Standards for Machine-to-Machine communication

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Why M2M standards?

Enable the vision of a “horizontal service layer” …

Pipe (vertical): 1 Application, 1 Network, 1 (or few) type of Device

Horizontal (based on common service Layer) Applications share common infrastructure, environments and network elements
What improvements can be expected by standards?

<table>
<thead>
<tr>
<th>To enable ‘plug and play’ M2M services</th>
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<tbody>
<tr>
<td>➔ Business Application Service providers should only need to think about their service - not to implement tasks that are common to most M2M services.</td>
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<tr>
<td>➔ <strong>Common tasks can be delegated</strong> to the M2M Service enablement (connectivity, security, AAA, lifecycle management, deployment support, subscription management, maintenance, …)</td>
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<th>To reduce diversity of M2M interfaces</th>
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<td>➔ create <strong>universally supported M2M service interfaces</strong> - but enable individual business</td>
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<tr>
<td>➔ reduce costs of supporting many types of interfaces (often supporting similar functions)</td>
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<tr>
<td>➔ but <strong>interworking with existing technologies</strong> must be enabled!</td>
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But... the technology landscape related to M2M is **very wide**!  
E.g. the Global Standards Collaboration M2M Task Force (GSC MSTF) identifies **143 organisations** with a direct or indirect interest in M2M standardisation!
We need a global M2M standard !!!

To enable M2M services **end-to-end**

To be a Focus of collaboration for M2M among SDOs

- don’t re-invent the wheel in different SDOs (competing standards 😐)
- create added value across businesses
**oneM2M** is a **Partnership Project**, established (mid 2012 by the 7 world-wide telecom SDOs) in order to cooperate in the production of **globally applicable, access-independent M2M Service Layer specifications**, including Technical Specifications and Reports related to M2M Solutions.

**Participation** is open to interested organizations and parties to provide opportunities for various levels of participation and provide flexibility for inputs from all market segments (currently 265 Participating Partners and Members).

[http://www.onem2m.org](http://www.onem2m.org)  
[http://member.onem2m.org](http://member.onem2m.org)
Relationship with selected other SDOs

- **ETSI TC M2M**
  - has just finished M2M release 1
  - try to re-use as much as possible in oneM2M

- **3GPP**
  - Working on MTC features since over 3 years
  - Interworking with oneM2M needed

- **OMA**
  - Re-using device management capabilities in oneM2M

- **BBF**
Organizational Structure

- **Steering Committee**
- **Finance Committee**
- **Marketing and Communications Group**
- **Technical Plenary**
  - Working Group 1 – Requirements
  - Working Group 2 – Architecture
  - Working Group 3 – Protocol
  - Working Group 4 – Security
  - Working Group 5 – Management, Abstraction and Semantics
  - Working Group N
Participation

- Member-based organization
- FRAND IPR policy
- Stop overlapping work

Partner Type 1

- Member-based organization
- Compatible IPR
- Don’t need to stop overlapping work

Partner Type 2

- individual member companies of PT 1 and PT2
- Contribute technically

Member companies

- government or regulatory agencies
- Contributions limited to regulatory matters and informational contributions

Associate members

Member-based organization

Compatible IPR

Don’t need to stop overlapping work

Partner Type 1

Partnership

Partner Type 2
Technical: functional, physical and business view

Service Layer - functional:

- It is a middleware (software) layer
- It sits between M2M applications and communication HW/SW that provides data transport
- It normally rides on top of IP
- It provides commonly need functions for M2M applications across different industry segments

Service Layer – physical view:

Service Layer – business view:

- Application Service provider => provides end-user services
- M2M Service Provider => provides oneM2M Service layer
- Network Operator => operates a (telecom) network
Draft Timeline for the first release of specs

1Q13: Evaluation of initial inputs

- Co-convened WG1/2
- Initial set of WI
- TP#2
- Initial set of WG’s
- TP#3
- Initial Requirement Set

2Q13: WG’s focus on Baseline Draft

- Baseline initiated
- First release of a minimally deployable solution

3Q13: Transition to Future Releases

4Q13: Subsequent Release

…

Source: oneM2M-TP-2012-0042R03-Consolidated_Workplan_Summary
What will the future of M2M look like?

**Semantic support of M2M data and Analytics**

- Allows to create an Abstraction Layer for devices
- Allows to realize some aspects of IoT
- Combine with “Big Data”, “Analytics” and “Cloud” technologies

**Future topic: Abstraction**

1. Application Service Provider offers Home Control service
2. A device in the home is replaced (e.g. by other technology)

- M2M System finds out which device has been replaced (information on the type of device and how to interface it)
- M2M System offers an Abstraction Layer
  - e.g. allows Home control Service to access a ‘switch’, not a KNX switch or ZigBee switch (‘switch’ interface is abstracted from specific technology)
  - Service becomes independent of (many specialized) technologies
  - Big cost savings possible – less maintenance, no manual interaction!

**oneM2M standard**

- is driving work on Abstraction
- expects to continue that work to enable full Semantics support by oneM2M
Standards beyond traditional M2M: Should enable a **secondary** Market for M2M Data

**Primary M2M Market**
- vertically connected sensor/applications
- target a specific business need
- collect and manage data through the M2M platform

**Secondary Open M2M Market**
- Re-use the data collected in the primary market – semantics will help understanding the original data
- Provide Data Analysis (aggregated, anonymized, processed information, e.g. for Smart City administration)

A new role for the M2M platform owner: **Data Aggregator and Data Broker**
Empowered by Innovation

NEC
Standards for Wide Area Networks (I/II)

Wide Area Networks:
**Target:**
- (a) protect 3GPP networks against effects of M2M traffic (many devices, non-human traffic …)
- (b) interface towards M2M servers

-SA2 agreed to work in Rel-12
- Small data and device triggering enhancements
- Power consumption optimization (prevent battery drain - frequent changes between Idle and Connected mode, too long periods in connected mode - Lower UE power consumption)
- MTC Monitoring (loss of connectivity, change of the location …)
- Group Based Features (Group based charging and group based MTC Features)
Standards for Wide Area Networks (II/II)

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<th>Work done in 3GPP:</th>
<th>No implementation plan in 3GPP yet for:</th>
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<tr>
<td>✓ SA1 ‘Service requirements for machine type communications’ – TS 22.368</td>
<td>● MTC feature activation</td>
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<tr>
<td>✓ SA3 Study ‘Security aspects of remote provisioning and change of subscription for M2M’ - TR33.812</td>
<td>● Fraud prevention (restrict the use of a USIM to a specific device)</td>
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<tr>
<td>✓ RAN2 Study ‘RAN improvements on machine type communications’ – TR37.868</td>
<td>● Efficiently maintain connectivity for large numbers of devices</td>
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<tr>
<td>✓ SA3 ‘Security Aspects of Network Improvements for Machine-Type Communications – TR33.868</td>
<td>● Use of IMS</td>
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<tr>
<td>✓ SA2 ‘Architecture enhancements to facilitate communications with packet data networks and applications’ - TS 23.682</td>
<td>● MTC Device triggering when not attached</td>
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MTC Device triggering when not attached

Charging for signaling and charging related to (the use of) particular MTC Features

Low Mobility (MTC Devices that do not move)

Time Controlled (send or receive data only during defined time intervals)

Time Tolerant (MTC Devices that can delay their data transfer)

Mobile originated only (MTC Devices only use mobile originated communications)

Infrequent mobile terminated (… mainly use mobile originated communications)

Priority alarm (alarm in the event of e.g. theft, vandalism)

Secure Connection (secure connection between the MTC Device and MTC Server).

Location specific trigger (trigger MTC Devices only in a particular area)

Infrequent transmission (long period between two data transmissions)

MSISDN-less (not yet agreed in SA2, SA1 did not confirm requirement)

(Removal of E.164 dependency for Mobile Originated SMS)
Standards for Local Area Networks (I/II)

Local Area Networks: 
**Target:** make LAN more useful by supporting multiple specific vertical segments

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Example ZigBee:
- 802.15.4 phy/link layer optimized for low bitrate

Support of specific vertical industry segments: 
**Application Profiles**
some Standards for LANs (II/II)

- IETF 6LowPAN / CoRE: low power wireless IPv6 communication / Constrained RESTful Environments
- M-Bus and wM-Bus used by Cenelec TC 294 for (wireless) meter reading
- DLMS/COSEM by DLMS User Association for smart meter reading – important in Europe
- ANSI C 12.xx automatic metering infrastructure (AMI); focused on American national market
- HomePlug Powerline Alliance fixed LAN (home automation- and automotive market)
- Building Automation, BACnet and LonWorks among the most popular industrial automation and control protocols
- Bluetooth and Bluetooth Low Energy (Ericsson 1994) now Bluetooth Special Interest Group for personal networks
- Z-Wave wireless protocol used for home electronics /energy management and remote control
- EnOcean: wireless standard optimized for solutions with ultra-low power consumption and energy harvesting
Some more important vertical SDOs / consortia

**eHealth**
- Continua Health Alliance (global, USA): 230 member companies around the world, establishing a system of interoperable personal connected health solutions. eHealth, telehealth
- Health Level Seven International (HL7) (global): authority on standards for interoperability of health information technology. Members in 55 countries

**Automotive**
- ITS Info-communications Forum (Japan): promote evolution of roadway, transportation and automotive fields using highly advanced intelligent transport systems (ITS)
- SAE International (global): association of more than 128,000 engineers and related technical experts in the aerospace, automotive and commercial-vehicle industries. Creating standards in these fields
- ERTICO (Europe): multi-sector, public / private partnership pursuing the development and deployment of ITS.
Some more important vertical SDOs / consortia

**Building-and Home automation**

- Obix (Open Building Information Xchange – global, USA): creating a standard XML and Web Services guideline for exchange of information between intelligent buildings.
- Home Gateway Initiative (Europe): Requirements for the digital home. They include home gateways, home networks, and home network devices. Many operators are present in this forum.

**Smart grid**

- JSCA Japan Smart Community Alliance (Japan): members from the electric power, gas, automobile, ICT, electric machinery, construction and trading industries.
- DRSG Demand Response and Smart Grid Colaition (USA) association for companies that provide products and services in the areas of demand response and smart grid.
- EDSO European Distribution System Operators for Smart Grids (Europe) an international non-profit association committed to the development of Smart Grids in Europe.
Other supporting SDOs and industry fora

**Other supporting standards**

- **OMA (Open Mobile alliance – global):** creating standards for device management (OMA DM) widely used in mobile networks. Also: OMA NGSI, OMA CPNS
- **BBF (Broadband Forum - global):** creating standards for device management (TR-069) mainly used in fixed networks (home gateways, home devices).
- **OSGi Alliance (global):** open specifications for modular software with Java. Interoperability of applications and services over networked devices. Markets: enterprise, mobile, home, telematics, consumer

**Open source projects that drive the market deployment**

- **Eclipse (has aMachine-to-Machine Industry Working Group):**
  - Koneki project: M2M SDK pushed by Sierra Wireless
  - Paho ... MQTT: lightweight M2M publish/subscribe protocol contributed from IBM
Other global activities for M2M Service enablers

**ITU-T (global):**
- Joint Coordination Activity on Internet of Things (JCA-IoT): Identification (e.g. identifiers like E.164, reader/writer like RFID interrogator, tags like RFID tag, barcode tag..), ubiquitous sensor network (USN).
- Focus Group on M2M Service Layer: identify Requirements, APIs and protocols, initially focussing on eHealth (co-operation with WHO, Continua)
- Internet of Things Global Standards Initiative (IoT-GSI): single location for information on and development of IoT standards

**GSMA (global) Connected living program (CLP) is identifying requirements for mobile network support for several market sectors – automobile, healthcare, education, and smart city**

**OMA DM work on lightweight M2M (global):**
- Specifically looking at constrained devices (low energy consumption, inexpensive..)
- Optimize M2M service implementation by using light weight protocol in service layer.
- Non-RESTful, IP and None-IP transport: Wireless (SMS, USSD, CSD),
- Simple security

This activity in OMA is mainly driven by Chinese operators and vendors