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Machine-to-Machine communications (M2M);
M2M service requirements

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Machine-to-Machine communications (M2M).

Introduction

Machine-to-Machine (M2M) communications is the communication between two or more entities that do not necessarily need any direct human intervention. M2M services intend to automate decision and communication processes.

The M2M service requirements detailed in the present document enable consistent, cost-effective, communication for wide-range ubiquitous applications. Examples of such applications include: fleet management, smart metering, home automation, e-health, etc.

The present document, together with the architecture specification, TS 102 690 [i.1], forms the basis for the M2M communications detailed technical specifications.

The present document specifies general and functional requirements for M2M communication services.

1 Scope

The present document specifies the M2M service requirements aiming at an efficient end-to-end delivery of M2M services.

It contains the following clauses:

- **General requirements** - describes communications features necessary for the correct establishment of M2M communications.
- **Management** - specifies requirements related to the management modes (malfunction detection, configuration, accounting, etc.).
- **Functional requirements for M2M services** - describes functionalities-related requirements for M2M (data collection & reporting, remote control operations, etc.).
- **Security** - covers the requirements for M2M device authentication, data integrity, privacy, etc.
- **Naming, numbering and addressing** - provides the requirements relating to naming, numbering and addressing schemes specific to M2M.

The M2M requirements in the present document are influenced by the following use cases:

- Smart meter use cases as described in TR 102 691 [i.2].
- eHealth use cases as described in TR 102 732 [i.3].
- Track and Trace use cases as described in annex B.
- Monitoring use cases as described in annex B.
- Transaction use cases as described in annex B.
- Control use cases as described in annex B.
- Home Automation use cases as described in annex B.
- City automation use cases as described in TR 102 897 [i.4].
- Connected consumer used cases as described in TR 102 875 [i.5].
- Automotive use cases as described in TR 102 898 [i.6].
- Smart Grid use cases as described in TR 102 935 [i.10].

2 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.

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

2.1 Normative references

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

Not applicable.

2.2 Informative references

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] ETSI TS 102 690: "Machine-to-Machine communications (M2M); Functional architecture".

[i.2] ETSI TR 102 691: "Machine-to-Machine communications (M2M); Smart Metering Use Cases".

[i.3] ETSI TR 102 732: "Machine to Machine Communications (M2M); Use cases of M2M applications for eHealth".

[i.4] ETSI TR 102 897: "Machine to Machine Communications (M2M); Use cases of M2M applications for City Automation".

[i.5] ETSI TR 102 875: "Access, Terminals, Transmission and Multiplexing (ATTM); Study of European requirements for Virtual Noise for ADSL2, ADSL2plus and VDSL2".

[i.6] ETSI TR 102 898: "Machine to Machine Communications (M2M); Use cases of Automotive Applications in M2M capable networks".

[i.7] ISO 16750: "Road vehicles -- Environmental conditions and testing for electrical and electronic equipment".

[i.8] ETSI TS 102 412: "Smart Cards; Smart Card Platform Requirements Stage 1 (Release 8)".

[i.9] ETSI TR 102 725: "Machine to Machine Communications (M2M) Definitions".

[i.10] ETSI TR 102 935: "Machine-to-Machine communications (M2M); Applicability of M2M architecture to Smart Grid Networks; Impact of Smart Grids on M2M platform".

3 Abbreviations

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

AEC	Automotive Electronics Council
CO	Connected Object
CPE	Customer Premises Equipment
CPU	Central Processing Unit
EPOS	Electronic Point of Sale
FW	Firmware
HLR	Home Location Register
HLSA	High-Level M2M System architecture
HSS	Home Subscriber Server
HW	Hardware
IMSI	International Mobile Subscriber Identity
ITS	Intelligent Transport System
M2M	Machine-to-Machine (communication)
MNO	Mobile Network Operator
MS	Mobile System
MVNO	Mobile Virtual Network Operator
NAT	Network Address Translator
NFC	Near Field Communication
OAM	Over-The-Air Management
PLC	Power Line Communication

QoS	Quality of Service
RFID	Radio Frequency IDentification
SLA	Service Level Agreement
SW	Software
TrE	Trusted Environment
UICC	Universal Integrated Circuit Card
USSD	Unstructured Supplementary Service Data
WAN	Wide Area Network
WLAN	Wireless Local Area Network
WSN	Wireless Sensor Networks

4 General requirements

General requirements specified below are for the M2M System in general, meaning that not all particular M2M systems or components of these systems need to implement every requirement.

4.1 M2M Application communication principles

The M2M System shall be able to allow communication between M2M Applications in the Network Domain, and the M2M Device Domain, by using multiple communication meansbased on IP Access.

Also a Connected Object may be able to communicate in a peer-to-peer manner with any other Connected Object.

The M2M System should abstract the underlying network structure including any network addressing mechanism used, e.g. in case of an IP based network the session establishment shall be possible when IP static or dynamic addressing are used.

NOTE: Abstraction (e.g. operational environment and topology) of the network can reduce the effort in application development for varying scenarios.

4.2 Message Delivery for sleeping devices

The M2M System shall be able to manage communication towards a sleeping device.

4.3 Void

4.4 Message transmission scheduling

The M2M System shall be able to manage the scheduling of network access and of messaging.

The M2M System shall be aware of the scheduling delay tolerance of the M2M Application.

4.5 Message communication path selection

Assuming multiple paths are available, the M2M System shall be able to select communication paths, based on e.g. policies or rely on routing mechanisms in case of transmission failures.

4.6 Communication with devices behind a M2M gateway

The M2M System should be able to communicate with Devices behind a M2M gateway.

4.7 Communication failure notification

M2M Applications, requesting reliable delivery of a message, shall be notified of any failures to deliver the message.

4.8 Scalability

The M2M System shall be scalable in terms of number of Connected Objects.

4.9 Abstraction of technologies heterogeneity

The M2M Gateway may be capable of interfacing to various M2M Area Network technologies.

4.10 M2M Service Capabilities discovery and registration

The M2M System shall support mechanisms to allow M2M Applications to discover M2M Service Capabilities offered to them.

Additionally the M2M Device and M2M Gateway shall support mechanisms to allow the registration of its M2M Service Capabilities to the M2M system.

4.11 M2M Trusted Application

The M2M Core may handle service request responses for trusted M2M Applications by allowing streamlined authentication procedures for these applications.

The M2M system may support trusted applications, that are applications pre-validated by the M2M Core.

4.12 Mobility

If the underlying network supports seamless mobility and roaming, the M2M System shall be able to use such mechanisms.

4.13 Communications integrity

The M2M System shall be able to support mechanisms to assure communications integrity for M2M services.

4.14 Device/Gateway integrity check

The M2M System may support M2M Device and M2M Gateway Integrity Validation [i.9].

4.15 Continuous connectivity

The M2M System shall support continuous connectivity, for M2M applications requesting the same M2M service on a regular and continuous basis. This continuous connectivity may be de-activated upon request of the Application or by an internal mechanism in the M2M Core.

4.16 Confirm

The M2M System may support mechanisms to confirm messages.

The M2M System shall support the delivery of the confirmation in a time that is configurable e.g. 1 s.

4.17 Void

4.18 Logging

Messaging and transactions requiring non-repudiation shall be capable of being logged. Important events (e.g. received information from the M2M Device or M2M Gateway is faulty, unsuccessful installation attempt from the M2M Device or M2M Gateway, service not operating, etc.) may be logged together with diagnostic information. Logs shall be retrievable upon request.

4.19 Void

4.20 Time Stamp

The M2M System shall be able to support accurate and secure and trusted time stamping. M2M Devices and M2M Gateways may support accurate and secure and trusted time stamping.

4.21 Device/Gateway failure robustness

After a non-destructive failure, e.g. after a power supply outage, a M2M Device or Gateway should immediately return in a full operating state autonomously, after performing the appropriate initialization e.g. Integrity Validation [i.9] if supported.

4.22 Void

4.23 Operator telco capabilities exposure

The M2M interface to the external M2M applications shall enable the exposition of telco operator capabilities (e.g. SMS, USSD, localization, subscription configuration, authentication (e.g. Generic Bootstrapping Architecture), etc.). The service platform shall be able to provide access to non-M2M resources abstracted as M2M resources to provide to the applications a consistent use of the M2M capabilities.(e.g. to send an SMS to common cellular phones).

4.24 Location reporting support

The M2M System shall be able to report M2M Device/Gateway location to M2M applications when this information is available. The location information of the M2M device/M2M gateway may be determined by the underlying network procedures (taking into account relevant privacy/security settings for transfer of such information), by application-level information reported from the M2M device/gateway application, or a combination of both.

4.25 Support of multiple M2M Applications

The M2M System shall support a mechanism to manage a multiple M2M Applications and to provide a mechanism to interact between multiple M2M Applications. This mechanism shall support as following:

- Maintenance of the list of registered M2M Applications.
- Maintenance of registration information of M2M Applications.
- Notification of newly registered M2M Applications towards the subscribing M2M Applications authenticated and authorized for the information exchange.