

ETSI TS 102 690 V2.1.1 (2013-10)



**Machine-to-Machine communications (M2M);
Functional architecture**

(<https://standards.iteh.ai>)

Document Preview

[ETSI TS 102 690 V2.1.1 \(2013-10\)](https://standards.iteh.ai/catalog/standards/etsi/51e28d73-c173-44fa-b65f-9e189b2022f7/etsi-ts-102-690-v2-1-1-2013-10)

<https://standards.iteh.ai/catalog/standards/etsi/51e28d73-c173-44fa-b65f-9e189b2022f7/etsi-ts-102-690-v2-1-1-2013-10>

Reference

RTS/M2M-00002ed211

Keywords

architecture, functional, M2M

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

(<https://standards.iteh.ai>)
Document Preview

Important notice

Individual copies of the present document can be downloaded from:

<http://www.etsi.org>

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the PDF version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at

<http://portal.etsi.org/tb/status/status.asp>

If you find errors in the present document, please send your comment to one of the following services:

http://portal.etsi.org/chaicor/ETSI_support.asp

Copyright Notification

No part may be reproduced except as authorized by written permission.
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2013.
All rights reserved.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members.
3GPP™ and **LTE™** are Trade Marks of ETSI registered for the benefit of its Members and
of the 3GPP Organizational Partners.
GSM® and the GSM logo are Trade Marks registered and owned by the GSM Association.

Contents

Intellectual Property Rights	12
Foreword.....	12
1 Scope	13
1.1 Document structure	13
2 References	14
2.1 Normative references	14
2.2 Informative references.....	16
3 Definitions, symbols and abbreviations	17
3.1 Definitions	17
3.2 Symbols.....	17
3.3 Abbreviations	17
4 High level architecture	17
5 Functional architecture.....	19
5.1 Framework	20
5.1.1 Functions and reference points	20
5.1.1.1 Functions of Service Capability Layers	22
5.1.2 High level flow of events.....	22
6 Reference points.....	25
6.1 Overview	25
6.2 mIa.....	27
6.3 dIa.....	27
6.4 mId	27
6.5 mIm	28
7 M2M Identification and addressing	28
7.1 Introduction	28
7.2 M2M Identification	29
7.2.1 M2M Identifiers.....	29
7.2.1.1 Application Identifier	29
7.2.1.2 M2M Node Identifier	29
7.2.1.3 SCL Identifier	29
7.2.1.4 M2M Service Connection Identifier	29
7.2.1.5 M2M Service Provider Identifier	29
7.2.1.6 MSBF Identifier	29
7.2.1.7 M2M Subscription Identifier.....	29
7.2.2 M2M Identifiers lifecycle and characteristics.....	30
7.3 M2M Application Addressing.....	33
7.3.1 Introduction.....	33
7.3.2 Application Reachability	33
7.3.2.1 M2M Communication Point of Contact (M2M PoC)	33
7.3.2.2 Principles guiding Locating Applications	34
7.3.2.3 Usage of M2M PoC by the M2M System.....	34
7.3.2.3.1 M2M PoC related to M2M SCLs associated with a Fixed Network	34
7.3.2.3.2 M2M PoC related to M2M SCLs associated with Mobile Networks	34
7.3.2.3.3 M2M PoC to M2M SCLs associated with multiple access networks.....	35
7.3.2.4 Reachability of a applications registered to NSCL	35
7.4 Service Discovery Across Multiple M2M Domains	35
7.5 NSCL to NSCL Communication Principles.....	35
7.5.1 Look-up Based Approach without NSCL to NSCL Registration	35
7.5.1.1 Public Domain Names and SCLs	36
7.5.1.2 High-Level Communication Principles.....	36
7.5.1.3 Filtering.....	37

8	M2M Security, M2M Service Bootstrap, Service Provisioning and M2M Service Connection procedures	37
8.1	Introduction	37
8.2	M2M Security Framework	37
8.2.1	Overview	37
8.2.2	Key hierarchy and realization	38
8.2.2.1	Description of M2M keys	38
8.2.2.2	M2M Root Key Provisioning	39
8.2.2.3	Secured Environment Domains	40
8.2.3	M2M Node Security Functionalities	40
8.2.3.1	Network M2M Node Security Functionalities	40
8.2.3.2	Device/Gateway M2M Node Common Security Functionalities	41
8.2.3.3	Gateway M2M Node Specific Security Functionalities	42
8.2.4	M2M Device/Gateway Integrity Validation (Optional)	42
8.2.4.1	Integrity Validation Functional Description	42
8.2.4.2	Integrity Validation prior to M2M Service Bootstrap (Optional)	42
8.2.5	Secured Environment Domain administration	44
8.3	M2M Service Bootstrap procedures	44
8.3.1	Introduction	44
8.3.2	Access Network Assisted M2M Service Bootstrap procedures	44
8.3.2.1	GBA based M2M Service Bootstrap procedure	44
8.3.2.2	EAP-based Bootstrap Procedure using SIM/AKA-based Credentials	46
8.3.2.3	Bootstrap Procedure Utilizing EAP-based Network Access Authentication	46
8.3.3	Access Network Independent M2M Service Bootstrap procedures	47
8.3.3.1	M2M Service Bootstrap required properties	48
8.3.3.2	M2M Service Bootstrap Authentication and Transport Options	48
8.3.3.3	Description of EAP over PANA as the M2M Service Bootstrap Transport	48
8.3.3.3.1	EAP-IBAKE over PANA	50
8.3.3.3.2	EAP-TLS over EAP/PANA	54
8.3.3.4	TLS over TCP	55
8.3.3.4.1	Detailed procedures	55
8.3.3.5	Common Aspects of TLS/Certificates-Based M2M Service Bootstrap procedures	57
8.3.3.5.1	Overview	57
8.3.3.5.2	Bootstrapping credentials when Using Device Certificates	57
8.3.3.5.3	Architecture	57
8.3.3.5.4	MSBF Certificate Status Verification Methods	59
8.4	M2M Service Connection procedures	60
8.4.1	Overview	60
8.4.2	M2M Service Connection procedure based on EAP / PANA	61
8.4.3	M2M Service Connection procedure based on TLS-PSK	62
8.4.3.1	Overview	62
8.4.3.2	High Level Call Flow	62
8.4.4	M2M Service Connection procedure based on GBA	64
8.5	mId Security	66
9	M2M Resource Management and Procedures	66
9.1	Introduction	66
9.1.1	Usage of resources in a RESTful architecture	66
9.1.2	Definitions	68
9.2	Resource structure	68
9.2.1	Types of resources to be used in a SCL	68
9.2.1.1	SCLBase Resource	69
9.2.1.2	SCL Resource	69
9.2.1.3	Application Resource	69
9.2.1.4	AccessRight Resource	69
9.2.1.5	Container Resource	69
9.2.1.6	LocationContainer Resource	69
9.2.1.7	Group Resource	69
9.2.1.8	Subscription Resource	70
9.2.1.9	M2MPoC Resource	70
9.2.1.10	MgmtObj Resource	70
9.2.1.11	MgmtCmd Resource	70

9.2.1.12	AttachedDevices Resource.....	70
9.2.1.13	AttachedDevice Resource	70
9.2.1.14	Announced Resource	71
9.2.1.15	NotificationChannel Resource	71
9.2.1.16	Discovery Resource	71
9.2.1.17	Collection Resource	71
9.2.2	Common attributes.....	71
9.2.3	Tree structure modelling relationship of different resource types	73
9.2.3.1	Overview	73
9.2.3.2	Resource <sclBase>	73
9.2.3.3	Resource <scls>.....	76
9.2.3.4	Resource <scl>	77
9.2.3.5	Resource applications.....	82
9.2.3.6	Resource <application>.....	83
9.2.3.7	Resource <applicationAnnc>	85
9.2.3.8	Resource accessRights	86
9.2.3.9	Resource <accessRight>	87
9.2.3.10	Resource <accessRightAnnc>.....	88
9.2.3.11	Resource containers	89
9.2.3.12	Resource <container>	91
9.2.3.13	Resource <containerAnnc>	91
9.2.3.14	Resource <locationContainer>	92
9.2.3.15	Resource <locationContainerAnnc>	94
9.2.3.16	Resource contentInstances	95
9.2.3.17	Resource <contentInstance>	96
9.2.3.18	Resource groups.....	97
9.2.3.19	Resource <group>	98
9.2.3.20	Resource <groupAnnc>	99
9.2.3.21	Resource membersContent.....	100
9.2.3.22	Resource subscriptions.....	100
9.2.3.23	Resource <subscription>	101
9.2.3.24	Resource m2mPocs	102
9.2.3.25	Resource <m2mPoc>	103
9.2.3.26	Resource mgmtObjs	104
9.2.3.27	Resource <mgmtObj>.....	105
9.2.3.28	Resource <parameters>.....	108
9.2.3.29	Resource <mgmtCmd>.....	108
9.2.3.30	Resource execInstances.....	110
9.2.3.31	Resource <execInstance>	110
9.2.3.32	Resource attachedDevices.....	111
9.2.3.33	Resource <attachedDevice>.....	112
9.2.3.34	Resource notificationChannels.....	113
9.2.3.35	Resource <notificationChannel>.....	114
9.2.3.36	Resource discovery	114
9.2.3.37	Resource subcontainers.....	115
9.2.3.38	Resource sclAnnCs	116
9.2.3.39	Resource <sclAnnc>	116
9.3	Interface Procedures.....	118
9.3.1	General concept and procedures	118
9.3.1.1	General responses	118
9.3.1.2	General mechanisms	118
9.3.1.3	Accessing resources in SCLs	118
9.3.1.4	Client-2-server and server-2-server communication	121
9.3.1.5	Aggregation of requests to access remotely hosted resources by store-and-forward handling	126
9.3.1.5.1	General principle of store-and-forward handling for accessing remotely hosted resources	126
9.3.1.5.2	Request issuer indicates no TRPDT and no RCAT	127
9.3.1.5.3	Request issuer indicates TRPDT only	127
9.3.1.5.4	Request issuer indicates RCAT only	127
9.3.1.5.5	Request issuer indicates a combination of TRPDT and RCAT	128
9.3.1.5.6	Policies governing SAF handling	128
9.3.1.6	Scheduled polling requests and notifications	131
9.3.2	Procedure description	132

9.3.2.1	General	132
9.3.2.2	Logical sequence of procedures	132
9.3.2.3	Resource name allocation	132
9.3.2.4	Discovery of <i><sclBase></i>	133
9.3.2.5	SCL collection management	133
9.3.2.5.1	Introduction	133
9.3.2.5.2	Retrieve <i>scls</i>	133
9.3.2.5.3	Update <i>scls</i>	133
9.3.2.5.4	Subscribe/Un-Subscribe to <i>scls</i>	133
9.3.2.6	SCL management	133
9.3.2.6.1	Introduction	133
9.3.2.6.2	Create <i><scl></i> (Register SCL)	133
9.3.2.6.3	Retrieve <i><scl></i>	139
9.3.2.6.4	Update <i><scl></i>	140
9.3.2.6.5	Delete <i><scl></i> (De-Register SCL)	141
9.3.2.6.6	Subscribe/Un-Subscribe to <i><scl></i>	142
9.3.2.7	Applications collection management	142
9.3.2.7.1	Introduction	142
9.3.2.7.2	Retrieve applications	142
9.3.2.7.3	Update applications	142
9.3.2.7.4	Subscribe/Un-Subscribe to <i>applications</i>	142
9.3.2.8	Application management	142
9.3.2.8.1	Introduction	142
9.3.2.8.2	Create <i><application></i> (Register Application)	142
9.3.2.8.3	Retrieve <i><application></i>	144
9.3.2.8.4	Update <i><application></i>	144
9.3.2.8.5	Delete <i><application></i> (De-register Application)	145
9.3.2.8.6	Subscribe/Un-Subscribe to <i><application></i>	146
9.3.2.8.7	Create <i><applicationAnnc></i> (Announce/de-announce an <i><application></i>)	146
9.3.2.9	<i>accessRights</i> collection management	146
9.3.2.9.1	Introduction	146
9.3.2.9.2	Retrieve <i>accessRights</i>	147
9.3.2.9.3	Update <i>accessRights</i>	147
9.3.2.9.4	Subscribe/Un-Subscribe <i>accessRights</i>	147
9.3.2.10	Access Right management	147
9.3.2.10.1	Introduction	147
9.3.2.10.2	Create <i><accessRight></i>	147
9.3.2.10.3	Retrieve <i><accessRight></i>	148
9.3.2.10.4	Update <i><accessRight></i>	149
9.3.2.10.5	Delete <i><accessRight></i>	150
9.3.2.10.6	Subscribe/Un-subscribe to <i><accessRight></i>	151
9.3.2.10.7	Create <i><accessRightAnnc></i> (Announce/de-announce an <i><accessRight></i>)	151
9.3.2.11	Container Collection management	151
9.3.2.11.1	Introduction	151
9.3.2.11.2	Retrieve containers	152
9.3.2.11.3	Update containers	152
9.3.2.11.4	Subscribe/un-subscribe to <i>containers</i>	152
9.3.2.12	Container management	152
9.3.2.12.1	Introduction	152
9.3.2.12.2	Create <i><container></i>	152
9.3.2.12.3	Retrieve <i><container></i>	154
9.3.2.12.4	Update <i><container></i>	155
9.3.2.12.5	Delete <i><container></i>	156
9.3.2.12.6	Subscribe/Unsubscribe to <i><container></i>	157
9.3.2.12.7	Create <i><containerAnnc></i> (Announce/De-announce a <i><container></i>)	157
9.3.2.13	Location Container management	157
9.3.2.13.1	Introduction	157
9.3.2.13.2	Create <i><locationContainer></i>	158
9.3.2.13.3	Retrieve <i><locationContainer></i>	158
9.3.2.13.4	Update <i><locationContainer></i>	158
9.3.2.13.5	Delete <i><locationContainer></i>	158
9.3.2.13.6	Subscribe/Un-subscribe to <i><locationContainer></i>	158

9.3.2.13.7	Create <locationContainerAnnc> (Announce/De-announce a <locationContainer>)	158
9.3.2.14	Content Instances collection management	159
9.3.2.14.1	Introduction	159
9.3.2.14.2	Retrieve instances in <i>contentInstances</i>	159
9.3.2.14.3	Retrieve meta-data from <i>contentInstances</i>	160
9.3.2.14.4	Retrieve instances from <i>contentInstances</i> of <locationContainer> of type "application generated" matching filter criteria	161
9.3.2.14.5	Retrieve meta-data of instances in a <locationContainer> of type "application generated" matching filter criteria	161
9.3.2.14.6	Retrieve instances from <i>contentInstances</i> of <locationContainer> of type "location server based"	161
9.3.2.14.7	Retrieve meta-data from <contentInstances> of <locationContainer> matching of type "server generated" matching filter criteria	163
9.3.2.14.8	Subscribe/Unsubscribe to a <i>contentInstances</i> in a <container>	163
9.3.2.14.9	Subscribe/Unsubscribe to <i>contentInstances</i> in a <locationContainer>	163
9.3.2.15	Content Instance management	163
9.3.2.15.1	Introduction	163
9.3.2.15.2	Create <contentInstance> in a <container>	163
9.3.2.15.3	Create <contentInstance> in a <locationContainer>	164
9.3.2.15.4	Retrieve <contentInstance> from a <container>	165
9.3.2.15.5	Retrieve <contentInstance> from a <locationContainer>	165
9.3.2.15.6	Delete <contentInstance>	165
9.3.2.16	Group collection management	166
9.3.2.16.1	Introduction	166
9.3.2.16.2	Retrieve <i>groups</i>	166
9.3.2.16.3	Update <i>groups</i>	166
9.3.2.16.4	Subscribe/Un-Subscribe <i>groups</i>	166
9.3.2.17	Group management	167
9.3.2.17.1	Introduction	167
9.3.2.17.2	Create <group>	167
9.3.2.17.3	Retrieve <group>	168
9.3.2.17.4	Update <group>	168
9.3.2.17.5	Delete <group>	169
9.3.2.17.6	Subscribe/Un-subscribe to <group>	170
9.3.2.17.7	Create <groupAnnc> (Announce/de-announce a <group>)	170
9.3.2.17.8	Verify group membership	170
9.3.2.17.9	Add/Delete a specific member to/from a group	171
9.3.2.17.10	Retrieve all members	171
9.3.2.17.11	Delete all members	171
9.3.2.17.12	Create <i>membersContent</i>	171
9.3.2.17.13	Retrieve <i>membersContent</i>	174
9.3.2.17.14	Update <i>membersContent</i>	174
9.3.2.17.15	Delete <i>membersContent</i>	175
9.3.2.17.16	Subscribe/Un-Subscribe <i>membersContent</i>	176
9.3.2.17.17	Aggregate the notifications from subscribed <i>membersContent</i>	176
9.3.2.18	Subscriptions collection management	178
9.3.2.18.1	Introduction	178
9.3.2.18.2	Retrieve <i>subscriptions</i>	178
9.3.2.18.3	Update <i>subscriptions</i>	178
9.3.2.18.4	Subscribe/Un-Subscribe to <i>subscriptions</i>	178
9.3.2.19	Subscription management	178
9.3.2.19.1	Introduction	178
9.3.2.19.2	Create <subscription> (Subscribe for modifications to a resource)	178
9.3.2.19.3	Update <subscription>	180
9.3.2.19.4	Retrieve <subscription>	180
9.3.2.19.5	Delete <subscription> (Unsubscribe)	181
9.3.2.19.6	Notification	182
9.3.2.19.7	Deletion of the Subscribed-to Resource	186
9.3.2.20	M2M Pocs Collection management	187
9.3.2.20.1	Introduction	187
9.3.2.20.2	Retrieve <i>m2mPocs</i>	187
9.3.2.20.3	Update <i>m2mPocs</i>	187