ISO 9001 : 2008

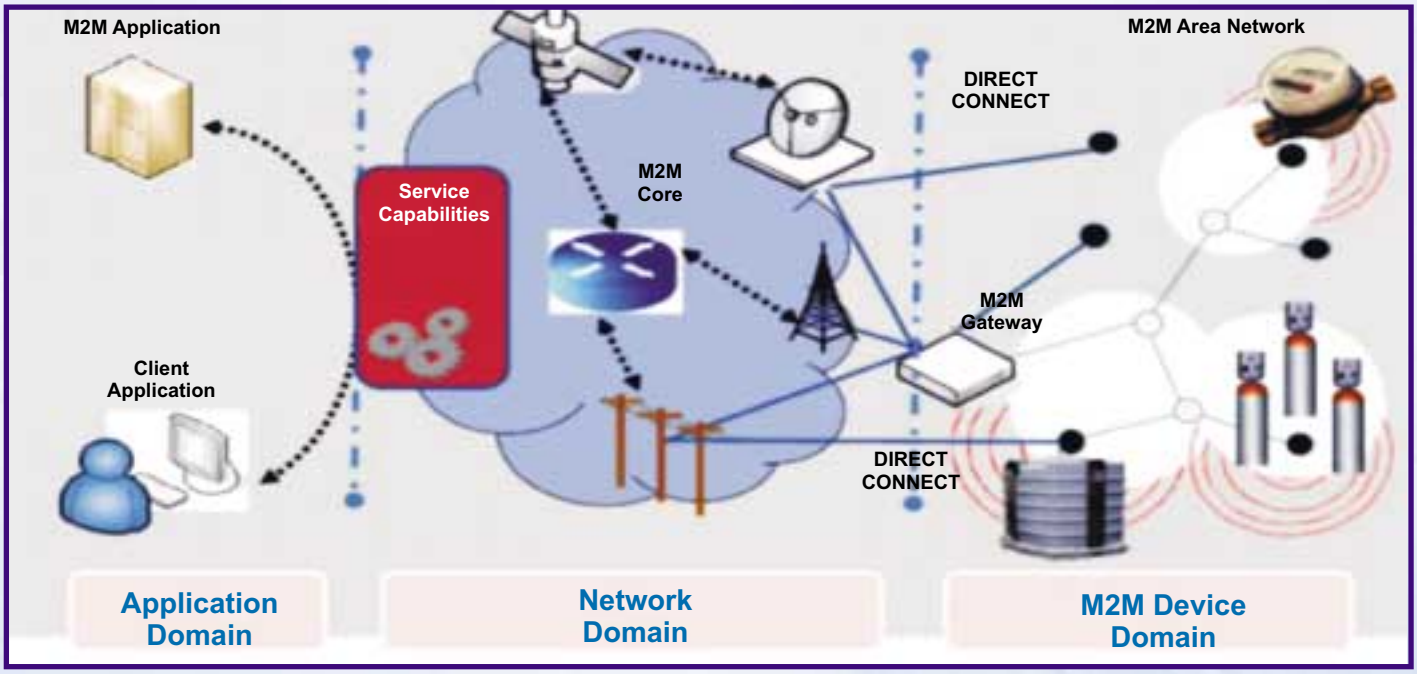
TEC

टी ई सी संचारिका

NEWSLETTER

VOL 16 SEPTEMBER 2012 ISSUE 3

M2M COMMUNICATION



Generic Machine to Machine Architecture

ISO 9001:2008
TELECOMMUNICATION ENGINEERING CENTRE

IN THIS ISSUE

Machine to Machine Communication

1.0 Introduction

M2M, the acronym for Machine-to-Machine Applications is an emerging area in the field of telecom technologies. With traditional revenue streams like Voice getting saturated in most markets around the world, M2M holds the promise of generating new avenues for revenue generation. M2M allows a wide variety of machines to become nodes of personal wireless networks, and provides to develop monitoring and remote control applications.

Machine-to-Machine (M2M) communication is a form of data communication that involves one or more entities that do not necessarily require human interaction or intervention in the process of communication thus making machines more intelligent and autonomous. M2M uses a device (sensor, meter, etc.) to capture an 'event' (temperature, inventory level, etc.), which is relayed through a network (wireless, wired or hybrid) to an application (software program), that translates the captured event into meaningful information.

M2M communication could be carried over mobile networks (e.g. GSM-GPRS, CDMA EVDO networks). In the M2M communication, the role of mobile network is largely confined to serve as a transport network.

The standardization of IPv6 has created an opportunity of having billions of devices which can be IP enabled and seamlessly addressable through mobile or wired broadband connections. Thus M2M offers tremendous opportunities as well as unique challenges. These devices vary from highly-mobile vehicles communicating in real-time, to immobile meter-reading appliances that send small amounts of data sporadically.

2. Applications of M2M

The applications of M2M cover many areas and the areas in which M2M is currently used are grouped as below:

(i) Consumer Electronics : Remote monitor and control, interoperability between e-Readers, Gaming Devices,Picture Frames, TVs

(ii) Transportation : Fleet management Services, Track driver performance, fuel consumption, Container / Cargo management, GPS asset tracking, Vehicle information to third parties

(iii) Utilities : Smart meters - energy & fuel consumption for home / industrial, Smart grid - monitor load real time, Electric Vehicle, Charging Infrastructure

(iv) Home/Buildings : Smart home - measure / control energy, home health monitoring, Building alarms - security, fire intrusion, emergency HVAC, lighting, solar energy, wind energy

(v) Security : Alarm System Monitoring - banking, retail, buildings, Video Surveillance - real time monitoring, video analytics, smart cards, Facility management

(vi) Manufacturing : Customized solutions in Asset management, smart sensors, Monitor/ diagnostics for industrial controllers, Tank Monitoring, Data collection, diagnostics for managed print services

(vii) Retail : ATM machines - cash replacement, repair diagnostics, paper availability, Supply chain - Empty shelves tracking, real time stock information, Wired/Wireless POS data delivery - card payments, account balances

(viii) Healthcare : Smart body sensors, Remote

patient monitoring of residential/ institutional, communicate with smart phone, central server

3.0 Architecture and components

The various components and elements of an M2M system are briefly described below:

3.1 M2M Device

Device capable of replying to request for data contained within those devices or capable of transmitting data autonomously. Sensors and communication devices are the endpoints of M2M applications. Generally, devices can connect directly to an operator's network, or they will probably interconnect using WPAN technologies such as ZigBee or Bluetooth. Backhaul to an operator's network is then achieved via gateways that encapsulate and manage all devices. Consequently, addressing and identifying, e.g., routing, of the devices relies heavily on the gateways. Devices that connect via gateways are normally outside the operator's responsibility but belong to M2M applications that are provided by service or application providers. Sensors and devices that connect directly into an operator's network (via embedded SIM, TPM and radio stack or fixed line access) are endpoints of the network. Thus, the responsibility in terms of accountability, SLAs etc., lies within the network operator (or virtual network operator). This holds true especially with respect to TPM where it is necessary to ensure that the module is really that reliable and well protected.

3.2 M2M Area Network (Device Domain)

Provide connectivity between M2M Devices and M2M Gateways, e.g. personal area network.

3.3 M2M Gateway

Equipment that uses M2M capabilities to ensure M2M Devices inter-working and

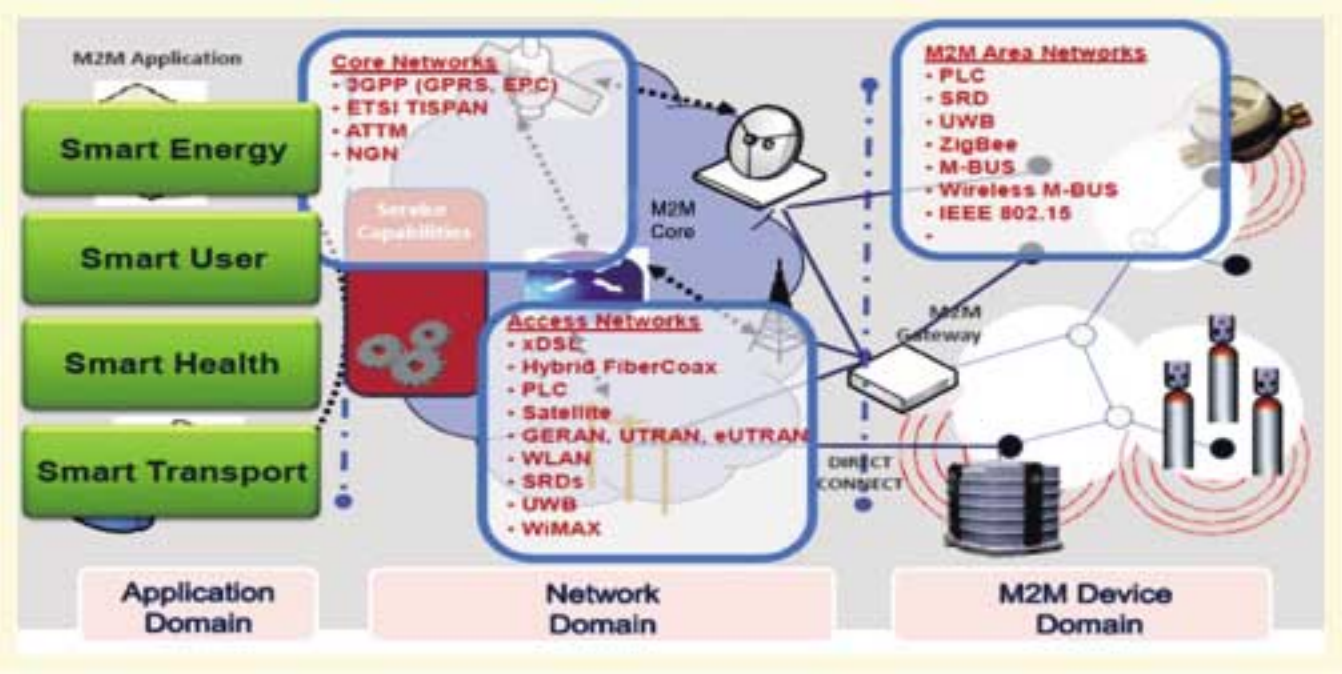


Figure 1: Examples of components of M2M system

interconnection to the communication network. Gateways and routers are the endpoints of the operator's network in scenarios where sensors and M2M devices do not connect directly to the network. Thus, the task of gateways and routers are twofold. Firstly, they have to ensure that the devices of the capillary network may be reached from outside and vice versa. These functions are addressed by the access enablers, such as identification, addressing, accounting etc., from the operator's platform and have to be supported at the gateway's side as well. Thus, platform and gateway form a distributed system, where generic and abstract capabilities are implemented on the gateway's side. Consequently, there will be a control flow between gateway and operator's platform that has to be distinguished from the data channel that is to transfer M2M application data. Secondly, there may be the need to map bulky internet protocols to their lightweight counterpart in low-power sensor networks. However, the latter application might lose its relevance since there are implementations of IPv6 for sensor networks available, that allow an all-IP approach.

3.4 M2M Communication Networks (Network Domain)

It covers the communications between the M2M Gateway(s) and M2M application(s), e.g. xDSL, LTE, WiMAX, and WLAN.

3.5 M2M Applications

Figure1 (on pre page) shows the M2M system with examples of various components and applications.

4.0 Key features of M2M

Some of the key features of M2M communication system are given below:

4.1 Low Mobility

M2M Devices do not move, move infrequently, or move only within a certain region

4.2 Time Controlled

Send or receive data only at certain pre-defined periods

4.3 Time Tolerant

Data transfer can be delayed

4.4 Packet Switched

Network operator to provide packet switched service with or without an MSISDN

4.5 Online small Data Transmissions

MTC Devices frequently send or receive small amounts of data.

4.6 Monitoring

Not intended to prevent theft or vandalism but provide functionality to detect the events

4.7 Low Power Consumption

To improve the ability of the system to efficiently service M2M applications

4.8 Location Specific Trigger

Intending to trigger M2M device in a particular area e.g. wake up the device

5.0 Issues /concerns in M2M

The key concerns in M2M are related to addressing and security. The M2M System should be flexible in supporting more than one naming scheme. Also it should support identification of connected objects or groups of connected objects by their names, temporary id, pseudonym (i.e. different names for the same entity), location or combination thereof (e.g. URIs or IMSI). The addressing schemes should include:

(i) IP address of connected objects.

(ii) IP address of group of connected objects (including multicast address).

(iii) E.164 addresses of connected objects (e.g. MSISDN).

It is expected that M2M devices would typically operate unmanned and unguarded by humans and thus are subject to increased levels of security threats, such as physical tampering, hacking, unauthorized monitoring, etc. Terminal devices may also get geographically dispersed over time. Such M2M devices should, therefore, provide adequate security to detect and resist attacks. Devices may also need to support remote management including firmware updates to correct faults or recover from malicious attacks. Some M2M Equipment (M2Mes) are typically required to be small, inexpensive, able to operate unattended by humans for extended periods of time, and to communicate over the wireless area network (WAN) or WLAN. M2Mes are typically deployed in the field for many years, and after deployment, tend to require remote management of their functionality. It is likely that M2Mes will be deployed in very large quantities, and many of them will also be mobile, making it unrealistic or impossible for operators or subscribers to send personnel to manage or service them. These requirements introduce a number of unique security vulnerabilities for the M2Mes and the wireless communication networks over which they communicate.

6.0 Standardization Efforts for M2M

The need for standardization is understandable given a plethora of devices, networks, applications,industries and geographies. However, there is no single standards body driving standardization efforts. The main issue is at the device end because each manufacturer is different and may use its own proprietary technology for data collection.Today's telecoms networks are designed mainly for human to human communication. At present for human to machine and machine to machine communication standardization are limited to standalone system not involving the mobile networks and other general transport models. In order to deliver effective M2M solutions and to allow the market to take off, efforts in the direction of standardizations to involve the existing technologies are being taken up by various SDOs as below:

(i) ETSI has established Machine-to-Machine Communications Technical Committee (TC M2M) to develop these necessary standards. TC M2M aims to bring disjointed component-level standards together, and to fill the standardization gaps. It is developing an end-to-end architecture to support multiple machine-to-machine type applications.

(ii) The standardization efforts in ITU are being addressed under various banners like 'Internet of Things (IoT)', 'Machine to Machine (M2M) communication', 'Machine oriented communication (MOC)', 'Smart ubiquitous networks (SUN)', 'Ubiquitous sensor networks (USN)', etc. Draft Recommendation ITU-T Y.IoT-overview "Overview of Internet of Things" covers the Introduction of IoT, Objectives of IoT, Characteristics of IoT, Ecosystem and business models for IoT, High level reference models of IoT, and Candidate study areas of IoT standardization.

(iii) China's sensor network standards working group under the China National Information Technology Standardization Committee

(iv) ZigBee Alliance - Suite of high level communication protocols using small and low-power digital radios

(v) Telecommunications Industry association (TIA) TR-50 Smart Device Communications Engineering Committee (United States)

(vi) HomePlug Alliance - Promotes adoption of cost effective, interoperable standards-based home powerline networks and products

(vii) DASH7 Alliance – Open source wireless sensor networking standard supporting tag-to-tag communication

7.0 Conclusion

Machine based interactions are witnessing a growth trajectory across industries. Domain knowledge and technical knowhow are the key requirements since an M2M solution touches upon core processes. The ecosystem is large, quite complex and very fragmented. M2M as an application holds the promise of bringing benefit to both telecom operators and vendors. For service providers it is an opportunity as low-bandwidth M2M services can be readily overlaid onto the current user services network. Vendors are expected to profit from selling both M2M-capable devices and from the network expansion brought about by increased throughput.

The challenges are many wherein a number of interested parties need to come together for an implementation. The standardization in the direction of special handling or optimization of the network for M2M specific service will lead for better support of M2M communications.

References:

(i) www.itu.int
(ii) www.m2m.com
(iii) www.etsi.org
(iv) www.tec.gov.in
(v) www.techmahindra.com
(vi) www.tcs.com

8.0 हिंदी कार्यशाला

दूरसंचार इंजीनियरी केंद्र द्वारा दिनांक 20 जून 2012 को "हिंदी व्याकरण" विषय पर कार्यशालाका आयोजन किया गया। श्री केवल कृष्ण, निदेशक केंद्रीय हिंदी प्रशिक्षण संस्थान, राजभाषा विभाग द्वारा इस कार्यशाला में व्याख्यान दिया गया तथा शब्द कोष, यूनिकोड और हिन्दी अनुवाद के मूल सिद्धान्तों एवं दैनिक व्यवहार में किस तरह हिन्दी को त्रुटि रहित लिखा एवं बोला जाए इस पर प्रकाश डाला गया। यह कार्यशाला हिंदी में काम करने की दृष्टि से बहुत उपयोगी सिद्ध हुई

कार्यशाला में भाग लेते हुये अधिकारी एवं कर्मचारीगण

9.0 हिंदी पखवाड़ा

दूरसंचार इंजीनियरी केंद्र में हिंदी पखवाड़े (14–28 सितम्बर 2012) का शुभारंभ वरिष्ठ उप महानिदेशक श्री अनिल कौशल द्वारा किया गया। इस पखवाड़े के अंतर्गत हिंदी के प्रचार एवं प्रसार हेतु नौं प्रतियोगिताओं का आयोजन किया जाएगा।

वरिष्ठ उप महानिदेशक द्वारा द्वीप प्रज्वलित कर हिंदी पखवाड़े का शुभारंभ

Approvals from April 2012 to June 2012

S. No.	Company/Product
1	**AE Telelink Systems**
1.1	Video confrencing Equipment LFZ-015
2	**Aspect Contact Centare(I) Ltd**
2.1	Computer Telephony Intergration, DCP-00
3	**Cisco Systems (I) (P) Limited**
3.1	TCP/IP ROUTER,CISCO ASR 901
3.2	TCP/IP ROUTER,CISCO ASR 5000
4	**Genband Inc.**
4.1	Switching node with N-N interface at STM-1,C3 softswitch with G9 gateway
4.2	Switching node with N-N interface at 2048Kbps,C3softswitch with G9 gateway
4.3	Switching node with N-N interface at 2048Kbps,C3softswitch with G2gateway
5	**M/s BPL Telecom Pvt. Ltd.,**
5.1	ISDN PABX SIGMA INDX
6	**M/s Arvind Limited (Telecom Division)**
6.1	PABX for Network connectivity,NEOS
7.	**M/s Fibcom India Limited,**
7.1	FIBCOM 6325 (STM-4)
7.2	FIBCOM 6325 (STM-16)
8	**M/s MATRIX COMSEC PVT. LTD**
8.1	PABX for Network connectivity,ETERNITY GE6S
8.2	PABX for Network connectivity,ETERNITY GE 12S
9	**Motorola Mobility India (P) Ltd.**
9.1	GSM Mobile phone, XT 535(MOC86)
9.2	GSM Mobile phone, Motorola XT 321
10	**Nokia India Private Limited**
10.1	GSM Mobile phone, Nokia Asha 305 (RM-766)
10.2	GSM Mobile phone, Nokia Lumia 900 (RM-823)

S. No.	Company/Product
10.3	GSM Mobile phone, Nokia 610(RM-835)
10.4	GSM Mobile phone, Nokia 808(RM-807)
10.5	GSM Mobile phone, Nokia 202(RM-834)
10.6	GSM Mobile phone, Nokia 302 (RM-813)
10.7	GSM Mobile phone, Nokia 110(RM-827)
10.8	Nokia Blue Tooth Headset, BH-310
10.9	Nokia Blue Tooth Headset, BH-221
11	**Polycom Technology Centare Pvt.**
11.1	Multi confrencing server RMX-2000
12	**Sharp Business Systems(I)(P) Ltd**
12.1	Sharp FAX Expansion KIT,MX-FX13
13	**Sonus Network Trading**
13.1	Switching Node GSX 9000 HDW with PSX and SAX 400
13.2	Switching Node GSX 9000 HDW with PSX and SAX 400
14	**Sunren Technical Solutions (P) Ltd**
14.1	Switching Node with 2 Mb/s , UMG 8900(Media Gateway),CSOFTX 3000 (Softswitch)
14.2	Switching node with N-N interface at STM-1,UMG 8900(Media Gateway),CSOFTX 3000 (Softswitch)
14.3	G3 Fax Machine,CLX-3305 FN
14.4	G3 Fax Machine,CLX-3305 FW
14.5	G3 Fax Machine,SCX-4521NS
14.6	PABX for Network connectivity,Mediant 800
14.7	PABX for Network connectivity,ST004
14.8	PABX for Network connectivity,ST003
14.9	PABX for Network connectivity,ST001
15	**M/s Multi Tech Systems**
15.1	V.90 MODEM (Analogue)MT 9234 MU

Important Activities of TEC during April 2012 to June 2012

Revised GRs/IRs

- FDMS for Optical Fibre Cables,
- Optical Fibre Cable for FTTH application,

Presentation on

- Solid state Fibre Switch
- Time Stamping in Telecom Network
- SAR Lab and ISAR
- EMF radiation from BTS
- Cloud Computing
- 3GFemto Cell solutions
- Fuel Cell
- Tetra based PMRTS
- IP Microwave & Millimetre Wave trends

DCC Conducted on

- GR on VRLA Battery
- GR on Tabular VRLA Battery

Approvals issued by TEC during the period from April 2012 to June 2012

Interface Approvals.....27

Type Approvals 0

Certificate of Approvals.....11

Activities at National Telecommunications Institute

- Course on Data Comm. Fundamentals
- Course on Quality Assurance in telecom Network
- Course on Productive tools for Office working
- Course on IPv6 essentials
- Mobile network planning & Dimensioning

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TEC Conducts

Type Approval

Interface Approval

Certificate of Approval

for

Telecom Products

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भाग	16	:	जनपथ
अंक	3	:	नई दिल्ली 110001

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