



Architecture Part 2: Study for the merging of architectures proposed for consideration by oneM2M

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Foreword

This Technical Report (TR) has been produced by ETSI Partnership Project oneM2M (oneM2M).

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1 Scope

The present document provides an evaluation of existing M2M-related Architecture work undertaken by the founding partners of oneM2M, including: the Association of Radio Industries and Businesses (ARIB) and the Telecommunication Technology Committee (TTC) of Japan; the Alliance for Telecommunications Industry Solutions (ATIS) and the Telecommunications Industry Association (TIA) of the USA; the China Communications Standards Association (CCSA); the European Telecommunications Standards Institute (ETSI); and the Telecommunications Technology Association (TTA) of Korea. Common Functional Entities and Reference Points are identified, as well as critical differences. New functionality will not be considered as part of this study.

The present document is intended to ensure a common understanding of existing M2M Architectural approaches, in order to facilitate future normative work resulting in oneM2M Technical Specifications.

The present document has been prepared under the auspices of the oneM2M Technical Plenary, by the oneM2M Architecture Working Group.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

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The following referenced documents are necessary for the application of the present document.

Not applicable.

2.2 Informative references

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NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] oneM2M Drafting Rules.
- [i.2] ATIS Machine to Machine (M2M) Committee.
- [i.3] ETSI Machine to Machine (M2M) Committee.
- [i.4] IETF draft-ietf-core-coap: "Constrained Application Protocol (CoAP)".
- [i.5] OMA Lightweight M2M.
- [i.6] OMA-DM (OMA): "OMA Device Management".
- [i.7] Fielding, R.T., (2000), Dissertation: "Architectural Styles and the Design of Network-based Software Architectures, Chapter 5 - Representational State Transfer (REST)". University of California Irvine.
- [i.8] TIA TR-50 - M2M: "Smart Device Communications".

3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

3GPP	3 rd Generation Partnership Project
AAA	Authentication, Authorization and Accounting
AAA-SD	Authentication, Authorization and Accounting-subscriber device
API	Application programming Interface
ARC	oneM2M Architecture Working Group
ARIB	Association of Radio Industries and Businesses (JP)
ASP	Application Service provider
ATIS	Alliance for Telecommunications Industry Solutions
CCSA	China Communications Standards Association
CoAP	Constrained Application Protocol
CoRE	Constrained Restful Environments
DA	Device Application
DSCL	Device Service Capability Layer
ETSI	European Telecommunications Standards Institute
GA	Gateway Applications
GSCL	Gateway Service Capability Layer
HATEOAS	Hypermedia As The Engine Of Application State
HTTP	HyperText Transfer Protocol
IETF	Internet Engineering Task Force
IF	Interface
M2M	Machine to Machine (communications)
MAS	M2M Authentication Server
MSBF	M2M Service Bootstrap Function
MSP	Machine to Machine Service Provider
MTC	Machine Type Communication
NA	Network Applications
NSCL	Network Service Capability Layer
NW	Network
OMA LWM2M	Open Mobile Alliance - Light Weight M2M
OMA	Open Mobile Alliance
PoA	Point of Attachment
REST	Representational State Transfer is a style of API interface
RPC	Remote Procedure Call
SOAP	Simple Object Access Protocol
TIA	Telecommunications Industry Association
TP	oneM2M Technical Plenary
TTA	Telecommunications Technology Association
TTC	Telecommunication Technology Committee
WSDL	Web Service Description Language
XML	Extensible Markup Language

4 Conventions

The key words "Shall", "Shall not", "May", "Need not", "Should", "Should not" in the present document are to be interpreted as described in the oneM2M Drafting Rules [i.1].

5 Analysis of Functional Entities

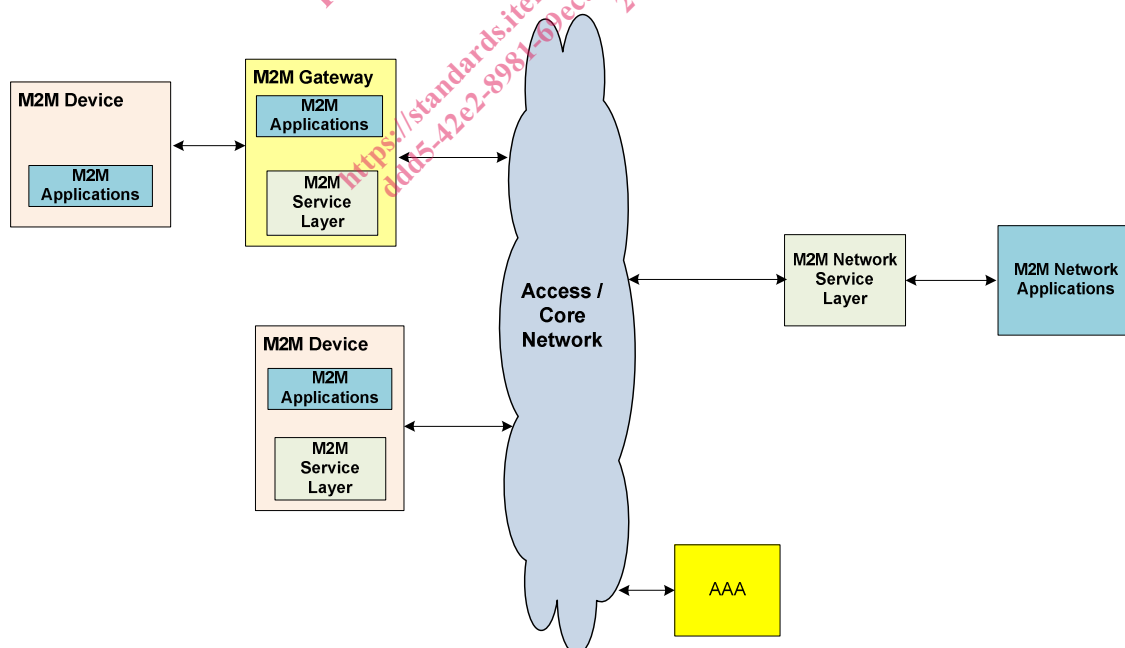
5.1 Existing Functional Entities: ATIS, ETSI, TIA

This clause provides a comparative analysis of existing ATIS M2M [i.2], ETSI M2M [i.3], and TIA TR-50 [i.8], functional architectural entities.

Table 5.1 provides a comparative matrix of the functional architectural entities supported by each architecture.

Table 5.1: TIA, ATIS, and ETSI M2M Functional Entity Comparative Matrix

Functional Entity	TIA TR-50	ATIS	ETSI M2M
M2M Service Capability hosted in the network domain	Yes <i>Server Container</i>	Yes <i>Service Capabilities</i>	Yes <i>Network Service Capability Layer (NSCL)</i>
M2M Service Capability hosted on an intermediary node	Yes <i>PoA Container</i>	No	Yes <i>Gateway Service Capability Layer (GSCL)</i>
M2M Service Capability hosted on an M2M Device	Yes <i>PoA Container</i>	No	Yes <i>Device Service Capability Layer (DSCL)</i>
Applications in the network domain	Yes <i>home applications</i>	Yes <i>Applications</i>	Yes <i>Network Applications (NA)</i>
Applications in the intermediary node	Yes <i>Node Application</i>	No	Yes <i>Gateway Application (GA)</i>
Applications in the M2M Device	Yes <i>PoA Application</i>	No	Yes <i>Device Application (DA)</i>
M2M Network	Yes <i>Server</i>	Yes <i>Network Service Functions</i>	Yes <i>Network Domain</i>
M2M intermediary node	Yes <i>PoA Device</i>	No	Yes <i>M2M Gateway</i>
M2M Device	Yes <i>PoA Device</i>	Yes <i>Device</i>	Yes <i>Device with Service Capabilities (D)</i> <i>Device without Service Capabilities (D')</i> <i>Legacy non-ETSI Device (d)</i>
AAA Server	Yes <i>AAA-SD</i>	No	Yes <i>M2M Authentication Server (MAS), M2M Service Bootstrap function (MSBF)</i>



NOTE: Functional Elements depicted in this figure may be placed anywhere, not necessarily outside the Access/Core network. The role/placement of AAA Server is for further study.

Figure 5.1: TIA, ATIS, and ETSI M2M Functional Architectural Entities

Figure 5.1 provides a high level overview of the common components when examining TIA TR-50 [i.8], ETSI M2M [i.3], and ATIS M2M [i.2] functional architectural entities.

6 Analysis of existing Reference Points

6.1 Reference Point analysis

This clause provides a comparative analysis of existing TIA TR-50 [i.8], ETSI M2M [i.3], and ATIS M2M [i.2], architectural reference points. Figure 6.1 shows the reference points from each source consolidated into a single functional architecture. Table 6.1 provides a comparative matrix of the reference points supported by each architecture.

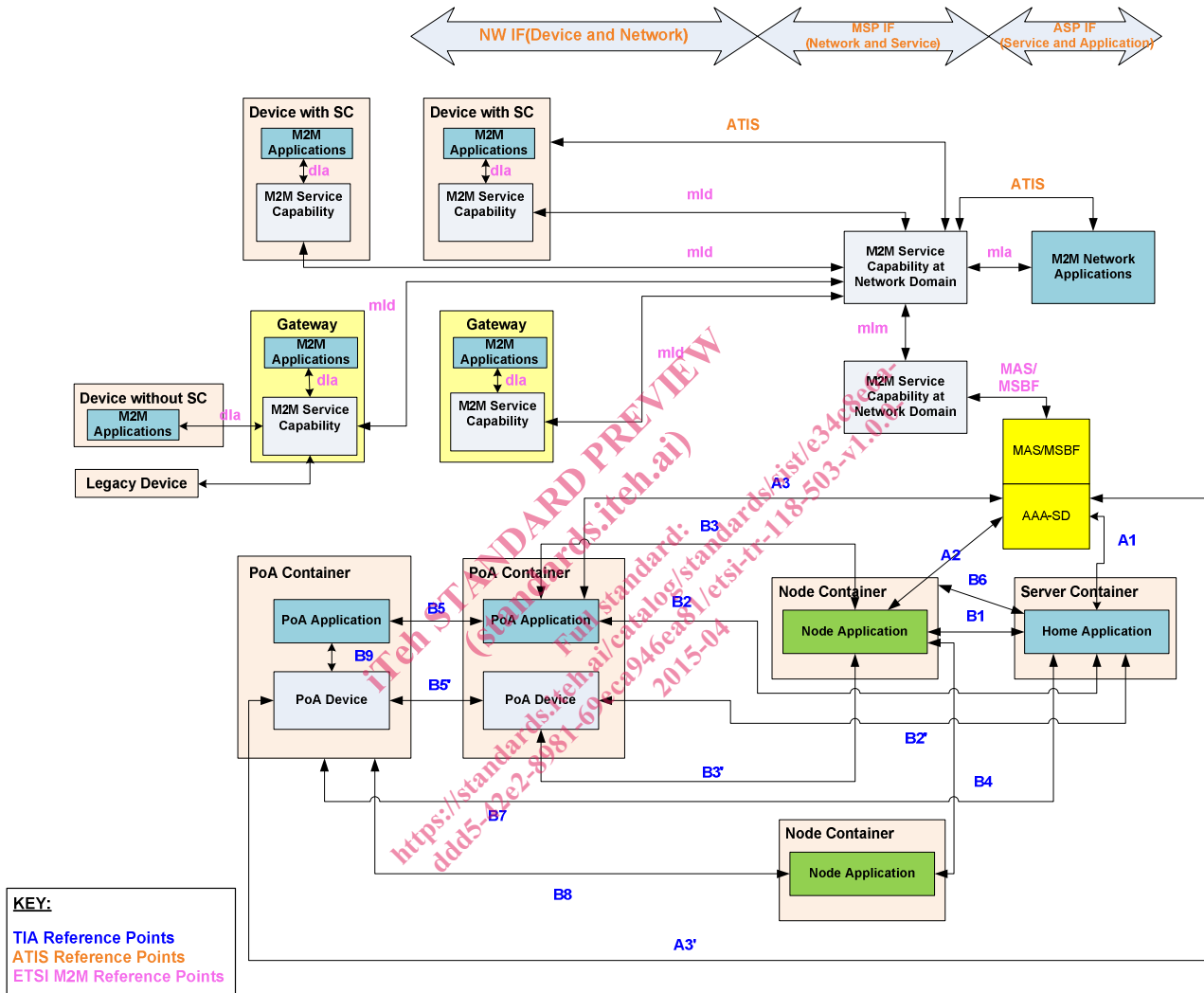


Figure 6.1: TIA, ATIS, and ETSI M2M Reference Point Analysis

Figure 6.1 provides a high level architectural overview with reference points of the common components when examining TIA TR-50, ETSI M2M, and ATIS M2M functional architectural entities.

Details of the reference points are provided in tables 6.1 and 6.2. Table 6.1 also provides details of 3GPP reference points pertaining to Machine Type Communication (MTC).

Table 6.1: TIA, ETSI, ATIS, and 3GPP Reference Point Analysis for M2M

Reference Point/Interface Description	Corresponding Reference Point				Comment
	TIA	ETSI	ATIS	3GPP	
M2M Device Application ↔ M2M Device Application	B5				
M2M Gateway Application ↔ M2M Gateway Application	B4				
M2M Device Application ↔ M2M Gateway Application	B3				
M2M Device Application ↔ M2M Network Application	B2				
M2M Gateway Application ↔ M2M Network Application	B1				
M2M Device Application ↔ M2M Device	B9				
M2M Gateway Application ↔ M2M Device	B3'				
M2M Network Application ↔ M2M Device	B2'		*		* ATIS Shows an interface 'Traffic Flow (Option 2)'
M2M Network Application ↔ Access/Core Network Provider				Gi/Sgi	
M2M Device Application ↔ M2M Device Service Layer		dla			
M2M Device Application ↔ M2M Gateway Service Layer		dla			
M2M Gateway Application ↔ M2M Device Service Layer	B8				
M2M Gateway Application ↔ M2M Gateway Service Layer		dla			
M2M Network Application ↔ M2M Device Service Layer	B7				
M2M Network Application ↔ M2M Gateway Service Layer	B6				
M2M Network Application ↔ M2M Network Service Layer		m1a	ASP IF		
M2M Device Service Layer ↔ M2M Network Service Layer		m1d			
M2M Gateway Service Layer ↔ M2M Network Service Layer		m1d			
M2M Network Service Layer ↔ M2M Network Service Layer		m1m			
M2M Network Service Layer ↔ M2M Device			*		* ATIS Shows an interfaces 'Traffic Flow (Option 1)' and 'Device Mangement'
M2M Network Service Layer ↔ Access/Core Network Provider			MSP IF	T _{SP}	
M2M Device ↔ M2M Device	B5'				
M2M Device ↔ Access/Core Network Provider			NW IF		
M2M Network Application ↔ AAA Server	A1				
M2M Gateway Application ↔ AAA Server	A2				
M2M Device Application ↔ AAA Server	A3				
M2M Device ↔ AAA Server	A3'				
M2M Network Service Layer ↔ AAA Server		MAS/ MSBF			