

M2M technologies



Message

The wireless subscriber base in India has reached 870 million, opening a new market for M2M which is already growing at a fast pace worldwide. M2M technologies allow both wireless and wired systems to communicate with other devices and systems of the same ability. Innovative applications such as smart cars, connected homes, smart metering, remote management and industrial data collection will be major revenue drivers of service providers worldwide in the near future.

We, in ASSOCHAM, are of the firm belief that M2M along with cloud computing and IPv6 will usher in a major revolution in India. M2M can touch each and every citizen's life in a profound way—be it financial inclusion, security, tracking, health, etc. M2M will pave the way for smart and efficient systems—electricity, water, smart cities, etc. The increased efficiencies in every sphere of life will help increase national productivity which is the need of the hour for our nation.

ASSOCHAM will continue to engage in providing an effective forum to facilitate dialogue between the Department of Telecom, the telecom industry and other stakeholders for ensuring a suitable M2M policy framework.



D. S. Rawat
Secretary General
ASSOCHAM

1. Background

What is M2M?

The term **M2M**, also commonly known as ubiquitous or pervasive computing refers to what is essentially a four-step process: data is generated, data is transmitted, data is analysed, and data acted upon. Other names that define M2M or its subsets include the ‘internet of things’, ‘connected devices’, ‘remote monitoring and diagnostics’, ‘smart computing’, ‘smart metering’ and ‘extended internet’.

M2M (machine to machine) leverages innovations in micro computing and wireless technology that allow embedded devices to collect and distribute real-time data and has the potential to connect millions of machines today, and even more in the near future. In simple terms, M2M is defined as a technology that enables electronic and mechanical devices to communicate with each other seamlessly and perform actions without human intervention.

The M2M system

The M2M system uses device (sensor, meter, etc.) to capture ‘event’ (temperature, inventory level, etc.), relayed through a communication network (wireless, wired or hybrid) to an application (software program) that translates the captured event into meaningful information (E.g. items need to be restocked) that can be actioned subsequently.

M2M works on four basic principles:

- Acquiring data through sensors, RFID and related devices
- Transmitting the data through the network channel
- Making decisions via intelligent application solutions
- Triggering an action, based on pre-determined rule-sets and analysed data.

The M2M ecosystem

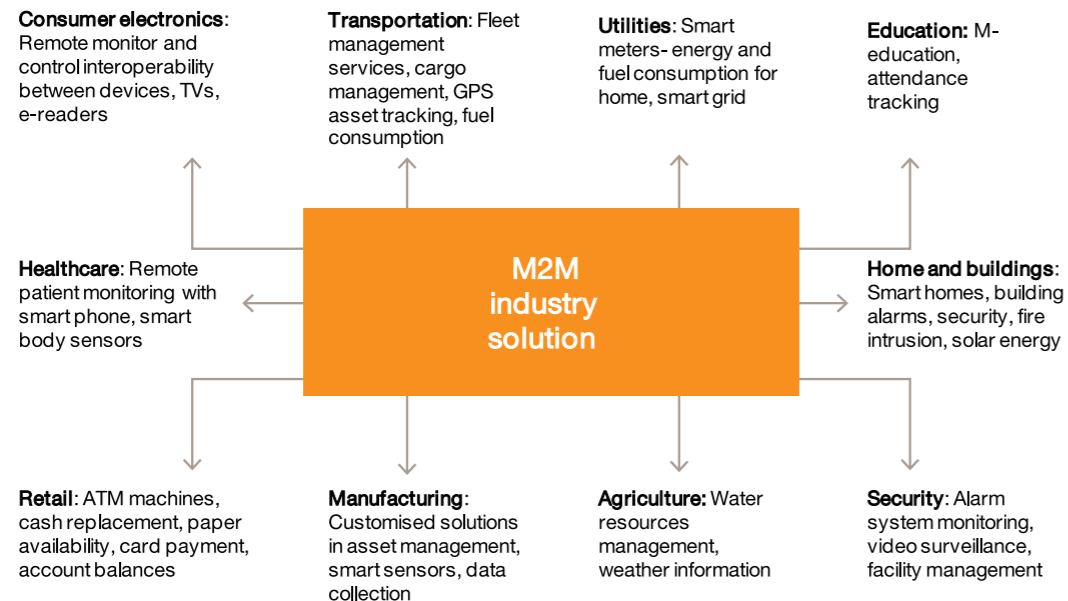
Telcos have taken the lead in building M2M networks that deliver granular device data to centralised applications that turn it into meaningful information. However, the M2M business is in its nascent stage and business models are evolving, driven by various value propositions for the players in the ecosystem. The four key categories in the M2M ecosystem are as follows:

- **Hardware and semiconductor company:** These provide the end-point devices from where data is acquired (sensors, GPS units, smart meters, RFID tags, video cameras, and smartcards).
- **Communication service provider:** These enable the transmission of data between machines.
- **M2M service provider:** These are vertical niche players providing specific M2M application solutions for data analysis for decision-making.
- **System integrator:** This is the technical domain expertise to bind all systems together.

The roles of these players may overlap in various business models that will evolve depending on the positioning created by each individual player and specific market opportunities.

Application of M2M

M2M provides benefits to individuals, companies, communities and organisations in the public and private sectors across industries. Some of them are:



Source: PwC analysis

2. M2M in India

We believe M2M has significant potential in India. To illustrate some of them, we expand here on four areas, namely smart city, smart grid, agriculture and healthcare.

Smart city

Smart city is inclusive of terms such as **digital city** or **connected cities**. Smart cities as an applied technology term often refers to a collection of various M2M services for electricity, water supply, waste management, traffic solutions and are referred to as, city basics.

It is estimated that every minute during the next 20 years, 30 Indians will leave rural India for urban areas. At this rate, India could need about 500 new cities in the next two decades¹. If there were ever a time to focus on developing solutions for sustainable cities, it is now. As population centres grow, they are placing greater demands on city infrastructure and vital services such as transportation, healthcare, education and public safety.

Replacing actual city infrastructure is often unrealistic in terms of cost and time. However, existing infrastructure can be infused with new intelligence. This means digitizing and connecting systems, so they can sense, analyse and integrate data, and respond intelligently to the needs of their jurisdictions.

How can a smarter city help?

A smart city is an environment that involves many technologies and multiple agents: from sensors scattered throughout the whole city (to collect any kind of data; traffic, water, energy, etc.) to the cellular devices owned by citizens. This data must be managed by a platform.

As per a recent PwC Connected Life report prepared for the GSMA, traffic telematics could help Chinese commuters reclaim nearly two hours each of their time every week².

Estimates indicate that the economic benefits of the resulting increase in productivity could add more than 20 billion USD to the Chinese GDP each year³.



Smart mobility

Issues	How M2M could help
<p>Vehicular growth due to rapid urbanisation:</p> <ul style="list-style-type: none"> Road traffic conditions in India are getting worse. The average number of vehicles has grown at the rate of 10% annually, in the last five yrs⁴. Vehicle penetration in metros such as Mumbai is suffering from about 590 vehicles per km of road⁵. Research on traffic shows that India loses around 60,000 crore INR (including fuel wastage) a year due to traffic congestion in urban centres and highways⁶. 	<p>Intelligent transportation system: Road network monitoring to determine traffic density real time and recommend routes to reduce travel time and congestion. It allows users to identify the best route.</p> <p>Smart parking: Real-time information about parking spots and notifications when restricted spots (loading bay, bus stations, disabled parking bay, etc.) occupied. People can locate free parking spots and their price through an intuitive graphical interface.</p> <p>Fleet management: Solution that identifies the positions of all service operator vehicles real time. It produces reports to plan, save and improve.</p>

Energy and environment

Issues	How M2M could help
<ul style="list-style-type: none"> Commercial buildings are the third largest consumers of energy in India after industry and agriculture. Buildings annually contribute to more than 20% of the electricity used in India⁷. Indian cities alone generate more than 100 million tonnes of solid waste a year. Indeed, forget the waste segregation and recycling directive of the Supreme Court, the Organisation for Economic Cooperation and Development estimates that up to 40% of municipal waste in India remains simply uncollected. Water scarcity is fast becoming urban India's crisis, with the government's own data revealing that residents in 22 out of 32 major cities have to deal with daily shortages. Delhi uses 36 million m³ of water per day. The New Delhi Jal Board supplies just over 30 million cubic metres per day, but only 17 million cubic metres actually reach consumers due to infrastructure problems, such as leaking pipes⁸. India is the largest groundwater user in the world, where an estimated 85% of drinking water is groundwater dependent. Millions of women and children spend several hours a day collecting water from distant sources of varying quality. Further, dysfunctional water supply systems have led to loss of investment caused by poor maintenance, limited financing and overall failure to address sustainability challenges in the field. 	<p>Smart grid and smart meters: Smart metering solutions in electricity, water and gas usage optimise energy efficiency through better insight on real-time consumption, losses and fraud. In India, smart grids can help increase efficiency of power grids where Transmission and Distribution losses are almost 30% of the total installed capacity⁹.</p> <p>Smart buildings: Solutions for centralised and remote management of buildings in each building can help them communicate with one another through a united command centre and manage individual building functions to reduce consumption of energy.</p> <p>Waste management: Waste management solution to integrate data from containers (type, filling level, etc) and traffic information in the optimal route detection of the waste collection fleet. A GPS device is installed in almost the entire fleet of cleaning and waste collection vehicles. This makes it possible to optimise routes and save time and resources.</p> <p>Watering management: By controlling gardens' soil humidity with an M2M solution, irrigation can be planned according to needs, thus saving costs.</p> <p>Low-cost M2M enabled water meters can enhance water pump monitoring and contribute to understanding user behaviour. Similarly, there could be a high demand for M2M solutions in sanitation and irrigation.</p>

Case studies

- Sarvajal¹⁰** (India) has developed business models on the use of M2M for clean water services. It uses a combination of GSM enabled remote monitoring systems and water ATMs to provide clean water services in India. *Soochak* controller enables remote monitoring and control of filtration operations. Water ATMs are managed via GSM and enable the use of stored value smart cards for water purchase. Their franchise business model ensures water production. Local distribution is managed centrally. As of November 2012, *Sarvajal* had 155 franchisees, impacting more than 85,000 lives.
- HT Media¹¹ distributes daily newspapers to distribution centres across the country using contracted vehicles on pre-determined routes, thus ensuring timely, safe and accurate delivery. M2M based services enable cost efficiencies for fleet operations. They help real-time monitoring of trucks and shipments. This helps streamline operations, minimise downtime and optimise asset performance.

Smart grid

Smart grid enables efficient functioning by improving reliability and economics for production and distribution of electricity.

Technology that allows for two-way communication between the utility and its customers makes the grid smart. Smart grid consists of elements working together with the electrical grid to respond digitally to rapidly changing electric demand.

As per the PwC Connected Life report, reducing power theft and increasing usage efficiency via smart meters can save enough electricity in India to power more than ten million homes¹².

Issues	How M2M could help
<p>Demand and supply gap in the Indian power sector: With total installed power generation capacity of about 223 GW (as of April 2013), India is still struggling to meet increasing power demand. According to the Central Electrical Authority (CEA), the total generation shortfall during 2011-12 was 8.5% with demand touching 937,199 million units and generation lagging at 857,886 million units¹³.</p> <p>Western India witnessed the highest shortfall at 11.4% during 2011-12. Southern India saw the largest demand-supply gap of 15.5% during April 2012¹⁴.</p>	<p>M2M can help reduce power theft and increase usage efficiency via smart meters, thus saving enough electricity in India to reduce the demand-supply gap.</p>
<p>High transmission and distribution (T and D) loss: According to the CEA, total T and D loss in India during 2010-11 was about 23.9% while aggregate technical and commercial (AT and C) loss is about 16.1%¹⁵. This includes both theft and technical losses. Further, for every 1 INR of power sold, the utilities are able to collect back only 80 <i>paisa</i>. The rest is either not collected or is lost due to AT and C losses.</p> <p>T and D losses are the main cause of mounting financial losses on state distribution utilities. According to a Planning Commission report, the reported AT and C loss of 28,853 INR crore for 20 states in the 10th Plan is underestimated as the actual AT and C losses are estimated to exceed 40,000 INR crore.¹⁶</p>	<p>Smart grid represents an unprecedented opportunity to move the energy industry into a new era of reliability, availability and efficiency. Commercial losses become measurable, traceable, and reducible when using more sensors and meters in the power grid. Solutions such as capability of remote disconnection on non-payment by consumers, automatic alarms when the network is being encroached on or when people engage in theft, will enable utilities to stop pilferage and avoid unsafe situations and accidents. In addition, optimal asset utilisation can be planned with online data of overloading transformers and network, which can help reduce and prevent failures.</p>
<p>India's power grid blackout¹⁷: On 31 July 2012, much of India's electricity supply network collapsed in the country causing an estimated shortage of 32 GW, affecting more than 680 million people; double the population of the US. It caused business losses estimated to run into the hundreds of millions of dollars.</p> <p>The power outage wreaked havoc on businesses and travellers. About 200 trains stopped operating for several hours. Metro rail services in the national capital of New Delhi and its suburbs were halted. About 270 miners were stuck in two underground coal mines in eastern India as elevators stopped working.</p>	<p>When a power outage occurs, smart grids will be able to detect and isolate the outages, containing them before they become large scale blackouts. This will also help ensure that electricity recovery resumes quickly and strategically after an emergency. For instance, prioritising of routing electricity to emergency services.</p>

The R-APDRP¹⁸ (Restructured Accelerated Power Development and Reform Programme) was focused on establishing baseline data, fix accountability, strengthen and upgrade sub-transmission network and reduce AT and C losses up to 15%. Projects under the scheme involved base line establishment, IT applications for energy auditing, strengthening of sub-transmission and distribution projects.

- **Automated meter reading (AMR):** AMR has become a necessity for effective energy management, energy accounting and to overcome the problems of manual reading.
- **Geographic information systems (GIS):** This involves conducting GPS survey of consumer households, connected electrical feeders and distribution transformers. Consumers are then indexed and given a unique electrical address (CIN), making it possible to segregate them for energy audit and accounting purposes. The geo-referenced data is also mapped on satellite imagery of appropriate scale.

Agriculture

The agriculture sector plays a vital role in the development of India with over 60% of the country's population deriving their subsistence from it. The total outlay of 4.01 billion USD has been proposed for the Ministry of Agriculture in the Union Budget 2013-14, which is 22% more than the revised estimates of 2012-13²¹.

Issues

Low irrigable land: As per a World Bank report, only 35% of the total agricultural land in India is irrigable. This in turn means dependencies on water pumps for irrigation. However, there is a significant demand and supply gap in the power sector in India leading to long hours of unscheduled power cuts and fluctuation.

No channel for local weather information: Lack of facility for accurate and timely information on localised weather conditions continues to be a challenge for the farmers.

Lack of storage space for food items: India has more than 20% of its population under poverty line, 54,000 crore INR worth of grains and farm produce is wasted every year which accounts for 13% of the GDP²². The reason behind such a huge wastage is non-availability of proper storage shelters.

Case studies

- The UHBVN, Haryana¹⁹ pilot project covers 31,914 consumers and 531 distribution transformers, for approximately 131.8 MU input energy consumption. The proposed project area is covered under the RAPDRP Scheme for IT implementation and system strengthening. The functionality of peak load management is proposed by implementing automated metering infrastructure (AMI) for residential consumers and industrial consumers.
- The CESC, Mysore²⁰ project involves 21,824 consumers (residential, commercial, industrial and agricultural) and 512 irrigation pumps sets covering over 14 feeders and 473 distribution transformers. Together, they account for input energy of 151.89 MU. Peak load management (PLM) and outage management (OM) are proposed by implementing AMI and integration to distributed generation and micro grid integration. Other possibilities include functionalities such as agriculture demand side management (DSM) with community portal, consumer portal to support DSM and demand response (DR), employee portal for knowledge-sharing and benefit realisation, KPI based MIS and data analytics for decision support.

How M2M could help

Remote-controlled water pump solutions: This can be used for automating the process of watering the crops through Zig-Bee, Wi-Fi, Bluetooth and related solutions as per availability of electricity.

Weather monitoring systems: This can be used for agri-based industries where sensors wirelessly send data to a centralised server and management or respective stakeholders can take predictive measures for one's business and needs.

M2M-based food supply chain management (FSCM): These systems can help curb this menace by collecting information about food stock and raising an alarm when the expiry date is nearing.

Case studies

- Nano-Ganesh, Water Pump Control²³ is a cellular-based wireless remote control and alarm system for water pumps designed considering unfavourable irrigation conditions. This counters routine problems like fluctuation in power supply, difficult terrain, fear of animals on way to pumps, hazardous locations of pumps, open wiring, shock hazards, rains etc. Also, in the rural water supply schemes, there is inadequate coordination between tank levels and the water source. All that Nano-Ganesh needs is a low cost wireless connectivity with voice transmission and Dual Tone Multi Frequency (DTMF) transmission available in most handsets.

So far, 10,000 remote controllers are in use and have improved the livelihoods of 40,000 people with 1,000 rural technicians getting an additional source of income; 180,000 m³ of water, 1080 M.W. of electricity, 180 m³ of fuel and 18 m³ of soil was saved in the year 2010 by installing 2,000 Nano-Ganesh sets; 720,000 USD saved in labour costs in the year 2010²⁴.

- Food Supply chain management (FSCM) using LTE network cum wireless sensor network²⁵ solution is being developed by Nippon Electrical Company. FSCM consist of all activities in movement of food from producers to consumers like purchase, storage, transportation, distribution and processing. This helps in providing better management and tracking of food items, distribution at reasonable prices in controlled markets, better price controls in private markets and ensuring food security through better management for PDS and during disasters like droughts, etc. Some of its uses are:
 - During transit, in case of theft Active Transport Tracking Device (ATTD) device would raise alarms to both the buyer and seller
 - Check weight periodically and thereby control leakage and pilferage
 - Detect and raise alarm when the food item expires

FSCM system with pesticides feature support sensor network would also help in pesticides control when it detects the weeds, fungus, bacteria and microorganism growth.



3. Market potential

Healthcare

The Indian healthcare industry, which comprises hospitals, medical infrastructure, medical devices, clinical trials, outsourcing, telemedicine, health insurance and medical equipment, is expected to reach an expenditure level of some 160 billion USD by 2017.²⁹

As per the PwC Connected Life report:

- Increased adoption of mHealth solutions could save over 1 million lives in Sub-Saharan Africa over the next five years²⁶
- mHealth solutions could help cut healthcare costs in OECD countries by over 400 billion USD in 2017²⁷

The use of cellular technologies for remote monitoring, disease management, and preventive medicine for the elderly could reduce Japan's healthcare spend by 10 billion USD in 2017²⁸.



M2M technology is widely considered as the 'next big thing', as it is forecasted that in coming years the number of devices with connectivity (or machine to machine connectivity) will outnumber human centric connections. However, the actual mainstream adoption has kicked in during the last few years. As per multiple research studies, M2M, a nascent industry sector until the last few years has embarked on its growth phase.

It is widely acknowledged by industry leaders that M2M has huge growth potential. Although, there are many M2M service offerings in India, the actual growth will start within next few years. As per the Cyber Media research report (2012), India M2M modules (device) market generated 27³² million USD (134.9 crore INR) revenues in 2011 and is expected to generate to 82.6 million USD (413.3 crore INR) by 2015, growing at a CAGR of 32.3%³³.

M2M service expansion

Even though the growth potential for M2M is big, it is essentially a long tail business. In addition, long tail characteristics; the M2M average revenue per connection (ARPC) is typically only a fraction of human average revenue per user (ARPU), but the volumes are expected to compensate for the same. On the technology side, the cost of sensors and meters are expected to fall to levels that will spark widespread use. Efforts are on by governments and industry groups to work together to standardise networking interfaces and technologies and help evolve to the point where data can flow freely among sensors, computers, and actuators.

Consequently, in the recent past, M2M services uptake is picking up globally especially in sectors like security, automotive, transport and logistics, utilities, retail and financial services, etc.

Issues

Lack of basic medical Infrastructure in rural areas: The total hospital bed density in India had increased to 1.3 per 1,000 by 2010, but remains significantly lower than the WHO guideline of 3.5 beds per 1,000. Underutilisation of existing resources further compounds the problem of miserable infrastructure. The bed density in rural centres is even lower.³⁰

Inadequate and underutilised health workforce: The total number of allopathic doctors and nurses in the country is less than WHO benchmark of 2.5 doctors per 1,000 populations, at 2.2 per 1,000 people. Further, the available health work force is not utilised properly.

Poorly maintained medical equipments and drugs: Most of the public health facilities have poorly maintained medical equipments and poor medicine management process.

How M2M could help?

Remote patient monitoring: Patients are provided with wireless devices enabling them to monitor their vitals and conditions, for example blood pressure, diabetes, or cardiac problems. Measurements can be taken by patients manually or captured by sensors and sent automatically to doctors. It allows constant monitoring of health, early spotting of warnings, and rapid application of diagnosis. This can help increase reach of medical attention to rural centres.

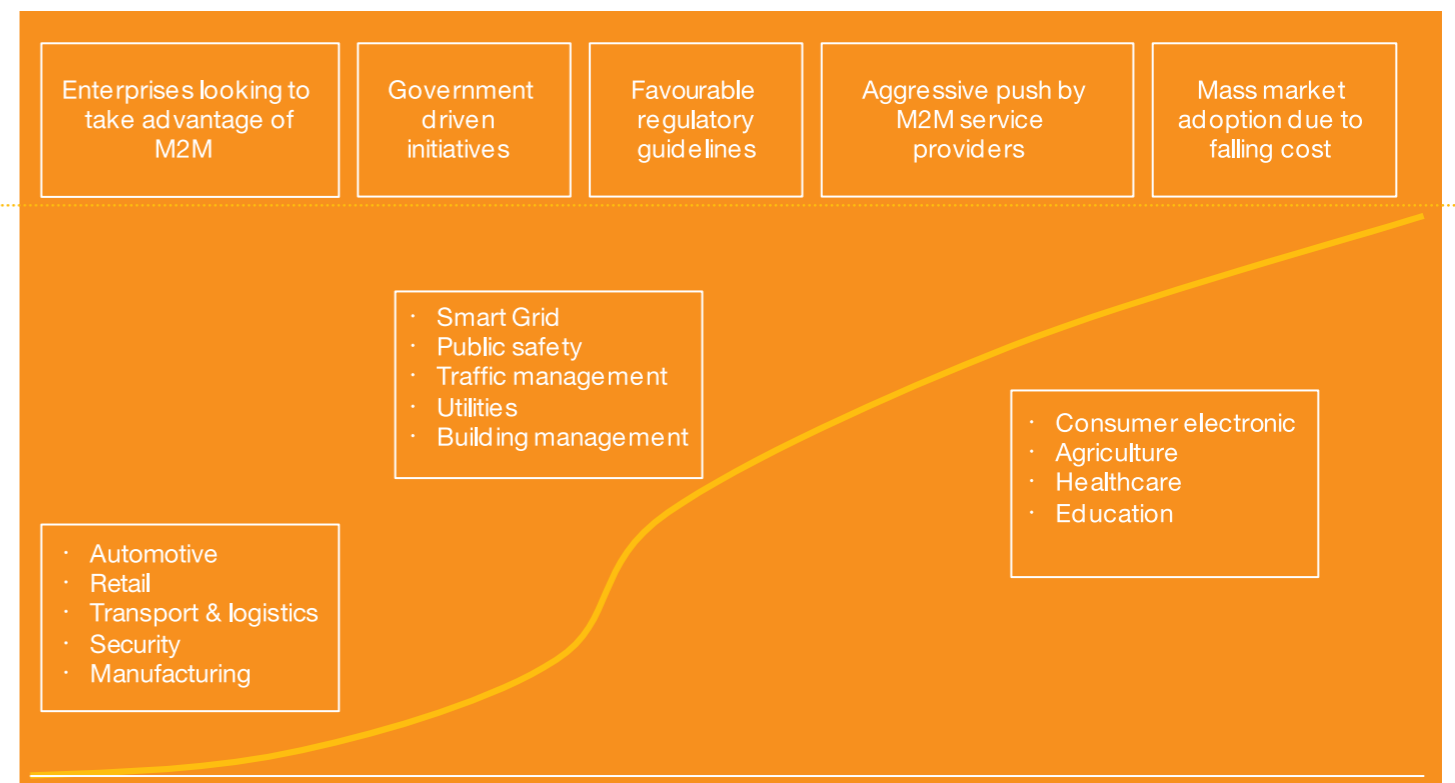
Organisation of healthcare work: Cellular devices falling into this group streamline work of healthcare professionals while they are on the go or are working remotely. They allow scanning of patient monitoring equipment, update medical records and share information with medical staff.

Medical asset tracking solutions: This helps in tracking the location and condition of drugs and equipment for security and maintenance needs. It improves productivity with visibility of asset availability.

Case study

Screening for oral cancer, point-of-care support and diagnostics (mHealth) involves screening high-risk individuals for oral cancer using smartphones with camera. The condition is either diagnosed by using pre-loaded software or by uploading data to the hospital's electronic medical records (EMR) system for specialist feedback. Treatment is advised through interactive videos on phone or referred to a specialist.

The open source telemedicine platform allows medical investigations to be encoded on to smartphones; it enables ECG, ultrasound and X-ray and CT-scanners, and also two-way sharing of medical data between a central medical record database and the phone, linking specialists with clinicians.³¹



4. Key issues for M2M in India

Diverse technology standards

M2M services is based on various access technology standards due to the fact that each type of M2M services has different requirement for mobility, power consumption, range, ease of roll out etc. M2M services which do not require mobility and are concentrated in limited geography are based on wireless personal area networks (WPANs). This includes Bluetooth, ZigBee, 6LowPlan, etc. and proprietary standards like Z-Wave and ANT. On the other hand M2M services with requirement of mobility and wider range are based on wireless technology standards like 2G/3G, IMAX, Satellite, etc.

Lack of guidelines for technology standards and protocols limit the benefits driven from uniformity and interoperability leading to complicated product lifecycle. For example, usage of propriety standard for smart grid potentially may lead to significant investment in inefficient legacy network.

The critical link between the M2M network and the core enterprise systems is the API, a standards based interface that allows real time data exchange and its standardisation will pave the way for real time interfaces that are lightweight, high scale and continuously available. All these characteristics are fundamental for M2M communication.

Resale of telecommunication services by non telecom operator (M2M service provider)

There are various M2M services for which a third party M2M service provider may need to procure SIM or bandwidth from a telecommunications service provider. These third parties may thus interface into the TSP's network. For example, providing smart grid managed services to a power distribution company which includes bundled services consisting of connectivity for the M2M devices.

As per current licensing norms this would contravene clause of resale of the telecom services and needs to be reviewed in the context of the emerging M2M opportunity.

Scarcity of numbers

M2M devices require a numbering scheme to function on the network. These could be IP addresses or IMSI / MSISDN equivalent. Although essentially a data based service, in many cases voice and SMS services would also be used in M2M.

MSISDNs and IMSIs are scarce resources that may diminish due to large number of devices. Also, availability of IPv4 addresses is limited and may not be sufficient for M2M. However, there has been wider adoption of IPv6 address globally which has significantly larger series of address available.

A standardised framework for addressing the M2M devices is needed to address issues around scalability, security and accountability.

Identity management: Know your customer (KYC)

Telecommunications operators are required to follow stringent norms for subscriber identification. The existing KYC guidelines are based on the principle of traceability of the end user (human being). However, mostly for M2M services, the M2M device may not be directly related to a particular user (human being). For example, in fleet management services, although the device is provided by the logistics service provider (procured from telecommunications operator), the vehicle may also be owned by the driver. Furthermore, the following cases can make KYC even more complex:

- M2M equipment may change ownership. For example, a car fitted with M2M technology for security, tracking and performance monitoring would change ownership as and when the car ownership is changed.
- There could be numerous M2M devices deployed by a single user (at home and work).

Also, as per current licence conditions, operators are not allowed to send SIM cards out of India without activation. However, in cases where the SIM card is required to be embedded in the product (consumer goods, vehicles, etc) during manufacture, such KYC guidelines may be affected.

In this context, the KYC framework needs to be reviewed.

Data privacy and security

Considering the significant proliferation of M2M services in health, transport, electronics, power and energy and essentially every other sector, a large amount of information will be generated, transmitted and collated. Data privacy and security for both individuals and enterprises would be a major concern and potentially an impediment for larger uptake, in the absence of safeguards.

With advent of cloud computing and innovative service models such as infrastructure as service (IAAS) and platform as service (PaaS), a plethora of M2M applications and databases will be hosted on the cloud. For instance, one of the key issues to be noted for hosting of application on cloud is the fact that as per the existing telecom licensing guidelines, subscriber data cannot be taken outside India. However, in cloud computing many of the applications will be hosted on servers located outside India posing both a regulatory compliance challenge and a data security issue.

Hence data privacy and security issues will need to be addressed accordingly.

Spectrum availability

Currently M2M services make extensive use of licenced and unlicensed spectrum bands.

- For unlicensed spectrum, there is a pertinent question about adequacy of availability. This may happen if increased number of M2M devices utilise unlicensed spectrum, especially 2.4 GHz (globally harmonised) through wireless personal area networks (ZigBee, wi-fi, etc). Also the performance in these unlicensed bands would deteriorate significantly due to overcrowding of M2M devices.
- For licenced spectrum, 2G and 3G spectrum band are preferred access medium for M2M devices. However, given the inherent scarcity of these spectrum bands along with longevity of M2M devices expected to last longer than the access technology changes.

Roaming

Considering the significance of some of the M2M services (real-time health monitoring, security, etc), devices may be required to choose an alternative back-up network during downtime, persisting dark spot or while roaming.

Hence, there may be need for a separate roaming agreement framework for M2M services which can be based on the special numbering scheme identified them. Intra circle roaming is another essential aspect.

Legal liabilities

M2M services in future may become very pervasive, which will make certain M2M services such as healthcare monitoring, intelligent driving system in automobiles, etc extremely critical. Such M2M services can be vulnerable to service failure which may lead to the loss of life and money. Further, any breach of data privacy could also result in a legal liability for the service providers.

In such cases, it is important to develop a clear framework to tackle liabilities.





Conclusion

The big growth potential of M2M businesses is beyond doubt as indicated in the various market researches. M2M has the potential to not only transform business for enterprises by bringing in efficiencies but can also touch millions of life through benefits derived through useful applications for medical diagnosis and treatment, cleaner water supply, improved irrigation, energy conservation, etc.

Currently, M2M services have started growing in India and are driven mainly by enterprises looking for benefits of M2M in addition to the various initiatives driven by government. However, the actual growth will kick in following enabling regulations, falling cost of the overall M2M services and devices and innovative services for masses.

The business models are currently driven by device centric M2M solution provided by niche M2M service providers. However, with the evolving new value proposition for other players like telecom operator and system integrator, new business models will evolve with the varying roles for each of the players.

Consensus and resolution on key issues related to technical standardisation and regulations by the government and industry groups will go a long way in unleashing the true potential of the M2M services.

References

1. http://www.ibm.com/smarterplanet/in/en/sustainable_cities/ideas/
2. PwC-GMSA report: Connected Life- The next five years in Asia, 2013
3. PwC-GMSA report: Connected Life- The next five years in Asia, 2013
4. <http://www.nhai.org/roadnetwork.htm>
5. <http://www.neoncarrot.co.uk/h%20aboutindia/india-%20statistics%201.html>
6. http://articles.timesofindia.indiatimes.com/2012-05-31/india/31920307_1_toll-plazas-road-space-stoppage
7. http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-19487.pdf
8. Running on Empty, Global Envision, July 2007,<http://www.globalenvision.org/library/1/1685>
9. <http://www.enpreview.com/article.php?ItemId=228&CategoryId=18>
10. Sustainable Energy & Water Access through M2M Connectivity by Michael Nique and Firas Arab
11. Trimble transport & logistics http://210.210.24.107/TMT/case_studies.php
12. PwC-GMSA report: Connected Life- The next five years in Asia, 2013
13. www.cea.nic.in/reports/yearly/lgbr_report.pdf
14. <http://economictimes.indiatimes.com/news/news-by-industry/energy/power/demand-supply-gap-between-power-generation-demand-touched-8-2-in-april-according-to-cea/articleshow/13395891.cms>
15. http://articles.economictimes.indiatimes.com/2013-09-13/news/42042045_1_power-plants-atc-losses-additional-power
16. <http://www.electricalmonitor.com/PrintArticle.aspx?aid=1552&sid=2>
17. "India's Mass Power Failure Worst Ever in World History" Outlook. Press Trust of India.
18. Ministry of Power http://www.powermin.nic.in/distribution/apdrp/projects/pdf/Re_Structured_APDRP_during_XI_Plan.pdf
19. <http://indiasmartgrid.org/en/Lists/Projects/DispForm.aspx?ID=4&ContentTypeId=0x0100A66C1B8C23DC784C9B03605F187DD0C5>
20. <http://indiasmartgrid.org/en/Lists/Projects/DispForm.aspx?ID=4&ContentTypeId=0x0100A66C1B8C23DC784C9B03605F187DD0C5>
21. <http://www.ibef.org/industry/agriculture-india.aspx>
22. www.sustainuance.com/think-before-you-throw/
23. <http://www.Nano-Ganesh.com>
24. <http://defindia.net/files/2013/08/CaseStudy3-2C-NanoGanesh.pdf>
25. www.gisfi.org/wg_documents/GISFI_IoT_20110672.doc
26. PwC-GSMA report: Connected Life - The impact of the Connected Life over the next five years, 2013
27. PwC-GSMA report: Connected Life - The impact of the Connected Life over the next five years, 2013
28. PwC-GMSA report: Connected Life- The next five years in Asia, 2013
29. <http://www.ibef.org/industry/healthcare-india.aspx>
30. National Rural Health Mission (NRHM) Data
31. www.mhealthinfo.org
32. 1 USD = 50 (assumption taken for comparison purpose)
33. <http://cmrindia.com/india-wireless-machine-2-machine-modules-market-crosses-inr-130-crore-in-2011>

About ASSOCHAM

The knowledge architect of corporate India

Evolution of value creator

ASSOCHAM initiated its endeavour of value creation for Indian industry in 1920. Having in its fold more than 400 chambers and trade associations, and serving more than 4,50,000 members from all over India, it has witnessed upswings as well as upheavals in the Indian economy, and has played a catalytic role in shaping the trade, commerce and industrial environment of the country.

Today, ASSOCHAM has emerged as the fountainhead of knowledge for Indian industry, which is all set to redefine the dynamics of growth and development in the technology driven cyber age of the knowledge based economy. ASSOCHAM is seen as a forceful, proactive, forward-looking institution equipping itself to meet the aspirations of corporate India in the new world of business. It is working towards creating an environment conducive for India business to compete globally.

ASSOCHAM derives its strength from its promoter chambers and other industry and regional chambers and associations spread all over the country.

Vision

Empower Indian enterprises by inculcating knowledge that will be the catalyst of growth in the barrierless technology driven global market and help them upscale, align and emerge as formidable players in their respective business segments.

Mission

As a representative organ of corporate India, ASSOCHAM articulates the genuine, legitimate needs and interests of its members. Its mission is to impact the policy and legislative environment so as to foster balanced economic, industrial and social development. We believe education, IT, BT, health, corporate social responsibility and environment to be the critical success factors.

Members: Our strength

ASSOCHAM represents the interests of more than 4,50,000 direct and indirect members across the country. Through its heterogeneous membership, ASSOCHAM combines the entrepreneurial spirit and business acumen of owners with management skills and expertise of professionals to set itself apart as a chamber with a difference.

Currently, ASSOCHAM has more than 100 national councils covering the entire gamut of economic activities in India. It has been especially acknowledged as a significant voice of Indian industry in the field of corporate social responsibility, environment and safety, HR and labour affairs, corporate governance, information technology, biotechnology, telecom, banking and finance, company law, corporate finance, economic and international affairs, mergers and acquisitions, tourism, civil aviation, infrastructure, energy and power, education, legal reforms, real estate and rural development, competency building and skill development to mention a few.

Insight into new business models

ASSOCHAM has been a significant contributory factor in the emergence of new-age Indian corporates, characterised by a new mindset and global ambition for dominating international business. The Chamber has addressed itself to key areas such as India as an investment destination, achieving international competitiveness, promoting international trade, corporate strategies for enhancing stakeholder value, government policies in sustaining India's development, infrastructure development for enhancing India's competitiveness, building Indian MNCs and the role of the financial sector as the catalyst for India's transformation. ASSOCHAM derives its strengths from the following promoter chambers: Bombay Chamber of Commerce and Industry, Mumbai; Cochin Chambers of Commerce and Industry, Cochin; Indian Merchant's Chamber, Mumbai; Madras Chamber of Commerce and Industry, Chennai; PHD Chamber of Commerce and Industry, New Delhi and has over 4 lakh direct and indirect members. Together, we can make a significant difference to the burden that our nation carries and bring in a bright, new tomorrow for our nation.

D. S. Rawat
Secretary General
email : d.s.rawat@assocham.com
The Associated Chambers of Commerce & Industry of India
ASSOCHAM Corporate Office:
5, Sardar Patel Marg, Chanakyapuri, New Delhi-110 021
Tel: 011-46550555 (Hunting Line) Fax: 011-23017008, 23017009

About PwC


PwC* helps organisations and individuals create the value they're looking for. We're a network of firms in 158 countries with more than 180,000 people who are committed to delivering quality in assurance, tax and advisory services. PwC India refers to the network of PwC firms in India, having offices in: Ahmedabad, Bangalore, Chennai, Delhi NCR, Hyderabad, Kolkata, Mumbai and Pune. For more information about PwC India's service offerings, please visit www.pwc.in.


*PwC refers to PwC India and may sometimes refer to the PwC network. Each member firm is a separate legal entity. Please see www.pwc.com/structure for further details.

You can connect with us on:

 facebook.com/PwCIndia

 twitter.com/PwC_IN

 linkedin.com/company/pwc-india

 youtube.com/pwc

Contacts



Mohammad Chowdhury

India Leader - Telecom
Phone: +91 9167665544
Email: mohammad.chowdhury@in.pwc.com



Ritesh Agrawal

Senior Manager - Telecom
Phone: +91 9886709583
Email: ritesh.a@in.pwc.com



Ashwani Kumar

Manager - Telecom
Phone: +91 9718111410
Email: ashwani.kumar@in.pwc.com

www.pwc.in

This publication does not constitute professional advice. The information in this publication has been obtained or derived from sources believed by PricewaterhouseCoopers Private Limited (PwCPL) to be reliable but PwCPL does not represent that this information is accurate or complete. Any opinions or estimates contained in this publication represent the judgment of PwCPL at this time and are subject to change without notice. Readers of this publication are advised to seek their own professional advice before taking any course of action or decision, for which they are entirely responsible, based on the contents of this publication. PwCPL neither accepts or assumes any responsibility or liability to any reader of this publication in respect of the information contained within it or for any decisions readers may take or decide not to or fail to take.

© 2013 PricewaterhouseCoopers Private Limited. All rights reserved. In this document, "PwC" refers to PricewaterhouseCoopers Private Limited (a limited liability company in India), which is a member firm of PricewaterhouseCoopers International Limited (PwCIL), each member firm of which is a separate legal entity.

NJ 117 - November 2013 M2M.indd
Designed by: PwC Brand and Communications, India