

# ETSI TS 118 106 V1.1.0 (2016-03)



## **oneM2M; Management Enablement (BBF) (oneM2M TS-0006 version 1.1.4 Release 1)**

*iTeh STANDARDS PREVIEW  
(standards.iteh.ai)  
Full standards list: <https://standards.iteh.ai/catalog/standards/sist/c2ad8945-db35-4697-a22e-63b05a76d32a/etsi-ts-118-106-v1.1.0-2016-03>*



---

ReferenceRTS/oneM2M-000006v110

---

Keywords

---

IoT, 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

---

**Important notice**

---

The present document can be downloaded from:  
<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (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  
<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:  
<https://portal.etsi.org/People/CommitteeSupportStaff.aspx>

---

**Copyright Notification**

---

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.  
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2016.  
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 .....	5
Foreword.....	5
1. Scope .....	6
2 References .....	6
2.1 Normative references .....	6
2.2 Informative references.....	6
3 Definitions, abbreviations and acronyms .....	6
3.1 Definitions.....	6
3.2 Abbreviations .....	7
3.3 Acronyms .....	7
4 Conventions.....	7
5 Mapping of basic data types .....	7
6 Mapping of identifiers .....	8
6.0 Introduction .....	8
6.1 Mapping of Device identifiers to the Node Resource .....	8
6.2 Identifier of an object instance .....	8
7 Mapping of resources .....	9
7.0 Introduction .....	9
7.1 General mapping assumptions.....	9
7.1.0 General.....	9
7.1.1 Mapping of Device identifiers .....	9
7.1.2 Mapping of Embedded Devices.....	9
7.2 Resource [deviceInfo] .....	9
7.3 Resource [memory] .....	10
7.4 Resource [battery] .....	10
7.5 Resource [areaNwkInfo] .....	11
7.6 Resource [areaNwkDeviceInfo] .....	11
7.7 Resource [eventLog] .....	11
7.8 Resource [deviceCapability] .....	12
7.9 Resource [firmware] .....	13
7.10 Resource [software].....	14
7.11 Resource [reboot] .....	15
7.12 Resource [cmdhPolicy] .....	15
7.12.0 Introduction.....	15
7.12.1 Resource [activeCmdhPolicy] .....	15
7.12.2 Resource [cmdhDefaults] .....	16
7.12.3 Resource [cmdhDefEcValue] .....	16
7.12.4 Resource [cmdhEcDefParamValues].....	17
7.12.5 Resource [cmdhLimits].....	17
7.12.6 Resource [cmdhNetworkAccessRules].....	18
7.12.7 Resource [cmdhNwAccessRule] .....	18
7.12.8 Resource [cmdhBuffer].....	18
7.13 Resource Type <mgmtCmd> .....	19
7.14 Resource Type <execInstance>.....	19
8 Mapping of procedures for management.....	19
8.0 Introduction .....	19
8.1 Resource Type <mgmtObj> primitive mappings .....	19
8.1.0 Introduction.....	19
8.1.1 Alias-Based Addressing Mechanism .....	20
8.1.2 Create primitive mapping .....	20
8.1.2.0 Introduction .....	20
8.1.2.1 M2M Service Layer Resource Instance Identifier mapping.....	20
8.1.3 Delete primitive mapping .....	20

8.1.3.1	Delete primitive mapping for deletion of Object Instances.....	20
8.1.3.2	Delete primitive mapping for software un-install operation .....	20
8.1.4	Update primitive mapping .....	22
8.1.4.1	Update primitive mapping for Parameter modifications .....	22
8.1.4.2	Update primitive mapping for upload file transfer operations .....	22
8.1.4.3	Update primitive mapping for download file transfer operations .....	23
8.1.4.4	Update primitive mapping for reboot operation.....	25
8.1.4.5	Update primitive mapping for factory reset operation .....	25
8.1.4.6	Update primitive mapping for software install operation.....	25
8.1.5	Retrieve primitive mapping .....	27
8.1.6	Notify primitive mapping .....	27
8.1.6.0	Introduction.....	27
8.1.6.1	Procedure for subscribed Resource attributes. ....	27
8.1.6.2	Notification primitive mapping.....	28
8.2	<mgmtCmd> and <execInstance> resource primitive mappings .....	28
8.2.1	Update (Execute) primitive for the <mgmtCmd> resource .....	28
8.2.1.0	Introduction.....	28
8.2.1.1	Execute File Download.....	29
8.2.1.2	Execute File Upload Operations .....	29
8.2.1.3	Report Results using TransferComplete RPC .....	29
8.2.1.4	Execute Software Operations with ChangeDUState RPC.....	30
8.2.1.5	Report Results with ChangeDUStateComplete RPC .....	31
8.2.1.6	Execute Reboot operation .....	32
8.2.1.7	Execute Factory Reset operation.....	32
8.2.2	Delete <mgmtCmd> resource primitive mapping .....	32
8.2.3	Update (Cancel) <execInstance> primitive mapping.....	33
8.2.4	Delete <execInstance> primitive mapping .....	34
9	Server Interactions.....	34
9.0	Introduction .....	34
9.1	Communication Session Establishment.....	34
9.1.1	IN-CSE to ACS Communication Session Establishment .....	34
9.1.2	ACS to IN-CSE Communication Session Establishment .....	35
9.1.3	ACS and IN-CSE Communication Session Requirements .....	35
9.2	Processing of Requests and Responses .....	35
9.2.1	Request and Notification Formatting .....	35
9.2.2	ACS Request Processing Requirements .....	35
9.2.3	ACS Notification Processing Requirements .....	35
9.3	Discovery and Synchronization of Resources .....	36
9.4	Access Management.....	36
9.4.1	Access Management Requirements.....	36
10	New Management Technology Specific Resources .....	36
History	.....	37

---

## Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org/>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

---

## Foreword

This Technical Specification (TS) has been produced by ETSI Partnership Project oneM2M (oneM2M).

**iTeh STANDARD PREVIEW**  
(standards.iteh.ai)  
Full standard:  
<https://standards.iteh.ai/catalog/standards/sist/e2ad8945-db35-4697-a22e-63b05a76d32a/etsi-ts-118-106-v1.1.0-2016-03>

---

# 1. Scope

The present document describes the protocol mappings between the management Resources for oneM2M and the BBF TR-181i2 Data Model [6].

---

## 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.

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 118 101: "oneM2M; Functional Architecture (oneM2M TS-0001)".
- [2] ETSI TS 118 104: "oneM2M; Service Layer Core Protocol Specification (oneM2M TS-0004)".
- [3] ETSI TS 118 111: "oneM2M; Common Terminology (oneM2M TS-0011)".
- [4] BroadBand Forum TR-069: "CPE WAN Management Protocol" Issue: 1 Amendment 5, November 2013.
- [5] BroadBand Forum TR-106: "Data Model Template for TR-069-Enabled Devices", Issue 1, Amendment 7, September 2013.
- [6] BroadBand Forum TR-181: "Device Data Model for TR-069", Issue 2 Amendment 8, September 2014.
- [7] BroadBand Forum TR-131: "ACS Northbound Interface Requirements", Issue: 1, November 2009.

### 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] oneM2M Drafting Rules.

NOTE: Available at <http://www.onem2m.org/images/files/oneM2M-Drafting-Rules.pdf>.

---

## 3 Definitions, abbreviations and acronyms

### 3.1 Definitions

For the purposes of the present document, the terms and definitions given in ETSI TS 118 111 [3] and the following apply:

**CPE Proxier:** CPE that is capable of proxying the communication between an ACS and a Proxied Device as defined in BBF TR-069 [4]

## 3.2 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI TS 118 111 [3] and the following apply:

ACS	Auto-Configuration Server
ADN	Application Dedicated Node
AE	Application Entity
ASN	Application Service Node
BBF	Broadband Forum
CMDH	Communication Management and Delivery Handling
CPE	Customer Premise Equipment
CSE	Common Services Entity
CWMP	CPE WAN Management Protocol
DM	Device Management
DU	Deployment Unit
IN-CSE	CSE which resides in the Infrastructure Node
LAN	Local Area Network
MN	Middle Node
OUI	Organizationally Unique Identifier
PC	Product Class
RPC	Remote Procedure Call
SN	Serial Number
UPA	Universal Powerline Association
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
USB	Universal Serial Bus
UUID	Universal Unique Identifier
XML	Extensible Markup Language

## 3.3 Acronyms

For the purposes of the present document, the acronyms given in ETSI TS 118 111 [3] apply.

## 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 Mapping of basic data types

BBF TR-106 [5] specifies the object structure supported by TR-069 enabled devices and specifies the structural requirements for the data hierarchy. This clause includes the mapping attribute data types to BBF TR-181 [6] parameters which follows the conventions of section 3 of BBF TR-106 [5] and data types described in table 4 of BBF TR-106 [5].

**Table 5-1: Data Type Mapping**

oneM2M Data Types	Mapping to data types in BBF TR-106 [5]	Conversion Notes
xs:boolean	boolean	
xs:string	string	Mapping is constrained to the size of the string
xs:unsignedInt	unsignedInt	
xs:unsignedLong	unsignedLong	
xs:integer	long	Mapping is constrained to the size of the long data type
Xs:positiveInteger	unsignedLong	Mapping is constrained to a lower limit of 1 and the size of the unsignedLong data type
Xs:nonNegativeInteger	unsignedLong	Mapping is constrained the size of the unsignedLong data type
Comma separated Lists	Comma separated Lists	Data structure is represented by comma separated list as described in section 3.2.3 of BBF TR-106 [5]

In some instances the conversion of the contents between data types will cause an error to occur (e.g. xs:integer to long). When an error occurs in the conversion of a data type, the STATUS\_BAD\_REQUEST response status code.

## 6 Mapping of identifiers

### 6.0 Introduction

The BBF TR-069 [4] specification defines three (3) types of devices, known as CPEs, that are capable of being managed from the perspective of the TR-069 agent:

- CPE that hosts the TR-069 agent: section A.3.3.1 Inform of BBF TR-069 [4] defines the required fields for a CPE to be identified. These fields include the OUI and Serial Number of the CPE assigned by the CPE manufacturer. Optionally the manufacturer may assign a Product Class to the CPE. The format of the identifier is as follows: OUI-[PC-]SN.
- Virtual Device: This type of device is addressed as a CPE. The Virtual Device has its own OUI-[PC-]SN as represented by the CPE Proxier. The CPE Proxier emulates a CWMP agent for each Virtual Device.
- Embedded Device: This type of device is addressed as one or more objects within the data model of the CPE that hosts the TR-069 agent.

### 6.1 Mapping of Device identifiers to the Node Resource

Node Resources are identified for each instance of an ADN, ASN and MN node and are identified using the M2M Node Identifier (M2M-Node-ID) defined in ETSI TS 118 101 [1].

CPE Device identifiers shall map to the nodeID attribute of the <node> resource. The CPE Device identifiers are obtained from the contents of the following attributes:

- Device.DeviceInfo.ManufacturerOUI
- Device.DeviceInfo.ProductClass
- Device.DeviceInfo.SerialNumber

Virtual Device identifiers shall map to the nodeID attribute of the <node> resource. The Virtual Device identifiers are obtained from the CPE Proxier using the contents of the attributes:

- Device.ManagementServer.VirtualDevice.{i}.ManufacturerOUI
- Device.ManagementServer.VirtualDevice.{i}.ProductClass
- Device.ManagementServer.VirtualDevice.{i}.SerialNumber

Embedded Device identifiers shall map to the nodeID attribute of the <node> resource. The Embedded Device identifiers are obtained using the containing CPE Device or Virtual Device identifiers along with the contents of the attributes of the:

- Device.ManagementServer.EmbeddedDevice.{i}.ControllerID
- Device.ManagementServer.EmbeddedDevice.{i}.ProxiedDeviceID

### 6.2 Identifier of an object instance

The BBF TR-069 [4] specification permits objects to have multiple object instances where each object instance is contained within the objectPath attribute of the Resource within the context of the Resource's objectId as defined in clause 7.1.



In order to allow the AE or CSE that originated the request that manipulates a Resource to easily align the M2M Service Layer with the Resource's external technology identifier, the value of the object instance "{i}" should be a part of the identifier of the Resource in the M2M Service Layer where possible. For example if the [areaNetwork] resource has an object instance identifier of "Device.X\_oneM2M\_org\_CSE.1.M2MareaNetworkDevice.[foo]" then the M2M Service Layer Resource should be identified using the object instance of the underlying technology (e.g. "/foo" for the Resource areaNetwork).

---

## 7 Mapping of resources

### 7.0 Introduction

This clause contains all information on how to map management resources from ETSI TS 118 104 [2] to managed objects and parameters as defined in the BBF TR-181 [6] data model or the Remote Procedure Calls (RPCs) in BBF TR-069 [4].

### 7.1 General mapping assumptions

#### 7.1.0 General

BBF TR-069 [4] specifies a protocol for communication between a CPE (Customer Premises Equipment) and an ACS (Auto-Configuration Server). Any TR-069 enabled device has to follow the data model as described in the BBF TR-106 [5] and BBF TR-181 [6] as well as RPCs described in BBF TR-069 [4].

As BBF TR-181 [6] is the model that the Resources are mapped, all Resources shall have the objects of the BBF TR-181 [6] namespace (e.g. "urn:broadband-forum-org:tr-181-2-7-0").

#### 7.1.1 Mapping of Device identifiers

The Device identifiers for CPEs are mapped to the Resource Type [deviceInfo].

For CPE and Virtual Devices map their Device Identifiers (OUI-[PC-]SN) to the manufacturer, deviceType and deviceLabel attributes of the Resource [deviceInfo].

For Embedded Devices, the ControllerID and ProxiedDeviceID parameters of the Device.ManagementServer.EmbeddedDevice.{i} object instance are mapped to the deviceLabel attribute of the Resource [deviceInfo] as a comma separated list: "Device.ManagementServer.EmbeddedDevice.{i}.ControllerID, Device.ManagementServer.EmbeddedDevice.{i}.ProxiedDeviceID".

#### 7.1.2 Mapping of Embedded Devices

The BBF TR-181 [6] specification does not provide a mechanism where Embedded Devices provide information related to the Device.DeviceInfo objects and sub-objects. Instead the BBF TR-181 [6] provides this information in a manner that is reliant on the Embedded Device's underlying technology (e.g. ZigBee®, UpnP®).

As such the mapping of the [memory] and [battery] Resources are implementation specific for each underlying technology and is outside the scope of the present document.

NOTE : ZigBee® and UpnP® are examples of a suitable products available commercially. This information is given for the convenience of users of the present document and does not constitute an endorsement by ETSI of these products.

## 7.2 Resource [deviceInfo]

The Resource [deviceInfo] is a read-only Resource that shall map to the Device.DeviceInfo object of BBF TR-181 [6] for CPE and Virtual Devices.

The information shall be retrieved using the GetParameterValues RPC of BBF TR-069 [4].

NOTE: The SerialNumber, ModelNumber, ProductClass attributes for a Virtual device are the same values as the Device.ManagementServer.VirtualDevice.{i} object in the CPE Proxier.

**Table 7.2-1: Resource [deviceInfo] for CPE and Virtual Devices**

Attribute Name of [deviceInfo]	TR-181 Parameter
deviceLabel	Device.DeviceInfo.SerialNumber
manufacturer	Device.DeviceInfo.Manufacturer
model	Device.DeviceInfo.ModelNumber
deviceType	Device.DeviceInfo.ProductClass
fwVersion	Device.DeviceInfo.SoftwareVersion if the device supports only 1 software version. If the device support multiple software versions this shall map to Device.DeviceInfo.AdditionalSoftwareVersion
swVersion	Device.DeviceInfo.SoftwareVersion
hwVersion	Device.DeviceInfo.HardwareVersion

**Table 7.2-2: Resource [deviceInfo] for Embedded Devices**

Attribute Name of [deviceInfo]	TR-181 Parameter
deviceLabel	Comma separated list: Device.ManagementServer.EmbeddedDevice.{i}.ControllerID, Device.ManagementServer.EmbeddedDevice.{i}.ProxiedDeviceID
manufacturer	No mapping available
model	No mapping available
deviceType	No mapping available
fwVersion	No mapping available
swVersion	No mapping available
hwVersion	No mapping available

### 7.3 Resource [memory]

The Resource [memory] is a read-only Resource that shall map to the Device.DeviceInfo.MemoryStatus object of BBF TR-181 [6] for CPE and Virtual Devices.

The information shall be retrieved using the GetParameterValues RPC of BBF TR-069 [4].

Attempts to modify the attributes of the memory Resource causes an error code "operation unsupported" to be returned.

**Table 7.3-1: Resource [memory]**

Attribute Name of [memory]	TR-181 Parameter
memAvailable	Device.DeviceInfo.MemoryStatus.Free
memTotal	Device.DeviceInfo.MemoryStatus.Total

### 7.4 Resource [battery]

The Resource [battery] is a read-only Resource that shall map to an instance of Device.DeviceInfo.X\_oneM2M\_org\_BatteryStatus.Battery.{i} object for CPE and Virtual Devices.

The information shall be retrieved using the GetParameterValues RPC of BBF TR-069 [4].

**Table 7.4-1: Resource [battery]**

Attribute Name of [battery]	TR-181 Parameter
batteryLevel	Device.DeviceInfo.X_oneM2M_org_BatteryStatus.Battery.{i}.Level
batteryStatus	Device.DeviceInfo.X_oneM2M_org_BatteryStatus.Battery.{i}.Status

## 7.5 Resource [areaNwkInfo]

The Resource [areaNwkInfo] is a multi-instance Resource where each instance of the Resource shall map to an instance of Device.X\_oneM2M\_org\_CSE.{i}.M2MareaNetwork.{i} object.

As the Resource [areaNwkInfo] is a multi-instance Resource, the M2MareaNetwork object is a multi-object instance that can be created and deleted.

The M2MareaNetwork instance shall be created using the Add Object RPC of BBF TR-069 [4].

The M2MareaNetwork instance shall be deleted using the Delete Object RPC of BBF TR-069 [4].

The information of an M2MareaNetwork shall be retrieved using the GetParameterValues RPC of BBF TR-069 [4].

The information of an M2MareaNetwork shall be modified using the SetParameterValues RPC of BBF TR-069 [4].

**Table 7.5-1: Resource [areaNwkInfo]**

Attribute Name of [areaNwkInfo]	X_oneM2M_org Parameter
areaNwkType	Device.X_oneM2M_org_CSE.{i}.M2MareaNetwork.{i}.Type
listOfDevices	Device.X_oneM2M_org_CSE.{i}.M2MareaNetwork.{i}.ListOfDevices

## 7.6 Resource [areaNwkDeviceInfo]

The Resource [areaNwkDeviceInfo] is a multi-instance Resource where each instance of the Resource shall map to an instance of Device.X\_oneM2M\_org\_CSE.{i}.AreaNetworkDevice.{i} object.

As the Resource [areaNwkDeviceInfo] is a multi-instance Resource, the AreaNetworkDevice object is a multi-object instance that can be created and deleted.

Instances of the Resource [areaNwkDeviceInfo] are referenced in the listOfDevices attribute of the associated Resource [areaNwkInfo].

The M2MareaNetworkDevice instance shall be created using the Add Object RPC of BBF TR-069 [4].

The M2MareaNetworkDevice instance shall be deleted using the Delete Object RPC of BBF TR-069 [4].

The information of an M2MareaNetworkDevice shall be retrieved using the GetParameterValues RPC of BBF TR-069 [4].

The information of an M2MareaNetworkDevice shall be modified using the SetParameterValues RPC of BBF TR-069 [4].

**Table 7.6-1: Resource [areaNwkDeviceInfo]**

Attribute Name of [areaNwkDeviceInfo]	X_oneM2M_org Parameter
devId	Device.X_oneM2M_org_CSE.{i}.M2MareaNetworkDevice.{i}.Host
devType	Device.X_oneM2M_org_CSE.{i}.M2MareaNetworkDevice.{i}.Type
areaNwkId	Reference to Device.X_oneM2M_org_CSE.{i}.M2MareaNetworkDevice.{i}.M2MareaNetwork
sleepInterval	Device.X_oneM2M_org_CSE.{i}.M2MareaNetworkDevice.{i}.SleepInterval
sleepDuration	Device.X_oneM2M_org_CSE.{i}.M2MareaNetworkDevice.{i}.SleepDuration
status	Device.X_oneM2M_org_CSE.{i}.M2MareaNetworkDevice.{i}.Status
listOfNeighbors	Device.X_oneM2M_org_CSE.{i}.M2MareaNetworkDevice.{i}.Neighbors

## 7.7 Resource [eventLog]

The Resource [eventLog] is a multi-instance Resource where each instance of the Resource shall map to an instance of Device.DeviceInfo.X\_oneM2M\_org\_Diagnostics.EventLog.{i} object.

The EventLog instance shall be created using the Add Object RPC of BBF TR-069 [4].