GSMA: Connected Living

How China is set for global M2M Leadership

June 2014

FOREWORD

Machine-to-machine (M2M) technology is transforming the world around us, making our lives, homes and cities smarter and more efficient with a never-ending stream of real-time actionable data, whether it's smart meters monitoring our energy use or remotely checking patients with chronic diseases. The M2M market is growing rapidly, with the number of connections set to reach a quarter of a billion this year, accounting for 2.8 per cent of all global mobile connections, double what it was in 2010. China is at the forefront of this growth. It is a country with the world's fastest-growing economy and is now the world's largest M2M market with 50 million connections, putting it ahead of the U.S. and Japan combined - a number that is set to grow exponentially.

The opportunity for further growth is immense, especially when one considers the sheer number of 'things' that could potentially be connected. All three of China's mobile operators - China Mobile, China Telecom and China Unicom – are experiencing tremendous growth, particularly in the agricultural, healthcare, automotive, retail and consumer electronics sectors and the country's rapidly expanding middle class will also drive the consumer market with demand for smart homes, wearable devices, smart city services and connected cars. China's leading operators are also all developing sophisticated M2M service propositions that go beyond the provision of basic connectivity.

China is of course unique. Its sheer size offers economies of scale not available to smaller countries and its M2M market has also enjoyed robust support and investment from government. Indeed, M2M's rapid development in China has been driven by a strong partnership between the public sector and the country's mobile operators, allowing the market to gain critical mass in a short time and establishing solid foundations for future growth.

At the GSMA, as part of our Connected Living Programme, we are working closely with operators in China and others around the world to accelerate the growth of M2M, enabling an "Internet of Things" that will bring numerous socio-economic benefits to citizens and businesses. We acknowledge the ever-increasing importance of Asia in the mobile ecosystem through our strong partnerships and direct engagement in the region and through events such as Mobile Asia Expo in Shanghai, which is now in its third year.

This report investigates why China is now the largest global market in the adoption of M2M and explores which sectors of the Chinese economy are adopting M2M, the role of government and, crucially, how Chinese operators are placing themselves centrally in the M2M value chain.

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Director General and Member of the Board,
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Executive summary

Machine-to-Machine (M2M) technology connects machines, devices and appliances wirelessly to each other and the Internet, turning them into intelligent assets that open up a range of new potential services and possibilities for how businesses are run. M2M is an integral part of the Internet of Things: the interaction of applications enabled by communication between two or more machines.

China is the global leader in the adoption of mobile M2M connectivity. At the end of 2013, China had 50 million mobile M2M connections, ahead of the U.S. with 32 million and Japan with 9.3 million, according to GSMA Intelligence. China's M2M market added almost 39 million M2M connections between 2010 and 2013. Demand from the energy and transportation industries has driven much of this early growth, while M2M solutions are also gaining traction in the automotive, smart city, healthcare, education and retail sectors.

Much more than connectivity

China's leading mobile operators – China Mobile, China Telecom and China Unicom – all of whom contributed to this report - are developing sophisticated M2M service propositions that go far beyond the provision of basic connectivity. In many cases, they are providing end-to-end solutions, supported by systems integration and dedicated charging policies. All three operators stress the importance of working with partners in this market and creating technological and commercial platforms that can nurture a vibrant and innovative M2M ecosystem. The operators' M2M propositions typically combine a generic horizontal platform, designed to work across all economic sectors, and dedicated vertical platforms for specific application areas, such as automotive or healthcare.

China Mobile has set up a dedicated unit, 'China Mobile Internet of Things Co. Ltd.', supported by a centralised dedicated M2M network, a unified operations platform, a dedicated number segment, communication channels and charging strategy. It has also developed standardised chipsets and modules, as well as own-brand devices for the Internet of Things.

China Telecom says its extensive fixed and mobile networks, together with its ICT integration capabilities and its localised customer service operations, give it an advantage in the M2M market. It believes a mobile operator needs to offer M2M customers quality of service (QoS) assurances, together with dedicated security and billing, and, in some cases, operational services.

China Unicom attributes its success to date in the M2M market to its high-quality, high speed WCDMA network and wide range of fixed resources that meet customer needs. In addition, they believe strong partnerships with ecosystem players are vital to ongoing business success.

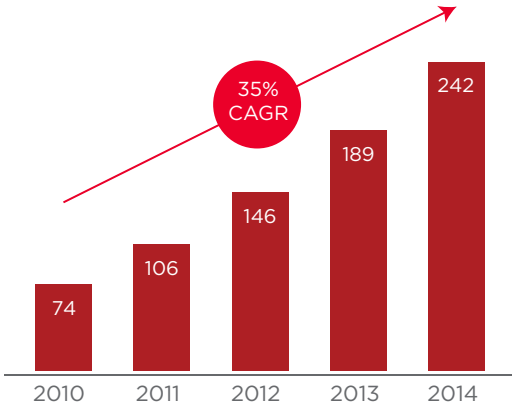
A close public-private partnership

As well as benefitting from economies of scale not available to smaller countries, China's M2M market has enjoyed robust support from both central and local government – in some other markets, regulatory uncertainty has held back the deployment of M2M solutions. In fact, the rapid development of the M2M market in China has been driven by a strong partnership between the public sector and the country's leading mobile operators. Close co-operation between the telecoms industry and state-owned enterprises and local governments has enabled the M2M market to gain critical mass in short period of time, laying a solid foundation for future growth.

All three of China's mobile operators see the current rapid growth continuing, citing considerable potential in the agricultural, healthcare, automotive, retail and consumer electronics sectors. In the consumer market, growth is likely to be driven by demand from China's rapidly expanding middle class for smart homes, wearable devices, smart city services and connected cars.

Analysts say the M2M market in China is also set to benefit from the rollout of 4G networks in the longer term, which provide the high throughput speeds and low latency required by advanced M2M applications, such as video surveillance and in-car multimedia services.

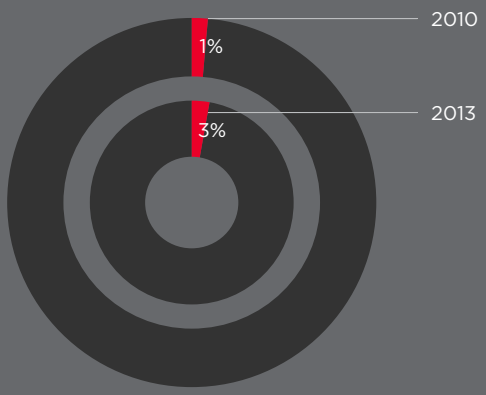
Global machine-to-machine (M2M) connections: 2010 to present



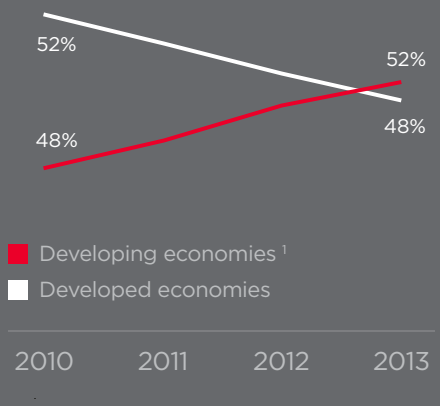
Global M2M connections (million)
Source: GSMA Intelligence

GSMA Intelligence refers to M2M connections as SIM connections that enable mobile data transmission between machines. It does not count SIMs used in computing devices in consumer electronics such as smartphones, dongles, tablets, e-readers, routers or hotspots.

428 operators have launched M2M services in **187 countries**
January 2014



M2M as a % of total global connections
Source: GSMA Intelligence

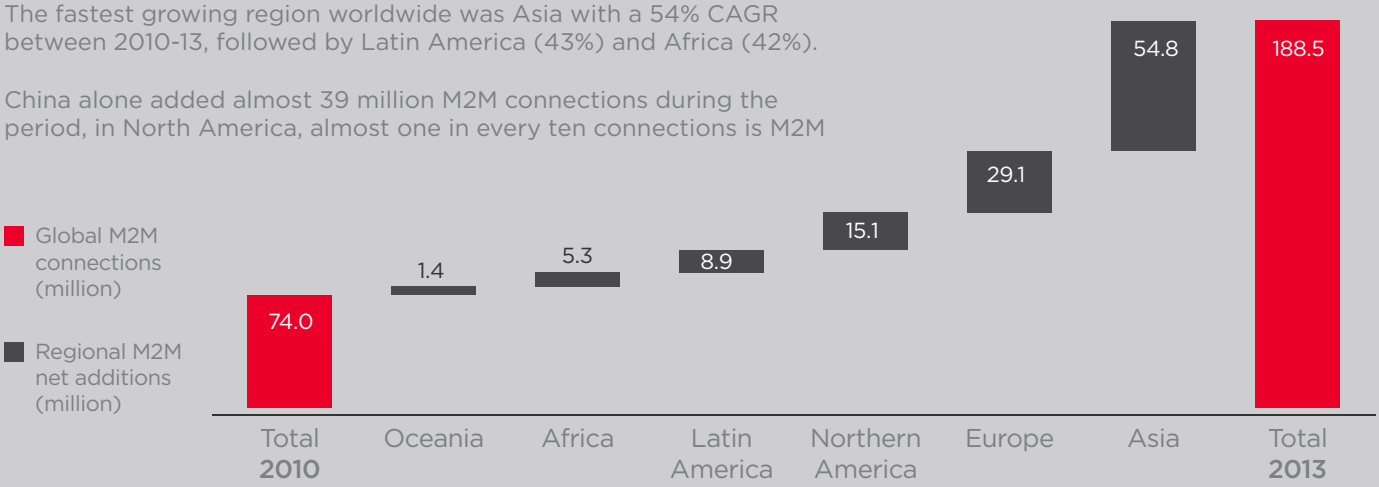


Regional share of global M2M connections
Source: GSMA Intelligence ([1] World Bank definition)

M2M connections growth has generally been stronger in developing markets over the last three years. This is partly due to growth in China, the world's largest mobile market, and now the single largest M2M market, too.

The fastest growing region worldwide was Asia with a 54% CAGR between 2010-13, followed by Latin America (43%) and Africa (42%).

China alone added almost 39 million M2M connections during the period, in North America, almost one in every ten connections is M2M



Source: GSMA Intelligence

INTRODUCTION – THE RISE OF CONNECTED LIVING

Mobile technologies and services are transforming many aspects of our personal and professional lives. Organisations and individuals can now use wireless networks to monitor and remotely control an array of machines, vehicles and devices. Mobile technologies are enabling remote monitoring of chronic diseases, smart energy meters, in-vehicle navigation, freight tracking, anywhere learning, remote controlled irrigation systems and many other life-enhancing innovations.

As well as enabling improvements in efficiency and effectiveness, the real-time information captured by connected devices is beginning to flow into an "Internet of Things" that promises to generate valuable insights for both private companies and public administrations. The Internet of Things describes the coordination of multiple machines, devices and appliances connected to the Internet through multiple networks. These devices include everyday objects, such as smartphones, tablets and consumer electronics, and other machines such as vehicles, monitors and sensors equipped with machine-to-machine (M2M) communications that enable them to send and receive data.

Mobile networks are at the heart of the Internet of Things. Global machine-to-machine (M2M) connections over mobile networks will hit a quarter of a billion this year, up from 189 million in 2013, according to GSMA Intelligence. M2M accounted for 2.8% of all global mobile connections at the end of 2013, double the 1.4% share recorded in 2010.

This report considers why China is the largest market in the world in the adoption of M2M. It explores which sectors of the Chinese economy are adopting M2M solutions first, describes how the country's mobile operators are moving up the value chain, outlines the technical architecture underpinning China's emerging Internet of Things and considers the pivotal role of the government. It draws on interviews with China's three major mobile operators which have been anonymised, industry analysts and technology vendors.

The GSMA is actively supporting the deployment of M2M solutions in China and elsewhere. The GSMA's Connected Living programme is helping mobile operators accelerate the delivery of new connected devices and services in four ways:

- IoT Connection Efficiency: The GSMA works with its ecosystem partners to establish guidelines for how machines should communicate via the mobile network in the most intelligent and efficient way.
- Future IoT Networks: The GSMA is working to establish common capabilities among mobile operators to enable a network that supports value creation for all stakeholders.
- Remote M2M Provisioning: The GSMA's vision is to unite all stakeholders behind a single, common and global specification to help accelerate the growing machine-to-machine (M2M) market.
- IoT Business Enablers: The GSMA is working to create a sustainable M2M environment that enables operators to unlock the consumer and business benefits of the IoT.

> "At the end of 2013, China had 50 million M2M connections, ahead of the U.S. with 32 million and Japan with 9.3 million"
>
> - Sylwia Kechiche, Senior Analyst M2M, GSMA Intelligence

How China compares with other countries

Asia is the largest regional M2M market accounting for 40% of global M2M connections, followed by Europe (29%), North America (19%), Latin America (7%), Africa (4%) and Oceania (1%), according to GSMA Intelligence. Asia added 55 million M2M net connections between 2010-13, compared with 29 million in Europe and 15 million in North America. China is the primary driver of the growth in Asia, adding almost 39 million M2M connections during the period.

At the end of 2013, China had 50 million M2M connections, ahead of the U.S. with 32 million and Japan with 9.3 million, according to Sylwia Kechiche, Senior Analyst M2M, GSMA Intelligence. The addressable market in China is immense and represents an incredible opportunity for continued future growth when one considers the sheer number of things that could potentially be connected.

WHICH INDUSTRIES ARE LEADING THE WAY IN M2M?

Energy is an early adopter

The energy sector was the first industry in China to embrace M2M technology on a large scale. Across the country, utility companies, which are mostly state-owned, are deploying smart meters that provide real-time information on energy usage, enabling the utility to better balance supply and demand, as well as enabling building owners to remotely control their energy systems. Alex Chau, Principal Analyst, Head of Asia at Machina Research, says that 180 million smart meters have been installed in China and a further 60 million are being deployed. Although most of the existing smart meters are connected using fixed lines, Chau expects mobile networks to play a key role as smart energy grids expand beyond the major cities.

Implementing intelligent transportation

As the workshop of the world and a major producer of food, China transports vast quantities of perishable produce, components and finished products. Like the energy sector, China's huge transportation industry is harnessing M2M to improve efficiency. Haulage companies are making increasing use of M2M solutions both to track the location of trucks and to control the temperature and humidity of their cargos. M2M solutions are enabling China to cut fuel costs significantly.

China's rail systems, urban transportation networks, highways and waterways are also using connected systems, including video cameras, to monitor performance and safety, according to Haihua Li of the China Academy of Telecommunications Research at the Ministry of Industry and Information Technology. At a Workshop on the Internet of Things in Beijing in August 2013, Li noted that 26 provinces in China have deployed electronic toll collection systems covering 4,600 lanes used by 5.1 million drivers.

At the same time, private vehicle owners in China are beginning to demand in-car navigation and info-entertainment services, which can make journeys safer, quicker and more enjoyable. The after-market for devices that enable consumers to connect their cars to such services is growing rapidly, according to Kevin Li, analyst in the Global Automotive Practice at Strategy Analytics. European car makers, in particular, are working with China's mobile operators to provide connected car services (see next section for more detail). Li says all three Chinese operators have dedicated teams serving the automotive sector.

Making cities smarter

China's central and local governments have also put the country at the forefront of the global movement to use information and communications technology (ICT) to improve urban life. All three of the leading mobile operators have major smart city programmes (see next section for more detail) and, by February 2013, 219 cities in China had announced they will roll out smart city technologies and services .

China's fast growing urban population means space is at a premium in many parts of the country, putting urban transport networks under increasing pressure. In response, China's cities are deploying intelligent traffic management systems, which monitor traffic flows and then adjust signals to ease congestion in specific bottlenecks. In many cases, drivers looking for somewhere to park can be a major contributor to congestion. In Shanghai and Beijing, a number of subscription services now use wirelessly connected sensors to let drivers know where to find free parking spaces, according to Alex Chau at Machina.

China's cities are also using mobile connectivity to remotely control streetlights and sewer covers, to track noise levels on construction sites and in residential areas, and to support evacuations in the event of an emergency. Another key M2M application is monitoring air quality and other environmental factors: China now has 343 centres automatically monitoring more than 15,000 pollution sources.

Healthcare, education and retail

M2M solutions are also being deployed in other sectors of the Chinese economy. Healthcare providers are piloting systems that enable patients to be monitored remotely, while schools in rural areas are being connected to cloud services that enable them to access the same educational resources that are available to their counterparts in the cities (see next section for more detail). At the same time, banks are increasingly supplying retailers with wirelessly connected point of sale terminals, which are more versatile than traditional cash registers.

"All three of China's mobile operators are developing sophisticated M2M service propositions that go far beyond the provision of basic connectivity"

Source: Haihua Li, China Academy of Telecommunications Research, MIIT, Workshop on the Internet of Things in Beijing, August 23, 2013:

HOW CHINA'S MOBILE OPERATORS ARE MOVING UP THE VALUE CHAIN

All three of China's mobile operators are developing sophisticated M2M service propositions that go far beyond the provision of basic connectivity, which can account for just a small fraction of the overall value. In many cases, the operators are providing end-to-end solutions, supported by systems integration and dedicated charging policies. All three operators stress the importance of working with partners in this market and creating technological and commercial platforms that can nurture a vibrant and innovative M2M ecosystem.

Now that they have secured 4G licenses, China's mobile operators can place more strategic focus on the M2M market and step up their efforts to play a larger role in the overall value chain, according to Alex Chau at Machina. The deployment of high-performance 4G networks could also give a boost to the M2M market. Even though the cost of a 4G module is still close to $100, Chau believes most M2M customers will want to use 4G to ensure the solution is future proof. Chinese operators also have the scale to bring down the cost of modules.

China Mobile – the world's largest M2M operator

The largest mobile operator in the world with 767 million connections at the end of 2013, China Mobile is also the largest M2M operator in the world. By December 2013, China Mobile had 32 million M2M connections, up from 22 million at the end of 2012.

China Mobile first launched M2M services in 2007, creating an operation center in Chongqing in 2008 to research and develop a national Internet of Things platform and M2M products. Two years later, China Mobile set up a dedicated unit, 'China Mobile Internet of Things Co. Ltd.', which focused initially on developing applications for the urban management, smart transportation and industrial control markets. China Mobile says a dedicated unit is necessary to provide professional market analysis that can be used to develop new products and business functions that meet market demand and ensure effective follow-up.

China Mobile has built a centralised dedicated M2M network supported by a unified operations platform, a dedicated number segment, communication channels and charging strategy. Without a dedicated network, China Mobile says M2M applications would need to be adapted to work across its 31 provincial networks. The operator has also developed standardised chipsets and modules, which have been an important factor driving M2M growth, as well as own-brand devices for the Internet of Things.

A broad portfolio of solutions

China Mobile has created a suite of low-cost, standardised and open M2M solutions, such as a home security service, a fleet management service and a remote surveillance service, together with an array of customised solutions (see next page). Moreover, the operator has signed "wireless city construction agreements" with 217 cities in 31 provinces.

China Mobile attributes its early success in the M2M market to the high quality of its network, comprehensive network coverage, a flexible billing strategy and the provision of an independent terminal management interface for customers. To nurture the M2M ecosystem, China Mobile says mobile operators need to establish a basic platform, supported by clear and specific application programming interfaces (APIs) that developers can use to create applications that run on the platform.

China Mobile also benefits from the development of a proprietary platform as well as Wireless Machine-to-Machine Protocol. The Protocol allows manufacturers to quickly develop and deploy M2M applications for use on China Mobile's network without having to perform extensive development and testing, which in turn results in a much faster time to market, according to Sylwia Kechiche, Senior Analyst M2M, GSMA Intelligence.

CHINA MOBILE'S M2M SOLUTIONS IN ACTION

Emergency rescue:
The China Mobile Information Platform shares patient data with emergency dispatching centres, which are then able to retrieve medical record and emergency contact information immediately, enabling them to better prepare for treatment and contact the patients' families as early as possible.

Noise monitoring:
China Mobile has developed a noise monitoring system that can automatically collect noise data using a combination of sensors, wireless networks and applications. The system is now part of the standard tools used by the Xiamen Government to monitor construction sites. It has been used in more than 46 sites where it has reduced the complaint rate by 77%. The system has also been implemented in 24 residential communities, serving 200,000 residents.

Smart Agriculture:
China Mobile has developed several Internet of Things applications aimed at the agricultural sector, including "Greenhouse Manager", "Smart Drip Irrigation System" and a "Crop Status and Environment Monitoring System", to help farmers increase both their productivity and income.

Health monitoring:
China Mobile works with medical organisations to provide in-home monitoring of the condition of post-surgery patients. The system monitors patients' health indicators and alerts medical professionals when irregularities occur. By enabling patients to recover from surgery in their own home, this service helps ease the pressure on hospitals.

Real-time transport information:
China Mobile says it is enabling drivers to access real-time traffic information and public transport users to check bus routes, schedules, and the actual position of buses on their handsets. These solutions have been launched in a number of provinces, including Jiangsu, Guangxi, Guizhou, and Hainan.

Smart Mining:
China Mobile has developed the "Electronic Coal Mine Mobile Information" system for Xinzheng Coal & Electric Company, a subsidiary of Zhengzhou Coal Industry Co., Ltd. in Henan. The system enables managers to locate the position of personnel and access real-time operational information, such as gas density, ventilation conditions, and performance of major equipment, on their mobile phones, significantly improving the safety of coal mines.

Smart Oilfield:
China Mobile's integrated Smart Oilfield system is designed to enable oilfield managers to conduct quick analysis, diagnose irregularities, provide instructions remotely, and achieve automated control. The mobile operator says the system can help an oilfield increase its yield and oil recovery rate by 2%-4% and 2%-7% respectively. It has been deployed in Karamay oilfield in Xinjiang, Daqing oilfield in Heilongjiang, and Shengli oilfield in Shandong.

Safer travel:
China Mobile's "Vehicle Guardian" application, which connects to police systems, can be used to track a vehicle's location, send safety warnings and monitor travel routes. This application, which has already been launched in Jiangsu, Fujian, Shanghai, Jiangxi and Hubei provinces, is used by more than 500,000 subscribers.

Smart Forestry:
China Mobile has developed the Forest Fire Watch platform in Fujian to monitor fire hazards in real-time and collect data on the weather and temperature. Since its deployment, the system has successfully detected 325 fire hazards and avoided economic losses of 770 million yuan, while reducing the need for patrols on the ground. China Mobile has also built a similar platform called Mobile Forest Patrol platform in Shandong, which protects the safety of forest patrols with real-time position tracking, patrol routes, and deviations from demarcations.

Safer cities:
China Mobile is working with law enforcement authorities on a "Safe City" project, supporting real-time surveillance of traffic and security situations. In Guangxi, the operator has developed the Smart Security Alarm system. When emergencies such as burglary, fire or gas leakage, happen, the system automatically sends alerts to homeowners and community monitoring centres.

Tackling the digital divide:
To address the imbalance of educational resources between urban and rural areas, China Mobile is constructing the National Education Resource Public Service Platform - a cloud platform of high-quality educational resources. The platform has served more than 900 schools nationwide, benefiting five million teachers and students. China Mobile has also piloted the Electronic Schoolbag Programme and distributed about 1,000 tablets PCs to more than 20 schools in Beijing, Guangdong, Jiangsu and other six provinces.

CHINA TELECOM – COMBINING FIXED AND MOBILE CONNECTIVITY

China Telecom is the largest fixed line operator in China and the third largest mobile operator. At the end of 2013, it served 186 million mobile connections and 156 wireline connections.

In 2007, China Telecom began constructing an Internet of Things platform, supporting multiple types of terminals and systems, and integrating various service functions, such as remote management, operation monitoring, alarm management, protocol adaptation, industry service access, and transparent data transmission. In October 2011, China Telecom established an application and promotion center and a key laboratory for the Internet of Things in Wuxi, Jiangsu province.

China Telecom says its extensive fixed and mobile networks, together with its ICT integration capabilities and its localised customer service operations, give it an advantage in the M2M market. It believes a mobile operator needs to offer M2M customers quality of service (QoS) assurances, together with dedicated security and billing, as well as operational services for large-scale applications. Moreover, the operator says a dedicated M2M unit is necessary to provide customers with specialist expertise and to aggregate the required resources for large customers.

If there is a need to carry high volumes of traffic, China Telecom believes a dedicated M2M network can offer advantages, such as simpler network interaction processes and lower costs.

Connecting 800,000 video cameras

China Telecom is a major supplier of connected video surveillance systems in China. The operator says its "Mega Eye" business, which started in 2003, is providing large scale video surveillance networks to industry, SMEs and consumers across 20 different sectors, including public security, transportation, finance, insurance, inspection and quarantine, environmental protection, meteorology, education, urban management, mining, tobacco, petroleum, petrochemical and manufacturing.

China Telecom says it invested heavily in research to develop the Mega Eye service, which offers carrier-grade network video surveillance system technology, mass media stream distribution, support for multiple tenants and low maintenance costs. As a result, Mega Eye is now a large scale service, supporting 800,000 cameras, and has been used at the World Expo and other major events.

China Telecom has also signed smart city construction agreements with 150 cities in 25 provinces, according to Haihua Li, China Academy of Telecommunications Research. At a workshop on the Internet of Things in Beijing, in August 2013, Li said the agreements encompass the following applications and services:

- **E-government:** smart environment, public safety, city supervision, smart government
- **People's livelihood:** intelligent transportation, intelligent medical, smart school management, smart community.
- **Economic aspect:** smart logistics, smart finance, smart tourism, smart agriculture, smart ocean, smart zone, smart building, smart enterprise.
- **An 'I-city'** unified access portal

China Telecom is also present in the automotive sector and is the connectivity provider for the Chinese version of GM OnStar services, which has over 700,000 active subscribers. China Telecom says it sees scope for considerable growth in China's M2M market.

CHINA UNICOM – M2M A KEY PART OF THE ENTERPRISE PROPOSITION

China Unicom is the second largest telecoms operator in China serving almost 281 million mobile connections and 88 million fixed-line connections at the end of 2013. As it is using the same 3G and 4G technologies as hundreds of mobile operators worldwide, Unicom benefits from the mobile industry's global economies of scale and has been able to sign multiple deals with multinational equipment manufacturers.

By the end of 2013, China Unicom was serving approximately 10 million M2M connections supporting various applications, including video surveillance, intelligent transportation, connected cars, smart meters and health monitoring.

The Internet of Things is an important part of China Unicom's enterprise proposition which encompasses solutions and planning, systems integration and operation. China Unicom says it has established a specialised "Corporate Customer Department" to meet demand in the public sector and provide the necessary project consulting. China Unicom believes that Municipal administration and government departments are one of the most important sources of market demand in the Chinese Internet of Things market. In its 2013 Annual Report, China Unicom said it is working on 175 smart city projects.

China Unicom says fleet management, remote meter reading, outdoor media, video surveillance and other industrial applications account for the bulk of the M2M market in China today. In future, it expects M2M to also be widely adopted in the automotive and healthcare sectors.

Forging international partnerships

China Unicom has entered into several M2M partnerships with international players. For example, in October 2011, the operator signed a strategic M2M agreement with Madrid-based group Telefónica. In June 2012, China Unicom and Telefónica Digital, with its partner Telstra, announced they had developed and successfully proven a remote management solution for embedded M2M SIMs with technical support from Giesecke & Devrient. The solution enables remote management of the subscription data of M2M embedded SIMs, including remote activation on demand, subscription transfer between different M2M devices and subscription replacement. China Unicom is working with its ecosystem partners and other global operators in the adoption, development and commercialization of GSMA guidelines.

In April 2014, China Unicom, signed a deal with global connectivity solutions provider, Cubic Telecom, to enable M2M devices to connect to its mobile network. Cubic specialises in providing over-the-air (OTA) services, such as software updates, telematics related services and location based services to enable M2M providers to manage data in real-time.

China Unicom has also signed partnerships with multiple automotive manufacturers, including Gelly, Chang'an, Roewe, Dongfeng, Yulong, D Partner and BMW. In the case of BMW, Unicom connects the automaker's cars to BMW's ConnectedDrive services via its 3G network, falling back to its 2G network where 3G coverage is not available. As well as providing specially-configured SIM cards to be permanently mounted into the embedded mobile modules inside the vehicles, China Unicom also operates a contact centre that handles the incoming calls from BMW drivers and hosts the data centres that run the ConnectedDrive information services.

Through a partnership with the Beijing Municipal Health Bureau, China Unicom is also active in the healthcare sector, supporting online appointment and health information services

for 114 hospitals in Beijing. Moreover, Unicom is working with 112 emergency medical centers and hospitals to develop smart ambulances equipped with an ECG monitor with embedded 3G connectivity and video surveillance. Data collected from the ECG monitor can be sent to the hospital through Unicom's 3G network in real time, enabling staff to prepare for the patient's arrival.

China Unicom says the use of wireless technologies for remote health monitoring also has great market potential. It says the aging of society and healthcare reform will have huge electronic health service needs, requiring operators to conduct pilot studies and strategic planning. It is running several pilot partnerships in this area and is working with property developers to equip apartments aimed at the elderly with health monitoring solutions. China Unicom attributes its success to date in the M2M market to its high-quality, high-speed WCDMA network and a wide range of fixed resources that can meet customers' needs, especially those requiring high-speed data and/or video transmission.

Although China Unicom sees a number of challenges in the M2M market, such as low ARPUs, fragmentation and immature business models, it believes the M2M business will grow to become an important source of subscribers and revenue growth.

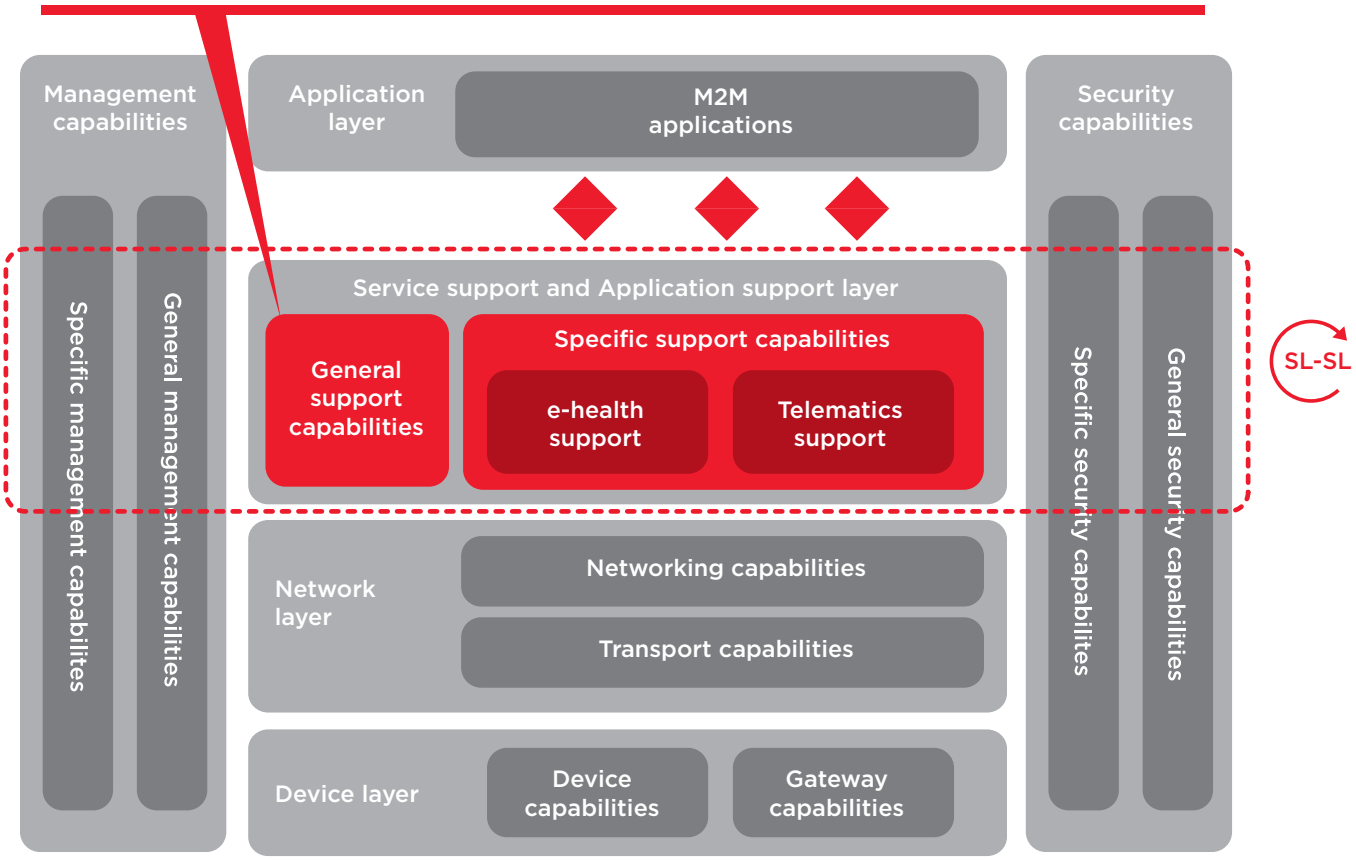
MOVING FROM M2M TO THE INTERNET OF THINGS

China is taking a pragmatic approach to building an Internet of Things, employing a wide range of wireless technologies, fixed networks, sensors, computing systems and applications. At a high level, China's government defines the Internet of Things as encompassing three kinds of networks :

- Industrial proprietary networks
- Telecoms networks (M2M solutions)
- The Internet

Speaking at an Internet of Things workshop in Beijing in August 2013, Haihua Li of China Academy of Telecommunications Research, said telecoms operators' M2M propositions typically combine a generic horizontal platform, designed to work across all economic sectors, and dedicated vertical platforms for specific application areas, such as automotive or healthcare.

M2M platform:
Horizontal M2M platform , provide common support to different application areas
Vertical Platforms. for specific application areas



The generic M2M platform typically consists of three key elements – the network infrastructure platform, the application and service support platform and the business operation support platform.

Source: Haihua Li of China Academy of Telecommunications Research, MIIT, presentation August, 2013

Supporting standardisation

Even though the Chinese market is large enough to generate major economies of scale, the country's M2M ecosystem is supporting international standardisation. China's operators and technology vendors are actively involved in international standardisation programmes related to M2M. China Unicom, for example, says it is important that industry associations and the relevant ISO standards reduce market fragmentation and operator technology deployment costs. Kevin Li, analyst in the Global Automotive Practice at Strategy Analytics, also called for more cross-operator standardisation work to make it easier for customers to deploy M2M solutions.

THE PIVOTAL ROLE OF THE GOVERNMENT

A rapidly developing and urbanising country, China is looking to use information and communications technologies to make its fast expanding cities smarter and enable a better quality of life for their citizens. In a bid to make the most efficient use of resources and space, the country's policy makers have prioritised the development of the Internet of Things. In 2011, Chinese Premier Wen Jiabao identified Internet of Things (IoT) as an "emerging strategic industry" in an interview with state media.

> "Once China has decided something, it can move very quickly,"
>
> - Alex Chau, Principal Analyst, Head of Asia, Machina Research

The Internet of Things is one of priority projects of China's 12th Five-Year Development Plan (2011- 2015). In February 2012, China's Ministry of Industry and Information Technology released the national 12th five year plan for IoT industry, which put forward the objectives, investment and roadmap required to develop China's IoT market. China's government plans to invest 3,860 billion yuan (US$603 billion) in the M2M ecosystem in the decade to 2020, according to China's R&D Center for Internet of Things (CIT-China). Many of China's M2M projects are being coordinated by the National Sensor Information Center (NSIC) in Wuxi, Jiangsu Province. This park is reported to be home to almost 1,000 companies working on Internet of Things-related projects. "The whole IoT industry chain has been developed here, from sensor chips to model applications, systems and the big demonstration projects," Sammy Shen, Vice-President of Business Development at the NSIC's Sensing China Center, said in an interview with Cheung Kong Graduate School of Business.

The government's pivotal role is recognised by the country's mobile operators. China Mobile says the Chinese government has provided "strong guidance" and made available special funds to accelerate the development of China's Internet of Things market. Similarly, China Unicom notes that the Chinese government attaches great importance to the networking industry, providing government funding and policy support that has created "a relatively good external policy environment". China Telecom adds that the government has "invested a lot of resources in the Internet of Things to improve people's livelihood, improve service levels and increase economic development opportunities."
In summary, the rapid development of the M2M market in China has been driven by a strong partnership between the public sector and the country's leading mobile operators. Close co-operation between the telecoms industry and state-owned enterprises and local governments has enabled the M2M market to gain critical mass in short period of time, laying a solid foundation for future growth.

http://wsnblog.com/2011/10/24/china-plans-big-investment-in-internet-of-things/

The GSMA Connected Living Programme

The GSMA Connected Living Programme is an initiative to help operators add value and accelerate the delivery of new connected devices and services in the M2M market. This is to be achieved by industry collaboration, appropriate regulation, optimising networks as well as developing key enablers to support the growth of M2M in the immediate future and the Internet of Things (IoT) in the longer term.

Our vision

To enable the IoT, a world in which consumers and businesses enjoy rich new services, connected by an intelligent and secure mobile network.

Our Programme:

1. IoT Connection Efficiency: The GSMA works with its ecosystem partners to establish guidelines for how machines should communicate via the mobile network in the most intelligent and efficient way.
2. Future IoT Networks: The GSMA is working to establish common capabilities among mobile operators to enable a network that supports value creation for all stakeholders.
3. Remote M2M Provisioning: The GSMA's vision is to unite all stakeholders behind a single, common and global specification to help accelerate the growing machine-to-machine (M2M) market.
4. IoT Business Enablers: The GSMA is working to create a sustainable M2M environment that enables operators to unlock the consumer and business benefits of the IoT.

Please visit **www.gsma.com/connectedliving** or email **connectedliving@gsma.com** for further information

About the GSMA

The GSMA represents the interests of mobile operators worldwide. Spanning more than 220 countries, the GSMA unites nearly 800 of the world's mobile operators with 250 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and Internet companies, as well as organisations in industry sectors such as financial services, healthcare, media, transport and utilities. The GSMA also produces industry-leading events such as Mobile World Congress and Mobile Asia Expo.