White Paper on M2M Device Classification

Candidate – 12 Jun 2012

Open Mobile Alliance

OMA-WP-M2M_Device_Classification-20120612-C

Use of this document is subject to all of the terms and conditions of the Use Agreement located at http://www.openmobilealliance.org/UseAgreement.html.

Unless this document is clearly designated as an approved specification, this document is a work in process, is not an approved Open Mobile Alliance™ specification, and is subject to revision or removal without notice.

You may use this document or any part of the document for internal or educational purposes only, provided you do not modify, edit or take out of context the information in this document in any manner. Information contained in this document may be used, at your sole risk, for any purposes. You may not use this document in any other manner without the prior written permission of the Open Mobile Alliance. The Open Mobile Alliance authorizes you to copy this document, provided that you retain all copyright and other proprietary notices contained in the original materials on any copies of the materials and that you comply strictly with these terms. This copyright permission does not constitute an endorsement of the products or services. The Open Mobile Alliance assumes no responsibility for errors or omissions in this document.

Each Open Mobile Alliance member has agreed to use reasonable endeavors to inform the Open Mobile Alliance in a timely manner of Essential IPR as it becomes aware that the Essential IPR is related to the prepared or published specification. However, the members do not have an obligation to conduct IPR searches. The declared Essential IPR is publicly available to members and non-members of the Open Mobile Alliance and may be found on the "OMA IPR Declarations" list at http://www.openmobilealliance.org/ipr.html. The Open Mobile Alliance has not conducted an independent IPR review of this document and the information contained herein, and makes no representations or warranties regarding third party IPR, including without limitation patents, copyrights or trade secret rights. This document may contain inventions for which you must obtain licenses from third parties before making, using or selling the inventions. Defined terms above are set forth in the schedule to the Open Mobile Alliance Application Form.

NO REPRESENTATIONS OR WARRANTIES (WHETHER EXPRESS OR IMPLIED) ARE MADE BY THE OPEN MOBILE ALLIANCE OR ANY OPEN MOBILE ALLIANCE MEMBER OR ITS AFFILIATES REGARDING ANY OF THE IPR'S REPRESENTED ON THE "OMA IPR DECLARATIONS" LIST, INCLUDING, BUT NOT LIMITED TO THE ACCURACY, COMPLETENESS, VALIDITY OR RELEVANCE OF THE INFORMATION OR WHETHER OR NOT SUCH RIGHTS ARE ESSENTIAL OR NON-ESSENTIAL.

THE OPEN MOBILE ALLIANCE IS NOT LIABLE FOR AND HEREBY DISCLAIMS ANY DIRECT, INDIRECT, PUNITIVE, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES ARISING OUT OF OR IN CONNECTION WITH THE USE OF DOCUMENTS AND THE INFORMATION CONTAINED IN THE DOCUMENTS.

© 2012 Open Mobile Alliance Ltd. All Rights Reserved.
Used with the permission of the Open Mobile Alliance Ltd. under the terms set forth above.

© 2012 Open Mobile Alliance Ltd. All Rights Reserved.

Used with the permission of the Open Mobile Alliance Ltd. under the terms as stated in this document. **[OMA-Template-WhitePaper-20110101-I]**

Contents

1. Scope

This document is to provide a Machine-to-Machine (M2M) device classification framework based on the horizontal attributes (e.g., wide area communication interface, local area communication interface, IP stack, human I/O capabilities, persistent configuration storage) of interest to communication service providers (CSPs) and M2M service providers (MSPs), independent of vertical markets, such as smart grid, connected cars, e-health, smart home, etc.

The objective of the M2M device classification is to enable the M2M industry to group a large and ever increasing number of M2M devices into a manageable number of classes so that M2M device management and service protocols, methods, and procedures can be systematically analyzed for re-useability and incrementally developed for the gaps in handling the M2M device classes not fully addressed by existing standards.

The classification scheme could help not only clarify the scope and requirements of M2M related work in OMA, but also articulate its linkage with all other M2M related standard development organizations (SDOs) to avoid overlapping and facilitate coordination related to M2M. It also enables integration of M2M services and management across the boundaries of vertical markets.

Once the white paper is completed, it can be used as a tool to analyze the applicability of existing requirements and specifications developed by OMA and other cooperative standards development organizations (SDOs) on various M2M devices based on the device classification scheme. It can also be used to identify the requirement and specification areas that need to be qualified or enhanced for the M2M device classes which are not well addressed by the current standards.

2. References

[ANT-AL]   ANT Alliance, http://www.thisisant.com/ant/ant-alliance

[BB-Forum]   Broadband Forum, http://www.broadband-forum.org/

[Bluetooth-SIG]   Bluetooth Special Interest Group, http://www.bluetooth.org/

[DSRC-ITS]   Intelligent Transportation Systems, Joint Program Office, http://www.its.dot.gov/DSRC/index.htm

[ETSI-M2M]   ETSI TS 102 690 v1.1.1, 2011-10, Machine-to-Machine Communications (M2M) Functional Architecture,
http://www.etsi.org/deliver/etsi_ts/102600_102699/102690/01.01.01_60/ts_102690v010101p.pdf

[PLC-Forum]   Power Line Communications Forum, http://www.plcforum.com/

[WiFi-AL]   WiFi Alliance, http://www.wi-fi.org/

[ZB-AL]   Zigbee Alliance, http://www.zigbee.org/

3. Terminology and Conventions

3.1   Conventions

This is an informative document, which is not intended to provide testable requirements to implementations.

3.2   Definitions

M2M Device   A M2M Device is a device that runs (a) M2M application(s) and communicates through the Network
                             Provider's network

3.3   Abbreviations

ADSL	Asymmetric Digital Subscriber Line
CSD	Circuit Switched Data
DSRC	Dedicated Short Range Communication
FL	Fixed (Wired) Local Area Network Interface
FTTH	Fiber To The Home
FW	Fixed (Wired) Wide Area Network Interface
IO	Input/Output
IP	Internet Protocol
M2M	Machine-to-Machine Communication
OMA	Open Mobile Alliance
PLC	Power Line Communications
PS	Persistent Configuration Storage
SIM	Subscriber Identity Module
SMS	Short Message Service
UICC	Universal Integrated Circuit Card
WL	Wireless Local Area Network Interface
WW	Wireless Wide Area Network Interface

4. M2M Device Classification Attributes

M2M devices [ETSI-M2M] are classified using the seven physical or logical attributes shown in Table 1, which include vertical-independent device characteristics of communication interfaces, IP stack, user input/output, and persistent configuration storage.

Attribute Identifier	Attribute Description	Attribute Values and Associated Meaning
#1	Wireless Wide Area Network Interface	- WW: with a Wireless Wide Area Network (e.g., 3G, 4G, WiMAX, GPRS) interface. - NWW: without any Wireless Wide Area Network interface. *: WW or NWW.
#2	Wireless Local Area Network Interface	- WL: with a Wireless Local Area Network (e.g., Local WiFi [WiFi-AL], Bluetooth [Bluetooth-SIG], ANT [ANT-AL], Zigbee [ZB-AL], DSRC [DSRC-ITS]) interface. - NWL: without any Wireless Local Area Network interface. *: WL or NWL.
#3	Fixed Wide Area Network Interface	- FW: with a Fixed (Wired) Wide Area Network (e.g., ADSL, FTTH, PLC [PLC-Forum]) interface. - NFW: without any Fixed (Wired) Wide Area Network interface. *: FW or NFW.
#4	Fixed Local Area Network Interface	- FL: with Fixed (Wired) Local Area Network (e.g., Ethernet, USB, RS232, TIA485) interface. - NFL: without any Fixed (Wired) Local Area Network interface. *: FL or NFL.
#5	IP Stack	- IP-UDP: with IP and UDP in communication stack. - IP-UDP+TCP: with IP, UDP, and TCP in communication stack. - IP-*: IP-UDP or IP-UDP+TCP. - NIP: without IP (e.g., SMS, CSD) in communication stack. *: IP or NIP.
#6	User Input/Output	- IO: with user I/O (e.g., keypad, touch screen, speaker). - NIO: without user I/O. *: IO or NIO.
#7	Persistent Configuration Storage	- PS: with persistent configuration storage. (e.g., SIM card, Embedded SIM, on board flash storage, micro SD card). - NPS: without persistent configuration storage. *: PS or NPS.

Table 1: Attributes for M2M device classification

5. M2M Device Class Examples

Device class with attributes #1 - #7, is expressed in the following notation, where "C" stands for Class:

C (attribute#1, attribute#2, attribute#3, attribute#4, attribute#5, attribute#6, attribute#7)

The examples for device class and associated devices are shown in Table 2.

Device Class Example	Description	Associated Device Examples
C(WW, WL, NFW, FL, NIP, NIO, PS)	M2M device class with Wireless Wide Area Network interface, Fixed Local Area Network interface (e.g., RS232 or TIA485), no IP stack, no user I/O, and persistent configuration storage (e.g., SIM).	GSM utility meter gateways
C(NWW, WL, NFW, NFL, IP, NIO, PS)	M2M device class with only Wireless Local Area Network interface (e.g., WiFi), IP stack, no user I/O, and persistent configuration storage.	Cleaning robots, surveillance robots
C(NWW, WL, NFW, FL, IP, IO, PS)	M2M device class with Wireless Local Area Network interface (e.g., WiFi), Wired Local Area Network interface (e.g., Ethernet), IP stack, user I/O, and persistent configuration storage.	WiFi-enabled smart appliance (washer, dryer, oven, refrigerator)
C(NWW, WL, NFW, NFL, NIP, NIO, NPS)	M2M device class with only Wireless Local Area Network interface (e.g., Zigbee, ANT+), no IP stack, no user I/O, no persistent configuration storage.	Zigbee weather sensors, home security sensors, ANT+ Fitness sensors
C(NWW, WL, NFW, NFL, NIP, IO, PS)	M2M device class with only Wireless Local Area Network interface (e.g., ANT+), no IP stack, user I/O (e.g., touch screen), having persistent configuration storage (e.g., micro SD cards).	Portable GPS devices, ANT+ Medical Monitors, Bluetooth car audio system, car hands free phone units
C(WW, WL, NFW, NFL, IP, IO, PS)	M2M device class with Wireless Wide Area Network interface (e.g., 3G/4G) interface, Wireless Local Area Network Interfaces (e.g., WiFi, Bluetooth), user I/O (e.g., touch screen), with persistent configuration storage (e.g., UICC).	Mobile handsets
C(WW, WL, NFW, FL, NIP, NIO, PS)	M2M device class with Wireless Wide Area	Telematics

	Network interface (e.g., GPRS), Wireless Local Area Network interface (e.g., DSRC), Fixed Local Area Network (e,g., Controller Area Network), no IP stack (e.g., SMS), no user I/O, persistent configuration storage.	onboard unit (with DSRC)
C(NWW, WL, NFW, NFL, IP, *, PS)	M2M device class with Wireless Local Area Network Interface, IP stack, with or without user I/O, with persistent configuration storage (e.g., UICC).	IP Robot: Teaching robot with screen and speaker, or cleaning robots without user I/O
C(NWW, WL, FW, FL, IP, NIO, PS)	M2M device class with no Wireless Wide Area Network interface, Wireless Local Area Network interface (e.g., WiFi), Wired Wide Area Network (e.g., FTTH/ADSL), Wired Local Area Network interface (e.g., Ethernet), IP stack, no user I/O, persistent configuration storage.	Residential Gateway (with WiFi)
C(NWW, NWL, FW, FL, NIP, NIO, PS)	M2M device class with no Wireless Wide Area Network interface, no Wireless Local Area Network interface, Wired Wide Area Network (e.g., PLC/HD-PLC), Wired Local Area Network interface, no IP stack, no user I/O, persistent configuration storage.	Smart Meter (with PLC)

Table 2: Examples of device class

6. Use of M2M Device Classification

The possible ways to use the above device classification scheme is as follows:

(1) Categorize M2M devices from all verticals into a M2M device class that can have the same device provisioning and management procedures.

(2) Analyze the existing device provisioning and management specifications with respect to their applicability to M2M device classes.

(3) Analyze the completeness, gaps, overlapping, and consistency of device provisioning and management specifications in the same or across SDOs on the device class basis.

Appendix A.   Change History   (Informative)

Document Identifier	Date	Sections	Description
OMA-WP-M2M_Device_Classification-20120222-D	22 Jan 2012	All	Initial version of M2M Device Classification White Paper draft
OMA-WP-M2M_Device_Classification-20120306-D	06 March 2012	All	Application of the WP template according to Action Item DM-2012-A033
OMA-WP-M2M_Device_Classification-20120417-D	17 April 2012	References, Definitions, Abbreviations	Incorporated CR OMA-DM-M2MDevClass-2012-0003R01-CR_revision_on_references_and_terminology.docx
OMA-WP-M2M_Device_Classification-20120502-D	02 May 2012	All	Editorial clean-up to match the White Paper template
OMA-WP-M2M_Device_Classification-20120523-D	23 May 2012	All	Incorporated CR OMA-DM-M2MDevClass-2012-0006R03-CR_editorial_comments_incorp
OMA-WP-M2M_Device_Classification-20120530-D	30 May 2012	All	History box restored Hyperlink font modified according to template Language set to English UK
OMA-WP-M2M_Device_Classification-20120612-C	12 Jun 2012	N/A	Status changed to Candidate by TP Ref # OMA-TP-2012-0224-INP_M2M_Device_Classification_1_0_RRP_for_Candidate_approval