuing to fund significant levels of IoT research and development, in areas such as modularity, reliability, flexibility, robustness and scalability. High reliability becomes especially important in large-scale systems with hundreds

1 *The Internet of Things and Data*



Source: GSR Discussion Paper, "Regulation and the Internet of Things" Professor Ian Brown (2015).

of thousands of sensors, devices and readers. Radio-frequency identification (RFID) tags could minimize energy consumption by extending battery life and the battery replacement cycle. We are gaining a better understanding of the technical capabilities needed for many applications, although cost, connectivity and reliability remain challenges for large-scale systems.

The paper explores the regulatory implications of the IoT for licensing, spectrum management, standards, competition, security and privacy. Telecom/ICT regulators are very familiar with some of these areas (e.g. competition, privacy and data protection), but may not typically take lead responsibility in them. The regulatory consequences are in some cases obvious — such as the need for a large address space to identify each connected object (as provided by Internet Protocol version 6, IPv6, for example).

Other implications, however, are less obvious. A United States Federal Communication Commission expert working group predicts

that IoT will add significant load to existing services such as Wi-Fi and 4G mobile networks, but expects that new spectrum will not need to be explicitly allocated to IoT communications. Studies for the European Commission have suggested that a licence-exempt model could support IoT development by avoiding contractual negotiations before devices are manufactured and used, promoting large-scale production of cheaper devices. Competition regulators will need to keep under review whether *ex post* investigations of abuse of market dominance are sufficient to foster a competitive market and innovation.

Privacy and security are two significant (and closely related) issues in large-scale IoT deployment. Without adequate security, intruders can break into IoT systems and networks, accessing potentially sensitive personal information about users, and using vulnerable devices to attack local networks and other devices. In large IoT systems such as smart cities, the lack of IoT security can create significant vulnerabilities, and be extremely complex to address given interdependencies and links to older public and private sector systems. Regulators have suggested that IoT companies should follow a security and privacy "by design" approach, building security and privacy functionality into the device from the outset of the development process, when it is much more likely to be effective. Companies developing and operating IoT systems need to conduct security testing, and consider how security vulnerabilities discovered after devices are sold can be fixed during their likely lifetime. Privacy regulators also agree that data minimization is an important principle for protecting privacy in consumer IoT devices, limiting the amount of personal data collected or retained, and therefore reducing the risk of data breaches and/or use of the data for other than the intended purpose(s).

The Discussion Paper cites a 2013 European Commission consultation exercise, which found a diversity of views on whether IoT-specific regulation is actually necessary. Industry respondents argued that State intervention would be unwise in this still-young sector, and that general rules such as the EU's forthcoming General Data Protection Regulation will suffice. Privacy advocacy groups and academics responded that IoT-specific regulation is necessary to build public confidence, as well as to ensure a competitive market. Meanwhile, a United States Federal Trade Commission (FTC) staff report suggested that IoT-specific legislation would be "premature", encouraging self-regulatory programmes for industry sectors to improve privacy and security practices — while also reiterating its call for "strong, flexible, and technology-neutral federal legislation" to strengthen its data security enforcement powers and require consumer notification following a security breach, and for broad-based privacy legislation.

The Discussion Paper notes that there is a pressing need for more widespread, common technical standards, which are likely to prove key to a low-cost, interoperable IoT. To date, IoT standards have evolved from a variety of different applications and stakeholders, who have different aims and requirements. The ITU Telecommunication Standardization Sector (ITU–T) has created a Global Standards Initiative on Internet of Things (IoT-GSI) to "promote […] a unified approach in ITU–T for development of technical standards (Recommendations) enabling the Internet of Things on a global scale". Standardization bodies such as IEEE, IETF and OneM2M are also developing IoT standards, while application-specific frameworks such as the M/490 Smart Grid reference architecture have been developed. Finding efficient mechanisms to encourage the adoption and use of the standards under development is an urgent issue for policy-makers to consider.

The Discussion Paper provides an excellent introduction to the opportunities and challenges opened up by the Internet of Things for anyone interested in gaining a greater understanding of our digital world. It provides a thorough overview of recent regulatory developments, as regulators, policy-makers, industry stakeholders and consumers get to grips with the opportunities and risks of living in a hyperconnected world.

The Discussion Paper is available at: www.itu.int/gsr15

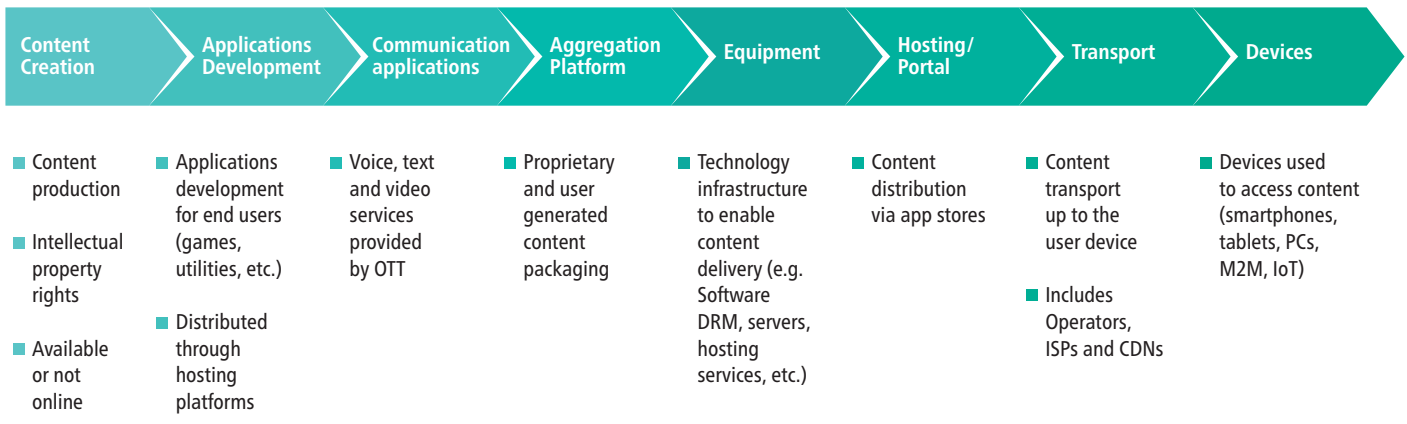
The Impact of Taxation on the Digital Economy

The GSR Discussion Paper by Professor Raul Katz of the Columbia Institute for Tele-Information examines the impact of taxation on consumption, investment and the different players in the digital economy (users, telecom operators, Internet Service Providers (ISPs) and Over-The-Top (OTT) players). It presents a typology of different taxation regimes in the digital sector and examines trends in taxation, fiscal policy and the potentially distortive effects of taxation (including double taxation, taxation asymmetries and the impact of location). It concludes by presenting lessons learned, best practices and recommendations for fiscal policy.

The digital economy is understood by some to be a global public good or, at the very least, certainly a global platform. The Paper makes an important contribution by examining the variety and impact of national approaches to a global good.

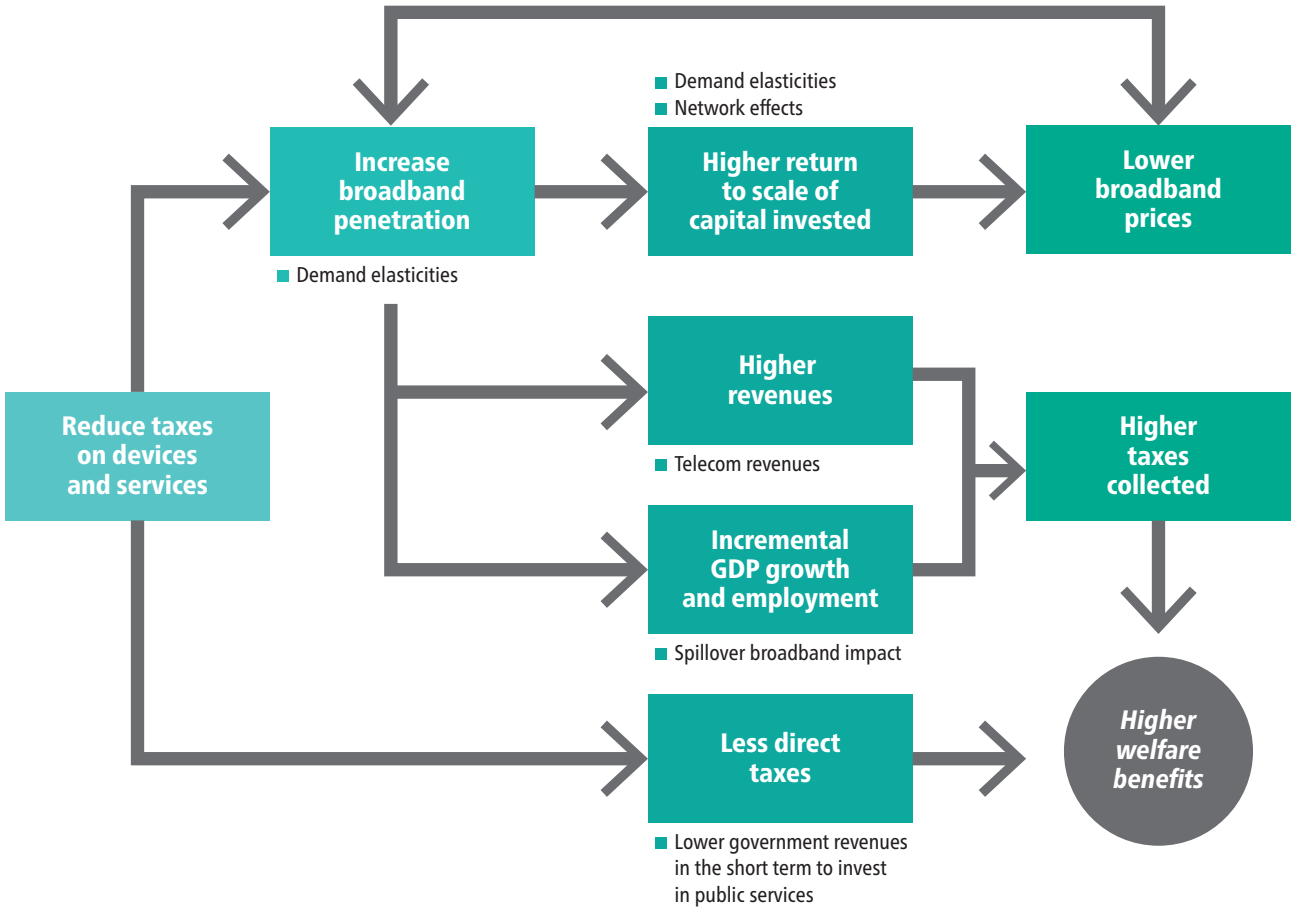
The Paper concludes that, overall, there are two opposing approaches in digital taxation policy — one is the goal to maximize revenue collection, based on steadily increasing revenues from digital products and services. The Paper notes that some governments see Internet access as an attractive source of revenue. Telecom users, telecom operators, ISPs and content/service providers can hence be subjected to a number of taxes, including: sales tax, equipment levies, custom duties, and VAT (Figure 1). Conversely, some governments consider that lowering taxes on the digital sector of the economy triggers spillovers that are often larger than the taxes foregone. For example, broadband consumption taxes (or 'Internet

1 *Value Chain of the Digital Economy*



Source: GSR Discussion Paper, "The Impact of Taxation on the Digital Economy", Professor Raul Katz (2015).

2 *A Virtuous Circle of Tax Reductions on Broadband Devices, Equipment and Services*



Source: Katz, R. and Berry, T., "Driving Demand of Broadband Networks and Services" (2014).

Access Taxes') are not uniformly applied across countries. And in some countries where broadband is considered to be a critical need, some regulators have chosen to reduce, or exempt, broadband service from any consumption tax or customs duties. For example, Colombia has decided to exempt digital devices from import duties and even sales taxes for underprivileged citizens. Proponents of this approach argue that a virtuous circle can be established, whereby the loss of tax revenue from reducing tax rates could be recouped from greater usage (Figure 2).

With regard to digital goods and services, the picture is more complicated. There is still little consensus among policy-makers as to which categories digital goods fall into, or whether digital goods should even be taxed at all. Current debates focus on various questions:

- What are the appropriate levels of taxation on **telecom equipment** purchased by operators, or hardware purchased by consumers?
- **How should Internet sales or e-commerce transactions be taxed?** The volume of e-commerce as a proportion of retail trade is increasing steadily around the world, but in many cases, sales taxes are not commonly paid on goods purchased via the Internet.
- **How should consumption of digital goods be taxed?** In most cases, payment of video streaming subscriptions from providers like Netflix or Apple TV does not include taxes.
- **Should the providers of digital platforms**, such as Google and Facebook, be taxed in the countries where revenues are generated or can they benefit from international rules that allow them to benefit from corporate tax exemptions in certain locations?
- **Should Internet service providers pay taxes the same way as telecom carriers?** Indeed, the Discussion Paper notes that the recent debate over net neutrality in the United States actually has taxation implications — the "reclassification" of ISPs as common carriers under Title II of the Communications Act of 1934 may mean that the requirement by the FCC that all telecom carriers contribute 16.1% of interstate telecom revenues to the Universal Service Fund (USF) applies.

In those countries where certain players in the digital ecosystem are not taxed, or they are subject to taxes or exemptions at different rates, tax asymmetries and other distortions can prove an important source of competitive advantage for some players over others.

In principle, taxation should seek to be neutral and equitable across all sectors of the economy. A distortion occurs when a change in the price of a good resulting from taxation triggers different changes in supply and demand from what would occur in the absence of taxes. The Paper examines the distortive effect of taxes in the digital eco-system at three levels:

- Potential disparities in tax burdens imposed on telecom operators, compared to other players in the digital eco-system (e.g. social networks, digital advertisers).
- Taxation asymmetries among global players in the digital sector (between countries).
- In-country taxation asymmetries between the telecom/ICT sector and other providers of other goods and services.

The rich and informative Paper presents an excellent overview of some of the issues involved in taxing the growing digital economy. It concludes that in developing fiscal policies, governments need to consider the trade-off between revenue generation and possible adverse effects to the development of the digital sector. Answers to this question are likely to be country-specific, based on countries' circumstances and policy trade-offs between revenue generation and the potential negative impact on the development of the digital sector, as well as the telecom/ICT market environment.

The Discussion Paper is available at: www.itu.int/gsr15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A few words with Belinda Exelby, Head of International Relations, GSMA

At GSR-15, GSMA participated in a session on mobile payments. Mobile money services have been hugely successful, particularly in the developing world. What is needed for this trend to grow and spread further?

There have been some great success stories for mobile money in Africa — Kenya and Tanzania are two good examples. But there is still a long way to go before a truly enabling regulatory environment is in place everywhere. Governments — financial regulators in particular — are instrumental. Unless they set the rules that allow mobile operators to provide mobile money services, the sector can never reach scale, and the barriers to financial services will not be breached. When the right regulatory framework is in place, mobile money services have proven to be sustainable and highly impactful.

What are the most important regulatory considerations to create digital opportunities for everyone?

Mobile is not a luxury and should not be regarded as such by governments. Mobile is a tool that societies need to solve the core problems facing their populations today. Governments share the responsibility, with industry, in enabling a digital future for all. This future is dependent on mobile broadband connectivity as well as value-added services that lift the lives of the underserved — services that can drive adoption and demonstrate transformational impact. Clearly, it is the regulatory authorities that can establish a pro-investment environment for the mobile sector — following best practice on issues such as spectrum licensing, base station siting, infrastructure sharing, etc. Meanwhile, high levels of mobile-specific taxation remain a concern in many countries, creating a deterrent to investment and increasing consumer prices. Bringing down the regulatory barriers to network deployment and affordability is essential, if we're going to connect the next billion people by 2020.

Belinda Exelby, Head of International Relations at GSMA

Last but not least, what does GSR mean to you?

GSR is a great opportunity to convene everyone in one place. It provides an opportunity for industry and regulators to meet face-to-face, to understand each other's challenges and share experiences from around the world.

GSMA was the Platinum Sponsor of the GSR-15 pre-events and GRID (Global Regulators-Industry Dialogue), and held a pre-event seminar on 'Driving Mobile's Future: Efficient Spectrum Management for Investment and Growth'.

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ITU Focus Group on Digital Financial Services

The ITU Focus Group on Digital Financial Services held its second meeting on 20–22 April 2015 at the World Bank in Washington D.C. The Focus Group aims to provide a multistakeholder platform to discuss the regulatory and policy issues associated with financial inclusion, as well as innovations in digital finance that may benefit from standardization. The Focus Group is chaired by Sacha Polverini of the Bill & Melinda Gates Foundation. Over 80 delegates attended the meeting from 24 countries, including participants from international organizations and industry associations such as the World Bank, Alliance for Financial Inclusion, Consultative Group to Assist the Poor (CGAP), International Finance Corporation (IFC), the GSM Association (GSMA), the Institute of International Finance (IIF) and the Grameen Foundation.

Financial inclusion has been recognized as a vital enabler of the digital world, as it allows access to many different aspects of the digital economy (obviously payment, but also education and health services, etc.). The overarching and cross-cutting nature of financial inclusion has been recognized by UN Member States in the global post-2015 development agenda.

During the Focus Group meeting, the World Bank presented its 2014 Findex study. According to this study, the proportion of adults with an account (with either a bank or mobile money service provider) has increased from 51% to 62% over the past three years, resulting in a reduction in the number of unbanked people from 2.5 billion in 2011 to 2 billion people in 2014. The World Bank Group's President Dr Jim Yong Kim established a goal in October 2013 for Universal Financial Access (UFA) to be achieved by 2020. To realize this goal, the World Bank Group aims to help 1 billion adults gain access to transaction accounts in contribution of reaching the overall objective, especially in 25 'focus countries' accounting for approximately three-quarters of unbanked people globally.

Participants at the Focus Group heard how digital financial services have played a great role in advancing financial inclusion. Best practices and lessons learned from Digital Financial Service (DFS) deployments were presented for various countries including Tanzania, Ghana, Egypt, Uganda, Burkina Faso, Bangladesh, Indonesia, Kenya, Brazil and Peru. In a number of Sub-Saharan African countries, there is now a greater number of people with a mobile money account with a mobile operator, than in the formal banking system. Of those 2 billion people who are unbanked, some 1.6 billion have a mobile phone in their households, so mobile money accounts are an important opportunity to further bridge the financial inclusion gap.

Indeed, a transaction account often provides a cornerstone for the provision of cashless retail payment services. Holders of transaction accounts should also be able to access broader financial services. From a payments perspective, efforts at financial inclusion should ultimately seek to make transaction accounts an effective gateway to other financial services.

Participants underlined that the collaboration between the telecom regulator and financial services regulator is key in establishing a conducive environment for DFS. In some countries (such as Tanzania), a Memorandum of Understanding outlines the respective responsibilities between the telecom provider and the Central Bank for the provision of DFS. In other countries, the government has mandated interoperability, but this has not always led to subsequent explosive growth in usage. Instead, authorities should undertake a market assessment and consult with all the different stakeholders before determining whether interoperability can be implemented. There is no single 'one solution fits all' approach as far as interoperability is concerned.

Another widely held assumption is that if a poor person owns a mobile phone, they are automatically able to use it. A study by the Grameen Foundation suggests that this may sometimes prove a faulty assumption. Usability and "mobile phone literacy" are significant issues that may prevent poor people from benefiting from mobile-enabled solutions. If not properly designed, DFS applications can also lead to confusion among people who are not familiar with the predominant language or the number of screens that users may need to go through to complete a transaction. For example, depending on the transaction, it can take up to 16 steps to complete a transaction and this is often difficult or unsuitable for people who are not literate. In addition, in some countries, a lower proportion of women own or have access to phones, or may not feel comfortable using a phone.

The next meeting of the Focus Group will be held on 30 September to 2 October 2015 in Kuala Lumpur, Malaysia. More details will be made available on the Focus Group website at www.itu.int/en/ITU-T/focusgroups/dfs/.

Overview of Council 2015

What did ITU Council 2015 achieve, and what were some of the major outcomes?

The 2015 ITU Council Session set a clear course for the year ahead by approving ITU's budget, strategic operational and financial plans, and providing guidance on the implementation of the Connect 2020 Agenda. It saw a number of major announcements, including a new *ITU Global ICT Entrepreneurship Initiative*. Council 2015 also reasserted ITU's commitment to addressing the growing scourge of cybercrime; the protection of children online; and the standardization of ICT, conformance and interoperability to facilitate connectivity worldwide.

Setting the tone for a highly productive Council Session in his opening State of the Union Address, ITU Secretary-General, Houlin Zhao emphasized that: "ITU continues to work closely with national administrations, influential policy-makers and leading industry executives in outreach and technical capacity-building… in our mission to connect the world, and in particular those not yet connected, and to facilitate the telecommunication/ICT industry and markets with innovations and sustainable new technologies". He commended the recent approval of radio-interface specifications

for IMT-Advanced and satellite IMT-Advanced (paving the way for 4G and 5G) and the new G.fast Recommendation for the delivery of 1 Gbps access speeds over copper fixed lines, as well as technical assistance to developing countries. The World Radiocommunication Conference 2015 (WRC-15) will take place on 2–27 November 2015. Mr Zhao committed that ITU will continue to improve its efficiency without sacrificing quality, while "results-based focus, transparency and accountability will remain our guiding principles".

Republic of Korea at the helm of Council 2015

Dr Wonki Min, Assistant Minister of Science, ICT and Future Planning of the Republic of Korea, was elected as Chairman of Council 2015. In his Opening Address, Dr Min noted that the Council 2015 Session was "extremely meaningful for all of us because we are celebrating the 150th Anniversary of ITU. For a century and a half, the Union has strived to enhance the lives of citizens around the world through the application of ICT — from good old telegraphy to more modern technologies such as satellites, mobile phones and the Internet." He called on Councillors to show "the same kind of spirit, commitment and hard work" that enabled ITU membership to reach consensus at PP-14.

With 373 participants representing the 48 Member States of Council, as well as 38 Member State Observers, 7 Sector Member Observers, and 3 Regional Telecommunication Organizations, Council again proved an effective forum for ITU Member States to discuss urgent major ICT-related issues. A number of Ministers were also present, many of whom also joined the ITU 150 celebrations held on Sunday, 17 May 2015 *(see separate article).*

Main Achievements of Council 2015

Argentina presented a contribution concerning the *ITU Global ICT Entrepreneurship Initiative* to bring together employers, Small- and Medium-sized Enterprises (SMEs), start-ups, innovation hubs,

high-tech parks, venture capitalists, industry and policy-makers in a global networking platform to exchange ideas and access to investment capital and new markets. It was proposed that SMEs could join ITU as Associates, and a platform should be developed to enable SMEs to share best practices and exchange ideas. Argentina offered to create, in collaboration with ITU, a regional 'chapter' for the Americas to optimize synergies and coordinate efforts by SMEs, centres of research, and academia to develop new products and standards in the region.

ITU hosted an Information Session on *'Fostering SMEs in the ICT Sector: ITU Telecom World 2015 and the ITU Global ICT Entrepreneurship Initiative',* opened by the ITU Secretary-General, Houlin Zhao. SMEs can play a major role as drivers of national and international innovation and economic development. The ITU Global ICT entrepreneurship initiative will kick off at *ITU Telecom World 2015* in Budapest, Hungary, from 12–15 October 2015, and offer excellent opportunities for SMEs from ITU Member States to connect with new markets. A number of Councillors supported ITU's initiative and Argentina's contribution.

'Telecommunications/ICT entrepreneurship for social impact' was adopted as the theme for the next World Telecommunication and Information Society Day (WTISD) to be held on 17 May 2016.

Councillors expressed appreciation of ITU's activities in **building confidence and security in the use of ICTs.** The importance of regional and international collaboration was underlined, in addition to the broad basis for cooperation undertaken by ITU. The Secretariat concurred with Council that collaboration at all levels was an essential part of the work in this area, especially in maximizing the efficiency of activities by various organizations.

The Council Working Group on **Child Online Protection** (CWG-COP) presented its report summarizing the main results of its work. A number of Councillors congratulated CWG-COP on its accomplishments. The Council approved a revised version of Resolution 1306, and resolved to maintain CWG-COP to guide ITU's work in child online protection. The Council encouraged CWG-COP to conduct online consultations with youth prior to its meetings to seek feedback and listen to their views.

Secretary-General Houlin Zhao thanked Councillors for their strong support for the World Summit on the Information Society (WSIS) process. He emphasized the importance of continuing to strive to meet the WSIS goals, in connecting the world, and of ensuring that the Sustainable Development Goals (SDGs) include proper recognition of the importance of ICTs — as well as the need (subject to approval of the United Nations General Assembly) to continue the WSIS process beyond 2015. Revised Resolutions 1332 and 1334 were adopted by Council.

Councillors expressed support for ITU's **Conformance and Interoperability** (C&I) programme, including conformity assessment programmes; interoperability events; capacity-building; and the establishment of test centres in developing countries. One major achievement was the launch of the 'ICT product conformity database' containing about 100 entries of e-health devices compliant with ITU–T Recommendation H.810, and mobile phones compatible with hands-free terminals in cars determined by an ITU testing event. Entries in this conformity database are voluntary, and permission is required from the respective vendors. Discussions focused on how to potentially expand its scope, and how it could help develop capacity for C&I programmes, especially in developing countries.

Councillors acknowledged the importance of the **Connect 2020 Agenda** approved by the 2014 Plenipotentiary Conference as setting goals for ITU and its membership in ICT growth, inclusiveness, sustainability, and innovation and partnership. The implementation of the Connect 2020 agenda requires the active participation and involvement of all stakeholders in the ICT ecosystem. The Secretariat highlighted the importance of the Connect 2020 Agenda in supporting the implementation of the UN post-2015 development agenda and the SDGs. The Chair and several Councillors encouraged Member States to do more to engage stakeholders.

The ITU Radiocommunication Sector (ITU–R) held an information session on **Digital Terrestrial Television Broadcasting** (DTTB) and its Digital Switchover (DSO) database. The digital switchover will deliver more channels, and increased spectrum efficiency, while the release of this spectrum (also known as the digital dividend) will allow for better mobile broadband coverage. A number of countries have completed the switchover, and many more are in the

process of doing so. The DSO database shows the status of ongoing, completed, planned and 'unknown' activities for each country, and provides a useful snapshot of global progress towards the digital switchover.

The ITU Telecommunication Standardization Sector (ITU–T) described its work to facilitate the **Internet of Things** and prepare for a globally connected world, including the work of the ITU–T Focus Group on Smart Sustainable Cities. Strong encouragement was given to ITU–T concerning plans to create a new study group, based on the work already achieved. Singapore offered to host the inaugural meeting of this new study group, should it be created; the Secretariat accepted the offer with gratitude.

For the ITU Telecommunication Development Sector (ITU–D), Councillors requested that the **role and activities of the ITU regional offices** be reinforced, with greater responsibility for regional directors. The Director of the ITU Telecommunication Development Bureau (BDT), Brahima Sanou, informed Council that BDT's top priority was to support ITU Member States by implementing regional initiatives.

Houlin Zhao presents the Chairman of ITU Council 2015, Dr Wonki Min, with the ITU 150th Gold Medal and certificate for his "outstanding service to the Union"

Looking forward

After some discussion, the 2015 Session of Council approved ITU's strategic, operational and financial plans, including the budget. Several Councillors expressed their appreciation of the contribution from the United States on Document access policy, advocating openness and transparency, reducing misconception, and increasing the value of the work of the Union, noting that exceptions must be clearly identified with regards to the documents which should be protected (such as working/temporary documents in study groups which have not yet been finalized, as well as information relating to intellectual property). A dedicated group was established on Information/Document Access Policy to prepare a draft access policy for submission to the Council Working Group on Financial and Human Resources for approval.

In his closing speech, Mr Zhao observed that "this Council gave ITU a clear direction for the year ahead, with a newly approved budget and rolling operational plans, and guidance on the implementation of the Connect 2020 Agenda". He stated that he will "continue carrying through… efficiency across all of our work". Mr Zhao commended Dr Min's very able chairmanship, acknowledging that: "he broke all records by finishing PP ahead of schedule, and he has now broken a Council record by finishing a full day early during a budget year". Mr Zhao then presented the Chairman with the ITU 150th Gold Medal and certificate for his "outstanding service to the Union". Many Councillors took the floor to congratulate the Chair and ITU on the successful 2015 Session of Council. The ITU Council will hold its next Session from **25 May to 2 June 2016** in Geneva, Switzerland.

ITU

ITU's 150th Anniversary Celebration

ITU celebrated its 150th Anniversary on 17 May 2015, with a glittering Awards Ceremony commemorating its long and distinguished history fostering innovation in information and communication technologies (ICTs). ITU was established on 17 May 1865 with the signing of the first International Telegraph Convention in Paris to facilitate the transmission of telegraphy across international borders through the coordination of the telegraph system, development of international standards and the exchange of information relating to telegraphic systems.

The 150th Anniversary celebration united nearly 1000 invitees from ITU Member States, Sector Members, Associates and Academia to show their support for the principles embodied by ITU in a celebration of the Union's illustrious history as the oldest UN organization in existence. The anniversary ceremony included interactive demonstrations, the announcement of the Laureates of the ITU 150 Awards, and video expressions of support from UN Secretary-General, Ban Ki-moon, and co-founder of Microsoft, Bill Gates.

In his video message, United Nations Secretary-General Ban Ki-moon commended ITU's many contributions as the oldest member in the United Nations system. "ITU has earned its global reputation for resilience and relevance", he stated, noting that "the digital revolution has transformed our world. New information

and communication technologies can help boost the economy and protect the environment".

In his Welcome Address, ITU Secretary-General Houlin Zhao observed that, "throughout our 150-year history, ITU has promoted international cooperation, working to achieve practical solutions to integrate new communication technologies as they develop, spreading their benefits to all". Mr Zhao warmly thanked the sponsors of the 150th Anniversary for their generosity.

H. E. Doris Leuthard, Switzerland's Minister of Environment, Transport, Energy and Communications, delivered the Keynote Speech on behalf of the host country. She observed that only less than half the world's population is connected to the Internet, and that everyone on Earth should be connected. She expressed Switzerland's active and continued support for ITU.

ITU 150th Anniversary Awards

The ITU 150 Awards were presented to eminent Laureates who have contributed to ITU's work:

Martin Cooper is a pioneer in wireless communications, often referred to as the 'father' of portable cellular telephony, who conceived the first portable cellular phone in 1973. Mr Cooper stated that in 1973, he "anticipated that mobile telephony would become pervasive, but could never have anticipated the modern telephone". He envisages that "in future, technology should be invisible, with more customization of technology".

Robert E. Kahn played a pioneering role in the development of the Internet, and has developed the concept of digital object architecture (DOA) as a framework for interoperability of heterogeneous information systems. In his intervention, Mr Kahn noted that change is *de rigeur* as part of the ever-accelerating trend in the growth of the Internet. He underlined the need for long-term interoperability of different systems.

Mark Krivocheev is widely known for his pioneering work in forging digital TV and high-definition television (HDTV) standards for providing high-quality sound and pictures. He described the challenges and vital importance of global standards to reflect common interest, and commended ITU's HDTV work. The next step will be the development of multiscreen TV broadcasting, and ITU is now looking at ultra high-definition TV.

Ken Sakamura designed the TRON open computer system architecture, which will be useful for ubiquitous computing of the future. He also helped produce many ITU Recommendations, including ITU–T H.642, "Multimedia information access triggered by tag-based identification". Mr Sakamura envisions a future in which an innovative ubiquitous computing infrastructure will be needed, but

His Majesty King Felipe VI of Spain gives a speech during a special ceremony held on 5 May at the Senate in Madrid to commemorate ITU's 150th Anniversary

noted that it is difficult to predict the new and marvellous services coming up next.

Thomas Wiegand co-chaired the development of ITU–T H.264/MPEG-AVC (recognized with a Primetime Emmy Award from the Los Angeles-based Academy of Television Arts & Sciences) and ITU–T H.265 HEVC video coding standards, facilitating video streaming on mobile devices. In his intervention, Mr Wiegand stated that we are just at the beginning of the second wave of digitization in this world. However, he sounded a note of warning — technology needs to be managed effectively for the good of society, with safeguards put in place against any negative aspects.

Bill Gates, co-founder of Microsoft, was given special recognition for his contributions and ongoing work with the Bill & Melinda Gates Foundation. He called for ITU to play a central role in technical standardization in the financial services sector, by improving quality and providing better coordination between telecom authorities and financial services regulators to bring the poor into the global economy with expanded access to financial services.

ITU's long-standing members

ITU also commended the ITU founding Member States, which signed the original convention in 1865: Austria, Belgium, Denmark, France, Germany, Greece, Hungary, Italy, Netherlands, Norway, Portugal, Russian Federation, Spain, Sweden, Switzerland and Turkey. Certificates were presented to ITU's long-standing industry members in honour of their work and contributions, such as Cable & Wireless, which joined ITU way back in 1871. Certificates were presented to Telecom Italia (a member since 1925), Exelis and Telefónica (since 1929), and Sirti (since 1931), among others.

Panel discussion

A second panel discussion on ICTs as drivers of a sustainable future was moderated by BBC correspondent Imogen Foulkes, and brought in key thinkers and doers in ICT: Philip Walton, COO, BRCK; Luis Von Ahn, CEO & founder, DuoLingo; Gabriela Styf Sjöman, CTO, Telecom Italia Group; Jian Wang, CTO, Alibaba; and Ulf Ewaldsson, CTO, Ericsson. Among other matters, the panel focused on the important role of start-ups and small and medium-sized enterprises (SMEs) in the rapidly evolving ICT landscape.

Global celebrations

The ITU 150th Anniversary was marked by celebrations in some 50 countries around the world, including a special ceremony held in Paris in the original room where the first International Telegraph Convention on 17 May 1865 was signed, and another held in Madrid, attended by King Felipe VI of Spain. Looking towards the future as the leading UN specialized agency for telecommunications and ICT, ITU is committed to driving innovation in partnership with the Union's 193 Member States and membership of over 700 private sector entities and academic institutions.

Digital resources

For more information, including access to the webcast and a map showing worldwide celebratory events, see: http://itu150.org/

WSIS Forum 2015

Innovating Together: Enabling ICTs for Sustainable Development

Ten years after the UN World Summit on the Information Society (WSIS), representatives of government, civil society, the private sector and international organizations convened in Geneva on 25–29 May 2015 to identify emerging trends, fresh priorities and innovations for advancing the 'ICT for development' agenda.

The WSIS Forum is a unique global platform for multi-stakeholder coordination of implementation of WSIS-related activities, projects, and initiatives. It aims to define strategies and tactics to help countries and organizations harness the power of ICTs to meet development goals more effectively.

The WSIS Forum was co-organized by ITU, UNESCO, UNDP and UNCTAD, in collaboration with a number of UN sister agencies (UNDESA, FAO, UNEP, WHO, UN Women, WIPO, WFP, ILO, WMO, UN, ITC, UPU, UNODC, UNICEF and the UN Regional Commissions). This year's Forum attracted over 1700 stakeholders from more

than 140 countries. More than 70 Ministers and deputies, several Ambassadors, CEOs and civil society leaders participated. Remote participation increased significantly during the course of the event.

The WSIS Forum is an effective platform for the coordination of multi-stakeholder implementation activities, information exchange, knowledge creation and the sharing of best practices. It continues to help facilitate multi-stakeholder and public/private partnerships to achieve development goals through ICTs. The Forum provides structured opportunities to network, learn and participate in debates and consultations on WSIS action-line implementation.

The **High-Level Track** on 26 and 27 May included the Opening Segment, Policy Statements, a WSIS Prize-giving ceremony recognizing grassroots innovation in the field of ICTs for social good, and the Ministerial Round Table. It focused on innovation, partnerships and the linkages between ICTs and the Global Sustainable Development Agenda.

During the High-Level Track, eighteen **WSIS Prizes** were awarded, recognizing the outstanding achievements of a range of organizations in strengthening implementation of the vision and targets set by WSIS across the eleven WSIS Action Lines. Over 300 projects were nominated for the 2015 contest, with the award winners elected through online voting involving over 100 000 stakeholders from around the world. For a list of winners and winning projects, please see the WSIS website www.itu.int/net4/wsis/forum/2015/

The **Forum Track** on 25, 28 and 29 May provided a platform for multi-stakeholder coordination of the implementation of the WSIS outcomes. It consisted of various interactive sessions, an Exhibition, world cafés, thematic workshops, country workshops and UN Regional Commission meetings, with the involvement and participation of all WSIS Action Line Facilitators, other UN agencies and WSIS stakeholders. Key topics on the agenda this year included innovation, accessibility, gender empowerment, sustainable development (the UN 'Post-2015 Agenda'), cybersecurity, and WSIS beyond 2015 (WSIS+10).

The Outcomes of the WSIS Forum 2015 were presented on the final day. These will be submitted to the UN Commission on Science and Technology, the UN General Assembly and the ITU Council. They comprise:

- The High-Level Policy Statements, providing a platform for high-ranking WSIS Stakeholders to express their views on the achievements, challenges and recommendations on the implementation of WSIS Action Lines, emerging trends and matters of strategic importance to the development of the ICT sector.
- The Forum Track Outcome Document, summarizing more than 150 sessions held during WSIS Forum 2015.
- The WSIS Action Line and Sustainable Development Goal (SDG) Matrix, launched during the WSIS Forum 2015. To underline the key role of ICTs in promoting sustainable development, WSIS Action Line Facilitators developed the WSIS-SDG Matrix exploring and demonstrating the direct linkages between the WSIS Action Lines and the proposed SDGs.
- The WSIS Stocktaking Report 2015, presenting data on implementation activities and sharing of best practices towards advancing development goals.
- The WSIS Stocktaking: Success Stories 2015, presenting greater insights into the key ICT success stories of the WSIS Prize Winners from the WSIS Stocktaking database.

This year's WSIS Forum programme benefited from the strategic partnership and contributions of the Platinum Partner (United Arab Emirates) and Gold Partners (the Democratic Republic of the Congo and Intel Corporation). The Forum benefited from other contributions by partners (including Japan, Kuwait, Saudi Arabia and Switzerland) and the Contributing Partners (Poland, Rwanda, ICANN, the Internet Society, and the International Federation for Information Processing).

For further information, please see:

- Video highlights and interviews on ITU's YouTube channel: http://bit.ly/1ITsMKV
- Live and archived webcasts of key sessions can be viewed at: www.itu.int/net4/wsis/forum/2015/Agenda/Webcast/Live

H. E. President Solís Rivera of Costa Rica

ITU Patron for Youth and ICT

H.E. President Luis Guillermo Solís Rivera of Costa Rica was inaugurated as ITU Patron for Youth and ICT at a special ceremony in Geneva on 8 June 2015.

In 2013, Costa Rica hosted ITU's BYND2015 Youth Summit where young participants from around the world called on governments to provide more flexible, dynamic and open means of governance using ICTs. Youth has become a priority issue for Member States within the UN system, with nearly half the world's population under age 25. The ICT sector offers opportunities for young people worldwide — according to ITU data, 45% of Internet users around the world are under age 25.

Houlin Zhao, Secretary-General of ITU, observed that "youth are often the earliest adopters and most intensive users of ICT devices and applications. Youth are leading also as developers, helping build the next generation of services and applications, with profound implications for socio-economic development". Mr Zhao added that President Solís, in his role as ITU Patron for Youth and ICT, would be a source of inspiration for young people around the world.

"Young people are the seeds of social and economic development of all nations, and are the engine of innovation in today's society," said President Solis. "ICT provides an opportunity to improve the lives of millions of people."

The ceremony included a 45-minute panel discussion on youth, ICT and sustainable development. The discussion explored the pioneering role that young people are playing by driving innovation in the ICT/technology sector, and connected a dynamic group of speakers onsite and online, including young entrepreneurs who are engaged in some amazing work around the world.

President Luis Guillermo Solís Rivera was elected President of Costa Rica in 2014, and is a historian and former diplomat, who has published widely on international affairs.


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Leader Interview with Chang-Gyu Hwang

Chief Executive Officer (CEO), KT Corp.

What are your personal values for leading KT forward?

Chang-Gyu Hwang: Since its foundation in 1981, KT has been leading the Republic of Korea in the development of the information and communication technologies (ICT) industry. It is well known as one of the most advanced telecommunications and ICT convergence service providers in the world with seamless coverage of the fixed and mobile network, including land, sea and air coverage. Providing customer-centric and differentiated services based on cutting-edge technologies is at the core of my management philosophy.

Keeping ahead with top-notch technology is an important starting point, but in addition, I believe our company cannot lead the market without providing customer-oriented value. A company must discover and address the hidden needs of customers when developing and delivering products and services. B2C takes up a large part of KT Group's business, and we focus our resources on improving our products and services tailored to customers' needs. For example, we have developed a solution using Big Data analytics to map network quality, which accelerates troubleshooting and means we can respond faster, thus enhancing customers' experience. KT was the first to launch an automatic response service using web and text messages as well as a free caller-ID application which issues alerts about smishing (phishing via SMS) and spam beforehand. These features allow us to provide more convenient customer care and preventative measures for possible fraud and inconveniences.

It is my strong belief that commanding market leadership can only be realized by empowering

employees with authority and responsibility. This is a core value that must be deeply rooted within an organizational culture. Under this philosophy, KT has empowered its field managers with a certain budget and resources to be utilized at their own discretion in effectively meeting customer requirements without having to go through an approval process.

Another important philosophy is fostering open collaboration across the company. One of the best practices we have in place is "No. 1 Workshop", which provides a venue for finding optimal solutions requiring inter-department collaboration. In doing so, we can achieve more active communications within the company, as well as significant reductions in trials and errors.

Through this practice, we have launched the GiGAWire and GiGA UHD TV products with great success. GiGAWire is an innovative technology that triples network speed using existing copper cables, which allows KT to instantly upgrade high speed broadband services to its customers. GiGA UHD TV is a world-first UHD IPTV service with 4 times higher display resolution at 10 times faster download speed, and it has been very well-received in the market, gathering 300 000 subscribers by April 2015.

Finally, I am a strong believer of open and interactive communications. Since I took the office as CEO of KT, I have personally met with more than 1000 employees, sent out periodic communications via e-mails, and internal broadcasts to share strategic directions, enhance company performance, and address important issues. These frequent interactions allow me to listen to our employees, as well as convey our management philosophy.

Please can you describe some of KT's exciting projects in the Republic of Korea and elsewhere?

Chang-Gyu Hwang: KT aims to create shared value with the larger community through 'broadband empowerment'. Under this goal, we recently launched the 'GiGA Island' project *(see the following article)*. It is a Community Development Project providing extended ICT benefits to residents located in remote islands, based on GiGA-speed infrastructure integrated with ICT solutions. The project offers ICT and converged services in education, culture, economy, and health care for residents who previously had limited access to high-speed Internet, due to geographic barriers.

I also introduced this GiGA Island project in my speech as a newly appointed Commissioner to the *UN Broadband Commission for Digital Development* in Paris in February of this year. The project was very well-received by Commissioners for its close alignment with the UN's Millenium Development Goals (MDGs) through Digital Inclusion. In essence, we are empowering residents of remote and isolated regions with new opportunities and better lifestyles through GiGA-speed infrastrucure and converged ICT services.

One of the most renowned business professors, Dr Michael Porter of Harvard Business School, has expressed deep interest in our project as one of the best cases for an innovative corporate strategy in Creating Shared Value (CSV). I believe the 'GiGA Island' project can be used as a corporate-government collaboration model. This model will both facilitate digital inclusion, enhance living conditions and create new business opportunities.

Another project I would like to highlight is the 'Gyeonggi-Creative Economy & Innovation Center (G-CEIC)'. KT opened G-CEIC in conjunction with the

Gyeonggi provincial government in March 2015. The center aims to foster venture companies and start-ups, as well as Small- and Medium-sized Businesses (SMBs), to develop their ideas into viable commercial business models and enter the global market, especially in the area of FinTech and the Internet of Things (IoT). It is our ambition to bring out the hidden Champion in all venture companies — the "K-Champs."

Last but not least, I would like to explain the Mobile Direct case in Rwanda. Starting in 2014, KT has built and launched a 4G LTE Mobile Broadband network in Rwanda to help improve poor fixed broadband coverage. We named it *"Mobile Direct"*, because it went directly to mobile, bypassing the fixed network, and from 2G to 4G. With this approach, KT has pioneered ways to expedite efforts to bring broadband Internet coverage to developing countries. The Olleh Rwanda Network, a joint venture company between KT and the Government of Rwanda, launched the 4G LTE commercial service in November 2014. Taking a similar approach, KT is currently planning to launch a TD-LTE based premium mobile broadband service in Uzbekistan in mid-2015.

What do you see as the up-and-coming trends to watch in the industry?

Chang-Gyu Hwang: I think that you cannot address today's ICT trends without mentioning convergence.

Recently, convergence is taking many different forms, blurring boundaries between hardware and software, bringing people and things closer together, and across industries.

With the growth of 4G LTE and smart and connected devices, convergence across various industries is expanding and accelerating. In an effort to stand at the forefront of the convergence era, we set out our plan to drive further growth through convergence businesses in five areas: Smart Energy, Next Generation Media, Life Enhancing Care, Networked Transportation, and Integrated Safety. By 2017, we expect revenues from the convergence businesses to grow to KRW 119 trillion (USD 108 billion) from KRW 300 billion (USD 275 million) today.

In this era of convergence, another key trend is IoT, where everything will be connected. The IoT presents tremendous opportunities for operators in connectivity, as well as creating new business models utilizing Big Data technology. With Big Data analysis, we can provide enhanced customer value beyond connectivity.

However, we are also observing fragmentation in IoT technologies and it is very important for the industries and stakeholders to work together to develop global standards for IoT in a timely manner. Based on a joint proposal by KT and Telefonica, the GSMA launched an IoT Big Data Ecosystem project earlier this year to identify and define key elements for standardization, as well as to promote the exchange of IoT Big Data to develop new business opportunities.

What is KT's strategy to lead 5th Generation Mobile world among other players?

Chang-Gyu Hwang: 5G will be a key driver for future innovations. In my Keynote Address at Mobile World Congress 2015 in Barcelona, I presented how 5G will bring changes to future lifestyles. I introduced KT's vision of 5G and our efforts in the development of 5G technology, and I also presented some of the services

envisaged for 5G, such as holographic contents, simultaneous interpretation service, and driverless cars.

With our leadership in providing top-notch 4G LTE services, KT has already made extensive efforts in developing various advanced technologies in partnership with vendors, such as 4X4 (4 transmit and 4 receive) massive antenna with Samsung Electronics, the world's first HetNet (heterogeneous network) CA (carrier aggregation) system with Ericsson, Device–to-Device technology with Samsung and Qualcomm, and the world's first LTE-M technology with Nokia. Last April, we successfully developed Massive MIMO (Multiple Input and Multiple Output), a core technique contributing to 5G, which we demonstrated in Shanghai as a part of collaboration for 5G with Huawei.

In preparing for the 5G era, cooperation among global stakeholders is very important and we are aligning our efforts to contribute to global leadership. As a Sector Member of ITU, KT is fully committed to the global standardization led by the ITU–R on IMT-2020 (5G) and is one of the leading companies to establish the ITU–T Focus Group on IMT-2020. Furthermore, during the MWC2015, I met with Nokia, Ericsson, Telefonica, NTT DoCoMo, and China Mobile, among others, to discuss industry collaboration in efforts toward the expedited development of 5G standards, technologies and spectrum. In March at MWC 2015, the three leading Asian operators, KT, NTT DoCoMo and China Mobile announced a 'Joint Statement on 5G Technological Cooperation for ICT Cooperation'. The CTOs of the three companies met again in Seoul in April and discussed follow-up actions to work on the standardization of 5G.

At the PyeonChang 2018 Winter Olympics, it is KT's goal to unveil the world's first 5G services at a pre-commercial level. We are planning to showcase a variety of services with enhanced speed, latency, and connectivity. For instance, we are preparing various services such as broadcasting from the viewpoint of players, a 360-degree panoramic view, and multi-dimensional service (broadcasting from multiple viewpoints). As an official telecommunications services partner of the PyeongChang 2018 Winter Olympics, KT will give its utmost efforts to realize the vision of 5G and make the Olympics a truly memorable set of Games for all time.

The following article describes KT Corp's GiGAtopia Strategy and GiGA Island Project.

Editor's Note: ITU activities relating to mobile and wireless broadband are carried out within the framework of International Mobile Telecommunications (IMT). In early 2012, the ITU Radiocommunication Sector (ITU–R) Working Party 5D embarked on a programme to develop 'IMT for 2020 and beyond', setting the stage for '5G' research activities emerging around the world to establish technical specifications and key elements for 'IMT for 2020', based on ITU–R's partnership with the mobile broadband industry and wide range of stakeholders in the '5G' community.

KT Corp. — Broadband Empowerment: Creating Value Beyond Connectivity

The focus is now shifting from connectivity to the value and opportunities created by connectivity, which could help ease social problems such as inequalities in education between rural and urban areas in both developing and developed countries. Korea Telecom (KT) announced its *GiGAtopia Strategy* in May 2014, linking a GiGA-speed fixed network with mobile broadband in five major industrial fields: media, energy, safety, health care and transportation. By upgrading the existing network of 100 Mbps to 1 Gbps and opening up a new space for the ICT industry, this strategy will provide entirely new services. KT is aiming to improve fundamental quality of life through the "broadband empowerment" of residents of remote and isolated regions through GiGA-speed infrastructure and converged ICT services.

The GiGA Island Project stands as the best example of broadband empowerment by KT by connecting islands to the mainland through super-high-speed broadband and tailored solutions. The project aims to improve the lifestyle of local communities in terms of education, culture, economy and medicine. In the long term, this project feeds into the plan to cover all 437 residential islands of the Republic of Korea with GiGA networks by 2019.

Box 1 — GiGA Island Project

What was the motivation to launch the GiGA Island Project?

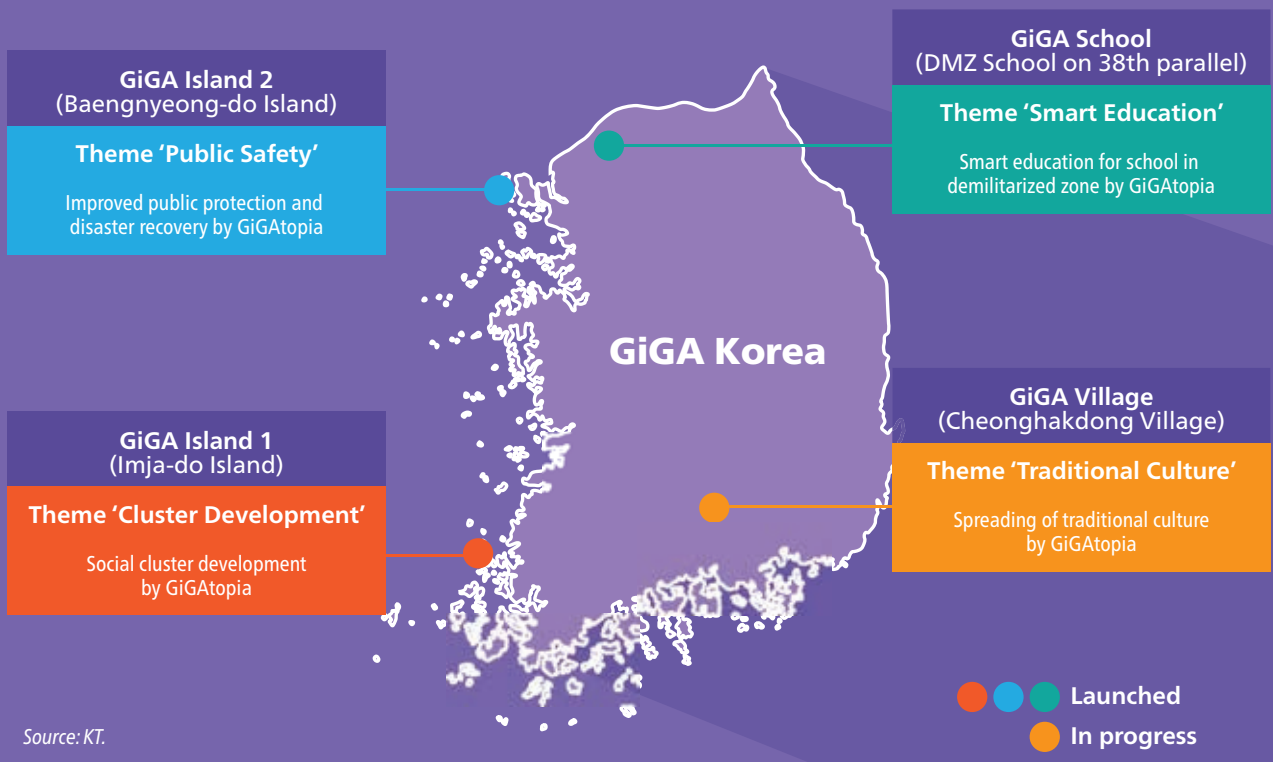
The GiGA Island Project is based on cooperation between KT, local government and residents to facilitate ICT infrastructure and solutions to help solve local problems. The GiGA Island Project aims to:

- *allocate limited resources more efficiently with the help of ICT solutions;*
- *meet the corporate and social Values of KT;*
- *improve the infrastructure of remote islands; and*
- *to create a new market to KT's business.*

How could the GiGA Island Project model be spread to other countries?

The concept of the GiGA Island project as a universal social platform based on collaboration between local operators, ICT solution providers and local government can be applied elsewhere. With its tailored solutions, local government authorities and communities can benefit from the enhanced lifestyles in the areas critical to their daily lives.

Progress in the GiGA Island Project



Source: KT.

The GiGA Island Project was launched in October 2014 on Imja-do Island, one of many islands surrounding the Korean Peninsula. The GiGA network has helped upgrade the quality of life on Imja-do Island in various ways:

- **Education:** Children can enjoy exchanges with foreign teachers in Seoul, 350 km away, via a video conferencing system;
- **Culture:** Residents can listen via a direct link-up to cultural lectures from a culture center 66 km away in Mokpo;
- **Health:** The elderly can receive health check-ups via mobile devices and send the results to medical institutions;
- **Farming:** Farmers can check on their crops' condition in real-time remotely from outside the island and control their facilities;
- **Media:** People can facilitate UHD contents for events such as screening movies in the village hall.

Box 2 lists some of the exciting applications that have been made possible since the launch of the GiGA Island Project.

Another GiGA Island was established on Baengnyeong-do Island towards the north of the Korean Peninsula in March 2015. KT established a triple network system comprising high-performance Microwave, satellite, and LTE-Advanced networks. These GiGA speed fixed and mobile broadband initiatives make communication with the outside world much easier. In accordance with the new Sustainable Development Goals (SDGs), broadband empowerment can improve social values and help empower women, ensure healthy lives, and provide better quality education. 'Broadband Empowerment' could help innovation across society as a whole.

Box 2 — Applications made possible by the GiGA Island Project

1) ***Smart Farming:*** *Mr and Mrs Na own a greenhouse that must be permanently monitored, and watered and ventilated at regular intervals. Since the 'Smart Farming system' was installed, they can now manage the greenhouse remotely through a smartphone app that allows them to control the temperature, humidity, and ventilation. Broccoli productivity has gone up by 20%. Mr and Mrs Na are now free from locational constraints, as they can now monitor the site without actually going there via Close Circuit TV (CCTV). Their lives have become more convenient and safer.*
2) ***Dream School Mentoring:*** *Jimin, a Korean-Vietnamese child, comes from a low-income family, and used to be very shy and lagged behind her peers in school. After joining a global mentoring programme with a Vietnamese teacher, she felt as if she had something special of her own, as her knowledge of Viet Nam was unique, and now she feels more confident around her peers. This experience has impacted her mindset.*
3) ***GiGA Cultural Center:*** *The residents of Imja-do Island previously had to travel more than 2 hours to take classes. The GiGA Cultural Center has now opened on the island, enabling people to take classes more easily.*

Source: 15 January 2015 Interviews for Maeil Business Newspaper, Rep. of Korea.

Looking Ahead: September—December 2015

Fall 2015 is likely to prove very busy at ITU, with a flurry of key events coming up. September will see the next meeting of the *ITU/UNESCO Broadband Commission for Digital Development,* ahead of the MDG Summit in New York (where the UN Member States will adopt the new set of Sustainable Development Goals (SDGs)). The Broadband Commission will listen to a number of leading regulators and industry executives making the case for the powerful role of broadband in helping achieve these goals.

ITU Telecom World 2015 will be held in Budapest, Hungary, on 12–15 October. This major event will unite leaders from the public and private sectors including Heads of State and Government, ministers, regulators, industry CEOs, investors, small- and medium-sized enterprises (SMEs), entrepreneurs and innovators, academics and consultants to facilitate ICT innovations for economic growth and social good. The Forum will feature networking and knowledge-sharing opportunities, while the Exhibition will provide a platform for SMEs and start-ups to showcase innovative products, technologies, investment and partnership opportunities from around the world. Centred around the OpenSpace meeting hub, it will feature media and leaders' lounges, the futuristic InnovationSpace and workshop areas.

The month of October will close with the Radiocommunication Assembly (RA-15). Ahead of the World Radiocommunication Conference 2015 (WRC-15), RA-15 will plan the structure, programme and approval of radiocommunication studies. It will assign Conference preparatory work and other questions to the Study Groups; respond to other requests from ITU conferences; suggest suitable topics for the agenda of future WRCs; and approve and issue Recommendations and Questions developed by the ITU-R Study Groups.

The full month of November will of course be dedicated to the all-important WRC-15, which will see thousands of delegates come together over four weeks in Geneva, Switzerland, to examine, review and, if necessary, revise the Radio Regulations, the international treaty governing the use of the radio-frequency spectrum and the geostationary-satellite and non-geostationary-satellite orbits. WRC-15 will hold major debates on growing needs for spectrum by different stakeholder groups, including participants from the mobile industry, broadcasters and other interest groups. WRC-15 will consider the spectrum aspects to new technologies, including flight tracking for civil aviation.

Although the need for additional spectrum to facilitate the development of terrestrial and satellite mobile broadband applications, in particular for IMT systems and public protection and disaster relief (PPDR), is likely to figure large on the agenda of WRC, other key areas to be addressed by WRC-15 include:

- **Aeronautical issues** for the development of unmanned aircraft systems (UAS) and wireless avionics intra-communications (WAIC), including Global Flight Tracking for Civil Aviation.
- **Maritime issues,** including the possible introduction of digital modulation to enhance onboard communication stations and enabling automatic identification system (AIS).
- **Radiolocation issues** for the development and growth of new automobile radar systems.
- **Scientific issues**, including the need for additional spectrum for Earth exploration satellite services and environmental monitoring, as well as the feasibility of achieving a **continuous reference time-scale (UTC)**.

WRC-15 will play a pivotal role in helping the radiocommunication environment adapt to users' evolving needs. All in all, by the time it concludes, the year 2015 is likely to have proved one of ITU's busiest and most productive years to date, and we look forward to justifying our members' faith in us as we continue coordinating the shared global use of the radio spectrum, promoting international cooperation in assigning satellite orbits and acting as the guardian of the Radio Regulations.

Official Visits

During April and May 2015, courtesy visits were made to ITU Secretary-General Houlin Zhao by the following Ministers, Ambassadors to the United Nations Office, international organizations and other important guests.

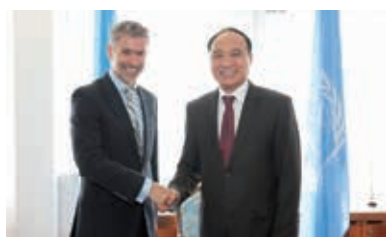
April

Hiem Phommachanh, Minister of Posts and Telecommunications, Lao, P.D.R. and Houlin Zhao, ITU Secretary-General

Walid Doudech, Ambassador of Tunisia

From left to right: Anayansi Rodríguez Camejo, Ambassador of Cuba; Houlin Zhao, ITU Secretary-General; and Claudia Pérez Alvarez, Counsellor

Eviatar Manor, Ambassador of Israel



Julian Braithwaite, Ambassador of the United Kingdom

Marcos Bezerra Abbott Galvão, Ambassador of Brazil to the World Trade Organization and other Economic Organizations in Geneva

May Council

Zohra Derdouri, outgoing Minister of Post and Information and Communication Technologies, Algeria

Nebojša Kaludjerović, Ambassador of Montenegro

Mohamed Auajjar, Ambassador of Morocco

Jānis Mažeiks Latvian, Latvia's Permanent Representative to United Nations in New York

Mohamed Siad Doualeh, Ambassador of Djibouti

Michel de Rosen CEO, Eutelsat Communications

Mohsen Naziri Asl, Ambassador of Iran

Methini Thepmani, Permanent Secretary, Ministry of Information and Communication Technology, Thailand

Areewan Haorangsi, Secretary General, Asia-Pacific Telecommunity

Francis Wangusi, Director General, Communications Authority, Kenya

Louis Napoleon C. Casambre, Undersecretary, Executive Director, Department of Science and Technology, Information and Communications Technology Office (ICTO), Philippines

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Abdou Karim Sall, Director General, Regulatory Authority of Telecommunications and Post (ARTP), Senegal

Catalin Marinescu, President, National Authority for Management and Regulation in Communications (ANCOM), Romania

Jean-Marc Hoscheit, Ambassador of Luxembourg

Hamad Al Mansoori, Director General, Telecommunications Regulatory Authority, United Arab Emirates

John Nasasira, Minister of Information and Communications Technology, Uganda

Yasuo Sakamoto, Vice-Minister for Policy Coordination, Ministry of Internal Affairs and Communications, Japan

Tatjana Matic, State Secretary, Serbia

Milan Hovorka, Deputy Minister of Industry and Trade, Czech Republic

Magdalena Gaj, President of the Office of Electronic Communications, Poland

Tayfun Acarer, Chairman of the Board, Information and Communication Technologies Authority (ICTA), and Mehmet Ferden Çarikçi, Ambassador of Turkey

Ali Hassan Bahdon, Minister of Communication in charge of Posts and Telecommunications, Djibouti

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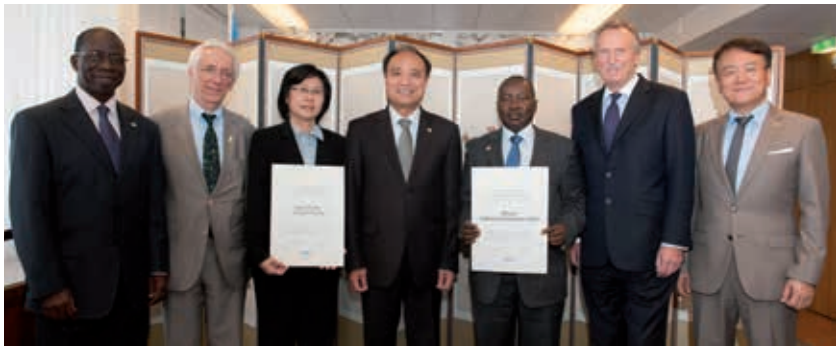

From left to right: Brahima Sanou, Director of the ITU Telecommunication Development Bureau; François Rancy, Director of the ITU Radiocommunication Bureau; Areewan Haorangsi, Secretary General, Asia-Pacific Telecommunity (APT); Houlin Zhao, ITU Secretary-General; Abdoulkarim Soumaila, Secretary General, African Telecommunications Union; Malcolm Johnson, ITU Deputy Secretary-General; and Chaesub Lee, Director of the ITU Telecommunication Standardization Bureau. Certificates are presented in recognition and appreciation for the contribution of APT and the African Telecommunications Union to the development of information and communication technologies and cooperation with ITU

From left to right: Brahima Sanou, Director of the ITU Telecommunication Development Bureau; Malcolm Johnson, ITU Deputy Secretary-General; Nurudin Mukhitdinov, Director General, Executive Committee of the Regional Commonwealth in the Field of Communications (RCC); Houlin Zhao, ITU Secretary-General; Natalya Zorya, Deputy to the Director General, Executive Committee of RCC; François Rancy, Director of the ITU Radiocommunication Bureau; and Chaesub Lee, Director of the ITU Standardization Bureau. A certificate is presented in recognition and appreciation for RCC's contribution to the development of information and communication technologies and cooperation with ITU

Dr Jian Wang, Chief Technology Officer, Alibaba Group

Khédija Ghariani, Secretary General, Arab Information and Communication Technologies Organization (AICTO)

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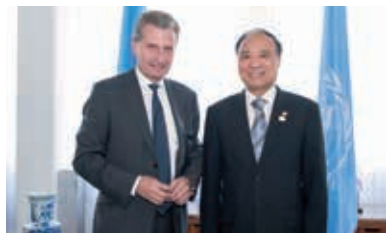
From left to right: Ioanna Samprakou, Director of Cabinet at the General Secretary for Telecommunications, Posts and ICT; Dimitris Tzortzis, Secretary General of ICT at the Ministry of Infrastructures, Transports and Networks; Houlin Zhao, ITU Secretary-General; Ambassador Alexandros Alexandris; and Paraskevi Nakiou, Attachée, Greece

Nébila Amadou Yaro, Minister of Development of the Digital Economy and Posts, Burkina Faso

From left to right: Aya Thiam Diallo, Ambassador of Mali; Dr Choguel Kokalla Maïga, Minister of Information and Communication and the Digital Economy; and Houlin Zhao, ITU Secretary-General

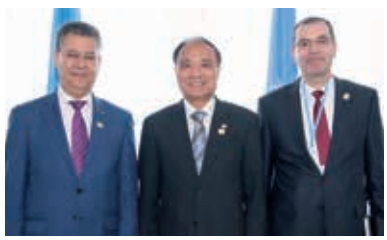
Supa Mandiwanzira, Minister of Information Communication Technology, Postal and Courier Services, Zimbabwe

Aristides C. Frederico Safeca, Secretary of State for Telecommunications, Angola



Günter Oettinger, European Union Commissioner for the Digital Economy and Society

Yaya Abdoul Kane, Minister of Posts and Telecommunications, Senegal



From left to right: Noaman Fehri, Tunisia's Minister of Communication Technologies and the Digital Economy; Houlin Zhao, ITU Secretary-General; and Doudech Walid, Ambassador of Tunisia

Dr Fred Matiang'i, Cabinet Secretary, Ministry of Information, Communications and Technology, Kenya

From left to right: Marios Demetriades, Minister of Transport, Communications and Works; Houlin Zhao, ITU Secretary General; and Andreas Ignatiou, Ambassador of Cyprus

Anusha Rahman Ahmad Khan, Minister of State for Information Technology; Houlin Zhao, ITU Secretary-General; and Zamir Akram, Ambassador of Pakistan

Iwona Wendel, Undersecretary of State, Ministry of Infrastructure and Development, Poland

Mahmoud Vaezi, Minister of Information and Communication Technology, Iran

Peter Thomas Drennan, United Nations Under-Secretary-General for Safety and Security

From left to right: Solofo Razafitrimo, Chargé d'affaires and Haulin Kola, First Counsellor, Representation of Madagascar to the United Nations agencies in Geneva; Houlin Zhao, ITU Secretary-General; and Jean Andriamaro Rakotomalala, Chairman of the Board of Madagascar's Communication Technologies Regulatory Authority

From left to right: Gordon Graylish, Vice President and General Manager, Enterprise Solutions, Intel Corporation; Houlin Zhao, ITU Secretary-General; and John Davies, World Ahead Vice President, Intel Corporation

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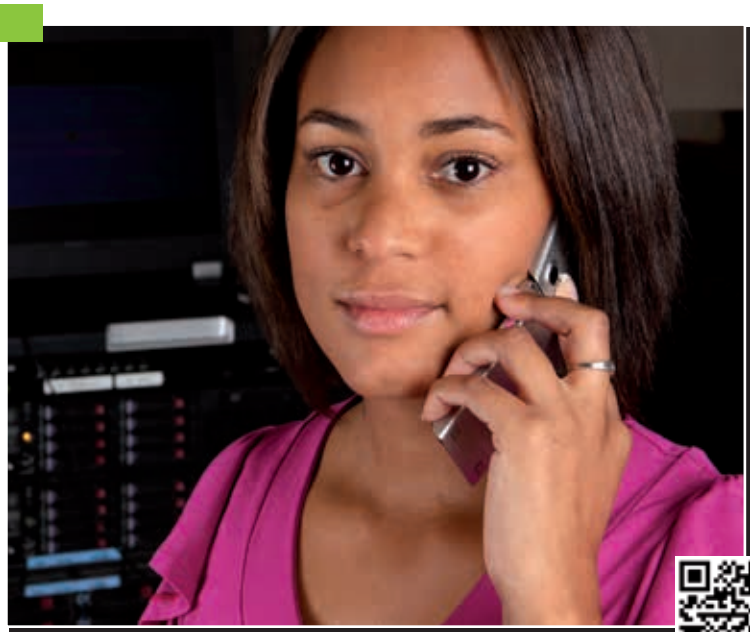

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