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EY foreword

The GSMA Mobile World Congress 2014 is testament to an industry that is evolving more dynamically than ever. Mobile technologies are creating new experiences for consumers and enterprises the world over, and the diversity of attendees at this year’s event underlines just how pervasive mobile has become to our lives. Mobile World Congress continues to showcase the latest in technology advances while also offering an unparalleled platform for industry and government leaders to discuss and debate the latest opportunities and challenges facing the industry.

As mobile penetration worldwide continues to rise and different industry sectors leverage mobile technologies to extend and improve their own service propositions, growth brings its own challenges. Widening use cases place an ever-greater premium on cross-sector collaboration, while closer relationships between mobile operators and technology vendors can also generate new efficiencies in industry value chains. For their part, mobile operators must pay close attention to new dynamics in their customer relationships: high levels of trust will be vital if new opportunities in big data are to translate into winning customer propositions, for example.

Greater consistency and predictability in the regulatory environment is also essential, whether in terms of data protection frameworks, spectrum release agendas or network sharing and consolidation scenarios. While large-scale migration to LTE services is now well under way, the full benefits of better mobile technology capabilities can be realized only through a supportive enabling environment that creates and safeguards incentives for investment.

The pace of innovation in the mobile industry is quickening all the time, whether in terms of mobile services themselves or the network infrastructure and architecture that underpin them. However, business models for many new service propositions remain in flux, and mobile operators must continue to work ever more closely with their ecosystem partners in order to ensure positive return on investment for all players. Changing organizational mindsets have an important role to play, and this year’s Congress was notable for the positive tone struck by mobile operators as they consider the potential for partnerships with over-the-top (OTT) service providers.

The mobile industry retains an enviable position as a force for positive change in an increasingly digital global economy. EY is optimistic about the scale and scope of opportunities available to the mobile industry as industry players seek new routes toward profitable growth. EY is privileged to lead this summary of Mobile World Congress 2014, and I would like to thank both the GSMA and EY’s team of analysts in helping to prepare these insights.

Jonathan Dharmapalan
Global Telecommunications Leader, EY
Dear Colleague,

I would first like to thank all of our attendees, exhibitors, sponsors and partners for their contributions in making the 2014 GSMA Mobile World Congress our most successful event ever.

2014 marked yet another year of record attendance at Mobile World Congress, underscoring its position as the place where industry leaders come to advance business. This year, 85,916 unique attendees visited Mobile World Congress, with continued, unparalleled support among the C-suite of the world’s leading companies. The seniority of attendees at MWC remained impressive, with over 4,500 CEOs and 54% senior-level attendees.

In the Mobile World Congress conference program, CEOs and senior executives from companies including Alcatel-Lucent, América Móvil, Cisco, Citigroup, Deutsche Telekom, Etisalat Group, Facebook, Ford, IBM, SingTel, NTT DOCOMO, Telenor Group, Viacom, VimpelCom and WhatsApp, among others, took to the stage to address key developments in the mobile ecosystem and outline how their organizations are “Creating What’s Next” in the mobile ecosystem.

The 2014 Congress at Fira Gran Via featured more than 1,800 exhibiting companies occupying over 98,000 square meters of net exhibition and hospitality space, providing opportunities for attendees to conduct business meetings, network with colleagues, experience cutting-edge mobile products and technologies, and gain insights into the latest industry trends. In addition, a record 3,909 international print, web and broadcast media attended the event to analyze and report on the many significant industry announcements made at Congress.

We not only had our largest-ever number of attendees and exhibitors, but MWC expanded to a second venue. We were pleased to host three exciting programs at Fira Montjuïc, which was the home of Mobile World Congress from 2006 to 2012. Launched in 2014, the mPowered Industries program comprised a range of vertical industry conferences and exhibits led by well-known and highly regarded domain leaders in the health, online travel, media and advertising, and broadcast verticals. Focusing on mobile developers, WIRJam and the GSMA joined forces to bring a three-day DevCon and Hackathon to Mobile World Congress. Additionally, Mobile World Capital Barcelona hosted the very successful 4 Years From Now (4YFN) program at Montjuïc, focusing on mobile entrepreneurship and innovation.

As the Mobile World Capital, Barcelona was once again a wonderful host city for Mobile World Congress. We extend our gratitude to the city of Barcelona, the city of Hospitalet, the Generalitat de Catalunya, the Fira de Barcelona and all of our Barcelona partners for being such welcoming and efficient hosts. We would also like to thank our numerous sponsors and partners for their continued support.

We look forward to seeing you again in Barcelona on 2-5 March 2015 for Mobile World Congress 2015.

Warm regards,

John Hoffman
CEO, GSMA Limited
Mobile World Congress (MWC) continues to be the showcase event of the global mobile industry. More than 85,000 visitors attended this year’s event in Barcelona, a year-on-year increase of 18% and a new record. The four-day conference and exhibition attracted executives from the world’s largest and most influential mobile operators, software companies, equipment providers, internet companies and companies from industry sectors such as automotive, finance and health care, as well as government delegations from across the globe.

The seniority of attendees at MWC remained impressive, with over 4,500 CEOs, an increase of 200 as compared to 2013, and 54% senior-level attendees overall. Meanwhile, more than 1,800 exhibiting companies showcased cutting-edge products and services, and preliminary economic analysis indicates that 2014 Mobile World Congress will have contributed more than €356 million and 7,220 part-time jobs to the local economy. The truly global nature of Congress was underlined by the representation of 201 countries this year, with Europe the most represented region with 60% of attendees, followed by North America and Asia-Pacific.

John Hoffman, CEO, GSMA Ltd., commented, “By any measure, the 2014 Mobile World Congress was a stunning success, and we thank our attendees, exhibitors, sponsors and partners for their continued support. Beyond the number of attendees and participating companies, the continued expansion of the event to address key adjacent industry sectors demonstrates just how pervasive mobile is in our everyday lives and how integrated it is becoming in everything that we do.”

Figure 1: Mobile World Congress total attendees*

![Bar chart showing Mobile World Congress total attendees by year: 2012: 67,176, 2013: 72,534, 2014: 85,916.]

Figure 2: Mobile World Congress total attendees by region*

![Pie chart showing distribution of attendees by region: Europe: 60%, North America: 14%, Asia-Pacific: 16%, Middle East: 3%, Africa: 3%, Central & South America: 2%.]

Source: GSMA

*Mobile World Congress total attendees include exhibition and conference attendees
Conference attendance

A total of 11,658 people attended the conference, with C-level participants accounting for 72% of delegates. Mobile, fixed and virtual network operators accounted for almost 26% of the conference attendees, in line with last year’s proportion. The number of conference attendees rose across the majority of company categories, with the application and software development vendor segment witnessing the largest increase.

Figure 3: Conference attendees by company type

Industry and government leaders gather in Barcelona

The four-day conference program began with a keynote on mobile operator strategies, where GSMA Director General Anne Bouverot was joined by the CEOs of América Móvil, Etisalat, SingTel and Telenor. The conference program featured Mobile World Live keynotes from Mark Zuckerberg (Founder and CEO of Facebook) and Virginia Rometty (Chairman, President and CEO of IBM). CEOs and senior executives from companies including Alcatel-Lucent, América Móvil, Bitcoin Foundation, Cisco, Citigroup, Etisalat Group, Ford Motor Company, Isis, Jasper Wireless, Kakao Corp., KDDI, Lookout, Millicom, NTT DOCOMO, Raspberry Pi Foundation, Shazam Entertainment, Shhmooze, SingTel, SK Planet, Tele2 Group, Viacom International Media Networks and WhatsApp also participated in the keynote program.

The Ministerial Programme is the cornerstone of the GSMA’s government program and focuses on the debate and knowledge-sharing of the revolutionary power of mobile. In 2014, the Programme again saw record attendance with the participation of 139 government delegations and 22 international institutions, as well as more than 1,000 government and industry representatives. This year’s theme reflected the pressures felt by the mobile sector in a shifting technological and regulatory landscape and explored the breadth of new applications that are coming into view. The keynotes and presentations of the Ministerial Programme 2014 highlighted emerging issues and persistent pain points, and offered firsthand perspectives from respected leaders in the mobile industry, government and beyond.

Cutting-edge products and services on show

Players from across the mobile ecosystem and adjacent industry sectors unveiled innovations across 98,000 net square meters of exhibition and hospitality space. Each year, exhibitors provide...
advanced product demonstrations and industry-changing announcements, and Mobile World Congress 2014 featured a number of pavilions and zones focused on specific mobile technology scenarios:

- **The Connected City** is one of the most popular attractions at Mobile World Congress and attracted 17,866 visitors over four days. Presented with operator partners AT&T, Deutsche Telekom, KT and Vodafone, The Connected City showcased mobile connected solutions for a range of services, such as education, health, retail, transport, smart cities and others.

- **NFC Experience** expanded in new directions in 2014, offering a range of services for attendees with NFC-enabled devices, such as venue access with the NFC Badge, catering and networking, and access to event information, as well as demonstrations of the latest NFC products and services. Ten thousand attendees utilized the NFC Badge, and nearly 51,000 NFC transactions were made across Fira Gran Via.
1. The internet of things comes of age

Vision becomes reality

Mobile technology’s potential to transform industries and communities has long been recognized, and at this year’s Congress there was strong evidence of progress by operators and vendors alike. There is growing demand for a range of M2M solutions, and industry players worldwide are responding to the challenge – by January 2014 there were 428 mobile operators offering M2M capabilities in 187 countries, equivalent to 4 in 10 mobile operators worldwide, according to GSMA Intelligence.

In some countries, regulation has played a crucial enabling role to date: Sweden’s status as an M2M market leader has been driven by early legislation mandating smart meter rollout, for example. According to GSMA Intelligence’s estimates, 10 countries account for 70% of all M2M connections as of year-end 2013: China, the US, Japan, Brazil, France, Italy, the UK, Russia, Germany and South Africa. China and the US combined account for a joint 44% of global M2M connections.
Yet as attention shifts beyond enterprise-centric M2M toward the consumer-oriented internet of things, relevance will become the chief focus area for operators and vendors alike. New device form factors driven by wearable technology will help shape take-up, and industry participants will need to work in tandem to provide a compelling customer experience that can provide new benefits in the world of connected lifestyles.

**Eyeing progress in different industry verticals**

Many mobile operators have mature M2M and internet of things strategies in place, with dedicated business units supporting the development of unique propositions. Customer needs are changing rapidly, and service providers are adapting their offerings in this light by combining home automation and...
energy management solutions as part of smart home initiatives, for example. Go-to-market approaches for such initiatives remain flexible, with operators considering offering such services either directly to customers or via white-label platforms.

At the same time, new use cases continue to emerge. Two mobile operators revealed internet-of-things services for farmers, whereby sensor-based solutions are used to monitor pregnant cows. By providing timely alerts, the rate of calf deaths can be substantially reduced in this scenario. Meanwhile, established use cases continue to prosper – automated driving solutions are emerging in the connected-car sphere, while there was positive news flow on a number of smart city initiatives, from Pisa in Italy to Barcelona itself.

Nevertheless, business models remain an area where there is plenty of experimentation still playing out – and complex ecosystems require long-term commitment. While regulation is unlocking new connected-car opportunities – witness eCall legislation in Europe and similar announcements in Brazil and Russia – revenue streams will take time to mature. For example, car data may not present a direct revenue opportunity to vehicle manufacturers, while the sheer range of use cases in the automotive sector will require current ecosystems to harness a number of different value chains.

Collaboration and standardization in focus

As the internet of things starts to gain traction, it is vital that scalability is built into new service propositions. To this end, technical specifications for embedded SIM architecture revealed by the GSMA in December 2013 have an important enabling role to play. Similarly, deals struck between leading vendors across the M2M value chain signal a greater focus on end-to-end solutions where international demands can be met in a cost-effective manner.

Collaboration in the widest sense is high on the list of priorities for players from across the value chain. Congress was notable for the diverse range of partnerships struck, involving operators, vendors, universities, start-ups and leading players from different industry verticals.

Meanwhile, historical barriers to growth are receding - various types of sensors are becoming cheap enough to be offered as mass-market products, while the emergence of sensor-related analytics is catalyzing new market opportunities. Even so, unique use cases also bring unique challenges. In the mHealth vertical, for instance, higher levels of cooperation are needed to ensure that the pooling, storing and analysis of health information provides robust levels of data protection. In this light, service providers will find that tailoring their go-to-market approaches for specific sector needs is a prerequisite for success in the internet of things.

2. Driving new form factors into the device landscape

Wearable technology set for strong growth

Wearable technology was very much the hot topic on the device front at this year’s Congress. Tier-one device manufacturers are seeking new ways of deepening their relationships with consumers, and wearable devices that leverage embedded connectivity or communicate with smartphones are seen as a major growth opportunity.

In terms of use cases, wearable fitness and health activity trackers are making much of the early running in this new category. Regarding form factors, smart bands and smart watches are expected to predominate in the near term, with smart glasses viewed as a longer-term growth opportunity. All told, some 177 million wearable devices are expected to ship by 2018, up from 22 million in 2013.
Smart bands are likely to benefit from being positioned as smartphone companions: their dependence on more powerful anchor devices will enable a lower bill of materials, and therefore lower price points.

Vendors are likely to focus on multiplying the use cases available through different classes of wearable devices - in such scenarios, a new generation of companion apps that leverage wearable capabilities will be vital. Additional functionalities such as biometric security and mobile payments could play an important role in determining how the wearable market develops in years to come.

Creating and sustaining end-user interest

While the coexistence of smartphones, tablets and wearable devices will create new points of differentiation between vendors - and opportunities to grow margins as a result - sustaining end-user interest across a widening device landscape will be critical. Specialist manufacturers such as Fitbit and Withings have helped to trigger the first wave of consumer interest in wearable technology - looking ahead, established handset vendors must consider how best to integrate wearable devices as part of a compelling terminals portfolio.

Cross-industry partnerships will become increasingly important. During Congress, Telefonica announced a partnership with LG, Samsung and Sony to integrate services, underlining how operators are also looking to take advantage of predicted growth in wearable devices. In the future, new relationships with sports and fashion brands are also likely to help position smart bands and watches as must-have, mass-market devices, while operators must consider how new devices with specific functions can be integrated as part of service bundles.

At the same time, vendors must ensure that end users feel reassured about the privacy credentials of services related to wearable technology, particularly given the abundance of personal data likely to be logged by these new devices and the role analytics could play in years to come. Given that wearable computing will act as an important catalyst for the internet of things, device management capabilities will also need to adapt to a more complex environment of connected gadgets.
Bundling devices and apps in new ways

Mobile operators are already making headway by bundling popular apps with mobile data plans, and device vendors too are looking at similar ways of boosting customer loyalty. Samsung’s announcement of its new flagship device, the Galaxy S5, was accompanied by news that it will come equipped with a range of bundled services, including an online content subscription and a one-year subscription to a personal training app.

Such strategies signal that long-term success in the smartphone market is increasingly predicated on adding value beyond scoring highly on technical specifications. As the internet of things matures and smartphones act as a gateway to a range of new consumer experiences inside and outside the home, the ability to bundle new services with devices will act as an important differentiator in a crowded market.

3. Embracing the needs of emerging markets

Targeting the unconnected and under-connected

Despite the phenomenal take-up of mobile technology worldwide, a significant proportion of the global population remain without access to mobile networks and devices. According to GSMA Intelligence, although there are seven billion mobile connections worldwide (i.e., SIM cards), the “real” penetration rate is far lower, with only 3.5 billion people actually subscribed to mobile services. In many underdeveloped markets in Sub-Saharan Africa, for example, penetration is still well below 50% of the population due to economics – only 50% of the population has the means to afford to subscribe to mobile.

![Figure 3: Mobile penetration in selected Sub-Saharan Africa countries](image)

Concerted effort is still required across the mobile industry in order to boost the coverage and take-up of mobile services. Collaboration is a key theme in this area, and this year’s Congress saw the announcement of a joint initiative between the GSMA and internet.org designed to lower the total cost of ownership (TCO) of mobile in emerging markets.

Cooperation across the value chain has never been more important as operators and vendors look to provide affordable data and drive new forms of content discovery. As operators in emerging markets consider how to migrate their customers to data-led tariffs, partnerships with content and application providers have a growing role to play.

Tie-ups in markets from Indonesia to Pakistan are already demonstrating how providing app-centric packages can help attract end users to new types of tariff, with features such as sachet and time-of-day pricing representing new forms of added value.
Looking ahead, adapting mobile data pricing to the needs of less affluent consumers will prove pivotal to operator strategies. At the same time, greater engagement with governments is also essential. Industry studies show that burdensome taxation regimes can act as a brake on growth, for example, limiting the economic multiplier effects generated by mobile technology in the long term.

Even where mobile networks are already well-established, the rise of new market structures can help spur the appearance of more affordable services. During Congress, Mexico’s newly formed Federal Telecommunications Institute highlighted how the country’s prospective open-access LTE network could attract MVNOs that would offer services at low prices.

**Reducing device costs in a wider OS landscape**

Flagship smartphones traditionally dominate the news flow emanating from Congress, yet vendors are increasingly focusing their attention on budget devices that can bring a smartphone-like experience to less affluent customers in emerging markets. This is vital if 4G services are to gain traction in less developed regions, where smartphone penetration has yet to break the 10% mark. During Congress, one operator highlighted that until smartphone prices drop below US$100, LTE will not make significant headway in India.

Accordingly, a number of vendors announced new low-cost devices aimed squarely at emerging markets. There are now three Firefox OS devices available through seven mobile operators in 14 countries, and Mozilla announced plans for a US$25 smartphone running on the open-source platform. Meanwhile, Nokia revealed its X series of devices running on the Android Open Source Project (AOSP).

Looking ahead, partnerships with chip vendors will be vital if lower price points are to be achieved across different smartphone operating systems. Meanwhile, operators themselves continue to evaluate opportunities for own-branded smartphones at new price points in order to deepen their customer relationships.

In the future, existing delineations between different device categories may well be rewritten as smartphone price points begin to impinge on feature phone territory, while compelling device and content bundles will determine how well improved affordability translates into an attractive overall proposition for customers.

**Taking mobile money transfer to new heights**

Mobile money transfer has proved itself one of the most successful new use cases for mobile technology in recent years. By the end of 2013, there were some 219 mobile money services for unbanked users available in 84 countries worldwide. The growth in mobile money users is even more impressive, with more than 61 million people using such services, up from 37 million in 2012.

Positive regulatory reforms are stimulating the take-up of such services. As mobile money services start to mature, the importance of high levels of regulatory certainty is clear. 52 markets worldwide now have two or more competing mobile money transfer services, and questions of interoperability are becoming all the more important. Indonesia is just one market that has witnessed a surge in take-up following a decision to interconnect three operators’ mobile money initiatives.

Going forward, continued growth of mobile money services for the unbanked will require increased dialogue with regulators as the field of service providers widens. Greater cross-industry collaboration is also needed to ensure that business models can evolve as interoperability demands become more pronounced. Legacy operating procedures should be revisited to ensure that issues such as dispute resolution do not undermine progress - while customer education programs can also be refined as service offerings become more sophisticated.
4. Redefining relationships in an OTT environment

Greater operator collaboration with OTT players

Much has been made of the threat posed to mobile operators by over-the-top (OTT) service providers as mobile instant messaging (IM) volumes overtake SMS and smartphone application developers enhance their services with new features, including voice. In recent years, the wave of new VoIP, messaging and video apps available across different mobile operating systems has been viewed as a threat to operators’ legacy revenue streams.

However, this year’s Congress saw operators communicate a more positive prognosis of how they can work with application providers to reshape end-user services. Leading mobile operators revealed that they would both partner with OTT service providers while also pushing operator-backed alternatives such as Joyn and Jibe in order to appeal to different customer segments.

For their part, OTT providers are more willing than ever to create new value propositions by partnering with mobile operators. Dropbox said it would give operators the opportunity to bundle its cloud storage service with operator data plans, a move it believed would both help reduce churn while also incentivizing customers to take up new data plans.

In emerging markets, operators have already struck landmark partnerships with leading OTT providers such as Facebook and Viber, helping operators provide low-cost data plans to end users and creating scope for new tariff structures. At the same time, both operators and vendors in developed markets are now striking arrangements with OTTs that offer users flat-rate access to services where usage does not count toward monthly data limits.

Such innovations underline how operators are working with application developers in new ways to enhance the customer experience. Looking ahead, a range of options are available to operators – whether in the form of bundling OTT services as part of distinct mobile data plans or providing advanced marketing, billing and distribution capabilities to their OTT partners.

Figure 4: Mobile operator strategies in the OTT environment

Source: EY analysis.

New attitudes to service innovation and investment

While closer engagement with OTTs signifies a step-change in mobile operator thinking, a widening ecosystem of service innovation is paving the way for differentiated approaches well beyond service bundling through alliances.

Legacy services such as SMS and MMS can be improved by the introduction of more group sharing features, while larger attachment sizes can aid the distribution of richer content. Voice services can also evolve as well – for example, the ability to add video during voice calls is included in the latest GSMA Rich Communication Services (RCS) 5.1 specification.

Meanwhile, VoLTE will allow operators to provide super HD voice, crucial given that dropped calls remain a bugbear for smartphone users. Operators in Japan, North America and South Korea are already driving such developments, with improved service quality and spectral efficiency acting as key drivers.
In addition, many leading operators are launching new incubator projects in order to support and benefit from cutting-edge technologies and services at an earlier stage of growth. Using this approach, operators can identify businesses with potential and take their ideas to proof-of-concept trials, while start-ups gain access to office space and business support services in return, including mentoring from operators and external experts.

As a result, operators are now investing across a variety of market growth segments, from m-commerce to big data. Such moves can also form part of wider moves to encourage entrepreneurship in different geographic regions. In January, two leading European operators joined a European Commission initiative to aid start-ups in the region alongside banking groups, charities and academic institutions, for example.

5. Boosting end-user trust in the big data era

Big data as the bedrock of innovation

Big data continues to dominate much of the debate about innovation in the mobile industry and beyond. At this year’s Congress, it was an underlying theme across a number of discussion areas, from the internet of things to the role of privacy and security in new service propositions. The convergence of mobility, cloud and analytics means that big data can be viewed in different ways, both as a tool for internal improvements as well as an enabler of new services for third parties.

Nevertheless, service provider approaches to big data are still at a nascent stage. The use of customer data among operators is best established as a driver for better engagement with end users, particularly as a way of reducing churn and more effectively targeting new offers. Meanwhile, more ambitious players are already considering how network- and customer-driven insights can be repurposed for third parties, in areas such as mobile shopping or connected-car services.

Improving trust levels with customers

While the potential for innovation in services and business processes through big data is well understood, one of the most emphatic messages coming from Congress was the need for operators and technology providers to improve trust levels with end users. Trust levels in a range of industry actors – from banks and mobile operators to social media providers – have seen falls over the last year.

Figure 5: Change in consumer trust levels in different organizations

As such, privacy and security concerns are on the rise: in one survey, 67% of consumers felt that organizations benefit the most from information on consumer purchasing behavior or history, while just 6% said that such innovations would be most likely to benefit the customer.
Many commentators during Congress underlined that better privacy and security credentials can help revitalize the mobile industry’s relationship with customers and pave the way for greater receptivity to new services. New service scenarios in digital identity are likely to pivot on well-understood privacy guarantees, while operators are already empowering customers to self-select levels of security for different smartphone applications in a bring-your-own-device (BYOD) environment.

Although the scope for innovation in big data is immense, operators must address such customer concerns as a priority. Greater understanding of the quid pro quo involved in personal data can unlock new service scenarios. In one survey of South Korean customers, 90% of mobile subscribers suggested that they would be willing to share their personal data if it was used to benefit national security, for example.

Turning big data into better data

In the future, there are a number of organizational changes that operators and other mobile industry players must make if big data is to deliver on its promise. Defining and prioritizing use cases for big data is vital - many service scenarios such as churn reduction and service personalization are inherently linked, for example. For this to happen, operators will need to consider the return on investment credentials of a number of competing initiatives.

Meanwhile, departmentalized storage of existing data may hamper big data initiatives, while technical skills in big data are also in short supply. Leadership support for big data projects can spur better interdepartmental communications, while analytics tools will need to be made more accessible to non-specialists over time.

As big data services provided to third parties become increasingly viable, cross-industry collaboration will determine the success of new propositions. New business models will hinge on the effective sharing of data between a number of enterprises and the consistent communication of service benefits to customers can act as the foundation for increased acceptance.

6. Making the most of digital identity

Operators to relieve consumer pain points

This year’s Congress saw the announcement of GSMA Mobile Connect, a global initiative featuring 12 leading operators designed to stimulate the adoption of mobile identity solutions. The new web-based authentication service runs on the OpenID Connect protocol in order to generate interoperability.

Simplification and convenience are also vital attributes of the initiative, and the operators involved are developing an identification solution that uses the subscriber’s mobile phone number or mobile user information held in the SIM card itself. In this way, end users can sidestep the need to create and manage multiple user names and passwords. As consumer research demonstrates, a majority of end users find mobile identity services appealing, and almost half see operators as well placed to provide such functionalities.

Figure 6: UK consumer attitudes to mobile identity

![Graph](source: “Mobile Identity UK Research Summary,” GSMA, June 2013)

At a strategic level, the GSMA Mobile Connect initiative sees operators taking a critical position as gatekeepers for the e-commerce revolution, extending their reach into adjacent market segments and creating new forms of brand affinity. Collaboration is very much the lifeblood of such services, enabling mobile operators to both collaborate and compete more effectively with over-the-top web and social media giants.
Expanding use cases into the offline world

Digital identity initiatives are most closely associated with environments where secure authentication and high levels of confidentiality are important, such as financial and health care services, as well as government identity schemes.

However, the benefits that secure SIM capabilities can bring across a range of use cases means that operator-led digital identity services can also work seamlessly between the online and offline worlds. In the latter scenario, national ID schemes and airport check-ins are just two use cases where digital identity can provide new forms of convenience and security.

Simplifying processes across a number of industries

Digital identity providers can speed the take-up of new offerings by tackling a number of existing inefficiencies in identification, authorization and transaction processes. Standardized mobile identity can improve the speed and reliability of transactions while enabling better interactions with government agencies. Meanwhile, a number of wider benefits can be unlocked in use cases as diverse as loyalty card schemes and recruitment processes.

For this to happen, leadership on the part of digital identity providers is essential. Government customers must understand the commercial imperatives of digital and mobile identity, for example, while transparent trust frameworks are needed so that end users are reassured regarding the integrity of digital identity services.

Although improved convenience provides the bedrock of the digital identity business case, security and control are no less important - and will require cross-sector collaboration if the full value of new identity solutions is to be realized.

7. Blurring boundaries in payments, advertising and retail

New partnerships in location-based payments

The pace of innovation in the world of mobile payments is increasing. In recent years, many operators in developed markets have prioritized horizontal partnerships as a means of enshrining scalability in national payments platforms while also assessing opportunities to provide related marketing services to third parties.

The need for horizontal collaboration remains important, yet this year's Congress was notable for a new wave of partnerships struck with card issuers and financial institutions, signaling that a range of industry actors are realigning their ambitions as mobile payment services begin to mature.

Partnerships between banks, card issuers and mobile operators leveraging near field communication (NFC) technology were announced in Spain and Germany, for example, while interest is growing in internationalizing existing national platforms. A number of international retailers highlighted the US operator-led ISIS payments platform as a mobile wallet approach that could be replicated in other markets. Meanwhile, four Asian operators unveiled the Asia NFC Alliance, which is set to drive the development of cross-border proximity payments.

At the same time, many payments platforms are offering differentiated capabilities. In the case of the UK's Weve, mobile marketing services are acting as the anchor product. Over 450 brands already use the service, which is expanding its capabilities beyond SMS and MMS marketing into display ads. Such innovations epitomize the cross-sector potential of mobile technology - and underline how mobile payments providers must take a holistic view of the services they can offer.
Catering for a wider mix of point-of-sale technologies

While partnerships evolve in new directions, a number of new technologies are also appearing that can spur new customer experiences. NFC has now matured into a de facto functionality available in the majority of new smartphones, but Host Card Emulation (HCE) and tokenization represent alternative enabling technologies for location-sensitive payments.

Such advances are likely to widen the field of innovation still further, encouraging new participants in mobile payments, while scope exists to combine new technologies in order to provide additional levels of security. Tokenization can help application-or cloud-based proximity payments enabled by HCE become more secure, for example. However, SIM-based security is still the only industrially deployed proven payment solution in the market today.

At the same time, there is plenty of innovation under way in the mobile point-of-sale (mPOS) arena. While a number of start-ups have made headway with smartphone-based card readers, operators are also considering their approaches in this space. In this light, innovation funds could help established players seize opportunities at an earlier stage of growth.

Enhancing the retail experience

As the convergence of mobile shopping, payments and marketing continues, retailers have a growing role to play – whether as enablers of new platforms for consumers or as beneficiaries of mobile network-driven insights themselves.

During Congress, there was plenty of evidence that retailers are leveraging mobile technology in new ways in order to improve the customer experience or improve the efficiency of their own systems and processes. As such, use cases are stretching to incorporate a number of business-to-business and business-to-consumer domains, putting an onus on service providers to clearly segment their addressable markets as they widen their suite of location-sensitive services and deploy complementary technologies such as Bluetooth Low Energy (BLE).

Arguably innovation is most tangible among small merchants. One of the services highlighted during the conference generates QR codes for unique clothes item purchases at sole trader stores in Hong Kong. These are in turn used to lead consumers to other stores selling similar products. While at first glance such a tool may seem to generate additional competition, the positive network effect involved benefits small designers, allowing them to reach a much wider audience.

Looking ahead, operators and technology specialists will need to do more to engage both large and small retailers in order to ensure that new capabilities are adapted to existing in-store pain points that can benefit consumers and merchants alike.
8. New efficiencies in network architecture and infrastructure

**Network virtualization takes center stage**

Network Functions Virtualization (NFV) was one of the major talking points of Congress. The ability to simulate network resources so that different functions can be decoupled and optimized is seen as a vital transformation path for operators as they consider how best to monetize data growth in the face of ongoing pressure on profitability.

Many operators underlined that the mobile industry faces a lack of scalable and sustainable architecture to meet customer needs. As their data traffic increases, they aggregate devices and M2M communication becomes mainstream. Moreover, current network architecture is ill-equipped to support higher levels of fixed-mobile convergence and more flexible service provisioning.

**Figure 8: The shift to network virtualization**

NFV is seen as highly complementary to software-defined networking (SDN). NFV focuses on optimizing network services by decoupling network functions such as caching from proprietary hardware appliances, while SDN shifts network control from hardware to software, allowing the network to become simpler and more scalable. The benefits in terms of capex and opex reductions are clear: in one example, spare capacity on network systems during low-demand periods could be used to run back-office functions such as billing.

Leading operators announced far-reaching visions of their networks of the future, detailing plans to move from proprietary infrastructure to platforms based on open standards. Reducing vendor lock-in is another important driver, while the move toward virtualization will also enable operators to deploy new services and applications more rapidly, thus allowing for more flexible business models. According to ETSI, early NFV deployments are already under way and are expected to accelerate in 2014-15.
Greater collaboration to drive small-cell rollouts

The sharp rise in data traffic worldwide is also leading operators to ramp up their deployments of small cells in both indoor and outdoor environments. A number of operators provided updates on their small-cell initiatives - KT’s small cells now handle 15% of its traffic in South Korea, for example - as vendors announced new technologies designed to speed rollouts and target new customer segments.

Small cells score well in terms of spectral efficiency, and both outdoor and indoor coverage levels are set to benefit from large-scale deployments. Historically, technical barriers such as interference and interoperability have held back adoption, but site acquisition for mini base stations, such as bus shelters and lampposts, also present problems.

Chinese vendor Huawei is tackling this through its “crowd-sourcing” solution, which enables partnerships between building owners, network integrators and enterprises. Meanwhile, small-cell solutions for enterprises are proving a vital focus area. A new partnership announced between Qualcomm and Cisco is set to customize small cells for business, while Ericsson’s Radio Dot technology is aimed at operators targeting gains in indoor performance for business users.

Thinking ahead to 5G

5G remains very much a nascent concept, referring less to a new industry standard and more to a long-term vision as to how mobile infrastructure will evolve over the next decade. For the time being, most operators will be focused on extracting better performance from current technologies. This is hardly surprising given that 2G still accounts for two-thirds of global mobile connections and 4G represents just 4% of the market worldwide.

Nevertheless, there were a number of announcements during Congress that underlined the importance of thinking ahead toward new iterations of mobile network standards. The Next Generation Mobile Networks Alliance (NGMN), composed of 21 operator members, announced an initiative to define use cases for 5G, in the process tackling issues such as APIs, latency and resiliency. Once the operators involved have specified their requirements, they will start defining architectures to deliver them before collaborating with standardization bodies, regulators and vendors - and possibly OTT players too.

Meanwhile, a joint 5G research and innovation program created by the European Commission and private sector has increased its investment budget to €4.2 billion, with a remit to return the EU to a leading role in mobile innovation in the wake of a slower 4G deployment rate compared to other regions.

While upgrade paths to 4G have seen the mobile industry shed the range of technology variants available during the 2G era, the move to 5G will have to embrace a shift to a world of connected devices and new M2M-driven use cases, which in turn will position future mobile network technologies as a collection of different standards. In this light, greater collaboration between operators, vendors and regulators is absolutely essential. Nevertheless, there is still work to be done harmonizing the TDD and FDD variants on multi-band and multi-mode devices in the 4G environment, an issue underlined by the Global TD-LTE Initiative (GTI) during Congress.
New approaches to spectrum management

Spectrum remains the lifeblood of the mobile industry, and its status as a finite resource places ever-greater pressure on policy-makers to ensure sufficient and sustainable access to radio frequencies. This is all the more important in view of consumers’ insatiable appetite for mobile data and the mobile sector’s role as an agent of transformation across other industry verticals.

Given the 8- to 10-year gap between allocating spectrum to mobile and actually making it available to the industry, it is vital that governments, regulators and industry actors recognize the strong relationship between mobile growth and economic productivity and align their interests accordingly. Long-term spectrum release frameworks are vital, and careful consideration must be given to how public sector spectrum holdings can be reassigned for mobile use, while a number of industry voices must be heard as additional swaths of sub-1 GHz spectrum are made available to mobile operators.

License renewal frameworks, spectrum sharing and trading, and the use of unlicensed spectrum are just some of the areas that will require greater focus from regulators and policy-makers in years to come in order to ensure optimal use of and access to spectrum. At the same time, technological advances may make additional high-frequency bands usable, meaning that existing spectrum release agendas may need to be refined over time. Looking ahead, all stakeholders must work together to ensure that spectrum demand and distribution mechanisms are aligned in a way that benefits the mobile industry and society as a whole.
Conclusion

Securing a new phase of mobile growth

Mobile World Congress 2014 revealed an industry that is starting to deliver growth opportunities in a number of directions, from connected-car services to payment and marketing services in the retail environment. At the same time, mobile devices and infrastructure have a vital enabling role to play in connecting communities in less mature economies. In this light, the scope for mobile technology to transform lives and societies has never been greater.

As technology cycles quicken and use cases multiply, it is vital that different stakeholders work together to ensure that mobile services live up to their wide-ranging promise. Value chains need to become more tightly integrated, while different industry actors should understand that innovation is increasingly a shared opportunity. Governments and regulators have a crucial role to play in creating a more predictable environment for investment, and more enlightened policies can support continued industry growth in the long term.

Looking ahead, the future for the mobile industry has never been brighter. As industry actors learn to cooperate in new ways, and customers warm to a new wave of mobile-powered services, the transformational power of mobile technology can evolve further still.
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