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WORLD

DAILY

DAY TWO • TUESDAY 23RD FEBRUARY



By Anne Morris

CEOs from the world's largest mobile operators highlighted the challenges facing the industry over the coming five years, as society adapts to the changes being brought by advancements in mobile technology and digitisation.

In the opening keynote on Monday, Mats Granryd, director

general of GSMA, said mobile technology has already played a huge part in driving global connectivity towards the creation of what he termed the "mobile society". But he warned that the industry should not rest on its laurels.

"What brought us here won't keep us here," he said. "We do need to be more innovative and more collaborative."

Vittorio Colao, Vodafone Group

CEOs issue rallying call to drive 'gigabit economy'

CEO, echoed this message, saying that the big changes in society over the next five years "will be really shaped by us".

"I call it the gigabit society," Colao said, noting that this would be when networks provide very high speeds and very low latency as well as a strong level of security.

"I am convinced we are building this now...we are all working in this direction," he added.

Cesar Alierta, chairman and CEO of Telefonica, added that telcos now have the opportunity to have a different kind of relationship with the customer, and could achieve this

by "fostering innovation", which he sees as the key to progress.

However, Vodafone's Colao noted that a healthy gigabit society would not result from a "random" development of technologies but would require pro-investment policies, a thriving ecosystem of providers with no dominant players, education and training, and regulatory frameworks that support strong competition.

He also underlined the "huge cost" to the industry of building the gigabit economy. "We need to be rewarded," he said. "We are not a lemon to be squeezed."

Oettinger: Cooperation between carmakers and telecoms a 'blueprint' for 5G

By Anne Morris

Gunther Oettinger, the EU commissioner for digital economy and society, said plans for a cross-industry connected car initiative are a possible "blueprint" for the telecoms sector in the context of future 5G developments.

Speaking during a media event organised by the 5G Public-Private Partnership (5G PPP) – the European Commission's flagship initiative on 5G – Oettinger said 5G has already been identified as a connectivity platform that will not only support the telecoms sector but also other key vertical sectors such as automotive, health, energy and smart factories.

Cont. on P3

Zuckerberg warns mobile industry not to ignore the unconnected

By Ken Wieland

Mark Zuckerberg, chief executive of Facebook, warned Congress delegates not to overlook the task of connecting some four billion people that still don't have access to the web.

Under questioning, he expressed "disappointment" that the 5G industry focus was on connecting things rather than the unconnected, and that there was a danger of just providing "faster connections" for rich people.

If that trend continued, argued Zuckerberg, there was a likelihood of making only a small dent in the unconnected number when

Congress meets in 2020. "We need to finish the job of internet access," he said.

Internet.org, a Facebook initiative launched three years ago to connect the world's population, has made significant progress, insisted Zuckerberg, despite a major setback in India where the Free Basics service was banned.

Free Basics offers users free access to a certain range of data services – including the social network – but not the full internet. Much to the delight of ardent net neutrality supporters, who felt Free Basics and its use of zero rating unfairly manipulated internet usage, India's authorities ruled against it.

Zuckerberg, however, gave no



sign of wanting to change the Free Basics model. "Every country is different," he said pragmatically, pointing out that Free Basics was still available in 38 countries and that it was responsible for attracting 19 million more people to the internet who didn't have access before.

Cont. on P3

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1. Based on HP's internal analysis as of January 14, 2016, of mobile devices preinstalled with Windows 10 Mobile, designed to pass MIL-STD-810G and IP67 testing, the ability to run virtualized corporate apps on a big screen using an optional dock, and a biometric solution for security.

2. Optional dock required and sold separately. Peripherals sold separately.

3. HP Workspace software update for Windows 10 required and planned in a future release. Subscription required. Corporate application must be licensed on corporate network for virtualization.

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Ford trumpets new in-vehicle system and wants to “fundamentally rethink” transportation

By Saleha Riaz and Joseph Waring

Ford is aggressively pursuing opportunities in the mobile space in its quest to “fundamentally rethink transportation”, its CEO, Mark Fields, said in the Mobile is Connected Living keynote.

It is looking to transition from being an “automotive company” to an “auto and mobility” company, through its Smart Mobility efforts – its plan to be a leader in connectivity, mobility, autonomous vehicles, customer experience, and data and analytics.

It announced that the third generation of Ford Sync, its in-

vehicle connectivity technology, is coming to Europe this year, with compatibility with Android Auto and Apple CarPlay.

Sync allows drivers to control audio, navigation, and climate functions and connected smartphones using conversational voice commands.

A new Kuga car, showcased at MWC, will feature the new system.

By 2023, Ford expects 43 million vehicles on the road to use Sync.

Fields also said the company will “triple engineering investment” in driver assist technology, speeding the roll-out of semi automated systems that make it easier to park and drive in heavy traffic.



“Congestion and gridlock is on the rise,” he said, adding that some people believe commuting can be more successful than their job, and the company wants to use technology to fix this.

One example is the GoPark app, which is a predictive parking system capable of directing drivers to streets where they’re most likely to find a space, and which will pilot in the UK.

FordPass, a “new customer experience platform”, will also debut this year in Europe. Features include a marketplace offering access to mobility services and partners; FordGuides who are able to help members resolve problems; and

“It is looking to transition from being an automotive company to an auto and mobility company”

FordHubs, where customers can experience new innovations.

Partners for FordPass include Mobile City, a mobile parking payment company.

Ericsson/Cisco partnership on track, insist execs

By Paul Rasmussen

The importance of the high-profile Ericsson/Cisco partnership was laid bare at the Swedish vendor’s press conference on Monday.

Hans Vestberg, Ericsson’s CEO, stressed that the agreement, which has only been operational for 74 days, was already gaining significant traction and had the continuous commitment from both companies.

Cisco’s chief strategy officer, Hilton Romanski, was more upfront, stating that with regard to the joint programme being a success, “our jobs were on the line”.

However, early results from the partnership would appear favourable. “We have around 200 active engagements worldwide with multiple wins,” said Vestberg. “We’ve achieved huge progress in a very short time.”

While not detailing these contract

awards, the executive confirmed they involved IP backhaul, data centre transformation and cable TV operations.

To illustrate the results of the partnership, Ericsson said its dynamic service manager, announced at the press briefing, was evidence of the joint collaboration and included intellectual property from the two companies. It combines Ericsson’s OSS technology with Cisco’s IP and optical knowledge to better manage

complex network services.

Separately, Ericsson announced it would extend its cloud transformation services and infrastructure portfolio by partnering with Amazon Web Service (AWS). This new deal will see Ericsson create a global team of technicians focused on the AWS Cloud and the opening of cloud innovation centres with customers, with Telstra being named as the first operator to become involved.

Vestberg also stressed that 5G was generating an enormous level of interest, but called for the industry to recognise the importance of agreed standards and interoperability.

Q Oettinger Cont. from P1

“These verticals are now at the centre of attention this year,” said Oettinger.

His comments came after he took part in a round table on Monday with leaders from the telecoms and automotive sectors, to discuss the future connectivity requirements for connected and autonomous driving.

“This cooperation is progressing well, mostly as a common technological and economic understanding,” he said.

“Today we discussed how a big

cross-sector deployment project could lead to a win-win situation on connected, automated and autonomous driving for both sectors – the telecoms and the car industry. This cooperation model for the automotive industry might become a blueprint for the telecoms sector also in the 5G context.”

Oettinger also welcomed the “timely” launch of a new white paper from the European Commission and the 5G Industry Association, titled 5G Empowering Vertical Industries.

He said it is necessary to involve these different vertical sectors in the 5G standardisation debates, in order to ensure that the different use cases are duly reflected in future decisions.

On 5G progress in general, Oettinger again expressed concerns that Europe is lagging behind other regions of the world, emphasising that “we Europeans have to do our job well”, such as harmonising spectrum policy and modernising regulation.

“We are definitely lagging behind but we are coming back to the

game,” he said. “The last two years have been quite successful. We are coming forward step by step.”

On a final note, Oettinger suggested that like South Korea, which plans to showcase its 5G services at the Olympic Games in 2018, Europe could also make use of a major event to showcase its 5G competence to its citizens.

“Maybe our European Football Championship in 2020 could be a good place to implement 5G and to demonstrate that 5G works,” he said.

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In an effort to minimise the environmental impact of our event, the GSMA promotes the usage of recycled materials and waste reduction wherever possible. Building on this commitment, we are now pursuing official Carbon Neutral certification of Mobile World Congress under the international standard PAS 2060.

Q Facebook Cont. from P1

“I can’t think of any other project that has had such a big impact,” said the Facebook CEO.

He also claimed that 50 per cent of Free Basics users, after using the service for a month, opted for a paid data package from operators.

Aside from Free Basics, Zuckerberg emphasised other aspects of Internet.org, plus his desire to cooperate with operators and other ecosystem players to work together to lower infrastructure costs for expanding internet access into difficult-to-reach places. This, he suggested, might feed into lower data prices for consumers.

Zuckerberg expects to ramp up tests of solar-powered drones, equipped with laser technology to provide internet access, starting later this year, and that he would be in talks with operators about ways to deploy them.

The Facebook CEO also flagged Telecom Infra Project, a newly-launched engineering-focused initiative from Facebook designed to bring together operators, infrastructure providers, system integrators and other tech companies to develop new approaches to infrastructure.

Sony debuts latest smartphones

By Steve Costello

Sony Mobile unveiled its latest additions to the Xperia smartphone line, called Xperia X, alongside a number of products designed to change the way users interact with technology.

The company said the X line “embodies Sony Mobile’s new brand vision through adding new layers of intelligent technology across popular and acclaimed Xperia features: camera, battery, and design.”

“There is still much more we can do to evolve smartphones. But do you really need smartphones that are full of additional functions that you never use?” Hiroki Totki, head

of Sony Mobile, mulled at the company’s press conference.

The new line includes three devices: Xperia X, Xperia X Performance, and Xperia XA, the last of which was described as a “super mid-range” device.

Xperia X and X Performance include a new “predictive hybrid autofocus” for the camera; and the line also includes smart battery management technology.

Xperia X Performance is powered by a Qualcomm Snapdragon 820 processor.

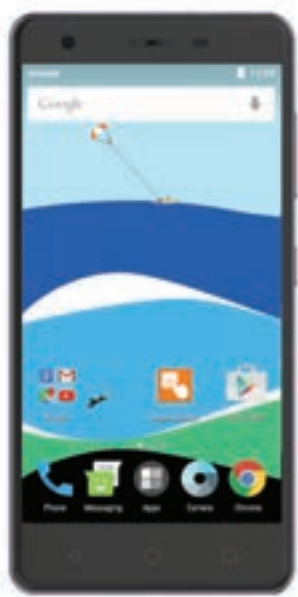
Availability is slated for “summer 2016”.

Also making an appearance were products described as “ambient connected devices”.

Rolling out later this year will be Xperia Ear, which the company said is a “next-generation wireless earpiece” powered by Sony’s voice technology. It enables users to make calls, perform internet searches, dictate messages and navigate to certain locations, pairing with a smartphone via NFC or Bluetooth.

The company also showcased “concepts” for products, with the aim of delivering machine learning, natural user interface and sensing.

This included Xperia Eye, a compact, wearable wide-angle lens camera; Xperia Projector, which would project onto a clear surface and respond to touch, voice and gestures; and Xperia Agent, a digital personal assistant powered by Sony’s voice technology.



Orange targets VoLTE and Voice over Wi-Fi; strikes Google partnership

By Kavitha Majithia

Orange today announced the launch of its first smartphone compatible with VoLTE and Wi-Fi calling, as it affirmed its intentions to roll-out the two services across its European footprint.

The majority of the operators’ customers will however have to wait to access both services, which have only so far been launched in Romania.

It said in a statement “it will undertake the necessary technical preparation and activate VoLTE in its remaining operations in Europe this year, and early 2017.” It has also earmarked a similar timeframe for Voice over Wi-Fi calling.

The Orange Neva 80 device, which will be available from April, will be priced at €200, and targets both the mass and premium segment of the market.

It will be the company’s slimmest smartphone available and will run on Android 6.0 Marshmallow.

Speaking to *Mobile World Daily*, Orange’s marketing deputy director, Guillaume de Riberolles said the Neva 80 was designed for customers “that want the best technology, but can’t afford the latest Samsung or Apple device.”

“We are continuing our devices story by providing enriched voice services across our European footprint and we believe it is now the right time for more countries to begin activating both VoLTE and Voice over Wi-Fi.”

In a separate update, Orange announced a new partnership with Google to provide its mobile customers across its EMEA footprint with “an all-inclusive digital communications package”.

Targeting growth in data services in the emerging markets, it will offer customers a bundled package of voice, SMS and data, in addition to a high specification smartphone, for a package starting at \$40 for three months.

Orange said its partnership with Google was intended to drive local content in the regions, build a local language ecosystem, and tap into 55 per cent of its customer base which does not use smartphones.

“We want to convert these people into data users,” added Yves Maitre, EVP for connected objects and partnerships. “Across the EMEA footprint we have seen data consumption increase rapidly, but parts of the population which is less wealthy cannot enjoy data. With this complete communications service, we hope to change that.”

5G to trigger disruption, claim industry leaders

By Paul Rasmussen and Ken Wieland

The next generation of mobile technology will be a key enabler for disrupting traditional business models, claimed a panel of senior industry execs on Monday.

“Complete business models are changing,” said Ralph de la Vega, vice chairman of AT&T. “Once we have data in the cloud there will be no stopping industries from disruption.”

Vega pointed to Airbnb and Uber as examples of new entrants having a significant impact on established businesses.

In future, 5G will have a much wider influence in areas such as real-time monitoring of IoT sensors, due to its low latency attributes.

Hans Vestberg, Ericsson CEO, reinforced this viewpoint: “2G, 3G

and 4G were very consumer focused in terms of usage models. 5G is different by being programmable for a very wide set of use cases, as well as providing huge efficiency increases.”

“We’ve tested 5G at 25Gbit/s on our test rigs, and now understand better the options available regarding use cases. Disruption is coming, but it’s only just starting,” added the Swedish exec.

Vega reckoned that 5G would start to be deployed in 2018. Brian Krzanich, chief executive of US chip giant Intel, agreed that “hardware and the fundamentals” would be established by that time.

Vestberg, however, thought it would not be until 2020-21 that 5G started to make traction. “We estimate there’ll be 150 million 5G subscribers in that timeframe, with some pre-standard

commercial networks arriving beforehand,” he said. “We don’t expect the standard will be set until 2020.”

As for the verticals that will see biggest disruption from mobile and wireless technologies, Vega pointed to healthcare. He gave an example of nano sensors injected into the blood to detect cancer cells early, combined with big data analytics to interpret the information. Vega asserted that cancer “would become a manageable disease before too long”.

Vestberg agreed that healthcare would see disruption, but perhaps more in the long term as the industry was so heavily regulated. He said the media industry, including the way TV is consumed, would undergo a greater upheaval in the shorter term.

Another disruptive and new opportunity, argued Krzanich, was for companies to manage large quantities of data generated by IoT sensors. “If you want to follow the dollars, it will not be in silicon but in big data analytics,” he said.



What should we do before 5G?



Guo Ping,
Deputy Chairman of the Board
and Rotating CEO,
Huawei Technologies Co., Ltd.

Fifth-generation mobile technology (5G) will bring about fundamental changes in the way society functions and how people live. But even the most innovative carriers won't use 5G commercially before 2020, and large-scale 5G rollout will probably take even longer.

So before 5G arrives, what should we do to capitalize on the opportunities emerging from the digital transformation of telecommunications and other industries?

THE FIRST THING TO DO IS TO INCREASE CONNECTIVITY.

By 2025, Huawei estimates that the world will have about 100 billion connections. Roughly 55% of them will stem from business applications such as smart manufacturing and smart cities, with another 45% coming from consumer areas such as smart homes, the Internet of Vehicles, and wearables.

Today, 99% of all equipment remains unconnected to the Internet. That will change, however, and as it does, we must improve connectivity by increasing the number of connections that can be supported.

The need for additional connections can arise from unexpected quarters – logistics and transport, for example. Long-distance shipping is made less efficient by the need to inspect shipments at multiple points along a journey.

Efficiency and security can be enhanced by adding a special connected lock to containers (and even small parcels). Integrated with GPRS, GPS, and RFID technologies, the lock monitors the geographic location and progress of each shipment and provides digital proof that the seal remains intact and the shipment has not been tampered with. This allows customs officers to wave the shipments through without opening them.

Such tracking and communications will work their way into nearly every corner of the commercial world, requiring very low power consumption, wide coverage, strong signals, and sometimes high-density connections.

Narrowband-IoT (NB-IoT) is the key technology for meeting these requirements. NB-IoT not only applies to long-distance marine transport, but also to areas such as urban logistics, supermarkets, and asset transfers inside companies.

THE SECOND THING WE MUST DO BETWEEN NOW AND 2020 IS SHIFT FROM BEING SUPPLY-DRIVEN TO BEING DEMAND-DRIVEN SO AS TO ENABLE THE DIGITAL TRANSFORMATION OF VERTICAL INDUSTRIES.

Traditionally, the ICT industry has been supply-driven rather than demand-driven. Today, we are seeing a marked shift from a supply-driven business model to one driven by customer demand. As this change occurs, industries will demand more from networks: more capacity, more bandwidth, less latency. To meet those demands, ICT providers must think carefully how to deliver a customer experience matching that provided by the best players in every industry.

Safe cities provide one example. Before they can build smart cities, governments need to build safe cities. Municipal officials must increase their ability to prevent crises, respond to emergencies, and make decisions quickly.

Video is a key part of any safe cities plan. The need for visibility and unified command will exert great pressure on bandwidth, since it is extremely difficult for mobile carriers to transmit large amounts of video data through their existing public wireless networks.

Yet bandwidth is only one of the demands of Safe City. Alarm handling and reception, broadband trunking eLTE, video surveillance, and intelligent analysis (of vehicle license plates, for example) are all key components.

Current public networks simply cannot meet all of these demands. Instead, private networks are often constructed. Future mobile networks may need to integrate high bandwidth requirements into public networks and use virtual private networks to provide services. These and other questions must be discussed with industries.

THE THIRD THING WE MUST DO BETWEEN NOW AND 2020 IS TO REDEFINE NETWORK CAPABILITIES. CARRIERS NEED TO ESTABLISH SOFTWARE-DEFINED ARCHITECTURE, ACHIEVE AGILE OPERATIONS, AND DEVELOP BIG DATA OPERATION CAPABILITIES.

To address the future needs of ICT convergence, we have launched the SoftCOM architecture to help carriers deploy software-defined networking, develop virtualized networks, and move networks to the Cloud.

To shift from a network-based experience to a service-based experience, we also need to use indicators that users can perceive directly. That means that, in addition to existing indicators such as bandwidth, latency, and call drop rates, we must add metrics such as minute-level service provisioning.

Compared with Internet services, it takes much longer to launch telecom services, creating a big gap in the user experience delivered by these two types of services. Last year, Huawei helped China Unicom address this issue by upgrading the carrier's business support system in Shanghai. As a result, its international bank clients can now subscribe to private lines and cloud services within 10 minutes.

China Unicom-Shanghai has also conducted trials in the use of Big Data, helping an outdoor advertising company identify patterns in foot traffic that allowed advertisers to optimize on-screen ads in real time. That particular trial has generated around US\$10m in annual revenue for China Unicom-Shanghai.

Based on one forecast, the total available market brought about by digital transformation will reach US\$15 trillion by 2025. But in order to capitalize on that opportunity, we need to lay the necessary groundwork before 5G arrives.

Facebook, Samsung commit to VR for the long term

By Kavith Majithia

Virtual Reality (VR) “can become the most social platform”, according to Facebook CEO Mark Zuckerberg, as he reaffirmed the company’s partnership with Samsung to drive VR forward.

Samsung used its annual Unpacked event on the eve of Mobile World Congress to showcase its VR capabilities after unveiling its two new flagship phones, the Galaxy S7 and S7 Edge.

The two devices were accompanied by a 360 degree camera, Gear 360, which the company said will “allow users to become the creator of their own VR content”.

In a surprise appearance at the Samsung event, Zuckerberg spoke of Facebook’s commitment to develop VR with the South Korean vendor, building on the company’s existing partnership to develop the Gear headsets through Oculus, the VR firm it acquired in 2014.

Specifically, he pushed Facebook’s vision of developing the service as a social platform, with 360 video, and Samsung’s new camera, integral to that strategy. The company also unveiled a new formal social VR team.

“While 100 million hours of video content is watched on Facebook, we see 360 video is much more immersive. You feel like you’re there,” he said.

“It’s still early days, but pretty soon, we’re going to live in a world where people have the power to broadcast live what we’re doing. Of course, to get there, there are a lot of complex technology challenges we need to address first. We see it as the next important computing platform, and we’re proud to be working on it with Samsung.”

The South Korean company said customers pre-ordering its latest smartphones will also get a free VR headset for a limited period of time, seemingly an attempt to gain more VR customers as it broadens its product portfolio in the space.

According to Ian Fogg, head of mobile analysis at IHS, the Gear 360 camera could indeed prove a “halo” product for Samsung in boosting more sales of the latest Galaxy smartphones.

He believes the device could be “critical to help Samsung persuade consumers it is time to upgrade their two or three year old smartphones, which cannot benefit from VR experiences”.

Post-AlcaLu Nokia looks forward to 5G, IoT

By Richard Handford

Nokia CEO Rajeiv Suri used the first major public event since the closing of the Alcatel-Lucent deal to update on the new entity’s progress, but he had an acquisition and a new IoT-focused investment fund to talk up too.

“Nokia is in a dramatically different position, it is unparalleled what we cover,” said Suri, laying out its areas of strength.

He also put to bed any suggestion that the combined entity’s fixed networks business was up for sale. “We have no plans to divest. Previously it was sub-scale, today it is profitable.”

Similarly, Nuage Networks, AlcaLu’s SDN business, is not about to depart either. “It stays and we continue to invest,” Suri confirmed.

“Just because we divested in the past does not mean we will do the same in the future,” he added.

On integration, he said new deployments of 4G will focus on the current Nokia. They are also developing a common public radio interface. Small cells are complimentary, he said. IMS is a Nokia focus while video and content is Alcatel-Lucent.

Later, during the Q&A, he confirmed there will be rationalisation in the portfolio, mainly in the mobile network

business, starting with radio access plus some of the core, as well as subscriber data management.

IoT and 5G are central to the new Nokia, and both received a boost from separate announcements. Suri said the vendor would “dramatically” increase 5G investment this year, without being more specific about figures.

To which end, Nokia Growth Partners announced the closing of a \$350 million fund for investing in IoT firms. The fund will invest mainly in the connected enterprise, consumer solutions, connected car and digital health, as well as enabling technologies with a focus on big data and analytics.

Next, Nokia plans to acquire Canada’s Nakina Systems, a security firm which specialises in both IoT and 5G, among other areas. The fee was not disclosed and the deal is due to close in the first quarter of 2016.

The Finnish vendor also unveiled the next generation of its Aircall Radio Access product, which the company described as “5G-ready”. Suri said the description means the equipment’s software can be upgraded to 5G when operators have the appropriate spectrum and licences in future years.

Also, during the Q&A he was asked whether the company still planned a return to the device market. He confirmed Nokia did but said: “We have no specific timeline and will explore this with the right partner. We think it is a good business model but there will be no manufacturing. We will license our IP.”

Yahoo urges caution around ad blocking

By Kavith Majithia

Yahoo’s VP of EMEA, Nick Hugh, said internet companies must “maintain respect for the types of advertising consumers will and won’t accept”, but urged operators to be “cautious” when it comes to adopting ad blocking technology.

“The digital ecosystem is a virtuous circle and while some operators might want to reduce costs by blocking ads, ultimately advertising helps drive uptake of all

products, mobile services included, so we would urge caution,” he told *Mobile World Daily*.

Hugh, who will appear in today’s Mobile Advertising: Ad Engagement and Ad-Blocking session, also pointed out that mobile operators “are among our biggest advertisers, and typically our discussions with them are about how to help grow their client base”.

For internet companies like Yahoo, the rise in ad blocking could prove a major issue, given its advertising based business model.

The company, like many others, has however been championing a strategy of ad betterment, intended to make advertising “as relevant and engaging as possible”, over an outright ban.

Hugh added that Yahoo still “believes ads can be part of an exciting, immersive experience that makes the internet better”.

“We empower our users to shape their ads to be as relevant and useful as possible by providing ad feedback directly within the ads on their page,” he added.

Hugh further urged publishers and advertisers to keep an eye on data and download times for their applications in particular.

“A notable reason why people block ads is because the size of it can slow down page load times, and its something we’ve always had, front and centre, with engineering teams dedicated to produce super-fast and slick load times.”



ZTE updates Blade smartphone line

By Kavith Majithia

Chinese handset player ZTE unveiled the latest iterations of its Blade smartphone series, announcing Blade V7 and Blade V7 Lite.

The company said the two devices “are designed to meet the needs of today’s smartphone users”. Blade V7 is equipped with a 5.2 inch full HD screen, is powered by an octacore chip, and is said to include an expanded Smart Sense intelligent gesture control.

Described as “slim and sleek”, the Blade V7 has a body that is 3mm thick at its thinnest point, with a 78.2 per cent screen to body ratio and “2.5D curved edge glass”.

It also has “4G LTE Plus” capability, 2G of RAM, and a front

and rear 13MOI cameras, and will initially be available in Germany, Spain, South Africa, Ethiopia and Mexico by the summer of this year.

The smaller ZTE Blade V7 Lite has a 5-inch display, HD screen, and comes with a fingerprint scanner, quick app launch and navigation. The Lite version comes with an 8MP camera, and will first launch in Russia, before wider availability in Mexico, Spain, Germany and Thailand by spring 2016.

“We’re proud to show off the Blade V7 and V7 Lite to the world, and we’re starting here in Barcelona,” said Jacky Zhang, CEO of EMEA and APAC, ZTE Mobile Devices.

“We know how important smartphones are to our daily lives,

especially for capturing those significant moments. Hence, we’ve designed the Blade V7 and Blade V7 Lite with that in mind.”

ZTE said more than 30 million Blade phones were shipped in over 50 countries worldwide by the end of last year.

“As overseas users have higher requirements for product quality, the success of the Blade is highly significant,” it added in a statement.

In a separate device launch at a press conference yesterday, the company also unveiled the latest version of its “smart projector”, Spro Plus. Placing it 2.4 metres away from any surface will project an image up to 80 inches across.

The device, which the company said can also work as a tablet,

comes with an 8.4 inch touch screen and 2K resolution, and also offers up to six hours battery life.

Waiman Lam, VP global mobile and technology, strategy and marketing ZTE Mobile Devices, said Spro Plus launch was part of the company’s drive towards “mobilising the big screen”.

“The Spro created a brand new category, the smart projector, and the industry has taken to the idea,” said Lam. “ZTE has been a pioneer in this space, and I’m very excited by the Spro Plus. Mobility is very important, and consumers clearly want the big screen experience.”

In the same conference, ZTE also announced a sponsorship deal with Sevilla Football Club, to become the team’s “official technology partner”.



Chris Bergey,
Vice President and General Manager of Mobile & Connected Solutions at SanDisk Corporation

What's in Store for Mobile in 2016

Are we at Peak Mobile yet? The point where the smartphone market is "mature" and we've got nothing to look forward to but incremental improvements and moderate increases in sales.

As I get ready for Mobile World Congress, the answer is: No. Not even close. The pace of innovation along with customer demand for greater performance and new experiences mean that mobile will remain one of the key drivers in technology. Don't forget: the camera phone was a questionable fad 15 years ago. Now more than a trillion digital images¹ get captured a year. Here's what to expect in 2016:

1. MEGA PHONE

In 2015, the typical premium smartphone came with 38.9GB of storage. By 2018, the typical capacity for premium smartphones will nearly double to 77.2GB, according to SanDisk Market Intelligence. The overall average, meanwhile, will rise from 12.1 GB in 2014 to 24.6 GB by 2018. Why? Phones are becoming the go-to device for a growing segment of customers. You're even seeing phones rival computers: the high-end iPhone already has as much capacity (128GB) as the entry-level MacBook Air.

2. THE NEED FOR SPEED

Besides capacity, manufacturers and consumers will start to concentrate more on the speed. With fast storage, you can capture 10 to 15% more images in burst mode or get better results with high-definition video. The latest embedded flash drives, for instance use predictive analytics to determine whether to load incoming (and soon-to-be captured) images into single-level memory cells for greater speed and responsiveness or go straight to "capacity" memory that hold three bits per cell.

You'll also see greater read/write speeds and transfer rates coming to memory cards and mobile memory.

3. UNREAL IMAGERY

Virtual reality, 3D photography and 4K Ultra HD will fundamentally change how we make and consume content: almost everyone that

experiences modern day VR is wowed. And the vast majority of users will first experience these new mediums through smartphones, or through systems that rely on smartphones. The idea that visual technology comes to the TV first is gone.

Accommodating these technologies will require changing the underlying architecture of devices. Processors and memory will have to function at a far faster rate. What's the point of making an HD phone when the video jitters? Many 3D photos need to incorporate multiple images and 3D models into a single piece of media, that then "moves" as you do. The hardware and software footprint for accomplishing this is far from basic.

4. THE INDUSTRY WILL ADDRESS THE ELEPHANT IN THE ROOM: NETWORKING

Global Internet traffic will grow by three fold over the next five years, according to some predictions². Users will begin to download high definition movies that could take up to 80GB. We will need much faster networks as well as edge devices that can store a video for neighbourhood or local download to cut down on traffic.

5. NEW FACES

Who was the fastest growing smartphone maker in the second quarter of 2015? Huawei, says Gartner³. China brands, particularly brands like Xiaomi, Lenovo and Huawei, will continue to shake up smartphone markets with new designs and new ways of selling directly to consumers.

Part of this is being driven by emerging markets, which accounted for 76 percent of all smartphone shipments in 2014 and will rise to 82 percent by 2020, according to SpecTRAX and PriceTRAX databases from Strategy Analytics. But many of these brands are expanding in Europe and North America. Check out ZTE's NBA sponsorships.

6. THIN IS IN.

You've seen ultrathin phones with new types of screens being demoed as concept devices for years. Soon, you're going to see them in greater numbers on shelves. USB Type-C™ devices will further cut down bulk by consolidating all external ports into a single, thin plug.



Photo credit: David Newton, SanDisk Extreme Team photographer. www.photopositive.co.uk

7. THE EYE IN THE SKY

Drones have sparked the imagination of entrepreneurs, consumers and large commercial users and adoption is happening faster than many anticipated. You are even seeing drones being used for professional filmmaking. But what are drones? Flying cameras that sometimes also have wireless connectivity. Thorny issues such as licensing and registration have to be worked out, but there's really no stopping the market. Drive capacities and cards will play a big role here in brining 4K Ultra HD to the skies.

8. YOUR SMARTPHONE IS SO JANUARY 2016

Consumers will turn in smartphones more rapidly than ever before. Repurposed smartphones are becoming a significant market. The market for refurbished phones is expected to grow from 53 million in 2014 to 275 million⁴ in a few years.

9. MEMORY CARDS TAKE ON A NEW ROLE

The number of phones with microSD™ card slots has actually been remarkably stable at 75 percent for the past several years, according

to Strategy Analytics. But in the near future, the use and versatility of microSD cards and slots will grow. Both Google and Microsoft have added OS support that let you use microSD card as primary memory.

10. YOUR SMARTPHONE WILL BECOME YOUR CONNECTING KEY TO EVERYTHING

The connected home, office, car, and city are happening quicker than expected. You're even seeing IoT take off in agriculture as a way to reduce water consumption and waste. Analyst projections are being increased all the time. And the lynchpin to all of these systems will be the phone. In the future, you literally won't be able to get around without one.

¹Josh Haftel, Adobe, December 2015

²Cisco Visual Networking Index, May 2015. ³Gartner Research, Aug. 2015.

⁴Global Telecoms Business, Feb. 2014.

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Telstra preps 1Gb/s launch for major cities

By Paul Rasmussen

Australian operator Telstra is to launch commercial 1Gb/s services in Melbourne, Sydney and Brisbane later this year. The company claims that it will be the first to offer this LTE Cat 16 network capability with compatible devices.

“Initially, the 1Gb/s service will only be available in major metro areas, but will expand in the future to cover more of the existing 3,000 LTE masts that Telstra currently uses,” said the operator’s managing director of networks, Mike Wright.

“Our technology roadmap will expand to include new features such as 4X4 MIMO to boost capacity and performance in densely populated areas,” added the executive.

The company confirmed that it was working closely with Netgear to develop a portable hotspot device capable of supporting the 1Gb/s speeds, but that the product would only become available towards the end of this year. The co-branded unit aims to support 20 connections with a battery life approaching 24 hours.

Wright added that Telstra was actively involved with testing 5G and announced that it would deploy a trial network in time for the Commonwealth Games in 2018.

Separately, Ericsson announced that Telstra would become the lead customer for its telecom cloud technology including network functions virtualisation (NFV) and software-defined networking (SDN). The company claims that this move will provide Telstra with a 5G-ready core and help its network scale to support IoT services.



Industry looks to reduce mobile gender gap

By Saleha Riaz

GSMA launched the Connected Women Commitment Initiative, with initial commitments from operator

members aiming to connect millions more women in low- and middle-income countries by 2020.

The aim is to support the United Nations Sustainable Development Goal to achieve gender equality and

empower all women and girls.

The work builds on projects that already see 15 million women benefitting from female-focused services offered by the GSMA’s Connected Women operator partners.

GSMA research estimates there are 200 million fewer women than men who own a mobile phone in low- and middle-income countries.

And even when women own a mobile device, they are far less likely to use it for more sophisticated services, such as mobile internet and mobile money, and therefore miss out on key socio-economic opportunities.

“Ensuring digital and financial inclusion for women is critically important, as when women thrive, societies, businesses and economies thrive,” said Mats Granryd, GSMA’s director general.

The first operator members to have made Connected Women Commitments in their markets include Dialog Axiata in Sri Lanka, Digi Telecommunications in Malaysia, Indosat Ooredoo in Indonesia, Tigo Rwanda and Turkcell.

Existing and future commitments include increasing the number of

female agents; improving the data top-up process to be safer and more appealing to women; and improving digital literacy among women through educational programmes and interactive content.

Tigo Rwanda, for instance, is committed to increasing the number of women using mobile financial services from 39 per cent to 45 per cent by 2020.

According to its CEO, Tongai Maramba: “Women take on a significant amount of responsibility for their families’ financial management, including emergency payments, remittances and daily domestic management; in fact women direct up to 90 per cent of their income to their families and communities.”

“Increasing women’s access to mobile financial services will in turn allow them to improve their quality of life, that of their families and that of their communities,” the executive added.

What’s more, the GSMA said closing the gender gap in mobile phone ownership and usage in the developing world could unlock an estimated \$170 billion market opportunity for the mobile industry in the period 2015-2020.

China Mobile’s connectivity underpins economic shift

By Richard Handford

China Mobile has a major role to play as the country’s economy transforms, according to Shang Bing, the operator’s chairman, speaking during yesterday’s keynote session.

“The Chinese economy is in a crucial period, it is moving towards a more sophisticated, complex model. It is important to improve competitive advantage. And mobile communications is playing an

important role. It is important for the industry to recognise these opportunities,” he said.

As China’s industry evolves, so does its demand for new kinds of information, which will come in areas such as healthcare and financial services. In turn this means more data traffic for China Mobile.

“We are entering a new era of connectivity,” he said, with more connections and higher speed services, eventually based on 5G.

Of course, the scale of what



underpins these shifts is vast, given that China Mobile runs the world’s largest 4G network and has 340 million subscribers on LTE. In 2015 alone, the number of subscribers added to the 4G network was 220 million.

Of course, as users adopt 4G their data consumption increases

dramatically. Last year, data traffic jumped by 150 per cent and became a major factor in the operator’s revenue growth. IoT is also a growing consideration.

“We also broadening our coverage and increasing access speeds and lowering tariffs,” said Shang.

SK Telecom kicks off 5G open trial initiative

By Joseph Waring

SK Telecom, KT, NTT Docomo and Verizon formed the 5G Open Trial Specification Alliance to develop specifications for early trials and commercialisation between 2016 and 2018.

The global initiative, driven by South Korea’s SKT, is intended to deliver an aligned specification to serve as a common, extendable platform for 5G pilot activity around the world.

It is focused on technical fundamentals and promoting a more inclusive open and

collaborative approach to 5G trials.

The Alliance will focus on 5G radio interface trial activities, and plans to provide the wireless industry with the ability to test and validate key technical components. Coordination is already underway, with technical trials expected in 2016-2018.

The four operators are joined by some of their (unnamed) key suppliers, and other industry participants are also expected to join.

Meanwhile, at Mobile World Congress SKT and Nokia are demonstrating over-the-air transmission speeds of 20.5Gb/s, which “is a meaningful achievement as it meets the performance requirement of 5G set by the International Telecommunication Union”, SKT said in a statement.

The two companies were able to increase the speed by improving the ‘channel coding’ technology, which

“A meaningful achievement that meets the requirements of 5G set by the ITU”

adds extra data bits to make the transmission of data more robust to disturbances on the wireless transmission.



Youn, Seok-am
EVP and Head of Media Business Division
SK Broadband

Inevitable Global Trend: Convergence of Telecommunications and Media

With rapid advancement of telecommunications technologies, the media industry is going through dramatic changes. Media consumption environment centered on television is shifting towards mobile and Internet as more than half of broadcasting content users are now consuming media service via PC or mobile screens. Moreover, instead of being satisfied with multitude of content delivered one-way from content providers to consumers, people are increasingly demanding more personalized content offerings that reflect each individual's needs, preference and network environment.

While many Over-the-Top (OTT) players including Netflix are adding extra tension in the market by expanding their global footprint, the existing TV operators and telecommunications service providers are jumping into the OTT market to provide content over mobile/fixed networks. They are not only providing customized content, but also actively promoting Multi Channel Network (MCN) business by creating content by themselves or supporting one-person content companies.

Increased use of broadcasting content via mobile can also be seen from the mobile data usage trend. According to Cisco Visual Networking Index: Forecast and Methodology, 2014–2019, global mobile data traffic will increase by a compound annual growth rate of 57 percent to reach 24.3 exabytes per month in 2019, representing a 10-fold increase compared to year 2014. More importantly, mobile video traffic, which has already exceeded 55 percent of global mobile data traffic in 2014, is expected to reach 72 percent by 2019.

Against this background, telecommunications service providers are actively pursuing integration with media companies. Globally, there are an increasing number of mergers and acquisitions between a telecommunications

network operator and a media company, including AT&T's acquisition of DirecTV in the U.S., Telefonica's purchase of Canal + in Spain, and KDDI's acquisition of J:COM in Japan. Such trend of mobile-TV convergence is bringing a sense of crisis to the pay TV industry. Thus, acquisitions and mergers between a telecommunications company and a media company also meet the interest of pay TV companies who are striving to overcome current challenges. In Korea, SK Telecom, which provides IPTV service through its subsidiary SK Broadband, has recently decided to acquire CJ Hellovision, the nation's No. 1 cable TV service provider. Building on its expertise in mobile network service and infrastructure, SK Telecom expects the deal to help it secure a new growth engine through an enforced media platform.

Upon achieving economies of scale through convergence of telecommunications and media, telecommunications companies will be able to expand their business scope to media business including content production, distribution and delivery, and benefit from strengthened competitiveness. Besides securing an expanded content pool through integration, they can also choose to produce attractive content through bold investments. They will not only secure strengthened competitiveness in terms of content sourcing,

but will also be able to provide personalized content service that satisfies each user's needs and preference through the application of sophisticated analytics technologies. Users, of course, will be able to enjoy seamless provision of content anytime, anywhere on multiple screens including mobile and PC.

Here, it is important that companies offer value that goes beyond a 'mere provision of multitude of content.' With a long-term perspective, they must achieve evolution of both telecommunications and media infrastructures so as to provide consumers with a new level of experience. For instance, instead of taking a one-size-fits-all approach to their bundled packages, the operators should allow users to decide what service and content they wish to bind. They also need to upgrade the quality of broadcasting content from standard definition to high (or ultra-high) definition and develop content applied with futuristic technologies such as Augmented Reality (AR) and Virtual Reality (VR) to provide users with a differentiated experience.

Furthermore, sophistication of mobile telecommunications networks will be pursued in order to support seamless streaming of large-volume contents. In particular, with the arrival of the 5G era marked by Gbps-level speeds and ultra-low latency, we will witness a dramatic improvement in the content and service quality along with increased number of content and service channels. In other words, convergence of telecommunications and media will lead to a virtuous cycle where advancement of media platform will promote sophistication of telecommunications infrastructure, and vice versa.



"it is important that companies offer value that goes beyond a 'mere provision of multitude of content.'"

Doro updates device line

By Steve Costello

Senior-focused device maker Doro updated its smartphone and feature phone lines, which will also see the wider rollout of its Connect and Care service.

The company's new smartphone, Doro 8030, features a "unique and revolutionary" user interface designed to focus on actions.

"Effectively it's like a really easy mode of Android. It has big icons, it makes the most used icons available to you, it simplifies the menu structures, to make the smartphone very simple," Chris Millington, managing director at Doro UK and Ireland, told *Mobile World Daily*.

Doro highlighted research which said that smartphone ownership among seniors is now nearing 40 per cent, and this figure will continue to increase through 2016, with 60 per cent of those aged 65+ intending to purchase one at next upgrade.

But the company is not turning its back on the feature phone segment.

"Just because the feature phone market is declining, it doesn't mean ours is. Because obviously the senior

"Just because the feature phone market is declining, it doesn't mean ours is"

market is different, and those that don't want a smartphone, don't want a smartphone," Millington said.

The company announced three 3G feature phones, 6520, 6525 and 6530.

The line features a clamshell form factor, with the two highest spec devices featuring an external display. And the senior focus of the feature phones does not mean that online services are out – Facebook and Twitter support are on board, along with email client and web browser.

The top device, 6530, also includes GPS, meaning it can support Doro's Connect & Care service – described as a "widely accessible first step toward a truly mobile consumer telecare offering".

The service allows a network of friends and family to be contacted when the user needs help – for example with shopping or transport.



Enterprises show growing appetite for small cells

By Anne Morris

Two studies show evidence of growing interest in small cell technology among enterprises, highlighting a promising opportunity for operators in the area of in-building mobile coverage and services for business users.

The Small Cell Forum said enterprise specialists Nemertes Research found 60 per cent of 500 enterprises surveyed across 17 sectors expect to have deployed

small cell technology by the end of next year.

In addition, forecasts from analyst firm Mobile Experts indicate that shipments of enterprise small cells are set to double during 2016, with a sales growth spike of 270 per cent expected for this year.

Enterprise small cell shipments are expected to be worth \$4 billion annually by 2020.

The Small Cell Forum said the results of the two reports highlight "a major and growing market

opportunity" for operators to sell business services and solutions based on small cells.

Robin Gareiss, president of Nemertes Research, said his company's research "clearly indicates" that enterprises want "high-quality mobile capabilities", whether inside their offices or on the road.

"Improving the quality of mobile voice and data is crucial to that goal, leading many to deploy small cells and learn more about the benefits of the technology," he said.

The research released by the Small Cell Forum this week also showed that 13.3 million small cells have now been deployed, with more than 3 million shipped in 2015 alone.

Non-residential small cells accounted for almost 40 per cent of shipments last quarter, and small cell revenues topped \$1 billion for the first time in 2015. Interestingly, non-residential small cells represented 65 per cent of revenue.

ZTE to commercialise pre5G in 2016

By Anne Morris

ZTE expects its so-called "pre5G" technology to go into commercial operation by the second half of 2016, with China Mobile set to be the first operator to use the vendor's pre-standard 5G base station.

China Mobile carried out pre-commercial tests of ZTE's pre5G technology on its network in 2015.

Also described by some as 4.5G, pre5G is marketed as an intermediate step between 4G and 5G, adding in elements that improve the performance of existing 4G networks by several times. According to ZTE, these include massive MIMO (multiple-input multiple-output), 5G MUSA (multi-user shared access) and ultra-dense network (UDN).

Speaking at a media event at Congress on Sunday, ZTE VP Zhang

Jianguo said the China-based vendor spent 2015 carrying out further research into the pre5G base station. The pre-commercial version was launched in March last year and demonstrated at MWC2015.

Zhang noted that massive MIMO is one of the major 5G technologies. He said the general strategy of ZTE is to introduce different elements step by step and eventually integrate them into 5G.

Q&A

Wilko Stark,
VP strategy, Mercedes Benz Cars Product
Strategy & Planning, Daimler



The Road to Connected and Autonomous Cars

Hall 4 – Auditorium 5
Tuesday 23 February, 15:15

What is Mercedes' role in developing connected/autonomous cars as a concept? How can connecting a car help with the overall driving experience?

An autonomous car will most likely become a third place where people will spend a good amount of time next to their living space and their office. Personal space and available time are scarce already and will become even more so. Hence, having a personal space in which I do not need to drive myself if I don't want to will be by definition luxury – exactly what we have always offered.

Could autonomous cars/technological advancements in vehicles one day impact the demand for fuel?

An autonomous car will use less fuel on a given route than a human driver on the same route, as it can allot just the right amount of energy that is needed.

How can the development of the connected car help with common problems involved with cars, such as pollution, traffic and congestion?

Efficient individual mobility is a key factor for preserving economic power and protecting the environment. In Germany alone traffic jams cause macroeconomic costs of more than €17 billion each year.

Preventing traffic jams can save numerous litres of fuel and avoid emissions. Car-to-X technology (also known as V2V technology) helps to prevent traffic jams. And Mercedes-Benz is the first auto maker to put Car-to-X technology on the roads – within our all new E-Class.

When do you believe autonomous cars will become widely available to the mass market?

We will see the first conditional automated cars in the market by 2020. In any case, it is a gradual, evolutionary process depending not only on technological progress but also on societal acceptance and political support.

In terms of technology, does Mercedes Benz see autonomous/connected cars as the most revolutionary thing to happen to the industry so far?

We strongly believe that the best time of the car is still ahead of us. As technological possibilities rise continuously, we are encountering new degrees of freedom concerning the overall design of a car. Just look at our concept car "F 015 – Luxury in Motion".

IT'S
NOT
ABOUT
THE PHONE
MAED
www.maedtechnology.com



Huawei announced the global commercial deployments of LampSite 2.0, leading indoor network digitalization to new stage

Huawei announced that LampSite2.0, a new generation indoor digitalization solution, has been achieved commercialization with global operators jointly at the Mobile World Congress (MWC) 2016. This solution provides a number of cutting-edge features, including supporting for on-demand concurrence of triple frequencies, software defined radio, and dynamic capacity provisioning, distributed MIMO, licensed assisted access (LAA), which leads indoor network digitalization to new stage. It marks a new important breakthrough of indoor mobile broadband industry, after Huawei awarded the "best mobile infrastructure" with LampSite at MWC 2015.

In the past years, with the development of 4G network, more and more stadiums, transportation hubs, shopping malls, and exhibition halls has upgraded their indoor network with LampSite globally. Downlink speed per user in Dubai mall which is the world's largest shopping mall, can achieve over 90Mbps after deploying LampSite solution. This record is broke with 251Mbps using LTE carrier aggregation technology in LampSite in the world's most expensive hotel Singapore Marina Bay Sands. Since the potential demand is unleashed, the average traffic per day is attracted to LampSite as 11 times as traditional DAS. In Beijing's most famous landmark China national stadium, deployment of LampSite inspired 243GB traffic at the opening day of IAAF world Championships Beijing 2015. In Beijing international airport, monthly data traffic has grown up to 27 times with improvement of user experience by LampSite. In Kunming international airport, customer complaints are reduced significantly by deploying LampSite. MBB experience in Zhengzhou Railway Station which is the largest transport hub in China, has seen significant improved since it covered with Huawei's LampSite solution. This solution fully unleashes the long pent-up traffic demands. The monthly traffic is increased as 340% as before. It is estimated that operators can earn back the investment just within two years. LampSite is commercially deployed in over several hundred of worldwide landmarks including the largest shopping mall in Thailand--Center World, the largest shopping mall in Qatar--Villaggio Mall, the largest airport in Indonesia--Jakarta airport etc. Indoor digitalization solution has been becoming the best choice of global operators to win the high data traffic area.

Additionally, LampSite was chosen by Fira Gran in MWC 2016 to upgrade DAS network in hall 1, hall 3 and hall6. It is obvious that the 4G network of Fira Gran performs a totally new look. Even at the peak time, the attendance can still access and share HD video with YouTube smoothly. Furthermore, Service Anchor is deployed based on LampSite network in Fira Gran which provides the convenient digital mobile service to the attendance of MWC2016. As entering the exhibition hall, the indoor positioning and navigation is served with the APP on cellular phone, but also the push of the introduction of booth as approaching.

Indoor coverage has always been an important element that boils down to user experience. In today's MBB era, 80% or more of all network traffic is generated indoors, an important fact that puts indoor coverage at a prominent place. Increasing data traffic burst effect and tide effect make it impossible for Macro outside-in and analog DAS to cope with higher and higher indoor capacity demand.

As the representative of Indoor digitalization solution, LampSite overturned the design concept and technical architecture of traditional analog DAS. It redefines the network construction standard of indoor mobile broadband network by three important digital upgrade: architecture, O&M, Service capability.



DIGITAL ARCHITECTURE:

In analogue indoor network architecture, signal source devices are centrally deployed and indoor networks use massive passive devices, creating strong interference and insufficient network capacity, making it difficult to expand. In digital indoor networks, radio frequency (RF) digital processing units are extended to network end nodes to significantly reduce interference and improve MIMO performance. Support for the software-defined band solution allows for on-demand deployment and capacity expansion.

DIGITAL O&M:

Black-box management under the analog system architecture is replaced with visualized O&M on the entire indoor network, making implementation of node-level accurate fault and traffic monitoring at an even higher efficiency, a reality.

DIGITAL SERVICE CAPABILITY:

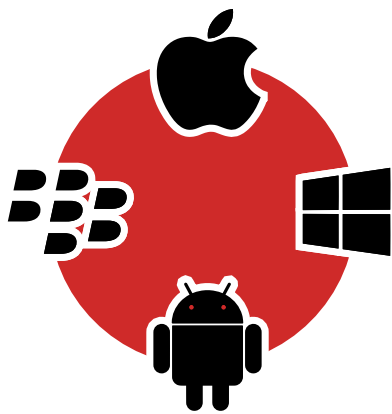
Analogue indoor networks are mainly intended to satisfy coverage needs and provide voice services. Digital, indoor networks are added with superb capabilities to offer data services and meet demands for increased capacity. Through convergence with fixed networks and optimization of local services, the service experience of enterprise applications can be improved remarkably.

In addition to retaining openness and scalability of digital network architecture, Huawei LampSite 2.0 goes further, to support a series of key features in a single RF unit, among which include software-defined bands, on-demand concurrence of triple frequencies, end node level cell splitting, distributed MIMO, convergent WiFi and smoothly evolution to LAA. It boasts on-demand capacity provisioning and cell edge resource coordination, indispensable functions to delivering greatly improved service experience in diversified indoor scenarios. This solution helps achieve accurate monitoring of all nodes on the entire network to guarantee network quality and service experience. This solution also allows for first time success with network deployment and consistent evolution of the initially deployed networks to meet service requirements well into the future.

According to analyst agency predict, the global shipment of indoor digital solution is expected to exceed that of analog DAS in 2016. The successful commercialization of LampSite2.0 accelerates the upgrading progress of indoor network digitalization which it keeps improving user experience and operator competitiveness, and leads to a better connected world.

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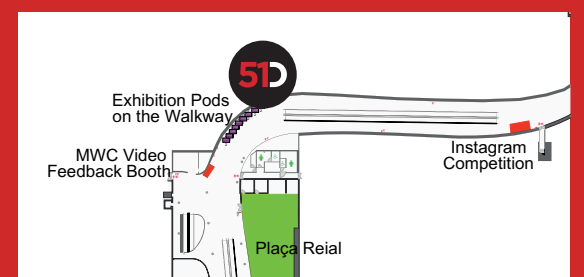
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Stand UW 7.6 Upper Walkway between Halls 7 and 8



Implementing heart rate variation measurement in a wristband: a small, robust and accurate optical solution

Monitoring the behaviour of a person's heart reveals valuable information about their health, lifestyle and even emotional state, as well as the early onset of heart disease. In a medical setting, this monitoring can be performed with dedicated equipment: heart patients in a hospital, for instance, are routinely fitted with an electro-cardiogram (ECG) chest strap. This device accurately records the electrical pulses emitted by the heart muscle as it contracts with each heartbeat.

An ECG chest strap, however, is cumbersome, uncomfortable and expensive, which restricts its use to medical settings and high-end sports equipment. This means that continuous, 24/7 heart monitoring is not today readily available to consumers outside the confines of a hospital. But how can we make it possible to capture ECG-like data about heart rate variability in a convenient, easily wearable device?

This was the question that ams set out to answer with its new AS7000 bio-sensor, an optical module which is small and thin enough to fit in popular wearable form factors such as smart watches and fitness bands. Highly integrated, the AS7000 enables designers to realise a simpler, more comfortable and cheaper implementation of HRM in a wristband than previous systems using multiple discrete components.

MEDICAL VALUE OF HRV MEASUREMENT

In heart rate monitoring, the primary measurement is the average heart rate called HRM, normally expressed in beats per minute. An important secondary measurement is the variation of this rate within a sampling interval, known as heart rate variation (HRV). The pattern of a person's HRV is strongly affected by factors such as their emotional state, heart health, and sleeping state, so HRV measurements are valuable to those interested in long-term lifestyle and health monitoring, as well as to clinical applications.

The ECG method of measuring heart activity via electrodes on the body senses the electrical stimulus generated from the central nervous system to make the muscles inside the heart contract. By measuring the interval between each electrical pulse, an HRV reading can be captured. As the heart beats, a pressure wave ripples through the blood vessels. This wave slightly changes the diameter of the blood vessel. This enables the implementation of an alternative method of HRM, called photoplethysmography (PPG). The principle of PPG is that the contraction and dilation of blood vessels at each heart beat affect the transmission of light (for instance through the fingertip in transmissive PPG) or the reflections of light (for instance from near the surface of the wrist in reflective PPG). PPG measures the pulse rate and pulse rate variation (PRV), rather than the electrical activity directly at the heart. Nevertheless, both PRV and HRV quantify the fluctuations of a signal over time, and medical research shows that HRV and PRV have a very close correlation.

Reflective PPG, then, enables the implementation of pulse rate and pulse rate variation measurements in a wristband. This is the application for which ams' AS7000 biosensor was developed: it is a module combining two LED light sources, a highly sensitive photo-diode



(light sensor), an analogue front end (AFE) for signal conditioning and amplification, and a small embedded processor which converts the raw reflected light signals into digital pulse rate measurements.

The spike in an ECG signal is called an R-wave. To measure heart rate variability, the sensor measures the time between the peaks of the R-waves (called RR intervals). To measure PRV, the peak-to-peak interval must also be timed. However, the peaks in the PPG waveform are shallower and flatter, and are therefore more difficult to measure accurately, even under stationary (relatively low noise) conditions. Noise in the form of motion artefacts is very difficult to distinguish from PPG peaks, and so movement makes PRV measurement even harder to accomplish.

In the setting of a wristband, motion artefacts can be generated by even very slight movements. For instance, finger movements that stretch or contract the tendons below the wristband's photo sensor have a marked impact on the PPG signal. In addition, any movement of the wristband itself will slightly change the pressure of the sensor on the skin. As a result, a wristband can only reliably capture PRV measurements during sampling intervals when the user is completely still.

OPTIMISING THE ELECTRICAL, OPTICAL AND MECHANICAL DESIGN

A wristband based AS7000 biosensor benefits from ams' low-noise and high-sensitivity analog expertise. The AS7000 biosensor comes with unique design techniques such as modulation and demodulation of the LED output, combined with amplifiers optimised for the modulation frequency; this reduces noise without greatly affecting power consumption. The AS7000 biosensor also includes filters to reduce the sensor's bandwidth, again to remove noise.

The biosensor also comes with detailed guidelines for the opto-mechanical design of the whole system. These comprehensive guidelines address the design and materials of the wrist strap and the overlay on the base of the device. The goal is to achieve a tight comfortable fit in order to couple the device closely to the user's skin. These guidelines ensure that motion-induced noise is kept to a minimum. Finally, ams supplies the algorithm for converting the PPG signal into a set of PRV peak-to-peak times, running in the AS7000 biosensor. An I2C interface to the host provides the PRV times in milliseconds. In other words, the AS7000 provides a complete hardware and software solution for PRV measurement in a wristband.

A wristband using the AS7000 may be worn 24/7 to provide PRV results comes very close in accuracy to the HRV measurements captured with a gold standard ECG device, and as clinically valid according to the Bland-Altman analysis. This means that a convenient comfortable wristband may be used to provide the PRV indicators for, for instance, stress levels or sleep quality. This opens up a new field of applications for the end user, benefiting from the innovations in the AS7000 biosensor to provide reliable, accurate heart rate measurements as a natural and convenient part of everyday life.

ams Hall 6 Booth 6E20

4YFN

CONNECTING STARTUPS

Nokia hails time of machines

By Marlene Sellebraten

If you are a Star Trek fan, then 5G-powered Internet of Things (IoT) and Virtual Reality (VR) should fulfill some of your dreams.

During a fireside chat at 4YFN, Marcus Weldon, CTO at Nokia, described a future IoT that has the ability to create fictional VR facilities reminiscent of Star Trek's holodeck experiences.

Low latency, interactivity and new visualisation techniques will be key to the future of telecoms services, he said. And 5G is happening faster than anyone had predicted.

"We have been talking about 5G in 2019-2020. It is coming faster than that because of software defined networks (SDN) and network function virtualisation (NFV). [Thanks to these] we can experiment with new software loads not tied to the hardware. We can try more dynamically in the market," he said.

Because software is now in the cloud, separate from hardware, the telecoms industry's pace of innovation and testing is improving, according to Weldon.

"We are getting faster as an industry. We are now looking at annual or [bi-annual] upgrades," he said.

If LTE was about having a faster 3G, 5G is about creating the Star Trek holodeck, he said.

"It is a different world we are going to create this time; it is a time of machines. IoT is not about consumers, it is about instrumenting our world so that industries are a lot more efficient. That stuff is going to change our world," he said.

Among possible use cases, in particular using VR, he stressed the potential to remotely control things, for example for remote surgery, interactions with a factory, piloting drones or visualising a holiday.

Looking at the first consumer iteration of IoT, such as pulse wristband and smart watches, Weldon considers them as precursors of things to come. He believes IoT's real coming-of-age will be of industrial nature though.

"IoT [will be about] industrial grade platforms rather than best-effort consumer-grade."

Microsoft Ventures wants to help startups scale

By Marlene Sellebraten

The number of accelerators is surging around the world, making it potentially harder for accelerated startups to attract investment and, ultimately, succeed.

Too many accelerators risk weakening the whole idea of startup acceleration, warned Zack Weisfeld, general manager at Microsoft Ventures Accelerators, during a keynote at 4YFN on Monday, where he presented a new accelerator concept, the Scaleator.

The model aims to help startups scale up from a minimum viable product (MVP) to a minimum viable company (MVC). Microsoft proposes here to leverage two things in particular: its wide network of corporate customers across all industries and the partnerships the company's accelerator programmes have access to around the world.

"It is the best time in history to start a company and the hardest time in history to be successful with

a startup," he said.

"Lots of companies start this way: they have an idea, then they join an incubator to make the idea more solid, then they join an accelerator and then there is the Series A funding crunch. It is getting harder and harder because there are more and more companies coming out of accelerators," he said.

The Scaleator can also be seen as a way for Microsoft Ventures to make itself more attractive as competition for the best startups intensifies among the broad range of accelerator programmes.

Microsoft Ventures launched its first accelerator programme in Tel Aviv in early 2012 and added programmes in Bangalore, Beijing, London, Paris, Berlin and Seattle.

In total, 454 companies have participated, raising a total of \$1.8 billion with a funding rate of 81 per cent. On average, each startup raised \$4.9 million. 29 of them got acquired and three chose the IPO road.

Microsoft Ventures receives 1,000 applications every year and accepts about 2 per cent. The investment company has got every reason to be pleased with these results, yet Weisfeld believes today's market requires a different type of accelerator in order to help startups jump over the series A crunch.

"We found that startups really need help with go-to-market, with access to customers, with access to tier-one investors... and also needed a pretty good process to manage the maturity and how to grow from founders to CEO," he said.

Mobile has power to tame transaction fees – PayPal CEO

By Joseph Waring

For billions of people across the world, even the simplest financial transactions can be either extremely time consuming or very expensive, which PayPal president CEO Dan Schulman said is "just crazy" in a world of high mobile and smartphone penetration.

In his keynote at Mobile World Congress, Schulman said: "We have the ability to make these transactions easier, faster, more secure and most importantly less expensive, which can make a real difference in the world."

Those outside the financial system spend about 10 per cent of their disposable income on unnecessary fees and interest charges, which is the same percentage that a typical family spends on food.

"We should blow through the paradigm that it's expensive to be poor. Our creed should be that managing and moving money should be a right of every citizen, and not just a privilege for the affluent," he said.

Schulman said that democratising money is an even bigger trend than the digitisation of commerce, the second huge trend that is defining the future of mobile.

PayPal is expanding its consumer platform because people are asking for more types of funding.

Consumers, he noted, have said they don't want to have to buy a prepaid card just to put cash on the PayPal platform. It now allows them to put some of their salary directly on the platform, cash cheques onto the platform and use peer-to-peer services.

These moves and its partnerships within the financial services ecosystem are designed to make

GV stresses commitment to Europe

By Marlene Sellebraten

Rich Miner, investment partner at GV, formerly known as Google Ventures, stated at 4YFN on Monday that the company is doubling down on Europe.

GV's commitment to Europe has been questioned since it became known in December 2015 that Alphabet's investment arm was to discontinue its dedicated European fund.

"We are not looking at it as shutting down Europe. We have a strong European team... We are definitely here in Europe with our global fund," he said.

Folding its European fund back in its global fund was also a way to provide incentives for the company's US team to invest in the continent, he added.

However, Miner also acknowledged there had been some attrition in the European team following the closing of the fund.

Started in 2009, GV's investments have included a number of seed rounds, but the company is now looking primarily at later stage investments.

"We wanted to establish our brand and a way to do that was to go out and write a lot of small cheques. It is clearly the case now that we are looking for opportunities to write some larger cheques. But we are still doing seed deals," Miner said.

GV recently led a \$60 million round in Kobalt Tunes, a London-based platform that helps music



rights holders collect royalties more efficiently from a variety of digital music services. GV is also an investor in Nexbit, the maker of Robin, a cloud-based Android phone.

Music and hardware are only two of many sectors GV is focusing on. Other industries of interest include health and life science, Artificial Intelligence and Virtual Reality (VR).

GV has already made five bets in the latter. While a believer in the transformational power of VR, Miner thinks the market should nevertheless temper its expectations.

"VR is at risk of being a little overheated and we should consider the impact VR will have on user interfaces," he said. "Will it be part of our everyday life? No. But will it have an impact? Definitely. In the business world, we will see more augmented reality, and in the entertainment space more VR."



mobile phones "the central point of consumers' financial lives".

An example of this is an app it recently rolled out in 145 countries and in 27 languages. This not only uses biometrics on Android and iOS for authentication and security, but positions PayPal to go into a full omni-channel solution, he said.

Starting with Vodafone in Europe,

customers can use their PayPal wallet for online and in-app check out, and later this year it will offer NFC capability in the US and Australia.

It will also allow users to check out with multiple POS options, such as barcodes, QR codes, beacons and NFC because it recognises merchants have different technology considerations.

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Terry McCabe
Mobile Division CTO
Mitel

Verticals: At the End of the 5G Rainbow

Service providers around the world are moving to 4G LTE networks, gaining spectral efficiency and realizing cost savings as they support the exploding mobile data demands of today. But 74% growth in global mobile data traffic in 2015, coupled with M2M/IoT, means there will be 11.6 billion mobile-connected devices outstripping the number of humans on the planet by 2020 (Source: Cisco).

The pace of change in how we communicate, the expanding capabilities of the devices available to us, and the aggressive innovation embodied within non-traditional services in the internet are fundamentally changing many business models. Voice and SMS have exploded into real-time collaboration, document sharing, mobile video chat, smart wearables, and augmented reality.

Mobile networks that have traditionally provided access as the service to consumers are now enabling connectivity to a wide range of services delivered to and from smart objects, connected vehicles, cloud applications, and - of course - people (whom we hope have always been smart!).

THE CHALLENGE AND OPPORTUNITY OF THE INTERNET OF THINGS

The Internet of Things is the ecosystem of physical objects, devices, vehicles, buildings, and all kinds of other objects that embed electronics, software, sensors, and network connectivity. As a byproduct, these objects collect and exchange vast quantities of information, generating a wealth of actionable insights made available through big data analytics.

The Challenge: To support billions of highly connected devices, a network infrastructure is needed that not only is highly scalable in terms of its capacity, but can also optimally handle the differing service needs of various IoT verticals. Latency, bandwidth requirements, scheduling of consumption, and service priority are widely variable for these IoT applications, so a "one size fits all" broadband network does not align well. Today's IoT applications shoehorn themselves into existing 4G LTE and Wi-Fi networks, but this is the early-adopter era; for mass adoption, we need a more adapted and suitable solution.

The Opportunity: To create a network platform that supports a diversity of potential use cases called logical network *slices*, which will enable optimized experiences of the network to be made available to specific services. This approach takes the idea of virtualization as applied to the data center in the development of cloud services, and applies it to the radio network. Thus, slices of the radio network can be associated with specific services and can exhibit specific characteristics of latency, bandwidth, and security.

The 5G slices of network spectrum can be logically applied to vertical segments for IoT/M2M purposes.

Just as virtualization enables resources within a data center to be partitioned and dedicated to specific applications, the 5G network slices allow the same infrastructure to address things such as IoT data collection, mission-critical real-time inter-vehicle control interactions, or medical information, emergency, or government services. Further, this transition also sets the stage to leverage traditional enterprise features and applications such as skills-based routing to tie IoT capabilities back into more personal, more intelligent responses. To do this, the network service architecture needs to be carrier grade and secure, scalable, and elastic to match these expectations.

MAINTAINING CARRIER GRADE

Today's IoT is often presented as "toys" or simple elements of home automation or fitness monitors that are Wi-Fi based. The communication services or experiences associated with these applications are typically implemented Over the Top (OTT) of broadband connections on a "best efforts" basis. For early adopters and un-stressed networks this is a satisfactory solution, but in the future this will not be the case.



The mobile cloud-based IoT of 2020 will be embedded in the critical infrastructure of smart automobiles, smart healthcare, smart power distribution, and smart cities. The integration of the service platform with the connectivity solution will be a key area of focus for the mobile network provider.

THE ROLE OF THE NETWORK PROVIDER EVOLVES

In this new network paradigm of 5G, voice, video, and messaging can become embedded in a vehicle, incorporated into a smart home infrastructure, or offered through a wearable.

In some of these cases, the network provider will continue to host the service, but in the case of specific enterprise use cases, there is no reason why the service cannot be hosted in the enterprise cloud. Today, 4G LTE prioritizes carrier voice traffic (QoS implementation). With network slices and increased granularity of policy control, the 5G networks will be able to offer a wide variety of QoS to different network consumers.

This model would allow the enterprise to become an operating service domain for communications (the private virtual network operator, or PVNO) with the benefits of extended services tuned to the needs of their business, integrated with their business processes, and using the native communications capabilities of a wide range of available devices.

CONCLUSIONS

We face a future where the role of the network will become increasingly central to everything that we do, and communication services will be implicit in the widest possible range of activities. Traditional telephony will become absorbed into this world of embedded communications; however, the reliability and security of those communications services will need to match or exceed traditional standards.

The network provider will be just one of the providers of communications services in this world, and in many cases will use the slicing technologies of 5G to allow the Network as a Service (NaaS) to be directly monetized.

The commercial models and differing service attribute requirements will necessitate a Distributed Hybrid Cloud model that balances the efficiencies, placing resources at the network edge with the effectiveness of centralized control and operation. Finally, in 5G deployments, there will be an initial focus on the use cases which are closest to traditional carrier business models, such as increased bandwidth broadband access to address ever-growing appetites for video content. However, the really transformational use cases will be driven by other ecosystem participants. Embracing these new business models where third-party service elements may operate within the network operator's network edge data centers will create many challenges and opportunities.

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Yifat Kafkaki,
Marketing and Business Development Evangelist for Big Data Analytics, Amdocs

Delivering a Data-Empowered Customer Experience

"War is ninety percent information"
- Napoleon Bonaparte

The famous French leader didn't live in the information age, yet he believed that much of his military success was due to having the right information. This paradigm is just as relevant today, if not more, as it was two centuries ago, and holds true for the business world. As service providers battle for a competitive advantage in a fast-moving and challenging market, data is crucial to their success.



Recognizing this, many service providers are actively investing in big data infrastructure and analytical tools in order to collect and analyze their data. However, service providers would be wise to keep in mind Benjamin Franklin's sage advice: "never confuse motion with action".

Service providers can get very busy collecting new data sources, building data lakes and developing new analytical models. However, these activities should be a means to an end. You can't stop there, because no value is created if the information and insights generated are not acted upon.

Roadblocks to taking action come from many angles. Employees will not actively use reports and dashboards if they do not trust the data and if the reports and dashboards are not intuitive and easily accessible. In addition, analytical insights must be generated in a high volume and repeatable process, tightly integrated into the service provider's business processes, as opposed to one-off data science projects.

This is why service providers must expand their focus beyond the technologies around big data analytics and concentrate instead on becoming data-empowered organizations, in which employees at all seniority levels are enabled to make decisions and take actions based on data and analysis, rather than gut feelings or long-held company practices.

To realize this vision, service providers must progress beyond collecting data and generating insights in isolated siloes or ad-hoc pilot projects, to building a company-wide data management foundation and then embedding data-driven decision making into day-to-day operational processes as well as strategic planning activities.

Building a robust data management foundation starts with mapping and extracting meaningful data sources, including

from the network, probes and digital channels, and storing the data in a Hadoop-based big data infrastructure which enables cost-efficient scalability, long data retention and real-time processing.

However, it is not enough to ingest data sources into Hadoop, this is only the first step. The data must be enriched and transformed to the right structure and format for reporting, dashboarding and analytics, and the multiple data sources must be correlated to create a holistic customer profile for each subscriber.

Another important consideration is to maintain consistent and high quality data. This necessitates processes including data cleansing, referential integrity checks, reconciliation to source systems and data governance. Data should be made accessible to the employees, on the right device and at the right time they need it, while diligently enforcing data privacy and security.

The end goal is firstly to provide a secure and rich data portal for business users to create and run their own reports and dashboards, as well as conduct trend analysis across the entire business, without waiting for the IT department. Secondly, the aim is to provide a common data management and analytical infrastructure on which IT, and even the business units themselves, can deploy analytical applications. By leveraging the common platform each application has access to all the company's data sources, as well as advanced analytical scores, such as customer lifetime value and churn propensity, and meaningful indices, such as customer value index and customer connectivity index, generated in real time.

One of the best examples of analytical applications service providers can deploy to data empower their business is in Customer Experience Management.

DATA-EMPOWERED CUSTOMER EXPERIENCE MANAGEMENT

Combining data from the network core, radio access network and handset connectivity, together with customer value and touch point interactions, can enable service providers to improve many aspects of customer experience management.

For example, when a subscriber calls a service provider's call center today to complain about problems with their mobile voice or data service, the call center agent typically has no visibility into the customer's network experience. The agent is limited to documenting the customer's issues and the times and locations they occurred, and opening a trouble ticket to move it to second-line support or to the network service desk.

This can be a lengthy process, and in some cases it can take days until the customer's problem is addressed and resolved, leaving the customer frustrated that their service provider is not aware of their experience and that they are not receiving effective support. Surveys have shown that network performance represents 30-40% of Net Promoter Score (NPS), so such experiences can cause a very negative impact on customer satisfaction.

A data-empowered approach changes this entire dynamic by putting the right information in the hands of the agent. The latest Customer Experience Management (CEM) solution provides a widget in the agent's desktop that presents a concise view of the subscriber's individual geo-located network Quality of Service (QoS) and usage. This provides a clear graphical view of the subscriber's network experience in near real-time, including number of dropped calls, failed data sessions and at the times and locations they occurred.

"Service providers must expand their focus beyond the technologies around big data analytics and concentrate instead on becoming data-empowered organizations"

The agent is prompted to take the appropriate action, for example crediting a VIP customer, opening a trouble ticket which is automatically populated with the relevant information, or explaining the cause of a temporary problem. Empowering the call center agent with visibility into the customer's voice and data experience reduces call handling time and improves first call resolution, and also reduces customer frustration which leads to an improved NPS.

For those trouble tickets which are passed to the network service desk, the Customer Experience Management solution enables network analysts to perform root cause analysis powered by machine learning to quickly identify and treat network issues, thus shortening the response time and improving the end-user experience.

Research by MIT's Sloan School of Management has found that firms which adopt data-driven decision making have output and productivity that is 5-6% higher than can be explained by other factors, such as investments in and use of information technology. If service providers successfully make this transition they will reap similar benefits in their business.

To do so, big data and analytics should be regarded as vitally important enablers, but not the end goal. Now is the time for service providers to start the journey to becoming data-empowered organizations.

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Kavi Bains,
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GSMA Intelligence

4G networks and local content availability driving strong uptake of mobile internet services in China

Mobile data usage trends in China are outpacing many major Western markets and allowing local operators to offset voice declines, according to GSMA Intelligence data.

China is experiencing strong data ARPU growth driven by consumers' increasing appetite for mobile internet services, which is helping to offset declining voice ARPU. China leads the way in the uptake of IP services when compared to other countries in the BRIC grouping (Brazil, Russia, India, China). Our survey data shows that 79% of Chinese consumers make use of non-operator IP voice and 81% use IP messaging. China's aggressive 4G rollout and diverse local content are key factors supporting these growth trends.

IP SERVICES CLOSING THE GAP ON OPERATOR SERVICES IN CHINA

Use of traditional mobile operator communications services in China remains strong. However, the percentage of consumers using SMS/MMS is only 8 percentage points higher than that for IP messaging apps. Other BRIC countries show much larger variances – for example, in Russia there is a 56 percentage point gap between the different types of messaging platforms. A similar result can be seen between operator and non-operator voice services: use of operator voice services are

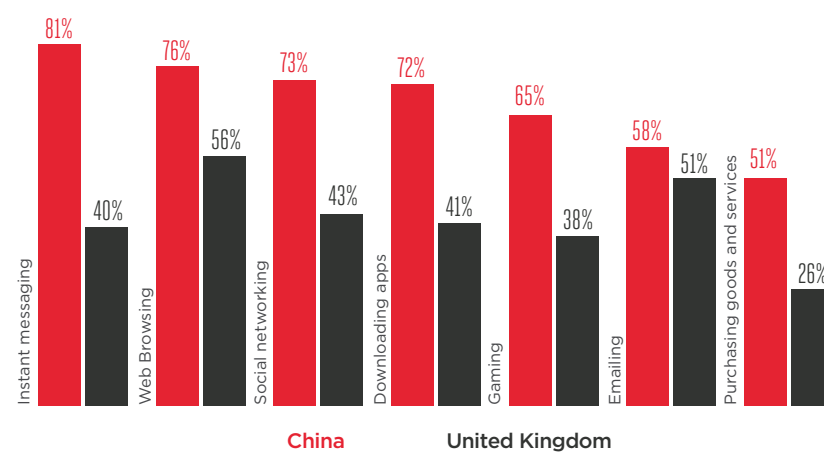
56 percentage points higher than non-operator voice services in Brazil, but only 1 percentage point higher in China.

CHINA OUTPACES DEVELOPED MARKETS IN MOBILE DATA SERVICES UPTAKE

The Chinese market is more advanced than some developed markets in regards to consumer uptake of mobile data services. In the UK, for example, 43% of respondents accessed social media services over mobile (Ofcom survey data); this compares to 73% in China. Meanwhile, 40% of UK respondents use IP messaging apps, compared to 81% in China. The significantly higher uptake in the Chinese market is present across the vast majority of mobile data services surveyed (see chart).

Chinese operators have benefited from these usage trends in the form of increasing data ARPU. GSMA Intelligence data shows that Chinese data ARPU increased by 32.3% year-on-year in Q2 2015, compared to a 16.9% increase in the UK. The increase is occurring in conjunction with a decline in voice ARPU. Our data shows a 19.2% decline year-on-year over the same period for China and a corresponding 8.2% decline for the UK. However, rising data ARPU has recently been robust enough to offset declining voice ARPU in both markets: blended ARPU for China and the UK showed positive year-on-year growth rates of 1.4% and 2.2% respectively in Q3 2015. In its H1 2015 interim results, China Mobile noted that it had

Internet usage in China and the UK



Source: Ofcom, GSMA Intelligence

“achieved [a] notable increase in data traffic operations and transition from voice-centric to data-centric operations”.

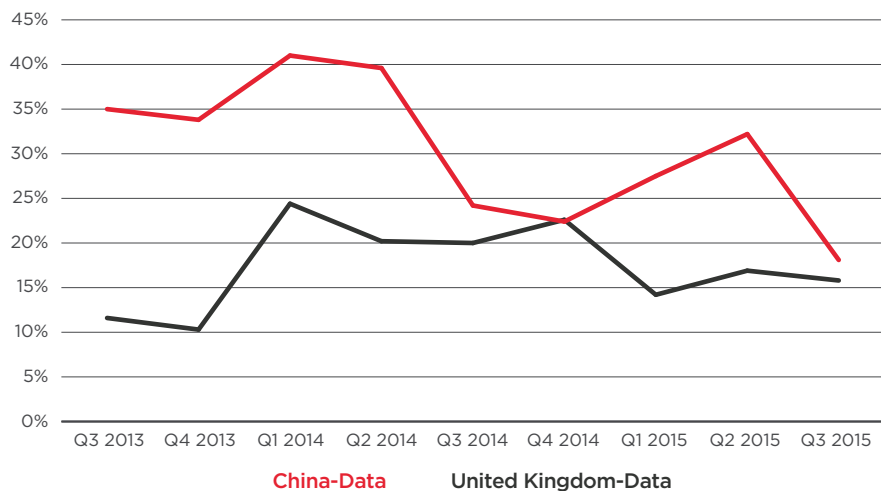
DEMAND AND SUPPLY SIDES DRIVING MOVE TO DATA-CENTRIC OPERATIONS IN CHINA

The transition from voice to data is occurring across the globe, and developed markets tend to be ahead of their developing counterparts. However, in China it is happening at an accelerated rate. Alongside IP messaging and social media, respondents to our survey in China also demonstrated strong uptake of other mobile data services such as gaming, apps and video. The ability to access a wide array of mobile data

services in China – enabled by the country's rapid rollout of 4G networks and supported by strong local content players, (such as QQ messenger) – is creating demand- and supply-side drivers that Chinese operators are exploiting. This is in contrast to the UK, for instance, where 4G rollout has been slower, there is less of a homegrown content ecosystem and stronger competition exists from cable and DSL-based services.

There are recent signs that competitive and regulatory pressure in China could be slowing mobile data revenue growth in the country. However, with strong demand set to continue as more people migrate to mobile internet services, China is set continue to outperform many Western markets for many quarters to come.

Year-on-year change in data ARPU: China v UK



Source: GSMA Intelligence

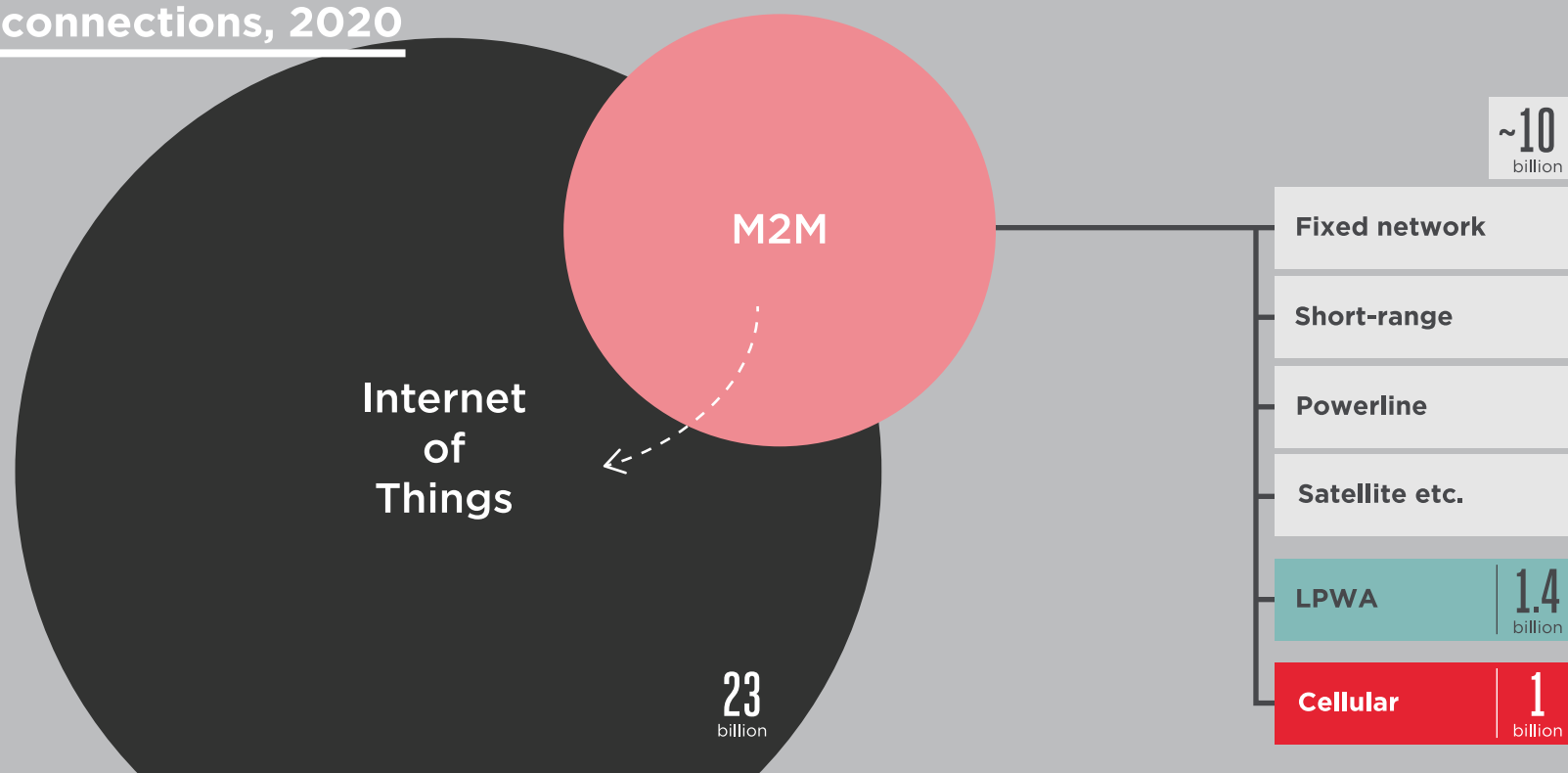
ABOUT GSMA INTELLIGENCE

GSMA Intelligence is the definitive source of global mobile operator data, analysis and forecasts; and a publisher of authoritative industry reports and research. Our data covers every operator group, network and MVNO in every country worldwide – from Afghanistan to Zimbabwe. It is the most accurate and complete set of industry metrics available, comprising tens of millions of individual data points, updated daily. GSMA Intelligence is relied on by leading operators, vendors, regulators, financial institutions and third-party industry players, to support strategic decision-making and long-term investment planning. The data is used as an industry reference point and is frequently cited by the media and by the industry itself. Our team of analysts and experts produce regular thought-leading research reports across a range of industry topics.



INTERNET OF THINGS: THE EVOLUTION OF M2M

Global connections, 2020



The **Internet of Things (IoT)** describes the coordination of multiple machines, devices and appliances connected to the Internet through multiple networks.

These include everyday objects such as smartphones, tablets and other consumer electronics, and machines such as vehicles, monitors and sensors equipped with M2M connectivity that allows them to send and receive data.

Machine-to-machine (M2M) describes the use of applications that are enabled by the communication between two or more machines.

M2M technology connects machines, devices and appliances wirelessly via a variety of communications channels, including IP and SMS, to deliver services with limited direct human intervention.

Low-power, wide area (LPWA) networks are designed for M2M applications with low data transmission levels, that require long battery lives and that operate unattended for long periods of time.

3GPP-licensed LPWA solutions complement and extend conventional networks, which make use of 2G, 3G and 4G cellular technologies.

LPWA benefits



Low power consumption



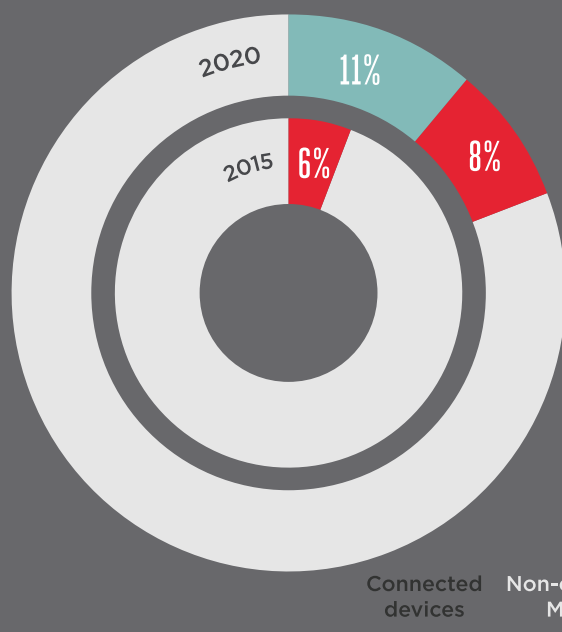
Good coverage



Low unit cost for sensors/modules

Sources: Industry estimates for IoT, LPWA and total M2M connections; GSMA Intelligence for cellular M2M connections

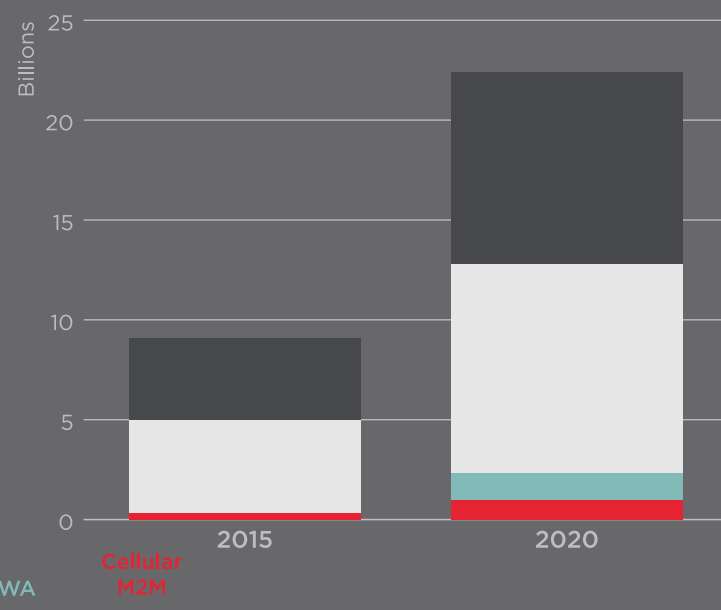
Percentage of total M2M connections



20%

Cellular M2M and LPWA could represent almost 20% of the global total M2M market by 2020

Internet of Things connections, average of industry estimates





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LeMobile Le 1s

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| Color: | Gold, Silver, Gray |
| Display: | 5.5 inch FHD In-Cell, 403 PPI |
| Chipset: | MediaTek® Helio™ X10 Turbo 2.2GHz, Octa-Core |
| Memory: | 3GB LPDDR3 RAM + 32GB ROM |
| Camera: | 13MP (PDAF) + 5MP |
| Fingerprint Sensor: | Yes |
| Sound effect: | DOLBY + DTS |
| Battery: | 3000mAh Fast charge |
| Connectors: | Type-C, USB2.0 |
| SIM Card: | Dual SIM |
| Network: | TDD-LTE/FDD-LTE/TD-SCDMA/WCDMA/GSM |
| OS: | EUI 5.5 based on Android Lollipop |



LeMobile Le Max Pro

| | |
|---------------------|--|
| Display: | 6.33-inch WQHD (2560x1440), Multi-touch |
| Chipset: | Qualcomm® Snapdragon™ 820, LTE-A CAT 12/13 |
| Memory: | 4GB LPDDR4@1866Mhz RAM, 32/64/128GB UFS2.0 ROM |
| Cameras: | 21Mp OIS rear camera with dual flashlights, 2.0µm large pixel front camera |
| Fingerprint Sensor: | Qualcomm® Snapdragon™ Sense™ ID 3D ultrasonic fingerprint |
| Connectivity: | NFC, 802.11 ad/ac/a/b/g/n, BT4.2, IR, MHL, USB Type-C |
| Battery: | 3400mAh |
| Network: | TDD-LTE/FDD-LTE/TD-SCDMA/WCDMA/EVDO/CDMA/GSM, Dual SIM |
| OS: | EUI based on Android M |

A strategy for mobile network success

NEC's Vision for Network Evolution toward 2020 and beyond



Kazuya Hashimoto,
NEC, Telecom Carrier Business
Unit, Vice president

Mobile network players are under pressure to deliver enhanced mobile broadband services with high data throughput, various IoT services with ultra-low latency and massive connectivity in line with future trends. To meet these challenges, what strategy should they adopt for future business?

OPEN INNOVATION AND COLLABORATION

NEC believes success will lie in open innovation and collaboration between network operators, vendors and industry verticals to build new ecosystems that generate benefits for society. We are therefore developing 5G solutions for social value platforms that will integrate mobile networks with ICT-enabled urban and industrial infrastructure to deliver wide-ranging advances such as ultra high-definition video broadcasts, advanced driver assistance and industrial IoT.

EMERGING NETWORK ARCHITECTURE

Innovative new business models and services will have diverse performance requirements that conflict with each other. Therefore, multi-industry ecosystems will require a flexible RAN architecture capable of delivering necessary functionalities and resources to each network node on demand. Based on vast experience in IT and telecom networks, NEC promotes a combination of the following technologies to realize the most practical and economical solution for 5G RAN architecture.

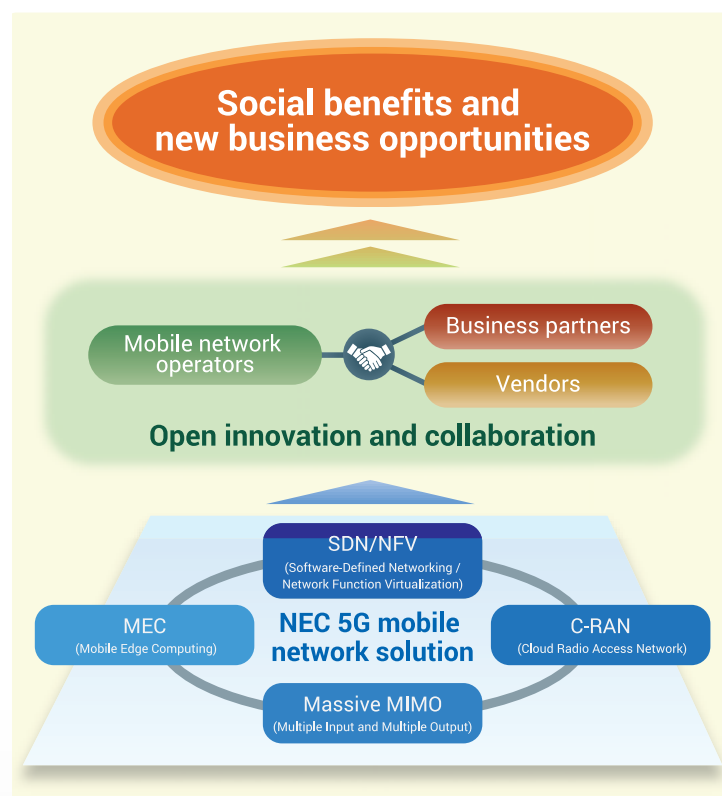
SDN/NFV (SOFTWARE-DEFINED NETWORKING / NETWORK FUNCTION VIRTUALIZATION)

SDN/NFV technologies realize network services on shared standard hardware, allowing faster and easier modification of network configurations such as capacity and geographical location. By using SDN/NFV technologies, networks can be deployed for each individual service and optimized based on particular latency, bandwidth, safety and security needs.

NEC's open ETSI and ONF-compliant approach to SDN/NFV supports multi-vendor platforms, optimal management of virtualization resources, service chaining tailored to the needs of individual operators, and carrier-grade performance as demonstrated in commercial live networks.

MASSIVE MIMO (MULTIPLE INPUT AND MULTIPLE OUTPUT)

Massive MIMO employs a large number of antenna elements at the base station to enable more accurate beamforming and enhanced spatial multiplexing in the horizontal and vertical directions. By directing the beams to specific users and services on demand, it delivers more



flexible cell coverage, lower power consumption and decreased interference with other users. It also accommodates more users at higher data rates with better reliability and contributes to lower TCO.

At NEC, we have developed a Massive MIMO Active Antenna System (AAS) in low SHF band (<6GHz) and demonstrated the viability of massive MIMO in collaborative 5G mobile communication trials with major mobile operators. Results show that advanced spatial domain technologies can be exploited to more efficiently employ radio spectrum resources and increase system capacity.

C-RAN (CLOUD RADIO ACCESS NETWORK)

Cloud-RAN separates DU (digital unit) functions from mobile base stations and enables the functions to be run on general-purpose servers. This makes it possible to centralize DU functions, allowing for multiple RUs (radio units) to be centrally controlled from one general-purpose server. It also improves the communication performance of mobile base stations through more precise control of radio interference between RUs, while cutting down on power and space consumption by consolidating DU hardware.

In place of the CPRI interface used for traditional C-RAN (L1 C-RAN), NEC has introduced a new functional split between DUs and RUs in LTE layer 3 (L3 C-RAN) or layer 2 (L2 C-RAN) that relaxes fronthaul requirements such as data rate and latency. NEC is also working on the realization of scalable control that fully utilizes the

statistical multiplexing effect through integrated control of L1/L2/L3 C-RAN. This additionally heightens affinity with Mobile Edge Computing by integrating with DU functions and related applications on the virtualization platform.

MEC (MOBILE EDGE COMPUTING)

MEC enables cloud computing for IT services at the edge of mobile networks, such as at base stations. It can be economically realized by using general-purpose computing resources in the C-RAN architecture. By localizing the path of end-to-end services, the ultra-low latencies required of real-time applications like virtual reality and advanced driver assistance can be provided without putting a massive burden on the upper layers of the core network.

Tight integration with base stations enables deeper analysis of user context information such as traffic characteristics, radio conditions and user location. NEC is currently developing innovative technologies for MEC that dynamically optimize mobile networks by leveraging various aspects of the context information to ensure high QoE for users.

BRINGING VALUE TO SOCIETY

Through collaboration, open innovation and leading-edge technology, NEC is committed to realizing social value platforms for future network business. Our flexible integration of advanced mobile networks with ICT-enabled urban and industrial infrastructure will bring wide-ranging benefits to consumers and businesses. It will also help resolve pressing environmental, safety and security issues to the benefit of all of society.

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NarrowBand IoT, Wide Range of Opportunities

3GPP STANDARDIZED CELLULAR IoT TECHNOLOGY

The Internet of Things (IoT) is moving quickly. The potential scale of thing-to-thing communication is gaining momentum, and represents endless opportunities for telecom operators.

However, operators' existing cellular networks cannot meet the growing need for Low Power Wide Area (LPWA) IoT connections. For example, they cannot easily offer deep indoor coverage, low power consumption terminals, low cost terminals, and massive connection numbers. In addition, operators are facing increasing pressure from non-standard technologies. These technologies are eroding the market space for the cellular IoT and could lead a market fragmentation among various propriety solutions.

In September 2015, NarrowBand Internet of Things (NB-IoT) was officially adopted by 3GPP as a work item for Release 13, and will be frozen in June 2016.

A global standard for NB-IoT will offer a more secure, reliable, and universal alternative to non-standardized technologies. It will unleash existing 2G/3G/4G networks capabilities to meet the needs of globalized industries and today's global communications in offering key benefits such as roaming and security. Standardized NB-IoT is a foundation for further evolution which guarantees for the long-term value of investments by telecom operators and corporate users.

TOP PRIORITY INVESTMENT FOR LEADING OPERATORS

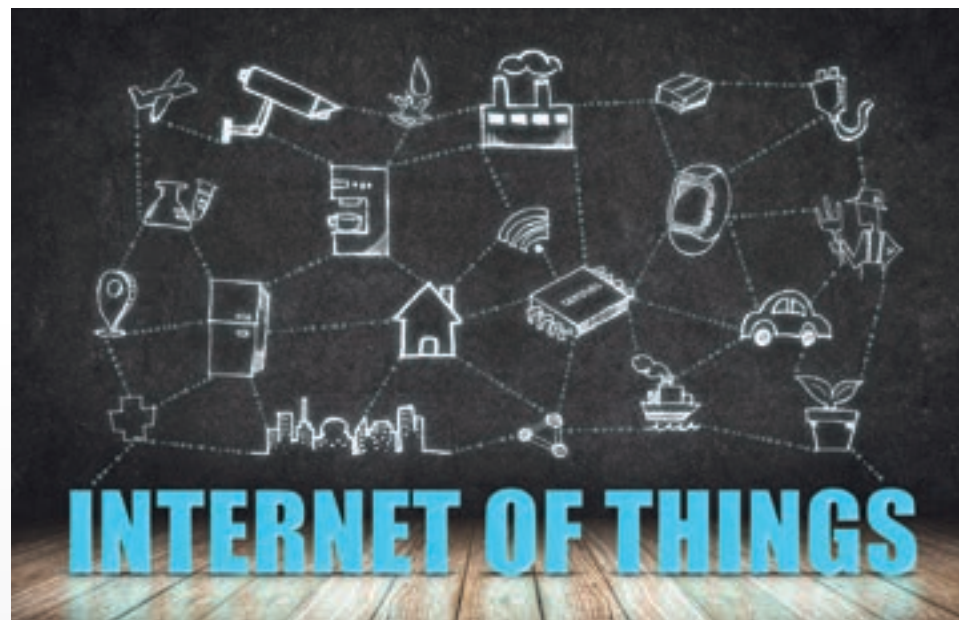
Machina Research forecasts that there will be 3.6bn LPWA connections by 2024 and the IoT market opportunity will be worth USD4.3 trillion. Leading operators are considering to leverage the advantage of mobile network to connect more things to capture the business opportunities in the most effective and efficient way

NB-IoT is the emerging industry solution for deployment of Low Power Wide Area (LPWA) networks based on licensed spectrum bands. It can be quickly deployed after a simple upgrade on existing network.

NB-IoT is expected to help operators expand new enterprise services and consumer services like wearable. "It's an opportunity that we think is absolutely purpose fit for operators," Luke Ibbetson, Vodafone's head of research and development said at the Huawei Mobile Broadband Forum in Hong Kong in November 2015, "For once we're not looking for the finest engineering solution, we're looking for the right one for the market at the right cost. "

FASTEST GROWING ECOSYSTEM

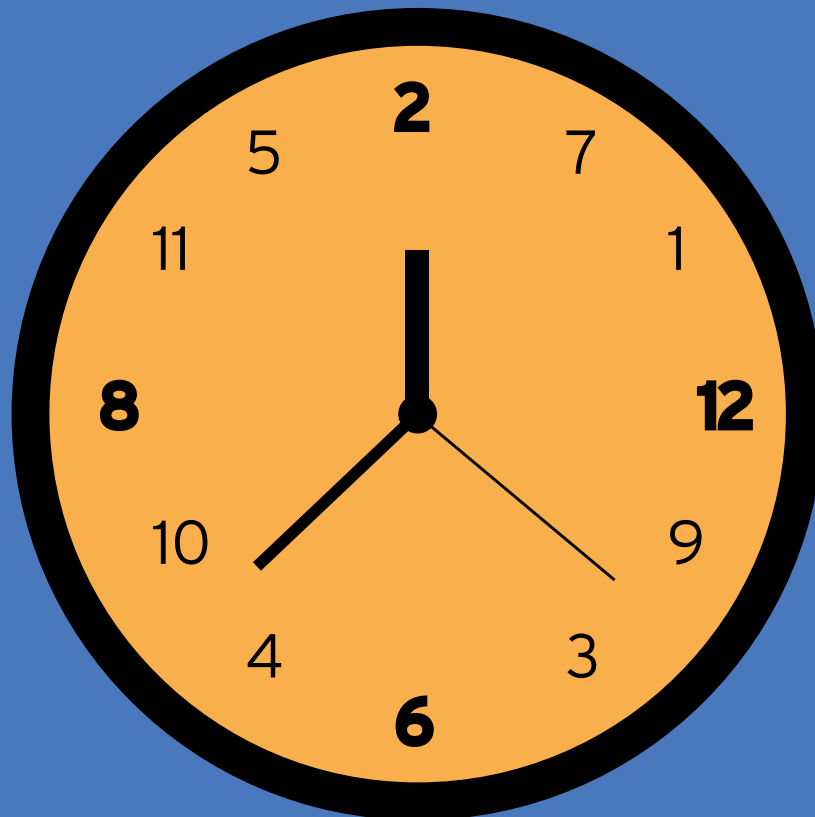
GSMA established the Mobile IoT initiative in 2015 and it was designed to accelerate the commercial availability of LPWA solutions in licensed spectrum. The NB-IoT Forum is dedicated to focus on the NB-IoT technology to address the LPWA market; it was set up before the Mobile World Congress 2016. A key element of the forum will be the creation of 'Open IoT Labs' that will be available to any operator, module vendor or application provider and are designed to develop and accelerate the commercial availability of LPWA technology as well as encourage organizations to create NB-IoT enabled devices and applications for a variety of different verticals. They will also provide an opportunity for end-to-end and interoperability testing.



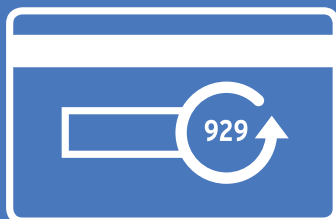
A large number of companies have already joined the NB-IoT eco-system, which leverage a powerful end-to-end industry chain. The ecosystem of NB-IoT has experienced rapid progress much more than other technologies. Leading industry players have already started several trials. Huawei provides end-to-end solutions to operators for verification, testing and application case study, Huawei is a key board member of NB-IoT Forum and has made major contributions to the development of the NB-IoT.

NB-IoT COMMERCIALIZATION SINCE 2016

The vertical IoT market is already taking off and calling for the rapid maturity of the NB-IoT end-to-end ecosystem. Top chipset and module manufacturers have announced that they will support NB-IoT by the end of this year or next year. Chipset will not be bottleneck any more for ecosystem. After 3GPP NB-IoT standard finalization this year, more commercial trials and deployments will appear in the market quickly. 2016 will see the world's first NB-IoT commercialization worldwide. Thanks to deep coverage capabilities and low power consumption, NB-IoT will be massively applied to smart metering everywhere in cities in the initial phase. Later on it will enter various vertical industries such as smart city lighting, asset tracking, smart agriculture, and environmental monitoring etc. The NB-IoT will lay a foundation to transform our life, work and business.



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Jennifer Walker,
Product Marketing Manager, Ericsson Broadcast and Media Services

Telco TV: the challenges of entering the media market

You would have to have been living on another planet to have missed all the news over the past 18 months; the big players in the telco world are making significant moves into the TV industry.

Last year, Vodafone UK announced that it will launch pay TV services in 2016; Vodafone's operations in Spain have already scored great success with over one million TV subscribers signed up. Likewise Orange, T-Mobile and Telefonica are all making moves in their respective key markets to offer quad play services and realize the power of the 'the fantastic four'.

As existing service providers, it's easy to see why telcos are well placed (and keen) to enter the TV industry.

We are streaming more on demand TV series and programs than ever before. Ericsson's ConsumerLab study in 2015 stated that consumers are now watching six hours of premium content a week on demand, this is an increase of 121% since 2011. Superfast broadband and 4G is providing consumers with access to IPTV, regardless of device.

We also know from this study that 61% of consumers now watch video content on their mobile phones. If service providers are smart with their bundled propositions, this could prompt an ever increasing usage of data. The end goal being to lower churn and obtain operating cost efficiencies.

So given there are synergies to be exploited, what should these service providers keep in mind as they move into the world of anywhere, everywhere TV? Let's consider three main areas:

1. FINDING CONTENT

Providing the best possible user experience is an obvious and important objective.

Yet over half of consumers say that they can't find anything to watch at least once a day (Ericsson ConsumerLab study, 2015). This figure goes up to 85% on a weekly basis. Given the huge amount of content now readily available at our fingertips, it's clear that we have a real problem on our hands; there's a lot of work that still needs to be done.

Recent studies have shown that churn, in some cases, could actually have been prevented if consumers were able to discover content more easily.

Fundamental to effective content discovery is enriched metadata.

So what do I mean when I say 'metadata'? Metadata is the fuel which powers the content discovery process. Imagine a world without detailed synopses, film or programme information, cast and crew details, images or trailers – our viewing experience would be brought back to the 1980s!

But the real challenge lies in getting a service provider who can source, format and deliver the deep, broad and rich datasets which are necessary to find and personalise the content which audiences are searching for. Telcos need to invest in the right quality of data and the richness of the information that they present.

With the power of social media, consumers' voices can be readily heard. They aren't afraid to 'cut the cord' if their experience does not live up to their expectations. That's why it is so crucial to make sure that metadata is at the centre of your content discovery strategy.

2. ACCESSING CONTENT

Traditionally consumers used to embark on their content journey through the Electronic Programme Guide (EPG).

With the advent of IP based TV, these traditions have been challenged and consumers can now access content from any connected device, supporting discovery and viewing across platforms.

So how can telcos give consumers what they want and replicate the simplicity of the over-the-top environment? For Pay TV operators, moving to an IPTV/cloud environment makes true multi-screen, TV anywhere easier, whilst also helping them to

compete against the OTT players who tend to provide consumers with intuitive interfaces and therefore potentially more engaging user experiences.

For telcos, another important opportunity today is getting smarter about video strategies. Service providers need to know how to leverage timely events, tap into new advertising technology, understand how their audience is engaging with content and optimise their video business accordingly to maximise returns.

Another key consideration which cannot be ignored is accessibility for all. By this I mean subtitles (or captions). We're all very familiar with subtitles on linear TV programs. Well, legislation is now being introduced in some markets around the world that will also require online video content to carry subtitles. Each market comes with a different regulatory framework; this is something we must keep front of mind as new directives are announced.

3. INVESTING IN THE RIGHT TECHNOLOGY

The internet has had a huge impact on what we expect when looking for content, and that change in expectations must be acknowledged regardless of platform. While an attractive, more graphically rich layout is important, functionality is what matters.

The objective for all telcos is to personalize the content discovery journey through the delivery of rich, detailed data delivered in the correct format to any screen; this can be realized through cloud-based technology.

There are two clear benefits to getting this right: 'sticky customers' who don't want to leave, and monetization opportunities, which boost returns. The latter is achieved by collecting information about consumer behavior and using that data to deliver targeted content, promotional offers and advertising.

In an interview with the BBC (published in Jan 2016), Netflix's Chief Executive Reed Hastings stated that Netflix will be spending over a billion dollars a year on technology improvements. During this talk he mentioned

two areas for improvement: 'buffering' and 'suggestions' (more often referred to as content recommendations).

For service providers this means the deployment of faster internet, smarter APIs, innovative cloud services and better recommendations algorithms fed by enriched metadata. Just a small list to get right!

I have no doubt that the first thing on this list will be accomplished as we move into a world of 5G and global-reach, fibre-optic broadband. The biggest challenge will then be content management and deploying algorithms which use relevant and smart data to provide the audience with exactly what they want to see.

In the meantime, it will be very interesting to see how the telco entrants fare. The approach to engagement, marketing, packaging and delivery are all very different in the traditional TV sector. Telcos will need to change from being mobile service providers with 'pipes and devices' to becoming credible content aggregator and delivery brands.

However one thing is certain. With their exposure to the cloud and consumer centric propositions, there is no doubt that telcos are well placed to face – and address – the technology challenges that lie ahead and realize seamless anywhere, anytime TV.

"Telcos will need to change from being mobile service providers with 'pipes and devices' to becoming credible content aggregator and delivery brands."

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Matthew Iji,
Analyst,
GSMA Intelligence



GSMA Intelligence

The future of SMS in the evolving messaging market

New mobile communication technologies are being made possible by rising smartphone adoption and mobile internet usage. IP messaging players are taking advantage of this opportunity, gaining scale and disrupting the traditional SMS model. However, not all markets are seeing the same trends, with evidence that the decline in SMS volumes has been slower in markets where unlimited SMS tariffs are common.

It is misleading to say that all mobile users are rapidly migrating away from SMS. A survey we conducted last year confirms that nearly half of the 23,000 people surveyed in developed markets do not use IP messaging at all. Some markets have remained engaged with SMS, while some clearly have not.

As SMS volumes began to decline, operators used tiered pricing models including bundled unlimited texts to maintain subscriber usage. Contract subscribers were the first to move to the new plans with tariffs such as Vodafone's Red offering unlimited text messaging and data-centric pricing. Prepaid tariffs soon followed suit.

Many operators across the world, including the majority of those in Western Europe, now offer an unlimited SMS option. Despite availability of this type of tariff, take-up is still relatively low in certain markets. In the Netherlands, for example, our survey shows that only 26% of users in the country have an unlimited SMS package. Dutch users are more likely to use IP messaging, with 71% of those

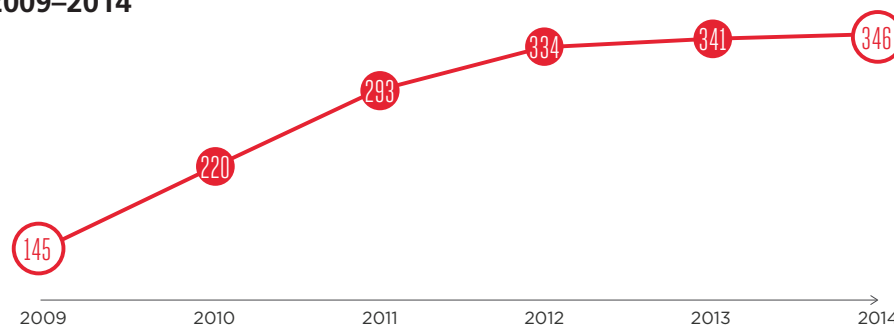
surveyed claiming to use third-party messaging services. The cost of SMS and widespread use of IP messaging has resulted in the Netherlands having one of the lowest text messaging rates in the world. The average number of SMS sent per subscriber per month in the Netherlands was 27 at the end of 2014, less than a third of the level seen in 2010.

The level of adoption of unlimited SMS tariffs and third-party messaging applications depends significantly on when bundled tariffs were first introduced to the market. In France, for example, Free offered unlimited messaging to its subscribers long before WhatsApp became prominent. Thus, when IP messaging was introduced to the market, the value proposition was not there; users had less of an incentive to migrate away from SMS. Our survey shows that in France 85% of mobile subscribers use unlimited text tariffs, the highest of any of the surveyed markets. Only 32% of French respondents use any type of third-party messaging service. While the popularity of SMS fell in neighbouring countries, the early adoption of inclusive messaging enabled the French market to maintain SMS volumes.

In 2014, French subscribers sent on average more than 300 SMS per month. However, as inclusive text bundles often effectively give SMS away as a free service they have not halted the decrease in SMS revenue.

Meanwhile, text messaging volumes are increasing in some African markets. Limited smartphone adoption of 21% in Sub-Saharan Africa prevents the majority of the population from accessing IP messaging applications.

France: average number of SMS sent per subscriber per month, 2009–2014



Source: GSMA Intelligence

Meanwhile, the requirement for SMS as an enabler for mobile money services such as M-Pesa has also added to the rapid recent growth of operator SMS volumes in countries such as Congo, Kenya and Tanzania. In Kenya, messaging revenue per subscriber increased by more than 200% between March 2010 and March 2015 due to the increasing volume of SMS in the country, although revenue is not as high as in developed markets with average revenue per SMS of less than \$0.01 in Q1 2015 in Kenya.

THE A2P REVENUE OPPORTUNITY

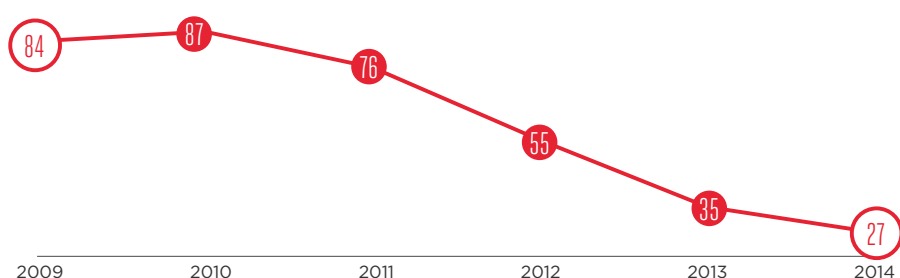
Application-to-person (A2P) messaging, where SMS contact is made to or from a business application, presents operators with an opportunity to continue generating income from SMS. According to industry estimates, by 2020 A2P messaging is expected to account for more than 35% of all

SMS volumes. Organisations including the UK National Health Service have already introduced SMS as an alternative to email and voice calls for appointment confirmation. From our discussions with A2P messaging providers, the market is currently concentrated on four main areas: promotion, utilities, service and loyalty.

The secure nature of the SIM card and mobile number combined with an effective A2P platform also enable SMS to be used as an additional layer of user authentication, whereas a message sent via a third-party application may not be suitable for this purpose.

Without A2P, we would expect global quarterly SMS volumes to fall from a peak of 1.8 trillion in 2012 to 700 billion in 2020. However, in our most likely scenario, we expect the growth of the A2P sector to offset the decline in P2P messaging, resulting in a 2020 total of 1.0 trillion messages per quarter.

Netherlands: average number of SMS sent per subscriber per month, 2009–2014



Source: GSMA Intelligence

ABOUT GSMA INTELLIGENCE

GSMA Intelligence is the definitive source of global mobile operator data, analysis and forecasts; and a publisher of authoritative industry reports and research. Our data covers every operator group, network and MVNO in every country worldwide – from Afghanistan to Zimbabwe. It is the most accurate and complete set of industry metrics available, comprising tens of millions of individual data points, updated daily. GSMA Intelligence is relied on by leading operators, vendors, regulators, financial institutions and third-party industry players, to support strategic decision-making and long-term investment planning. The data is used as an industry reference point and is frequently cited by the media and by the industry itself. Our team of analysts and experts produce regular thought-leading research reports across a range of industry topics.

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Kavi Bains,
Analyst,
GSMA Intelligence



GSMA Intelligence

Shared data plans gaining traction in MENA and North America – but Europe lagging behind

Consumers in the Middle East, North Africa and North America are leading the way in migrating to shared data plans, according to the latest GSMA Intelligence survey

The results of our 2015 consumer survey show that uptake of shared data plans is most prevalent in the Middle East and North Africa (MENA) and North America regions. As expected, there is relatively high uptake in developed countries such as the US (35%) and Qatar (44%), but interestingly, developing countries within MENA such as Algeria (34%) and Egypt (33%) also show levels of adoption that are significantly ahead of the majority of developed markets. The wide variances in uptake across both developed and developing countries therefore highlight a potential opportunity in many markets.

The survey also illustrates that the opportunity varies by age group. Operators have had more success with shared data plans in the 18 to 34 year-old bracket. There are also distinct differences between uptake among different age groups in developed and developing markets. In developing countries, the uptake is heavily skewed towards those below 35 years old, while there is a more even spread in developed markets.

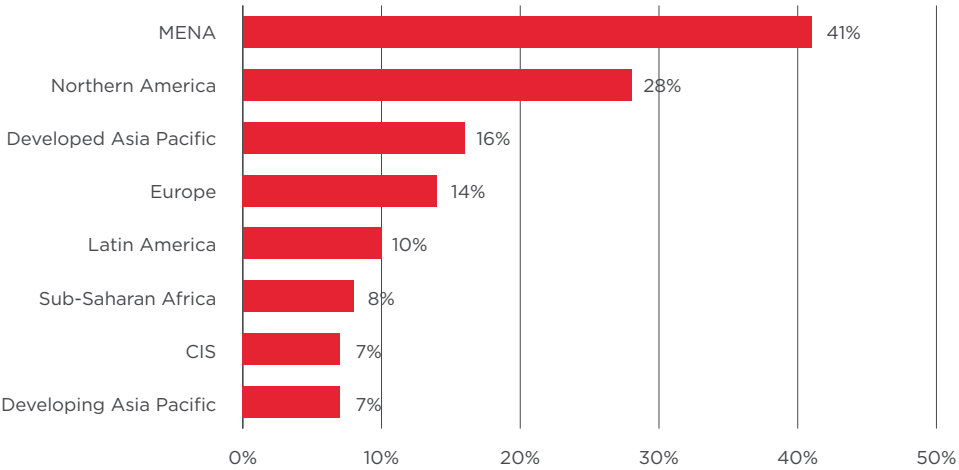
Shared data plans within the US have been prominent for some time, dating back to mid-2012 when AT&T and Verizon Wireless both launched offerings. Since then US operators have capitalised on the popularity of these

plans - all four national carriers offer and heavily promote their family plans (which allow data sharing within a single subscription). AT&T, for example, noted in its Q4 2015 earnings that “the total number of ‘Mobile Share’ accounts was up 15% year over year”, and that “about 81% of postpaid smartphone subscribers are on Mobile Share Value plans”. Strong competition within the US market, driven by Sprint and T-Mobile US, is also helping to drive uptake of shared data plans, prompting operators to set increasingly attractive price points. However, this is impacting service revenue: AT&T highlighted that “continued adoption of Mobile Share Value plans” drove a decline in wireless service revenue of 1.7% year-on-year.

Meanwhile, in the MENA region, local operators are providing customers with several ways to share data plans. In Saudi Arabia - where take-up of shared data plans are particularly strong – market-leader STC recently launched its “postpaid 1000” tariff, which includes unlimited data with multiple SIMs. This compares to rival Mobily’s offer of an “open internet” plan, which includes the ability to share allowances of data, minutes and SMS with other subscribers. In Qatar, Vodafone allows customers to bundle USBs, hotspots and tablets with a mobile contract.

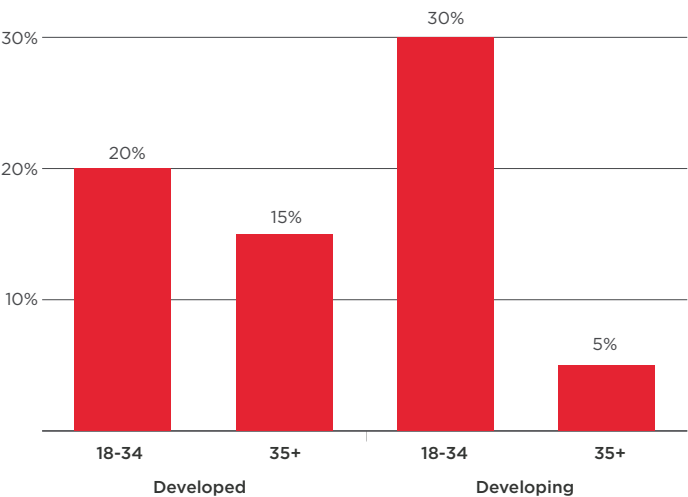
Although the survey indicates low levels of adoption of shared data plans within the CIS, Sub-Saharan Africa and Latin America regions, it also highlights surprisingly low adoption within Europe. Of the region’s largest economies, the UK, Germany, France,

Take-up of shared data plans, by region



Source: GSMA Intelligence

Take-up of shared data plans, by age group



Source: GSMA Intelligence

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Italy and Spain all recorded uptake of shared data plans of between 10% and 12%. These low levels of adoption can be explained by the comparatively late launch of shared data plans in the region. In the UK, for example, O2 and Vodafone only launched shared data plans during the second half of 2014.

Despite their availability, European operators have not promoted the plans to the same extent as their US counterparts. This could reflect the more challenging market conditions

within Europe, and specifically a strong desire not to cannibalise existing revenue.

Instead, most European consumers must purchase an additional connection with a separate data allowance if they wish to use data on another device. But this strategy risks missing the mobile data growth opportunity presented by shared data plans: if a consumer can spread data usage across multiple devices it raises the likelihood of them upgrading to a larger data plan in the future.



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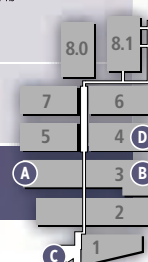


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| Date | Activity | Location |
|-------------------------------|--|---|
| Tuesday, 23 February | | |
| 09:00 – 16:30 | GSMA Innovation City – Experience Mobile Connect and meet the experts | A Hall 3 Stand 3A11 and 3A31 |
| 09:30 – 11:00 | Seminar: Remote payments opportunity | C GSMA Seminar Theatre 1 & 2 |
| 14:00 – 16:00 | Vendor and Operator Speed Dating Event | B Hall 3, CC3, Level 1, Room 3.14a |
| 14:00 – 15:30 | Leadership Workshop – The future of digital identity in building a successful digital society | D Ministerial Programme – Auditorium A |
| 16:30 – 18:00 | Digital Service Provider Workshop – Global use cases | B Hall 3, CC3, Level 1, Room 3.14a |
| Wednesday, 24 February | | |
| 09:00 – 19:00 | GSMA Innovation City – Experience Mobile Connect and meet the experts | A Hall 3 Stand 3A11 and 3A31 |
| 09:00 – 11:00 | Developer Workshop | B Hall 3, CC3, Level 1, Room 3.14b |
| 17:00 – 18:30 | Seminar: Mobile Connect – Driving global economic growth through secure mobile identity verification | C GSMA Seminar Theatre 1 |
| Thursday, 25 February | | |
| 09:00 – 16:00 | GSMA Innovation City – Experience Mobile Connect and meet the experts | A Hall 3 Stand 3A11 and 3A31 |

To find out more visit us at the GSMA Innovation City
Hall 3, Stand 3A11 and 3A31





Dennisa Nichiforov-Chuang,
Senior Analyst, Spectrum
GSMA Intelligence



GSMA Intelligence

Improved spectrum harmonisation powering 4G adoption

4G connections have now surpassed one billion worldwide and growth is being spurred by recent improvements in 4G spectrum harmonisation

There was one short of 400 operators with live commercial 4G-LTE networks globally (excluding fixed-wireless networks) by November 2015, with more than half of the world’s mobile markets (142) covered by at least one 4G operator. This represents an increase of 83 networks compared to January 2015.

Meanwhile, the number of 4G connections worldwide almost doubled over the past 12 months, from 519 million to 1 billion, meaning that close to 14% of the world’s mobile connections (excluding M2M) are now running on 4G, compared to just 7% a year ago. By the end of 2016 we expect that more than 18% of connections globally will be on LTE, rising to more than 30% of connections by 2020.

One of the main drivers for 4G adoption is coverage, which is in turn driven by the timing, type and amount of 4G-suitable

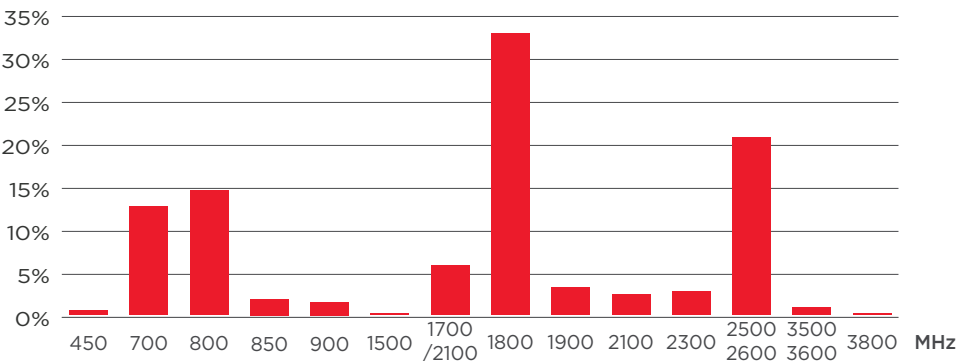
spectrum licensed to operators.

Despite the fact that 4G networks span 14 different spectrum bands, which initially meant a lack of harmonisation at the global level, there is clear concentration of deployments around the digital dividend bands (28–700 MHz and 20–800 MHz), the refarmed band 3 (1800 MHz) and the IMT-extension bands (bands 7, 38 and 41 – 2500 MHz and 2600 MHz). A third of 4G networks today run on refarmed 1800 MHz spectrum, while more than half of the networks run on ‘new’ digital dividend and IMT-extension bands.

Overall, more than 80% of 4G networks operate in one of these three types of spectrum bands. This demonstrates the progress made recently with regards to regional spectrum harmonisation which in turn will eliminate barriers to 4G adoption through economies of scale in handset and network equipment production - as well as better handset availability and lower prices for consumers.

At a regional level, the same bundling pattern can be seen around refarmed spectrum, the digital dividend bands and the

Global 4G-LTE deployments by frequency band, 2015



Source: GSMA Intelligence

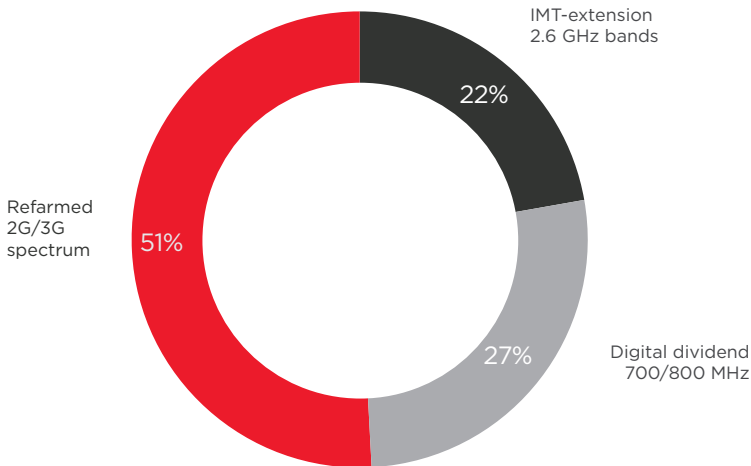
IMT-extension bands. The 1800 MHz is the most refarmed band for 4G deployments: in the Middle East and North Africa region, nearly 56% of 4G launches have occurred in this band, while in Europe and Sub-Saharan Africa this figure stands at around 43% of deployments. The rest of the networks in these three regions have mainly been deployed in the digital dividend band and in the IMT-extension bands (see graphic).

In the North America region, the majority of 4G deployments are now in the digital

dividend band (60% of networks) followed by the AWS (1700/2100 MHz band 4 and 10) and the 1900 MHz PCS (band 2) bands.

Our research shows that the fragmentation in the 4G spectrum scenarios we have seen in the past in Latin America are improving significantly; the majority of 4G deployments in the region are bundled around four main bands: the AWS (1700/2100 MHz band), the digital dividend band, the IMT-extension band and the 1900 MHz PCS band.

Percentage of spectrum scenarios used in global 4G-LTE deployments



Source: GSMA Intelligence

ABOUT GSMA INTELLIGENCE

GSMA Intelligence is the definitive source of global mobile operator data, analysis and forecasts; and a publisher of authoritative industry reports and research. Our data covers every operator group, network and MVNO in every country worldwide – from Afghanistan to Zimbabwe. It is the most accurate and complete set of industry metrics available, comprising tens of millions of individual data points, updated daily. GSMA Intelligence is relied on by leading operators, vendors, regulators, financial institutions and third-party industry players, to support strategic decision-making and long-term investment planning. The data is used as an industry reference point and is frequently cited by the media and by the industry itself. Our team of analysts and experts produce regular thought-leading research reports across a range of industry topics.

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DISCOVER ALL THE BENEFITS OF MEMBERSHIP

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Fostering an entrepreneurial and innovative ecosystem

Mobile World Capital Barcelona is an initiative driving the mobile and digital transformation of society while helping improve people's lives globally.

With support of the public and private sector throughout Barcelona, Catalonia and Spain, MWC Capital focuses on three areas: the **digital empowerment** of new generations, professionals and citizens; the **digital transformation** of industries; and the acceleration of **digital innovation** through entrepreneurship.

Collectively, our mSchools, mHealth, Smart Living, mVenturesBcn programmes are positively transforming the education system, the industry, and the economy.

BARCELONA GEARS UP TO BE THE WORLD CAPITAL OF ENTREPRENEURSHIP WITH 4YFN'S NEW EDITION

4 Years From Now (4YFN), the business platform for the growing community of technology startups at the international level, backed by Mobile World Capital Barcelona, launches the third edition of its event, in collaboration with the GSMA. With a view to supporting digital entrepreneurial talent, 4YFN 2016 is expanding its space to 18,000 m2, more than double that at the 2015 edition, and presenting a wide range of activities aimed at generating new business opportunities for the entrepreneurial community worldwide.

PROGRAMME OVERVIEW

4YFN features interactive workshops, cutting-edge exhibitions and unique networking opportunities. The programme explores a different content track daily is led by globally known experts and entrepreneurs. Content tracks include: Disrupted by Mobile, Internet of Things and Digital Media.

SPEAKERS

Some of the most fascinating speakers in the mobile ecosystem will share their ideas and visions at **4YFN**. Confirmed speakers include:

- Yossi Vardi, Chairman, 4YFN
- Marcus Weldon, CTO, Alcatel-Lucent / President, Bell Lab
- Mark Shuttleworth, Founder, Canonical / Co-Founder, Ubuntu
- Rich Miner, General Partner, Google Ventures / CoFounder, Android
- Dirk Ahlborn, CEO, Hyperloop
- Jessica Delpirou, VP Southern Europe, Meetic Group
- Zack Weisfeld, General Manager, Microsoft Ventures
- Jimmy Maymann, CEO, The Huffington Post
- Jimmy Wales, Chairman, Wikipedia/TPO
- David Sable, Global CEO, Young & Rubicam

NETWORKING ACTIVITIES

This year's event includes activities such as "pitch the press", Founders and Investors "speed dating" activity, and startups will pitch to investors at a "pitching point". Networking areas have also grown so that there is more space for attendees to mingle. On a more relaxed and sociable note, there will be daily afterwork networking sessions and the official closing party on the 24 February that is a must for everyone!

INNOVATION MARKET

The epi-centre for innovation! With more than 400 startups exhibiting their cutting-edge products from countries far and wide, to huge multi-national companies such as **IBM**, **Telefonica**, **Twitter** and **Zurich**, who all have one thing in common - a devotion and interest in innovation. This really is the hub of all hubs! Take a stroll and discover new projects from every continent on the globe.

For more information on how Mobile World Capital Barcelona is becoming the world capital of entrepreneurship please visit us at FIRA Monjuic, Hall 8 or <http://4yfn.com/>.

mVenturesBcn is a new player in the field of innovation in Spain aiming to boost innovation through startups.

Facilitating the growing and scaling of startups mVenturesBcn partners with the best accelerators to stimulate entrepreneurship, the startup ecosystem and the innovation of tomorrow.



ACCELERATION PROGRAMMES

Startups are pioneers of the digital transformation and mVenturesBcn aim is to accelerate the globalization of the startup ecosystem in Barcelona working together with the best accelerators from around the world to screen, grow and empower talent.

Startupbootcamp IoT & Data is committed to finding, funding, coaching, and growing the most ambitious early stage companies and entrepreneurs working in the Internet of Things and Data space. On December 1st 2015, the eleven teams selected to enter the programme moved into the MediaTic Building Barcelona, a startup co-working space in the heart of the 22@Barcelona district.

A second high quality accelerator with proven track record will be opening in Barcelona shortly.

TECHNOLOGY TRANSFER PROGRAMMES

This last 15 years have yield us a world-class scientific and technologic research. Technology is a unique driver to improve people's way of life and MWC Capital relentlessly pursues the development and commercialization of the next technology that will radically change society and industry. In tightly collaboration with research centres and universities mVenturesBcn creates a new paradigm to transform high-end technology into new markets. Technology Transfer Programme is born with the aim of supporting the creation of startups based in novel technology.

For more information on how Mobile Word Capital is boosting innovation please visit us at Congress Square 70 or <http://mventuresbcn.com/>.



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Collectively, our mSchools, mHealth, mLiving, mVenturesBcn programmes are positively transforming the health and education system, the industry, and the economy.

MWCcapital hosts the Mobile World Congress and delivers 4YearsFromNow [4YFN], a business platform for the startup community.



Come visit us at CONGRESS SQUARE 70 (CS70).

+Info at www.mobileworldcapital.com





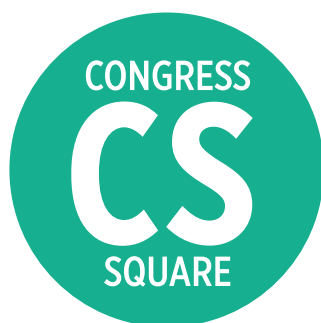
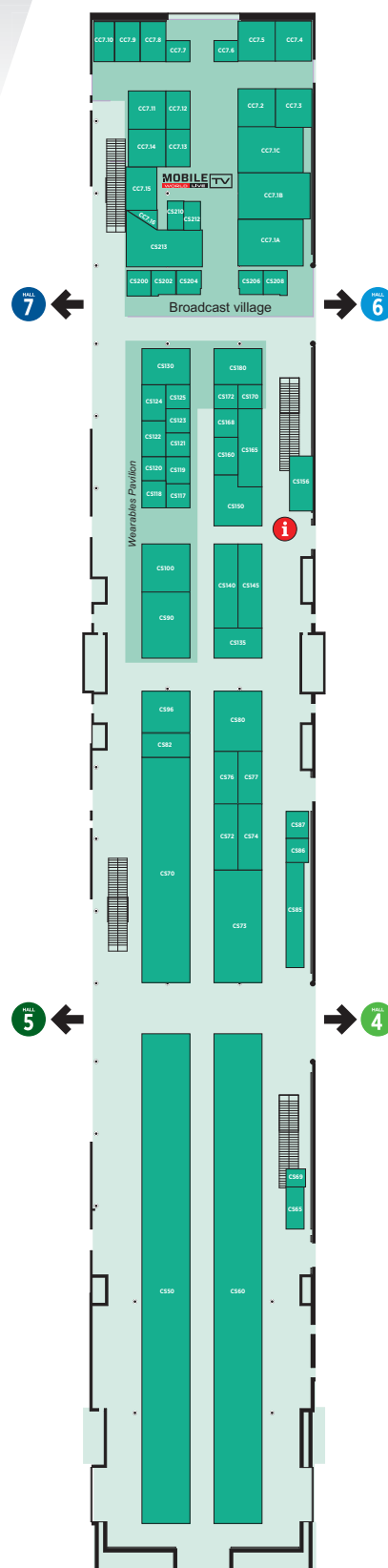
Stand: 3J22



Intel Paves the Way to 5G

Intel will announce new partnerships and technologies that will accelerate the road to 5G and help make amazing experiences of the future possible. The proliferation of smart and connected devices, data-rich personalized services, and cloud applications are placing unprecedented demands on wireless networks. Faster, smarter, more efficient 5G networks and technologies will be critical to support our devices, data and the incredible experiences they will enable. Working alongside key partners and applying its networking and wireless communications expertise, Intel will lay the path to 5G, enabling faster speeds, lower latencies, higher capacities and increased efficiencies – all essential for disruptive use cases including smart cities, telemedicine, autonomous driving and more.

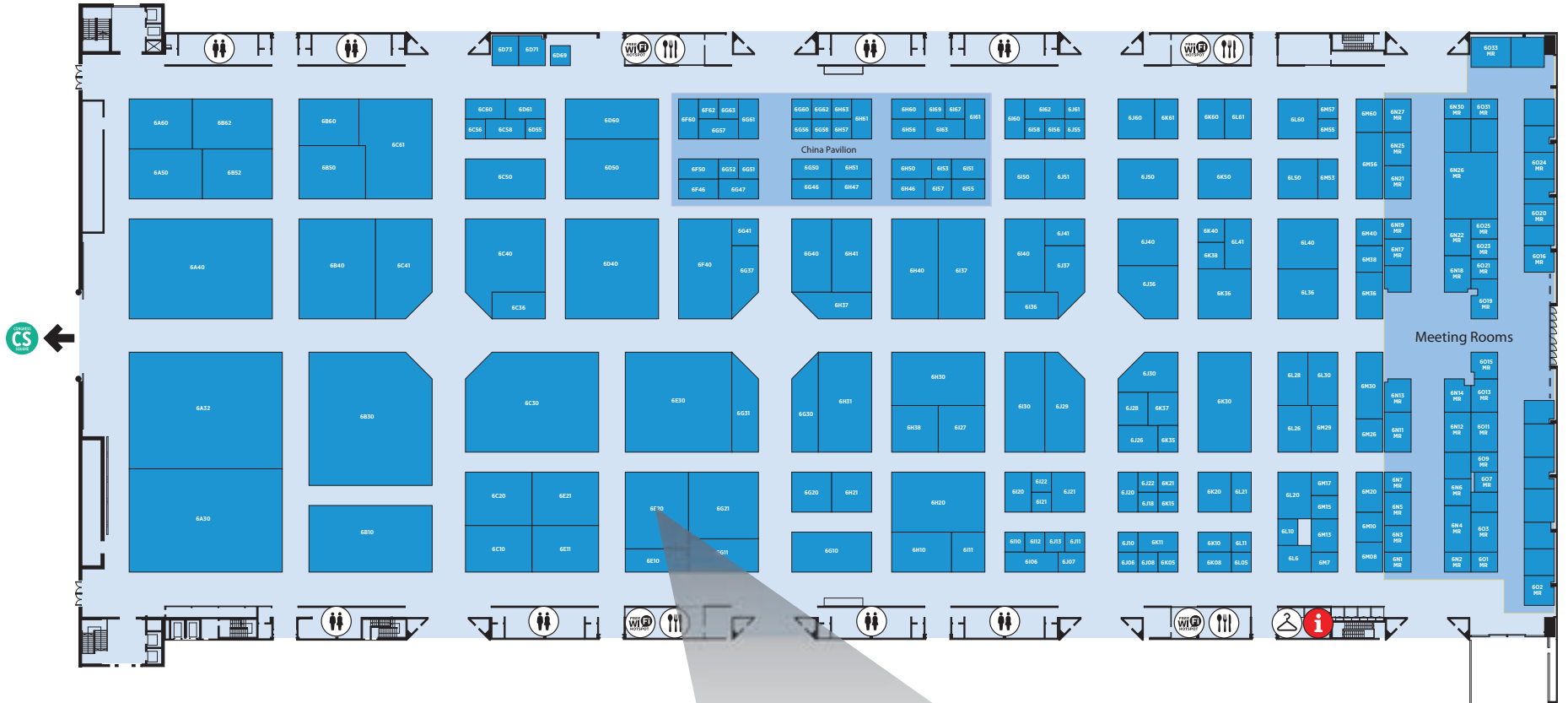
Visit Intel in Hall 3, Stand #3D30 for 5G demos.





HALL 5





HALL
6

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HALL
7





EXHIBITOR LISTING

| COMPANY NAME | STAND |
|--------------|-------|
|--------------|-------|

HALL 1

| | |
|---|------------------------------|
| 3D World | 1C19 |
| 5G Test Network Finland | 1E04 |
| A3&O Limited | 1F46 |
| Accanto Systems | 1E04, 2A44MR |
| Accenture | 1E40, 2H2, 2H20 |
| ACER EUROPE SA | 1G50 |
| Acsys Technologies Ltd | 1A08 |
| Akyumen Technologies Corp. | 1C04 |
| Altai Technologies Limited | 1G45 |
| ARCHOS SA | 1G29 |
| Argela | 1E19 |
| Article12 Technologies Inc. | 1A40 |
| ASMO Solutions | 1E04 |
| Assurant Solutions | 1C17, 2EMR.A1 |
| Bagel Labs co., Ltd. | 1C19 |
| BaiCells | 1A21 |
| Bango | 1E22 |
| BaseN | 1E04 |
| BIGDATAPUMP | 1E04 |
| Binbit | 1A30 |
| Blue Danube Systems | 1G11, 2A26MR |
| Boogie Software Oy | 1E04 |
| C Squared Systems, LLC | 1E50 |
| Capricode | 1E04 |
| Cataleya | 1C41 |
| CITI SAPI de CV | 1A30 |
| Cloudstreet | 1E04 |
| CÓATL | 1A30 |
| Comba Telecom | 1G45, 5A31 |
| Consejo para el Desarrollo de la Industria de Software de Nuevo León AC | 1A30 |
| Convergentia Ltd. | 1E04 |
| COS Phones | 1G2 |
| Creanord | 1E04 |
| Creoir Oy | 1E04 |
| Crucialtec co.,ltd. | 1C30 |
| Daegu Technopark(Mobile Technology Convergence Center) | 1C19 |
| Dai Nippon Printing Co., Ltd. | 1G30 |
| DDS, Inc. | 1H18 |
| Dhatim | 1G09 |
| Doria International Inc. | 1G08 |
| DUALi Inc. | 1F50 |
| Elisa Videra | 1E04 |
| epay, A Euronet Worldwide Company | 1G49 |
| Equal Experts | 1D41 |
| Ethertronics, Inc. | 1E20 |
| Exomi Oy | 1E04 |
| FastROI Oy | 1E04 |
| Fingerprint Cards | 1B42, 2A11MR, 2A13MR, 2A15MR |
| Finland Pavilion | 1E04 |
| Flitto | 1G5 |
| Ford-Werke GmbH | 1A38, 3C20 |
| FraSen Inc. | 1C19 |
| Gadmohe Interactive Limited | 1G45 |
| Gamma Nu Inc. | 1A12 |
| GOOD WAY TECHNOLOGY CO., LTD. | 1E12 |
| Goodix | 1F40 |
| Goonies | 1C19 |
| Graphite Software | 1E24 |
| Green Packet | 1G4 |
| Hannam University, ICT Marketing Center | 1A19 |
| Hanyang Information & Communications Co., Ltd. | 1E51 |
| HAOHAN Data Technology Co., LTD. | 1E49 |
| Hong Kong Applied Science and Technology Research Institute (ASTRI) | 1G45 |
| Hong Kong Science and Technology Parks Corporation | 1G45 |
| Honpe Technology(Shenzhen)Co.,Ltd | 1F49 |
| Huawei Technologies Co., Ltd. | 3I30, 1J50, 2EMR.A11, 8.0E80 |
| HZO Inc. | 1H19 |
| Iber-Cel | 1A30 |
| Iceblink Digital, Inc | 1D46 |
| ICT-CRC | 1C19 |
| Idealink Inc. (SMARTGOLF LLC) | 1C19 |
| IDEX ASA | 1H25, 2C8MR |
| IITP (Institute for Information & communications Technology Promotion) | 1C19 |
| ILIAS PROJECT Inc. Limited. | 1C19 |
| iMusicTech Limited | 1G45 |
| INCELL International | 1E09 |
| Indalgo | 1E04 |
| IndoorAtlas | 1E04 |
| Industryhack | 1E04 |
| INFACOM | 1D50 |
| Infinet Malta Ltd | 1E46 |
| INSight Power | 1C19 |
| Insta DefSec Oy | 1E04 |
| Inteqsoft/ Queretaro Mexico Information Technology Cluster | 1A30 |
| Interop Technologies | 1C02 |
| Invest Hong Kong | 1G45 |
| Invest in Finland | 1E04 |
| IT Health Co. Ltd | 1C19 |
| ixonos | 1E04 |
| JD SOUND INC | 1G3 |
| JDLab | 1E45 |
| JL-Soft Oy | 1E04 |
| JSpectrum Software Limited | 1G45 |
| Keysight Technologies | 1E10, 2M2 |
| KISED(Korea Institute of Startup & Entrepreneurship Development) | 1G3 |
| KnowRoaming Ltd. | 1A07 |
| Lenolink Telecommunication Co.,Ltd | 1F47 |
| LigoWave | 1H26 |
| Magconn Inc. / TennRich Intl. Corp. | 1C20 |
| MagmaLabs | 1A30 |
| Mammamia | 1C19 |
| Marvel Digital Ltd. | 1G45 |
| MediaMotive | 1A17 |
| MexicoIT/CANIETI | 1A30 |
| MobiSystems, Inc. | 1D48 |
| MYCOM OSI | 1A20 |
| MYMEDIA CO.,LTD. | 1C19 |
| Mypop Inc. | 1C19 |

| COMPANY NAME | STAND |
|--------------|-------|
|--------------|-------|

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|--|---------------------|
| NAES Group | 1C15 |
| Navigil Ltd | 1E04 |
| NEOPON | 1C19 |
| NEOPOP | 1C19 |
| Neowine Co., Ltd. | 1A15 |
| NETSCOUT | 1C40 |
| Neus | 1G45 |
| NTT DOCOMO, INC. | 1C39 |
| Nurugo | 1G6 |
| ONEm Communications | 1C29, CC8 8.18 Tues |
| Oy Cap-Net Finland Ab | 1E04 |
| P.I.Works | 1G20 |
| P2 Wireless Technologies | 1G45 |
| PCS Wireless | 1E30 |
| Piceasoft | 1E04, 2A5MR |
| PLATFORMBASE | 1F50 |
| Pluribus Networks | 1E05 |
| POSH Mobile | 1E30 |
| PricewaterhouseCoopers LLP. | 1A48 |
| Prinics co.,Ltd | 1F50 |
| Project People Limited | 1H09 |
| PrometalTech Co. LTD | 1E26 |
| ProMexico | 1A30 |
| Pulse Electronics | 1E04 |
| Quiubas Mobile SMS | 1A30 |
| Quuppa | 1E04 |
| RADWIN | 1G25 |
| RealNetworks, Inc | 1H42 |
| RippleBuds Inc. | 1C19 |
| RNware Co., Ltd. | 1C19 |
| ROKIT,inc. | 1E43 |
| Rugged Tooling | 1E04 |
| Sarokal Test Systems Oy | 1E04 |
| Securifi | 1E48 |
| Sense Of Intelligence | 1E04 |
| Sensire | 1E04 |
| Shenzhen RFLC Technology Co.,Ltd | 1H20 |
| Shuangdeng Group Co., Ltd | 1C14 |
| Sico | 1H07 |
| Sikur | 1G19, 8.1E33 |
| Small & medium Business Corporation (SBC) | 1F50 |
| Smartlink SA | 1H16 |
| Sofica Ltd. | 1E04 |
| Sunkyoung S.T Co., Ltd | 1F50 |
| Suwon | 1F50 |
| Taiwan External Trade Development Council (TAITRA) | 1D49, 7L81 |
| Tangoe | 1C16, 2B1MR |
| Taoglas Ltd | 1A11 |
| Taqua | 1H27 |
| Tekes - the Finnish Funding Agency for Innovation | 1E04 |
| Teleplan International N.V. | 1E03 |
| The Alpha Labs Co., Inc. | 1C19 |
| TOYO Corporation | 1G10 |
| TREEBYS CO., LTD. | 1C19 |
| UMVEN (Wow Venture) | 1D44 |
| Union Golden Rich | 1C19 |
| UROS – Uni-fi Roaming Solutions Ltd | 1E04 |
| Valor Communication, Inc. | 1C12 |
| Varaani Works Oy | 1E04 |
| Verkotan Ltd. | 1E04 |
| Vincit Oy | 1E04 |
| Voxox | 1H31 |
| VTT | 1E04 |
| We Software Limited | 1G45 |
| WebRadar | 1H21 |
| WEVERCOMM CO., LTD. | 1F50 |
| Wirepas | 1E04 |
| X Engineering | 1C19 |
| xEdu | 1E04 |
| XXLSEC | 1E04 |
| Yepzon | 1E04 |
| ZEPETRONIX | 1C19 |
| ZUP | 1C13 |

HALL 2

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|-----------------------------------|-------------------------------------|
| AAC Technologies featuring WiSpry | 2B40MR |
| Ab Initio Software | 2EMR.C5 |
| Accanto Systems | 1E04, 2A44MR |
| Accenture | 1E40, 2H2, 2H20 |
| AdaptiveMobile | 2B28MR |
| ADTRAN | 2EMR.K10, 2EMR.K8 |
| Advanced Micro Devices | 2B52MR |
| Affirmed Networks | 2C19MR |
| Airvana (now CommScope) | 2J30 |
| Allianz Global Assistance | 2EMR.B9 |
| Alpha Networks Inc. | 2B17MR |
| Altera, now part of Intel | 2B13MR |
| American Express | 2EMR.J7, 2EMR.J9 |
| Analog Devices International | 2EMR.D4 |
| Aria Systems | 2EMR.J6 |
| Aricent | 2EMR.L10, 2EMR.L8, 2EMR.M7, 2EMR.M9 |
| Artesyn Embedded Technologies | 2B9MR |
| Asavie | 7F70, 2B46MR |
| ASOCS | 2E46 |
| Assurant Solutions | 1C17, 2EMR.A1 |
| AudioCodes | 5E71, 2B54MR |
| Aviat Networks | 2B56MR |
| Azimuth Systems | 2A9MR |
| BehavioReal | 2E46 |
| BICS | 2E40 |
| BlackBerry | 2L20 |
| BLU Products | 2EMR.K7 |
| Blue Danube Systems | 1G11, 2A26MR |
| Boost Communications AS | 2J34MR |
| Brightstar | 2I20 |
| Broadcom Limited | 2B3MR |
| Brocade | 2G29 |
| BT | 2A38MR |
| BTI Wireless | 2D21MR |
| Capgemini Technology Services | 2EMR.B6 |
| Cavium, Inc. | 2M33 |

| COMPANY NAME | STAND |
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|---|---------------------------------------|
| CELISTICS HOLDINGS, S. A. | 2E36 |
| Cellwize | 2E46 |
| CENX | 2F50 |
| Ciena | 5C61, 2J51 |
| Cirrus Logic | 2F12 |
| Citigroup | 2EMR.A2, 2EMR.A4, 2EMR.A6 |
| Citrix | 2EMR.J10, 2EMR.J12, 2EMR.K11, 2EMR.K9 |
| Cohere Technologies | 2EMR.C11, 2EMR.C9 |
| CommScope | 2J30 |
| Consumer Physics | 2J32MR |
| Corephotonics | 2C9MR |
| Coriant | 2I30 |
| Coronet | 2E46 |
| Cradlepoint | 2D7MR |
| CTDI Europe | 2M37 |
| CYANOGEN, INC. | 2EMR.A12 |
| D-Link | 2D33MR |
| Deezer | 2B20MR, 2B22MR |
| Deloitte | 2EMR.D7 |
| Dialog Semiconductor | 2EMR.K4 |
| DMI (Digital Management Inc.) | 2C13MR |
| Dolby | 2J28 |
| Dropbox Ireland | 2B5MR, 2B7MR |
| DSP Group | 2A32MR |
| EMERSON NETWORK POWER | 2G13 |
| EQUINIX | 2EMR.B12 |
| ERICSSON | 2N60 |
| ESS Technology | 2C6MR |
| Etisalat | 2J20 |
| EUROTECH S.p.A. | 2A34MR |
| eVolution Networks | 2E46 |
| Evolving Systems | 2D10MR, 2D9MR |
| Federated Wireless | 2EMR.J8 |
| Fingerprint Cards | 1B42, 2A11MR, 2A13MR, 2A15MR |
| Firefox | 2EMR.E51, CC8.16 |
| Fon Wireless | 2EMR.L3 |
| FotoNation | 2A16MR, 2A18MR |
| Gameloft | 2C25MR |
| GENBAND | 2I31 |
| General Motors | 2EMR.B2 |
| Gfi Informatique | 2D37MR |
| Gilat Satellite Networks | 2E46, 2C17MR |
| Giraffic | 2E46 |
| Global Certification Forum (GCF) Ltd | 2EMR.D5 |
| GLOBALFOUNDRIES | 2A28MR |
| GSMA Managed Services | 2A2MR |
| Guavus | 2EMR.L1, 2EMR.L2 |
| Harman International Industries | 2K30 |
| HCL | 8.0E20, 2H30 |
| HERE Europe BV | 2EMR.C1 |
| HSBC | 2EMR.L11, 2EMR.L12, 2EMR.L9 |
| HUAQIN Telecom Technology Co.,LTD | 2B18MR |
| Huawei Technologies Co., Ltd. | 3I30, 1J50, 2EMR.A11, 8.0E80 |
| i-Blades | 2N21MR |
| iconectiv | 2D35MR |
| Icontrol Networks | 2B6MR |
| IDEX ASA | 1H25, 2C8MR |
| IMA | 5D60, 8.1B12, 2D60, 2E46, 2E60 |
| Infinera | 2EMR.B5, 2EMR.C6 |
| Ingram Micro | 2E37 |
| InMobi | 2B42MR |
| INRIX | 2EMR.J11 |
| INTEGRATED DEVICE TECHNOLOGY | 2B26MR |
| Intel Corporation | 3D30, 2EMR.D12, 4EMR.3, CC1 1.3 Mon |
| InvenSense | 2C16MR |
| ironsource | 2E46, 8.1A73, 8.1I48 |
| Italtel | 2G10 |
| Jacada | 2E46 |
| JMA Wireless | 2E08MR |
| Jolla Ltd. | 2EMR.K6 |
| Juniper Networks | 2I60, 2J61 |
| Kaltura | 2E46 |
| Keysight Technologies | 1E10, 2M2 |
| Knowles Corporation | 2B23MR |
| KPMG International | 2EMR.L5 |
| Kumu Networks | 2B27MR |
| KYOCERA Corporation | 2F60 |
| Lattice/SIBeam | 2EMR.M11 |
| LG Electronics | 3K20, 2K20, 2N19MR |
| Limitless Mobile | 2EMR.J2 |
| LinkedIn | 2A36MR |
| LONGCHEER TECHNOLOGY (SHANGHAI) CO.,LTD | 2C12MR |
| Luminate Wireless, Inc. | 2N2 |
| Luxoft | 2EMR.K5 |
| Mahindra Comviva | 2E39 |
| Maxim Integrated | 2EMR.D1, 2EMR.D3 |
| Mellanox | 5K29, 2D11MR |
| Metaswitch Networks | 2EMR.C10, 2EMR.C12, 2EMR.C8 |
| Micron | 2EMR.K3 |
| Microsemi Corporation | 2C27MR |
| Mirantis | 2A6MR |
| MitraStar Technology | 2B24MR |
| MobileIron | 2EMR.M10, 2EMR.M12 |
| Mosaik | 2C28MR |
| Mozilla | 2EMR.E51, CC8.16 |
| Myriad Group | 2EMR.B10 |
| NetComm Wireless | 2B19MR, 2B21MR |
| NetCracker Technology | 5G21, 2H31 |
| Netronome | 2N17MR |
| Neustar | 2B44MR, 2C15MR |
| Nextbit | 2N23MR |
| NGMN | 2B60MR |
| Noveto Systems Ltd | 2E46, 2D04MR |
| Nuro Secure Messaging | 2E46 |
| OASIS SMART SIM | 2D13MR, 2D15MR, 2D19MR |
| Ooredoo | 2H60 |
| Openet | 2F36 |
| OSRAM Opto Semiconductors GmbH | 8.1I59, 2EMR.B7 |
| Overture Networks | 2B32MR |
| Palo Alto Networks | 2EMR.J4 |
| PayPal | 2EMR.A3, 2EMR.A5, 2EMR.A8 |
| PCCW Global Ltd. | 2G26 |

| COMPANY NAME | STAND |
|--------------|-------|
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| PGI | 2EMR.E50 |
| Piceasoft | 1E04, 2A5MR |
| Pixelworks, Inc. | 2A3MR |
| Pontis | 2E46 |
| Qnovo | 2C5MR |
| Qorvo | 2I25 |
| Qwilt | 2B30MR |
| RAD | 2E46 |
| RADCOM LTD | 2E46 |
| Radware | 2E46 |
| Radyoos Media | 2E46 |
| Rambus | 2EMR.B1, 2EMR.B3 |
| Real Impact Analytics | 2K19MR |
| Red Hat | 2G30 |
| RingCentral | 2EMR.L6 |
| Salesforce | 2EMR.D50, 2EMR.D51, 2EMR.D52 |
| Samsung Electronics Networks | 2M10 |
| Samsung Semiconductor | 2F21 |
| SAS | 2C7MR |
| Screenovate Technologies | 2E46 |
| Sensirion AG | 2C10MR |
| Sercomm Corporation | 2D5MR |
| Shanghai Feixun Communication Co., Ltd. | 2EMR.K2 |
| Shanghai Tianma Micro-electronics Co.Ltd. | 2B2MR, 2B4MR |
| Shanghai Wind Communication Technologies Co.,Ltd. | 2A22MR |
| SHENZHEN HIPAD TELECOMMUNICATION TECHNOLOG CO.,LTD | 2A24MR |
| Shields | 2D17MR |
| Shine Technologies | 2B25MR |
| Sigma Systems | 2B15MR, 2C21MR |
| Sisvel Group | 2A42MR |
| Sivers IMA | 2C4MR |
| Skyworks Solutions | 2F18 |
| SLA Mobile | 2A30MR |
| Smartpipe Solutions Limited | 2B48MR |
| Smith Micro Software, Inc. | 2EMR.C2, 2EMR.C4 |
| Snype | 2I4 |
| Sony Europe Limited | 2EMR.C7 |
| Speedtest by Ookla | 2EMR.M8 |
| STC | 2G60 |
| SweetLabs | 2E06MR |
| Synaptics | 2G61 |
| Syniverse | 2G21 |
| Tangoe | 1C16, 2B1MR |
| Tanla Solutions Ltd. | 2EMR.B11 |
| Tata Communications | 5I81, 2H26 |
| Technicolor | 2F20 |
| Telenor Group | 2G20 |
| The Boston Consulting Group | 2A19MR |
| TIMWE | 2F40 |
| TM Forum | 2EMR.K1 |
| TRANSATEL | 2A10MR |
| Tropo, now part of Cisco | 2EMR.L7 |
| u-blox | 2B8MR, 2C1MR, 2C3MR |
| Unlockd | 2K21MR |
| Upstream | 2L1 |
| Verimatrix, Inc | 2EMR.C3 |
| VESA/DisplayPort | 2C23MR |
| Viavi Solutions | 6I37, 2EMR.D10, 6N18MR, 6N22MR, 6O19MR, 6O21MR, 6O23MR, 6O25MR |
| Vonetize | 5D81, 2D42 |
| WalkMe | 2E46 |
| Western Union Digital | 2C11MR |
| Wi-Fi Alliance | 2A08MR |
| Wireless Broadband Alliance | 2A12MR, 2EMR.B8 |
| Wistron NetWeb Corp. | 2C24MR |
| Yahoo | 2J29 |
| Yandex | 2EMR.L4 |
| Yulong Technologies (Hong Kong) Co., Limited | 2EMR.A9 |
| Zain | 2G31 |

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| Akamai Technologies | 3B30 |
| AMDOCS | 3G10 |
| AT&T | 3A31, 3A9MR |
| Beijing Shu Zi Jia Yuan Technology Limited | 3K4MR |
| Canonical | 3J30 |
| Cheil Germany GmbH | 3K6 |
| China Mobile Communications Corporation | 3A10 |
| Cisco | 3E30 |
| Dell Inc. | 3K30 |
| Deutsche Telekom AG | 3L20 |
| EyeVerify | 3K10 |
| Ford-Werke GmbH | 1A38, 3C20 |
| Global M2M Association | 3A11 |
| GSMA | 3A13 |
| GSMA | 3A11 |
| GSMA Innovation City | 3A11 |
| Hewlett Packard Enterprise | 3A20 |
| Huawei Technologies Co., Ltd. | 3I30, 1J50, 2EMR.A11, 8.0E80 |
| IBM | 3H30 |
| Intel Corporation | 3D30, 2EMR.D12, 4EMR.3, CC1 1.3 Mon |
| Jasper | 3A11, 3A6MR |
| KT | 3A11, 3A5MR |
| LENOVO | 3N30 |
| LG Electronics | 3K20, 2K20, 2N19MR |
| Microsoft | 3M30 |
| MOBI | 3H34MR |
| MWC Shanghai | 3C30 |
| NEC | 3N10, 3N11, 3N21, 3N31 |
| Nereus | 3N33MR |
| Nextivity Inc. | 3H32MR |
| NOKIA | 3D10 |
| Nokia | 3B10 |
| Oracle Corporation | 3B20 |
| QLogic Corporation | 3G2MR |
| Qualcomm Incorporated | 3E10 |
| Samsung Electronics | 3I10 |
| SanDisk | 3J22 |
| SAP SE | 3M41 |
| Sierra Wireless | 3A11, 3A1MR, 3A2MR, 3A3MR |
| SIMCom Wireless Solutions | 3K2MR |
| SK hynix Inc. | 3H10 |

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| COMPANY NAME | STAND |
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| SK Telecom | 3H10 |
| Sony Mobile Communications Inc. | 3M10 |
| Telefónica SA | 3J20 |
| VMware Inc. | 3K10 |
| Wind River UK Ltd | 3D30 |
| ZTE Corporation | 3F30 |

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| Asurion Europe | 4EMR.7 |
| BroadSoft, Inc | 4EMR.5, 4EMR.6 |
| GE Digital | 4EMR.1, 4EMR.2 |
| Intel Corporation | 3D30, 2EMR.D12, 4EMR.3, CCI 1.3 Mon |
| TeleCommunication Systems, Inc. | 8.0C25, 4EMR.4 |

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| 6WIND | 5H18, 5L15MR |
| A2IA | 5B41 |
| ABC-SmartCard | 5B61 |
| Accuris Networks | 5J80, 5M36MR |
| ACCUVER/INNOWIRELESS | 5M14MR |
| ACOME | 5B61 |
| Action Technologies Co., LTD | 5K20 |
| ADAX | 5H16 |
| ADIPSYS | 5B61 |
| Advantech | 5L16MR |
| Aerotel Medical Systems | 5F81 |
| AGold Communication (Shanghai) Co.,Ltd | 5K63 |
| Ai pashi communication limited | 5C80 |
| AIR-LYNX | 5A72 |
| AirHop Communications | 5L23MR |
| ALCINEO | 5B61 |
| Allot Communications | 5G41 |
| Altair semiconductor | 5L38MR, 5L39MR |
| Alvarion Technologies | 5E81 |
| AMARISOFT | 5K13 |
| Apliman Technologies | 5C82 |
| AppDome | 5E81 |
| Aptilo Networks | 5G66, 5L28MR |
| Aquitaine Science Transfert | 5B61 |
| Arcadyan Technology Corporation | 5H72 |
| AriadNEXT | 5B41 |
| ARKAMYS | 5B61 |
| ASCOT INDUSTRIAL SRL | 5J41 |
| Asentria Corporation | 5F73 |
| ASKEY COMPUTER CORP. | 5F11 |
| Aspenta | 5F41 |
| ATES Networks | 5B61 |
| Athonet SRL | 5M2MR |
| AudioCodes | 5E71, 2B54MR |
| AUSONIA Srl | 5J81 |
| Autofactory Inc. | 5E20 |
| AVSystem | 5K83 |
| BD Multimedia - Payment.net | 5B61 |
| Bittium | 5E40 |
| Blanco Technology Group | 5C45, 5L27MR |
| BlueWaveTel Co., Ltd | 5E20 |
| BoomeRing Communication (2005) Ltd. | 5D81 |
| BoostEdge SAS | 5B41 |
| Bretagne Commerce International | 5B41 |
| BroadView Communications | 5I31 |
| BUSINESS FRANCE / FRENCH TECH PAVILION | 5B41, 5B61, 8.1D41, 8.1E49 |
| CALLUP | 5E71 |
| CallVU | 5D81 |
| Cambridge Broadband Networks Ltd (CBNL) | 5H27 |
| Cartesian | 5L9MR |
| Casa Systems | 5C51 |
| CCI DES HAUTS-DE-SEINE | 5B61 |
| Celeno | 5E81 |
| Cell Buddy | 5D81 |
| Cellint Traffic Solutions | 5D81 |
| CellMining | 5C81 |
| CelPlan Technologies Inc., | 5I40 |
| Centile Telecom Applications | 5B81 |
| Ceragon Networks | 5G61, 5L17MR |
| ChannelVAS | 5H51 |
| Chubb | 5J76 |
| Ciena | 5C61, 2J51 |
| CIRPACK | 5B61 |
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| COM4INNOV | 5B61 |
| COMARCH | 5J50 |
| Comba Telecom | 1G45, 5A31 |
| Comigo | 5E71 |
| CommuniTake Technologies | 5E71 |
| Comptel | 5G40 |
| Consilience I | 5E20 |
| CopSonic | 5B61 |
| CSG International | 5B20 |
| cVidya | 5D81, 7F30 |
| Cybercom Group | 5J51 |
| CYSALYS | 5B41 |
| DATA2B | 5B41 |
| DATATRONICS, S.A. | 5F71 |
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| Deveryware | 5B41 |
| DialogTech | 5I31 |
| DigitalRoute | 5L5MR, 5L7MR |
| Digitata | 5C10 |
| DONGGUAN ARUN INTERNATIONAL | 5I70 |
| DTS Licensing Ltd. | 5I30, 5L13MR |
| DXO | 5B41, 5M6MR |
| Eastcompeace Technology Co., Ltd. | 5I20 |
| EBlink | 5B71 |
| ECI | 5F81 |
| Elgazala Technopark | 5I41 |
| Elitecore Technologies Pvt Ltd | 5I80 |
| EMEKGROUPTelekomünikasyonve | |
| Treyler Sanayi Ticaret Anonim Sirket | 5F61 |
| ENENSYS | 5B41 |

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| Enghouse Networks | 5J31 |
| Enigmmedia | 5J65 |
| Epiq Solutions | 5I31 |
| EpiWorks, Inc. | 5I31 |
| Epudo(DongGuan)Digital Technology Co.,Ltd | 5J08 |
| ERATO Wireless Audio CO., LTD | 5E70 |
| Escape Communications | 5I83 |
| ESET | 5B05 |
| Esprit | 5I41 |
| Essence | 5E71 |
| Etiya | 5F61 |
| EVISTEL | 5H30 |
| Exalinks S.A.S. | 5B61 |
| Expandium | 5B61 |
| eyeSight Technologies | 5D81 |
| F5 Networks | 5G11, 5L19MR, 5M16MR, 5M18MR |
| fathom | 5H80 |
| FeelgoodHousing Co.,Ltd. | 5E20 |
| Feitian Technologies Co., Ltd | 5J18 |
| FIBARO | 5J61 |
| FIGENSOFT | 5F61 |
| FIRSTAK | 5I41 |
| Flash Networks | 5D60 |
| Flytxt | 5I77 |
| FONYOU TELECOM | 5K81 |
| Friendly Technologies | 5E71 |
| Front Porch (Network Engagement) | 5K67 |
| Fujian Sunnada Network Technology Co.,Ltd. | 5G70 |
| Fujitsu | 5A40, 5L4MR, 5L8MR |
| Fuzhou Rockchip Electronics Co., Ltd. | 5D10 |
| G-Lab GmbH / Geneva Lab | 5B10 |
| Gemalto | 5A80 |
| Gemtek Technology Co., Ltd. | 5I26 |
| Get'IT | 5I41 |
| GIGASET PRO | 5B81 |
| GIROPTIC | 5B61 |
| Global Engineering Telecom | 5B41 |
| Globitel | 5H70 |
| Haltian | 5C43 |
| HEC Paris | 5B41 |
| Hefei Maniron Electronic and Technology Co., Ltd | 5I72 |
| Hesvit Health Tech Co., Ltd | 5I74 |
| Hewlett Packard Enterprise OpenNFV | |
| Partner Showcase | 5F31, CC8 8.19 Wed (AM) |
| Hi-Park Solutions LTD | 5D81 |
| Hisense International Co | 5E21 |
| Hoyos Labs | 5M38MR |
| HP Inc. | 5D31 |
| Humavox | 5F81 |
| HYTEM | 5B61 |
| I-New Unified Mobile Solutions AG | 5I15 |
| iBasis | 5L24MR |
| iJoon Co., Ltd | 5E20 |
| IMA | 5D60, 8.1B12, 2D60, 2E46, 2E60 |
| imVision | 5F81 |
| Infonova | 8.1B61, 5L11MR |
| INMobiles OFF-SHORE S.A.L | 5H11 |
| INNOPOLIS Foundation | 5E20, CCI 1.3 Wed |
| INNOPRESSO, Inc. | 5E20 |
| Innos Company Limited | 5K84 |
| Innovile Communications | 5F61 |
| Inovar | 5I50 |
| Intense Technologies | 5K51 |
| Intersec | 5B26 |
| INVEST IN PROVENCE COTE D'AZUR | 5B61 |
| INVEST, TRADE & INNOVATE | |
| IN LANGUEDOC-ROUSSILLON-MIDI-PYRENEES | 5B61 |
| Invigo Off-Shore SAL | 5I11 |
| ip-label | 5B41 |
| IPdIA | 5B61 |
| IPgallery | 5D81 |
| IPT PowerTech Group | 5J60 |
| IQP Corporation | 5D81 |
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| Israel Export Institute | 5C81, 5D81, 5E71, 5E81, 5F81, 5M30MR |
| Istanbul Chamber of Commerce | 5F61 |
| Istanbul Convention and Visitors Bureau | 5F61 |
| IT-Development | 5B41 |
| J2C Co., Ltd | 5E20 |
| Japan Radio Co., Ltd. | 5H76 |
| Jet Infosystems | 5K21 |
| JETMULTIMEDIA TUNISIE (DIGITAL VIRGO GROUP) | 5I41 |
| JpU | 5C81 |
| Kaspersky Lab | 5D11, CC8 8.18 Mon |
| Kenbotong Technology Co., Ltd. | 5G77 |
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| KID0Z | 5D81 |
| KocharTech | 5G27 |
| Kontron | 5H41 |
| KTB Solution | 5K12 |
| kwik | 5D81 |
| La-Mark Vision Ltd. | 5D81 |
| LANDOLSI TELECOM TECHNOLOGY - L2T | 5I41 |
| Legos - Local Exchange Global Operation Services | 5B61 |
| Lemko Corporation | 5I31 |
| Lexifone | 5C81 |
| LivingObjects | 5B61 |
| LOGICOM | 5K49 |
| Lucidlogix Technologies | 5F81 |
| LuxCarta | 5G23, 5L31MR |
| M2M Solution | 5B61 |
| Magisto | 5D81 |
| Malata Mobile | 5I60 |
| Mantu | 5F81 |
| MARTIN TELEKOM | 5F61 |
| MasterCard | 5D61, 5L21MR |
| mce Systems | 5C81 |
| MCR Media Group | 5D81 |
| MDS | 5I10 |
| MellanoX | 5K29, 2D11MR |
| MER-Cello Wireless | 5D81 |
| MOBI Antenna Technologies(SHENZHEN)Co.,Ltd | 5F75 |
| Mobile Tornado | 5E81 |

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| MobiMESH - WiFi Engagement | 5J63 |
| Monitorlinq Limited | CS96, 5L37MR |
| Movius | 5L3MR |
| MRV Communications | 5D81 |
| MyPermissions | 5D81 |
| NAMU Inc. | 5E20 |
| Narada Power Source Co.,Ltd | 5J22 |
| National Digital Certification Agency | 5I41 |
| nblisscomz, Inc. | 5E20 |
| NCC Group | 5H28 |
| Netas | 5F61 |
| NetCracker Technology | 5G21, 2H31 |
| NETGEAR | 5F21 |
| Netvision Telecom Inc. | 5E20 |
| NEWRACOM Inc. | 5E20 |
| Ningbo Yuda Communication Technology Co., Ltd. | 5D70 |
| NOV'IT | 5B41 |
| NowSecure | 5I31 |
| NTS RETAIL | 8.1B61, 5L29MR |
| Nubo Software | 5C81 |
| NuCurrent Inc. | 5I31 |
| OLEDCOMM | 5B41 |
| Omnitele Ltd | 5D40 |
| One Smart Star | 5D81 |
| ONOFF TELECOM | 5B41 |
| Oodrive | 5B41 |
| OpenCloud | 5E30 |
| OptoFidelity Ltd | 5C43 |
| Optulink, Inc. | 5I31 |
| Orange | 5A61 |
| P-OSS SOLUTIONS | 5J09 |
| Panamax Inc. | 5J70 |
| Pangea Money Transfer | 5I31 |
| Paris Ile-de-France Regional Chamber of Commerce and industry | 5B61 |
| PeerApp | 5M8MR |
| PETER-SERVICE | 5J21 |
| PetPace LTD | 5D81 |
| Pixagility | 5B61 |
| PKC Electronics Oy | 5J16 |
| Planet Network International | 5B61 |
| playthe.net | 5D09 |
| PLUSSH | 5B41 |
| Polaris Networks Inc | 5K50 |
| POLE STAR | 5B61 |
| PopPay, Inc. | 5E20 |
| Power HF Co., Ltd | 5D66 |
| PowerReviews | 5I31 |
| PRAGMA | 5B61 |
| PRINTSECURE | 5I41 |
| PRISMA | 5I41 |
| Procera Networks, Inc. | 5H61, 5M4MR |
| Procolombia | Z3B.2, 5M32MR |
| PROTEI | 5H20 |
| Q-Factor LTD | 5D81 |
| Qosmos | 5G31 |
| Qowiso | 5B41 |
| QUECELL | 5M12MR |
| Qvantel | 5A41 |
| Radisys | 5I61, 5M24MR |
| Raisecom Technology Co., Ltd | 5C11 |
| RCS - Rampal Cellular Stockmarket | 5F81, 5L22MR |
| Recommerce Solutions | 5B61, 5L26MR |
| RED TECHNOLOGIES | 5B41 |
| Redknee | 5C31 |
| Reeko Communication Technology Co., Limited | 5H81 |
| Reliefwatch | 5I31 |
| REVE Systems India Pvt Ltd | 5I05 |
| RFM WIRELESS | 5I73 |
| RoamSmart | 5I41 |
| Ruckus Wireless | 5E41 |
| SafeDK | 5D81 |
| Saft | 5I69 |
| Sagemcom | 5B61 |
| Saguna | 5C81 |
| Sandvine | 5I51 |
| scanovate | 5D81 |
| SCS Cluster / Pôle SCS | 5B61 |
| Secure-IC | 5B41 |
| Seju Engineering Co.,Ltd. | 5E20 |
| SELECOM | 5B61 |
| SELP | 5B61 |
| Sensineo | 5B61 |
| SERMA SAFETY & SECURITY | 5B61 |
| SETELIA | 5G17 |
| SHENZHEN BLEPHONE TECHNOLOGY CO., LTD | 5H74 |
| SHENZHEN CHUANGXINQI COMMUNICATION CO.,LTD | 5I36 |
| Shenzhen Crave Communication Co., Ltd | 5H73 |
| shenzhen cyber blue electronic co., limited | 5H26 |
| Shenzhen Diadem Technology Co.,Ltd | 5G68 |
| Shenzhen Fortuneship Technology Co.,Ltd | 5G81 |
| Shenzhen GrenTech Co., Ltd | 5J11 |
| Shenzhen Hengnuo I.O.T Tech Company Limited | 5G16 |
| Shenzhen Hilinks Technology Co.,Ltd. | 5K08 |
| Shenzhen Hong Ding investment development Co.,LTD | 5B83 |
| ShenZhen Huihong Export & Import Co.,Ltd | 5B84 |
| Shenzhen Iproda Technology Co.,Ltd | 5K06 |
| Shenzhen Landing Technology Co., Ltd | 5J71 |
| SHENZHEN PAN OCEAN NETWORK DEVELOPMENT CO.,LTD | 5K57 |
| Shenzhen Unistrong science&technology co.,Ltd. | 5K26 |
| Shenzhen Xin Kingbrand Enterprises Co., Ltd | 5H40 |
| Sichuan Province Langfeng Information Technology Co.Ltd | 5H71 |
| Siemens Convergence Creators | 5G71 |
| Simgo | 5D81 |
| SiNode Systems | 5I31 |
| Siradel | 5A70 |
| Sisteer | 5B41 |
| Six dee Telecom Solutions Pvt. Ltd. | 5K41 |
| SleepRate | 5E81 |
| Smartcom | 5B61 |
| SmartViser | 5B41 |
| Sofrecom | 5A61 |
| Solmittech Co., Ltd. | 5E20 |

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| SOPHOS | 5H31 |
| SOTI Inc. | 5B40 |
| SPB TV | 5D41 |
| Spirent Communications | 5E71 |
| SQream Technologies | 5E81 |
| STARDUST | 5B61 |
| Start Innovation | 5B82 |
| STATE OF ILLINOIS | 5I31, 8.1121 |
| StoreDot | 5F81 |
| StreamWIDE | 5C65 |
| Subex UK Limited | 5F10 |
| SUNPARTNER TECHNOLOGIES | 5B21 |
| SUNWAVE SOLUTIONS LIMITED | 5I67 |
| SuperCom | 5E81 |
| SURF Communication Solutions | 5F81 |
| Svyazcom | 5K28 |
| SyCy | 5B61 |
| Symbio | 5C43 |
| Synchronoss Technologies, Inc. | 5A21 |
| Systematic Paris-Region | 5B41 |
| Systems and Electronic Development FZCO (SEDCO) | 5H70 |
| SYSTRAN | 5B61 |
| Tango Telecom Ltd | 5L20MR |
| Tata Communications | 5I81, 2H26 |
| Tata Consultancy Services | 5E31 |
| Tech Mahindra | 5G51 |
| Techshino Europe B.V. | 5H83 |
| Tecnotree | 5L32MR |
| Tekoia | 5F81 |
| Telcap | 5B61 |
| Teleena | 5J20 |
| TELENITY | 5J66 |
| Telit Communications PLC | 5E61, 5M26MR |
| The Redeem Group | 5K11, 5M10MR |
| ThinkandGo | 5B61 |
| Tieto | 5L10MR |
| Trackimo | 5E81 |
| Transaction Network Services | 5L36MR |
| TTG INTERNATIONAL TELECOMMUNICATION SERVICES | 5F61 |
| Tunisia Export | 5I41 |
| Vasona Networks | 5J10 |
| Vaulto | 5D81 |
| Vedicis | 5B41 |
| VERSCOM SOLUTIONS | 5F61 |
| VESTEL | 5A81 |
| Vexigo | 5D81 |
| Viaccess-Orca | 5C71 |
| Vidmind | 5C81 |
| Vimmi Communications Ltd. | 5E71 |
| VisualOn Inc | 5L18MR |
| Vonetize | 5D81, 2D42 |
| W-HA | 5A61 |
| Wakingapp | 5D81 |
| Wipro Limited | 5C21 |
| Wireless Power Consortium | 5D42 |
| WiseSec Ltd. | 5D81 |
| Wulff Entre Ltd. | 5C41, 5E42 |
| Xilinx | 5L14MR |
| XOOLOO | 5B61 |
| XTALIC | 5K31 |
| ZetaPush | 5B41 |
| Zhilabs | 5M20MR |
| Zimperium, Inc. | 5C81 |
| ZyXEL Communications Corp. | 5G10 |

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| @-yet GmbH | 6B40 |
| 2direct GmbH | 6B40 |
| 2operate | 6C50 |
| 3Z Telecom | 6D61 |
| 4G Americas | 6016MR |
| 7layers | 6C56 |
| Accolade Technology | 6J61 |
| ADAPTIt S.A. | 6F46 |
| Airspan Communications | 6J30 |
| ALBEDO Telecom | 6K15 |
| Alcatel OneTouch | 6B10, 6C30 |
| Altistar | 6M56 |
| Altom Consulting SRL | 6H40 |
| AM3D A/S | 6C50 |
| ams AG | 6E20 |
| AMS Software & Elektronik GmbH | 6L05 |
| Anite | 6I50 |
| Anker Technology Co. Limited | 6K10 |
| Anritsu | 6F40, 6024MR |
| AppsCo | 6H20 |
| ARGENTINA | 6M26 |
| ARM | 6C10, CC8 8.19 Tues |
| Artiza Networks | 6K11 |
| Ascom Network Testing | 6L26 |
| AELSAN A.S. | 6G40 |
| ASTELLIA | 6G20 |
| avinotec GmbH | 6B40 |
| AVM GmbH | 6D60 |
| BEIJING ZHONGGUANCUN OVERSEAS | |
| SCIENCE PARK CO.LTD | 6G10, 709MR |
| BIC-IRAP / atene KOM GmbH | 6B40 |
| BQ | 6B52 |
| Cabrio Investment SRL | 6H40 |
| Cadence Design Systems | 6L36, 6M36, 6N14MR, 6O13MR, 6O15MR |
| CBS Interactive | 6O33MR |
| Celfocus | 6L40 |
| Cellebrite | 6H37 |
| CellMax Technologies | 6G37 |
| CellVision AS | 6H20 |
| CEVA, INC | 6A50 |
| CHECKD AS | 6H20 |
| Chemtronics | 6I11 |
| CI Mobile Minds GmbH | 6B40 |
| Clean Messaging | 6I58 |
| Cloudera | 6M30 |
| Cobham Wireless | 6D50 |

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| | |
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| COMLAB | 6K08 |
| COMPRION GmbH | 6I20 |
| Computaris International Ltd | 6N6MR |
| Computaris Romania | 6H40 |
| cPacket Networks, Inc. | 6M08 |
| CPS.HUB NRW | 6B40 |
| Cumulocity GmbH | 6B40 |
| Dali Wireless | 6J60 |
| Danish IT Industry Association | 6C50 |
| Dantracker Technology Company ApS | 6C50 |
| Dapredi Soft Systems | 6H40 |
| Deltanode Solutions AB | 6I22 |
| Dencrypt | 6C50 |
| DEUTSCHE POST AG | 6B40 |
| Dialogic | 6B62 |
| Digilink Technology Co.,Ltd | 6I57 |
| Dmax Electronic Technology Co.,Limited | 6I69 |
| Düsseldorf, City of | 6B40 |
| Eahison Communication Co.,Ltd | 6G6I |
| EC SYSTEM | 6D69 |
| EDCH | 6L60 |
| Elliptic Laboratories AS | 6H20 |
| Empirix | 6C20 |
| Energy Sistem Technology | 6M29 |
| eta automatizari industriale | 6H40 |
| Evozon Systems | 6H40 |
| EXFO | 6K36 |
| F-Secure | 6B60 |
| Focus Infocom GmbH | 6J1I |
| Forsk | 6J20 |
| Foshan Amplitec Tech Development Co.,Ltd | 6H60 |
| FROG CELLSAT LIMITED | 6J06 |
| Fujian Helios Technologies Co.,Ltd | 6F46 |
| G DATA Software AG | 6B40 |
| GSMK CRYPTOPHONE | 6J07 |
| Guizhou Sunshine Photoelectric Group Co., Ltd. | 6J40 |
| Haier telecom Co.,Ltd | 6K30 |
| Hansen Technologies | 6C50 |
| Hansen Technology Co., Ltd. | 6I53 |
| Hanwang Technology Co., Ltd | 6G5I |
| Hitachi | 6G2I |
| Hong Kong Topwise Communications Limited. | 6G46 |
| Huadoo Bright Group Ltd. | 6H2I |
| Ibys Technologies | 6I10 |
| iGlobalTracking AS & Tetronik GmbH | 6H20 |
| Imagination Technologies | 6E30 |
| IMG Communication Technology Co.,Ltd | 6C58 |
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| Innovation Norway | 6H20 |
| INVEST IN DENMARK | 6C50 |
| IPM HK LIMITED | 6J13 |
| ipoque, a Rohde & Schwarz company | 6B50 |
| IT SIX GLOBAL SERVICES | 6H40 |
| Ixia | 6M15, 6N4MR |
| Jiangsu Hengxin Technology Co.,Ltd | 6H47 |
| Jiangsu Trigiant Technology Co., Ltd | 6G56 |
| JQL Electronics Inc | 6H57 |
| Kaelus | 609MR |
| KATHREIN-Werke KG | 6J36 |
| KLEOS | 6L30 |
| Li Tong Group | 6M38 |
| LitePoint | 6N5MR, 6N7MR |
| LS telcom | 6L1I |
| M&M MEDIANET | 6H40 |
| Materna GmbH | 6B40 |
| MAX4G | 6D55 |
| MeaWallet AS | 6H20 |
| MediaTek Inc. | 6E2I |
| Message Mobile GmbH | 6B40 |
| Microlab | 6K05, 607MR |
| Microtel Innovation srl | 6K6I |
| Mobile Atlanta | 6L6I |
| Mobileum, Inc. | 6H4I |
| MODELABS MOBILES | 6D73 |
| Moota Telecom AS | 6H20 |
| Morpho | 6G30, 6N12MR, 6N2MR, 6011MR |
| MSI - Mobile Systems International | 6L2I |
| MTI Wireless Edge Ltd. | 6J22 |
| Mymo Wireless Technology Pvt Ltd | 6I12 |
| N.A.T. GmbH | 6B40 |
| Napatech | 6J2I |
| Narda Safety Test Solutions GmbH | 6M40 |
| Nash Technologies GmbH | 6L4I |
| National Instruments | 6L50, 6N21MR |
| NEXT Biometrics AS | 6H20 |
| Nihon Dengyo Kosaku, Co., Ltd. | 6J5I |
| Nordic Semiconductor | 6H20 |
| Norwegian Computing Center | 6H20 |
| NRW.International GmbH | 6B40 |
| NRW.INVEST GmbH | 6B40 |
| NuAns | 6M60 |
| OBERTHUR TECHNOLOGIES | 6H30, 6I27, 6I30, 6N26MR |
| Obi Worldphone | 6A60 |
| OCRMO TECHNOLOGY INC | 6H40 |
| ONIX | 6L6 |
| Opencode Systems | 6I36 |
| Openwave Mobility | 7C70, 6N11MR |
| OPTICOM GmbH | 6M20 |
| Otter Products EMEA | 6N1MR, 6N3MR |
| P2i | CS165, 6N17MR |
| Panasonic System Communications Company Europe | 6H3I, 602MR |
| Panorama Antennas Ltd | 6J10 |
| PCTEST and ART-Fi | 6I56 |
| POLYSTAR | 6G3I |
| Power Idea Technology (Shenzhen) Co., Limited | 6H46 |
| Prisma Telecom Testing | 6G4I |
| QiTASC GmbH | 6M13 |
| QRC Technologies | 6J55, 6031MR |
| QROi | 6L28, 6N19MR |
| Qualigon GmbH | 6B40 |

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| QUALITY TECHNOLOGY INDUSTRIAL CO., LTD | 6I55 |
| Raycap Inc. | 6K20 |
| Relia Communication Equipment Co., Ltd | 6G63 |
| Rflight Communication Electronic Co., Ltd | 6G6I |
| Rohde & Schwarz | 6B50, 6C40 |
| Romanian Association for Electronics and Software Industry - Timisoara Branch (ARIES-TM) | 6H40 |
| ROPARDO | 6H40 |
| Rosberg System | 6H20 |
| Rosenberger Hochfrequenztechnik GmbH & Co. KG | 6G37 |
| RWTH Aachen University | 6B40 |
| Samsung | 6A30 |
| Sanjole Inc. | 6M53 |
| Seagate CSSG / formerly Dot Hill Systems | 6I2I |
| Secusmart GmbH | 6B40 |
| Seluxit ApS | 6C50 |
| SevOne Inc | 6020MR |
| Shenzhen AAPPAA Technology Co.,Ltd | 6I60 |
| Shenzhen Banana Technology Co.,Ltd | 6G57 |
| Shenzhen Cheng Fong Digital-Tech Ltd | 6I63 |
| SHENZHEN GOTRON ELECTRONIC CO., LTD | 6G62 |
| SHENZHEN HONGKAIJIAWEI TECHNOLOGY CO.,LTD | 6H63 |
| ShenZhen Huano Mobile Technology Co.,Ltd | 6I6I |
| Shenzhen Huaptec Co.,Ltd | 6G47 |
| Shenzhen JEKO Technology Co., Ltd. | 6I62 |
| ShenZhen JINGFENG WEIYE Technology Co.,Ltd | 6L10 |
| Shenzhen Jinxingyuantong Digital Tech. Co., Ltd | 6M7 |
| Shenzhen Joyplus Technology Co., LTD | 6I5I |
| Shenzhen KEP Technology Co., Ltd | 6I67 |
| Shenzhen Kinstone D&T Develop Co., Ltd | 6F50 |
| Shenzhen Luckystar Digital Technology Co., Ltd | 6G58 |
| Shenzhen Neostra Technology Co.,Ltd. | 6G50 |
| SHENZHEN POMP TECHNOLOGY CO.,LIMITED | 6G52 |
| Shenzhen Shouxin Tongda Electronics Co., Ltd | 6H56 |
| Shenzhen United Time Technology Co., Ltd | 6H5I |
| Shenzhen WJM Silicone&Plastic Electronic CO.,LTD | 6F62 |
| SIAE MICROELETTRONICA | 6J29 |
| Sichuan Jiuzhou Electric Group Co.,Ltd. | 6H50 |
| SIGOS GmbH | 6H38 |
| SIMARTIS TELECOM SRL | 6H40 |
| SISWOO LIMITED | 6E10 |
| SOFTECH | 6H40 |
| SOLITON SYSTEMS K.K. | 6K60 |
| Sonus | 6G1I |
| Spectronite | 6L30 |
| Speed Communication Equipment Co.,Ltd (Smalt Technology Co.,Ltd) | 6H6I |
| Sphinx IT | 6H40 |
| Splirent Communications | 6J37 |
| Sprocomm Technologies CO.,LTD | 6K50 |
| Sunsight Instruments LLC | 6K40 |
| SuperD Co., Ltd. | 6E1I |
| Synopsys, Inc | 601MR, 603MR |
| Systemics-PAB sp. z o.o. | 6J28 |
| Tarana Wireless | 6K2I, 6N13MR |
| Tech Data Mobile | 6A40 |
| TeleTrusT – IT Security Association Germany | 6B40 |
| TEM MOBILE LIMITED | 6M10 |
| Testplant | 6J4I |
| The Eye Tribe | 6C50 |
| Thin Film Electronics | 6H20 |
| Tongyuu Communication Inc. | 6C36 |
| Trustonic | 6I40 |
| V3D | 6K38 |
| VALID | 6J50 |
| Vector Data | 6J18 |
| Viavi Solutions | 6I37, 2EMR.D10, 6N18MR, 6N22MR, 6019MR, 6021MR, 6023MR, 6025MR |
| Victorfon | 6C50 |
| Viettel Group | 6C6I |
| Visa Inc. | 6D40 |
| Visual Fan S.r.l. | 6H40 |
| VITSMO Co., Ltd. | 6I1I |
| Vodafone España S.A.U | 6B30 |
| Voipfuture | 6M17 |
| W2BI, Inc. (an ADVANTEST Group Company) | 6K37 |
| WIKO | 6A32 |
| WIT Software SA | 6C60 |
| WOLDER | 6L20 |
| WUHAN FINGU ELECTRONIC TECHNOLOGY CO. LTD. | 6J26 |
| Wuhan Gewei Electronic Technologies Co. Ltd. | 6K35 |
| WUHAN GREENET INFORMATION SERVICE CO.,LTD. | 6G60 |
| XCom Global | 6M55 |
| zafaco GmbH | 6B40 |
| Zylinc | 6C50 |
| Zynk Software Srl | 6H40 |

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| 6Harmonics Inc. | 7K50 |
| 87seconds sprl | 7G7I |
| A1 Systems | 7J27 |
| AAUXX | 7G6I |
| Absolute | 7H4I |
| Acadine Technologies | 7A1I |
| Accelleran | 7G7I |
| Actuator Solutions GmbH | 7M37 |
| Acuragate | 7G7I |
| adsquare GmbH | 7L5I |
| ADVA Optical Networking | 7H3I |
| Advantech Wireless | 7B25 |
| Aequilibrium Software Inc. | 7H4I |
| Ahope Co., Ltd. | 7G6I |
| airG Inc. | 7H4I |
| AirWire Technologies, Inc. | 7D8I |
| AIT Corporation | 7J28 |
| Alberta Government | 7H4I |
| Alepo | 7E14 |
| Alerant Inc. | 7M43 |
| Alpha Wireless | 7D80 |
| Amino Communications | 7C80 |
| AMPHENOL ANTENNA SOLUTIONS | 7C68 |

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| Anam Technologies | 7F70 |
| ANT Wireless | 7M49 |
| APP MEDIA | 7L5I |
| AppCarousel | 7H4I |
| Appland | 7E4I |
| Applicata | 7H10 |
| APPTIVATOR | 7G7I |
| Arcinteractive Inc. | 7E2I |
| Aria Networks | 7C86 |
| Art and Technology Holdings. Co.,LTD | 7E2I |
| Asavie | 7F70, 2B46MR |
| AsialInfo | 7B5I |
| Aspire Technology | 7F70 |
| AT4 wireless | 7H15 |
| Atlantis Internacional, S.L | 7E20 |
| Atos | 7N65 |
| ATTO RESEARCH | 7M03 |
| AttoCore | 7K07 |
| Aurora Innovation | 7E4I |
| Avanti Communications Group plc | 7B4I |
| Avertim | 7G7I |
| AWEX BARCELONA | 7G7I |
| AWEX The Wallonia Foreign Trade and Investment Agency | 7G7I |
| Awingu | 7G7I |
| Azcom Technology | 7G2I |
| BBB | 7M02 |
| Beijing Dynamic Power Co., Ltd. | 7M22 |
| BEIJING ZHONGGUANCUN OVERSEAS SCIENCE PARK CO.LTD | 6G10, 709MR |
| BELGIUM - BÉLGICA | 7G7I |
| Bell ID | 7J3I, 7028MR |
| Benetel | 7F70 |
| BERLIN.mobile c/o Berlin-Brandenburg | 7L5I |
| Binatone Electronics (Official Motorola licensee) | 7F8I |
| BLINQ | 7I5I |
| BLUEPIN Co., Ltd. | 7E2I |
| Brainstorm Mobile Solutions | 7C70 |
| Brandenburg Economic Development GmbH (ZAB) | 7L5I |
| BridgeGateData | 7H4I |
| Bright Creations | 7F3I |
| Broadband 4 Africa Ltd | 7C70 |
| BRUSSELS INVEST & EXPORT | 7G7I |
| BRUSSELS INVEST & EXPORT SPAIN | 7G7I |
| BSB POWER COMPANY LIMITED | 7M28 |
| BugFinders | 7B19 |
| BUJEON Electronics Co.,Ltd. | 7G6I |
| Business Sweden | 7E4I, 7F4I |
| CACI | 7C70 |
| Cambridge Consultants | 7B2I |
| Carta Worldwide | 7I5I |
| Case Station | 7G4I |
| CasePower | 7F4I |
| castLabs | 7L5I |
| CCS | 7B67, 7P36MR |
| CCww (Communications Consultants Worldwide) | 7C13 |
| CE+T Power | 7G7I |
| CEKO Co., Ltd | 7G6I |
| Cellular Italia S.p.A. Single Shareholder Company | 7E5I |
| cellXica Ltd | 7K07, 701MR |
| Celly S.p.A | 7E19 |
| Cerillion | 7B6I |
| Cesanta | 7F70 |
| CETECOM | 7L65 |
| ChongQing Wasam Free-minded Times Industrial Co., Ltd. | 7E08 |
| CICS AB - Customer Intelligence Consulting & Services | 7F4I |
| Cigniti Technologies | 7C73 |
| Clearbridge Mobile | 7K50 |
| CLOUDALIZE | 7G7I |
| Cluep | 7I5I |
| CLX Networks | 7G60 |
| COELMO spa | 7M20 |
| Cognizant | 7E4I |
| Coiler Corporation | 7F7I |
| Colony Networks Inc. | 7H4I |
| Combain Mobile AB | 7E4I |
| CommAgility | 7C88 |
| Commsquare | 7G7I |
| Communication Components Antenna Inc. | 7K50 |
| Compuverde | 7E4I |
| Connio Inc. | 7H4I |
| Contela, Inc. | 7G6I |
| Contentful | 7L5I |
| Copper Horse Solutions Ltd | 7C70 |
| COSTER Co.,Ltd. | 7J08 |
| CrowdCare Corporation | 7K50 |
| Crunchfish | 7E4I |
| Cubic Telecom | 7F70 |
| Cummins Power Generation | 7M16 |
| CUPP Computing AS | 7K43 |
| Curate Mobile Ltd. | 7I5I |
| cVidya | 5D8I, 7F30 |
| Dahl Sweden Mobile Technology AB (publ) | 7F4I |
| DASAN Network Solutions | 7G6I |
| DataWind | 7H40 |
| DBM MAROC | 7J6I |
| Deverto Systems Ltd. | 7M43 |
| Dial Technologies | 7J6I |
| Digital Virgo | 7J6I |
| DIGITALK | 7C70 |
| Disruptive-Digital-Studio | 7G7I |
| DM TELECOM | 7J6I |
| DNX Co., Ltd. | 7G6I |
| Doro AB | 7A8I |
| DPA technology Spain | 7M04 |
| DragonWave Inc. | 7E12 |
| Dream Payments | 7J2I |
| Druid Software | 7F70 |
| E-LINK TECHNOLOGY CO.,LTD | 7M36 |
| EANTC | 7L5I |
| Edgetier | 7F70 |
| Edgewater Wireless | 7K50 |
| Egis Technology Inc. | 7K20 |

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| ELAN Microelectronics Corp. | 7G68 |
| Electro Rent Europe | 7G7I |
| Electronics and Telecommunications Research Institute(ETRI) | 7N63 |
| Embassy of Canada to Spain | 7H40, 7H4I, 70I2MR, 70I5MR, 7027MR |
| Emixis | 7G7I |
| Emnify | 7L5I, 707MR |
| ENABIL Solutions Ltd. | 7H4I |
| Encore Repair Services LLC | 7C67 |
| Enea Software AB | 7J30 |
| Energic Plus | 7K25 |
| EnSilica | 7C70 |
| Enterprise Ireland | 7F70 |
| Epson Europe BV | CS100, 7P14MR, 7P16MR |
| Equiendo Ltd | 7F70 |
| ERCOM | 7J40 |
| ESCAUX | 7G7I |
| Escher Group | 7F70 |
| eServGlobal | 7I6I |
| Europlasma NV | 7M55 |
| EVE Energy Co., Ltd. | 7K27 |
| Eventbase | 7H4I |
| Expeto Wireless Inc. | 7H4I |
| Export Development Canada | 7H40 |
| Fab-straps (Gmrlens bvba) | 7G7I |
| Fastback Networks | 70I9MR |
| FIME | 7J10 |
| Flanders Investment & Trade | 7G7I |
| FLANDERS INVESTMENT & TRADE | 7G7I |
| FlexGroups | 7H40 |
| FlexiTon Ltd. | 7M43 |
| Fliplet | 7B87 |
| Flybits, Inc. | 7K50 |
| Fonesalesman | 7K06 |
| Franklin Wireless | 7K63 |
| Fraunhofer HHI | 7G3I |
| Fraunhofer IIS | 7G3I |
| FUEL Mobile | 7H4I |
| FULL Enterprise Corp. | 7N8I |
| FusionPipe Software Solutions Inc. | 7H4I |
| FUTURE PRODUCT DESIGN a.s. | 7D68 |
| GADMEI ELECTRONICS TECHNOLOGY | 7J32 |
| Galtronics, A Baylin Technologies Company | 7K50 |
| Garmin | CS90, 7025MR |
| GeoPal | 7F70 |
| GETNORD RUGGED PHONES | 7K8I |
| Giesecke & Devrient | 7A4I, 7P18MR |
| Gionee Communication Equipment Co., Ltd. Shenzhen | 7C50, 7C6I |
| Giza Systems | 7F3I |
| glispa | 7L5I |
| Global Device Network | 7G37 |
| Global Wireless Solutions, Inc. | 7H12 |
| Golla Oy | 7C4I |
| GREAT Britain Pavilion | 7C70, 7033MR, 7P38MR, 7P40MR |
| Green Power Electronics Co., Ltd. | 7G6I |
| Greenwave Systems | 7K78, 7023MR |
| Guangdong OPPO Mobile Telecomm. Corp., Ltd. | 7A80 |
| Guangzhou Sunruo Film Co.,Ltd | 7M08 |
| GuardSquare | 7G7I |
| Hama GmbH & Co KG | 7C4I |
| HANCOM Inc. | 7G6I |
| Hancom Secure Inc. | 7G6I |
| HancornGMD Inc. | 7G6I |
| HANK ELECTRONICS CO., LTD | 7K5I |
| HAUD | 7K65 |
| HEAD acoustics | 7K74 |
| Heliocentris Industry GmbH | 7K3I |
| Herbert Richter GmbH & Co. KG | 7K72 |
| HeyStaks | 7F70 |
| HIPA (Hungarian Investment Promotion Agency) | 7M43 |
| HK TIANRUIXIANG COMMUNICATION EQUIPMENT LIMITED | 7H2I |
| HOI MEA | 7F3I |
| Hootsuite | 7H4I |
| HTC Corporation | 7A40, 7A60 |
| Hungarian National Trading House | 7M43 |
| i-Retail | 7J18 |
| iBwave Solutions Inc | 7C7I |
| ICT Association of Manitoba (ICTAM) | 7H4I |
| ICT West | 7H4I |
| IEEE | 7L7I |
| IEI Integration Corp. | 7J15 |
| imec | 7G7I, 7017MR |
| Imint / Vidhance | 7F4I |
| ImmerVision | 7011MR |
| iMobMedia | 7F70 |
| Incognito | 7H4I |
| Infobright | 7I5I |
| INFOMARK | 7G6I |
| INFOPOLE Cluster TIC | 7G7I |
| Information Technology Industry Development Agency (ITIDA) | 7F3I |
| Infotecs GmbH | 7L5I |
| InfoVista | 7G40 |
| Infradata | 7G7I, 706MR |
| INGECYS TELECOM | 7J6I |
| Ingenico Group | 7J43 |
| Ingenious Technologies AG | 7L5I |
| Inhance Technology | 7F70 |
| InnJoo Technology L.L.C | 7C05 |
| interactive digital media GmbH | 7G70 |
| Intercede | 7B8I |
| InterDigital | 7A7I |
| Intex Technologies (India) Ltd. | 7B44, CC1.2 Mon |
| Intracom Telecom | 7B54 |
| ip.access Ltd | 7C60 |
| iPay International Limited | 7E3I |
| iProof | 7C14 |
| Itos Technology, S.L | 7J16 |
| IxDS GmbH | 7L5I |
| Jamo Solutions NV | 7G7I |
| JonDeTech AB | 7F4I |
| Joy Electronics Appliances (Zhuhai) Co., Ltd | 7I94 |
| JSC Ingenium | 7M13 |
| k-free Technology Limited. | 7M25 |

EXHIBITOR LISTING

| COMPANY NAME | STAND | COMPANY NAME | STAND | COMPANY NAME | STAND | COMPANY NAME | STAND |
|---|----------------|---|--------------|--|------------------------------|--|----------------------------|
| KABELWERK EUPEN AG | 7G71 | Seglan | 7J05 | WIP Factory | 7H41 | Open Interconnect Consortium | 8.0C35, 8.0E62MR |
| KDLAB Inc. | 7G61 | Sendum Wireless Corp | 7H41 | Wirecard | 7K30, 7O8MR | OpenX | 8.1F70, 8.0A37MR |
| Kernel-i Co., Ltd. | 7G61 | Sentinel Alert | 7H41 | Wittra AB | 7F41 | ORBCOMM | 8.0G11 |
| Kingcomm Technology Co., Limited | 7G05 | SEONTECH | 7G61 | World Telecom Labs | 7G71 | Pantheon pro GmbH | 8.0I23 |
| Kisan Telecom Co., Ltd. | 7G76 | SEQR Portugal | 7E41 | WORLDLINE | 7N65, 7N89MR, 7O34MR | PanzerGlass | 8.0G19 |
| Koonsys Ltd. | 7M43 | Sequans Communications | 7I81 | Wray Castle Limited | 7B17 | Pomeranian Science and Technology Park Gdynia | 8.0C49 |
| KOTRA(Korea Trade-Investment Promotion Agency) | 7G61, 7O24MR | Shanghai Tricheer Technology Co.,Ltd | 7H22 | Wyless | 7O35MR | Qube-OS srl | 8.0K7 |
| LabSat by Racelogic | 7H18 | ShareWork | 7E41 | Xceed | 7F31 | Robert Bosch Car Multimedia GmbH | 8.0D33 |
| Laird | 7B85 | Shenzhen ACT Industrial Co.,Ltd | 7M09 | XINTEC | 7F70 | Safe Host | 8.0G20 |
| Lanner Electronics Inc. | 7E06 | Shenzhen Ankede Communication Technology Co.,Limited | 7K70 | XINYI SMART CARD CO.,LTD | 7M32 | Safe4 Security Group AS | 8.0D10 |
| Lime Microsystems | 7O36MR, 7O37MR | Shenzhen Bmorn Technology Co.,ltd | 7K68 | Xoanon Analytics AB | 7F41 | Shanghai Notion Information Technology CO.,LTD | 8.0J34 |
| Limes Audio | 7E41 | Shenzhen Boway Electronics Co., Ltd | 7L61 | Yagram Health | 7G71 | Shenzhen Feipu Communication Technology Co.,Ltd. | 8.0I6 |
| Linquet | 7H41 | Shenzhen Bravo Technology Co.,Ltd | 7J63 | YAP Company | 7G61 | SIGFOX | 8.0C10, 8.0A35MR |
| LogiSense Corporation | 7K50 | Shenzhen Chuangwei Electronic Appliance TECH Co.,Ltd | 7J38 | Yeahmobi | 7K05 | Simulity Labs Ltd | 8.0D25 |
| Loyaltek SA | 7G71 | Shenzhen COTRAN New Material Co., Ltd | 7M01 | Ying Tai Eeltronics Co.,Ltd | 7L76 | Sizmek | 8.0J23, 8.0A29MR |
| Lumata | 7O32MR | Shenzhen Cylan Technology Co., Ltd. | 7N67 | YouAppi | 8.1H13, 7O5MR | SpectrumMAX | 8.0I7 |
| Made in Mind - Mu | 7C70 | Shenzhen DBK Electronics Co., Ltd. | 7M45 | Youxel Technology | 7F31 | SpotX | 8.0F15 |
| mADme | 7F70 | Shenzhen Envicool Technolgy Co.,Ltd | 7K15 | YuTong Intelligent Technology Co., Ltd | 7K41 | STICKGO | 8.0H20 |
| MAG Consulting | 7F31 | ShenZhen Honestda Electronic Co.,Ltd | 7N60 | Zhejiang Ebang communication co., ltd | 7D76 | Structured Data Systems Limited | 8.0F10 |
| Maroc Export | 7J61 | SHENZHEN HUIHUA EXPLOIT TECHNOLOGY CO.LTD | 7M19 | Zhuhai XH Smartcard Co., Ltd | 7D61 | Swag Technologies Sdn Bhd | 8.0J20 |
| MATRIXX Software | 7F60 | ShenZhen iDWELL Technology Co.,Ltd | 7H03 | Zinwave | 7O21MR | SWH SETS | 8.0J30 |
| Maysun Info Technology Co., Ltd. | 7F67 | Shenzhen Kechaoda Technology Co.,Ltd | 7H05 | ZIRA Ltd. | 7K04 | Swrve | 8.1H15, 8.0A30MR |
| MDS Technology Co., Ltd. | 7G61 | Shenzhen Konkra Telecommunications Technology Co.,Ltd. | 7I71 | ZY4 | 7H41 | Sytl Reply | 8.0L6 |
| MEMS Drive Inc. | 7N94MR | SHENZHEN LENO INDUSTRY.,LTD | 7E08 | | | T-PAY Mobile | 8.0E52 |
| Meontrust Inc. | 7J12 | Shenzhen Naitavonne Electronics and Technology Co.,LTD | 7K64, 7O18MR | | | Talent Swarm - Atheer | 8.0F40 |
| Meunity Nilecode | 7F31 | Shenzhen Rainbow Time Technology Co., Ltd. | 7I82 | | | Talking Data | 8.0E53 |
| Micran, Research and Production company | 7N95 | SHENZHEN TIANLONG CENTURY TECHNOLOGY DEVELOPMENT CO LTD | 7I90 | Aban Telecom Solutions & Services | 8.0F34 | Taptica | 8.1E70, 8.0A31MR |
| Micropross | 7J06 | Shenzhen Tozed Technologies Co., Ltd | 7M11 | Accedian | 8.0I27 | Telecom Review | 8.0K23 |
| Miiya | 7G71 | SHENZHEN YIKIN COMMUNICATION TECHNOLOGY CO.,LTD | 7K71 | Accelerite | 8.0D53 | TeleCommunication Systems, Inc. | 8.0C25, 4EMR.4 |
| MIMOTech and CSG Science & Technology (Hefei) | 7H08 | Shenzhen Weile Electronics Co.,Ltd | 7H20 | Actility | 8.0E40, 8.0A05MR | TeleSemana.com | 8.0K31 |
| MiniCRM Zrt. | 7M43 | Shenzhen Wewins Wireless Co., Ltd | 7K08 | AdsNative | 8.1K66, 8.0J56MR | The Graphene Council | 8.0J33 |
| MIO Global | 7H41 | Shenzhen WIIME Communitcation Co., Ltd | 7H11 | AIXTRON | 8.0L30 | The LoRa Alliance | 8.0E10, 8.0A10MR, 8.0A12MR |
| Mitel | 7A21 | ShenZhen Xinghuabao Electronic Technology Co.Ltd | 7H17 | Altran | 8.0F30 | The National Graphene Insitute | 8.0L30 |
| Mobeewave | 7H40 | SHENZHEN YUNJI INTELLIGENT TECHNOLOGY CO., LTD. | 7J73 | AMO GmbH | 8.0L30 | ThingWorx | 8.0C13 |
| Mobile Arts | 7F41 | Shenzhen Zhanweixun (ZOPO) Technology Co., Ltd. | 7G50 | AP PHOTONICS | 8.0K15 | ThroughTek Co., Ltd. | 8.0E39 |
| MobiWeb | 7D70 | Sicap | 7K61 | Apptimize | 8.0I35 | Tile Inc. | 8.0D24 |
| Mobylla | 7G71 | Silicon Mitus, Inc. | 7G61 | APPTURBO | 8.1E30, 8.0A34MR | Torry Harris Business Solutions (THBS) | 8.0E19 |
| Mogencelab Co., Ltd. | 7N69 | SiteSpy | 7F70 | Atende S.A. | 8.0J13 | TUNE | 8.1F50, 8.0E66MR |
| Mojio | 7H41 | SlidenJoy | 7G71 | Avanzare Innovacion Tecnologica | 8.0L30 | Twilio | 8.1H51, 8.0A42MR |
| Mondial Telecom SA | 7G71 | Small Cell Forum | 7F61 | Avay Hamrah Hooshmand Hezardastan | 8.0F20 | UBICQUIA LLC | 8.0D20 |
| Moni Technologies | 7C70 | Smart Villages Company | 7F31 | AXONIX | 8.0I37 | UCOPIA | 8.0I9 |
| MRF Geosystems Corporation | 7H41 | SmartStudy Co., Ltd. | 7E21 | Bangladesh Uganda | 8.0F10 | Valid8.com | 8.0I11 |
| mufin GmbH | 7L51 | SOLiD/Pantech | 7G81 | Basebone | 8.0E68MR | VEFXI Corporation | 8.0K41 |
| MultiPass UK Ltd. | 7C70 | SoundOfMotion | 7H41 | BeMyApp | 8.0F36 | VIP Response B.V. | 8.0H14 |
| Multiwave Sensors Inc | 7K50 | SPLICE Software | 7H41 | Brain Station-23 | 8.0F10 | Vkansee Technology | 8.0J24 |
| MYANDROID | 7J61 | SPS Inc | 7E21 | Brite:Bill | 8.0I19 | Winjit Technologies | 8.0D40 |
| myFC | 7F41 | Starhome Mach | 7F51 | Brokerbabe.com | 8.0I8 | WiseMo | 8.0D50 |
| Nakina Systems | 7J11 | Statflo Inc. | 7I51 | CalAmp | 8.1B71, 8.0A38MR | Z-Wave Alliance | 8.0H16 |
| National IT Industry Promotion Agency (NIPA) | 7E21 | STK | 7F21 | Cambridge Graphene Centre | 8.0L30 | Zagg Inc | 8.0A32MR |
| Navayo Research Kft. | 7M43 | STMicroelectronics | 7A61 | Cardtek | 8.0F24 | Zapgocharger Ltd | 8.0L30 |
| Nearex | 7K01 | Stream Technologies Ltd | 7C18 | CartoDB | 8.0I13 | | |
| Neofonie Mobile GmbH | 7L51 | Striim | 7G80 | Catalan Institute of Nanoscience and Nanotechnology (ICN2) | 8.0L30 | | |
| Neonode Inc | 7F41 | Summit Tech | 7N61 | Cellomat | 8.0F08 | | |
| Nestlean | 7H41 | Sun Cupid Technology (HK) Ltd | 7J65 | ChatSim Srl | 8.0D51 | | |
| Netaxis Solutions | 7G71 | Superdigital Technology Co.,Limited. | 7L78 | Check Point Software | 8.0D29, 8.0A06MR | | |
| Neth3D/ Intucomm | 7I92 | SuperTab | 7G71 | Cheetah Mobile Inc. | 8.0E9 | | |
| NetNumber | 7F80 | Suprema Inc. | 7J17 | ClinicMaster INTERNATIONAL | 8.0F10 | | |
| Netonomics AB | 7E41 | Sweden Mobile Association | 7E41 | CNBC | 8.0D48, CS200 | | |
| Netsweeper Inc | 7K50 | SwiftKey | 7P44MR | Compatel | 8.0I12 | | |
| New Explorer Telecom CO.,LTD. | 7M21 | Symsoft | 7G60 | Consiglio Nazionale delle Ricerche-ISOF | 8.0L30 | | |
| NewNet Mobile Communications | 7O22MR | T2M | 7C13 | Cosmobile Srl. | 8.0L20 | | |
| NII SOKB Ltd. | 7J71 | Tag Systems | 7J05 | DataSoft Systems Bangladesh Limited | 8.0F10 | | |
| Nixxis | 7G71 | Taiwan External Trade Development Council (TAITRA) | 1D49, 7L81 | Domotz | 8.0E30 | | |
| Noom, Inc. | 7M02 | TalkPool | 7E41 | Dongxin Telecom Co.,Ltd | 8.0I15 | | |
| Novatti | 7J25 | Teclo Networks AG | 7G11 | EIT Digital | 8.0D42 | | |
| Novello srl | 7N71 | TEDEXIS - APHEX CAPITAL LLC | 7J22 | Expway | 8.0J40, 8.0B31MR | | |
| NoviFlow inc. | 7H40 | TEKSAN JENERATOR ELEKTRIK SANAYI VE TICARET A.S. | 7K35 | FlexEnable Ltd | 8.0L30 | | |
| nquiringminds | 7C70 | Tektelic Communications | 7H41 | Fondazione Istituto Italiano di Tecnologia - Graphene Labs | 8.0L30 | | |
| NRT TECHNOLOGY | 7I51 | TELEFIELD Inc. | 7G61 | Genesys Telecommunications | 8.0E29 | | |
| NTG Clarity Networks Inc. | 7I51 | Telepin Software | 7I51 | GNext sas | 8.0L30 | | |
| NuRAN Wireless | 7H40 | TeleSign | 7O2MR, 7O4MR | Graphene Flagship | 8.0L30 | | |
| NXP Semiconductors | 7C21, 7E30 | TEOCO | 7I83 | GRAPHENEA | 8.0L30 | | |
| OCTASIC | 7N59, 7O26MR | TESSARES | 7G71 | Group 2000 Nederland B.V. | 8.0I10 | | |
| OnePhone Holding AB | 7F41 | TestObject GmbH | 7L51 | GSMA Intelligence | 8.0J50MR, 8.0J52MR | | |
| Ontario, Canada | 7I51, 7K50 | The Campfire Union | 7H41 | GUANGDONG SHENGLU TELECOMMUNICATION TECH.CO.,LTD | 8.0J14 | | |
| OP-TIM | 7G71 | Thinkeco Power Inc | 7H41 | Hamamatsu Photonics Europe GmbH | 8.0C19 | | |
| OPENGEAR | 7C84 | THINKPLUS CO., LTD | 7M57 | Haydale Limited | 8.0J37 | | |
| OpenSignal | 7B15, 7P42MR | TierOne OSS Technologies Inc. | 7K50 | HCL | 8.0E20, 2H30 | | |
| Openwave Mobility | 7C70, 6N11MR | Timeline Global Telecom Solutions | 7I84 | Heptagon USA, Inc | 8.0E22, 8.0E64MR | | |
| Option Wireless Technology | 7G71 | Topdisk Technology Limited | 7K21 | Huawei Technologies Co., Ltd. | 3I30, 1J50, 2EMR.A11, 8.0E80 | | |
| OTOT GROUP - SHENZHEN AOLIZHENGGE ELECTRONIC. COLTD | 7M53 | TP-LINK | 7B11 | ICFO - The Institute of Photonic Sciences | 8.0L30 | | |
| Peli Products S.L.U. | 7J20 | Trade and Investment British Columbia | 7H41 | IKI Mobile | 8.0J17 | | |
| Peraso Technologies, Inc | 7K50, 7P28MR | TRAIS Co., Ltd. | 7G61 | Industrial Internet Consortium | 8.0D21 | | |
| phd consulting | 7G71 | Trust International B.V. | 7M29 | IneoQuest | 8.0B10MR | | |
| plista GmbH | 7L51 | Trustly Group AB | 7K03 | Insightus | 8.0G4 | | |
| PolyNet Ltd. | 7M43 | TTAG Systems Corporation | 7I51 | IOFIT | 8.0K5 | | |
| POWERSTORM | 7M30 | Tutela Technologies | 7H41 | IPONWEB & BidSwitch | 8.0B30MR | | |
| PressReader | 7H41 | tyntec | 7O31MR | Iskratel | 8.0C45 | | |
| Primal Technologies Inc. | 7K50 | Tyrone Fabrication | 7M40 | Jampp | 8.0A33MR | | |
| ProLogium Technology Co., Ltd. | 7M47 | UKTI | 7C40, 7O30MR | John Alan GmbH | 8.0J10 | | |
| Purple Forge | 7K50 | UL Transaction Security Division | 7K40 | Kaa IoT Platform | 8.0D30 | | |
| PYCOGROUP | 7G71 | Unidocs Inc. | 7E21 | KAONMEDIA | 8.0H10 | | |
| Quamotion | 7G71 | uniqCast | 7M51 | Kaonsoft Inc | 8.0H10 | | |
| Quebec - Ministry of Economy, Innovation and Trade | 7H40 | Universally Apps Ltd | 7C70 | KeyASIC Inc. | 8.0F22 | | |
| Quram | 7G61 | UXP Systems | 7K50 | Laboremus Uganda | 8.0F10 | | |
| RAMZO | 7J61 | ValueLabs | 7M27 | Libellium | 8.0C11 | | |
| Ranplan Wireless Network Design Ltd. | 7C12 | VARRAM System Co., Ltd | 7E21 | Libre Srl | 8.0L30 | | |
| RealVNC | 7C81 | VASCO Data Security | 7G71 | LLVISION TECHNOLOGY | 8.0G21 | | |
| Redflow | 7K17 | Veritran | 7H13 | Massiveimpact | 8.0J58MR | | |
| ReFlex Wireless Inc. | 7H41 | VISA SPA | 7M06 | mGage | 8.0E60MR | | |
| Relish New Brand Expeirince | 7H41 | VISICOM | 7C65 | Microblink Ltd | 8.0G14 | | |
| Remerge | 7L51 | Vistatec | 7F70 | Mixpanel | 8.0G17, 8.0A40MR | | |
| ResponseTek | 7H41 | VUIDEA, INC | 7E21 | Moogsoft | 8.0E21 | | |
| reunit | 7G71 | WALTOP International Corp. | 7C07 | Multimedia Development Corporation Sdn Bhd | 8.0G2 | | |
| RF Window Co., Ltd. | 7G61, 7O14MR | Wbird AB | 7E41 | myDevices - a division of Avanquest | 8.1D41, 8.0A04MR | | |
| RIFT.io | 7N73 | Wedge Networks Inc. | 7H41 | Nascenia Limited | 8.0F10 | | |
| Riot Micro | 7H41 | WeDo Technologies | 7G09 | NetMediaEurope | 8.0K21 | | |
| Rogerthat | 7G71 | WEENKO | 7J61 | Nokia R&D UK | 8.0L30 | | |
| Sangshin Elecom Co., Ltd. | 7G61 | West One Technology | 7B39 | Noxtak Group | 8.0H9 | | |
| SBS SPA | 7N45 | whatever mobile GmbH | 7L51 | Numerex | 8.0B32MR | | |
| Scottish Development International | 7B31 | WiMatek Systems | 7H41 | nVision | 8.0L30 | | |
| SecureCom Mobile Inc. | 7H41 | | | O2Micro (Chengdu)Co.,Ltd | 8.0L14 | | |

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| 1001 Taxis | 8.1D41 |
| 3db Access | 8.1G58 |
| 42matters AG | 8.1G58 |
| A4G | 8.1K77 |
| Accengage | 8.1D41 |
| ACL Mobile | 8.1K31 |
| Acrobits S.r.o | 8.1K54 |
| Actionpay | 8.1D72 |
| Adcash | 8.1K14 |
| adjust | 8.1D10 |
| Adobe | CC8.2 |
| Adsmurai | 8.1K48 |
| AdsNative | 8.1K66, 8.0J56MR |
| ADSPAY INTERNATIONAL | 8.1K31 |
| AdTrax | 8.1K31 |
| Advance Mobile Advertising | 8.1E22 |
| ADVANTAGE AUSTRIA | 8.1B61 |
| Adxmi | 8.1B13 |
| Adxpérience | 8.1E49 |
| Adzmedia | 8.1K50 |
| AGUILA Technologies | 8.1E49 |
| AirConsole by N-Dream AG | 8.1G58 |
| Airpush, inc. | 8.1D60 |
| AMD Telecom | 8.1E67 |
| AOL | 8.1B41 |
| APImetrics | 8.1B58 |
| App Annie | 8.1D53 |
| Appaloosa.io | 8.1D41 |
| Appcoach | 8.1K79 |
| AppDynamics | 8.1I61 |
| AppGrade | 8.1K16 |
| Applause | 8.1E60 |
| Applidium | 8.1D41 |
| AppLift GmbH | 8.1I50 |
| Appnext | 8.1E10 |
| AppNexus | 8.1F65 |
| Apps Panel | 8.1E49 |
| Appsee | 8.1G63 |
| AppsFlyer | 8.1H22 |
| Apptamin | 8.1E49 |
| Apptentive | 8.1B58 |
| AppThis | 8.1D61 |
| APPTURBO | 8.1E30, 8.0A34MR |
| Aptelligent | 8.1D15 |
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| Aquafadas | 8.1E49 |
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| Atlantis IT | 8.1K48 |
| Austria Card | 8.1B61 |
| Avast Software | 8.1H65 |
| AVG Technologies | 8.1E41 |
| Award Solutions | CC8 8.17 Tues, CC8 8.17 Wed |
| Baidu Inc. | 8.1K73 |
| BAMBOO GROUP | 8.1G49, 8.1J35 |
| baramundi software AG | 8.1I59 |
| Barcelona SEO | 8.1J11 |
| Batch.com | 8.1B21 |
| Bayern International - Bavarian Bureau for International Business Relations | 8.1I59 |
| Beekeeper | 8.1G58 |

EXHIBITOR LISTING

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| Beintoo | 8.1H19 |
| BERGER-LEVRAULT | 8.1D41 |
| Bidul and Co | 8.1D41 |
| BILLY PERFORMANCE NETWORK SLU | 8.1J14 |
| BNSTAR | 8.1K48 |
| Brasil IT+ | 8.1E33 |
| BroadNet | 8.1D70 |
| Broadpeak | 8.1I18 |
| Bucksense, Inc. | 8.1K40 |
| Buddy Platform Ltd. | 8.1B58 |
| BUSINESS FRANCE / FRENCH TECH PAVILION | 5B41, 5B61, 8.1D41, 8.1E49 |
| BuzzCity | 8.1D66 |
| bwtech | 8.1E33 |
| CAKE | 8.1H11 |
| CalAmp | 8.1B71, 8.0A38MR |
| CatalogPlayer | 8.1K48 |
| Catalunya Apps | 8.1K48 |
| Catchy | 8.1B58 |
| Cellfish | 8.1D41 |
| Celltick Technologies Ltd. | 8.1C20 |
| Cequens | 8.1K22 |
| Certification Centre | 8.1J35 |
| ClicksMob | 8.1J34 |
| CloseConnexions | 8.1K31 |
| CloudSense | 8.1B73 |
| CM Telecom | 8.1D50 |
| ComfyLight | 8.1G58 |
| Coyote | 8.1E49 |
| CreaLog GmbH | 8.1I59 |
| CREOVA | 8.1D41 |
| Criteo | 8.1F31 |
| Crowd Mobile | 8.1G69 |
| CRYPTO S.A. | 8.1I49 |
| Cyberclick | 8.1K48 |
| Cytech Mobile | 8.1I49 |
| DaoPay GmbH | 8.1B61 |
| DATACOM | 8.1E33 |
| Daxium | 8.1D41 |
| DeviceAtlas | 8.1D11 |
| DIALOGA GROUP LLC | 8.1D49 |
| Digital Horizons Limited | 8.1H50 |
| Digital Turbine - Right App, Right Person, Right Time | 8.1K11 |
| DIMOCO | 8.1A67 |
| Displaylink | 8.1H20 |
| dmg - DSNR Media Group | CC8.8 |
| DOCOMO Digital | 8.1B51 |
| Dogfish Software | 8.1B58 |
| DPL | 8.1K70 |
| DS Effects | 8.1H60 |
| e-Residency / Enterprise Estonia | 8.1J35 |
| Ecofleet Eesti Ltd | 8.1J35 |
| EDELMAN | CC8 8.22 Tues (AM) |
| EiTV | 8.1E33 |
| Elatec CSS GmbH | 8.1I59 |
| eMotion Digital | 8.1E33 |
| emporia Telecom GmbH & Co KG | 8.1B61 |
| Enterprise Estonia | 8.1J35 |
| ENTERPRISE GREECE | 8.1I49 |
| Entersoft | 8.1I49 |
| European Computer Telecoms AG | 8.1I59 |
| Evamp & Saanga | 8.1K70 |
| FAMOCO | 8.1E49 |
| Fanpictor | 8.1G58 |
| Ferpection | 8.1D41 |
| Fiksu | 8.1C31 |
| Firefox | 2EMR.E51, CC8.16 |
| FLIR Systems | 8.1C21 |
| Fortumo | 8.1J35 |
| FrenchSouth.digital | 8.1D41 |
| FS | CC8.10, CC8.11, CC8.9 |
| FTAPI Software GmbH | 8.1I59 |
| Fyber GmbH | 8.1I11 |
| GaneshSpeaks.com | 8.1B15 |
| GENERAL MOBILE | CC8 8.22 Mon (PM) |
| General UI | 8.1B58 |
| GeoEdge | 8.1J31 |
| Global Delight | 8.1H70 |
| Glympse | 8.1B58 |
| Going Up S.A. | 8.1I49 |
| Golden Frog, GmbH | 8.1G58 |
| GoodBarber | 8.1D41 |
| Google | 8.1F39 |
| GoSwift | 8.1J35 |
| Government of Catalonia | 8.1K48, CS50 |
| GTX GmbH | 8.1J67 |
| Guppy Games Media | 8.1B58 |
| Gupshup | 8.1H44 |
| GWIFI Limited | 8.1J9 |
| HAMAC | 8.1I49 |
| Headway Digital | 8.1K20 |
| HealthApp | 8.1K48 |
| Hewlett Packard Enterprise OpenNFV | |
| Partner Showcase | 5F31, CC8 8.19 Wed (AM) |
| Hewlett Packard Enterprise Software | 8.1D14 |
| Highside | 8.1D65 |
| HOB GmbH & Co. KG | 8.1K68 |
| Homido VR | 8.1D41 |
| hoolio | 8.1G58 |
| Hub of Innovation & Entrepreneurship Technopolis City of Athens-INNOVATHENS powered by Samsung | 8.1I49 |
| Hyetis Technologies SA | 8.1G58 |
| ICAR | 8.1K52 |
| Icaro Tech | 8.1E33 |
| Idscan Biometrics LTD | 8.1J13 |
| IMA | 5D60, 8.1B12, 2D60, 2E46, 2E60 |
| Immersion | 8.1G41 |
| iMobileMagic / PhoneNear | 8.1H58 |
| INDIA PAVILION - BY IAMAI | 8.1K31 |
| indoo.rs GmbH | 8.1B61 |
| Indus Net Technologies | 8.1H21 |
| Infobip | 8.1F49 |
| Infonova | 8.1B61, 5L11MR |
| Inneractive | 8.1K42 |

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| Inqbarna (Coverbox) | 8.1K48 |
| Insert | 8.1I16 |
| Intertrust | 8.1J17 |
| Intis Telecom | 8.1H64 |
| ironsource | 2E46, 8.1A73, 8.1I48 |
| ItsOn, Inc. | CC8.21 |
| IXIA Corp. | 8.1E33 |
| KANG | 8.1D41 |
| Kantar | 8.1D51 |
| kapptivate | 8.1D41 |
| Kaspersky Lab | 5D11, CC8 8.18 Mon |
| Keima Ltd | 8.1H49 |
| Kirmia | 8.1J30 |
| Kirusa | 8.1J15 |
| Kochava | 8.1G34MR |
| Konduko SA | 8.1G58 |
| KUZZLE | 8.1D41 |
| Kwanko | 8.1K64 |
| Leadbolt | 8.1C11 |
| Ledger | 8.1E49 |
| Lextech Global Services | 8.1I21 |
| Liftoff | 8.1D68 |
| Lleida.net | 8.1I41 |
| LOOPY MESSENGER | 8.1D20 |
| LOVOO GmbH | 8.1J3 |
| Lyra Network | 8.1E49 |
| M-STAT | 8.1I49 |
| M800 Limited | 8.1K85 |
| MACOM | CC8.15 |
| MADGIC | 8.1D41 |
| Malwarebytes | 8.1J35 |
| Manage | 8.1J10 |
| Marfeel | 8.1J20 |
| Mars Media Group | 8.1G71 |
| Marvell | CC8 8.23 Mon -Thurs, CC8.12 |
| Matomy Media Group | 8.1K41 |
| Mblox | 8.1C41 |
| MC1 | 8.1E33 |
| MediaMath | 8.1G20 |
| MediaShakers | 8.1K24 |
| Mellon Group of Companies | 8.1I49 |
| MessageBird | 8.1E58 |
| Microgaming | 8.1G35 |
| Microtronics Engineering GmbH | 8.1B61 |
| minimob | 8.1I40 |
| Mitto AG | 8.1H68 |
| Mobapi | 8.1D41 |
| MobCo Media | 8.1G70 |
| MOBI LAB | 8.1J35 |
| MOBIBASE | 8.1D41 |
| Mobiera | 8.1J5 |
| mobile-pocket | 8.1B61 |
| Mobusi | 8.1E37 |
| MobyT S.p.A. | 8.1D71 |
| MOCA | 8.1B75 |
| Mooncascade | 8.1J35 |
| MOTIVIAN SA | 8.1I49 |
| Mozilla | 2EMR.E51, CC8.16 |
| MPASS Ltd | 8.1I49 |
| MUBIQUO | 8.1D20 |
| myDevices - a division of Avanquest | 8.1D41, 8.0A04MR |
| MyOmega System Technologies GmbH | 8.1I59 |
| Nabd | 8.1K75 |
| Navita | 8.1E33 |
| NBA Properties, Inc. | 8.1K65 |
| NCSR Demokritos | 8.1I49 |
| NeoSOFT Technologies | 8.1I20 |
| Netgem | 8.1D41 |
| NetMotion Wireless | 8.1B58 |
| New Frontier Innovation | 8.1B61 |
| New Voice International AG | 8.1G58 |
| NexStreaming | 8.1D59 |
| NEXUS GEOGRAPHICS | 8.1K48 |
| NovelTech - MitosTravelGuides.com | 8.1I49 |
| NTH Mobile | 8.1K51 |
| NTS RETAIL | 8.1B61, 5L29MR |
| Nutiteq | 8.1J35 |
| OLAmobile | 8.1D31 |
| ONEm Communications | 1C29, CC8 8.18 Tues |
| OneVisage | 8.1G58 |
| OnYourMap SA | 8.1J71 |
| Opencell Software | 8.1E49 |
| Opentrends | 8.1J63 |
| OpenX | 8.1F70, 8.0A37MR |
| Opera | 8.1A63 |
| Ora Interactive | 8.1I21 |
| Oral-B | 8.1I68 |
| ORBIWISE SA | 8.1G58 |
| OSRAM Opto Semiconductors GmbH | 8.1I59, 2EMR.B7 |
| Oxigen Services India Pvt. Ltd. | 8.1K31 |
| Pakistan Software Export Board (PSEB) | 8.1K70 |
| PARKNAV | 8.1I21 |
| pasiona | 8.1K48 |
| pCloud | 8.1H48 |
| Perk | 8.1F71 |
| Pocket Media | 8.1G61 |
| PortaOne | 8.1K54 |
| Positium | 8.1J35 |
| PRADEO | 8.1E49 |
| PRIME SYSTEMS | 8.1E33 |
| Priori IT Corporation | 8.1E33 |
| Privately Srl | 8.1G58 |
| Promotional Handling Ltd | 8.1H49 |
| Protonyx Data Services S.A. | 8.1I49 |
| PubMatic Ltd | 8.1E61 |
| PubNative | 8.1J65 |
| Qikspace | 8.1B58 |
| Quantcast | 8.1B11 |
| Quickplay | 8.1G47 |
| RadiumOne | 8.1A11 |
| RationalHeads Technologies Private Limited | 8.1K31 |
| RecargaPay | 8.1B77 |

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| REGATE SA | 8.1I49 |
| RouteSms Solutions Limited | 8.1E51 |
| Rubicon Project | 8.1B20 |
| ScientiaMobile | 8.1C13 |
| Secure Tech Consultancy (Pvt) Ltd | 8.1K70 |
| Shenzhen D-Light Technology Corp.,Ltd. | 8.1H61 |
| Shootr | 8.1J33 |
| Sikur | 1G19, 8.1E33 |
| SimilarWeb | 8.1F42 |
| SINGULARLOGIC | 8.1I49 |
| Sirqul, Inc. | 8.1B58 |
| Sixtemia Mobile Studio | 8.1K48 |
| Sky | 8.1G33 |
| Smaato | 8.1B53 |
| Smadex | 8.1K48 |
| Smart AdServer | 8.1F78 |
| SOFTWeb Adaptive I.T. Solutions® | 8.1I49 |
| SONORYS GERMANY GMBH | 8.1I59 |
| Spreadtrum Communications, Inc. | CC8.14 |
| Spyke Media | 8.1J67 |
| STARTAPP | 8.1G23 |
| STATE OF ILLINOIS | 5I31, 8.1I21 |
| Stefanini Consultoria e Assessoria em Informática S/A | 8.1E33 |
| StickyADS.tv | 8.1E49 |
| STORIT | 8.1D41 |
| Stripe | CC8.3 |
| SUMMVIEW | 8.1D41 |
| Surikate | 8.1D21 |
| Switzerland Global Enterprise | 8.1G58 |
| Swrve | 8.1H15, 8.0A30MR |
| Syntonic | 8.1B58 |
| Tapjoy Ltd | 8.1E68 |
| Tappx | 8.1K48 |
| TAPTAP Networks | 8.1A21 |
| Taptica | 8.1E70, 8.0A31MR |
| Teads | 8.1B74 |
| Tech21 | CC8.20 |
| TEKONSULT | 8.1I59 |
| TELENAVIS | 8.1I49 |
| Telintelt | 8.1C10 |
| TellMePlus | 8.1D41 |
| Testbirds | 8.1I10 |
| The ASO Project | 8.1J7 |
| Tiendeo Web Marketing, S.L | 8.1K48 |
| TIM | CC8.1 |
| TNG Technology Consulting | 8.1I59 |
| Tokenlab | 8.1E33 |
| TouchPal | 8.1E20 |
| TRUSTe | 8.1I63 |
| TUNE | 8.1F50, 8.0E66MR |
| Tupl | 8.1B58 |
| Twilio | 8.1H51, 8.0A42MR |
| Twinlife | 8.1D41 |
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| UnSheeping | 8.1K62 |
| Upcom | 8.1I49 |
| UR | 8.1E49 |
| Urban Airship | 8.1C14 |
| USERDIVE - Uncover Truth Inc. | 8.1K48 |
| VectorDynamix | 8.1K70 |
| VerbaVoice | 8.1I59 |
| Verscom Technologies & Services (Pvt) Ltd | 8.1K70 |
| Vibes Media | 8.1I21 |
| VIDAVO | 8.1I49 |
| VimpelCom Ltd | CC8.24A, CC8.24B |
| Vital Energy GmbH | 8.1B61 |
| Viva Wallet | 8.1I49 |
| VoiceWeb International | 8.1I49 |
| VoluumDSP | 8.1F33 |
| Vserv Digital Services Pvt Ltd | 8.1G11 |
| Washington State Department of Commerce | 8.1B58 |
| Wassa | 8.1D41 |
| WebToGo GmbH | 8.1I59 |
| Welsh Government | 8.1H49 |
| WildTangent, Inc. | 8.1I13 |
| xAd | 8.1I51, CC8 8.22 Tuesday (PM) |
| Xee | 8.1E49 |
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| YouAppi | 8.1H13, 705MR |
| Yuboto Ltd | 8.1I49 |
| ZAYO | 8.1D41 |

| CONGRESS SQUARE |
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| 6TL Engineering | CS50 |
| Accent Systems | CS50 |
| ACUNTIA | CS60 |
| AiQ Smart Clothing Inc. | CS125 |
| Appszoom / Mobonaut | CS60 |
| Arsys | CS60 |
| AYSOCOM | CS60 |
| AZETTI NETWORKS | CS60 |
| Barcelona Tv | CS212 |
| BIID | CS50 |
| Bismart | CS50 |
| BlitWorks | CS50 |
| Bloomberg | CS210 |
| Bullitt Group / Cat Phones | CS80 |
| Captio | CS60 |
| CELLNEX TELECOM | CS82 |
| CL3VER | CS50 |
| CNBC | 8.0D48, CS200 |
| CNET | CS206 |
| CodiTramuntana, S.L. | CS50 |
| Computer Vision Center | CS50 |
| Conecta Wireless | CS50 |
| CRAZY4MEDIA | CS60 |
| CTTC | CS50 |
| Culcharge | CS118 |
| Dinero por tu Móvil S.L. | CS60 |
| Direccio General de Telecomunicacions | CS50 |
| DISASHOP SL | CS60 |

| COMPANY NAME | STAND |
|--------------|-------|
|--------------|-------|

| | |
|--|-----------------------|
| eCooltra Motosharing | CS50 |
| Enertika | CS50 |
| Enterprise Europe Network Catalonia | CS50 |
| Epsilon Technologies | CS50 |
| Epson Europe BV | CS100, 7P14MR, 7P16MR |
| EURECAT | CS50 |
| European Commission | CS74 |
| Eurostar Mediagroup | CS60 |
| FACEPHI BIOMETRIA | CS60 |
| Facomsa | CS50 |
| ForceManager | CS60 |
| FREETEL | CS150 |
| Future Space | CS60 |
| Garmin | CS90, 7025MR |
| gestpointgsm | CS60 |
| GOODRAM / Wilk Elektronik S.A. | CS135 |
| Government of Catalonia | 8.1K48, CS50 |
| GP TECHNOLOGIES LIMITED | CS122 |
| GRUPO CYS | CS60 |
| GUESS WATCHES | CS124 |
| HEMAV | CS50 |
| Hooptap | CS60 |
| i2CAT | CS50 |
| IDI EIKON | CS60 |
| Igalia | CS60 |
| inAtlas | CS50 |
| Inovum IT Solutions SL | CS50 |
| INTERNALIA GROUP - Smart Business Apps | CS60 |
| IntesisHome | CS50 |
| IvyHealth S.L. | CS180 |
| J21 Partners - Consulting & Ventures | CS60 |
| KEC | CS50 |
| KITMAKER ENTERTAINMENT. S.A. | CS60 |
| Landatel Comunicaciones, S.L. | CS60 |
| LE MOUSTACHE CLUB, S.L. | CS60 |
| Ledmotive Technologies S.L | CS50 |
| Lexibook | CS76 |
| Lhings | CS50 |
| MASVOZ | CS60 |
| Maxcom S.A. | CS135 |
| Medtep | CS50 |
| MERak | CS50 |
| MGA | CS50 |
| MINIBATT WIRELESS | CS50 |
| Mobbeel | CS60 |
| Mobile World Capital Barcelona | CS70 |
| Monitoring Limited | CS96, 5L37MR |
| Monster Europe Ltd | CS120 |
| Mooveteam by SFY | CS60 |
| MOVILOK | CS60 |
| MWC Tours | CS204 |
| MyKronoz | CS130 |
| MyScreen PROTECTOR | CS135 |
| Neapolis | CS50 |
| Nestwork | CS60 |
| NEXIONA | CS50 |
| Nice People At Work | CS50 |
| Nite Ize Inc | CS121 |
| Omate | CS172 |
| OTC Engineering | CS50 |
| P2i | CS165, 6N17MR |
| PICK DATA, S.L. | CS50 |
| PNY | CS72 |
| Qeexo, Co. | CS86 |
| QQ.com | CS208 |
| Quobis | CS60 |
| Qustodio | CS50 |
| Reticare | CS60 |
| RTVE | CS202 |
| Safelayer Secure Communications | CS60 |
| Sanatmetal Ltd | CS170 |
| Saygus | CS65 |
| SD Association | CS168 |
| SDP Telecom a Molex Company | CS77 |
| Sensing & Control Systems S.L. | CS60 |
| Shotl | CS50 |
| Shoulderpod | CS50 |
| Signaturit Solutions, S.L. | CS50 |
| Sistelbanda | CS60 |
| SlashMobility | CS50 |
| Software Quality Systems, S.A. | CS60 |
| SOMFY ESPAÑA | CS96 |
| SPA CONDOR ELECTRONICS | CS156 |
| SPANISH PAVILION | CS60 |
| Sparsity Technologies | CS50 |
| SpiderCloud Wireless | CS85 |
| STARLAB | CS50 |
| Summa Networks | CS60 |
| Taisys Technologies Co., Ltd | CS73 |
| Tecnocom | CS60 |
| TELECOMING | CS60 |
| TELNET Redes Inteligentes, S. A. | CS60 |
| Telrad Networks | CS160 |
| ThinkSmart, S.A. | CS60 |
| Tinkerlink | CS50 |
| Toro Development SL (TORO) | CS50 |
| TRANSCOM INSTRUMENTS | CS69 |
| TransferTo | CS87 |
| Tu Pediastra Online | CS50 |
| Unify Software and Solutions GmbH & Co. KG | CS145 |
| Validated ID | CS50 |
| Vuzix Corporation | CS119 |
| Watchdata | CS140 |
| WATTIOCORP, S.L. | CS60 |
| Wavecontrol | CS50 |



UNIQUE SUBSCRIBERS: UNDERSTANDING THE TRUE REACH OF MOBILE

4.7 billion unique subscribers using 7.3 billion connections as of the end of 2015

Global market penetration

Subscribers

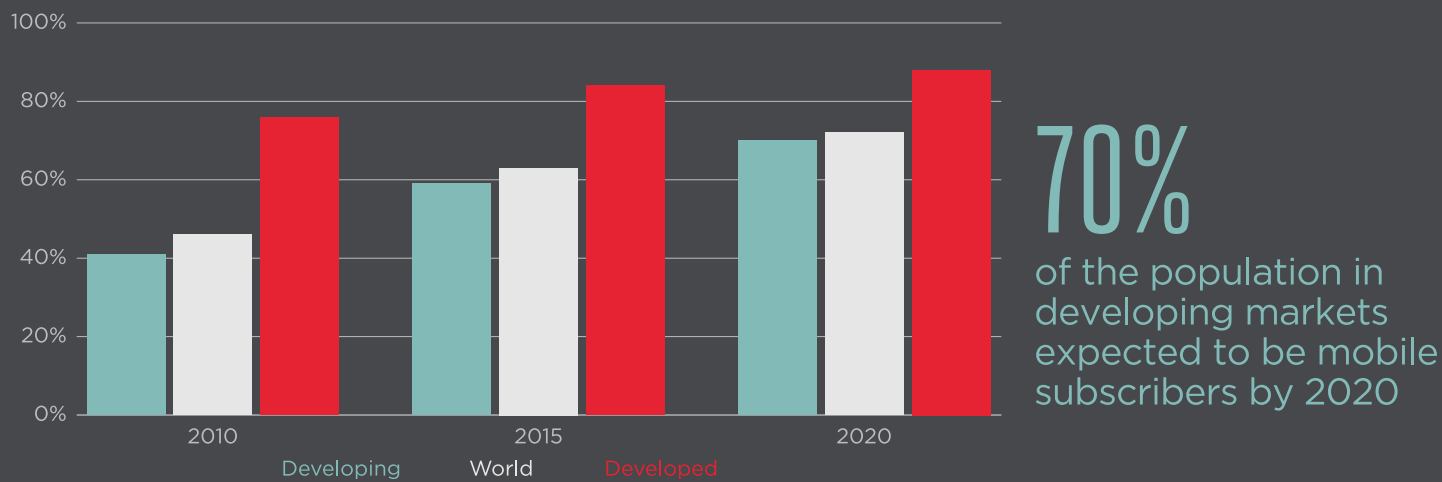


Connections



Note: Subscribers differ from connections such that a unique subscriber can have multiple connections.

Subscriber penetration: developing markets are rapidly closing the penetration gap



Multiple SIM ownership: developing markets have driven decline in global SIM ratio



*Calculated on active connections

Decline fuelled in part by move to smartphones and OTT services

Mobile operators have connected

1.4 billion

new unique subscribers since 2010

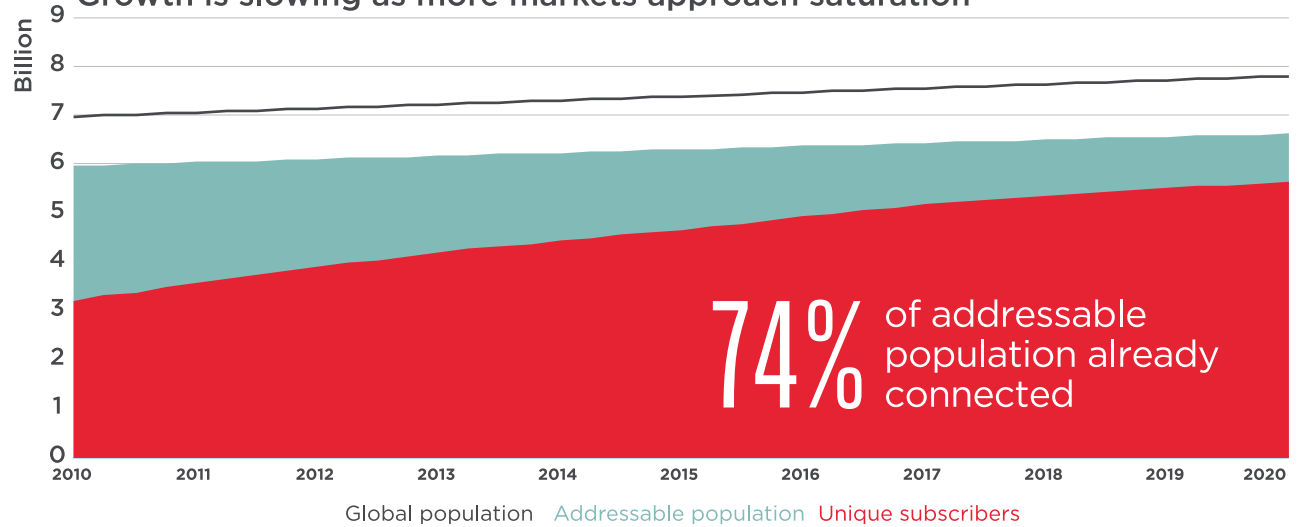
and are expected to connect a further

1 billion

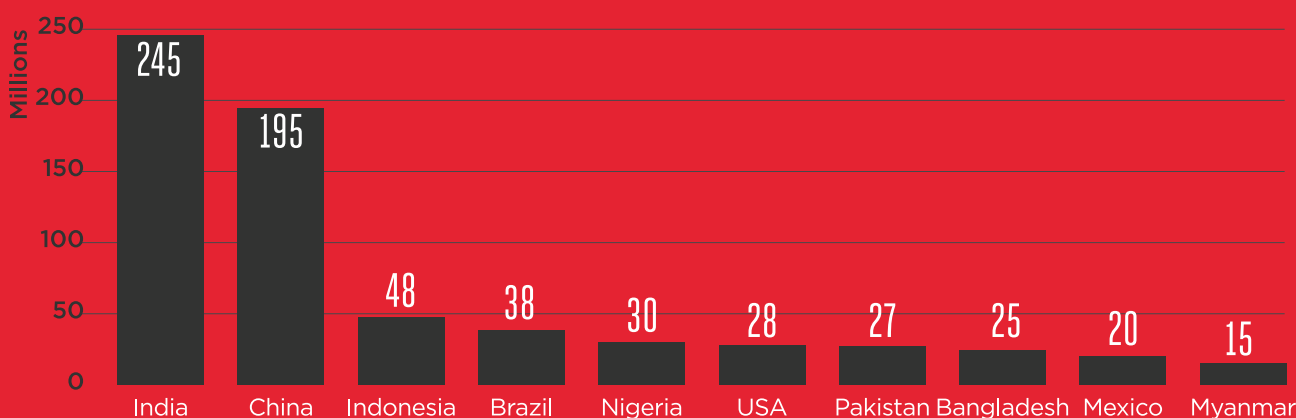
by the end of 2020

Unique subscribers and addressable population

Growth is slowing as more markets approach saturation



Top 10 markets by subscriber growth, 2015-2020



45%

China and India will account for almost 45% of the next 1 billion

By Charlie Ashton,
Senior Director, Business Development, Networking Solutions, Wind River

Virtualized CPE - The Emergence of an Early NFV Use Case

Over the past year or so, a strong consensus seems to have emerged within the telecom industry that the #1 use case for early deployments of Network Functions Virtualization (NFV) will be Virtualized Customer Premises Equipment (vCPE). Let's consider how vCPE represents an interesting business proposition for service providers.

Applicable to both enterprise and residential scenarios, vCPE replaces physical hardware appliances traditionally located at the customer premise that provide connectivity, security and other functions. By deploying general-purpose compute platforms based on industry-standard servers, either locally at the customer's premise or in a centralized data center, service providers can remotely instantiate, configure and manage functions that were once deployed on dedicated hardware platforms. This virtualization of CPE functions reduces OPEX through more efficient utilization of compute resources, through increased agility in the deployment of services and through the elimination of "truck rolls" required to update and maintain equipment at remote locations.

NO WONDER CFOS ARE EXCITED

Industry analysts have studied the economics of vCPE in detail. A fascinating recent report from Analysys Mason, "vCPE services business case: potentially billions of dollars payback for fixed CSPs," provides a wealth of information on the ROI for both enterprise and residential vCPE.

Among their most interesting findings, Analysys Mason calculates that enterprise vCPE (otherwise known as virtual Business CPE "vBCPE") can generate new revenue of

\$1.4B in North America and Western Europe over a 5-year period, for service providers who are early adopters of this technology. vBCPE offers them a Return on Investment (ROI) of 156% along with 47% annual OPEX savings per site and a payback period of just 3 years. Those compelling numbers result from a combination of the use of standard hardware, operations support system (OSS) automation and customer self-provisioning.

For residential applications, the primary benefit of vCPE is cost reduction. Service providers can increase margins, while also allowing customers to self-provision their upsell services and add video with cloud-based digital video recording (cloud DVR) and virtual set-top boxes (vSTB). For first-movers, Analysys Mason estimates \$1.3B in net cost savings over a 5-year period, with ROI of 49%, a 5-year payback period and a massive 82% cost savings per household.

Numbers like these indicate a business value proposition for vCPE that is much more clear-cut than for many other NFV functions and services. As a use case, vCPE also has less dependency on the complexities of Management and Orchestration (MANO), where the standards are still in flux and there's a lack of consensus on which approach will gain the most traction.

So it's easy to see why Finance executives at service providers are excited about vCPE. From the Operations side however, important questions have been raised about achieving service reliability while maximizing cost reductions.

MULTIPLE HOSTING SCENARIOS

Service providers typically need to support three primary hosting options for the Virtualized Network Functions (VNFs) that comprise a vCPE:

- The service provider's data center, supporting many thousands of customers over a wide geographical area.
- The service provider's Point-of-Presence (PoP) or Central Office (CO) locations, serving multiple local customers.
- The customer premise, which is whether the traditional physical appliances are located.

In the first two scenarios, service providers need to run the vCPE remotely on an NFV Infrastructure (NFVI) platform that guarantees Carrier Grade uptime for the services in order to minimize revenue impacts from downtime, while at the same time optimizing server utilization to maximize OPEX savings compared to physical infrastructure. A new NFVI platform has been developed to address exactly these requirements and has achieved great industry traction since its launch a couple of years ago. In a service provider data center, PoP or CO, a typical installation will involve tens, hundreds or thousands of servers. The server allows a large number of compute node servers to be controlled by as few as two control node servers, which is key to maximizing the overall utilization of the infrastructure.

The customer premise scenario presents different challenges, particularly for enterprise (vBCPE) deployments.

BUSINESS CPE NEEDS HIGH RELIABILITY AND LOW COST

For many vBCPE deployments at enterprise customers, low cost is critical to justify the replacement of traditional physical network appliances. The vBCPE performance requirements can in many cases be met by a single server, especially with the processing

bandwidth now available in the latest Intel® Architecture platforms. At the same time, enterprises require high reliability for networking services, which are viewed as business-critical functions.

For enterprise deployments that are both low cost and highly reliable, the ideal solution is to deploy the vBCPE on a two-server configuration. To minimize cost, each server runs all the necessary compute, control and storage functions.

The dual-server approach allows for an active-standby approach to reliability, guaranteeing service continuity in the event of a failure of either node.

Wind River Titanium Server CPE is the industry's first NFVI solution that allows service providers to ensure this balance of low cost and high reliability. This CPE platform builds on the proven, well-established Titanium Server NFVI platform. By leveraging Titanium Server CPE, service providers can deploy cost-sensitive NFV applications such as a virtual Business CPE on only two servers. Each server runs all the compute, control and storage functions, while delivering best-in-class VNF performance to maximize the number of users supported per server and thereby also maximize OPEX savings. At the same time, service providers can maintain full Carrier Grade uptime for vBCPE services. This enables them to minimize any revenue impact resulting from Service Level Agreement (SLA) penalties triggered by service downtime.

The industry is moving quickly to focus on early use cases like virtual CPE that will deliver strong return on investment and we're ready and eager to continue to deliver the NFVI platform features that are required for these applications.



Yang Yuanqing,
Chairman and CEO



Lenovo CEO wants to win at mobile with Moto

Lenovo's chairman and CEO, Yang Yuanqing, talks about the importance of Moto and Project Tango while explaining the "five elements of smart connectivity" and its challenges.

MOBILE WORLD DAILY (MWD):
WITH MOTO GOING THROUGH REBRANDING, HOW WILL LENOVO TAKE THE BRAND FORWARD?

Yang Yuanqing (YY): Moto and Lenovo Vibe will be our two main smartphone product brands going forward. Moto is a great global brand, and it will represent our premium smartphone products, while Vibe will be the flagship brand for our value smartphones.

The Motorola name will continue to exist as a corporate entity, but it will be used more

selectively. Our strategy for mobile is to breakthrough in mature markets with innovation and a premium brand; grow rapidly in emerging markets with efficiency and scale; and turnaround our China business using our deep understanding of that unique market.

In 2016 and beyond, Motorola will be essential to our global success. Through our acquisition, we gained a significant intellectual property advantage, a legendary brand and great talents, especially in design and engineering. Winning in mobile – while delivering a great customer experience – is a top priority, and Moto is critical to this effort.

MWD: WHY IS PROJECT TANGO IMPORTANT AND WHAT IMPACT WILL IT HAVE ON THE INDUSTRY?



“Winning in mobile – while delivering a great customer experience – is a top priority, and Moto is critical to this effort”

YY: Project Tango is an augmented reality technology that allows a mobile device to interpret three-dimensional space and motion. It can help transform a user's phone into a 'magic lens,' showing them digital information from the physical world.

It can detect a user's precise location and respond to their movement, allowing them to explore virtual games and creating a useful tool showing information about the space around them.

We see this technology having similar value

and opportunity as GPS. GPS was a game-changing innovation. Once we had GPS in our phones we could discover so many new places around us that we never knew about. Consumers wouldn't even consider buying a phone today that did not have GPS. Tango should be the same way.

The Tango project is a great opportunity for us to be the first to launch this device in partnership with Google and work with them through the development of a technology that we believe is destined to become an indispensable part of our lives.



MWD: WHAT KEY TRENDS WILL WE SEE IN THE MOBILE INDUSTRY IN 2016 AND WHAT CHALLENGES WILL IT FACE?

YY: I firmly believe that the world of smart connectivity is coming. Smart devices will be everywhere in 2016, and they are getting smarter and easier to use. We think of this trend in terms of what we call the 'five elements of smart connectivity'.

The first is about connecting users to devices in a more natural way; touch and natural language for example. The result of this tightening relationship between user and device is that we can express ourselves in a faster and more intuitive way.

The second element is an intelligent and seamless connection between the device and the network, to ensure that our customers can connect anytime, anywhere.

The third element of connectivity is between devices, not only between smart devices like phones and PCs, but also between traditional devices; household appliances for example in our 'smart homes.'

The fourth element is connectivity with personal and big data. With the help of a personal cloud, devices will understand users much better and individuals can always reach the data they need and manage it more effectively.

Finally, smart connectivity will allow our customers to obtain the services they need in the most natural way, preferably in one stop.

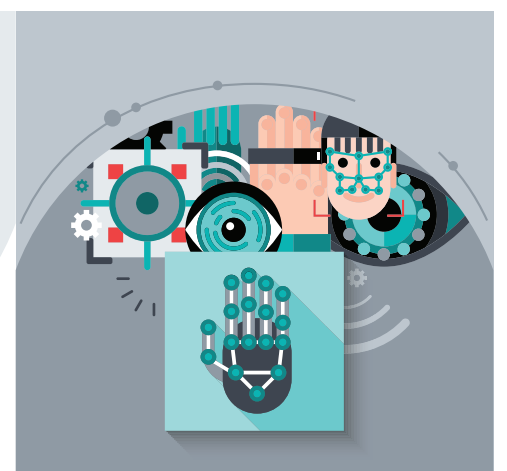
The challenge, of course, is to bring all this together in a meaningful way for our customers and create an experience that adds value to their lives.

**Meet Lenovo at MWC16:
Hall 3, Booth 3N30**

“Project Tango can help transform a user’s phone into a ‘magic lens,’ showing them digital information from the physical world”

“Project Tango has similar value and opportunity as GPS”

“I firmly believe that the world of smart connectivity is coming”



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10 x 10G • 40/100G



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Who needs an MPA?

Service Providers

Embedded Network Monitoring
Network Simulation
Load Testing

Enterprise

Data Centers
Cloud Computing Environments
Storage Area Networks

Lab and Manufacturing

Research, Development, and QA Labs
Manufacturing and Production
Automated Testing Environments

Applications

- OTN & SONET/SDH Optical Transport with ODU multiplexing, multi-channel analysis, and packet client
- Ethernet/IP Services with MPLS, VLAN, RFC & Y.1564
- Fibre Channel Characterization with switch fabric and name server login
- Service Disruption Time measurement for all rates and protocols
- Latency and Round Trip Delay measurements for all rates and protocols
- Bit Error Rate generation and analysis

Benefits

- No Testing Restrictions – Each port independently supports any rate and protocol
- Save Valuable Time – Simplified workflow and automated testing creation/maintenance
- Flexible & Expandable Equipment – Field upgradable, additional test ports and modules can be added to meet your changing requirements
- Reduce Rack Space & Power – The low power, compact form factor significantly reduces the amount of rack space
- Eliminates Truck Rolls – Convenient remote management and operation

Key Highlights

- Compact form factor system (1U x 19 in chassis)
- Low 400W max power dissipation, AC or -48VDC
- Field upgradable, rack-mounted platform with up to 5 x Test Modules: 2x 10G and 1x 40/100G
- All ports can be configured independently and operated simultaneously
- One single platform for multi-protocol testing requirements which will grow as needs change and expand, allowing modules to be easily added on-site and new capabilities to be downloaded



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All-Rate Handheld Testers
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Truly Portable

Small lightweight tablet-inspired design with a large high resolution touch screen, and built-in battery

✓ Packet Optical Transport ✓ Metro/Core ✓ Mobile Fronthaul/Backhaul

Features

- All ports can be configured independently and operated simultaneously
- Multi-rate (1.5Mbps to 111.8Gbps), multi-user, multi-protocol operation
- All-in-one solution with comprehensive feature set for Transport, Datacom, and Converged network testing
- Most intuitive interface in the industry with simplest, most consistent setup and workflow across all protocols
- Every test feature accessible by remote GUI and automation scripting
- Industry proven technology in a platform that provides continuity, maintains familiarity, long term support and service
- All products in the Intelligent Network Test Solutions (INTS) product family support seamless operation, a unified GUI/workflow and scripting interface

Available Configurations

AR100G All Rate 100G

1x
40/100G
 PORT

2x
10G
 PORTS

QP10G Quad Port 10G

4x
10G
 PORTS



Garmin Health Band Challenge



Garmin's Health Band Challenge returns to Mobile World Congress in 2016 and this year Garmin are giving you the chance to win even more top prizes!

Head to the Garmin stand, Congress Square #CS90, to get involved in exciting fitness challenges with great prizes on offer. Garmin hostesses will also be distributing 2000 scratch cards during the event with 1000's of prizes to be won! Registered attendees can even enjoy a 40% discount on a Garmin vivosmart HR wearable to keep the fitness momentum from MWC going all year!

Avast security apps at MWC

Hackers are also excited about the latest technology introduced at Mobile World Congress. They know valuable data is stored on phones and are always finding ways to attack. Avast will exhibit its Avast Mobile Security app for Android, which scans mobile devices and secures them against infected files, phishing, malware, and spyware, and is completely redesigned and free.

Avast will also demonstrate Avast SecureLine VPN, available

for iOS and Android, which protects users from being hacked while using open, unprotected Wi-Fi. „Public hotspots have become commonplace. They're convenient to connect to, but hackers can easily access the personal data of connected users. With Avast SecureLine VPN, we circumvent this problem," said Gagan Singh, president of mobile at Avast.

Avast: Hall 8.1 (App Planet), Booth H65



Hybrid Messaging improves delivery rates

Improving delivery rates and cutting back on messaging costs. CM Telecom introduced a combination of sms and push messaging in a new product: Hybrid Messaging. The new mobile messaging method can make huge cost saving and improves delivery rates.

According to CM Telecom, Hybrid Messaging intelligently combines push notifications and SMS in one channel and saves on costs sending push messages when the end users has the designated app installed. With services such as CM Telecom's Hybrid Messaging facilities,

businesses can create messages regardless of the platform, including push notifications for any apps that need to communicate directly with audiences.

<https://www.cmtelecom.com>
Visit CM Telecom at stand 8.1 D50



Mexican MVNE deployed PROTEI HLR/HSS

PROTEI has proved demands for its MVNO-targeted solutions by implementing new project. New project have been successfully implemented in Mexico where PROTEI deployed its HLR/HSS as a part of the turn-key MVNE project with one of world leading OSS/BSS supplier Redknee. Four new MNVOs are now built basing on this MVNE providing wide range of services including 4G data with affordable prices to their subscribers and encouraging market competition.

Convenient licensing, decent functionality and competitive price were key factors impacting Redknee's choice.

Redknee's real-time billing, charging, policy and customer care offerings provide the agility and scalability to drive a unique user experience and increase profitability. Choosing PROTEI HLR/HSS RedKnee confirms the high level and competitiveness of PROTEI solutions.

Stand 5H20, www.protei.com



NFV/SDN

Intracom Telecom Innovates in NFV & IoT: From Technology to Value

Intracom Telecom, a global telecommunications systems vendor, demonstrates its smart end-to-end Revenue Management platform specifically crafted for the IoT Era. The NGINius™ suite enables Service Providers to maximize revenue & efficiently control applications in diverse IoT domains, while supporting the full spectrum of simple to very complex B2B2x business models. In addition, through the company's active participation in the OpenDaylight forum and the innovations demonstrated in the Software Defined Networks & Network Function Virtualization (SDN & NFV) areas, Intracom Telecom showcases

how it empowers Service Providers to achieve intelligent orchestration and smooth migration of complex networks to the NFV paradigm, enabling them to reap the benefits of these disruptive, game-changing technologies. One of the first such real-world applications enabling "virtualized WiFi access" is demonstrated live!

Contact Details:
Alexandros Tarnaris,
Communications Director,
Email: atarnar@intracom-telecom.com

For a live demo, visit us at Hall 7, 7B54.

MTN Nigeria Partners with ONEm to access its growing Mobile Ecosystem



ONEm Communications has announced its partnership with MTN Nigeria in an expansion bid of its ever-growing mobile ecosystem.

Christopher Richardson, CEO of ONEm Communications states "We are proud to welcome MTN to our ecosystem being such a well-known brand in the Nigerian market in particular how their presence offers significant growth potential in an ever expanding ecosystem of Mobile Operators, services and Content Providers".

Chief Information Officer of MTN, Randhir Nilchandra Bikraj

adds, "The ICT industry with MTN as leader is a critical enabler of socio-economic growth in Nigeria. MTN is leading in this regard through the provision of innovative services and solutions that enable the distribution of economic activities. We are always looking for opportunities to widen our universe, and improve on our services. The partnership with ONEm is one of such opportunity."

ONEm provides Mobile Operators with an ever-increasing choice in communications, entertainment and utility services for their subscribers. MTN Nigeria customers will be able to access a range of social content and services called DEETS (Dynamic Ecosystem Enabled Text Services). ONEm offers Mobile Operators a fast way to introduce innovation with ready services that are easy to use and works over a Private Global Platform.

Visit ONEm – Hall 1, Stand 1C29



A new OS designed for smart devices in the IoT era

There are countless new opportunities in the technology industry, with a forecasted 20 billion "things" worldwide being enabled / connected by 2020. However, these developments also present challenges for smart device makers, as existing operating systems are not designed to meet the needs of this increasingly horizontal marketplace.

ACADINE Technologies, an independent provider of operating systems and software/services platforms, has changed this dynamic with the launch of H5OS.

H5OS is a commercially-ready, scalable HTML5-based OS designed for a new generation smart devices in the IoT era. H5OS embraces open web standards to facilitate cross-platform functionality and innovation, allowing systems / apps to be enhanced "on the fly". Meanwhile, it enables scalability and customization across the full spectrum of form factors and hardware platforms.

For more information, please visit ACADINE at Hall7, #7A11 or browse acadine.com

MYCOM OSI launches new digital services quality platform

MYCOM OSI, the leading independent provider of Assurance, Automation & Analytics solutions to the world's largest Communications Service Providers (CSPs), today launched MYCOM OSI ProAssure™, a new product for proactively managing the quality of service in a digital, virtualized service environment.

MYCOM OSI ProAssure™ is a digital services quality management platform that identifies developing problems in services and resolves them before

mycomosi

they impact on the customer. It prioritizes NOC and SOC operations to focus on revenue-impacting problems, speeding up identification and resolution of critical service degradations in both physical and virtualized networks.

MYCOM OSI enables 'Digital Experiences for a Smart World'.

Meet us at stand 1A20, visit www.mycom-osi.com or contact us on info@mycom-osi.com.

Laird Public Safety DAS Antennas Extend Radio Communication Coverage for Emergency Responders

To ensure consistent, highly reliable emergency voice & data radio coverage inside buildings, Laird engineers have designed a range of new antennas for a Distributed Antenna System (DAS). The CMS Standard and CMS Low Passive Intermodulation (PIM) Omnidirectional DAS Antennas deliver superior wide band performance across the 380-960 MHz and 1395-6000 MHz bands including the Advanced Wireless Services (AWS-3) band and LTE 600 MHz band.

Both antennas are IP67 rated for



dirt and dust intrusion and temporary water immersion making them ideal for highly reliable operation in harsh indoor and outdoor conditions.

The CMS Public Safety DAS antennas come standard with an



industry leading five (5) year materials and workmanship product warranty.

Come and visit us at stand 7B85 or email us at IAS-EUSales@lairdtech.com

LTE Advanced Pro accelerates 4G broadband beyond 1Gbps.

LTE standards are continuing to push 4G to higher data rates and higher capacity. Key technologies

for this higher data rate are 5CA and 256QAM transmission from the base station. Continuing



Anritsu's commitment to support the industry with cutting edge technology is the demonstration of industry first CA test setup capable of 1Gbps throughput testing of devices and chipsets. The demonstration uses Anritsu's Rapid Test Designer (RTD) software to rapidly create a test script that controls the MD8430A LTE signalling tester, and confirms the correct operation of the LTE-Advanced device. In a second demonstration of the LTE-A Pro workbench, the MT8821C device test platform is running a 5CA configuration using only a single box, for an integrated LTE-A Pro RF TRX test environment.

Come and visit us at stand 6F40 www.anritsu.com



Gu Zhang,
Forecasting Analyst,
GSMA Intelligence



GSMA Intelligence

Smartphones to account for half of all mobile connections this year as focus switches to developing world

There are now more smartphones connected to mobile networks than basic and feature phones – but smartphone adoption is peaking in many markets and manufacturers are switching their focus to growth opportunities in markets such as India and Myanmar

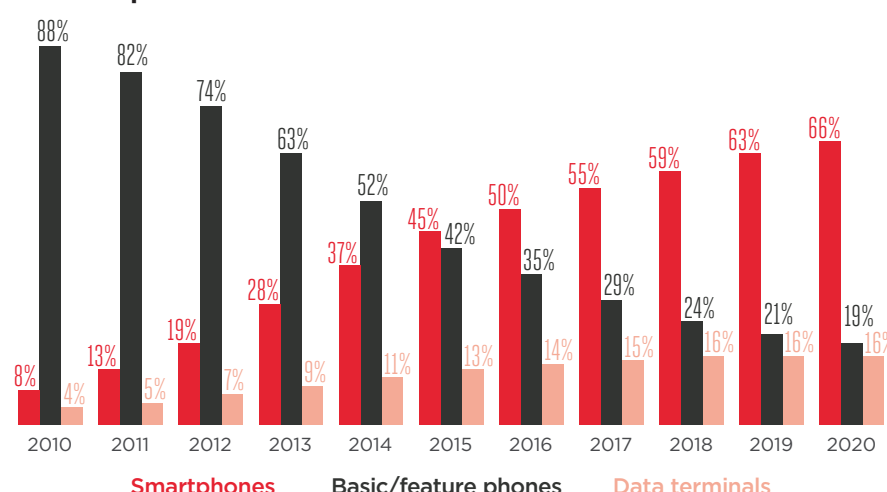
Smartphones accounted for 45% of global mobile connections (excluding M2M) last quarter (Q4 2015), surpassing basic and feature phone connections for the first time. Basic and feature phones accounted for 42% of total connections at the end of 2015 with data terminals making up the remaining 13%. Just five years ago, smartphones accounted for less than one in ten connections: 2.9 billion smartphone connections have been added since 2010 and another 2.5 billion (net additions) are expected over the next five years. Basic and feature phone connections are not expected to grow over this period but there will still be a substantial market due to their long replacement cycle and lack of mobile broadband coverage in some countries. We forecast that about one in five

connections will be still on basic and feature phones by 2020.

There is still a 25 percentage point gap between levels of smartphone adoption between the developed (65% adoption) and developing world (40%) markets, but this gap will narrow to about half the current level by 2020 as the developing world catches up – and the developed world approaches the ceiling of smartphone adoption.

Affordability is a major factor influencing smartphone adoption, especially in the developing world. Smartphone prices are expected to decrease in future due to increasing competition, a drop in the cost of materials and improvements in software. However, the portfolio of low-margin smartphones under \$50 may not significantly increase. Indeed, competition is shifting to higher-end segments as vendors increasingly see little point in developing low-end, low-margin smartphones that have a user experience that offers little improvement from a feature phone. In December 2015, Mozilla announced that it will stop developing and selling Firefox OS smartphones, while larger vendors such as Lenovo, Xiaomi, Huawei, ZTE and HTC have

Device adoption forecast



Source: GSMA Intelligence

all announced restructuring plans to move their focus onto high-end devices.

North America had the highest smartphone adoption rate of any global region at the end of 2015 at 74%, followed by Europe on 59%. At the other end of the scale, only one in five connections in Sub-Saharan Africa is a smartphone. Other regions are around the global average of 45%.

China is the largest single smartphone market with 890 million smartphone connections in Q4 2015, an adoption rate of 68%. It added 129.4 million smartphone connections last year. As well as a fast-expanding middle class, China also benefits from a strong domestic smartphone manufacturing market, which has accelerated smartphone adoption and affordability. However, smartphone growth has been slowing in China since early 2015. The market today is mainly driven by replacements from existing smartphone users who are looking to upgrade to high-end devices. Vendors in China are restructuring their product

portfolios to reflect these new dynamics.

Meanwhile, India is set to replace the US as the world's second-largest smartphone market next quarter (Q2 2016). Currently less than one in four connections are on smartphones in India, an adoption rate of just 23%, but we expect adoption to accelerate to over 50% by 2020. This huge growth potential has attracted both foreign and local investment in India's smartphone manufacturing sector, including several Chinese smartphone manufacturers that have shifted production to India.

Another smartphone market of interest is Myanmar, where smartphone adoption has increased six-fold in just 18 months, from 10% in Q2 2014 to 66% in Q4 2015. Since launching in Myanmar in Q3 2014, both Ooredoo and Telenor have rapidly rolled-out 3G and actively promoted affordable smartphones and data bundles. As a result, many first time handset buyers skipped the basic and feature phones and became active data users via smartphones.

ABOUT GSMA INTELLIGENCE

GSMA Intelligence is the definitive source of global mobile operator data, analysis and forecasts; and a publisher of authoritative industry reports and research. Our data covers every operator group, network and MVNO in every country worldwide – from Afghanistan to Zimbabwe. It is the most accurate and complete set of industry metrics available, comprising tens of millions of individual data points, updated daily. GSMA Intelligence is relied on by leading operators, vendors, regulators, financial institutions and third-party industry players, to support strategic decision-making and long-term investment planning. The data is used as an industry reference point and is frequently cited by the media and by the industry itself. Our team of analysts and experts produce regular thought-leading research reports across a range of industry topics.

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SHOW IN PICTURES








DAY 2
Tuesday
23 February


09:15 - 10:30
Keynote 5: Mobile is Securing the Digital ID
Hall 4 Auditorium 1
Twitter: #MWCKEY5

- Moderator
- 

Michael O'Hara, CMO, GSMA
- 

Simon Segars, CEO, ARM
- 

Anne Bouverot, Chair & CEO, Morpho (Safran)
- 

Pavel Durov, Founder & CEO, Telegram
- 

Sigve Brekke, President & CEO, Telenor

10:30 - 11:00
Networking Break: Featuring Apps at The Showcase Stage
Hall 4 - The Showcase Stage

Moderator
David MacQueen, Executive Director, Apps & Media, Strategy Analytics

Philip Steele, Founder, nCube
Damir Sabol, CEO, Photomath
Henry Ludlam, CEO, Team First
Agathe Evain, CMO, Lilymedia

11:00 - 12:00
5G: Creating Value for Industry Verticals
Hall 4 Auditorium 2
Twitter: #MWC5G2

Moderator
Peter Jarich, VP, Consumer Infrastructure Services, Current Analysis

Günther Oettinger, Commissioner, Digital Economy, European Commission
Vish Nandlall, CTO, Telstra
Hossein Moiin, EVP & CTO, Nokia
Ulf Ewaldsson, CTO, Ericsson
Roberto Viola, Director General DG CONNECT, European Commission
Seizo Onoe, CTO & EVP, NTT DOCOMO
Alex Jinsung Choi, CTO, SK Telecom
Vish Nandlall, CTO, Telstra

11:00 - 12:00
Mobile Advertising: Ad-Engagement and Ad-Blocking
Hall 4 Auditorium 3
Twitter: #MWCADV

Moderator
John Jackson, Research VP, Mobile & Connected Platforms, IDC

James Hilton, Global CEO & Founder, M&C Saatchi Mobile
Allie Kline, CMO, AOL
Benjamin Faes, MD, Media & Platforms, Google
Pete Blackshaw, VP, Digital & Social Media, Nestle
Roi Carthy, CMO, Shine
Nick Hugh, VP & GM Advertising EMEA, Yahoo

11:00 - 12:00
The New Digital Operator
Hall 4 Auditorium 4
Twitter: #MWCNDO

Moderator
Susan Welsh de Grimaldo, Director, Wireless Operator Strategies, Strategy Analytics

Shelly Swanback, Group Operating Officer, Accenture Digital
Mike Sutcliff, Group, CEO, Accenture Digital
Vasyl Latsanytch, CMO, MTS Group
Masakatsu Fujiwara, Head of European R&D Representative Office, NTT
Michael Duncan, CEO, Consumer, Telefónica


11:00 - 12:00
The Industrial Internet of Things
Hall 4 Auditorium 5
Twitter: #MWCIOT1

Moderator
Dan Shey, VP, B2B, ABI Research


Ronald Zink, Director, On-Board Applications, John Deere & Company
Angel Barrio, VP M2M, Etisalat Group
Christopher Ganz, Group VP Service R&D, ABB
Mats Myrberg, Senior Director, Business Development, IoT & Research, Microsoft

12:15 - 13:00
Keynote 6: Mobile is Media, Part 1
Hall 4 Auditorium 1
Twitter: #MWCKEY6

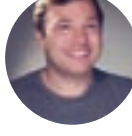
Moderator



Rajeev Chand, MD & Head of Research, Rutberg & Company



Jonah Peretti, Founder & CEO, BuzzFeed



Ralf Reichert, CEO, Turtle Entertainment (ESL)

13:00 - 14:00
Networking Lunch: featuring the Entertainment Showcase at The Showcase Stage
Hall 4 - The Showcase Stage

Moderator: **Avi Greengart**, Research Director, Platforms & Devices, Current Analysis

Grant Martin, VP, Business Development, Avegant
Joerg Tewes, CEO, Avegant
Yaw Asamani, CEO & Co-Founder, DooWapp
Jon NEVERDIE Jacobs, Presidential Candidate, Virtual Reality
Artem Kiselev, CEO, MinglVision
Madhumita Halder, Co-Founder, MadRat Games
Rajat Dhariwal, Co-Founder, MadRat Games



Leading Digital Transformation
MWC 2016, Hall 3 Booth No. 3M41

14:00 - 15:00

Keynote 7: Mobile is Media, Part 2

Hall 4 Auditorium 1
Twitter: #MWCKEY7

Moderator



Caroline Hyde,
European Business Correspondent,
Bloomberg TV



Gavin Patterson,
CEO,
BT Group



Laura Desmond,
Chief Revenue Officer, Publicis Groupe &
Global Chief Executive Officer,
Starcom Mediavest Group



Jonathan Skogmo,
CEO,
Jukin Media

15:15 - 16:15

Enterprise Mobility CIO Roundtable

Hall 4 Auditorium 2
Twitter: #MWCCIO

Moderator

Nick McQuire, VP, Enterprise, CCS Insight

Pere Nebot, CIO, CaixaBank

Marc Decorte, VP, Connected Digital Technologies, Shell

Isabelle Droll, CIO, TUI OneAviation, TUI Group

Kalman Tiboldi, Chief Business Innovation Officer, TVH Group

15:15 - 16:15

Data Monetisation: Capturing the MNO Revenue Opportunity

Hall 4 Auditorium 3
Twitter: #MWCDTMN

Moderator

Dan Thomas, Technology Correspondent, Financial Times

Richard Jarvis, Head of Threat Analytics Engineering, BAE Systems

Yogesh Malik, Group CTO, VimpelCom

Matt Beal, Director, Innovation & Architecture, Vodafone Group

Rima Qureshi, Group SVP, Strategy, Ericsson

15:15 - 16:15

The Virtual Reality Opportunity

Hall 4 Auditorium 4
Twitter: #MWCVRO

Moderator

Jefferson Wang, Senior Partner, IBB Consulting

Edward Tang, Founder & CSO, Avegant

Arthur van Hoff, CTO & Co-Founder, Jaunt

Mihai Pohontu, VP, Emerging Platforms, Samsung

Myles McGovern, CEO, Immersive Media

15:15 - 16:15

The Road to Connected and Autonomous Cars

Hall 4 Auditorium 5
Twitter: #MWCATO

Moderator

Dominique Bonte, VP, B2B, ABI Research

Macario Namie, VP, Strategy, Jasper

Michael Wanzeck, Head of Connected Car, Porsche

David Bunch, Global VP, Shell Retail Marketing &
Chairman, Shell Brands International

Wilko Andreas Stark, VP, Strategy & Mercedes-Benz Cars
Product Strategy & Planning, Daimler

16:45 - 17:45

Financial Transactions: The Rise of Digital Money

Hall 4 Auditorium 2
Twitter: #MWCFNT

Moderator

Samee Zafar, Director, Edgar, Dunn & Company

Naveed Sultan, Global Head of Treasury & Trade Solutions,
Institutional Clients Group, Citi

Yair Finzi, Co-Founder & CEO, SecuredTouch

Hiroyuki Sato, CEO, DOCOMO Digital

Andi Dervishi, Fintech Global Head, IFC

Anuj Nayar, Senior Director, Global Initiatives, PayPal

Yair Finzi, Co-Founder & CEO, SecuredTouch

16:45 - 17:45

Cognitive Computing

Hall 4 Auditorium 3
Twitter: #MWCCGC

Moderator

Malik Saadi, MD & VP, Strategic Technology, ABI Research

Michael Karasick, Ph.D., VP, Innovations, IBM Watson
Group, IBM

Jeff Gehlhaar, VP, Technology, Corporate Research &
Development, Qualcomm Incorporated

Werner Vogels, CTO, Amazon

16:45 - 17:45

Innovating for Inclusion

Hall 4 Auditorium 4
Twitter: #MWCICN

Moderator

Tarek Bazley, Science & Technology Editor, Al Jazeera English

Sebastian Tolstoy, VP, Business Unit Radio, Ericsson

Vincent Gouarne, Global Head TMT & VC, IFC

Yael Maguire, Head of Connectivity Lab, Facebook
Internet.org

Mike Cassidy, VP & Project Leader, Project Loon, X
(formerly Google[x])

Rangu Salgame, CEO, Growth Ventures & Service Provider
Group, Tata Communications

Irfan Wahab Khan, Deputy CEO, Telenor Pakistan

Mark Kaplan, CEO, Tone

16:45 - 17:45

Stadiums: Enhancing the Fan Experience

Hall 4 Auditorium 5
Twitter: #MWCSDM

Moderator

Tony Poulos, Managing Editor, Disruptive Views

Christine Pantoya, SVP, Mobile Strategy, NBA

Laurence Sotsky, CEO, Hopscotch

Chot Reyes, President, Media5

Doug Webster, VP, Service Provider Marketing, Cisco
Systems, Inc.

Matt Stagg, Head of Mobile Video & Content, EE

Sergio Verdu, Director, Digital Media, ESPN

Pierre-Louis de Guillebon, EVP, B2B Services-Paris,
Euro2016, Orange

Kate McKenzie, COO, Telstra

18:00 - 18:45

Keynote 8: Qualcomm & MERCEDES AMG Petronas Formula One Team

Hall 4 Auditorium 1
Twitter: #MWCKEY8

Moderator



Nicki Shields,
TV Presenter & Journalist,
Formula E & CNN



Derek Aberle,
President,
Qualcomm Incorporated



Lewis Hamilton,
Driver,
Mercedes AMG Petronas



Paddy Lowe,
Executive Director, Technical,
Mercedes AMG Petronas

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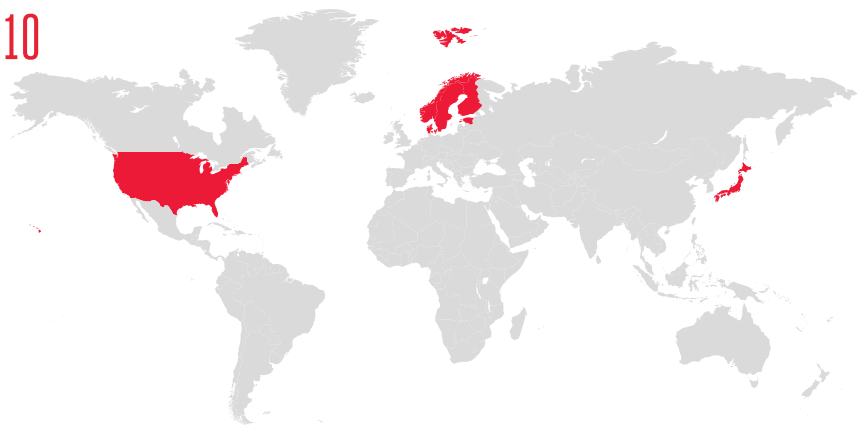
Company:

Email:

Network equipment: ☐ Ericsson ☐ Huawei ☐ Nokia ☐ ZTE

GLOBAL 4G-LTE FORECASTS: 2010-2020

2010



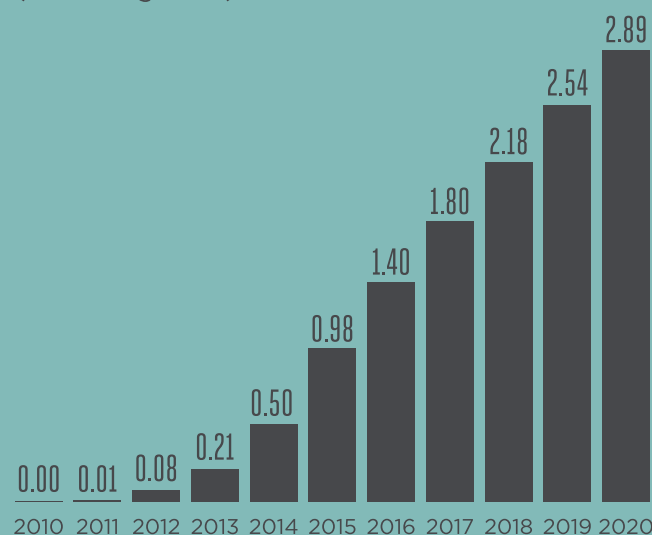
2015



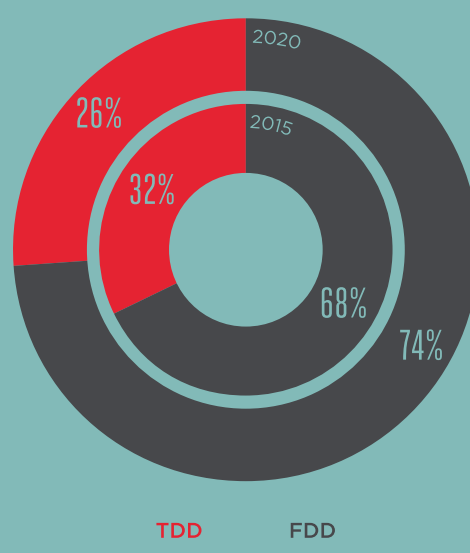
451 operators have commercially launched 4G-LTE networks across 151 countries worldwide as of the end of December 2015. We expect the number of 4G operators to increase by almost 50% by 2020.

Nearly 3 billion 4G-LTE (FDD/TDD) connections (excluding M2M) expected worldwide by 2020

Global 4G-LTE connections, in billions (excluding M2M)

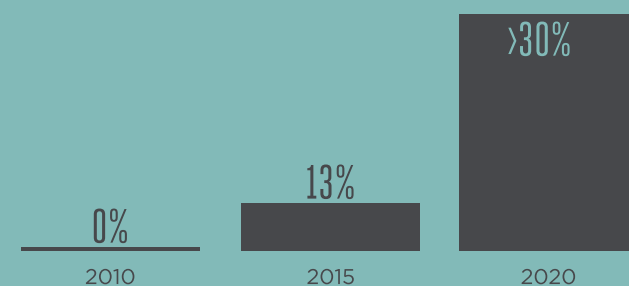


FDD and TDD share of global LTE connections



% of global total connections (excluding M2M)

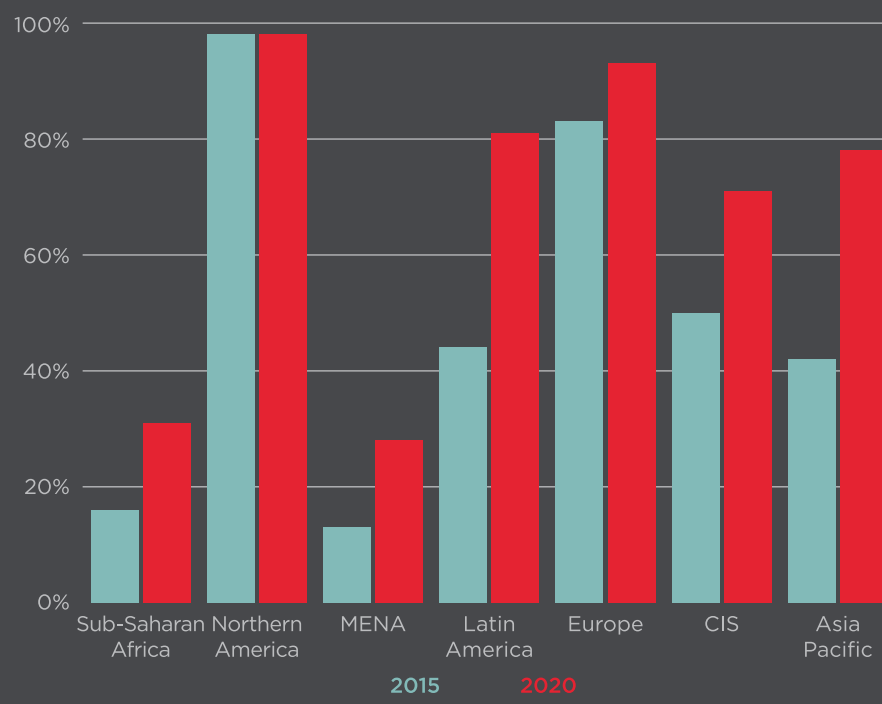
>30% of global connections will run on 4G-LTE networks by 2020, from 13% in Q4 2015



LTE network population coverage

63%

of the world's population will be covered by 4G-LTE networks by end of 2020



3 in 5

global 4G-LTE connections will come from the developing region in 2020