Management and Provisioning of M2M Devices and Applications

Salvatore Scarpina
Device Management Working Group Vice Chairman, OMA
Innovation and Industry Relation, Research and Prototyping - Telecom Italia S.p.A.
During 10 years of activity, OMA has developed and published a number of Enabler Specifications covering a wide area of Service Layer Applications.

Among the success of many of them stated by the market: OMA Device Management
OMA Expertise: Interoperability Program

Interoperability allows systems from multiple vendors to readily work together and exchange data.

Interoperability has been a key point in OMA DM success.

To be interoperable, one should actively be engaged in the ongoing process of ensuring that the systems, procedures and culture of an organization are managed in such a way as to maximize opportunities for exchange and re-use of information, whether internally or externally. (Paul Miller, 2002)
OMA has now achieved commercial deployment of 1.4 Billion\textsuperscript{[1]} devices implementing the **Firmware Update Management Object** enabler (according to deployment information from OMA members)
More than **60 Management Objects**
have been registered by
**OMA Working Groups**
and more than **30 Management Objects**
from **other SDOs**
3GPP, ETSI, WiMax Forum among them
(according to OMNA registry portal [2])

<table>
<thead>
<tr>
<th>NO Identifier</th>
<th>NO Index</th>
<th>Description</th>
<th>Owner</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>org.openmobilealliance/1.0/PoC</td>
<td>0x0001</td>
<td>POC Control</td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plane MO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>org.openmobilealliance/1.0/PRESENCE</td>
<td>0x0002</td>
<td>Presence SIMPLE</td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>org.oma.org/oma_pocit2.1p</td>
<td>0x0002</td>
<td>OMA POC</td>
<td></td>
<td>2.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>org.oma.org/oma_pocit2.0</td>
<td>0x0004</td>
<td>OMA POC</td>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>org.oma.org/oma_สดcast:1.0</td>
<td>0x0005</td>
<td>OMA BCAST</td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MO</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
M2M devices will outnumber mobiles

Machina Research[^3] and GSMA[^4] forecast that the number of connected devices will grow from 9 billion in 2011 to **24 billion** in 2020, due in particular to M2M connections which will increase up to **12 billion** in 2020[^3]

There will be more M2M devices shipped each year than PCs, cell phones, tablets, set-top boxes, and gaming platforms put together[^5]

Remote management of M2M devices will be a critical aspect and opportunity
Press release [6], May 21st 2012 – Sprint, Metrum, Tollgrade Make Smart Grid Smarter

Enabling smart meters with wireless connectivity

Both Metrum and Tollgrade have completed

OMA Device Management certification

OMA DM already in M2M applications

“Over the Air” Management

and configuration

of devices

and efficient use of network resources.

Suitable for large-scale deployments
OMA DM already in M2M specifications

ETSI M2M Functional Architecture specifies OMA DM as supported enabler to implement Remote Entity Management (REM) Service Capability. A number of Management Objects compliant with OMA DM Enabler have been specified.
How to manage billions of devices

OMA recognizes the need for current OMA DM technology to **evolve**, in order to address **M2M challenges**

- Evolving **heterogeneous networks** supporting mobile and M2M devices
- Provisioning and Management of **constrained devices** through **constrained connectivity**
- Support of M2M devices **through a Gateway**
- Support of M2M devices **acting as a Gateway** for other devices
- Provisioning and Management of **devices** and **applications**
OMA and oneM2M

OMA collaborated with ETSI TC M2M during the specification of ETSI M2M Release 1:

OMA DM is natively included in the Functional Architecture and several Management Object have been specified.

OMA, in the very best interest of collaboration, harmonization and coordination, welcomes oneM2M Global Initiative.

In addition, OMA is proud to have been accepted as first Partner Type 2 [7].
Current M2M related OMA activities

In addition to OMA DM (v 1.3), several **OMA Enablers**, already developed or under specification, could fit in **M2M scenarios** in different ways.

- **OMA DM 1.3 Profiling** *(specifically for M2M context)*
- **OMA DM 2.0** *(next generation RESTful based DM Protocol)*
- **Lightweight M2M** *(protocol for service delivery and management of constrained device)*
- **OMA DM Gateway** *(for managing device through a Gateway)*
- **OMA CPNS, OMA SUPL, the Device API Program, ...**

*(please refer to Backup for a complete list)*
OMA Enablers in M2M scenario: example

The ability to monitor, provision and manage billions of heterogeneous connected devices over a variety of connections is absolutely essential (rif.[8])

www.openmobilealliance.org
OMA has started an internal activity to understand how to collaborate with and within oneM2M, elaborating a consistent view of how OMA relates to the M2M world and identifying a consistent strategy to drive coherently all internal activities.

Internal coordination and harmonization for better collaboration
Conclusions

- The Management of mobile devices using OMA DM 1.X technology has been proved to be successful.

- The Management of M2M devices, numbering in the billions, requires evolution in existing technologies.

- The importance of Management was already identified in ETSI M2M and good collaboration took place regarding existing technology.

- OMA is developing a new strategy for considering M2M scenarios and requirements in current and future specifications, in order to provide concrete contributions to the oneM2M framework.
References

[1] OMA Device Management Achieves 1.4 Billion Deployments  

[2] OMNA DM MO Registry  
  http://www.openmobilealliance.org/Tech/omna/omna-dm_mo-registry.aspx


[4] GSMA Connected Living  
  http://www.gsma.com/connectedliving/

[5] Simplifying M2M  
  http://blogs.windriver.com/m2m/

[6] Metrum, Tollgrade and Sprint Make the Smart Grid Smarter  
  http://newsroom.sprint.com/article_display.cfm?article_id=2290

[7] Open Mobile Alliance (OMA) Joins oneM2M Partnership  

[8] M2M Enablers from the Open Mobile Alliance  
  http://www.openmobilealliance.org/comms/pages/OMA_M2M_enablers.htm
Open Mobile Alliance - Overview

More than 120 members from across the mobile value chain
• Founded June 2002
• Operators, terminal and software vendors, content and entertainment providers

Interoperable service enablers across multiple domains
• Architecture, Security, Charging and Network APIs
• Person-to-Person Communications
• Device Capabilities
• Access to Content
• Services Access Interface
• Service Customization

Current and Ongoing Technical Deliverables – more detail in presentation
• >70 service enablers delivered in 2011 with 73 planned for 2012
• Ongoing refinement of interoperability testing program with Test on Demand
• API Framework—building on success of GSMA OneAPI and Parlay affiliation
• M2M Communications—enabling terminals as gateways and converged personal networks

New and improved organizational structures and efficiencies
• Fast track process for omitting or combining steps and deliverables in OMA Process
• Min Max procedure for an alternative path to traditional testing of every OMA enabler

Collaboration with other bodies—including oneM2M, GSMA, W3C & ETSI
• Reduce duplication and fragmentation
• New strategic program of liaisons with appointed Board level champions to other bodies
• OMA maintains formal cooperation agreements or frameworks with nearly 50 industry bodies
## Status of M2M related OMA activities

<table>
<thead>
<tr>
<th>Enabler</th>
<th>Status</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM 1.2.1</td>
<td>Approved (2008/06)</td>
<td>&gt;80 MOs registered in OMNA</td>
</tr>
<tr>
<td>DM 1.3</td>
<td>Candidate in 1Q2013</td>
<td>Backward compatible with DM 1.2.1</td>
</tr>
<tr>
<td>DM 2.0</td>
<td>Candidate in 1Q2013</td>
<td>Scalable and HTTP oriented protocol</td>
</tr>
<tr>
<td>DM Smart Card</td>
<td>Candidate in 2011</td>
<td>DM Server on Smart Card</td>
</tr>
<tr>
<td>Lightweight M2M</td>
<td>Candidate in 2Q2013</td>
<td>Protocol for management and service on constrained devices</td>
</tr>
<tr>
<td>DMClientAPIFw 1.0</td>
<td>Candidate in 3Q2011</td>
<td>API allowing Applications to access DM Management Tree</td>
</tr>
<tr>
<td>OpenCMAPI</td>
<td>V1.0 Candidate in 2Q2012</td>
<td>API allowing Applications to access connectivity capabilities</td>
</tr>
<tr>
<td></td>
<td>V1.1 Candidate in 2Q2013</td>
<td></td>
</tr>
<tr>
<td>CPNS</td>
<td>V1.0 Candidate in 1Q2012</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V1.1 Candidate in 3Q2012</td>
<td></td>
</tr>
<tr>
<td>SUPL</td>
<td>Candidate in 2Q2011</td>
<td></td>
</tr>
<tr>
<td>REST APIs</td>
<td>Many already approved</td>
<td>Not specific APIs for M2M but OMA guidelines may be used to develop M2M APIs</td>
</tr>
<tr>
<td>M2M DM Profiling OIG</td>
<td>Completed end of 2012</td>
<td>The goal of this OMA Incubator Group is to profile the OMA DM enablers to create an OMA DM compliant service for M2M</td>
</tr>
</tbody>
</table>
OMA DM Firmware Update MO (FUMO)

Defines the Management Tree object and mechanisms necessary to download firmware update packages and to upgrade the firmware of already deployed devices.

OMA DM Gateway Management Object (GwMO)

OMA DM GwMO facilitates interaction between a DM Server and a DM Client when direct and unaided interaction is not possible and/or device supports a management protocol other than OMA-DM.

V1.0 Approved as Candidate in March 2012
V1.1 scheduled as Candidate at the end of 2013
OMA Lightweight M2M

Lightweight M2M manages capability constrained M2M devices and applications, optimizing network resources over multiple bearers and transports, both IP (TCP, UDP) & Non-IP Transport (SMS, USSD, CSD). Reuse the winning “Object” resource model already implemented in OMA DM.

Approval targeted for mid-2013

OMA M2M Device Classification

The White Paper allows to group M2M devices into a manageable number of classes, relying on horizontal attributes and independently of vertical markets. Avoid overlap and facilitate coordination related to M2M standardization.

Approval June 2012
OMA Converged Personal Network Service (CPNS)

OMA CPNS enables interaction with in-home M2M services and applications, between personal networks and the CPNS Server. This allows remote control, monitoring and content delivery.

V1 Approved in May 2011
V1.1 targeted for Fall 2012

GwMO: M2M Devices through a gateway
CPNS: M2M Device as a gateway

OMA Secure User Plane Location

OMA SUPL uses user plane data bearers to carry positioning technology-related protocols between mobile terminal and the network. It relies on different localization technologies, depending from device and use case.

Approval targeted for mid-2013
Local applications on the device can use the Open Connection Manager API to manage connectivity and connections. It is applicable to different types of devices requiring mobile Internet access.

OMA Device API – Connection Manager

OpenCMAPI v.1.1 started, scheduled for 2Q2013

OMA Device API – DM Client-Side API Framework

Local applications on a device can access the Management Tree handled by the OMA DM Client in order to retrieve/update the Management Objects content and to be notified on Management Objects update.

Approved in October 2011