



GSMA Intelligence



ANALYSIS

Mobile World Congress 2016 wrap-up

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Executive summary

Partnerships, platforms and the path to 5G

For the first time in the event's history, the 2016 edition of Mobile World Congress welcomed more than 100,000 visitors to Barcelona for the mobile industry's biggest event. Attendees from over 200 countries convened to showcase new products and reflect on key industry issues and announcements.

While we set out our key findings from the show over the next few pages, several broader themes run across much of this analysis and point the way for the industry as it continues to transform:

- **Partnership** announcements were in abundance this year. As the mobile ecosystem expands, it's clear that collaboration that is innovative, vibrant and value-sharing will lead to a much better experience for end users and avoid industry fragmentation.
- **Platforms and ecosystems.** Whether it's consumer offerings evolving to become dominant 'lifestyle' platforms or the challenge of unleashing the value of IoT platforms that are scalable and secure, platform approaches took centre stage across many discussions this year.
- **Path to 5G.** Despite announcements of alliances for trial specifications, and governments competing to be first in the race to launch 5G, operators are only just beginning to grapple with the business case decisions necessary to ensure 5G is a life-enhancing story that the industry tells together.

Overall, the mood at Mobile World Congress was one of tangible progress towards standards, the practicalities of implementation and use cases. Operators and vendors are moving to deploy solutions aimed at tackling the digital transformation required for new business models. The industry continues to reshape for the opportunities and challenges ahead.

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Devices: Focus shifts as smartphone innovation slows

More than 40 smartphones were announced by over 20 global manufacturers during this year's Mobile World Congress. Samsung, LG, Sony and others used the show as a platform to launch flagship products, but this year was largely underwhelming in terms of innovation.

Key points

- Samsung revealed its latest flagship smartphones, Galaxy S7 and S7 Edge, via a virtual reality presentation using its Gear VR headsets. Features include a microSD card slot, an 'always on' display that shows the time, calendar or images, and a 12MP camera (versus 16MP for the Samsung S6 Edge).
- LG unveiled its G5 "modular" phone, which sees a shift in design from its predecessor. The key feature of this device is the ability to add accessories and companion devices such as a better camera or audio player (through a partnership with B&O).
- Sony announced three new devices in its new X series. Xperia X focuses on improved camera technology and battery life. The 13MP 'low-light selfie' shooter was highlighted in the stand demo.
- The Xiaomi Mi 5 is a strong contender as a good-looking, feature-packed mid-tier smartphone. It features a 5.1-inch full HD screen, 16MP camera, 128GB storage and a ceramic-backed option.
- Alcatel is dropping OneTouch from its brandname, and unveiled its Idol 4+ and Idol 4S smartphones. The Idol 4S box can be used to create a Google Cardboard-style VR headset. Priced between €279 and €449, the devices are aimed squarely at the mid-tier.

Viewpoint: Smartphone accessories take centre stage

At a panel discussion on the first day of Mobile World Congress, Qualcomm argued that "Innovation in the handset is not constrained to the 4.5-inch or 5-inch screen in the device; it's everything surrounding it, including the ability to capture virtual reality and watch it and share it over wireless with friends and family".

With the smartphone market subject to commoditisation, manufacturers are instead focusing on driving the value proposition for consumers by offering an ecosystem of products to support their flagships. By and large, this year's flagships have seen only incremental improvements in specifications, but the launches featured a suite of supporting products.

This ecosystem is about consumer lifestyle and includes virtual reality experiences, better cameras, accessories, smart watches and even robots, offering a real point of differentiation over rivals. LG's adoption of a "modular" design for G5 is a good example, and Samsung is following the same path with its Gear 360 camera as well as its existing smart watches, as is Sony with its Xperia Ear earpiece.

With pricing pressure as evident as ever in the smartphone space, add-on sales could prove lucrative for vendors – though the idea of boosting revenue through accessory sales is far from new. It is also far from clear how great the demand is for new technologies such as VR and remote control robots, certainly in the short term. On the flipside, no vendor looking to claim a leadership position can afford to sit on the fence.

Devices: Wearables start to mean business

Although the majority of wearables on display this year were for the consumer market, the real interest was in wearables for industry, with the conversation dominated by augmented reality (AR). In total there were 167 wearables on display, up from 53 last year. Of these, 153 were aimed at the consumer market and 14 at the enterprise space.

Key points

- Interest in the enterprise market was highlighted by the entrance of vendors that have traditionally focused on consumer products. Fitbit, for instance, has launched a new solution for corporate wellness programmes.
- Alongside AR headsets, other products targeted at the industrial sector were on display. Examples included ProGlove, a glove that monitors employees' movements and incorporates a laser scanner on the wrist.
- Across the consumer sector there has been significant convergence in form factors. Of the 167 wearables on display, 70 were smart watches and only 30 were fitness trackers, a significant development compared to 2015.
- Wearables for children were also well represented at the show with 18 on display, compared with only two last year.



Viewpoint: Augmented reality leads the way

Augmented reality headsets dominated interest in wearables this year. AR layers virtual information onto a user's real-world view to create an enhanced, composite experience. It is distinct from virtual reality, which creates a fully simulated environment. It is usually developed as a headset to allow hands-free use. The potential benefits for industry are huge: a recent study by Boeing, quoted at Mobile World Congress, found that engineers relying on an AR tablets were able to complete tasks 30% faster and 90% more accurately than when relying on a PDF guide.

Currently the primary use case is remote assistance, where specialists in a centralized site are able to advise colleagues in the field. This minimises travel time for key staff and allows companies to scale with a less experienced team.

Beyond these direct benefits, AR is also seen as a gateway to further integration of wearables in industry. From our conversations with market players such as Vuzix and Atheer, it's apparent that companies will only invest in wearables if shown a use case that will provide rapid return on investment with minimal disruption to current processes. As companies realise its potential, they become open to introducing more complex solutions.

One of the major challenges to widespread adoption of AR is the interoperability of platforms. Although some companies such as Talent Swarm are looking to address this by developing databases of machine parts, they are limited in size and number.

For operators, the growth of AR is positive as the majority of headsets rely on cellular connectivity and create opportunities to provide managed services.

Devices: Virtual reality: vendors jostle for position

Virtual reality (VR) took centre stage at a number of stands at Mobile World Congress. With smartphone evolution becoming ever more incremental, VR is fast emerging as the latest product line used by device vendors to showcase innovation and draw consumers to their brands. However, questions remain over the business model, both for device manufacturers and content creators. Furthermore, emerging platform fragmentation and the price points of high-end headsets mean VR is likely to be a slow burner.

Key points

- Clear dividing lines are emerging in the design, function and pricing of VR products, as vendors jostle for position in this emerging field.
- Content will be king: most of the vendor focus was on user-generated content, with both Samsung and LG releasing cameras capable of taking 360-degree video – Samsung with its Gear 360 and LG with its LG 360 Cam. Each camera is compatible with its company's latest smartphone and VR headset.
- Despite the Oculus Rift being a gaming VR device, Mark Zuckerberg claimed VR is all about videos and highlighted that more than 1 million hours of 360 video had already been watched on the Gear VR.
- Mihai Pohontu, VP of Emerging Platforms at Samsung, noted that most of the PR for VR has focused on hardware. He highlighted the efforts his company is making to stimulate content production for the Gear VR, under the 'Made for Samsung' banner.

Viewpoint: Fragmentation creates multiple VR visions

The past year has seen a plethora of VR announcements from established device manufacturers as well as crowd-funded projects. With many set to launch in 2016, it would appear that VR is a product category firmly on the up. However, uncertainty remains over VR's key proposition, and the drive by vendors to differentiate and stimulate usage is causing increasing fragmentation within the VR space.

VR headsets designed predominantly with gaming in mind, such as the Facebook-owned Oculus Rift and the HTC Vive, point to VR's future with immersive, interactive content. But with these headsets costing \$600 and \$799 respectively, gaming is currently a niche VR service. Graphics chip company Nvidia estimates that less than 1% of global PCs expected to be in use during 2016 will be powerful enough to even run such headsets.

The launch of 360-degree cameras by both Samsung and LG, alongside their flagship smartphones, suggests video is VR's immediate future. Indeed, by linking VR headsets to a mobile device as opposed to a desktop computer, manufacturers are targeting a much larger addressable base, and by bundling VR headsets and 360-degree cameras with their smartphones, the larger vendors are creating greater consumer lock-in, as well as a potential groundswell of user-generated content. Samsung went one further in this regard, talking up its "Made for Samsung" programme as a means to support the creation and delivery of VR applications and content by, for example, providing funds and promotion for developers – a clear recognition of the monetisation problem VR faces today.

Networks: Industry demonstrates 5G technology and intent

The roadmap for the fifth generation of mobile networks became much clearer this year, with several major equipment vendors demonstrating 5G technologies live at the show and a number of operators announcing strategic partnerships – as well as some bullish launch dates. Despite the initial business case remaining hazy, these developments were underpinned by the consensus that formed around network slicing as the key enabler to unlock the value from 5G in the longer term.

Key points

- Operators/groups including AT&T, China Mobile, Deutsche Telekom, KT, NTT Docomo, SK Telecom, Telefónica, Telenor, Telstra, TIM, T-Mobile USA and Verizon Wireless all announced 5G trials with various vendors. Verizon was particularly upbeat, suggesting that it could launch the technology as early as 2017 after conducting trials in the 28 GHz band with Samsung.
- The major equipment vendors demonstrated various 5G technology trials. Nokia unveiled its AirScale base station, which the company described as “5G ready”, stating that sales could begin as early as 2017, while rival Ericsson’s stand featured a live 5G test bed achieving 26 Gbps; the vendor announced that it already had 5G partnerships with 21 operators.
- SK Telecom, KT, NTT Docomo and Verizon formed an alliance to develop specifications for 5G trials beginning this year, with SK Telecom also announcing a separate partnership with Deutsche Telekom.
- Meanwhile EU Digital Commissioner Günther Oettinger detailed a 5G action plan to accelerate development in Europe, and added Brazil to the EU’s list of international partners.

Viewpoint: Network virtualisation serves up three slices of 5G

With LTE Advanced increasingly offering consumers greater download speeds, there is currently little demand for a yet faster network technology. Early 5G launches are likely to be limited to a select group of large operators building out high-capacity coverage in urban areas, enabling services such as advanced broadcasting or 3D imaging.

Increased speed is in many ways the least significant feature of 5G, as a business case built around enhanced mobile broadband (eMBB) in saturated markets is unlikely to excite investors on its own. The true value of the technology will come from the flexibility offered by it being built on the principles of network virtualisation and software-defined networks (SDN).

Using network slicing (see *NFV – a prerequisite for network innovation*) to segment the physical network into bespoke logical networks, the same hardware that supports eMBB services can be optimised for very different applications – and potentially much broader revenue streams. The most immediate is the significant opportunity to take a greater share of the IoT or massive machine type communications (mMTC) market, of which cellular currently accounts for only a small percentage of connections.

The third phase of 5G development will be in sectors that largely do not currently exist, as they can only be enabled by a super low-latency network i.e. critical machine type communications (cMTC) such as autonomous driving, augmented reality and tactile internet. Early 5G deployment could give operators a greater foothold in the longer term business opportunity presented by these and as yet unimagined services. However, given ITU standardisation of the technology will not happen until 2020, partnerships remain critical to ensure that working to aggressive timelines with different technologies does not lead to fragmentation.

Networks: Connecting the unconnected – balloons and drones to the rescue?

The task of connecting the unconnected was highlighted in several keynotes at this year's Mobile World Congress, including the session headlined by Facebook's Mark Zuckerberg. With the majority of unconnected people living in areas where it is uneconomical to deploy conventional infrastructure, there was greater emphasis on the need for innovative technologies to tackle the challenge of coverage expansion.

Key points

- More than 4 billion people are without access to high-speed Internet, including 3 billion people without any form of connectivity, mostly in developing countries (source: GSMA Intelligence).
- Facebook announced the Telecom Infra Project (TIP), an engineering-focused, collaborative initiative between telecoms operators, infrastructure providers, systems integrators and other technology companies to develop new technologies and reimagine traditional approaches to network deployment.
- Google's Project Loon partnership with operators enables it to directly transmit 4G signals to mobile handsets on the ground by sharing operators' mobile spectrum. This is a more affordable way of reaching users in certain terrains than deploying conventional network infrastructure, according to Mike Cassidy, head of Project Loon.
- Director of engineering at Facebook Connectivity Labs, Yael Maguire, disclosed that the firm's solar-powered vehicles (drones) are testing data connectivity in the millimetre wave band (70–80 GHz) and underlined the importance of government buy-in to successful implementation of the project.

Viewpoint: Ecosystem collaboration is vital for new connectivity solutions

Google and Facebook are venturing into the connectivity space, primarily through aerial initiatives and, more recently, Facebook's TIP. Neither company intends to become a full service provider, but their intervention should lead regulators and operators to rethink infrastructure deployment models and consider innovative connectivity solutions.

Collaboration with governments and operators is crucial to the success of aerial network solutions, given the spectrum requirements and regulation of connectivity services. Project Loon has partnered with operators, giving it access to mobile spectrum for the provision of LTE services. Pilots have been launched with Vodafone in New Zealand, Telstra in Australia, Telefónica in Brazil, and Telkomsel, XL Axiata and Indosat in Indonesia. There are agreements in place with Telefónica for similar pilots in Chile and Argentina. A trial launched in February 2016 in Sri Lanka was preceded by the government taking a 25% stake in the local Project Loon joint venture in return for spectrum, with a further 10% reserved for operators, highlighting a deeper level of partnership.

Alternative network solutions will play an important role in extending connectivity to the last frontier, but success is contingent on ecosystem collaboration, with strong buy-in from governments and operators. At present, aerial technologies have the best prospect of scaling given their potential to cover a wide area and investment from the two biggest non-telco players in the connectivity space. The possibility of the first commercial Project Loon users in 2016 has been cited in several media reports, but no firm commitments have been made. Although the viability of the technologies will ultimately be tested following commercial launch, improvements across several operational areas, notably coverage, connectivity, interoperability and flight time, strengthen their rural coverage proposition.

Networks: NFV – a prerequisite for network innovation

With the technology standards and business case for network function virtualisation (NFV) and software-defined networks (SDN) now widely accepted, the conversation in Barcelona centred more on the practicalities of implementation. As key enablers of network flexibility and innovation, NFV and SDN are expected to underpin the development and rollout of 5G, with network slicing in particular facilitating the diverse range of applications and use cases expected of the next generation of networks.

Key points

- AT&T announced that it virtualised 5% of its network functions in 2015, and is targeting 30% virtualisation by the end of 2016 and 75% by 2020 – although CSO and Group President John Donovan emphasised both the challenges and benefits of NFV implementation.
- Telekom Austria has launched the world's first live network with a fully virtualised stack. Legacy hardware will continue to serve 60–80% of traffic before it gradually introduces and stress tests NFV.
- Telefónica also detailed its gradual rollout of NFV, emphasising the importance of legacy networks and the need to guarantee a smooth transition.
- Cisco announced its new NFV Infrastructure Solution, which is already being implemented by operators such as Vodacom. In combination with Cisco's recently announced partnership with Ericsson, it is clear that the software company is committed to developing its position in the telecoms industry.
- ETSI, the operator standards body for NFV, announced that it has begun work to standardise the open source management and orchestration (MANO) stack, with the aim of avoiding fragmentation of the technology.

Viewpoint: NFV/SDN: enabling new business models

Market dynamics are forcing operators to transform their business to monetise data services, and NFV/SDN is a core enabler of this transformation. Service providers have to consider virtualisation as a core part of their technology roadmap to reduce cost, accelerate time to market and implement innovative business models. With network slicing, operators can quickly adapt their network to accommodate new services such as augmented and virtual reality, commercial networks and emerging IoT applications.

However, virtualisation alone is not enough to provide end-to-end solutions; operators have to invest in orchestration capabilities to link the virtualised functions to the physical elements of the network. In addition, significant focus and investment has to be given to the big data analytics element of the NFV equation that will fuel the core capabilities of virtualised networks.

As such innovation moves from mechanical engineering to digital engineering, operators are looking to become software providers. This transformation implies a massive cultural change. Service providers looking to move into network virtualisation have two choices: select a single network supplier and have limited control over their long-term roadmap, or invest in open source solutions (which in turn means embracing the cultural change and investment in people and new skills) and be in full control of their technology roadmap.

Virtualisation is also disrupting traditional business models for network vendors. The long-term savings for operators will come primarily from reduced network maintenance costs, as generic equipment is easier to maintain and upgrade with just software. The decoupling of hardware and software implied by network virtualisation also allows software companies to become more direct competitors to hardware vendors, providing greater choice to operators.

Networks: Ecosystem collaboration drives readiness of mobile IoT

Mobile World Congress 2016 brought mobile networks into focus as key enablers of the Internet of Things. A number of vendors and operators demonstrated solutions based on 3GPP-approved LPWA standards in licensed spectrum: LTE machine type communication (LTE-MTC), extended coverage GSM IoT (EC-GSM-IoT) and narrow band IoT (NB-IoT). Innovation City hosted six demonstrations of mobile IoT and showcased several use cases for licensed LPWA solutions.

Key points

- The mobile IoT licensed standards allow operators to optimise their existing mobile network infrastructure through an upgrade to EC-GSM-IoT for 2G networks and LTE-MTC for LTE networks, while NB-IoT can use both 2G and 4G spectrum.
- Sierra Wireless demonstrated how LTE-MTC can be used for connected shoes, wearables and healthcare devices as well as industrial devices such as smart meters, while Ericsson and Intel focused on use cases in fleet tracking and smart grid monitoring.
- Ericsson, Intel and Orange showed how EC-GSM-IoT can address the challenges of extending coverage to difficult-to-reach indoor locations such as basements, as well as remote rural areas.
- Connected bikes (Ericsson, Nokia, Intel, SK Telecom), smart parking (Deutsche Telekom), pet tracking (Huawei and Vodafone) and water metering (Vodafone, u-blox, Huawei) were highlighted as use cases for NB-IoT.
- NB-IoT currently has the widest industry support and has made good progress partly due to the NB-IoT Forum launched in November 2015, bringing together the likes of Huawei, Ericsson and Nokia with a number of operators.

Viewpoint: LPWA becomes a key target for IoT

Whereas last year unlicensed LPWA operators Sigfox and LoRa dominated the narrative around the LPWA opportunity, this year use of licensed networks for LPWA came to the fore. For mobile operators to move beyond the cellular M2M opportunity, they need to address the low-cost standardised solutions that will enable additional M2M/IoT application areas with specific requirements such as low data, extended coverage and long battery life. The addressable market for such applications is large, totalling around 1.4 billion connections by 2020, with some industry watchers forecasting 5 billion by 2022.

The Mobile IoT initiative, led by the GSMA, is a prime example of the important role ecosystem collaboration plays in enabling fast and interoperable adoption. It accelerated the 3GPP group's progress towards producing standards in licensed spectrum, all of which will be 3GPP-compliant for Release 13 in the first half of 2016, with pilots planned for the latter part of the year and commercial rollouts in 2017.

The Mobile IoT initiative has brought together 30 mobile operators, device makers and chipset, module and infrastructure companies, including AT&T, Verizon, China Mobile, Deutsche Telekom, Orange, Qualcomm, Nokia, Ericsson and Huawei, with the goal of facilitating demonstrations, proofs of concept and trials of three LPWA technologies. Ericsson's Head of Mobile Broadband, Eric Parsons, stated: "the whole industry has come together and made hard choices, and now has a standard near completion in record time; perhaps deployment can be in record time too".

Standardisation will enable the industry to achieve economies of scale and interoperability, as well as helping mobile operators around the world source equipment from multiple suppliers, which will shorten time to market and enable mass adoption.

Services: IoT platforms suffer from cacophony of standards

The Internet of Things (IoT) was a key theme at this year's show, but particularly noteworthy was the large number and variety of exhibitors showcasing IoT platforms, including device manufacturers, IT companies, car makers and online grocers. A key challenge is how to ensure interoperability of home and industrial applications based on different protocols and standards through collaboration between ecosystem players.

Key points

- A number of partnerships were announced this year, including Gemalto and Jasper (integrating Jasper's IoT service platform with Gemalto's LinqUs On-Demand Connectivity); HPE teaming up with ARM for its mbed IoT device platform; and BlackBerry and Microsoft partnering so enterprises can install and manage BlackBerry BE12 via the Azure cloud platform.
- Cisco, Microsoft, Intel, Samsung, Arris, CableLabs, Electrolux and GE Digital formed the Open Connectivity Foundation to help unify IoT standards around Windows 10 and Azure Cloud.
- Amdocs launched a multi-industry, cloud-based, multi-tenant platform, supporting various engagement models.
- Wedge Networks launched a security-as-a-service platform for IoT in enterprise networks.
- Operators are betting on creating an ecosystem and attracting developers to their platforms. AT&T already has 10,000 developers building solutions on its IoT platform, while Verizon announced that it will expand its ThingSpace platform to third-party providers; it is already used by 4,000 developers.
- Ocado, the UK online grocer, outlined its plans to make its smart platform available beyond the retail sector to other industries such as airports and mining, and to expand into the smart home.

Viewpoint: Platform fragmentation can stifle IoT growth

There are currently hundreds of platforms that address the IoT market, from a multitude of vendors: well-established IT players, operators, device manufacturers and non-traditional sectors. These are often built to respond to a particular industry need, making them vertical-specific. Fragmented and proprietary systems will not enable the creation of an ecosystem nor the economies of scale and value add that comes from bringing insights and data from multiple industries.

Interoperability is the key challenge for the growing range of home and industrial connected devices and the different platforms required to link and control them. With the evolution to IoT, which connects different types of end points – sensors, devices and information systems – through multiple networks, there is a need to build open and scalable solutions that are easy to integrate and can be deployed horizontally. Without this, the goal of connecting billions of devices – estimated to total 23 billion IoT connections by 2020 – will come in short. Bringing multiple solutions together will be key to any successful IoT platform, but also required are open and exposed APIs, security, simplicity and partnerships between multiple stakeholders. Mihai Voicu, Chief Security Officer at Telit, summarised: “IoT platforms are designed to help data analytics, and I can see cloud-based platforms interacting with one another.”

Although there are a number of partnerships between different IoT players and a few initiatives designed to bring the industry together around certain protocols or platforms, no single company is setting the trend. There is a risk that the winning platform will come from outside the operator community, relegating the role of operators to solely providing connectivity.

Services: Rapid expansion of security threat expected by 2020

A number of leading companies taking part in Mobile World Congress this year warned of an exponential increase in new security threats by 2020, driven by an estimated 23 billion IoT endpoints (GSMA). The global cost of cybercrime is already estimated at \$400 billion in 2015 according to Lloyds Corporation. Countering a bigger, more complex threat landscape will accelerate costs and increase the likelihood of individual privacy being affected.

Key points

- ARM CEO Simon Segars warned that hackers will find new ways to infiltrate an IoT world that will differ widely from today's cybercrime.
- Darktrace CTO Dave Palmer suggested we were in a "golden age of hacking" with mobile Internet and machine-to-machine connections needing particular attention.
- Mobolize CTO William Chow emphasised that the mobile phone has a wide attack surface and needs the whole ecosystem to be involved in defending it against exploits, with much faster patching of vulnerabilities.
- BAE Head of Threat Analytics, Richard Jarvis suggested users will only consent to sharing their data if they see trust, control and value in the process.



Viewpoint: Ecosystem-wide security and user tools needed to defend and protect

The increasing number of vulnerabilities available to the attack community comes not just from the exponential expansion that is expected in IoT endpoints but also the widening opportunities available on mobile handsets via mobile internet and the increasing number of apps downloaded. Unless the security community can predict where the 'bad actors' are going to strike in this enlarged threat landscape, the probability that people will experience a data breach or privacy loss will rise sharply. The result will be growing demand from customers for tools to defend their digital life and business.

A multi-layered, ecosystem-wide approach to security is needed to maximise the protection of both users and enterprises. Such an approach would need to include stronger and easier authentication of identity; behavioural profiling of bad actors; 'immune systems' that allow machines to fight back; consented 'clean-feed' access that pre-filters a household's internet connection; open standards; and collaboration. The GSMA has also published its IoT Security Guidelines to help service providers design and build secure IoT products.

As users see more value in their data, they will care more about its security. Matt Beal, Director of Innovation and Architecture at Vodafone, believes customers are approaching a valuation of their own data and will soon demand greater control and value from it. If users perceive more value in their data, they will be increasingly interested in protecting it and will mistrust those companies that don't. However, unless the mobile ecosystem provides users with the appropriate tools, authentication and information, they will not be able to contribute to security at all.

Services: Mobile commerce ecosystem continues to expand

Mobile payments and digital commerce were prominent subjects at this year's event, with many believing a cashless society is a realistic proposition in the years ahead. Interestingly, the distinction between mobile payment services offered in developed countries and mobile money services traditionally available in emerging markets is blurring, with PayPal announcing that its users will be able to send money directly to M-Pesa accounts through its Xoom business.

Key points

- According to the GSMA's State of the Industry Report on Mobile Money, published during Mobile World Congress, the number of mobile money services grew to 271 in 2015, covering 93 countries. There is still work to do however, with 2 billion people around the world still without access to banking facilities.
- Stripe, which offers a payments platform to app developers, announced a new service called Atlas that allows entrepreneurs in the developing world access to the same kind of payments infrastructure as start-ups in the US and Europe.
- PayPal announced that users could now use NFC technology to pay for goods using their PayPal wallet.
- Visa announced that it was extending its Visa Ready programme to IoT. Visa Ready enables companies to add secure payments to their products and services. As well as existing partners such as mobile device vendors, the programme is being extended to manufacturers of cars, wearables and other IoT companies.

Viewpoint: Mobile money to become an ecosystem of financial services

The growth of mobile money in emerging markets has changed the lives of many users. Karim Khoja, CEO of Roshan, recalled his experience in Afghanistan where M-Pesa is now used to pay the local police force. Following the launch of the service, officers believed they had received a significant pay rise as direct payments from the service removed reliance on often corrupt middlemen.

As well as continuing to connect the unconnected, providers are now working to create an ecosystem of services. Mobile credit is a key component of this ecosystem. While 400 million people in India borrowed money over the last year, only one in seven of these were approved for a loan by a bank. The remaining debtors had to use informal, unregulated services often with extortionate interest rates. From customer records, mobile operators can assess credit worthiness, enabling them to provide small loans to users.

To pay for these loans, operators can provide incentives for other users to save money in a mobile bank. This could take the form of free credit for prepaid SIM cards or insurance for handsets. The adoption of this model by more operators could lead to financial inclusion and its associated benefits for millions of new customers.

The biggest challenge for operators is sustainability. There is minimal return to be made from simply moving money; the benefits come from owning more of the value chain. For example, Telenor has been able to monetise a micro-financing economy in Pakistan by owning its own bank. We expect to see more initiatives like this in the future as the ecosystem expands to include more services and users.

Services: The sharing economy: on-demand gets physical

The sharing economy was well represented at Mobile World Congress this year, with appearances (among others) from AirBnB, KakaoTaxi and Just Eat underscoring its transition from niche to mainstream. Across the multiple segments emerging as leaders in the fragmented space (including hospitality, transport and catering), companies see a huge opportunity to build on another key theme of Congress – platforms – and take real-time, contextual and personalised P2P consumer interactions to the mass market.

Key points

- Globally, the size of the sharing economy was estimated at \$15 billion in 2014 and is projected to reach \$335 billion by 2025 (source: [PWC](#)).
- AirBnB VP of Engineering Mike Curtis announced the company had 30,000 hostings in Barcelona during the week of Mobile World Congress. He cited a Goldman Sachs [survey](#) in which 16% of respondents had used P2P lodging sites in Q4 2015, up from 11% in 2014.
- Kakao CBO John Jung reported that KakaoTaxi had handled more than 80 million rides since its launch in March 2015, with 700,000 rides daily and 84% taxi driver penetration. He also discussed Kakao Taxi Black, which adds mobile payment capabilities to the service.
- Just Eat COO Adrian Blair said the company now had 60,000 restaurants on its platform across 15 countries. He added that Just Eat has a database of 15 million restaurant reviews, providing “the most comprehensive and up-to-date restaurant information in the industry”.
- Though absent from Mobile World Congress, Uber is growing strongly: total bookings were estimated to reach \$10.8 billion in 2015, and more than doubled in 2016 to \$26.1 billion (source: [Reuters via CNBC](#)).

Viewpoint: Verticals to consolidate into ‘winner takes all’ markets

Recent disclosure from large sharing economy players reaffirms an environment of high subscriber and transaction growth (30–50%), driven by rising smartphone penetration and network effects. Profitability is less assured and more unevenly distributed. Business models are generally based on a revenue share, with commission ranging from 10–25% (AirBnB 10–15%, Just Eat 10–12%, Uber 25%). This provides in-built operating leverage for highly scaled companies, but constrains sub-scale players given fierce competition. For example, Uber is profitable in the US and Just Eat operates at an EBITDA margin of 25%, but both command market shares in excess of 50%. Verticals are likely to consolidate into ‘winner takes all’ markets with a carrying capacity of perhaps two or three players with global footprints. The exceptions are national champions, particularly in India (e.g. Zomato) and the CJK triangle (e.g. Kakao and Line in Korea and Japan).

Personalisation and trust have become the other key issues. A recent [survey](#) from PwC underlines the point: among US consumers, 19% have engaged in a sharing economy transaction, but 69% would only trust a company if personally recommended. Increasing transaction volumes on mobile (AirBnB reports over 50% of bookings go via mobile, Just Eat 60%) in the context of recent high-profile customer security breaches will only raise the stakes. Company management present at Mobile World Congress stressed investments in security as a priority to assuage consumer concerns, though we believe the real targets of this messaging are regulators. We expect continued pressure on the (quasi) self-regulation model, with a ramp-up in the level of transparency on operating models and acceptance of more regulation the price of its continuation.

Services: Ad-blocking momentum continues as battle lines are drawn

Ad blocking proved to be one of the more controversial topics at Mobile World Congress. Hutchison's deal with Shine Technologies to deploy network-level ad blocking was leaked beforehand. Shine was keen to stress that this would be done on a purely opt-in basis, but one notably heated discussion saw Shine under attack from Google, AOL and Yahoo among others for posing a threat to the 'free' internet model and undermining consumer choice.

Key points

- The growth of mobile video was seen as creating a great environment for marketers, but there was acknowledgement from several players that consumers want control over what they access.
- Hutchison became the largest mobile operator to date to announce a deal with Shine for network-level ad blocking, with the service set to be rolled out to subscribers on an opt-in basis in the UK and Italy.
- Former Mozilla CEO Brendan Eich launched the Brave browser. Its capabilities include a digital wallet based on blockchain that allows end users to make micropayments for content that they choose to view and for advertisers to be paid for those adverts users view.
- A number of advertisers were quick to acknowledge their failings and contribution to the consumer revolt, stating that the industry had not been sufficiently creative in adapting advertising content for mobile and smaller screens.

Viewpoint: Enabling real consumer choice is key

There was agreement from all sides of the digital advertising ecosystem that the current system has not worked well. Consumers are unhappy with the impact on their mobile experience, with video ads using a growing proportion of their data consumption. For operators these growing data volumes can also have implications for network planning.

Martin Sorrell, chief executive of WPP, acknowledged that the 'creatives' in the industry had been slow to adapt to mobile: "we haven't contextualised correctly yet". This also explained the underinvestment in mobile by advertisers as compared to other forms of digital and analogue media. There were similar sentiments from others, with Unilever expressing concerns about the viewability of many ads on mobile devices.

Micropayments has been suggested for some time as a potential alternative to the 'free' content model, with the Brave browser one of the first examples to reach app stores. Operator billing mechanisms could also evolve as a future route to pay for content and reward advertisers. Shine acknowledged that its revenue model had still to be defined, with the general suspicion that operators are motivated more by the desire to regain a share of advertising revenues than concern for the user experience.

The real end game with digital advertising is to empower consumers, giving them clear choice of what they view and control of their own data. The advertising industry is already adapting with more contextual ('native') advertising, and creative adverts are themselves becoming content that users are keen to consume. The dominant players are also adapting, with Google's Accelerated Mobile Pages and Facebook's Canvas allowing more contextual ads to be inserted into news feeds. For ad blockers the challenge is to develop sustainable revenue models if they are to be anything other than the short-term catalyst for change.



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