



SmartM2M; Smart Applications; Communication Framework

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Contents

Intellectual Property Rights	4
Foreword.....	4
Modal verbs terminology.....	5
1 Scope	6
2 References	6
2.1 Normative references	6
2.2 Informative references.....	7
3 Definition of terms, symbols and abbreviations.....	8
3.1 Terms.....	8
3.2 Symbols.....	8
3.3 Abbreviations	8
4 Smart Applications communication functionality and protocols	8
4.1 Introduction	8
4.2 Smart Applications Communication Framework	9
5 Interworking with the Smart Applications Communication Framework	10
History	11

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Smart Machine-to-Machine communications (SmartM2M).

The final scope is to provide a set of specifications that assure a smooth communication between the smart applications in IoT systems. An important aspect is to ensure a common interworking framework to cater for the communication among systems that apply the full set of specifications as referenced in the present document. This is in recognition of the potential long term existence of legacy and specialized systems and the need to communication amongst & between systems.

The full set of specifications cover three aspects:

- 1) The semantic aspect specified by the Smart Applications REference ontology (SAREF) and its mapping on the SAREF Communication Framework provided by oneM2M standard:
 - ETSI TS 103 264 [1], which includes the SAREF and its extensions.
- NOTE: This work is based on the Study on Semantic Assets for Smart Appliances Interoperability of the European Commission DG Communications Networks, Content & Technology [i.1].
- 2) The SAREF communication framework, the present document.
 - 3) The full testing support for the above mentioned documents:
 - ETSI TS 103 268-1 [i.6].
 - ETSI TS 103 268-2 [i.7].
 - ETSI TS 103 268-3 [i.8].
 - ETSI TS 103 268-4 [i.9].

Modal verbs terminology

In the present document "shall", "shall not", "should", "should not", "may", "need not", "will", "will not", "can" and "cannot" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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1 Scope

The present document defines a framework for Smart Applications communication based on oneM2M specifications. It also provides adjustments as required by the interested stakeholders.

The present document includes:

- An introduction to the oneM2M framework and its relation with the ETSI M2M one.
- The specification of the interworking framework for Smart Applications with normative reference to oneM2M specifications.
- The specification about how to interwork with the oneM2M framework.

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 referenced document (including any amendments) applies.

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

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 necessary for the application of the present document.

- [1] ETSI TS 103 264 (V3.1.1): "SmartM2M; Smart Applications; Reference Ontology and oneM2M Mapping".
- [2] ETSI TS 118 111: "oneM2M; Common Terminology (oneM2M TS-0011)".
- [3] ETSI TS 118 102: "oneM2M Requirements (oneM2M TS-0002)".
- [4] ETSI TS 118 101: "oneM2M; Functional Architecture (oneM2M TS-0001)".
- [5] ETSI TS 118 104: "oneM2M; Service Layer Core Protocol Specification (oneM2M TS-0004)".
- [6] ETSI TS 118 103: "oneM2M; Security solutions (oneM2M TS-0003)".
- [7] ETSI TS 118 105: "oneM2M; Management Enablement (OMA) (oneM2M TS-0005)".
- [8] ETSI TS 118 106: "oneM2M; Management Enablement (BBF) (oneM2M TS-0006)".
- [9] ETSI TS 118 109: "oneM2M; HTTP Protocol Binding (oneM2M TS-0009)".
- [10] ETSI TS 118 120: "oneM2M; WebSocket Protocol Binding (oneM2M TS-0020)".
- [11] ETSI TS 118 112: "oneM2M; Base Ontology (oneM2M TS-0012)".
- [12] ETSI TS 118 115: "oneM2M; Testing Framework (oneM2M TS-0015)".
- [13] ETSI TS 118 113: "oneM2M; Interoperability Testing (oneM2M TS-0013)".
- [14] ETSI TS 118 122: "oneM2M Field Device Configuration (oneM2M TS-0022)".
- [15] oneM2M TS 0016: "Secure Environment Abstraction".
- [16] ETSI TS 118 132: "MAF and MEF Interface Specification (oneM2M TS-0032)".

- [17] oneM2M TS 0026: "3GPP Interworking".
- [18] oneM2M TS 0030: "Ontology Based Interworking".
- [19] oneM2M TS 0031: "Feature Catalogue".
- [20] oneM2M TS 0033: "Interworking Framework".
- [21] oneM2M TS 0034: "Semantics Support".

2.2 Informative 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 referenced document (including any amendments) applies.

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] European Commission and TNO: "Study on Semantic Assets for Smart Appliances Interoperability", final report, April 2015.
- NOTE: Available at <https://sites.google.com/site/smartappliancesproject/deliverables>.
- [i.2] ETSI TR 102 725: "Machine-to-Machine communications (M2M); Definitions".
 - [i.3] ETSI TS 102 689: "Machine-to-Machine communications (M2M); M2M Service Requirements".
 - [i.4] ETSI TS 102 690: "Machine-to-Machine communications (M2M); Functional architecture".
 - [i.5] ETSI TS 102 921: "Machine-to-Machine communications (M2M); m1a, d1a and m1d interfaces".
 - [i.6] ETSI TS 103 268-1: "SmartM2M Smart Appliances Ontology and Communication Framework Testing; Part 1: Testing methodology".
 - [i.7] ETSI TS 103 268-2: "SmartM2M; Smart Appliances Ontology and Communication Framework Testing; Part 2: Protocol Implementation Conformance Statement (PICS) pro forma".
 - [i.8] ETSI TS 103 268-3: "SmartM2M; Smart Appliances Ontology and Communication Framework Testing; Part 3: Test Suite Structure and Test Purposes (TSS & TP)".
 - [i.9] ETSI TS 103 268-4: "SmartM2M; Smart Appliances Ontology and Communication Framework Testing; Part 4: Abstract Test Suite (ATS) and Protocol Implementation eXtra Information for Testing (PIXIT)".
 - [i.10] onem2M TR 0001: "Use Cases Collection".
 - [i.11] oneM2M TR 0025: "Application Developer Guide".
 - [i.12] oneM2M TR 0035: "Device Management Use Case".
 - [i.13] oneM2M TR 0045: "Implementing Semantics".
 - [i.14] ETSI TR 102 966: "Machine-to-Machine communications (M2M); Interworking between the M2M Architecture and M2M Area Network technologies".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI TS 118 111 [2] and the following apply.

NOTE: A term defined in the present document takes precedence over the definition of the same term, if any, in ETSI TS 118 111 [2].

smart applications: any application in an IoT system making use of the SAREF as specified in the present document and making use of the SAREF communication framework as specified in ETSI TS 118 104 [5]

smart applications communication framework: set of protocols, elements and functionalities that supports communication and interworking for smart applications, as specified in the present document and in ETSI TS 103 264 [1]

3.2 Symbols

Void.

3.3 Abbreviations

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

IoT	Internet of Things
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4 Smart Applications communication functionality and protocols

4.1 Introduction

The oneM2M specifications define a framework for the communication and sharing of information. The major paradigm can be referred to as "store & share". De facto any object and information is mapped to resources that can be shared, discovered and accessed via a resource oriented architecture and its related protocols.

IP protocols and URI formats are at the basis of the communication and identification, making the solution Internet of Things friendly, so the oneM2M system is a component of IoT.

The following three aspects most characterize the oneM2M solution (and similarly the ETSI M2M specifications) in the context of smart applications:

- The mentioned store & share mechanism allows information sharing among multiple services, without consuming the data or explicitly addressing the interested applications. In fact, the use of a communication that allows the storage of the information (on devices, gateways and servers) and its retrieval using application identities, removes the need for end to end routing of the information.
- A separation between security and privacy, where security is based on existing security mechanisms, while privacy is enforced by the system flexibly determined by the service application. The service application may decide to which applications/applications sets and under which conditions they choose to share the information.

- Transparency with respect to the application semantics. Data is stored and retrieved transparently from the point of view of the communication framework, which knows very little or nothing about the nature of the data contained and its format. This implies that to provide a full communication interoperability at the application level the service application needs to share a semantic model or to interwork with a common semantic model. In the case of Smart Applications the common semantics are defined in ETSI TS 103 264 [1].

Everything is then integrated with the required communication feature: among others, security, device management, group managements, location management, communication scheduling, etc., are all part of the oneM2M solution. An intelligent independence from the underlying network: multiple IP based networks can be used, and the M2M System is used to hide (or abstract) the data with respect to the applications. This tries to make conscious & efficient use of the available connectivity means, with the possibility of reusing underlying network functionality where available.

Additionally the oneM2M Communication Framework allows a flexible deployment. It is designed as a distributed system, where the functionalities and information can be distributed on devices, gateways and centralized servers, according to the specific service needs and optimizations.

Technically the oneM2M system is an evolution and extension of the ETSI M2M system & specifications, and even if they are not strictly interoperable, the constituent elements are the same, allowing an easy interworking and a smooth evolution from ETSI M2M to oneM2M M2M systems.

4.2 Smart Applications Communication Framework

The Communication Framework for Smart Applications shall comply with the following specifications:

NOTE: For oneM2M specifications for which the transposition process by ETSI is still ongoing at the date of the present document, only the oneM2M number is provided.

- ETSI TS 118 111 (oneM2M TS-0011) [2].
- ETSI TS 118 102 (oneM2M TS-0002) [3].
- ETSI TS 118 101 (oneM2M TS-0001) [4].
- ETSI TS 118 104 (oneM2M TS-0004) [5].
- ETSI TS 118 103 (oneM2M TS-0003) [6].
- ETSI TS 118 105 (oneM2M TS-0005) [7].
- ETSI TS 118 106 (oneM2M TS-0006) [8].
- ETSI TS 118 109 (oneM2M TS-0009) [9].
- ETSI TS 118 120 (oneM2M TS-0020) [10].
- ETSI TS 118 112 (oneM2M TS-0012) [11].
- ETSI TS 118 115 (oneM2M TS-0015) [12].
- oneM2M TS 0013 [13].
- ETSI TS 118 122 (oneM2M TS-0022) [14].
- oneM2M TS 0016 [15].
- ETSI TS 118 132 (oneM2M TS-0032) [16].
- oneM2M TS 0026 [17].
- oneM2M TS 0030 [18].
- oneM2M TS 0031 [19].
- oneM2M TS 0033 [20].