M2M in China

Opportunities to build on global leadership

EY

Building a better working world

Contents

Introduction

The Chinese machine-to-machine (M2M) market is set for explosive growth. China is already the market leader worldwide, accounting for a third of the global M2M connections at the end of 2014. A number of factors have contributed to this initial success, with economies of scale topping the list. The sheer number of telecoms subscribers creates a large addressable market for newer services such as M2M, and China's market boasts a strong partnership between the public sector and the leading mobile operators. Support from the Government has been crucial to building the necessary critical mass for M2M in a short time.

Having established a leadership role in M2M, China is all set to capitalize on the Internet of Things (IoT) opportunity. Mobile networks are forming the backbone of IoT service delivery in China, in addition to industrial proprietary networks, the internet, and other forms of low-range wireless connectivity, such as Bluetooth, Wi-Fi and ZigBee.

At the end of 2014, China had 74 million cellular M2M connections, according to GSMA. Chinese operators and the Government have allowed the market to grow dramatically in a relatively short time, laying the foundation for further expansion and accelerated development of the IoT. With China's mandate to become a nation of smart cities, demand for M2M solutions is surging, and healthy growth rates are expected to continue for years to come.

CAGR: 29%

	2014	2020F
350		
300		
250		
200		
150		
100		
50		
0		
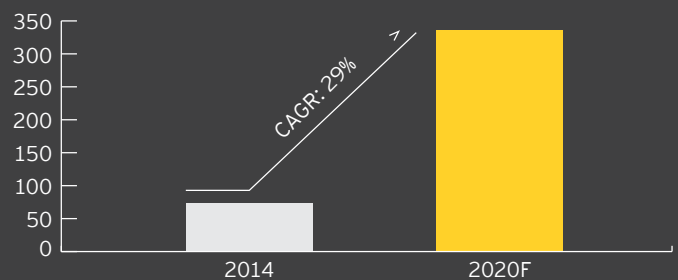
Current market landscape

The Government's proactive support of IoT development has benefited the M2M industry. Since 2011, the Ministry of Industry and Information Technology (MIIT) and the Ministry of Finance (MOF) have allocated a special fund of RMB500 million annually to support IoT in technological R&D, industrialization, application models, standard design and public service.[1]

The Government has selected 202 cities, including Beijing, Guangzhou, Hangzhou and Shanghai, to pilot smart-city projects with applications in vertical sectors such as transportation, electricity, public safety and environmental protection. Multiple connected Government services and city initiatives are also playing a significant role in leading the country's appetite for IoT solutions.

Over the next five years, we will see large-scale deployment of IoT, supported by new use cases and improvements to the customer experience. Increased investment in IoT will fuel more demand for M2M services, which will boost overall market growth. With that, M2M will become one of the key drivers of the future mobile internet era in China, forming an important part of the IoT

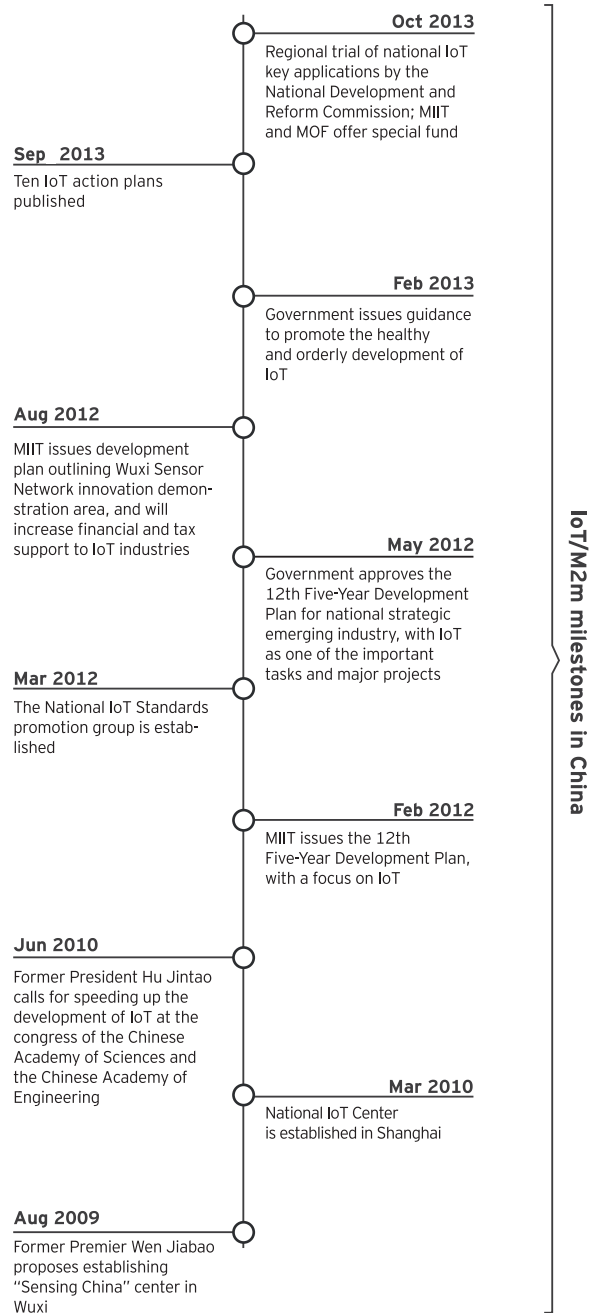[1] "A Vision of IoT: Applications, Challenges, and Opportunities with China perspectives", IEEE, 4 Aug 2014.

Government's pivotal role in IoT

China's IoT story began in 2009 as former Premier Wen Jiabao initiated the concept of "Sensing China" in order to develop sensor networks. Subsequently, China's Five-Year Development Plan (2011-2015) prioritized the development of IoT. In February 2012, MIIT released the national plan for the IoT industry, which put forward the objectives, investment and road map required to develop the market, stressing nine application areas that could improve the economy, society and the environment. The Government has since provided more than US$24 billion, with investment in IoT projects set to reach RMB3,860 billion (US$603 billion) by 2020. [2]

It has also led the development of standards, establishing an IoT standards association and promoting Chinese-developed standards internationally. Furthermore, China has forged international cooperation (e.g., with the European Union and United States) to help shape the global IoT market.

Since early 2015, China has pursued an "Internet Plus" action plan to integrate mobile internet, cloud computing, big data and the IoT with modern manufacturing to foster new industries and business development, including e-commerce, industrial internet and internet finance. This means that increased Government support, as well as more collaboration between traditional industries and internet companies, is expected. In the 12th five-year plan, outlined in October 2015, IoT featured prominently as a means to link infrastructure and manufacturing more efficiently as well as to encourage entrepreneurship and innovation.

■ IoT/M2M milestones in China

Oct 2013
Regional trial of national IoT key applications by the National Development and Reform Commission; MIIT and MOF offer special fund

Sep 2013
Ten IoT action plans published

Feb 2013
Government issues guidance to promote the healthy and orderly development of IoT

Aug 2012
MIIT issues development plan outlining Wuxi Sensor Network innovation demonstration area, and will increase financial and tax support to IoT industries

May 2012
Government approves the 12th Five-Year Development Plan for national strategic emerging industry, with IoT as one of the important tasks and major projects

Mar 2012
The National IoT Standards promotion group is established

Feb 2012
MIIT issues the 12th Five-Year Development Plan, with a focus on IoT

Jun 2010
Former President Hu Jintao calls for speeding up the development of IoT at the congress of the Chinese Academy of Sciences and the Chinese Academy of Engineering

Mar 2010
National IoT Center is established in Shanghai

Aug 2009
Former Premier Wen Jiabao proposes establishing "Sensing China" center in Wuxi

■ Nine important application areas in the 12th Five-Year Development Plan for the IoT

	Economic operation	Infrastructure	People's livelihood
Economy	Smart industrial	Smart grid	
	Smart logistics		
	Smart agriculture		
Society			Intelligent medical
			Smart household
		Intelligent transportation	
		Smart-city security and management	
Environment	Smart environment protection		

[2] "How China is set for global M2M leadership," GSMA, June 2014

Active participation across industries

Several groups of players are actively involved in the China M2M space. Telecoms operators are leading the development of services related to IoT and engaging with the smart-city projects initiated by many Chinese city authorities to expand their M2M and IoT businesses. Mobile operators have developed sophisticated M2M service propositions that go beyond providing basic connectivity, typically combining a generic horizontal platform, designed to work across all industry sectors, with dedicated vertical platforms for specific application areas, such as automotive or health care.

Proactive support from the Government has put Chinese technology vendors at the forefront of M2M technology development, which includes chipset design, device manufacturing, information processing, and standardization and infrastructure solutions.

Vendors are exporting solutions to telecoms operators to build scale in the network to promote efficiency and reduce costs. With its substantial investment and innovation, China has achieved technical breakthroughs in the IoT space in the past few years, as shown in Government documents. They include fiber optic sensor utilization, ultrahigh-frequency (UHF) radio-frequency identification (RFID) products and wireless chipsets specific for industrial process automation.

Large internet players have also accelerated their deployments of smart hardware devices to build a solid presence in the huge IoT market since 2014, in cooperation with traditional manufacturers of products such as household and electrical appliances. The internet companies, as well as traditional makers of household appliances, are also working with MIIT to formulate uniform IoT connection standards. The standards are set to be released during 2016.

Energy and transport sectors are leading adopters of M2M

The energy and transport sectors have been early adopters of M2M solutions in China, driving organizational efficiency and new service propositions. Strong Government investments and a decrease in the price of M2M modules have led these enterprises to adapt M2M for inventory control, smart grid monitoring and fleet management to increase efficiency, lower costs and manage infrastructure. The Government has also established regulations enforcing smart monitoring of electricity and water meters to promote usage of M2M in the energy and utility sectors. It is not surprising that in 2019, these two sectors are expected to constitute 29% of the M2M market. Meanwhile, other sectors, such as logistics, securities and health care, are growing apace in using M2M technology to deliver services, such as fleet management, asset tracking, surveillance and smart health. Going forward, the wearables and connected-car markets also will see significant growth potential.

China M2M market drivers and the market outlook

Sectors	Drivers	The market outlook
Energy	‣ China spent US$4.3 billion in smart grid investments in 2013, ahead of the US.[3] ‣ World's largest market for smart electricity meters. ‣ The State Grid Corporation of China controls most of the electrical grid in the country, allowing faster smart meter rollout.	‣ The State Grid Corporation planned to install 300 million smart meters by 2015 and seeks up to 380 million by 2020.[4] ‣ Smart meters in China are forecast to grow from 139 million in 2012 to 377 million by 2020, reaching a penetration of 74%.[4]
Transportation and automotive	‣ Driven by fleet management market due to the need to monitor vehicles (rising fuel prices and road congestion) and growth of e-commerce. ‣ Introduction of telematics solution by commercial vehicle original equipment manufacturers (OEMs); demand for in-car navigation and info-entertainment services by private vehicle owners. ‣ Improving efficiency through intelligent transportation systems is a key focus.	‣ The number of fleet management systems is expected to grow from 2.1 million in 2014 to 5.9 million by 2019 at a CAGR of 22.9%.[5]
Smart cities	‣ Increasing urbanization and the rising rate of the urban middle class. ‣ China's urban population is forecast to grow from 527 million in 2005 to 930 million in 2025.[6]	‣ There were over 320 smart cities in China by April 2015. The market value for smart cities is expected to reach more than $28 billion in 2020.[7]
Health care	‣ Aging population – China had over 200 million aging people in 2013, 14.8% of the total. That figure is expected to top 250 million and represent 16% of the total in 2020.[8] ‣ Chronic diseases – high cost of treatment for coronary heart disease and diabetes. ‣ Need for healthcare inclusion – 300 million people lie outside the existing system. [8]	‣ The Government's goal is to establish a universal basic health care system providing safe, effective, convenient and low-cost services by 2020.

IoT plays an important role in improving government services and the lives of citizens

Energy
Remote meter reading

Smart cities
Safe city – real-time surveillance of traffic and security situations
Smart home service – video, smart home, health care, life info, wearables, online education and TV shopping

Agriculture
Greenhouse gas management
Smart irrigation systems
Crop monitoring systems

M2M applications in China

Security
Connected video surveillance

Health care
Emergency rescue
Health monitoring
Online doctor appointment
and health information services
Smart ambulances

Transportation
Real-time traffic information
Public transport information
Apps connecting with police systems
Connectivity solutions to commercial vehicle OEMs

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[3] "China Pushes Past U.S. in Smart Grid Spending," IEEE Spectrum, 21 February 2014.

[4] "Global Market for Smart Electricity Meters: Government Policies Driving Strong Growth," US International Trade Commission, June 2014.

[5] "Fleet management in China," Berg Insight, January 2015.

[6] "China: Leading the Smart City Race," Industry Report Store, 28 April 2015.

[7] "Smart cities in China," China-Britain Business Council, January 2016.

[8] "Internet of Things on HealthCare and Chinese Wearable Medical Devices," Transpacific IP, June 2014.

New network technologies fueling growth

China is at the forefront of M2M growth. Yet the market is still in the early stages, as M2M accounted for less than 5% of telco's service revenue in 2015, according to external research. Benefiting from the Government's proactive support and the sheer scale of the opportunity, the addressable market and the opportunity for further growth are immense.
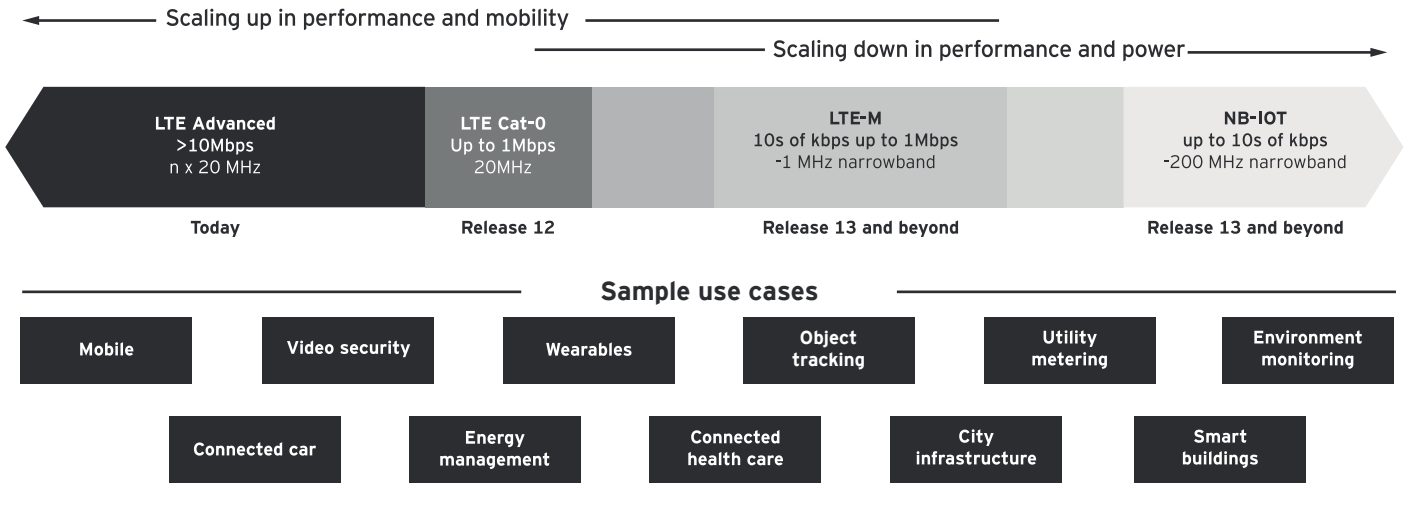
Smart-city technology probably represents the single biggest opportunity for M2M in China. The Government has identified it as a strategic focus area, and the National Development and Reform Commission (NDRC) and MIIT have issued guidelines for developing smart cities. Many local governments see smart-city applications as a solution to administrative challenges. The acceleration of the smart-city initiative will drive the need for intelligent applications that require M2M connectivity.

From a technology standpoint, Chinese vendors are bullish that the rollout of LTE-M (LTE for machine-type communications) – a 4G specification developed for machine connectivity – starting in 2016 will unlock M2M growth. By supporting more connections per cell and supporting low power use cases, it will accelerate industry-wide developments, creating new business opportunities and providing a better end-user experience.

The arrival of narrowband IoT (NB-IoT) technology will complement the LTE family to provide globally standardized, reliable (based on licensed spectrum) solutions to meet a rich and varied set of IoT services. The new technology will provide extended indoor coverage, support for a massive number of low-throughput devices and ultralow device cost.

Chinese telecoms operators and equipment vendors are among the core members of the global NB-IoT Forum formed in November 2015 to accelerate the ecosystem around this technology. Meanwhile, low-power wider area (LPWA) networks are gaining traction as an alternative technology for low-cost, low-data rate M2M connectivity.

← Scaling up in performance and mobility

Scaling down in performance and power →

LTE Advanced >10Mbps n x 20 MHz	LTE Cat-0 Up to 1Mbps 20MHz		LTE-M 10s of kbps up to 1Mbps -1 MHz narrowband		NB-IOT up to 10s of kbps -200 MHz narrowband
Today	Release 12		Release 13 and beyond		Release 13 and beyond

Sample use cases

Mobile	Video security	Wearables	Object tracking	Utility metering	Environment monitoring
	Connected car	Energy management	Connected health care	City infrastructure	Smart buildings

Source: Qualcomm

In the longer term, 5G mobile technology will enable connectivity between people and things and between things and things, and at the same time fully meet the needs of various industries in terms of bandwidth and latency requirements. It is set to become the first network capable of being versatile and scalable enough to enable the future of the IoT, which will bring new consumer experiences. Recognizing that this will be important in transforming IoT, China is pushing for leadership in 5G development and deployment, where equipment vendors and telecoms operators are cooperating on and investing in 5G research and development.

The increased deployment of software-defined networking (SDN) and network function virtualization (NFV) by Chinese telecoms operators can also benefit the management of billions of devices. Software-defined networks can help operators more dynamically provision services while overhauling billing systems can enable operators to embrace a number of different partners along the value chain.

China's global leadership in M2M

China is the manufacturing center of the world, while its equipment vendors are global leaders in the provision of mobile infrastructure. It has a robust supply chain for cheap, volume manufacturing, as well as expertise for hardware products. China's software developers are also heavily invested in mobile, which is the gateway for IoT, and its manufacturers are rapidly building their own retail brands. The increasing sophistication of the manufacturing base in China and the willingness of retailers to promote or adopt new brands from China will have far-ranging impacts in the electronics industry.

With ambitious government plans for the IoT, China is poised to take a leading role in global M2M development. Its huge smartphone user base provides a strong foundation for the sector to develop.[9] A domestic industry for IoT products is already evolving, while local governments are encouraging adoption through new building codes and other incentives.

In summary, a mixture of demand-side and supply-side factors positions China to build its global leadership in IoT. From high rates of urbanization to high levels of state backing and a dynamic technology sector, China has many key drivers in place to promote long-term growth of IoT.

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[9] "Poised for takeoff: China's Internet of Things," CKGSB Knowledge, 24 September 2015.

Addressing market challenges

Connected devices are growing at an unprecedented rate: internet-connected machines will surpass the online population in the next 10 years. Yet one of the by-products of high growth rates is the fragmented nature of the M2M ecosystem, where a number of different entities are competing and collaborating against a backdrop of changing customer needs. In this environment, there are both short-term and long-term challenges that need to be addressed.

Security and privacy issues top user concerns

Interconnected M2M systems can leave more private information exposed and this risk increases when data is aggregated. Information is stored on both private and public networks, further reducing control over data. The greater complexity of interconnected networks could introduce vulnerabilities and increase exposure to potential attackers on connected machines, leading to potential breaches of customer privacy.

In particular, concerns about data security and privacy have risen among M2M users in the health care and automotive industries. In health care, for instance, data leakage can cause misuse of a patient's health-related information. It is critical to maintain privacy and confidentiality while still providing the necessary semantic context during the exchange of information.

Information security is a key issue in China and has been a roadblock to the wider adoption of the IoT. Policy documents from the State Council, the State-owned Assets Supervision and Administration Commission (SASAC) and MIIT have set specific requirements for information security protection for IoT systems. Standards bodies are also actively addressing the ability to provide rights to the information source and anonymize the semantic information.

Lack of standardization at various levels hinders growth

Technical standards are required to promote network compatibility and the interoperability of M2M devices.

However, M2M standards remain complex and fragmented, and they vary across industry verticals and countries. Standardization is needed across all elements of the complex value chain, including integrators, hardware companies and application developers, to reduce deployment costs and technical integration issues. For an M2M network to be effective, standardization of technical and application layers, as well as between devices, is also necessary. Yet fragmentation also presents an opportunity for China, who is eager to develop IoT standards that can be adopted globally.

Globally, a number of international standards organizations, alliances and trade bodies have looked to achieve standardization of different layers of M2M, such as device, network and service. China aims to define the market for international standards development and is trying to standardize both IoT and M2M networks to enhance efficiency. The China Communications Standards Association (CCSA) is one of seven standards development organizations (SDOs) that have formed the oneM2M global initiative in 2012 to develop technical specifications for a common M2M service layer that can be readily embedded within various solutions.

M2M modules present software management challenges

An M2M module has a life-span of 7 to 15 years and, similar to all computing devices, it will face some software and hardware defects during its lifetime. M2M service providers deploy these modules in remote and unmanned locations where they are used to perform various functions, such as monitoring, security and metering. It is difficult, time-consuming and costly for service providers to send technicians to remote locations if the modules malfunction or require software upgrades. Given the pace at which the mobile M2M module market is evolving and the innovations that are taking place, the modules will become outdated if they are not upgraded on time. The size of China amplifies this challenge and makes this an all-the-more-pressing issue for service providers.

Restrict tax or nontax charge-related local incentives

To attract investment, local government authorities used to grant enterprises financial subsidies based on the tax contributions of an enterprise (including the contributions of nontax charges that are stipulated by the central government). The ability to provide such subsidies has been restricted since May 2015. Local incentives and subsidies related to tax and nontax charges stipulated by the central government are now subject to the approval of the State Council, to the extent that the policies for providing such incentives and subsidies are not formally issued. Although the new rule does not disallow local governments from offering incentives and subsidies according to their economic development needs, it does signal that the method of providing them has already changed. In the "Internet Plus" action plan issued in early 2015, the State Council encourages local governments to explore new modes to support the building and demonstration of Internet Plus platforms and launch risk compensation mechanisms to diversify the channel of local incentives and financial support.

Key success factors to grow the market

An efficient interconnected environment is vital to M2M development. This demands a dedicated mobile networks, improved coverage and bandwidth availability, increased usage of smart devices, and supportive government policies. All these will affect an operator's ability to address the needs of particular applications, with government support proving particularly beneficial in China. To customers, the applications must be compatible with different device types, configurations and operating systems, and they must be supported by different wireless networks to gain real value.

The M2M market development represents a complex set of interrelated elements. Designing an M2M business involves optimizing all these elements, including business model, supply chain, vertical applications and ongoing support challenges. All players in the M2M ecosystem must have the flexibility to position themselves for upcoming opportunities.

Revamp the organizational model

A number of operators have restructured their M2M business activities over the last year to reflect the "strategic importance" of M2M. A clear sign of commitment to the market involves the allocation of dedicated resources and capital. Moreover, M2M is seen as a cross-functional business that requires collaboration across company functions such as sales and marketing. China Mobile established an IoT base in Chongqing in 2010, and set up a wholly owned subsidiary called "China Mobile Internet of Things Co. Ltd." in 2012.

Given the wholesale orientation of many M2M business models, many telecoms operators' M2M business units report to a wholesale division. This not only perpetuates the bit-pipe model but also can result in a fragmented strategy and an inconsistent marketing message. Moreover, a narrow focus limits opportunities to leverage competencies that can apply across sectors and generate horizontal opportunities.

Aligning the M2M business within the mobility or enterprise units of the organization is preferable to a wholesale alignment. M2M must be considered a solution to enable both consumer and enterprise segments. While consumer offerings such as smart home services will require M2M for delivery, the ability to link M2M to existing enterprise contracts for connectivity offers telecoms operators a real ability to generate loyalty and monetize demand for new service offerings.

There are additional considerations, however. Operators need to be mindful of the wire-line component inherent in many M2M services, either backhaul or last-mile connectivity, which will in turn require closer collaboration with their wholesale divisions. M2M should force operators to rethink organizational silos and develop a product set that complements existing services across a range of customer segments.
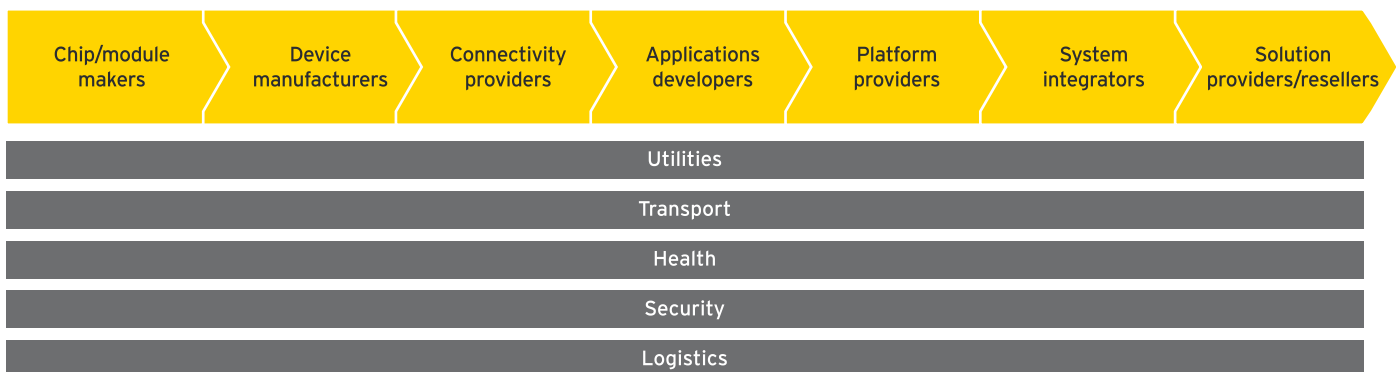
Find the appropriate position along the value chain

With M2M still in its infancy, the industry value chain is not mature enough to deploy large-scale M2M applications. While most service providers do not expect significant revenue in the short term, they are increasing investments in this area, with an eye toward the huge growth potential. Competition with non-telecoms service and application providers will increase in China, considering the proactive involvement of large internet players and appliance manufacturers. Quick movement into the market is thus essential.

Operators are searching for their roles in the M2M value chain. For example, in China, some take a win-win approach with their hardware and software partners, not trying to dominate the value chain or to unfairly limit their revenue-sharing with partners. Others make an aggressive push toward M2M ecosystem development by positioning themselves as major players.

Nevertheless, operators' ability to consolidate this long value chain to promote M2M solutions in vertical industries is limited. What's still missing is a strong integrator that can consolidate multiple M2M systems within a sector (e.g., automotive) to drive synergies among different service aspects, such as transportation, environmental protection, public security, insurance, manufacturing and safety. To this end, there is no one-size-fits-all operating model that guarantees success or returns for an M2M service.

■ **An overview of the China M2M ecosystem**

Chip/module makers	Device manufacturers	Connectivity providers	Applications developers	Platform providers	System integrators	Solution providers/resellers

Utilities
Transport
Health
Security
Logistics

Drive partnerships in different dimensions

Service providers will find it difficult to tackle M2M alone. Successful partnerships and other forms of collaboration with third parties can deliver solutions effectively. In China, the market is driven by partnerships between government (at all levels) and local service providers. Operators need to work with third parties to obtain competencies they do not have and with competitors to give M2M solutions wider customer reach. They also need partners to provide the integration element of larger, more complex deals.

Cross-industry collaborations are equally critical to the success of M2M. Operators should consider establishing preferred relationships with leading providers of vertical solutions to develop targeted applications and establish the building blocks for successful M2M services.

While partnerships are vital to the growth of M2M, service providers should focus less on the number of partnerships and more on their quality and relevance in terms of providing a complementary set of capabilities. It is not uncommon to see operators active in M2M services to have hundreds of partners along the value chain. To forge more effective partnership, some operators have created formal partner programs to actively form mutually beneficial relationships. They also need flexible attitudes to revenue sharing, which will depend on partners' M2M solution capabilities.

Partnership model of Deutsche Telekom

Deutsche Telekom (DT) has more than 600 companies across 56 countries participating in its partner program. Partners are primarily categorized into hardware, software, system integrators and end-to-end solutions providers. Moreover, DT has three levels of partnership, depending on the type of collaboration:

1. **Registered partners** – they are registered only on the DT partner portal and can submit solutions on the "solution finder" section.

2. **Product partners** – they are registered members of the partner profile and can sell products in DT's "M2M Marketplace."

3. **Project partners** – they are officially authorized partners as part of DT's "Cooperation Non-Disclosure Agreement." These partners can participate in DT's M2M projects.

A bold acquisition strategy can generate more value from M2M

While partnership provides a fast route to market, acquisition strategies can bring a mixture of customers, vertical expertise and development capabilities to operators and service providers. For example, one smartphone vendor is now moving to gain IoT market share by building an ecosystem of connected devices controlled by its smartphones. In recent months, this handset manufacturer has acquired 20 tech start-ups and launched a number of smart home products, including a blood pressure monitor, air filter, security camera, scale, power strip and light bulb.[10] For their part, operators may need to consider investing in priority sectors such as utilities and transport.

Looking ahead, operators have the financial clout to experiment with new business models, such as those that involve no up-front fee, or share revenues and cost savings, many of which may be hard for smaller organizations to test. Acquisition also has downsides: the geographic coverage of a target may not match the operator's footprint, integration can be challenging, and the vertical focus of most M2M companies may not sit well with multiple vertical opportunities sought by operators.[11]

Move toward a complete-solution business model

The evolving nature of the M2M market has led to the creation of new business models around different types of offerings, partnerships and pricing strategies. Operator business models are evolving beyond providing connectivity alone, since connectivity accounts for a minority share of the M2M revenue opportunity. To reduce system complexity, they are developing end-to-end solutions and adopting a platform-based approach instead of a network-only. Providers can offer a greater value proposition to customers if they have a turnkey M2M service with the appropriate device software, network services, cloud-based device management platforms and applications.

To improve the revenue potential of M2M, operators also need to generate recurrent revenue from services to offset the low average revenue per device. There is a trend toward offering more complex applications and developing a robust portfolio of services to offset low revenues per connection. This requires operators to engage in strategic partnerships with stakeholders along the value chain. The profitability of operators in delivering solutions and services will hinge on how service-oriented they become.

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[10] "Poised for takeoff: China's Internet of Things," CKGSB Knowledge, 24 September 2015.

[11] "The IoT and M2M market is experiencing vibrant M&A activity, but telecom operators are curiously absent," Analysis Mason, 14 July 2014.

Form alliances to deliver cross-border solutions

M2M in China remains a domestic market today, and service providers are focusing on a localized market strategy. Despite the sheer scale of the market, industry players should start thinking out of the box before the market matures. As M2M gains traction, future solutions will be not only domestic but also regionally focused. Operators should offer a unified service to customers across multiple geographies over a single operating platform. This requires them to start building up regional scale and capabilities, as their global counterparts are already doing.

Deploying an international solution proves challenging both from a partnership perspective, as highlighted above, and from a cost perspective, because roaming contracts can bloat traffic costs. Given solid in-market network coverage, network quality and overall market presence, operators with a multi-country footprint are better positioned to serve multinationals, leveraging existing roaming relationships with operator partners.

To capture global opportunities, cross-border, cross-vendor alliances have emerged in several world regions, furthering development of M2M ecosystems. These alliances aim to deliver enhanced and seamless services globally through M2M roaming services and interoperability agreements, while some develop a global solution meant to simplify and promote the adoption of M2M worldwide. Participating in an alliance with a stronger footprint in this region can boost the potential of a pan-Asian M2M collaboration.

Unlock the potential of big data

M2M data is likely to increase drastically in volume terms over the coming years. More and more applications are being equipped with sensors that can monitor and measure many different variables that will create vast amounts of data. This trend from merely connected devices toward connected ecosystems has driven the application of big data analytics in some sectors, unlocking the potential of M2M.

Big data analytics can provide customer and usage insights that help organizations enhance and innovate their products, set pricing, manage loyalty programs and cut costs. Without adequate analytics, and the right practices to take advantage of it, companies rolling out M2M solutions can only participate in lower-value activities: monitoring, reporting and simple rules-based actions. Using proper data management platforms and leveraging the power of cloud computing are vital to data analysis and data sharing.

Big data can also create new business opportunities in the long run. Operators can extend the strengths of their brand, their embedded technology capabilities, and their experience and resources as a trusted service provider in managing data for the M2M market. As enterprises explore big data opportunities, M2M solutions will become even more pervasive.

Leverage preferential tax treatments to reduce costs

As China moves from an export-oriented manufacturer to a service-oriented economy whose growth is based on domestic consumption, the Government has released a number of tax policies to encourage the development and application of technologies. The following preferential treatments are commonly applicable to the M2M industry:

Category	Preferential treatments	Notes
High and new technology enterprises (HNTE)	‣ 15% reduced corporate income tax (CIT) rate ‣ Deduction limit on employee education expenses for CIT purposes increased to 8% of total salaries (ordinary limit is 2.5%)	Among other conditions, the applicants must have independent intellectual property rights to key technologies of their main products (services) gained through independent research and development, transfer, donation or acquisition in the most recent three years, or through exclusive worldwide license for over five years.
Technologically advanced service enterprises (TASE)	‣ 15% reduced CIT rate ‣ Deduction limit on employee education expenses for CIT purposes increased to 8% of total salaries ‣ Value-added tax (VAT) exemption on qualified offshore outsourcing services	The CIT and VAT preferential treatments are valid until the end of 2018 for the elected 31 cities in China.
Software enterprises	A two-year CIT exemption followed by a three-year 50% reduction on CIT liabilities	
Super deduction on R&D expenditures	Additional 50% deduction of qualified R&D expenditures/costs (i.e., 150% deduction of actual expenses incurred)	

Conclusion

The focused government support for the IoT has put China at the forefront of global M2M communications. Deployment of smart-city pilots has accelerated adoption in several key sectors, such as energy and transport, with new network technologies supporting future market growth.

Telecoms operators, technology vendors and internet companies are racing to take advantage of the M2M opportunity, with each sector considering its positioning within a complex and fragmented value chain. Yet the industry needs to cooperate to tackle several major market impediments, including standardization and security. Clearing these hurdles is imperative to drive demand in other sectors, such as health care and financial services.

As Chinese operators continue to push M2M industry applications to offset slowing domestic growth and to open a new revenue source, they need to construct a global vision for developing the market. When setting their future path, they can learn from the experiences of service providers that have developed global reach and capabilities.

To succeed in the long term, operators must also look at revamping their organizational model to increase agility. Engaging in partnerships and alliances is vital to delivering robust and innovative solutions. Pursuing acquisitions can also position service providers for a greater share of M2M industry revenues. Meanwhile, sharper focus on big data analytics also provides opportunities for further differentiation by delivering greater insights for customers.

Glossary

Acronym	Term	Definition
CIT	Corporate income tax	Income tax on the income of companies
IoT	Internet of Things	A scenario in which objects, animals or people are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. IoT has evolved from the convergence of wireless technologies, micro-electromechanical systems (MEMS) and the internet.
LPWA	Low power wide area	These networks are built specifically for M2M communications and offer long-range, low-power consumption. They solve cost and battery-life issues that cellular technology cannot, and LPWA networks solve range issues that technologies like Bluetooth or BLE struggle with.
LTE	Long-term evolution	LTE is the term applied to evolved versions of GSM, W-CDMA and HSPA 3G mobile standards; it is often synonymous with the term 4G. LTE provides peak download 1 Gbps and peak upload speeds of 500 Mbps.
LTE-M	LTE for machine-type communication	LTE-M is an evolution of LTE optimized for IoT in 3GPP RAN. It is a design of a new narrowband M2M system built from existing LTE functionalities for Low Power Wide Area (LPWA) systems.
M2M	Machine-to-machine	M2M refers to wireless communications via cellular technologies, including Bluetooth standards between devices and related applications such as automatic meter reading, fleet management, security monitoring and telemedicine.
NB-IoT	Narrowband Internet of Things	LPWA technology, NB-IoT is designed to support a massive number of low throughput devices, low delay sensitivity, ultra-low device cost, low device power consumption and optimal network architecture.
NFV	Network functions virtualization	An initiative to decouple the network functions from proprietary hardware appliances so they can run in software. NFV aims to leverage standard IT virtualization technology to consolidate many network equipment types onto industry standard high volume servers, switches and storage, which could be located in Datacenters, Network Nodes and in the end user premises.
RFID	Radio frequency identification tag	A radio frequency identification tag is a device (usually a low cost device) that receives a radio signal and responds with a code that provides an identification of the tag. An RFID tag may be self-powered (e.g., battery) or it may be a simple mixer circuit that does not require external power.
SDN	Software-defined networking	SDN is an architectural concept that encompasses the programmability of multiple network layers – including management, network services, control, forwarding and transport planes – to optimize the use of network resources, promote interoperability across suppliers and network layers, increase network agility, unleash service innovation, accelerate service time-to-market, extract business intelligence and ultimately enable dynamic, service-driven virtual networks.
UHF	Ultra high frequency	UHF is the ITU designation for radio frequencies in the range between 300 MHz and 3 GHz, also known as the decimeter band as the wavelengths range from one meter to one decimeter.

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