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| **oneM2M**  **Technical Specification** | |
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| Abstract: | This document specifies the M2M Services provided by the M2M Services Platform, the integration and interworking of the M2M Services functional architecture of the oneM2M Services Platform and informatively illustrates the use of the M2M Services within the context of complex business services. |

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About oneM2M

The purpose and goal of oneM2M is to develop technical specifications which address the need for a common M2M Service Layer that can be readily embedded within various hardware and software, and relied upon to connect the myriad of devices in the field with M2M application servers worldwide.

More information about oneM2M may be found at: http//www.oneM2M.org

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# 1 Scope

This specification describes the M2M Services provided by the oneM2M Services Platform, the integration and interworking of the M2M Services functional architecture of the oneM2M Services Platform and informatively illustrates the use of the M2M Services within the context of complex business services.

# 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 referenced document (including any amendments) applies.

## 2.1 Normative references

The following referenced documents are necessary, partially or totally, for the application of the present document. Their use in the context of this TS is specified by the normative statements that are referring back to this clause.

[1] oneM2M TS-0002: “oneM2M Requirements; oneM2M-TS-0002-V-0.6.2”

[2] oneM2M TS-0001: “oneM2M Functional Architecture”

## 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] oneM2M Drafting Rules (<http://member.onem2m.org/Static_pages/Others/Rules_Pages/oneM2M-Drafting-Rules-V1_0.doc>)

[i.2] W3C [WD-wsdl20-patterns-20040326](http://www.w3.org/TR/2004/WD-wsdl20-patterns-20040326):”Web Services Description Language (WSDL) Version 2.0 Part 2: Message Exchange Patterns.”

[i.3] OASIS [soa-rm](http://docs.oasis-open.org/soa-rm/v1.0/soa-rm.pdf): "Reference Model for Service Oriented Architecture 1.0"

# 3 Definitions, symbols, abbreviations and acronyms

Delete from the above heading the word(s) which is/are not applicable.

## 3.1 Definitions

For the purposes of the present document, the terms and definitions apply:

**M2M Service:** A Service that creates added-value to the providing M2M Service Platform and is consumed by one or more Supporting Services. The Data Exchange Service is an example of a M2M Service.

**M2M Service Registration:** When a Service is deployed into a SOA environment; the SOA environment’s Service Registry is updated so that the Service can be accessed by other Services.

**Service**[i.3]**:** A mechanism to enable access to one or more Service Capabilities, where the access is provided using a prescribed interface and is exercised consistent with constraints and policies as specified by the service description.

**Service Capability**[i.3]**:** A real-world effect that a service provider is able to provide to a service consumer.

**Service Cluster:** A collection of distributed and related Services that are gathered to solve a business problem.

**Service Component:** An entity of the M2M Services Architecture which may contain one or more M2M Services.

**Service Execution Environment:** An Execution Environment is a logical entity that represents an environment capable of running Services.

**Service Exposure Component:** A Service Component that provides an enforcement point for specific oneM2M Reference Points (e.g. Mca, Mcn, Mcc’).

**Service Registry:** A component of an underlying SOA environment that maintains information about Services and provides facilities to publish and discover Services to entities that would utilize the Service.

**Supporting Service:** A Service that creates added-value to an organization and is relevant to the business process of the organization that consumes Services from the M2M Services Platform. Business Services are typically complex, orchestrated Services which consume M2M Services among other Services. A Device Onboarding Service is an example of a Supporting Service.

Editor’s Note: Need definition of M2M Service Capability; Something like: **M2M Service Capability:** A Service Capability that is identified within the M2M System Platform.

## 3.2 Symbols

For the purposes of the present document, the symbols apply:

<symbol> <Explanation>

<2nd symbol> <2nd Explanation>

<3rd symbol> <3rd Explanation>

## 3.3 Abbreviations

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

AE Application Entity

BSS Business Support System

CSE Common Service Entity

ESB Enterprise Service Bus

MEP Message Exchange Pattern

M2M Machine-to-Machine

M2M-Serv-Cap-ID M2M Service Capability Identifier

NMS Network Management System

OSS Operational Support System

SEE Service Execution Environment

## 3.4 Acronyms

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

# 4 Conventions

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

# 5 M2M Services Architecture

This clause describes the architecture the M2M Services within the context of the M2M Services Platform.

## 5.1 Introduction

The architecture of the M2M Service Platform as defined in the oneM2M Functional Architecture [2] includes an entity described as the Common Service Entity (CSE). The CSE comprises a set of service functions that are common to the M2M environment and are exposed through the Mca and Mcc’ Reference Points. These Reference Points are described in the oneM2M Functional Architecture [2]. The M2M Service Architecture described in this specification is primarily suitable for the Infrastructure Domain where the CSE is viewed as a set of Service Components.

The M2M Service Architecture augments the oneM2M Functional Architecture by specifying M2M Services provided to M2M Application and M2M Service Providers.

These M2M Services are consumed by:

* AEs across the Mca Reference Point via the Service Exposure Component
* Other Infrastructure CSEs across the Mcc’ Reference Point via the Remote Service Exposure Component
* Other Service Components across the Msc Reference Point

These M2M Services utilize services of the:

* Underlying Network across the Mcn Reference Point via the Network Service Utilization Component



Figure 5.1-2: oneM2M Services Architecture

The oneM2M Services architecture in Figure 5.1-2 comprises of the following entities:

1. **Application Entity (AE):** Defined by the oneM2M Functional Architecture [2], the Application Entity provides Application logic for the end-to-end M2M solutions.
2. **Common Services Entity (CSE):** Defined by the oneM2M Functional Architecture [2], a Common Services Entity comprises the set of "service functions" that are common to the M2M environments and specified by oneM2M. For oneM2M Services, this definition of a CSE is a logical representation where “service functions” that are exposed through the Mca and Mcc’ Reference Points via the corresponding Service Exposure and Remote Service Exposure Components and the Network Service Utilization Component utilizes services of the Underlying Network through the Mcn referent point. In addition Service Components consume and provide M2M Services with other Service Components.

As a logical representation of loosely coupled Service Components, the CSE is entity that in itself is identifiable but not directly addressable. Instead the addressable entities are the corresponding Service Exposure Components of the Reference Points.

Editors note: Need to clarify that the Services are the addressable entities within a components; components are not directly addressable.

* + **Service Exposure Component**: The Service Exposure Component exposes services to AEs.
  + **Network Service Utilization Component**: The Network Service Utilization Component consumes services from the NSE.
  + **Remote Service Exposure Component**: The Remote Service Exposure connects Services from different M2M environments.

The Service Exposure, Network Service Utilization and Remote Service Exposure Components follow the CSE Public Domain Names convention described in section 6.5.1.2 of the Functional Architecture [2] but are extended as a sub-domain of the Infrastructure Node public domain name.

## 5.2 Reference Points

The M2M Service Architecture exposes M2M Services across the Mca, Mcn, Mcc’ and Msc Reference Points. The enhancement of the Mcc Reference Point to expose M2M Services through the Remote Service Exposure Component is FFS.

### 5.2.1 Mca Reference Point

The Mca Reference Point is defined within the oneM2M Functional Architecture [2]. Additional protocol support is defined in this specification for other application protocols. In the M2M Service Architecture, when an AE uses a protocol across the Mca Reference Point that is not defined by oneM2M (e.g., XMPP, DDS, MQTT), the CSE passes through the payload and offers additional M2M Services.

Editor’s note: This description needs further clarification; specifically what does it mean to pass through the payload.

### 5.2.2 Msc Reference Point

The Msc Reference Point specifies set of interactions between the Service Capabilities of different Service Components. The realization of the interaction between the Services Capabilities is implementation specific.

Editor’s Note: There is a need to define a term for an interface which specifies a service definition but does not specify the communication bindings of the stage 3 work.

### 5.2.2.1 Message Exchange Patterns

Communication between M2M Service Components which pass over the Msc Reference Point utilizes a web services approach, e.g., Web Services Message Exchange Patterns (MEP) defined by WSDL[i.2]:

* In-Only
* Robust In-Only
* In-Out
* In-Optional-Out
* Out-Only
* Robust Out-Only
* Out-In
* Out-Optional-In



Figure 5.2.2.1-1: Message Exchange Patterns

The MEP(s) utilized by a M2M Service Capability is documented within the Service Capabilities Policy clause.

**Note:** A subset of the MEPs provided by a M2M Service Capability would be exposed by the Service Exposure Component or the Remote Service Exposure Component.

### 5.2.2.2 M2M Identifiers

### 5.2.2.2.1 M2M Service Capability Identifier (M2M-Serv-Cap-ID)

Service Components contain multiple M2M Services (M2M-Serv-ID). Each M2M Service contains multiple M2M Service Capabilities. The M2M Service Capability Identifier is assigned to each M2M Service Capability.

| Identifier | Assigned by | Assigned to | Assigned during | Lifetime | Uniqueness | Used during | Remarks |
| --- | --- | --- | --- | --- | --- | --- | --- |
| M2M Service Capability Identifier | M2M SP | M2M Service Capability | M2M Service Registration.  This is the identifier from the Services Registry. | Life of the M2M Service Registration. | Global | Message exchange between Service Components across the Msc and Mcc’.  Message exchange across the Mca. |  |

Table 5.2.2.2.1-1 M2M Service Capability Identifier

### 5.2.3 Mcc’ Reference Point

The Mcc’ Reference Point is defined within the oneM2M Functional Architecture [2]. The oneM2M Service Architecture utilizes communications over the Mcc’ Reference Point to construct a Service Cluster for service sharing and capacity expansion. A messaging exchange protocol (e.g., AMQP, XMPP, JMS) between two service execution environments (SEE) (e.g., ESB, Apache Service Mix) accommodates the SEEs with same and different ownership.

**Note:** The protocol used for communication between SEEs with different ownership may require additional security capabilities and is FFS.

### 5.2.4 Mcn Reference Point

The Mcn Reference Point is defined within the oneM2M Functional Architecture [2].

## 5.3 Configurations support by M2M Service Architecture

M2M Services exposed across the Mca, Mcn, Mcc’ and Msc reference are supported for Infrastructure Nodes as defined in the oneM2M Functional Architecture [2].

# 6 M2M Services

This clause describes the M2M Services provided by the M2M Services Platform.

## 6.1 Introduction

The M2M Services defined in this clause are utilized by the Supporting Services described in the Annexes of this specification.



Figure 6.1-1: M2M Services

## 6.2 Service Subscription

The Service Subscription service provides the ability to:

* Validate the service capabilities (e.g., requests, notifications) that go across the Mca Reference Point by ensuring Supporting Service requested by the originator is permitted within the context of the M2M Service Subscription
* Assist in authorization of a M2M Service Capability by returning a role for the requested M2M Service Capability
* Assist in returning the Broker service instance needed to exchange data for data exchange service capabilities
* Assist in returning the Management Adapter service instance needed to manage the device

### 6.2.1 Service Capabilities

#### 6.2.1.1 validateSupportingService

This service capability ensures that a valid M2M Service Subscription exists for the requested service capability requested that is either received by the M2M Service Platform from an AE or is transmitted to the AE from the M2M Service Platform.

##### 6.2.1.1.1 Pre-conditions

A correlation between the M2M Service that defines the Supporting Service and the M2M Service Subscription has been defined in order to validate the M2M Service.

##### 6.2.1.1.2 Signature - validateSupportingService

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| subscriptionId | IN | NO | The M2M Service Subscription Identifier (M2M-Service-Profile-ID) |
| serviceId | IN | NO | The M2M Service Identifier (M2M-Serv-ID) |
| serviceCapId | IN | NO | The M2M Service Capability Identifier (M2M-Serv-Cap-ID) |
| responseType | OUT | NO | Response types:   * Supporting Service does not exist for requested M2M Service Subscription * Supporting Service does exist for the requested M2M Service Subscription |

Table 6.2.1.1.2-1 Service Subscription - validateSupportingService capability

##### 6.2.1.1.3 Post-Conditions

Not Applicable

##### 6.2.1.1.4 Exceptions

Not Applicable

##### 6.2.1.1.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.2.1.1.6 oneM2M Resource Interworking

This service capability interworks with the following oneM2M Resource operations that are interworked are:

* TBD

Editors note: The oneM2M Resource Interworking will be identified if a M2M Service Subscription operation is identified

#### 6.2.1.2 retrieveAuthorization

This service capability determines the Role associated with the M2M Service Capability and the M2M Service Subscription.

##### 6.2.1.2.1 Pre-conditions

A correlation exists between the M2M Service Subscription, M2M Service and M2M Service Capability to a Role.

##### 6.2.1.2.2 Signature - retrieveAuthorization

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| subscriptionId | IN | NO | The M2M Service Subscription Identifier (M2M-Service-Profile-ID) |
| serviceId | IN | NO | The M2M Service Identifier (M2M-Serv-ID) |
| serviceCapId | IN | NO | The M2M Service Capability Identifier (M2M-Serv-Cap-ID) |
| rolePolicies | OUT | Yes | The Attribute Based Control Role policies that are valid for this M2M Service Subscription, M2M Service and M2M Service Capability. |
| responseType | OUT | NO | Response types   * Roles do not exist |
|  |  |  |  |

Table 6.2.1.1.2-1 Service Subscription - retrieveAuthorization capability

##### 6.2.1.2.3 Post-Conditions

Not Applicable

##### 6.2.1.2.4 Exceptions

Not Applicable

##### 6.2.1.2.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.2.1.2.6 oneM2M Resource Interworking

This service capability interworks with the following oneM2M Resource operations that are interworked are:

* TBD

Editors note: The oneM2M Resource Interworking will be identified if a M2M Service Subscription operation is identified from the Security TS.

#### 6.2.1.3 getBroker

This service capability obtains the Broker instance that will be used to subscribe and publish requests based on the requested M2M Service Capability (e.g., publishRequest, subscribeRequest), AE, Resource and M2M Service Subscription.

For the publishRequest service capability the AE is the from AE-ID and the resource is the toResource representing a leaf node from the publication resource.

For the subscribeRequest service capability the AE is the from AE-ID and the resource is the publication resource.

##### 6.2.1.3.1 Pre-conditions

A correlation between a M2M Service Subscription, AE, Resource and Broker exist.

##### 6.2.1.3.2 Signature - getBroker

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| subscriptionId | IN | NO | The M2M Service Subscription Identifier (M2M-Service-Profile-ID) |
| serviceId | IN | NO | The M2M Service Identifier (M2M-Serv-ID) of the M2M Service Capability |
| aeId | IN | NO | The identifier of the AE |
| Resource | IN | NO | The identifier of the resource that is associated with the AE and M2M Service Subscription |
| broker | OUT | NO | The returned instance of the Broker service associated with the M2M Service Subscription. |
| responseType | OUT | NO | Response types:   * Broker does not exist for requested M2M Service Capability, M2M Service Subscription and Resource |

Table 6.2.1.3.2-1 Service Subscription - getBroker capability

##### 6.2.1.3.3 Post-Conditions

Not Applicable

##### 6.2.1.3.4 Exceptions

Not Applicable

##### 6.2.1.3.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.2.1.3.6 oneM2M Resource Interworking

This service capability interworks with the following oneM2M Resource operations that are interworked are:

Not Applicable

#### 6.2.1.4 getManagementAdapter

This service capability obtains the Management Adapter instance that will be used to manage device based on the requested M2M Service Capability (e.g., downloadFirmware, installFirmware) and device.

##### 6.2.1.4.1 Pre-conditions

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.2.1.4.2 Signature - getManagementAdapter

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| subscriptionId | IN | NO | The M2M Service Subscription Identifier (M2M-Service-Profile-ID) |
| serviceId | IN | NO | The M2M Service Identifier (M2M-Serv-ID) of the M2M Service Capability |
| deviceId | IN | YES | The unique device identifier in the context of the M2M Service Subscription. |
| managementAdapter | OUT | NO | The returned instance of the Management Adapter service associated with the subscription. |
| responseType | OUT | NO | Response types:   * Management Adapter does not exist |

Table 6.2.4.1.2-1 Service Subscription - getManagementAdapter capability

Editor’s Note: The pre-conditions mention that the Management Adapter is associated with the M2M Service Capability but the argument is for the M2M Service. Need to determine if the Adapter is is associated with the M2M Service or M2M Service Capability (operation).

##### 6.2.1.4.3 Post-Conditions

Not Applicable

##### 6.2.1.4.4 Exceptions

Not Applicable

##### 6.2.1.4.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.2.1.4.6 oneM2M Resource Interworking

This service capability interworks with the following oneM2M Resource operations that are interworked are:

Not Applicable

#### 6.2.1.5 getTransportAdapter

This service capability obtains the Transport adapter instance that will be used to send requests based on the requested M2M Service Capability AE and M2M Service Subscription.

##### 6.2.1.5.1 Pre-conditions

A correlation between a M2M Service Subscription, AE and type of transport adapter (e.g., Broker) service exist.

##### 6.2.1.5.2 Signature - getTransportAdapter

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| subscriptionId | IN | NO | The M2M Service Subscription Identifier (M2M-Service-Profile-ID) |
| serviceId | IN | NO | The M2M Service Identifier (M2M-Serv-ID) of the M2M Service Capability |
| aeId | IN | NO | The identifier of the AE that is to target of the request (“to”) (AE-ID) |
| transportAdapter | OUT | NO | The returned instance of the service (e.g., Broker) associated with the M2M Service Subscription. |
| responseType | OUT | NO | Response types:   * Transport Adapter does not exist for requested M2M Service Capability, M2M Service Subscription and target |

Table 6.2.1.5.2-1 Service Subscription - getTransportAdapter capability

Editor’s Note: The pre-conditions do not mention a M2M Service in the pre-conditions – not sure why it is in the arguments. I think the intent was to pass the service capability like the “sendMessage) – so the correlation should be to the same as getBroker.

##### 6.2.1.5.3 Post-Conditions

Not Applicable

##### 6.2.1.5.4 Exceptions

Not Applicable

##### 6.2.1.5.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.2.1.5.6 oneM2M Resource Interworking

Not Applicable

#### 6.2.1.6 getAE

This service capability provides the ability to retrieve the Application Entity information.

##### 6.2.1.6.1 Pre-conditions

Not Applicable

##### 6.2.1.6.2 Signature – getAE

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| aeId | IN | NO | The Application Entity Id (AE-ID) |
| applicationId | OUT | NO | The Application Identifier (App-ID) for the AE |
| serviceSubscriptionId | OUT | YES | The M2M Service Subscription (M2M-Service-Profile-ID) for the AE |
|  |  |  |  |
|  |  |  |  |

Table 6.2.1.6.2-1 Service Subscription – getAE capability

##### 6.2.1.6

Figure 6.2.1.6.3-1 Service Subscription – getAE Diagram

##### 6.2.1.6.4 Post-Conditions

Not Applicable

##### 6.2.1.6.5 Exceptions

Not Applicable

##### 6.2.1.6.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.2.1.6.7 oneM2M Resource Interworking

When an AE is registered using a CREATE operation on the <AE> resource, the AE is associated with the M2M Service Subscription which is returned along with the correlated AE information (e.g., Application, Device).

## 6.3 Authorization

The Authorization service provides the ability to:

* Authorize the Originator for the service capability

### 6.3.1 Service Capabilities

#### 6.3.1.1 authorizeServiceCapability

This service capability authenticates an Originator is valid Originator of the request and then authorizes the service capability within the context of a M2M Service Subscription between the from AE-ID and to AE-ID.

##### 6.3.1.1.1 Pre-conditions

The M2M Identifiers for the request Originator, M2M Service Subscription from AE-ID and to AE-ID are assigned to the M2M Service Subscription.

A correlation between the M2M Service Capability, M2M Service and the M2M authorization event has been defined in order to authorize the M2M Service Capability.

##### 6.3.1.1.2 Common M2M Service Capability Parameters for Request Authentication and Authorization

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| originator | IN | NO | The identifier of the Originator that is issuing the request. |
| subscriptionId | IN | NO | The M2M Service Subscription Identifier (M2M-Service-Profile-ID) |
| from | IN | NO | The identifier of the Originator of the request (AE-ID) |
| to | IN | NO | The identifier of the AE that is to target of the request (AE-ID) |
| serviceCapId | IN | NO | The identifier of the M2M Service Capability (M2M-Serv-Cap-ID) |
| serviceId | IN | NO | The identifier of the M2M Service (M2M-Serv-ID) |
| responseType | OUT | YES | Response types that are relevant to the Authentication and Authorizations of requests from AEs across the Mca Reference Point.   * Originator is not authenticated * Originator does not have a M2M Service Subscription * Originator not authorized for the service capability |

Table 6.3.1.1.2-1 Common M2M Service Capability Parameters for Request Authentication and Authorization

##### 6.3.1.1.3 Service Interactions

This service capability will consume the ServiceSubscription:retrieveAuthorization

##### 6.3.1.1.4 Post-Conditions

Not Applicable

##### 6.3.1.1.5 Exceptions

Not Applicable

##### 6.3.1.1.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.3.1.1.6 oneM2M Resource Interworking

This service capability interworks with the following oneM2M Resource operations that are interworked are:

* FFS – The End-toEnd Security Framework is expected to develop APIs that can be issued for this purposed.

## 6.4 Data Exchange

### 6.4.1 Overview

The Data Exchange service provides the ability to exchange payloads between AEs across the Mca Reference Point using supported data exchange patterns. This service utilizes an underlying transport adapter to provide the transportation functions.

The supported data exchange patterns are:

* Subscribe-Publish-Notify
* Request-Response

#### 6.4.1.1 Subscribe-Publish-Notify Data Exchange

This data exchange pattern permits AEs to subscribe to publication resources. When an AE publishes data to a specific publication resource, the AEs that have subscribe to the publication resource are notified of the publication by receiving the published data.

##### 6.4.1.1.1 Supporting Rules

A publication resource is an entity that represents the mechanism used by underlying publish and subscribe protocols which represent one or more queues in the underlying protocol. A publication resource in the data exchange service provides capabilities to reference one or more queues in the underlying protocol using a tree mechanism where wildcards are placed to represent all elements of the tree branch or leaf.

###### 6.4.1.1.1.1 Publication Resources

When a AE publishes a payload to a publication resource, the publication resource is evaluated to obtain the leaf node of the tree. The AEs that have subscribed to leaf nodes of the tree receive the message via the notify M2M Service Capability.

###### 6.4.1.1.1.2 Delivery Policy

As part of the notify M2M Service Capability the Service Layer attempts to honor the delivery policy of the subscriber and publisher. The delivery policy is the attempt by the Service Layer to provide a reliable delivery of the payload that was published using the mechanisms of the underlying Broker. The reliable delivery of a payload is defined in the deliveryPolicy type.

| Attribute | Description |
| --- | --- |
| retryLimit | The number of retries by the Broker to connected subscribers before assuming failure of the notification. |

Table 6.4.1.1.1..2-1 Type: deliveryPolicy

###### 6.4.1.1.1.3 Message Retainment Policy

When a message is published, the M2M Service Layer, using the resources of the underlying Broker, attempts to retain messages according to a retainment policy. Retainment of messages permits AEs that are subscribed to the publication resource but not connected to the underlying Broker to receive messages, up to the retainLimit once the AE connects to the Broker. The message retainment policy is defined in the retainmentPolicy type.

| Attribute | Description |
| --- | --- |
| retainLimit | The maximum number of messages retained by the Broker for a subscriber that is not connected to the underlying Broker. |

Table 6.4.1.1.1..3-1 Type: retainmentPolicy

###### 6.4.1.1.1.4 Service Subscription Integration

In order for the Data Exchange Service to take advantage of the underlying transport, there shall be an association between the AE Resource and the identifier of the underlying transport within the context of the M2M Service Subscription.

#### 6.4.1.2 Request-Response Data Exchange

This data exchange pattern permits AEs to synchronously send messages to other AEs utilizing the underlying transport.

##### 6.4.1.2.1 Supporting Rules

Messages are sent to from an AE to another AE via the Service Layer. When sending a message the originating AE can provide a delivery policy to be used by the transport adapter when sending the message to the target AE.

###### 6.4.1.1.2.2 Delivery Policy

As part of the message sending capability the Service Layer attempts to honor the delivery policy of the message Originator. The delivery policy is the attempt by the Service Layer to provide a reliable delivery of the payload that was sent using the mechanisms of the transport adapter. The reliable delivery of a payload is defined in the deliveryPolicy type.

| Attribute | Description |
| --- | --- |
| retryLimit | The number of retries by the transport adapter to target AEs before assuming failure of the notification. |

Table 6.4.1.1.2.2-1 Type: deliveryPolicy

###### 6.4.1.1.2.3 Service Subscription Integration

In order for the Data Exchange Service to take advantage of the underlying transport, there shall be an association between the target AE and the identifier of the underlying transport within the context of the M2M Service Subscription.

### 6.4.2 Service Capabilities

#### 6.4.2.1 subscribe

This service capability provides the ability for AEs to subscribe to receive payloads based on a publication resource.

As part of the subscription, the subscribing AE can provide delivery and retainment policies to enhance the robustness of the notification to AEs that have subscribed to the publication resource identified in the request.

##### 6.4.2.1.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a M2M Service Subscription, publication resource, subscribing AE and Broker exist.

##### 6.4.2.1.2 Signature - subscribe

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| publicationResource | IN | NO | The publication resource. See 6.4.1.1.1.1 |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.1.1.1.2 |
| retainmentPolicy | IN | YES | The retainment policy for unconnected subscribers. See 6.4.1.1.1.3 |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table 6.4.2.1.2-1 Data Exchange Service – subscribe capability

##### 6.4.2.1.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the subscribe request to the Supporting Service to validate the request and obtain the Broker instance for the subscription request.
2. Issue the request to the broker to subscribe the AE-ID for the publication resource
3. Issue the subscribe complete subscription request to the Supporting Service



Figure 6.4.2.1.3-1 Data Exchange Service – subscribe capability

##### 6.4.2.1.4 Post-Conditions

Not Applicable

##### 6.4.2.1.5 Exceptions

Not Applicable

##### 6.4.2.1.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.4.2.1.7 oneM2M Resource Interworking

This service capability interworks with the following oneM2M Resource operations that are interworked are:

Not Applicable

#### 6.4.2.2 publish

This service capability provides the ability for AEs to publish payloads to a leaf node of a publication resource.

As part of the publication, the publishing AE can provide a delivery policy to enhance the robustness of the publication to AEs that have subscribed to the Resource identified in the request.

##### 6.4.2.2.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a M2M Service Subscription, resource to publish the payload, publishing AE and Broker exist.

##### 6.4.2.2.2 Signature – publish

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| toResource | IN | NO | The leaf node of a publication resource. See 6.4.1.1.1.1 |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.1.1.1.2 |
| payload | IN | NO | The payload to published. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table 6.4.2.2.2-1 Data Exchange Service – publish capability

##### 6.4.2.2.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the publish request to the Supporting Service to validate the request
2. Issue the request to the broker to publish the payload from the publishing AE to the resource in the request
3. Issue the complete publication request to the Supporting Service



Figure 6.4.2.2.3-1 Data Exchange Service –publish (In-Out) capability

##### 6.4.2.2.4 Post-Conditions

Not Applicable

##### 6.4.2.2.5 Exceptions

Not Applicable

##### 6.4.2.2.6 Policies for Use

Message Exchange Patterns: In-Out, In-Only

The In-Only message exchange pattern would return a transport layer acknowledgement if supported by the underlying transport layer protocol. Response types or Exceptions are not returned in this message exchange pattern.

Transaction Pattern: Participation allowed

##### 6.4.2.2.7 oneM2M Resource Interworking

This service capability interworks with the following oneM2M Resource operations that are interworked are:

Not Applicable

#### 6.4.2.3 notify

This service capability provides the ability to notify AEs that have subscribed to the publication resource identified in a publish request.

##### 6.4.2.3.1 Pre-conditions

A correlation between a M2M Service Subscription, subscribed AE, publication resource and Broker exist.

##### 6.4.2.3.2 Signature – notify

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| fromResource | IN | NO | The leaf node of a publication resource. See 6.4.1.1.1.1 |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.1.1.1.2 |
| payload | IN | NO | The Payload of the message to notify to the AE |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table 6.4.2.3.2-1 Data Exchange Service – notify capability

##### 6.4.2.3.3 Post-Conditions

Not Applicable

##### 6.4.2.3.4 Exceptions

Not Applicable

##### 6.4.2.3.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.4.2.3.6 oneM2M Resource Interworking

This service capability interworks with the following oneM2M Resource operations that are interworked are:

Not Applicable

#### 6.4.2.4 sendMessage

This service capability provides the ability for AEs to send messages to a target AE.

As part of the message send request, the originating AE can provide a delivery policy to enhance the robustness of the message to the AE.

##### 6.4.2.4.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a M2M Service Subscription, Originating AE and Transport Adapter exist.

##### 6.4.2.4.2 Signature – sendMessage

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deliveryPolicy | IN | YES | The delivery policy when sending to the target AE. See 6.4.1.1.2.2 |
| payload | IN | NO | The payload to be sent. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table 6.4.2.4.2-1 Data Exchange Service – sendMessage capability

##### 6.4.2.4.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the sendMessage request to the Supporting Service to validate the request
2. Issue the request to the transport adapter (in this case the Broker service) to send the payload from the Originator to the target AE.
3. Issue the complete sendMessage request to the Supporting Service



Figure 6.4.2.4.3-1 Data Exchange Service –sendMessage capability

##### 6.4.2.4.4 Post-Conditions

Not Applicable

##### 6.4.2.4.5 Exceptions

Not Applicable

##### 6.4.2.4.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.4.2.4.7 oneM2M Resource Interworking

Not Applicable

## 6.5 Broker

### 6.5.1 Overview

The Broker service provides the ability to adapt the Publish-Subscribe-Notify and Request Response data exchange patterns to the underlying transport protocol and deployment configuration.

The Broker maintains the subscriptions to the publication resources

### 6.5.2 Service Capabilities

#### 6.5.2.1 subscribe

This service capability provides the ability for AEs to subscribe to receive payloads based on a publication resource.

As part of the publication, the publishing AE can provide delivery and retainment policies to enhance the robustness of the notification to AEs that have subscribed to the Resource identified in the request.

##### 6.5.2.1.1 Pre-conditions

Not Applicable

##### 6.5.2.1.2 Signature – subscribe

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| publicationResource | IN | NO | The publication resource. See 6.4.1.1.1.1 |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.1.1.1.2 |
| retainmentPolicy | IN | YES | The retainment policy for unconnected subscribers. See 6.4.1.1.1.3 |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table 6.5.2.2.2-1 Broker – subscribe capability

##### 6.5.2.1.3 Post-Conditions

Not Applicable

##### 6.5.2.1.4 Exceptions

Not Applicable

##### 6.5.2.1.5 Policies for Use

Message Exchange Patterns: In-Out

The In-Only message exchange pattern would return a transport layer acknowledgement if supported by the underlying Transaction Pattern: Participation allowed

#### 6.5.2.2 publish

This service capability provides the ability for AEs to publish payloads to a leaf node of a publication resource.

As part of the publication, the publishing AE can provide a delivery policy to enhance the robustness of the publication to AEs that have subscribed to the Resource identified in the request.

##### 6.5.2.2.1 Pre-conditions

Not Applicable.

##### 6.5.2.2.2 Signature – publish

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| toResource | IN | NO | The leaf node of a publication resource. See 6.4.1.1.1.1 |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.1.1.1.2 |
| payload | IN | NO | Payload to be published. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table 6.5.2.2.2-1 Broker – publish capability

##### 6.5.2.3.3 Post-Conditions

Not Applicable

##### 6.5.2.3.4 Exceptions

Not Applicable

##### 6.5.2.3.5 Policies for Use

Message Exchange Patterns: In-Out

The In-Only message exchange pattern would return a transport layer acknowledgement if supported by the underlying Transaction Pattern: Participation allowed

##### 6.5.2.3.6 oneM2M Resource Interworking

This service capability interworks with the following oneM2M Resource operations that are interworked are:

Not Applicable

#### 6.5.2.3 notify

This service capability provides the ability for the Broker to notify AEs that have subscribed to the publication resource identified in the request.

##### 6.5.2.3.1 Pre-conditions

The Broker maintains the AEs (to AE-ID, clientId) that have subscribed to publicationResources.

The Broker maintains the M2M Service Subscription (subscriptionId) for AE subscriptions to publicationResources.

##### 6.5.2.3.2 Signature – notify

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| payload | IN | NO | See Table A.2.1-1 |
| fromResource | IN | NO | The leaf node of a publication resource. See 6.4.1.1.1.1 |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.1.1.1.2 |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Originator does not have a Broker for the requested resource * Originator has requested an invalid delivery policy * Exception: Request may not have been completed |

Table 6.5.2.3.2-1 Broker – notify capability

##### 6.5.2.3.3 Service Interactions

For each AE subscribed to the resource perform the interactions of service capabilities required for this service capability:

1. Issue the notify request to the Supporting Service to validate the request
2. Issue the request to the SE: Data Exchange
3. Issue the complete publication request to the Supporting Service



Figure 6.5.2.3.3-1 Broker –notify (In-Out) capability

##### 6.5.2.3.4 Post-Conditions

Not Applicable

##### 6.5.2.3.5 Exceptions

Not Applicable

##### 6.5.2.3.6 Policies for Use

Message Exchange Patterns: In-Out, In-Only

The In-Only message exchange pattern would return a transport layer acknowledgement if supported by the underlying transport layer protocol. Response types or Exceptions are not returned in this message exchange pattern.

Transaction Pattern: Participation allowed

##### 6.5.2.3.7 oneM2M Resource Interworking

This service capability interworks with the following oneM2M Resource operations that are interworked are:

Not Applicable

#### 6.5.2.4 sendMessage

This service capability provides the ability for AEs to send message payloads to a target AE.

As part of the send message, the originating AE can provide delivery to enhance the robustness of the publication to AEs that have subscribed to the Resource identified in the request.

##### 6.5.2.4.1 Pre-conditions

The Broker service has connectivity to the target AE where the target AE has subscribed to the Broker to receive send message requests from the Broker.

##### 6.5.2.4.2 Signature – sendMessage

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.1.1.2.2 |
| payload | IN | NO | Payload to be published. |
| responseType | OUT | YES | Unique response types for this service.   * Target AE is not subscribed with the Broker to receive messages * Originator has requested an invalid delivery policy   Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table 6.5.2.4.2-1 Broker – sendMessage capability

##### 6.5.2.4.3 Post-Conditions

Not Applicable

##### 6.5.2.4.4 Exceptions

Not Applicable

##### 6.5.2.4.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.5.2.4.6 oneM2M Resource Interworking

Not Applicable

## 6.6 Device Management

### 6.6.1 Overview

The Device Management service provides for the capability for an AE to manage devices across the Mca Reference Point using supported device management message exchange patterns. This service utilizes management adapters to provide the management functions.

The supported device management message exchanges patterns are:

* Request-Response
* Request- Asynchronous Notification

#### 6.6.1.1 Device Management

The Device Management service permits AEs to request management operations (e.g., device configuration operations, device troubleshooting operations, device firmware management operations, and application software management operations) and provide the result or report/retrieve the status of the operations to the originating AE.

AEs have the option to request to manage a targeted set of devices that include:

* Individual device
* Multiple devices through the use of lists of devices
* A group that designates as list of devices using the groupID.

AEs have option to request management operations to be performed based on a schedule.

AEs have the option to request that responses to requests be delivered synchronous (the request is held until all responses are received) or asynchronously (Reports of the operation are transmitted to the AE when an operation has completed) to the request submission. For asynchronous requests, reports are transmitted based on a report policy configured as part of the original request.

AEs also have the capability to request to manage devices by complex operations (e.g. upgradefirmware), where the M2M service platform can orchestrate management operations (e.g. installfirmware, downloadware) according to the business process.

##### 6.6.1.1.1 Supporting Rules

###### 6.6.1.1.1.1 Report Period Parameter

The reportPolicy parameter is used to determine when a report is sent by the M2M System to the AE. The report period attribute is defined in the reportPolicy parameter.

| Parameter | Description |
| --- | --- |
| reportPeriod | Describes the period which reports for a operation are sent to the AE. |

Table 6.6.1.1.1.1-1 Parameter:reportPolicy

###### 6.6.1.1.1.2 Aggregation Policy Parameter

The aggregationPolicy parameter is used to determine the time period for aggregating the result of the management operation prior to the reports being sent to the AE. The aggregation period attribute is defined in the aggregationPolicy parameter.

| Parameter | Description |
| --- | --- |
| aggregationPeriod | The time period of aggregating reports prior to transmission to the AE. |

Table 6.6.1.1.1.2-1 Parameter: aggregationPolicy

###### 6.6.1.1.1.3 Firmware Report Type

The FirmwareReport is complex type that defines the current state of a firmware management operation for a specific device.

| Parameter | Optional | Description |
| --- | --- | --- |
| groupId | YES | The group identifier. |
| deviceId | NO | The unique device identifier in the context of the M2M Service Subscription. |
| operation | YES | The firmware management operation.(e.g. installFirmware, downloadFirmware) |
| operationResult | YES | The firmware management operation execution result. |
| operationStatus | YES | The firmware management operation execution status. It can be Initiated, Started, Finished, Cancelled, or Deleted. |

Table 6.6.1.1.1.3-1 Type: FirmwareReport

###### 6.6.1.1.1.4 Orchestration Rule Type

The OrchestrationRule is a complex type that describes the target and associated schedule of the request for the execution of the management operation.

| Parameter | Optional | Description |
| --- | --- | --- |
| groupId | YES | The group identifier. |
| deviceId | NO | The unique device identifier in the context of the M2M Service Subscription. |
| operation | NO | The orchestrated operation. (e.g. installFirmware, downloadFirmware) |
| schedule | YES | The time when to execute firmware operation. If it is not provided, the operation shall be executed immediately. |

Table 6.6.1.1.1.4-1 Type: OrchestrationRule

###### 6.6.1.1.1.5 Firmware Info Type

The FirmwareInfo is a complex type that describes the version, name, URL of the device firmware.

| Parameter | Optional | Description |
| --- | --- | --- |
| version | YES | The version of the firmware. |
| name | YES | The name of the firmware to be used on the device. |
| url | YES | The URL from which the firmware image can be downloaded. |

Table 6.6.1.1.1.5-1 Type: FirmwareInfo

###### 6.6.1.1.1.6 Service Subscription Integration

In order for the Device Management Service to take advantage of the Management Adapter, there shall be association between the device associated with a Service Subscription and the service capability to the Management Adapter.

###### 6.6.1.1.1.7 Device Info Type

The DeviceInfo is a complex type that describes the device label, manufacturer, model, device type, firmware version, software version, hardware version.

| Parameter | Optional | Description |
| --- | --- | --- |
| deviceLabel | YES | Unique device label assigned by the manufacturer. The uniqueness may be global or only valid within a certain domain (e.g. vendor-wise or for a certain deviceType). |
| manufacturer | YES | The name/identifier of the device manufacturer. |
| model | YES | The name/identifier of the device mode assigned by the manufacturer. |
| deviceType | YES | The type (e.g. cell phone, photo frame, smart meter) or product class (e.g. X-series) of the device. |
| fwVersion | YES | The firmware version of the device.  NOTE: If the device only supports one kind of Software this is identical to softwareVersion. |
| swVersion | YES | The software version of the device. |
| hwVersion | YES | The hardware version of the device. |

Table 6.6.1.1.1.7-1 Type: DeviceInfo

###### 6.6.1.1.1.8 Memory Type

The Memory is a complex type that describes the current available amount of memory and the total amount of memory.

| Parameter | Optional | Description |
| --- | --- | --- |
| memAvailable | YES | The current available amount of memory in bytes. |
| memTotal | YES | The total amount of memory in bytes. |

Table 6.6.1.1.1.8-1 Type: Memory

###### 6.6.1.1.1.9 Battery Type

The Battery is a complex type that describes the current battery level and the status of the battery.

| Parameter | Optional | Description |
| --- | --- | --- |
| level | YES | The current battery level as a percent of the battery capacity |
| status | YES | Indicates the status of the battery. Enum BatteryStatus, see 6.6.1.1.1.11. |

Table 6.6.1.1.1.9-1 Type: Battery

###### 6.6.1.1.1.10 DeviceCapability Type

The DeviceCapability is a complex type that describes the name of the capability, attach label, capability action status.

| Parameter | Optional | Description |
| --- | --- | --- |
| name | YES | The name of the capability. Enum DeviceCapabilityName, see 6.6.1.1.1.12. |
| attached | YES | Indicates whether the capability is attached to the device or not. |
| state | NO | Indicates if the capability is enabled or disabled |

Table 6.6.1.1.1.10-1 Type: DeviceCapability

###### 6.6.1.1.1.11 BatteryStatus Enum

| Battery Status | Description |
| --- | --- |
| Normal | The battery is operating normally and not on power. |
| Charging | The battery is currently charging. |
| Charge Complete | The battery is fully charged and still on power. |
| Damaged | The battery has some problem. |
| Low Battery | The battery is low on charge. |
| Not Installed | The battery is not installed. |
| Unknown | The battery information is not available. |

Table 6.6.1.1.1.11-1 Enum: BatteryStatus

###### 6.6.1.1.1.12 DeviceCapabilityName Enum

| **Device Capability Name** | Description |
| --- | --- |
| Hardware: ExternalMemory | Used to enable/disable the removable card memory or storage disk. |
| Hardware: Display | Used to enable/disable the display screen. |
| Hardware: Camera | Used to enable/disable the camera. |
| Hardware: Speaker | Used to enable/disable the speaker. |
| I/O: Tethering | Used to enable/disable the device to be attached to other devices. |
| I/O: AudioInputEncoder | Used to enable/disable the audio input encoder. |
| I/O: AttachedDevice | Used to enable/disable the capability to allow other devices to be attached to this device. |
| I/O: Keyboard | Used to enable/disable the keyboard |
| I/O: InputPeripheral | Used to enable/disable the input peripheral. |
| I/O: OutputPeripheral | Used to enable/disable the output peripheral. |
| I/O: USB | Used to enable/disable the USB port. |
| I/O: SerialPort | Used to enable/disable the serial port. |
| I/O: ParallelPort | Used to enable/disable the Parallel port. |
| I/O: GPS | Used to enable/disable GPS capability |
| I/O: GNSS | Used to enable/disable GNSS capability |
| Connectivity: Bluetooth | Used to enable/disable the Bluetooth connectivity. |
| Connectivity: WLAN | Used to enable/disable the WLAN connectivity. |
| Connectivity: Infrared | Used to enable/disable the Infrared connectivity. |
| Connectivity: WCDMA | Used to enable/disable the WCDMA connectivity |
| Connectivity: GPRS | Used to enable/disable the GPRS connectivity |
| Connectivity: EDGE | Used to enable/disable the EDGE connectivity |
| Connectivity: CDMA | Used to enable/disable the CDMA connectivity |
| Connectivity: WiMAX | Used to enable/disable the WiMAX connectivity |
| Connectivity: LTE | Used to enable/disable the LTE connectivity |
| Connectivity: NFC | Used to enable/disable the NFC connectivity |
| Connectivity: TD-SCDMA | Used to enable/disable the TD-SCDMA connectivity |
| LAN Interfaces: USB | Used to enable/disable the USB Interface |
| LAN Interfaces: Wi-Fi | Used to enable/disable the Wi-Fi Radio |
| LAN Interfaces: HomePlug | Used to enable/disable the HomePlug Interface |
| LAN Interfaces: MoCA | Used to enable/disable the MoCA Interface |
| LAN Interfaces: UPA | Used to enable/disable the UPA Interface |
| Hardware: SmartCardReader | Used to enable/disable the SmartCardReader |

Table 6.6.1.1.1.11-1 Enum: DeviceCapabilityName

###### 6.6.1.1.1.13 LockStatus Enum

| **Lock Status** | Description |
| --- | --- |
| locked | The device is locked. |
| unlocked | The device is unlocked. |

Table 6.6.1.1.1.11-1 Enum: LockedStatus

###### 6.6.1.1.1.14 Area Network Info Type

The AreaNwkInfo is a complex type that describes the information about a M2M area network. Information includes the area network identifier, area network name, area network type, and the list of devices in the M2M Area Network.

| Parameter | Optional | Description |
| --- | --- | --- |
| areaNwkId | NO | The unique area network identifier. |
| areaNwkName | YES | The Area Network name. |
| areaNwkType | YES | The areaNwkType is an implementation-chosen string that indicates the type of M2M Area Network. |
| listOfDevices | YES | Indicates the list of devices in the M2M Area Network. Type AreaNwkDevice, see 6.6.1.1.1.15. From listOfDevices, the topology of the area network can be discovered and retrieved. |

Table 6.6.1.1.1.14-1 Type: AreaNwkInfo

###### 6.6.1.1.1.15 Area Network Device Type

The AreaNwkDevice is a complex type that describes the device information for a device in the context of a M2M Area Network. Information includes the device identifier, area network identifier and the area network device specific information.

| Parameter | Optional | Description |
| --- | --- | --- |
| deviceId | NO | The unique device identifier in the context of the M2M Service Subscription. |
| areaNwkDeviceInfo | YES | The area network device information. Type AreaNwkDeviceInfo, see 6.6.1.1.1.16. |

Table 6.6.1.1.1.15-1 Type: AreaNwkDevice

###### 6.6.1.1.1.16 Area Network Device Info Type

The AreaNwkDeviceInfo is a complex type that describes information about the device in the context of the M2M Area Network. Information includes the type of device, the interval of time between two sleep cycles, the time duration of each sleep cycle, the status of the device and any neighbor devices.

| Parameter | Optional | Description |
| --- | --- | --- |
| deviceType | YES | The type (e.g. cell phone, photo frame, smart meter) or product class (e.g. X-series) of the device. |
| sleepInterval | YES | The interval between two sleep cycles. |
| sleepDuration | YES | The time duration of each sleep cycle. |
| status | YES | The status of the device (sleeping or waked up). |
| listOfNeighbors | YES | Indicates the neighbour devices of the same area network. When modified, the connection relationship of the devices shall be modified accordingly. |

Table 6.6.1.1.1.16-1 Type: AreaNwkDeviceInfo

###### 6.6.1.1.1.17 LogTypeId Enum

| **LogTypeId** | Description |
| --- | --- |
| system | System log |
| security | Security log |
| event | Event log |
| trace | Trace log |
| panic | Panic log |

Table 6.6.1.1.1.17-1 Enum: LogTypeId

###### 6.6.1.1.1.18 LogStatus Enum

| **LogStatus** | Description |
| --- | --- |
| Started | the logging activity is started |
| Stopped | the logging activity is stopped |
| Unknown | the current status of the logging activity is unknown. |
| NotPresent | the log data is not present and the logData attribute shall be ignored. |
| Error | error conditions for the logging activities, and the logging is stopped. |

Table 6.6.1.1.1.18-1 Enum: LogStatus

###### 6.6.1.1.1.19 LogInfo Type

The LogInfo is a complex type that describes the log type, diagnostic data, log action status.

| Parameter | Optional | Description |
| --- | --- | --- |
| logTypeId | NO | The type of the log. E.g. security log, system log.  Enum LogTypeId, see 6.6.1.1.1.17. |
| logData | NO | Diagnostic data logged upon event of interests defined by the diagnostic function. |
| logActionStatus | NO | Indicates the status of the Action. E.g. Started, Stopped.  Enum LogStatus, see 6.6.1.1.1.18. |

Table 6.6.1.1.1.19-1 Type: LogInfo

###### 6.6.1.1.1.20 TroubleshootingReport Type

The TroubleshootingReport is complex type that defines the current state of a troubleshooting operation for a specific device.

| Parameter | Optional | Description |
| --- | --- | --- |
| groupId | YES | The group identifier. |
| deviceId | NO | The unique device identifier in the context of the M2M Service Subscription. |
| operation | YES | The troubleshooting operation.(e.g. rebootDevice, resetDevice, uploadDeviceLog) |
| operationResult | YES | The troubleshooting operation execution result. |
| operationStatus | YES | The troubleshooting operation execution status. It can be Initiated, Started, Finished, Cancelling, or Cancelled. |

Table 6.6.1.1.1.20-1 Type: TroubleshootingReport

###### 6.6.1.1.1.21 Log Type

The Log is a complex type that describes the log information, log URL.

| Parameter | Optional | Description |
| --- | --- | --- |
| logInfo | NO | The log information. Type LogInfo, see 6.6.1.1.1.19. |
| logURL | NO | The URL from which the log can be accessed. |

Table 6.6.1.1.1.21-1 Type: Log

###### 6.6.1.1.1.22 Log Filter Criteria

| Criterion name | Description |
| --- | --- |
| logTypeId | The type of the log. E.g. security log, system log.  Enum LogTypeId, see 6.6.1.1.1.17. |
| startTime | The start time of log. |
| endTime | The end time of log. |

Table 6.6.1.1.1.22 Log Filter Criteria

###### 6.6.1.1.1.24 Action Enum

| **InstallStatus** | Description |
| --- | --- |
| Install | The action that installs the software. |
| Uninstall | The action that un-installs the software. |
| activate | The action that activates software previously installed. |
| deactivate | The action that deactivates software. |

Table 6.6.1.1.1.24-1 Enum: Action

###### 6.6.1.1.1.25 Status Enum

| **LogStatus** | Description |
| --- | --- |
| Successful | The status is successful. |
| Failure | The status is failure. |
| In-Process | The status is in process. |

Table 6.6.1.1.1.25-1 Enum: Status

###### 6.6.1.1.1.26 ActionStatus Type

The ActionStatus is a complex type that describes the action and related status.

| Parameter | Optional | Description |
| --- | --- | --- |
| action | NO | The action being performed  Enum Action, see 6.6.1.1.1.24. |
| status | NO | Indicates the status of the operation is successful, failure or in process. Enum Status, see 6.6.1.1.1.25. |

Table 6.6.1.1.1.26-1 Type: ActionStatus

###### 6.6.1.1.1.27 SoftwareReport Type

The SoftwareReport is complex type that defines the current state of an application software management operation for a specific device.

| Parameter | Optional | Description |
| --- | --- | --- |
| groupId | YES | The group identifier. |
| deviceId | NO | The unique device identifier in the context of the M2M Service Subscription. |
| operation | YES | The application software management operation.(e.g. downloadSoftware, installSoftware, activateSoftware, deactivateSoftware, removeSoftware) |
| operationResult | YES | The application software management operation execution result. |
| installStatus | YES | Indicates the status of the install.  Enum ActionStatus, see 6.6.1.1.1.26. |
| activeStatus | YES | The status of active or deactivate action.  Enum ActionStatus, see 6.6.1.1.1.26. |

Table 6.6.1.1.1.27-1 Type: SoftwareReport

### 6.6.2 Service Capabilities

#### 6.6.2.1 downloadFirmware

This service capability provides the ability for AEs to download device firmware.

##### 6.6.2.1.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the service capability and device exist.

##### 6.6.2.1.2 Signature - downloadFirmware

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| firmwareInfo | IN | NO | The device firmware information.  Type FirmwareInfo, see 6.6.1.1.1.5 |
| deviceId | IN | YES | The unique device identifier in the context of the M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| requestId | OUT | NO | The M2M Request Identifier (M2M-Request-ID) |
| firmwareReport | OUT | YES | The firmware management operation execution result or status. Type FirmwareReport, see 6.6.1.1.1.3. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation * report policy does not supported by the Management Adapter * Operation exception: Firmware miss dependency * Operation exception: The new firmware is too large for available program or data memory |

Table 6.6.2.1.2-1 Device Management Service –downloadFirmware capability

##### 6.6.2.1.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.2.1.3-1 downloadFirmware Diagram

##### 6.6.2.1.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to download firmware.

##### 6.6.2.1.5 Exceptions

* Missing dependency within the device for the firmware
* New firmware is too large for available program or data memory

When invoking the service capability meet these exceptions, the response feedback and no subsequence notifications. AE can continue issue the request after M2M Area network meet the requirement or invoke other service capabilities to troubleshoot related devices.

Editors note: The highlighted text is unclear; we need to clarify the exception handling

##### 6.6.2.1.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.2.1.7 oneM2M Resource Interworking

This service capability is used to download firmware. The service capability aligns with the <firmware> resource and maps to the UPDATE procedure for the attribute update of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.6.2.2 installFirmware

This service capability provides the ability for AEs to install firmware on the device.

##### 6.6.2.2.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the service capability and device exist.

The firmware to be installed exists on the device.

##### 6.6.2.2.2 Signature –installFirmware

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| firmwareInfo | IN | NO | The device firmware information.  Type FirmwareInfo, see 6.6.1.1.1.5 |
| deviceId | IN | YES | The unique device identifier in the context of the M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. |
| requestId | OUT | NO | The M2M Request Identifier (M2M-Request-ID) |
| firmwareReport | OUT | YES | The firmware management operation execution result or status. Type FirmwareReport, see 6.6.1.1.1.3. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation * Report policy does not supported by the Management Adapter * Operation exception: Firmware is missing dependency on the device * Operation exception: The new firmware is too large for available program or data memory |

Table 6.6.2.2.2-1 Device Management Service –installFirmware capability

##### 6.6.2.2.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.2.2.3-1 installFirmware Diagram

##### 6.6.2.2.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to install firmware.

##### 6.6.2.2.5 Exceptions

* Missing dependency of the firmware on the device
* New firmware is too large for available program or data memory

When invoking the service capability meet these exceptions, the response feedback and no subsequence notifications. AE can continue issue the request after M2M Area network meet the requirement or invoke other service capabilities to troubleshoot related devices.

Editors note: The highlighted text is unclear; we need to clarify the exception handling

##### 6.6.2.2.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.2.2.7 oneM2M Resource Interworking

This service capability is used to install firmware. The service capability aligns with the <firmware> resource and maps to the UPDATE procedure for the attribute update of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.6.2.3 getFirmwareInformation

This service capability provides the ability for AEs to get device firmware information.

##### 6.6.2.3.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the service capability and device exist.

##### 6.6.2.3.2 Signature –getFirmwareInformation

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | YES | The unique device identifier in the context of the M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. |
| requestId | OUT | NO | The M2M Request Identifier (M2M-Request-ID) |
| firmwareInfo | OUT | YES | The device firmware information.  Type FirmwareInfo, see 6.6.1.1.1.5 |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation * Report policy does not supported by the Management Adapter |

Table 6.6.2.3.2-1 Device Management Service –getFirmwareInformation capability

##### 6.6.2.3.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.2.3.3-1 getFirmwareInformation Diagram

##### 6.6.2.3.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get firmware information.

##### 6.6.2.3.5 Exceptions

Not Applicable

##### 6.6.2.3.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.2.3.7 oneM2M Resource Interworking

This service capability is used to get firmware information. The service capability aligns with the <firmware> resource and maps to the RETRIEVE procedure for the attribute version, name, URL of the resource.

#### 6.6.2.4 getFirmwareExecStatus

This service capability provides the ability for AEs to get state of firmware management operation for a specific device.

##### 6.6.2.4.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and previously submitted firmware request exist.

##### 6.6.2.4.2 Signature –getFirmwareExecInstance

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| operationRequestId | IN | NO | The M2M Request Identifier of previously submitted firmware request (M2M-Request-ID) |
| deviceId | IN | YES | The unique device identifier in the context of the M2M Service Subscription. |
| requestId | OUT | NO | The M2M Request Identifier (M2M-Request-ID) |
| firmwareReport | OUT | YES | The firmware management operation execution result or status. Type FirmwareReport, see 6.6.1.1.1.3. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation * Report policy is not supported by the Management Adapter * The previously submitted firmware request does not exist |

Table 6.6.2.4.2-1 Device Management Service –getFirmwareExecInstance capability

##### 6.6.2.4.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.2.3.3-1 getFirmwareExecStatus Diagram

##### 6.6.2.4.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get firmware state of management operation.

##### 6.6.2.4.5 Exceptions

Not Applicable

##### 6.6.2.4.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.2.4.7 oneM2M Resource Interworking

This service capability is used to get state of firmware management operation. The service capability aligns with the <firmware> resource and maps to the RETRIEVE procedure for the attribute updateStatus of the resource. The service capability also aligns with the <execInstance> resource and maps to the RETRIEVE procedure for the attribute execStatus, execResult of the resource.

#### 6.6.2.5 reportFirmwareStatus

This service capability provides the ability to report the firmware management operation execution result or status information to the AE.

##### 6.6.2.5.1 Pre-conditions

A correlation between a Management Adapter, the M2M Service Capability and previously submitted firmware request exist.

##### 6.6.2.5.2 Signature –reportFirmwareStatus

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| isLastReport | IN | NO | Boolean, whether it is the last report. |
| sequenceNumber | IN | NO | The report sequence number. |
| firmwareReportList | IN | NO | Array of firmwareReport.  Type FirmwareReport, see 6.6.1.1.1.3. |
| aggregationPolicy | IN | YES | The policy used to aggregate the result of the management operation prior to the reports being sent. See clause 6.6.1.1.1.2. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * The target AE does not exist. * Aggregation policy does not supported |

Table 6.3.2.5.2-1 Device Management Service –reportFirmwareStatus capability

##### 6.6.2.5.3 Post-Conditions

The AE has received a report of firmware operation execution status or result.

Editor’s note; There are post conditions that requires the M2M System to maintain the “state” of the report (i.e., sequence number.

##### 6.6.2.5.4 Exceptions

Not Applicable

##### 6.6.2.5.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.2.5.6 oneM2M Resource Interworking

Not Applicable

#### 6.6.2.6 upgradeFirmware

This service capability is a complex operation for AEs to upgrade firmware on one or more devices. The service capability utilizes orchestration rules for the related management operations such as downloadFirmware, installFirmware, getFirmwareInformation, getFirmwareExecInstance and reportFirmwareStatus according to the business process.

This service capability permits AEs to upgrade the firmware on individual device, multiple devices or a group of devices. In addition the upgrade of the firmware is permitted based on a schedule for each of the operations.

##### 6.6.2.6.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between Management Adapter, the service capability and devices or device group exist.

##### 6.6.2.6.2 Signature - upgradeFirmware

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| orchestrationRuleList | IN | NO | List of OrchestrationRule. Type OrchestrationRule, see clause 6.6.1.1.1.4. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| aggregationPolicy | IN | YES | The policy used to aggregate the result of the management operation prior to the reports being sent. See clause 6.6.1.1.1.2. |
|  |  |  |  |
| requestId | OUT | NO | The M2M Request Identifier (M2M-Request-ID) |
| firmwareReportList | OUT | YES | Array of firmwareReport.  Type FirmwareReport, see 6.6.1.1.1.3. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Report policy is not supported by the Management Adapter * Aggregation policy is not supported by the Management Adapter * The Orchestration Rules are not supported by the Management Adapter * Operation exception: The device’s reachability schedule is inconsistent with the schedule of the Orchestration rule. |

Table 6.6.2.6.2-1 Device Management Service –upgradeFirmware capability

Editors Note: Need to clarify the device’s reachability schedule.

##### 6.6.2.6.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.2.1.6-1 upgradeFirmware Diagram

##### 6.6.2.6.4 Post-Conditions

The Management Adapter has submitted a set of requests to the Management Server to manage firmware.

##### 6.6.2.6.5 Exceptions

* The device’s reachability schedule is inconsistent with the schedule of the Orchestration rule.

##### 6.6.2.6.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.2.6.7 oneM2M Resource Interworking

Not Applicable

#### 6.6.2.7 getDeviceInformation

This service capability provides the ability for AEs to get device information.

##### 6.6.2.7.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.6.2.7.2 Signature - getDeviceInformation

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| deviceInfo | OUT | NO | The device information. Type DeviceInfo, see 6.6.1.1.1.7. |
| memory | OUT | YES | The memory information. Type Memory, see 6.6.1.1.1.8. |
| battery | OUT | YES | The battery information. Type Battery, see 6.6.1.1.1.9. |
| lockStatus | OUT | YES | The device lock status. Enum LockStatus, see 6.6.1.1.1.13. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation |

Table 6.6.2.7.2-1 Device Management Service –getDeviceInformation capability

##### 6.6.2.7.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.2.7.3-1 getDeviceInformation Diagram

##### 6.6.2.7.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get device information.

Based on the capabilities supported by the device, the memory, battery and lock status information may or may not be returned.

##### 6.6.2.7.5 Exceptions

Not Applicable

##### 6.6.2.7.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.2.7.7 oneM2M Resource Interworking

This service capability is used to get device information. The service capability aligns with the <deviceInfo> resource and maps to the Retrieve procedure for the resource. The service capability aligns with the <memory> resource and maps to the Retrieve procedure for the resource. The service capability aligns with the <battery> resource and maps to the Retrieve procedure for the resource.

#### 6.6.2.8 getDeviceCapabilities

This service capability provides the ability for AEs to get the device capabilities.

##### 6.6.2.8.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.6.2.8.2 Signature –getDeviceCapabilities

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| deviceCapabilities | OUT | YES | List of deviceCapability. Type DeviceCapability, see 6.6.1.1.1.10. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation |

Table 6.6.2.8.2-1 Device Management Service –getDeviceCapabilities capability

##### 6.6.2.8.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.2.8.3-1 getDeviceCapabilities Diagram

##### 6.6.2.8.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get device capabilities.

##### 6.6.2.8.5 Exceptions

Not Applicable

##### 6.6.2.8.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.2.8.7 oneM2M Resource Interworking

This service capability is used to get device capabilities. The service capability aligns with the<deviceCapability> resource and maps to the RETRIEVE procedure for the resource.

#### 6.6.2.9 enableDeviceCapability

This service capability provides the ability for AEs to enable device capability.

##### 6.6.2.9.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.6.2.9.2 Signature –enableDeviceCapability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| name | IN | NO | The name of the capability. Enum DeviceCapabilityName, see 6.6.1.1.1.12. |
| state | OUT | NO | Indicates if the capability is enabled or disabled. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation |

Table 6.6.2.9.2-1 Device Management Service –enableDeviceCapability capability

##### 6.6.2.9.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.2.9.3-1 enableDeviceCapability Diagram

##### 6.6.2.9.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to enable device capability.

##### 6.6.2.9.5 Exceptions

Not Applicable

##### 6.6.2.9.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.2.9.7 oneM2M Resource Interworking

This service capability is used to enable device capability. The service capability aligns with the <deviceCapability> resource and maps to the UPDATE procedure for the attribute enable of the resource.

#### 6.6.2.10 disableDeviceCapability

This service capability provides the ability for AEs to disable device capability.

##### 6.6.2.10.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the service capability and device exist.

##### 6.6.2.10.2 Signature –disableDeviceCapability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| name | IN | NO | The name of the capability. Enum DeviceCapabilityName, see 6.6.1.1.1.12. |
| state | OUT | NO | Indicates if the capability is enabled or disabled. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation |

Table 6.6.2.10.2-1 Device Management Service –disableDeviceCapability capability

##### 6.6.2.10.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.2.10.3-1 disableDeviceCapability Diagram

##### 6.6.2.10.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to disable device capability.

##### 6.6.2.10.5 Exceptions

Not Applicable

##### 6.6.2.10.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.2.10.7 oneM2M Resource Interworking

This service capability is used to disable device capability. The service capability aligns with the <deviceCapability> resource and maps to the UPDATE procedure for the attribute disable of the resource.

#### 6.6.2.11 getAreaNetworks

This service capability provides the ability for AEs to get area networks information.

##### 6.6.2.11.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and area network exist.

##### 6.6.2.11.2 Signature - getAreaNetworks

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| AreaNwks | OUT | YES | Array of area network. Type AreaNwkInfo, see 6.6.1.1.1.14. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation |

Table 6.6.2.11.2-1 Device Management Service –getAreaNetworks capability

##### 6.6.2.11.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.2.11.3-1 getAreaNetworks Diagram

##### 6.6.2.11.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get area networks information.

##### 6.6.2.11.5 Exceptions

Not Applicable

##### 6.6.2.11.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.2.11.7 oneM2M Resource Interworking

This service capability is used to get area networks information. The service capability aligns with the <areaNwkInfo> resource and maps to the RETRIEVE procedure for the resource. The service capability aligns with the <areaNwkDeviceInfo> resource and maps to the Retrieve procedure for the resource.

#### 6.6.2.12 updateDeviceForAreaNetwork

This service capability provides the ability for AEs to update device information for area network.

##### 6.6.2.12.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability, the device and area network exist.

##### 6.6.2.12.2 Signature –updateDeviceForAreaNetwork

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| areaNwkId | IN | NO | The unique area network identifier. |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| areaNwkDeviceInfo | IN | YES | The existing areaNwkDeviceInfo are replaced with the information in this parameter. Type AreaNwkDeviceInfo, see 6.6.1.1.1.16. |
| lastModifiedTime | OUT | NO | The modified time. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation |

Table 6.6.2.12.2-1 Device Management Service –updateDeviceForAreaNetwork capability

##### 6.6.2.12.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.2.12.3-1 updateDeviceForAreaNetwork Diagram

##### 6.6.2.12.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to update device information for area network.

##### 6.6.2.12.5 Exceptions

Not Applicable

##### 6.6.2.12.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.2.12.7 oneM2M Resource Interworking

The service capability aligns with the <areaNwkDeviceInfo> resource and maps to the Update procedure for attribute devType , sleepInterval , sleepDuration , status , listOfNeighbors of the resource.

#### 6.6.2.13 rebootDevice

This service capability provides the ability for AEs to reboot device.

##### 6.6.2.13.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.6.2.13.2 Signature - rebootDevice

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| troubleshootingReport | OUT | YES | The troubleshooting operation execution result or status. Type TroubleshootingReport, see 6.6.1.1.1.20. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation * report policy does not supported by the Management Adapter |

Table 6.6.2.13.2-1 Device Management Service –rebootDevice capability

##### 6.6.2.13.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.2.13.3-1 rebootDevice Diagram

##### 6.6.2.13.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to reboot device.

##### 6.6.2.13.5 Exceptions

Not Applicable

##### 6.6.2.13.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.2.13.7 oneM2M Resource Interworking

This service capability is used to reboot device. The service capability aligns with the <reboot> resource and maps to the Execute procedure for the attribute reboot of the resource.

#### 6.6.2.14 resetDevice

This service capability provides the ability for AEs to reset device.

##### 6.6.2.14.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.6.2.14.2 Signature –resetDevice

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| troubleshootingReport | OUT | YES | The troubleshooting operation execution result or status. Type TroubleshootingReport, see 6.6.1.1.1.20. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation * report policy does not supported by the Management Adapter |

Table 6.6.2.14.2-1 Device Management Service –resetDevice capability

##### 6.6.2.14.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.2.14.3-1 resetDevice Diagram

##### 6.6.2.14.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to reset device.

##### 6.6.2.14.5 Exceptions

Not Applicable

##### 6.6.2.14.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.2.14.7 oneM2M Resource Interworking

This service capability is used to reset device. The service capability aligns with the <reboot> resource and maps to the Execute procedure for the attribute factoryReset of the resource.

#### 6.6.2.15 uploadDeviceLog

This service capability provides the ability for AEs to upload device log.

##### 6.6.2.15.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.6.2.15.2 Signature –uploadDeviceLog

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| logInfo | IN | NO | The log information. Type LogInfo, see 6.6.1.1.1.19. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| logURL | OUT | YES | The URL from which the log can be uploaded. |
| troubleshootingReport | OUT | YES | The troubleshooting operation execution result or status. Type TroubleshootingReport, see 6.6.1.1.1.20. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation * report policy does not supported by the Management Adapter |

Table 6.6.2.15.2-1 Device Management Service –uploadDeviceLog capability

##### 6.6.2.15.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.2.15.3-1 uploadDeviceLog Diagram

##### 6.6.2.15.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to upload device log.

##### 6.6.2.15.5 Exceptions

Not Applicable

##### 6.6.2.15.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.2.15.7 oneM2M Resource Interworking

This service capability is used to upload device log. The service capability aligns with the <eventLog> resource and maps to the Update procedure for the resource.

#### 6.6.2.16 reportTroubleshootingStatus

This service capability provides the ability to report the device troubleshooting operation execution result or status information to the AE.

##### 6.6.2.16.1 Pre-conditions

A correlation between a Management Adapter, the M2M Service Capability and previously submitted troubleshooting request exist.

##### 6.6.2.16.2 Signature –reportTroubleshootingStatus

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| isLastReport | IN | NO | Boolean, whether it is the last report. |
| sequenceNumber | IN | NO | The report sequence number. |
| troubleshootingReportList | IN | NO | Array of troubleshootingReport.  Type TroubleshootingReport, see 6.6.1.1.1.20. |
| aggregationPolicy | IN | YES | The policy used to aggregate the result of the management operation prior to the reports being sent. See clause 6.6.1.1.1.2. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * The target AE does not exist. * Aggregation policy does not supported |

Table 6.6.2.16.2-1 Device Management Service –reportTroubleshootingStatus capability

##### 6.6.2.16.3 Post-Conditions

The AE has received a report of troubleshooting operation execution status or result.

##### 6.6.2.16.4 Exceptions

Not Applicable

##### 6.6.2.16.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.2.16.6 oneM2M Resource Interworking

Not Applicable

#### 6.6.2.17 getDeviceLogs

This service capability provides the ability for AEs to get all logs of a device.

##### 6.6.2.17.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.6.2.17.2 Signature - getDeviceLogs

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| logList | OUT | YES | Array of log. Type Log, see 6.6.1.1.1.21. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation |

Table 6.6.2.17.2-1 Device Management Service –getDeviceLogs capability

##### 6.6.2.17.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.2.17.3-1 getDeviceLogs Diagram

##### 6.6.2.17.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get all logs of a device.

##### 6.6.2.17.5 Exceptions

Not Applicable

##### 6.6.2.17.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.2.17.7 oneM2M Resource Interworking

This service capability is used to get all logs of a device. The service capability aligns with the <eventLog> resource and maps to the Retrieve procedure for the resource.

#### 6.6.2.18 getDeviceLogInformation

This service capability provides the ability for AEs to get a device log information.

##### 6.6.2.18.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.6.2.18.2 Signature - getDeviceLogInformation

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| filterCriteria | IN | YES | See Table 6.6.1.1.1.22 |
| logURL | IN | YES | The URL from which the log can be accessed. |
| log | OUT | YES | Type Log, see 6.6.1.1.1.21. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation |

Table 6.6.2.18.2-1 Device Management Service –getDeviceLogInformation capability

##### 6.6.2.18.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.2.18.3-1 getDeviceLogInformation Diagram

##### 6.6.2.18.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get a device log information.

##### 6.6.2.18.5 Exceptions

Not Applicable

##### 6.6.2.18.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.2.18.7 oneM2M Resource Interworking

This service capability is used to a device log information. The service capability aligns with the <eventLog> resource and maps to the Retrieve procedure for the resource.

#### 6.6.2.19 getSoftwareInformation

This service capability provides the ability for AEs to get application software information.

##### 6.6.2.19.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.6.2.19.2 Signature - getSoftwareInformation

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| version | OUT | YES | The version of the software. |
| name | OUT | YES | The name of the software. |
| URL | OUT | YES | The URL from which the software package can be downloaded. |
| installStatus | OUT | YES | Indicates the status of the install.  Enum ActionStatus, see 6.6.1.1.1.26. |
| activeStatus | OUT | YES | The status of active or deactivate action.  Enum ActionStatus, see 6.6.1.1.1.26. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation |

Table 6.6.2.19.2-1 Device Management Service –getSoftwareInformation capability

##### 6.6.2.19.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.2.19.3-1 getSoftwareInformation Diagram

##### 6.6.2.19.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get application software information.

##### 6.6.2.19.5 Exceptions

Not Applicable

##### 6.6.2.19.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.2.19.7 oneM2M Resource Interworking

This service capability is used to get application software information. The service capability aligns with the <software> resource and maps to the Retrieve procedure for the resource.

#### 6.6.2.20 downloadSoftware

This service capability provides the ability for AEs to download application software.

##### 6.6.2.20.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.6.2.20.2 Signature –downloadSoftware

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| URL | IN | NO | The URL from which the software package can be downloaded. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| softwareReport | OUT | YES | The software management operation execution result or status. Type SoftwareReport, see 6.6.1.1.1.27. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation * report policy does not supported by the Management Adapter |

Table 6.6.2.20.2-1 Device Management Service –downloadSoftware capability

##### 6.6.2.20.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.2.20.3-1 downloadSoftware Diagram

##### 6.6.2.20.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to download application software.

##### 6.6.2.20.5 Exceptions

Not Applicable

##### 6.6.2.20.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.2.20.7 oneM2M Resource Interworking

This service capability is used to download application software. The service capability aligns with the <software> resource and maps to the UPDATE procedure for the attribute install of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.6.2.21 installSoftware

This service capability provides the ability for AEs to install application software.

##### 6.6.2.21.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.6.2.21.2 Signature –installSoftware

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| softwareReport | OUT | YES | The software management operation execution result or status. Type SoftwareReport, see 6.6.1.1.1.27. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation * report policy does not supported by the Management Adapter |

Table 6.6.2.21.2-1 Device Management Service –installSoftware capability

##### 6.6.2.21.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.2.21.3-1 installSoftware Diagram

##### 6.6.2.21.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to install application software.

##### 6.6.2.21.5 Exceptions

Not Applicable

##### 6.6.2.21.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.2.21.7 oneM2M Resource Interworking

This service capability is used to install application software. The service capability aligns with the <software> resource and maps to the UPDATE procedure for the attribute install of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.6.2.22 activateSoftware

This service capability provides the ability for AEs to activate software previously installed.

##### 6.6.2.22.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.6.2.22.2 Signature –activateSoftware

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| softwareReport | OUT | YES | The software management operation execution result or status. Type SoftwareReport, see 6.6.1.1.1.27. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation * report policy does not supported by the Management Adapter |

Table 6.6.2.22.2-1 Device Management Service –activateSoftware capability

##### 6.6.2.22.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.2.22.3-1 activateSoftware Diagram

##### 6.6.2.22.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to activate software previously installed.

##### 6.6.2.22.5 Exceptions

Not Applicable

##### 6.6.2.22.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.2.22.7 oneM2M Resource Interworking

This service capability is used to activate software previously installed. The service capability aligns with the <software> resource and maps to the UPDATE procedure for the attribute activate of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.6.2.23 deactivateSoftware

This service capability provides the ability for AEs to deactivates software.

##### 6.6.2.23.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and the device exist.

##### 6.6.2.23.2 Signature –deactivateSoftware

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| softwareReport | OUT | YES | The software management operation execution result or status. Type SoftwareReport, see 6.6.1.1.1.27. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation * report policy does not supported by the Management Adapter |

Table 6.6.2.23.2-1 Device Management Service –deactivateSoftware capability

##### 6.6.2.23.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.2.23.3-1 deactivateSoftware Diagram

##### 6.6.2.23.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to deactivates software.

##### 6.6.2.23.5 Exceptions

Not Applicable

##### 6.6.2.23.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.2.23.7 oneM2M Resource Interworking

This service capability is used to deactivates software. The service capability aligns with the <software> resource and maps to the UPDATE procedure for the attribute deactivate of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.6.2.24 removeSoftware

This service capability provides the ability for AEs to uninstall the software.

##### 6.6.2.24.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and the device exist.

##### 6.6.2.24.2 Signature - removeSoftware

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| softwareReport | OUT | YES | The software management operation execution result or status. Type SoftwareReport, see 6.6.1.1.1.27. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation * report policy does not supported by the Management Adapter |

Table 6.6.2.24.2-1 Device Management Service –removeSoftware capability

##### 6.6.2.24.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.2.24.3-1 removeSoftware Diagram

##### 6.6.2.24.4 Post-Conditions

The Management Adapter has submitted a set of requests to the Management Server to uninstall the software.

##### 6.6.2.24.5 Exceptions

Not Applicable

##### 6.6.2.24.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.2.24.7 oneM2M Resource Interworking

This service capability is used to install application software. The service capability aligns with the <software> resource and maps to the UPDATE procedure for the attribute uninstall of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.6.2.25 reportSoftwareStatus

This service capability provides the ability to report the application software management operation execution result or status information to the AE.

##### 6.6.2.25.1 Pre-conditions

A correlation between a Management Adapter, the M2M Service Capability and previously submitted application software management request exist.

##### 6.6.2.25.2 Signature –reportSoftwareStatus

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| isLastReport | IN | NO | Boolean, whether it is the last report. |
| sequenceNumber | IN | NO | The report sequence number. |
| softwareReportList | IN | NO | Array of softwareReport.  Type SoftwareReport, see 6.6.1.1.1.27. |
| aggregationPolicy | IN | YES | The policy used to aggregate the result of the management operation prior to the reports being sent. See clause 6.6.1.1.1.2. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * The target AE does not exist. * Aggregation policy does not supported |

Table 6.6.2.25.2-1 Device Management Service –reportSoftwareStatus capability

##### 6.6.2.25.3 Post-Conditions

The AE has received a report of application software management operation execution status or result.

##### 6.6.2.25.4 Exceptions

Not Applicable

##### 6.6.2.25.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.2.25.6 oneM2M Resource Interworking

Not Applicable

## 6.7 Management Adapter

### 6.7.1 Overview

The Management Adapter service provides the ability to adapt the M2M Service Layer operations to the technology specific operations of the Management Server.

### 6.7.2 Service Capabilities

#### 6.7.2.1 downloadFirmware

This service capability provides the ability to download the specific device firmware.

##### 6.7.2.1.1 Pre-conditions

A correlation between a Management Server, the service capability and device exist.

##### 6.7.2.1.2 Signature – downloadFirmware

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| firmwareInfo | IN | NO | The device firmware information.  Type FirmwareInfo, see 6.6.1.1.1.5 |
| deviceId | IN | YES | The unique device identifier in the context of the M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| requestId | IN | NO | The M2M Request Identifier (M2M-Request-ID) |
| firmwareReport | OUT | YES | The firmware management operation execution result or status. Type FirmwareReport, see 6.6.1.1.1.3. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Report policy is not supported by the Management Adapter |

Table 6.7.2.1.2-1 Management Adapter –downloadFirmware capability

##### 6.7.2.1.3 Post-Conditions

The Management Adapter has submitted a request to the Management Server to download the firmware.

##### 6.7.2.1.4 Exceptions

* New firmware is too large for available program or data memory

When these exceptions are thrown, the requested operation is completed and any corresponding reports for the device are not sent.

Editors Note: These exceptions should be considered as whether they are exceptions or should be error response code. Exceptions stop processing immediately; errors response complete the request-response interaction. Both will be reported to the target AE.

##### 6.7.2.1.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.1.6 oneM2M Resource Interworking

This service capability is used to download firmware. The service capability aligns with the <firmware> resource and maps to the UPDATE procedure for the attribute update of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.7.2.2 installFirmware

This service capability provides the ability to install firmware on a device.

##### 6.7.2.2.1 Pre-conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.2.2 Signature –installFirmware

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| firmwareInfo | IN | NO | The device firmware information.  Type FirmwareInfo, see 6.6.1.1.1.5 |
| deviceId | IN | YES | The unique device identifier in the context of the M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. |
| requestId | IN | NO | The M2M Request Identifier (M2M-Request-ID) |
| firmwareReport | OUT | YES | The firmware management operation execution result or status. Type FirmwareReport, see 6.6.1.1.1.3. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation * Report policy does not supported by the Management Adapter |

Table 6.7.2.2.2-1 Management Adapter –installFirmware capability

##### 6.7.2.2.3 Post-Conditions

The Management Adapter has submitted a request to the Management Server to install firmware.

##### 6.7.2.2.4 Exceptions

* Missing dependency in the device for the firmware and requested operation
* New firmware is too large for available program or data memory

When these exceptions are thrown, the requested operation is completed and any corresponding reports for the device are not sent.

##### 6.7.2.2.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.2.6 oneM2M Resource Interworking

This service capability is used to install firmware. The service capability aligns with the <firmware> resource and maps to the UPDATE procedure for the attribute update of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.7.2.3 getFirmwareInformation

This service capability provides the ability to retrieve the information related to the firmware on a device..

##### 6.7.2.3.1 Pre-conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.3.2 Signature –getFirmwareInformation

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | YES | The unique device identifier in the context of the M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. |
| requestId | IN | NO | The M2M Request Identifier (M2M-Request-ID) |
| firmwareInfo | OUT | YES | The device firmware information.  Type FirmwareInfo, see 6.6.1.1.1.5 |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Report policy is not supported by the Management Adapter |

Table 6.7.2.3.2-1 Management Adapter –getFirmwareInformation capability

##### 6.7.2.3.3 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get the firmware information.

##### 6.7.2.3.4 Exceptions

Not Applicable

##### 6.7.2.3.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.3.6 oneM2M Resource Interworking

This service capability is used to get firmware information. The service capability aligns with the <firmware> resource and maps to the RETRIEVE procedure for the attribute version, name, URL of the resource.

#### 6.7.2.4 getFirmwareExecStatus

This service capability provides the ability to get state of firmware management operation for a specific device.

##### 6.7.2.4.1 Pre-conditions

A correlation between a Management Server, the M2M Service Capability and previously submitted firmware request exist.

##### 6.7.2.4.2 Signature –getFirmwareExecInstance

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| operationRequestId | IN | NO | The M2M Request Identifier of previously submitted firmware request (M2M-Request-ID) |
| deviceId | IN | YES | The unique device identifier in the context of the M2M Service Subscription. When provided the FirmwareReport type is generated for only the specified device. |
| firmwareReports | OUT | YES | The list of firmware management operation execution result or status for each device in the operation request. Type FirmwareReport, see 6.6.1.1.1.3. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * The previously submitted firmware request does not exist |

Table 6.7.2.4.2-1 Management Adapter –getFirmwareExecStatus capability

##### 6.7.2.4.3 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get the firmware operation execution status or result for each device in the operation request.

##### 6.7.2.4.4 Exceptions

Not Applicable

##### 6.7.2.4.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.4.6 oneM2M Resource Interworking

This service capability is used to get state of firmware management operation. The service capability aligns with the <firmware> resource and maps to the RETRIEVE procedure for the attribute updateStatus of the resource. The service capability also aligns with the <execInstance> resource and maps to the RETRIEVE procedure for the attribute execStatus, execResult of the resource.

#### 6.7.2.5 reportFirmwareStatus

This service capability provides the ability for the Management Adapter to report the firmware management operation execution result or status information. The Management Adapter can send one or multiple firmware reports according to the aggregation policy.

##### 6.7.2.5.1 Pre-conditions

A correlation between a Management Server, the M2M Service Capability and previously submitted firmware requests exist.

##### 6.7.2.5.2 Signature –reportFirmwareStatus

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| to | IN | NO | The identifier of the AE that is to receive the data(M2M-AppInst-ID) |
| isLastReport | IN | NO | Boolean, whether it is the last report. |
| sequenceNumber | IN | NO | The report sequence number. |
| firmwareReportList | IN | NO | Array of firmwareReport.  Type FirmwareReport, see 6.6.1.1.1.3. |
| aggregationPolicy | IN | YES | The policy used to aggregate the result of the management operation prior to the reports being sent. See clause 6.6.1.1.1.2. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * The target AE does not exist. * Aggregation policy does not supported |

Table 6.7.2.5.2-1 Management Adapter –reportFirmwareStatus capability

##### 6.7.2.5.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.7.2.5.3-1 firmwareReport Diagram

##### 6.7.2.5.4 Post-Conditions

Not Applicable

Editors note: We need to clarify the post conditions around the sequence number of the report.

##### 6.7.2.5.5 Exceptions

Not Applicable

##### 6.7.2.5.6 Policies for Use

Message Exchange Patterns: Not Applicable

Transaction Pattern: Not Applicable

##### 6.7.2.5.7 oneM2M Resource Interworking

Not Applicable

#### 6.7.2.6 getDeviceInformation

This service capability provides the ability to get the specific device information.

##### 6.7.2.6.1 Pre-conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.6.2 Signature –getDeviceInformation

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| deviceInfo | OUT | YES | The device information. Type DeviceInfo, see 6.6.1.1.1.7. |
| memory | OUT | YES | The memory information. Type Memory, see 6.6.1.1.1.8. |
| battery | OUT | YES | The battery information. Type Battery, see 6.6.1.1.1.9. |
| lockStatus | OUT | YES | The device lock status. Enum LockStatus, see 6.6.1.1.1.13. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table 6.7.2.6.2-1 Management Adapter –getDeviceInformation capability

##### 6.7.2.6.3 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get the device information.

##### 6.7.2.6.4 Exceptions

Not Applicable

##### 6.7.2.6.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.6.6 oneM2M Resource Interworking

This service capability is used to get device information. The service capability aligns with the <deviceInfo> resource and maps to the RETRIEVE procedure for the resource. The service capability aligns with the <memory> resource and maps to the Retrieve procedure for the resource. The service capability aligns with the <battery> resource and maps to the Retrieve procedure for the resource.

#### 6.7.2.7 getDeviceCapabilities

This service capability provides the ability to get device capabilities.

##### 6.7.2.7.1 Pre-conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.7.2 Signature –getDeviceCapabilities

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| deviceCapabilities | OUT | YES | Array of deviceCapability. Type DeviceCapability, see 6.6.1.1.1.10. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table 6.7.2.7.2-1 Management Adapter –getDeviceCapabilities capability

##### 6.7.2.7.3 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get device capabilities.

##### 6.7.2.7.4 Exceptions

Not Applicable

##### 6.7.2.7.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.7.6 oneM2M Resource Interworking

This service capability is used to get device capabilities. The service capability aligns with the<deviceCapability> resource and maps to the RETRIEVE procedure for the resource.

#### 6.7.2.8 enableDeviceCapability

This service capability provides the ability to enable device capability.

##### 6.7.2.8.1 Pre-conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.8.2 Signature –enableDeviceCapability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| name | IN | NO | The name of the capability. Enum DeviceCapabilityName, see 6.6.1.1.1.12. |
| state | OUT | NO | Indicates if the capability is enabled or disabled. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table 6.7.2.8.2-1 Management Adapter –enableDeviceCapability capability

##### 6.7.2.8.3 Post-Conditions

The Management Adapter has submitted a request to the Management Server to enable device capability.

##### 6.7.2.8.4 Exceptions

Not Applicable

##### 6.7.2.8.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.8.6 oneM2M Resource Interworking

This service capability is used to enable device capability. The service capability aligns with the <deviceCapability> resource and maps to the UPDATE procedure for the attribute enable of the resource.

#### 6.7.2.9 disableDeviceCapability

This service capability provides the ability to disable device capability.

##### 6.7.2.9.1 Pre-conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.9.2 Signature –disableDeviceCapability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| name | IN | NO | The name of the capability. Enum DeviceCapabilityName, see 6.6.1.1.1.12. |
| state | OUT | NO | Indicates if the capability is enabled or disabled. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table 6.7.2.9.2-1 Management Adapter –disableDeviceCapability capability

##### 6.7.2.9.3 Post-Conditions

The Management Adapter has submitted a request to the Management Server to disable device capability.

##### 6.7.2.9.4 Exceptions

Not Applicable

##### 6.7.2.9.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.9.6 oneM2M Resource Interworking

This service capability is used to disable device capability. The service capability aligns with the <deviceCapability> resource and maps to the UPDATE procedure for the attribute disable of the resource.

#### 6.7.2.10 getAreaNetworks

This service capability provides the ability to get area networks information.

##### 6.7.2.10.1 Pre-conditions

A correlation between a Management Server, the M2M Service Capability and area network exist.

##### 6.7.2.10.2 Signature –getAreaNetworks

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| AreaNwks | OUT | YES | Array of area network. Type AreaNwkInfo, see 6.6.1.1.1.13. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table 6.7.2.10.2-1 Management Adapter –getAreaNetworks capability

##### 6.7.2.10.3 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get area networks information.

##### 6.7.2.10.4 Exceptions

Not Applicable

##### 6.7.2.10.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.10.6 oneM2M Resource Interworking

This service capability is used to get area networks information. The service capability aligns with the <areaNwkInfo> resource and maps to the RETRIEVE procedure for the resource. The service capability aligns with the <areaNwkDeviceInfo> resource and maps to the Retrieve procedure for the resource.

#### 6.7.2.11 updateDeviceForAreaNetwork

This service capability provides the ability for the Management Adapter to update device information for area network.

##### 6.7.2.11.1 Pre-conditions

A correlation between a Management Server, the M2M Service Capability, the device and area network exists.

##### 6.7.2.11.2 Signature –updateDeviceForAreaNetwork

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| areaNwkId | IN | NO | The unique area network identifier. |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| areaNwkDeviceInfo | IN | YES | The existing areaNwkDeviceInfo are replaced with the information in this parameter. Type AreaNwkDeviceInfo, see 6.6.1.1.1.15. |
| lastModifiedTime | OUT | NO | The modified time. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table 6.7.2.11.2-1 Management Adapter –updateDeviceForAreaNetwork capability

##### 6.7.2.11.3 Post-Conditions

The Management Adapter has submitted a request to the Management Server to update device information for area network.

##### 6.7.2.11.4 Exceptions

Not Applicable

##### 6.7.2.11.5 Policies for Use

Message Exchange Patterns: Not Applicable

Transaction Pattern: Not Applicable

##### 6.7.2.11.6 oneM2M Resource Interworking

The service capability aligns with the <areaNwkDeviceInfo> resource and maps to the Update procedure for attribute devType , sleepInterval , sleepDuration , status , listOfNeighbors of the resource.

#### 6.7.2.12 rebootDevice

This service capability provides the ability to reboot the specific device.

##### 6.7.2.12.1 Pre-conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.12.2 Signature –rebootDevice

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| troubleshootingReport | OUT | YES | The troubleshooting operation execution result or status. Type TroubleshootingReport, see 6.6.1.1.1.20. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table 6.7.2.12.2-1 Management Adapter –rebootDevice capability

##### 6.7.2.12.3 Post-Conditions

The Management Adapter has submitted a request to the Management Server to reboot the device.

##### 6.7.2.12.4 Exceptions

Not Applicable

##### 6.7.2.12.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.12.6 oneM2M Resource Interworking

This service capability is used to reboot device. The service capability aligns with the <reboot> resource and maps to the Execute procedure for the attribute reboot of the resource.

#### 6.7.2.13 resetDevice

This service capability provides the ability to reset device.

##### 6.7.2.13.1 Pre-conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.13.2 SIgnature –resetDevice

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| troubleshootingReport | OUT | YES | The troubleshooting operation execution result or status. Type TroubleshootingReport, see 6.6.1.1.1.20. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table 6.7.2.13.2-1 Management Adapter –resetDevice capability

##### 6.7.2.13.3 Post-Conditions

The Management Adapter has submitted a request to the Management Server to reset device.

##### 6.7.2.13.4 Exceptions

Not Applicable

##### 6.7.2.13.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.13.6 oneM2M Resource Interworking

This service capability is used to reset device. The service capability aligns with the <reboot> resource and maps to the Execute procedure for the attribute factoryReset of the resource.

#### 6.7.2.14 uploadDeviceLog

This service capability provides the ability to upload device log.

##### 6.7.2.14.1 Pre-conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.14.2 SIgnature –uploadDeviceLog

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| logInfo | IN | NO | The log information. Type LogInfo, see 6.6.1.1.1.19. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| logURL | OUT | YES | The URL from which the log can be uploaded. |
| troubleshootingReport | OUT | YES | The troubleshooting operation execution result or status. Type TroubleshootingReport, see 6.6.1.1.1.20. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table 6.7.2.14.2-1 Management Adapter –uploadDeviceLog capability

##### 6.7.2.14.3 Post-Conditions

The Management Adapter has submitted a request to the Management Server to upload device log.

##### 6.7.2.14.4 Exceptions

Not Applicable

##### 6.7.2.14.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.14.6 oneM2M Resource Interworking

This service capability is used to upload device log. The service capability aligns with the <eventLog> resource and maps to the Update procedure for the resource.

#### 6.7.2.15 reportTroubleshootingStatus

This service capability provides the ability for the Management Adapter to report the troubleshooting operation execution result or status information. The Management Adapter can send one or multiple troubleshooting reports according to the aggregation policy.

##### 6.7.2.15.1 Pre-conditions

A correlation between a Management Server, the M2M Service Capability and previously submitted troubleshooting requests exist.

##### 6.7.2.15.2 Signature –reportTroubleshootingStatus

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| to | IN | NO | The identifier of the AE that is to receive the data(M2M-AppInst-ID) |
| isLastReport | IN | NO | Boolean, whether it is the last report. |
| sequenceNumber | IN | NO | The report sequence number. |
| troubleshootingReportList | IN | NO | Array of troubleshootingReport.  Type TroubleshootingReport, see 6.6.1.1.1.20. |
| aggregationPolicy | IN | YES | The policy used to aggregate the result of the management operation prior to the reports being sent. See clause 6.6.1.1.1.2. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * The target AE does not exist. * Aggregation policy does not supported |

Table 6.7.2.18.2-1 Management Adapter –reportTroubleshootingStatus capability

##### 6.7.2.15.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.7.2.15.3-1 reportTroubleshootingStatus Diagram

##### 6.7.2.15.4 Post-Conditions

Not Applicable

##### 6.7.2.15.5 Exceptions

Not Applicable

##### 6.7.2.15.6 Policies for Use

Message Exchange Patterns: Not Applicable

Transaction Pattern: Not Applicable

##### 6.7.2.15.7 oneM2M Resource Interworking

Not Applicable

#### 6.7.2.16 getDeviceLogs

This service capability provides the ability to get all logs of a device.

##### 6.7.2.16.1 Pre-conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.16.2 SIgnature –getDeviceLogs

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| logList | OUT | YES | Array of log. Type Log, see 6.6.1.1.1.21. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table 6.7.2.16.2-1 Management Adapter –getDeviceLogs capability

##### 6.7.2.16.3 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get all logs of a device.

##### 6.7.2.16.4 Exceptions

Not Applicable

##### 6.7.2.16.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.16.6 oneM2M Resource Interworking

This service capability is used to get all logs of a device. The service capability aligns with the <eventLog> resource and maps to the Retrieve procedure for the resource.

#### 6.7.2.17 getDeviceLogInformation

This service capability provides the ability to get a device log information.

##### 6.7.2.17.1 Pre-conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.17.2 SIgnature –getDeviceLogInformation

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| filterCriteria | IN | YES | See Table 6.6.1.1.1.22 |
| logURL | IN | YES | The URL from which the log can be accessed. |
| log | OUT | YES | Type Log, see 6.6.1.1.1.21. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table 6.7.2.17.2-1 Management Adapter –getDeviceLogInformation capability

##### 6.7.2.17.3 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get a device log information.

##### 6.7.2.17.4 Exceptions

Not Applicable

##### 6.7.2.17.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.17.6 oneM2M Resource Interworking

This service capability is used to get device log information. The service capability aligns with the <eventLog> resource and maps to the Retrieve procedure for the resource.

#### 6.7.2.18 getSoftwareInformation

This service capability provides the ability to get application software information.

##### 6.7.2.18.1 Pre-conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.18.2 Signature –getSoftwareInformation

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| version | OUT | YES | The version of the software. |
| name | OUT | YES | The name of the software. |
| URL | OUT | YES | The URL from which the software package can be downloaded. |
| installStatus | OUT | YES | Indicates the status of the install.  Enum ActionStatus, see 6.6.1.1.1.26. |
| activeStatus | OUT | YES | The status of active or deactivate action.  Enum ActionStatus, see 6.6.1.1.1.26. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |
|  |  |  |  |

**Table 6.7.2.18.2-1 Management Adapter –getSoftwareInformation capability**

##### 6.7.2.18.3 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get application software information.

##### 6.7.2.18.4 Exceptions

Not Applicable

##### 6.7.2.18.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.18.6 oneM2M Resource Interworking

This service capability is used to get application software information. The service capability aligns with the <software> resource and maps to the Retrieve procedure for the resource.

#### 6.7.2.19 downloadSoftware

This service capability provides the ability to download application software.

##### 6.7.2.19.1 Pre-conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.19.2 SIgnature –downloadSoftware

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| URL | IN | NO | The URL from which the software package can be downloaded. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| softwareReport | OUT | YES | The software management operation execution result or status. Type SoftwareReport, see 6.6.1.1.1.27. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table 6.7.2.19.2-1 Management Adapter –downloadSoftware capability

##### 6.7.2.19.3 Post-Conditions

The Management Adapter has submitted a request to the Management Server to download application software.

##### 6.7.2.19.4 Exceptions

Not Applicable

##### 6.7.2.19.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.19.6 oneM2M Resource Interworking

This service capability is used to download application software. The service capability aligns with the <software> resource and maps to the UPDATE procedure for the attribute install of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.7.2.20 installSoftware

This M2M Service Capability provides the ability to install application software.

##### 6.7.2.20.1 Pre-conditions

A correlation between a Management Server, the service capability and device exist.

##### 6.7.2.20.2 SIgnature –installSoftware

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| softwareReport | OUT | YES | The software management operation execution result or status. Type SoftwareReport, see 6.6.1.1.1.27. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table 6.7.2.20.2-1 Management Adapter –installSoftware capability

##### 6.7.2.20.3 Post-Conditions

The Management Adapter has submitted a request to the Management Server to install application software.

##### 6.7.2.20.4 Exceptions

Not Applicable

##### 6.7.2.20.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.20.6 oneM2M Resource Interworking

This service capability is used to install application software. The service capability aligns with the <software> resource and maps to the UPDATE procedure for the attribute install of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.7.2.21 activateSoftware

This service capability provides the ability to activate software previously installed.

##### 6.7.2.21.1 Pre-conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.21.2 SIgnature –activateSoftware

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| softwareReport | OUT | YES | The software management operation execution result or status. Type SoftwareReport, see 6.6.1.1.1.27. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table 6.7.2.21.2-1 Management Adapter –activateSoftware capability

##### 6.7.2.21.3 Post-Conditions

The Management Adapter has submitted a request to the Management Server to activate software previously installed.

##### 6.7.2.21.4 Exceptions

Not Applicable

##### 6.7.2.21.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.21.6 oneM2M Resource Interworking

This service capability is used to activate software previously installed. The service capability aligns with the <software> resource and maps to the UPDATE procedure for the attribute activate of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.7.2.22 deactivateSoftware

This service capability provides the ability for the Management Adapter to deactivates software.

##### 6.7.2.22.1 Pre-conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.22.2 Signature –deactivateSoftware

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| softwareReport | OUT | YES | The software management operation execution result or status. Type SoftwareReport, see 6.6.1.1.1.27. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table 6.7.2.16.2-1 Management Adapter –deactivateSoftware capability

##### 6.7.2.22.3 Post-Conditions

The Management Adapter has submitted a request to the Management Server to deactivates software.

##### 6.7.2.22.4 Exceptions

Not Applicable

##### 6.7.2.22.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.22.6 oneM2M Resource Interworking

This service capability is used to deactivates software. The service capability aligns with the <software> resource and maps to the UPDATE procedure for the attribute deactivate of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.7.2.23 removeSoftware

This service capability provides the ability for the Management Adapter to uninstall the software.

##### 6.7.2.23.1 Pre-conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.23.2 Signature –removeSoftware

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| softwareReport | OUT | YES | The software management operation execution result or status. Type SoftwareReport, see 6.6.1.1.1.27. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table 6.7.2.23.2-1 Management Adapter –removeSoftware capability

##### 6.7.2.23.3 Post-Conditions

The Management Adapter has submitted a request to the Management Server to uninstall the software.

##### 6.7.2.23.4 Exceptions

Not Applicable

##### 6.7.2.23.5 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.23.6 oneM2M Resource Interworking

This service capability is used to install application software. The service capability aligns with the <software> resource and maps to the UPDATE procedure for the attribute uninstall of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.7.2.24 reportSoftwareStatus

This service capability provides the ability for the Management Adapter to report the application software management operation execution result or status information. The Management Adapter can send one or multiple software reports according to the aggregation policy.

##### 6.7.2.24.1 Pre-conditions

A correlation between a Management Server, the M2M Service Capability and previously submitted application software management requests exist.

##### 6.7.2.24.2 Signature –reportSoftwareStatus

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| to | IN | NO | The identifier of the AE that is to receive the data(M2M-AppInst-ID) |
| isLastReport | IN | NO | Boolean, whether it is the last report. |
| sequenceNumber | IN | NO | The report sequence number. |
| softwareReportList | IN | NO | Array of softwareReport.  Type SoftwareReport, see 6.6.1.1.1.27. |
| aggregationPolicy | IN | YES | The policy used to aggregate the result of the management operation prior to the reports being sent. See clause 6.6.1.1.1.2. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * The target AE does not exist. * Aggregation policy does not supported |

Table 6.7.2.24.2-1 Management Adapter –reportSoftwareStatus capability

##### 6.7.2.24.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.7.2.24.3-1 reportSoftwareStatus Diagram

##### 6.7.2.24.4 Post-Conditions

Not Applicable

##### 6.7.2.24.5 Exceptions

Not Applicable

##### 6.7.2.24.6 Policies for Use

Message Exchange Patterns: Not Applicable

Transaction Pattern: Not Applicable

##### 6.7.2.24.7 oneM2M Resource Interworking

Not Applicable

## 6.8 Supporting Service Administration

### 6.8.1 Overview

The Supporting Service Administration service provides the capability to administer the following across the Msc Reference Points:

* Maintenance of Supporting Services
* Association of Service Roles

#### 6.8.1.1 Supporting Service Entity

The Supporting Service is a primary entity that provides the attributes to identify the Supporting Service and associated Service Roles within the oneM2M System. These Supporting Services and associated Service Roles shall be maintained by the M2M Service Provider.

| Attribute name | Description |
| --- | --- |
| serviceId | The Supporting Service Identifier (M2M-Serv-ID). |
| labels | The List of labels used as filter criteria for the Supporting Service. |
| serviceRoleIds | List of Service Role Identifiers (SRole-ID) associated with the Supporting Service. |
| lastModifiedTime | See Table A.2.1-1 |
| creationTime | See Table A.2.1-1 |

Table 6.8.1.1-1 Supporting Service Entity

##### 6.8.1.1.1 M2M Service Filter Criteria

| Criterion name | Description |
| --- | --- |
| serviceId | The Supporting Service Identifier (M2M-Serv-ID). |
| labels | One or more labels assigned to the Supporting Service entity. |
| serviceRoleIds | One or more Service Role Identifiers (SRole-ID) associated with the Supporting Service entity. |
| lastModifiedTime | See Table A.2.1-1 |
| creationTime | See Table A.2.1-1 |

Table 6.8.1.1.1-1 Supporting Service Filter Criteria

### 6.8.2 Service Capabilities

#### 6.8.2.1 createSupportingService

This service capability provides the ability to create a Supporting Service.

##### 6.8.2.1.1 Pre-conditions

Not Applicable

##### 6.8.2.1.2 Signature - createSupportingService

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| name | IN | NO | The unique name of the Supporting Service. |
| description | IN | YES | The description of the Supporting Service. |
| serviceId | OUT | NO | The identifier of the created M2M Service (M2M-Serv-ID) |
| responseType | OUT | YES | Unique response types for this service.   * Supporting Service exists for the name parameter * Supporting Service Role exists for serviceRole name parameter |

Table 6.4.2.1.2-1 Supporting Service Administration – createSupportingService capability

##### 6.8.2.1.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the createSupportingService capability



Figure 6.8.2.1.3-1 Supporting Service Administration – createSupportingService Diagram

##### 6.8.2.1.4 Post-Conditions

Not Applicable

##### 6.8.2.1.5 Exceptions

Not Applicable

##### 6.8.2.1.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.8.2.1.7 oneM2M Resource Interworking

This service capability creates the Supporting Service (M2M Service). The M2M Service entity is described in the Annex G of the oneM2M Functional Architecture [2]. The M2M-Serv-ID created using this capability shall map to the M2M-Serv-ID of the oneM2M Functional Architecture [2].

#### 6.8.2.2 deleteSupportingService

This service capability provides the ability to delete a Supporting Service. This service capability shall be restricted to the Msc Reference Point.

##### 6.8.2.2.1 Pre-conditions

The Supporting Service’s Service Roles are not associated with any M2M Service Subscriptions.

##### 6.8.2.2.2 Signature – deleteSupportingService

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceId | IN | NO | The M2M Service Identifier (M2M-Serv-ID). |
| responseType | OUT | YES | Unique response types for this service.   * Service does not exist * Service has Service Roles associated with M2M Service Subscriptions |

Table 6.8.2.2.2-1 Supporting Service Administration – deleteSupportingService capability

##### 6.8.2.2.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the deleteSupportingService capability



Figure 6.8.2.2.3-1 Supporting Service Administration – deleteSupportingService Diagram

##### 6.8.2.2.4 Post-Conditions

The Supporting Service is deleted along with any associations of the has to the Service Roles. The Node information associated with the Supporting Service is also deleted.

##### 6.8.2.2.5 Exceptions

Not Applicable

##### 6.8.2.2.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.8.2.2.7 oneM2M Resource Interworking

This service capability deletes the Supporting Service (M2M Service). The M2M Service entity is described in the Annex G of the oneM2M Functional Architecture [2].

#### 6.8.2.3 updateSupportingService

This service capability provides the ability to update a Supporting Service. This service capability shall be restricted to the Msc Reference Point.

##### 6.8.4.1.1 Pre-conditions

Not Applicable

##### 6.8.2.3.2 Signature – updateSupportingService

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceId | IN | NO | The M2M Service Identifier (M2M-Serv-ID). |
| labels | IN | YES | See Table A.2.1-1  The existing labels are replaced with the labels in this parameter. |
| lastModifiedTime | OUT | NO | See Table A.2.1-1 |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service Subscription does not exist |

Table 6.8.2.3.2-1 Supporting Service Administration – updateSupportingService capability

##### 6.8.2.3.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the updateSupportingService capability



Figure 6.8.2.3.3-1 M2M Service Administration – updateSupportingService Diagram

##### 6.8.2.3.4 Post-Conditions

Not Applicable

##### 6.8.2.3.5 Exceptions

Not Applicable

##### 6.8.2.3.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.8.2.3.7 oneM2M Resource Interworking

This service capability updates the Supporting Service (M2M Service). The M2M Service entity is described in the Annex G of the oneM2M Functional Architecture [2].

#### 6.8.2.4 addRoleToSupportingService

This service capability provides the ability to add new Service Roles to a Supporting Service. This service capability shall be restricted to the Msc Reference Point.

##### 6.8.2.4.1 Pre-conditions

M2M Service exists.

##### 6.8.2.4.2 Signature – addRoleToSupportingService

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceId | IN | NO | The M2M Service Identifier (M2M-Serv-ID). |
| serviceRoleIds | IN | NO | List of Service Role Identifiers (SRole-ID) to be associated with the Supporting Service. If a SRole-ID in the parameter is already associated with the Supporting Service, nothing is done for the SRole-ID as it already is associated. |
| lastModifiedTime | OUT | NO | See Table A.2.1-1 |
| responseType | OUT | YES | Unique response types for this service.   * Service does not exist |

Table 6.8.2.4.2-1 Supporting Service Administration – addRoleToSupportingService capability

##### 6.8.2.4.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the addRoleToSupportingService capability



Figure 6.8.2.4.3-1 Supporting Service Administration – addRoleToSupportingService Diagram

##### 6.8.2.4.4 Post-Conditions

The Supporting Service is updated with any associations of the Supporting Service has to the Service Roles.

##### 6.8.2.4.5 Exceptions

Not Applicable

##### 6.8.2.4.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.8.2.4.7 oneM2M Resource Interworking

This service capability updates the Supporting Service (M2M Service) with the respective M2M Service Roles. The M2M Service entity is described in the Annex G of the oneM2M Functional Architecture [2].

#### 6.8.2.5 deleteRoleFromSupportingService

This service capability provides the ability to delete existing Service Roles from a Supporting Service. This service capability shall be restricted to the Msc Reference Point.

##### 6.8.2.5.1 Pre-conditions

The Service Role is not associated with any M2M Service Subscriptions.

##### 6.8.2.5.2 Signature – deleteRoleFromSupportingService

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceId | IN | NO | The Supporting Service Identifier (M2M-Serv-ID). |
| serviceRoleIds | IN | NO | List of Service Role Identifiers (SRole-ID) to be deleted from the association with the Supporting Service. |
| lastModifiedTime | OUT | NO | See Table A.2.1-1 |
| responseType | OUT | YES | Unique response types for this service.   * Service does not exist * Service Role does not exist * Service Role is associated with a M2M Service Subscription |

Table 6.8.2.5.2-1 Supporting Service Administration – deleteRoleFromSupportingService capability

##### 6.8.2.5.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the deleteRoleFromSupportingService capability



Figure 6.8.2.5.3-1 Supporting Service Administration – deleteRoleFromSupportingService Diagram

##### 6.8.2.5.4 Post-Conditions

The Supporting Service is updated with associations of the identified Service Roles deleted.

##### 6.8.2.5.5 Exceptions

Not Applicable

##### 6.8.2.5.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.8.2.5.7 oneM2M Resource Interworking

This service capability updates the Supporting Service (M2M Service) with the respective Service Roles removed. The M2M Service entity is described in the Annex G of the oneM2M Functional Architecture [2].

#### 6.8.2.6 getSupportingService

This service capability provides the ability to retrieve the existing Supporting Service. This service capability shall be restricted to the Msc Reference Points.

##### 6.8.2.6.1 Pre-conditions

Not Applicable

##### 6.8.2.6.2 Signature – getSupportingService

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| filterCriteria | IN | NO | See Table 6.8.1.1.1-1 |
| services | OUT | NO | The resulting Supporting Service entities in Table 6.8.1.1-1. |
| responseType | OUT | YES | Unique response types for this service.   * None |

Table 6.8.2.6.2-1 Supporting Service Administration – getSupportingService capability

##### 6.8.2.6.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the getSupportingService capability



Figure 6.8.2.6.3-1 Supporting Service Administration – getSupportingService Diagram

##### 6.8.2.6.4 Post-Conditions

Not Applicable

##### 6.8.2.6.5 Exceptions

Not Applicable

##### 6.8.2.6.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.8.2.6.7 oneM2M Resource Interworking

This service capability retrieves the Supporting Service (M2M Service). The M2M Service entity is described in the Annex G of the oneM2M Functional Architecture [2].

#### 6.8.2.7 getServiceCapability

This service capability inspects the request to determine the M2M Service Capability associated with the request.

##### 6.8.2.7.1 Pre-conditions

There is a correlation to the service capabilities’ operation (signature) and the M2M-Serv-Cap-ID. In many deployments the service capabilities’ signature serves as the M2M Service Capability.

##### 6.8.2.7.2 Signature - getServiceCapability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| operation | IN | NO | Request operation – Common to all requests |
| serviceCapId | OUT | NO | The M2M Service Capability Identifier (M2M-Serv-Cap-ID). |
| serviceId | OUT | NO | The M2M Service Identifier for this M2M Service Capability |
| responseType | OUT | YES | Response types:   * Unable to determine M2M Service Capability from the operation |

Table 6.8.2.7.2-1 getServiceCapability capability

##### 6.8.2.7.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the getServiceCapability capability



Figure 6.8.2.7.3-1 Supporting Service Administration – getServiceCapability Diagram

##### 6.8.2.7.4 Post-Conditions

Not Applicable

##### 6.8.2.7.5 Exceptions

Not Applicable

##### 6.8.2.7.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.8.2.3.7 oneM2M Resource Interworking

Not Applicable

## 6.9 Service Subscription Administration

Editors Note: Need to develop a Section that delineates the request attributes needed by the Mca vs. the Msc.

Editors Note: Need to determine how the entity instance based access management is configured in order to ensure no cross ASP access to other ASPs data.

Editors Note: Need a clause on the language that is permitted for evaluation of Filter Criteria

Editors Note: Need to consider which service capabilities are exposed across the Mcc’ Reference Point and what the request looks like.

### 6.9.1 Overview

The Service Subscription Administration service provides the capability to administrate the following across the Mca and Msc Reference Points:

* Maintenance of Services Subscriptions
* Association of information for devices and Applications to the M2M Service Subscription

The M2M Service Subscription defines the technical part of the contract between a M2M Subscriber (typically an M2M Application Service Provider) and a M2M Service Provider. Each M2M Service Subscription has a unique identifier (M2M-Service-Profile-ID).

A M2M Service Subscription establishes an association between one or more M2M Applications and one or more devices (M2M Nodes). In addition, the M2M Service Subscription is associated with one or more Service Roles.

A M2M Service Subscription shall be used for the following purposes:

* Serve as a basis for authorization for service capabilities
* Serve as the basis for charging
* Identify which devices and M2M Applications are part of this M2M Service Subscription

#### 6.9.1.1 Service Subscription Entity

| Attribute name | Description |
| --- | --- |
| serviceSubscriptionId | The M2M Service Subscription Identifier (M2M-Service-Profile-ID). |
| labels | List of labels used as filter criteria for the M2M Service Subscription |
| serviceRoleIds | List of Service Role Identifiers (SRole-ID) associated with the M2M Service Subscription. |
| lastModifiedTime | See Table A.2.1-1 |
| creationTime | See Table A.2.1-1 |

Table 6.9.1.1-1 Service Subscription Entity

##### 6.9.1.1.1 Service Subscription Filter Criteria

| Criterion name | Description |
| --- | --- |
| serviceSubscriptionId | The M2M Service Subscription Identifier (M2M-Service-Profile-ID). |
| labels | List of labels assigned to the M2M Service Subscription entity. |
| serviceRoleIds | List of Service Role Identifiers (SRole-ID) associated with the M2M Service Subscription entity. |
| lastModifiedTime | See Table A.2.1-1 |
| creationTime | See Table A.2.1-1 |

Table 6.9.1.1.1-1 Service Subscription Filter Criteria

#### 6.9.1.2 Device Entity for Service Subscription

| Attribute name | Description |
| --- | --- |
| serviceSubscriptionId | The M2M Service Subscription Identifier (M2M-Service-Profile-ID) for the Device. |
| deviceId | The unique device identifier in the context of the M2M Service Subscription. |
| externalIds | List of URNs that represent the external identifiers associated with this device. |
| applicationIds | List of M2M Application Identifiers (App-ID) associated with the device. |

Table 6.9.1.2-1 Device Entity for Service Subscription

#### 6.9.1.2.1 Device Filter Criteria

| Criterion name | Description |
| --- | --- |
| serviceSubscriptionId | The M2M Service Subscription Identifier (M2M-Service-Profile-ID) for the Device. |
| deviceId | The unique device identifier in the context of the M2M Service Subscription. |
| externalIds | List of URNs that represent the external identifiers associated with this device. |
| applicationIds | List of M2M Application Identifiers (App-ID) associated with the device. |

Table 6.9.1.2.1-1 Device Filter Criteria

### 6.9.2 Service Capabilities

#### 6.9.2.1 createServiceSubscription

This service capability provides the ability to create a M2M Service Subscription. This service capability shall be restricted to the Msc Reference Point.

##### 6.9.2.1.1 Pre-conditions

Not Applicable

##### 6.9.2.1.2 Signature – createServiceSubscription

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceSubscriptionId | IN-OUT | YES | The M2M Service Subscription Identifier (M2M-Service-Profile-ID). If the attribute is not provided on input, the oneM2M System shall assign the M2M-Service-Profile-ID.  The M2M-Service-Profile-ID is unique for the oneM2M System. |
| labels | IN | YES | See Table A.2.1-1 |
| serviceRoleIds | IN | NO | List of Service Role Identifiers (SRole-ID) to be associated with the M2M Service Subscription. |
| creationTime | OUT | NO | See Table A.2.1-1 |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service Subscription exists * Service Role does not exist |

Table 6.9.2.1.2-1 Service Subscription Administration – createServiceSubscription capability

##### 6.9.2.1.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the createServiceSubscription capability



Figure 6.9.2.1.3-1 Service Subscription Administration – createServiceSubscription Diagram

##### 6.9.2.1.4 Post-Conditions

The M2M Service Subscription is created and any Service Roles are associated with the M2M Service Subscription.

##### 6.9.2.1.5 Exceptions

Not Applicable

##### 6.9.2.1.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.2.1.7 oneM2M Resource Interworking

This service capability creates the M2M Service Subscription with the identifier (M2M-Service-Profile-ID) and maps to the CREATE procedure for the <m2mServiceSubscription> resource.

When the M2M Service Subscription is created the creationTime, M2M-Service-Profile-ID and subsServ&RoleList attributes are present.

This service capability utilizes the access management services with the privileges associated with the associated Service Role. As such the accessControlPolicyIDs and subsGroup attributes of the <m2mServiceSubscription> resource is not used within this service capability.

#### 6.9.2.2 deleteServiceSubscription

This service capability provides the ability to delete a M2M Service Subscription. This service capability shall be restricted to the Msc Reference Point.

##### 6.9.2.2.1 Pre-conditions

Not Applicable

##### 6.9.2.2.2 Signature – deleteServiceSubscription

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription Identifier (M2M-Service-Profile-ID). |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service Subscription does not exist |

Table 6.9.2.2.2-1 Service Subscription Administration – deleteServiceSubscription capability

##### 6.9.2.2.3 Service Interactions

1. The interactions of service capabilities required for this service capability:
2. Issue the deleteServiceSubscription capability



Figure 6.9.2.2.3-1 Service Subscription Administration – deleteServiceSubscription Diagram

##### 6.9.2.2.4 Post-Conditions

The M2M Service Subscription is deleted along with any associations of the M2M Service Subscription has to the Service Roles. The Node information (e.g., devices, M2M Applications) associated with the M2M Service Subscription is also deleted.

##### 6.9.2.2.5 Exceptions

Not Applicable

##### 6.9.2.2.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.2.2.7 oneM2M Resource Interworking

This service capability deletes the M2M Service Subscription with the identifier (M2M-Service-Profile-ID) and maps to the DELETE procedure for the <m2mServiceSubscription> resource.

#### 6.9.2.3 updateServiceSubscription

This service capability provides the ability to update a M2M Service Subscription. This service capability shall be restricted to the Msc Reference Point.

##### 6.9.2.3.1 Pre-conditions

Not Applicable

##### 6.9.2.3.2 Signature – updateServiceSubscription

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription Identifier (M2M-Service-Profile-ID). |
| labels | IN | YES | See Table A.2.1-1  The existing labels are replaced with the labels in this parameter. |
| serviceRoleIds | IN | YES | List of Service Role Identifiers (SRole-ID) to be associated with the M2M Service Subscription. If supplied, SRole-IDs in the list that are not already associated with the M2M Service Subscription are added. SRole-IDs that are associated with the M2M Service Subscription but not in the list are deleted. |
| lastModifiedTime | OUT | NO | See Table A.2.1-1 |
| roleIdResult | OUT | YES | If the parameter serviceRoleIds is present, this parameter provides the results (added, deleted) for each affected Service Roles. |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service Subscription does not exist * Service Role does not exist for a Supporting Service |

Table 6.9.2.3.2-1 Service Subscription Administration – updateServiceSubscription capability

##### 6.9.2.3.3 Service Interactions

1. The interactions of service capabilities required for this service capability:
2. Issue the updateServiceSubscription capability



Figure 6.9.2.3.3-1 Service Subscription Administration – updateServiceSubscription Diagram

##### 6.9.2.3.4 Post-Conditions

The M2M Service Subscription is updated along with any associations of the M2M Service Subscription has to the Service Roles.

##### 6.9.2.3.5 Exceptions

Not Applicable

##### 6.9.2.3.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.2.3.7 oneM2M Resource Interworking

This service capability updates the M2M Service Subscription with the identifier (M2M-Service-Profile-ID) and maps to the UPDATE procedure for the <m2mServiceSubscription> resource.

#### 6.9.2.4 addRoleToServiceSubscription

This service capability provides the ability to add new Service Roles to a M2M Service Subscription. This service capability shall be restricted to the Msc Reference Point.

##### 6.9.2.4.1 Pre-conditions

Not Applicable

##### 6.9.2.4.2 Signature – addRoleToServiceSubscription

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription Identifier (M2M-Service-Profile-ID). |
| serviceRoleIds | IN | NO | List of Service Role Identifiers (SRole-ID) to be associated with the M2M Service Subscription. If a SRole-ID in the parameter is already associated with the M2M Service Subscription, nothing is done for the SRole-ID as it already is associated. |
| lastModifiedTime | OUT | NO | See Table A.2.1-1 |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service Subscription does not exist * Service Role does not exist for a Supporting Service |

Table 6.9.2.4.2-1 Service Subscription Administration – addRoleToServiceSubscription capability

##### 6.9.2.4.3 Service Interactions

1. The interactions of service capabilities required for this service capability:
2. Issue the addRoleToServiceSubscription capability



Figure 6.9.2.4.3-1 Service Subscription Administration – addRoleToServiceSubscription Diagram

##### 6.9.2.4.4 Post-Conditions

The M2M Service Subscription is updated with any associations of the M2M Service Subscription has to the Service Roles.

##### 6.9.2.4.5 Exceptions

Not Applicable

##### 6.9.2.4.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.2.4.7 oneM2M Resource Interworking

Not Applicable

#### 6.9.2.5 deleteRoleFromServiceSubscription

This service capability provides the ability to delete existing Service Roles from a M2M Service Subscription. This service capability shall be restricted to the Msc Reference Point.

##### 6.9.2.5.1 Pre-conditions

Not Applicable

##### 6.9.2.5.2 Signature – deleteRoleFromServiceSubscription

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription Identifier (M2M-Service-Profile-ID). |
| serviceRoleIds | IN | NO | List of Service Role Identifiers (SRole-ID) to be deleted from the association with the M2M Service Subscription. |
| lastModifiedTime | OUT | NO | See Table A.2.1-1 |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service Subscription does not exist * Service Role does not exist for a Supporting Service |

Table 6.9.2.5.2-1 Service Subscription Administration – deleteRoleFromServiceSubscription capability

##### 6.9.2.5.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the deleteRoleFromServiceSubscription capability



Figure 6.9.2.5.3-1 Service Subscription Administration – deleteRoleFromServiceSubscription Diagram

##### 6.9.2.5.4 Post-Conditions

The M2M Service Subscription is updated with associations of the identified Service Roles deleted.

##### 6.9.2.5.5 Exceptions

Not Applicable

##### 6.9.2.5.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.2.5.7 oneM2M Resource Interworking

Not Applicable

#### 6.9.2.6 getServiceSubscription

This service capability provides the ability to retrieve the existing M2M Service Subscription. This service capability shall be restricted to the Msc and Mca Reference Points.

##### 6.9.2.6.1 Pre-conditions

Not Applicable

##### 6.9.2.6.2 Signature – getServiceSubscription

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| filterCriteria | IN | NO | See Table 6.9.1.1.1-1 |
| serviceSubscriptions | OUT | NO | The resulting M2M Service Subscription entities in Table 6.9.1.1-1. |
| responseType | OUT | YES | Unique response types for this service.   * None |

Table 6.9.2.6.2-1 Service Subscription Administration – getServiceSubscription capability

##### 6.9.2.6.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the getServiceSubscription capability



Figure 6.9.2.6.3-1 Service Subscription Administration – getServiceSubscription Diagram

##### 6.9.2.6.4 Post-Conditions

Not Applicable

##### 6.9.2.6.5 Exceptions

Not Applicable

##### 6.9.2.6.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.2.6.7 oneM2M Resource Interworking

This service capability retrieves the M2M Service Subscription for the specified filter criteria and maps to the RETRIEVE procedure for the <m2mServiceSubscription> resource.

#### 6.9.2.7 addDeviceToServiceSubscription

This service capability provides the ability to add a device to the existing M2M Service Subscription. This service capability shall be restricted to the Msc and Mca Reference Points.

##### 6.9.2.7.1 Pre-conditions

Not Applicable

##### 6.9.2.7.2 Signature – addDeviceToServiceSubscription

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription (M2M-Service-Profile-ID) to add the Device |
| externalIds | IN | YES | A List of URNs that represent the external identifiers associated with this device. |
| applicationIds | IN | YES | A list of Application identifiers (App-ID) associated with this device. |
| deviceId | OUT | NO | The unique device identifier in the context of the M2M Service Subscription. |
| lastModifiedTime | OUT | NO | See Table A.2.1-1 |
| responseType | OUT | YES | Unique response types for this service.   * Device exists for this M2M Service Subscription |

Table 6.9.2.7.2-1 Service Subscription Administration – addDeviceToServiceSubscription capability

##### 6.9.2.7.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the addDeviceToServiceSubscription capability



Figure 6.9.2.7.3-1 Service Subscription Administration – addDeviceToServiceSubscription Diagram

##### 6.9.2.7.4 Post-Conditions

Not Applicable

##### 6.9.2.7.5 Exceptions

Not Applicable

##### 6.9.2.7.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.2.7.7 oneM2M Resource Interworking

This service capability adds the device information for the M2M Service Subscription. This capability maps to the CREATE procedure of the <nodeInfo> resource.

#### 6.9.2.8 deleteDeviceFromServiceSubscription

This service capability provides the ability to delete a device from the existing M2M Service Subscription. This service capability shall be restricted to the Msc and Mca Reference Points.

##### 6.9.2.8.1 Pre-conditions

Not Applicable

##### 6.9.2.8.2 Signature – deleteDeviceFromServiceSubscription

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription (M2M-Service-Profile-ID) for the Devices |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| responseType | OUT | YES | Unique response types for this service.   * Device does not exist for this M2M Service Subscription |

Table 6.9.2.8.2-1 Service Subscription Administration – deleteDeviceFromServiceSubscription capability

##### 6.9.2.8.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the deleteDeviceFromServiceSubscription capability



Figure 6.9.2.8.3-1 Service Subscription Administration – deleteDeviceFromServiceSubscription Diagram

##### 6.9.2.8.4 Post-Conditions

Not Applicable

##### 6.9.2.8.5 Exceptions

Not Applicable

##### 6.9.2.8.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.2.8.7 oneM2M Resource Interworking

This service capability removes the device information for the M2M Service Subscription. This capability maps to the DELETE procedure of the <nodeInfo> resource.

#### 6.9.2.9 getDevicesForServiceSubscription

This service capability provides the ability to retrieve the devices for an existing M2M Service Subscription. This service capability shall be restricted to the Msc and Mca Reference Points.

##### 6.9.2.9.1 Pre-conditions

Not Applicable

##### 6.9.2.9.2 Signature – getDevicesForServiceSubscription

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| filterCriteria | IN | NO | See Table 6.9.1.2.1-1 |
| devices | OUT | NO | The resulting Device entities in Table 6.9.1.2-1. |
| responseType | OUT | YES | Unique response types for this service.   * None |

Table 6.9.2.9.2-1 Service Subscription Administration – getDevicesForServiceSubscription capability

##### 6.9.2.9.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the getDevicesForServiceSubscription capability



Figure 6.9.2.9.3-1 Service Subscription Administration – getDevicesForServiceSubscription Diagram

##### 6.9.2.9.4 Post-Conditions

Not Applicable

##### 6.9.2.9.5 Exceptions

Not Applicable

##### 6.9.2.9.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.2.9.7 oneM2M Resource Interworking

This service capability retrieves the devices for a M2M Service Subscription for the specified filter criteria and maps to the RETRIEVE procedure for the <nodeInfo> resource.

#### 6.9.2.10 addApplicationsToServiceSubscription

This service capability provides the ability to add M2M Applications (App-ID) to an existing M2M Service Subscription. This service capability shall be restricted to the Msc and Mca Reference Points.

##### 6.9.2.10.1 Pre-conditions

Not Applicable

##### 6.9.2.10.2 Signature – addApplicationsToServiceSubscription

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription (M2M-Service-Profile-ID) for the M2M Applications. |
| applicationIds | IN | NO | A list of Application identifiers (App-ID) |
| lastModifiedTime | OUT | NO | See Table A.2.1-1 |
| responseType | OUT | YES | Unique response types for this service.   * M2M Application exists for this M2M Service Subscription |

Table 6.9.2.10.2-1 Service Subscription Administration – addApplicationsToServiceSubscription capability

##### 6.9.2.10.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the addApplicationsToServiceSubscription capability



Figure 6.9.2.10.3-1 Service Subscription Administration – addApplicationsToServiceSubscription Diagram

##### 6.9.2.10.4 Post-Conditions

Not Applicable

##### 6.9.2.10.5 Exceptions

Not Applicable

##### 6.9.2.10.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.2.10.7 oneM2M Resource Interworking

This service capability adds M2M Applications to a M2M Service Subscription. The service capability aligns with the <m2mServiceSubscription> resource. However there isn’t a procedure specified that allows an AE to update just the M2M Applications associated with the <m2mServiceSubscription> resource.

#### 6.9.2.11 deleteApplicationsFromServiceSubscription

This service capability provides the ability to delete M2M Applications (App-ID) from an existing M2M Service Subscription. This service capability shall be restricted to the Msc and Mca Reference Points.

##### 6.9.2.11.1 Pre-conditions

Not Applicable

##### 6.9.2.11.2 Signature – deleteApplicationsFromServiceSubscription

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription (M2M-Service-Profile-ID) for the Applications |
| applicationIds | IN | NO | A list of M2M Application identifiers (App-ID) |
| lastModifiedTime | OUT | NO | See Table A.2.1-1 |
| responseType | OUT | YES | Unique response types for this service.   * M2M Application exists for the M2M Service Subscription |

Table 6.9.2.11.2-1 Service Subscription Administration – deleteApplicationsFromServiceSubscription capability

##### 6.9.2.11.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the deleteApplicationsFromServiceSubscription capability



Figure 6.9.2.11.3-1 Service Subscription Administration – deleteApplicationsFromServiceSubscription Diagram

##### 6.9.2.11.4 Post-Conditions

Not Applicable

##### 6.9.2.11.5 Exceptions

Not Applicable

##### 6.9.2.11.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.2.11.7 oneM2M Resource Interworking

This service capability delete M2M Applications from a M2M Service Subscription. The service capability aligns with the <m2mServiceSubscription> resource. However there isn’t a procedure specified that allows an AE to update just the M2M Applications associated with the <m2mServiceSubscription> resource.

#### 6.9.2.12 getApplicationsForServiceSubscription

This service capability provides the ability to retrieve the M2M Applications for an existing M2M Service Subscription. This service capability shall be restricted to the Msc and Mca Reference Points.

##### 6.9.2.12.1 Pre-conditions

Not Applicable

##### 6.9.2.12.2 Signature – getApplicationsForServiceSubscription

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription (M2M-Service-Profile-ID) for the Applications |
| applicationIds | OUT | NO | A list of Application identifiers (App-ID) |
| lastModifiedTime | OUT | NO | See Table A.2.1-1 |
| responseType | OUT | YES | Unique response types for this service.   * None |

Table 6.9.2.12.2-1 Service Subscription Administration – getApplicationsForServiceSubscription capability

##### 6.9.2.12.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the getApplicationsForServiceSubscription capability



Figure 6.9.2.12.3-1 Service Subscription Administration – getApplicationsForServiceSubscription Diagram

##### 6.9.2.12.4 Post-Conditions

Not Applicable

##### 6.9.2.12.5 Exceptions

Not Applicable

##### 6.9.2.12.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.2.12.7 oneM2M Resource Interworking

This service capability retrieves M2M Application Identifiers for a M2M Service Subscription. The service capability aligns with the <m2mServiceSubscription> resource and maps to the RETRIEVE procedure for the Resource.

#### 6.9.2.13 updateApplicationForDevice

This service capability provides the ability to update the M2M Applications to be associated to a device within the context of a M2M Service Subscription. This service capability shall be restricted to the Msc and Mca Reference Points.

##### 6.9.2.13.1 Pre-conditions

Not Applicable

##### 6.9.2.13.2 updateApplicationForDevice

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription (M2M-Service-Profile-ID) for the device |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| applicationIds | IN | NO | A list of Application identifiers (App-ID) |
| lastModifiedTime | OUT | NO | See Table A.2.1-1 |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service Subscription does not exist * Device does not exist for the M2M Service Subscription |

Table 6.9.2.13.2-1 Service Subscription Administration – updateApplicationForDevice capability

##### 6.9.2.13.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the updateApplicationForDevice capability



Figure 6.9.2.13.3-1 Service Subscription Administration – updateApplicationForDevice Diagram

##### 6.9.2.13.4 Post-Conditions

The M2M Applications for the device is replaced.

##### 6.9.2.13.5 Exceptions

Not Applicable

##### 6.9.2.13.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.2.13.7 oneM2M Resource Interworking

This service capability updates the M2M Application list for the device information in M2M Service Subscription. This capability maps to the UPDATE procedure of the <nodeInfo> resource.

| 6.9.2.14 |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

#### getApplicationsForDevice

This service capability provides the ability to retrieve the M2M Applications for a Device in the context of a M2M Service Subscription. This service capability shall be restricted to the Msc Reference Point.

##### 6.9.2.14.1 Pre-conditions

Not Applicable

##### 6.9.2.14.2 Signature – getApplicationsForServiceSubscription

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription (M2M-Service-Profile-ID) for the Device |
| deviceId | IN | NO | A device Identifier that hosts the applications |
| applicationIds | OUT | NO | A list of Application identifiers (App-ID) |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service Subscription does not exist * Device Identifier does not exist for the M2M Service Subscription |

Table 6.9.2.14.2-1 Service Subscription Administration – getApplicationsForDevice capability

##### 6.9.2.14.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the getApplicationsForDevice capability



Figure 6.9.2.14.3-1 Service Subscription Administration – getApplicationsForDevice Diagram

##### 6.9.2.14.4 Post-Conditions

Not Applicable

##### 6.9.2.14.5 Exceptions

Not Applicable

##### 6.9.2.14.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

This service capability retrieves Service Subscribed Node and maps to the RETRIEVE procedure for the <serviceSubscribedNode> resource. The is not a correlation of which Applications reside on a specific node. This mapping is FFS.

## 6.10 Event Collection

### 6.10.1 Overview

The Event Collection service provides the capability to record events for accounting purposes.

#### 6.10.1.1 Event Collection Types

##### 6.10.1.1.1 Event Collection Record

|  |  |  |
| --- | --- | --- |
| Information Element | Optional | Description |
| eventRecordID | NO | It is the unique ID that identifies a specific event record. |
| eventCollectionTriggerID | NO | It is the unique ID that identifies a specific event collection triggering scenario, which triggers information recording for a specific event. |
| collectingEntityID | NO | This is the unique ID of the entity that collects the statistics. It can be an AE-ID or M2M Service Capability Identifier (M2M-Serv-Cap-ID) |
| collectedEntityID | NO | This is the unique ID of the entity whose service layer operation statistics are being collected. It can be an AE-ID or M2M Service Capability Identifier (M2M-Serv-Cap-ID). |
| serviceProfileID | YES | An M2M Service Profile Identifier defines M2M Services and/or M2M Service Roles and AEs applicable to M2M Nodes. |
| eventDescription | NO | Describes the event triggered at the service. It is a subset of the eventConfig data structure. The specific structure depends on the specific event defined by the Event Collection Trigger. |
| Vendor Specific Information | YES | Defines Vendor specific information |

Table 6.10.1.1-1 Type: Event Record Template

##### 6.10.1.1.2 Event Configuration Type

| **Parameter name** | **Optional** | **Description** |
| --- | --- | --- |
| eventType | NO | This attribute indicates the type of the event, such as “subscribeComplete”, “downloadFirmware “, “timer based”,, “storage based”, etc. The eventType can be a combination of multiple sub-types, for example, it can be based on both “subscribeComplete” and a timer. |
| serviceRoleIds | YES | Defines the specific service role. |
| eventStart | YES | This attribute indicates the start time of the event. It is mandatory if the eventType includes “timer based”. |
| eventEnd | YES | This attribute indicates the end time of the event. It is mandatory if the eventType includes “timer based”. |
| dataSize | YES | This attribute defines the data size if an event is triggered when the stored data exceeds a certain size. It is mandatory if the eventType is “storage based”. |

Table 6.10.1.1.2-1 Type: Event Collection – eventConfig

### 6.10.2 Service Capabilities

#### 6.10.2.1 setEventCollectionPolicy

This service capability provides the ability for AEs to configure event collection policies for statistics and charging purposes. This service capability applies to the Mca Reference Point.

##### 6.10.2.1.1 Pre-conditions

The Originator can be an AE, and the Originator wants to configure event collection policies at a receiving service capability. The receiving service capability conducts event collection according to the policies. The receiving service capability may establish its own event collection policies.

The Originator, if different from the receiving service capability, is subscribed and registered to the receiving service capability.

##### 6.10.2.1.2 Signature – setEventCollectionPolicy

| **Parameter name** | **Direction** | **Optional** | **Description** |
| --- | --- | --- | --- |
| serviceId | IN | NO | The M2M Service Identifier (M2M-Serv-ID) |
| eventConfig | IN | NO | The configuration of the event collection policy. Defined in Table 6.10.1.1.2-1. |
| eventCollectionPolicyID | OUT | NO | The receiving service capability generates a unique policy ID for each policy. |
| responseType | OUT | YES | Unique response types for this service. Exception:   * Policy already exists |

Table 6.10.2.1.2-1 Event Collection – setEventCollectionPolicy capability

##### 6.10.2.1.3 Post-Conditions

Not Applicable

##### 6.10.2.1.4 Exceptions

1. The Originator has no access right to create the policy

##### 6.10.2.1.5 Policies for Use

Message Exchange Patterns: In-Out

##### 6.10.2.1.6 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.10.2.1.6-1 setEventCollectionPolicy Diagram

##### 6.10.2.1.7 oneM2M Resource Interworking

The service capability aligns with the <eventConfig> resource and maps to the CREATE procedure for the resource.

#### 6.10.2.2 getEventCollectionPolicy

This service capability provides the ability for entities, such as an AE or a service capability, to retrieve the existing policies stored at a service capability. This service capability applies to the Mca and Msc Reference Point.

##### 6.10.2.2.1 Pre-conditions

The Originator can be an AE or a service capability, and the Originator wants to retrieve event collection policies at a receiving service capability.

The Originator, if different from the receiving service capability, is subscribed and registered to the receiving service capability. The Originator is only allowed to retrieve with the proper access right.

##### 6.10.2.2.2 Signature – getEventCollectionPolicy

| **Parameter name** | **Direction** | **Optional** | **Description** |
| --- | --- | --- | --- |
| eventCollectionPolicyID | IN | NO | See Table 6.10.2.1.2-2. The eventCollectionPolicyID specifies the specific event collection policy to retrieve, if the Originator has such information. If the Originator does not have the information regarding eventCollectionPolicyID, it indicates eventCollectionPolicyID with a specific value that represents “any IDs”, and uses the filterCriteria to filter selected policies. |
| filterCriteria | IN | YES | See Table 6.8.1.1.1-1 |
| responseType | OUT | YES | Unique response types for this service. Exception:   * eventCollectionPolicyID does not exist |

Table 6.10.2.2.2-1 Event Collection – getEventCollectionPolicy capability

Editors Note: Filter Criteria needs to be defined

##### 6.10.2.2.3 Post-Conditions

Not Applicable

##### 6.10.2.2.4 Exceptions

The Originator has no access right to retrieve the policy

##### 6.10.2.2.5 Policies for Use

Message Exchange Patterns: In-Out

##### 6.10.2.2.6 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.10.2.2.6-1 getEventCollectionPolicy Diagram

##### 6.10.2.2.7 oneM2M Resource Interworking

The service capability aligns with the <eventConfig> resource and maps to the RETRIEVE procedure for the resource.

#### 6.10.2.3 setEventCollectionTriggers

This service capability provides the ability for AEs and service capabilities to configure specific triggers for event collection, based on the Event Collection Policy. This service capability applies to the Mca and Msc Reference Point.

##### 6.10.2.3.1 Pre-conditions

The Originator can be an AE or a service capability, and the Originator wants to configure event collection triggers based on existing event collection policy available at the collecting service capability.

##### 6.10.2.3.2 Signature – setEventCollectionTriggers

| **Parameter name** | **Direction** | **Optional** | **Description** |
| --- | --- | --- | --- |
| eventCollectionPolicyID | IN | NO | This attribute specify the policy used to define the specific event collection trigger. |
| collectingEntityID | IN | NO | This is the ID of the entity where the event is being collected. If not specified, the default collecting entity is the receiving service capability. |
| collectedEntityID | IN | NO | This is the ID of the entity that triggered the event collection. If not specified, the default is all entities triggered the event at the collecting entity. |
| eventReceiverID | IN | YES | In cases when there is another entity, other than the collecting entity (such as a service capability), wants to receive the collected event, this attribute provides the unique ID of this entity. |
| serviceRoleIds | IN | YES | Specifies the service roles that trigger the event collection. |
| serviceId | IN | YES | Specifies the services that trigger the event collection. |
| triggerStatus | IN | YES | This attribute indicates if the trigger is activated or not. If not defined, the trigger is activated. |
| eventCollectionTriggerID | OUT | NO | The receiving service capability generates a unique ID for each event collection trigger. |
| responseType | OUT | YES | Unique response types for this service. Exception:   * eventCollectionPolicyID is invalid * collectingEntityID is invalid * collectedEntityID is invalid * eventReceiverID is invalid * triggerStatus is invalid |

Table 6.10.2.3.2-1 Event Collection – setEventCollectionTriggers capability

##### 6.10.2.3.3 Post-Conditions

After the successful creation of event collection triggers, when the defined event happens at the collectingEntity, and when the event collection trigger status is ACTIVE, the collectingEntity shall collect the event. The supporting service shall send a recordEvent message to the Event Collection entity.

##### 6.10.2.3.4 Exceptions

The Originator has no access right to create the event collection triggers

##### 6.10.2.3.5 Policies for Use

Message Exchange Patterns: In-Out

##### 6.10.2.3.6 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.10.2.3.6-1 setEventCollectionTriggers Diagram

##### 6.10.2.3.7 oneM2M Resource Interworking

The service capability aligns with the <statsCollect> resource and maps to the CREATE procedure for the resource.

#### 6.10.2.4 getEventCollectionTriggers

This service capability provides the ability for AEs and service capabilities to retrieve event collection triggers at a receiving service capability. This service capability applies to the Mca and Msc Reference Point.

##### 6.10.2.4.1 Pre-conditions

Originating AEs and service capabilities are subscribed and registered to the receiving service capability. Originator has the access right to retrieve.

##### 6.10.2.4.2 Signature – getEventCollectionTriggers

| **Parameter name** | **Direction** | **Optional** | **Description** |
| --- | --- | --- | --- |
| eventCollectionTriggerID | IN | YES | This attribute specifies which event collection triggers to retrieve. If not specified, any event collection trigger matching the filter criteria should be retrieved. If the Originator does not have the information regarding eventCollectionTriggerID, it indicates with a specific value that represents “any IDs”, and uses the filterCriteria to filter selected event triggers. |
| filterCriteria | IN | YES | See Table 6.8.1.1.1-1 |
| responseType | OUT | YES | Unique response types for this service. Exception:   * eventCollectionTriggerID does not exist |

Table 6.10.2.4.2-1 Event Collection – getEventCollectionTriggers capability

##### 6.10.2.4.3 Post-Conditions

Not Applicable

##### 6.10.2.4.4 Exceptions

The Originator has no access right to retrieve the event collection triggers

##### 6.10.2.4.5 Policies for Use

Message Exchange Patterns: In-Out

##### 6.10.2.4.6 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.10.2.4.6-1 getEventCollectionTriggers Diagram

##### 6.10.2.4.7 oneM2M Resource Interworking

The service capability aligns with the <statsCollect> resource and maps to the RETRIEVE procedure for the resource.

#### 6.10.2.5 recordEvent

This service capability provides the ability for a service (such as Data Exchange service) to trigger the event collection service to record an event. This service applies to the Msc Reference Point.

##### 6.10.2.5.1 Pre-conditions

Event Collection Triggers have been created by the setEventCollectionTriggers capability.

##### 6.10.2.5.2 Signature – recordEvent

| **Parameter name** | **Direction** | **Optional** | **Description** |
| --- | --- | --- | --- |
| eventCollectionPolicyID | IN | YES | This attribute specify the policy used to define the specific event collection trigger. |
| eventCollectionTriggerID | IN | NO | The service where the trigger happens provides the eventCollectionTriggerID being used. |
| eventDescription | IN | NO | This attribute describes the event triggered at the service. It is a subset of the eventConfig data structure. It contains one or more parameters defined in the eventConfig data type. |
| recordID | OUT | NO | The event collection service generates a unique recordID. |
| responseType | OUT | YES | Unique response types for this service. Exception:.   * Event recording cannot be completed |

Table 6.10.2.5.2-1 Event Collection – recordEvent capability

##### 6.10.2.5.3 Post-Conditions

Not Applicable

##### 6.10.2.5.4 Exceptions

Not Applicable

##### 6.10.2.5.5 Policies for Use

Message Exchange Patterns: In-Out

##### 6.10.2.5.6 Service Interactions

The request comes from the service where the event was triggered to the Event Collection entity.



Figure 6.10.2.5.6-1 recordEvent Diagram

##### 6.10.2.5.7 oneM2M Resource Interworking

Not Applicable

#### 6.10.2.6 getEventRecords

This service capability provides the ability for AEs and service capabilities to retrieve the recorded events for statistical or charging purposes. This service capability applies to the Mca and Msc Reference Point.

##### 6.10.2.6.1 Pre-conditions

Originating AEs and service capabilities are subscribed and registered to the receiving service capability.

##### 6.10.2.6.2 Signature – getEventRecords

| **Parameter name** | **Direction** | **Optional** | **Description** |
| --- | --- | --- | --- |
| eventRecordID | IN | NO | This attribute specifies which record to retrieve. If not specified, any event records matching the filter criteria should be retrieved. If the Originator does not have the information regarding the eventRecordID, it indicates with a specific value that represents “any IDs”, and use the filterCriteria to filter selected records of events. |
| filterCriteria | IN | YES | See Table 6.8.1.1.1-1 |
| responseType | OUT | YES | Unique response types for this service. Exception:   * The eventRecordID |

Table 6.10.2.6.2-1 Event Collection – getRecords capability

##### 6.10.2.6.3 Post-Conditions

Not Applicable

##### 6.10.2.6.4 Exceptions

Not Applicable

##### 6.10.2.6.5 Policies for Use

Message Exchange Patterns: In-Out

##### 6.10.2.6.6 Service Interactions

The Originator sends the request to the Event Collection entity to obtain the event records that it is

interested in.



Figure 6.10.2.6.6-1 getEventRecords Diagram

##### 6.10.2.6.7 oneM2M Resource Interworking

Not Applicable

## 6.11 Registration

### 6.11.1 Overview

The Registration service provides the ability for:

* Initial Registration of an AE
* Refresh an existing Registration of an AE
* AE initiated termination of an existing Registration

### 6.11.2 Service Capabilities

Editors Note: The fetching of the service profile is FFS in all operations involving such a step

Editors Note: The validation that the AE-ID is associated with the service profile is FFS in all operations involving such a step

#### 6.11.2.1 registerAE

This service capability enables an AE or a third party provisioned with the proper authorization to register with the M2M System. This service capability shall be restricted across the Mca Reference Point.

##### 6.11.2.1.1 Pre-conditions

The AE has not registered with the M2M System.

The common request attributes for the Mca Reference Point contains the Application Entity (AE-ID) that the Originator has requested to be used for future exchanges between the AE and the M2M System.

##### 6.11.2.1.2 Signature - registerAE

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| pointOf Access | IN | NO | The point of Access of the registered AE. |
| applicationId | IN | NO | The Application Identifier (App-ID). |
| expirationTime | IN | NO | The expiration time of the registration as requested by the Originator |
| aeId | OUT | NO | AE-ID is provided back in the response |
| responseType | OUT | NO | Unique response types for this service:   * AE successfully registered * AE not successfully registered |

Table 6.11.2.1.2-1 Registration – registerAE capability

##### 6.11.2.1.3 Services Interaction

The interactions of service capabilities required for this service capability:

1. Issue the request to Supporting Services to validate the service profile, authorize the request and record the event.
2. Send a notification for a first-time application registration on the device in the event there is a subscription

##### 

Figure 6.11.2.1.3-1 Registration – registerAE Diagram

##### 6.11.2.1.4 Post-Conditions

AE is registered and can start using service capabilities

The returned AE-ID shall be used in any subsequent operation related to that application

##### 6.11.2.1.5 Exceptions

Not Applicable

##### 6.11.2.1.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.11.2.1.7 oneM2M Resource Interworking

This service capability interworks with the following oneM2M Resource operations:

* Create AE

#### 6.11.2.2 refreshAERegistration

This service capability enables an AE or a third party provisioned with the proper authorization to refresh an existing registration with the M2M System. This service capability shall be restricted to the Mca and Msc Reference Points.

##### 6.11.2.2.1 Pre-conditions

The AE has successfully registered with the M2M System.

The common request attributes for the Mca and Msc Reference Points contains the Application Entity (AE-ID) that the Originator has requested to be used for future exchanges between the AE and the M2M System.

##### 6.11.2.2.2 Signature - refreshAERegistration

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| aeId | IN | NO | aeId |
| pointOfAccess | IN | YES | The point of Access of the registered AE. POA is optional only if identical to the one in the refreshed registration |
| expirationTime | IN | NO | The expiration time of the registration as requested by the Originator. |
| responseType | OUT | NO | Unique response types for this service:   * AE successfully refreshed * Registration Does not exist |

Table 6.11.2.2.2-1 Registration - refreshAERegistration capability

##### 6.11.2.2.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to Supporting Services to validate the service profile, authorize the service request and record the event.



Figure 6.11.2.2.3-1 Registration – refreshAERegistration Diagram

##### 6.11.2.2.4 Post-Conditions

AE is registered and can start using service capabilities

##### 6.11.2.2.5 Exceptions

Not Applicable

##### 6.11.2.2.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.11.2.2.7 oneM2M Resource Interworking

This service capability interworks with the following oneM2M Resource operations:

* Update AE

#### 6.11.2.3 deregisterAE

This service capability enables an AE or a third party provisioned with the proper authorization to deregister from the M2M System. This service capability shall be restricted to the Mca Reference Points.

##### 6.11.2.3.1 Pre-conditions

The AE successfully registered with the M2M System.

The common request attributes for the Mca and Msc Reference Points contains the Application Entity (AE-ID) that the Originator has requested to be used for future exchanges between the AE and the M2M System.

##### 6.11.2.3.2 Signature - deregisterAE

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| aeId | IN | NO | aeId |
| responseType | OUT | NO | Unique response types for this service:   * AE successfully De-registered * Registration Does not exist |

Table 6.11.2.3.2-1 Registration – deregisterAE capability

##### 6.11.2.3.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to Supporting Services to validate the service peofile, authorize the request and record the event.



Figure 6.11.2.3.3-1 Registration – deregisterAE Diagram

##### 6.11.2.3.4 Post-Conditions

AE is no longer registered and cannot use any services.

##### 6.11.2.3.5 Exceptions

Not Applicable

Transaction Pattern: Participation allowed

##### 6.11.2.3.6 oneM2M Resource Interworking

This service capability interworks with the following oneM2M Resource operations:

* Delete AE

## 6.12 Registration Administration

### 6.12.1 Overview

The Registration administration service provides the ability for:

* Retrieve the AE’s Registration status
* Revoke an AE existing Registration
* Permit subscriptions to AE Registration events

### 6.12.2 Service Capabilities

Editors Note: The fetching of the service profile is FFS in all operations involving such a step

Editors Note: The validation that the AE-ID is associated with the service profile is FFS in all operations involving such a step

Editors Note: These services need to belong to a component – right now there isn’t a component defined.

#### 6.12.2.1 getRegistrationStatus

This service capability enables a third party authorized for this operation, to retrieve the registration status for an AE. This service capability is limited to the Msc Reference Point

##### 6.12.2.1.1 Pre-conditions

The common request attributes for the Msc Reference Point contains the Application Entity (AE-ID) that the Originator has requested to be used for future exchanges between the AE and the M2M System.

##### 6.12.2.1.2 Signature - getRegistrationStatus

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| aeId | IN | NO | aeId |
| responseType | OUT | NO | Unique response types for this service:   * AE successfully Retrieved * Registration does not exist |

Table 6.12.2.1.2-1 Registration Administration – getRegistrationStatus capability

##### 6.12.2.1.3 Service Interaction

The interactions of service capabilities required for this service capability:

1. Issue a request to Service Subscription Administration to fetch the service profile for the registered AE-ID

##### 

Figure 6.12.2.1.3-1 Registration Administration – getRegistrationStatus Diagram

##### 6.12.2.1.4 Post-Conditions

Not Applicable

##### 6.12.2.1.5 Exceptions

Not Applicable

##### 6.12.2.1.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.12.2.1.7 oneM2M Resource Interworking

This service capability interworks with the following oneM2M Resource operations:

* Read AE

#### 6.12.2.2 revokeAERegistration

This service capability enables a third party authorized for this operation to revoke an existing AE registration. This service capability shall be restricted to the Msc Reference Points

##### 6.12.2.2.1 Pre-conditions

The AE successfully registered with the M2M System.

The common request attributes for the Msc Reference Point contains the Application Entity (AE-ID) that the Originator has requested to be used for future exchanges between the AE and the M2M System.

##### 6.12.2.2.2 Signature - revokeAERegistration

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| aeId | IN | NO | aeId |
| responseType | OUT | NO | Unique response types for this service:   * AE successfully De-registsred * Registration does not exist |

Table 6.12.2.2.2-1 Registration Administration - revokeAERegistration capability

##### 6.12.2.2.3 Service Interaction

The interactions of service capabilities required for this service capability:

1. Issue a request to the Service Subscription Administration to fetch the service profile.



Figure 6.12.2.2.3-1 Registration Administration – revokeAERegistration Diagram

##### 6.12.2.2.4 Post-Conditions

AE is no longer registered and cannot use any services

##### 6.12.2.2.5 Exceptions

Not Applicable

##### 6.12.2.2.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.12.2.2.7 oneM2M Resource Interworking

This service capability interworks with the following oneM2M Resource operations:

* Delete AE

#### 6.12.2.3. subscribeInitialAERegistrationEvent

This service capability enables a third party that is authorized to subscribe to the initial (first time ony) registration of an AE on all devices. This capability shall be restricted to the Msc Reference Point

##### 6.12.2.3.1 Pre-conditions

Not Applicable

##### 6.12.2.3.2 Signature - subscriveInitialAERegistrationEvent

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter name | Direction | | Optional | Description |
| aeId | IN | | NO | aeId |
| subscriptionId | | OUT | YES | Return subscriptionId in case of a success. |
| responseType | | OUT | NO | Unique response types for this service:   * successfully subscribed * not successfully subscribed |

6.12.2.3.2-1 Registration Administration - subscribeInitialAERegistrationEvent capabilty

##### 6.12.2.3.3 Service Interaction

The interactions of service capabilities required for this service capability:

1. Issue a request to the Service Subscription Administration to retrieve the service profile.



Figure 6.12.2.3.3-1 Registration – subscribeInitialAERegistrationEvent Diagram

##### 6.12.2.3.4 Post-Conditions

An event is created

##### 6.12.2.3.5 Exceptions

Not Applicable

##### 6.12.2.3.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.12.2.3.7 oneM2M Resource Interworking

Not Applicable

#### 6.12.2.4 unsubscribeInitialAERegistrationEvent

This service capability enables a third party having the ACP for this operation to remove an existing subscription against an AE initial registration. This capability shall be restricted to the Msc Reference Point.

##### 6.12.2.4.1 Pre-conditions

Not Applicable

##### 6.12.2.4.2 Signature - unsubcribeInitialAERegistrationEvent

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| subscriptionId | IN | NO | The subscriptionId for the AE initial registration event. |
| responseType | OUT | NO | Unique response types for this service:   * Successfully unsubscribed * Subscription does not exist |

Table 6.12.2.4.2-1 unsubscribeInitialAERegistrationEvent capability

##### 6.12.2.4.3 Service Interaction

The interactions of service capabilities required for this service capability:

1. Issue a request to the Service Subscription Administration to fetch the service profile.



Figure 6.12.2.4.3-1 Registration Administration – unsubscribeInitialAERegistrationEvent Diagram

##### 6.12.2.4.4 Post-Conditions

Subscription to AE no longer exists for the Originator

##### 6.12.2.4.5 Exceptions

Not Applicable

##### 6.12.2.4.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.12.2.4.7 oneM2M Resource Interworking

Not Applicable

#### 6.12.2.5 getInitialSubscriptionAERegistrationEvents

This service capability enables a third party authorized for this operation to request a list of subscriptions against an initial registration AE. This capability shall be restricted to the Msc Reference Point.

##### 6.12.2.5.1 Pre-conditions

Not applicable

##### 6.12.2.5.2 Signature - getInitialSubscriptionAERegistrationEvents

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| aeId | IN | NO | aeId |
| subscriptionIds | OUT | NO | List of subscriptionIds associated with that event |
| responseType | OUT | NO | Unique response types for this service:   * AE successfully de-registered * Registration does not exist |

Table 6.12.2.5.2-1 Registration Administration - getInitialSubscriptionAERegistrationEvents capability

##### 6.12.2.5.3 Service Interaction

The interactions of service capabilities required for this service capability:

Issue the request to the Service Subscription Administration to fetch the service profile



Figure 6.12.2.5.3-1 Registration Administration – getInitialSubscriptionAERegistrationEvents Diagram

##### 6.12.2.5.4 Post-Conditions

Not Applicable

##### 6.12.2.5.5 Exceptions

Not Applicable

##### 6.12.2.5.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.12.2.5.7 oneM2M Resource Interworking

Not Applicable

# 7 M2M Service Components

This clause describes the M2M Service Components provided by the M2M Services Platform.

## 7.1 Introduction

An M2M Service Component defines the set of M2M Services that are related in the sense that the M2M Services that comprise the M2M Service Component are typically deployed together in order to support one or more Supporting Services.

The M2M Service Architecture augments the oneM2M Functional Architecture by specifying M2M Services provided to M2M Service Providers. These M2M Services are exposed to the AE across the Mca Reference Point as well as other Service Components across the Msc Reference Point.

## 7.1.1 Service Component Interaction Cross Reference



Table 7.1-1 Service Component Cross Reference

## 7.2 Infrastructure Component (INF)

The INF Component provides services that are exposed to other M2M Service Components across the Msc Reference Point. The Services within the INF Component are common and utility type Services needed to enable other M2M Services.

## 7.2.1 INF to Service Cross Reference

Authorization: All Service Capabilities

Service Subscription: retrieveAuthorization

Registration Services: registerAE, refreshAERegistration, deregisterAE

## 7.3 Service Subscription Component (SSUB)

The SSUB Component provides services that are necessary to maintain Supporting Service, the associations (e.g., Services Roles) to the Supporting Service, M2M Service Subscriptions, the associations (e.g., AE, devices) to the M2M Service Subscription and any external identifiers associated with AE and devices. In addition the services used to manage devices and AEs are part of this component.

## 7.3.1 SSUB to Service Cross Reference

Service Subscription: All Service Capabilities

Supporting Service Administration: All Service Capabilities

Service Subscription Administration: All Service Capabilities

## 7.4 Transport Adapter (TRA)

The TRA component provides services are used to integrate or adapt Data Exchange requests to the underlying Data Exchange transport (e.g., XMPP or MQTT Broker).

## 7.4.1 TRA to Service Cross Reference

Broker: All Service Capabilities

SE:Data Exchange: notify

## 7.5 Accounting (ACC)

The ACC Component provides services that are record events necessary to charge for the Services provided to AEs.

## 7.5.1 Accounting to Service Cross Reference

Event Collection: All Service Capabilities

## 7.6 Service Exposure (SE)

The SE Component acts as the primary interface for AEs to interact with the M2M Service Layer across the Mca Reference Point.

## 7.6.1 Service Exposure to Service Cross Reference

SE Data Exchange: All Service Capabilities

Service Subscription: getBroker

Broker: publish, subscribe, sendMessage

Service Subscription Administration: getServiceSubscription, addDeviceToServiceSubscription, deleteDeviceFromServiceSubscription, getDevicesForServiceSubscription, addApplicationsToServiceSubscription, deleteApplicationsFromServiceSubscription, getApplicationsForServiceSubscription

Device Management: All Service Capabilities

Event Collecton: setEventCollectionPolicy, getEventCollectionPolicy, setEventCollectionTriggers, getEventCollectionTriggers, getEventRecords

Registration Services: registerAE, refreshAERegistration, deregisterAE

## 7.7 Management Adapter (MA)

The Management Adapter component provides services that are used to integrate or adapt Device Management requests to the Management Servers of existing device management technologies(e.g., TR‑069, OMA-DM, and LWM2M) .

## 7.7.1 Management Adapter to Service Cross Reference

Management Adapter: All Service Capabilities

Device Management: reportFirmwareStatus, reportSoftwareStatus, reportTroubleshootingStatus

## 7.8 Device Management (DM)

The Device Management component provides services to manage devices without consideration of the technology of Underlying Network.

### 7.8.1 Device Management to Service Cross Reference

Device Management: All Service Capabilities

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# Annex A: Common Request Processing

## A.1 Overview

This annex illustrates the usage of the common services described in this technical specification for implementation requests received from AEs across the Mca Reference Point.

### A.2 Mca Common Request Processing

AEs communicate with the M2M System over the Mca Reference Point through the SE component. The SE component accepts the request from the AE and provides the request to the Supporting Service in order allow the M2M Service Provider to ensure the request is properly authorized and recorded. In addition, the M2M Service Provider is able to orchestrate other capabilities that have not been specified.

### A.2.1 Mca Common Request Data Types (Normative)

Each request that is received by the SE component across the Mca Reference Point shall have a common set of input parameters as described in Table A.2.1-1 Mca: Common Request Input Parameters.

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| from | IN | NO | The identifier of the Originator of the request (AE-ID) |
| to | IN | NO | The identifier of the AE that is to target of the request (AE-ID) |
| requestId | IN-OUT | NO | The request identifier. When supplied by the Originator, the same value is returned in the response if the response is applicable for the message exchange pattern. If not supplied by the Originator, the M2M System supplied a globally unique value in the response if the response is applicable for the message exchange pattern. |

Table A.2.1-1 Mca: Common Request Input Parameters

Service capabilities in the SE component whose message exchange patterns require a response shall have a common set of output parameters as described in Table A.2.1-2 Mca: Common Request Output Parameters.

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| responseType | OUT | YES | Response types that are relevant to requests from AEs across the Mca Reference Point. |

Table A.2.1-2 Mca: Common Request Output Parameters

### A.2.2 Authentication and Authorization of Requests

Upon reception of requests across the Mca reference, the request Originator is authenticated and the request service capability is authorized when the:

* Request Originator has a M2M Service Subscription for the request service capability.
* Request Originator is authorized for the request service capability.

#### A.2.2.1 Pre-conditions

The external identifiers for the from AE-ID are assigned to a M2M Service Profile Identifier.

A correlation between the service capability and the M2M authorization event has been defined in order to authorize the service capability.

#### A.2.2.2 Common M2M Service Capability Parameters for Request Authentication and Authorization

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Mca common request input parameters | IN | NO | The Mca common request input parameters defined in Table A.2.1-1. |
| responseType | OUT | YES | Response types that are relevant to the Authentication and Authorizations of requests from AEs across the Mca Reference Point.   * Originator is not authenticated * Originator does not have a M2M Service Subscription * Originator not authorized for the M2M Service Capability |

Table A.2.2.2-1 Common M2M Service Capability Parameters for Request Authentication and Authorization

##### A.2.2.3 Service Interactions

The interactions of service capabilities required to authenticate and authorize a request:

1. Validate the M2M Service Subscription using the to AE-ID and from AE-ID parameters received from the Originator.
2. Authorize the use of the service capability within the M2M Service Subscription



Figure A.2.2.3-1 Mca Common Request Authorization Diagram

#### A.2.2.4 Post-Conditions

Success case: The request is permitted.

Failure case: The request is not permitted and an optional response type is transmitted back the request Originator.

#### A.2.2.5 Exceptions

Not Applicable

#### A.2.2.6 Policies for Use

Message Exchange Patterns: In-Out, In-Only, Robust In-Only, In-Optional-Out

Transaction Pattern: Participation allowed

### A.3 Msc Common Request Processing

Service Components communicate with each other across the Msc Reference Point. Additional input or output parameters are not necessary when invoking service capabilities across the Msc Reference Point. As such signature of the service capability is sufficient for implementing the service capability in clause 6 when the capability is invoked across the Msc Reference Point.

### A.3.1 Msc Common Request Data Types (Normative)

Each request that is received by the M2M Component across the Msc Reference Point shall have a common set of input parameters as described in Table A.3.1-1 Msc: Common Request Input Parameters.

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| requestId | IN-OUT | NO | The request identifier. When supplied by the Originator, the same value is returned in the response if the response is applicable for the message exchange pattern. If not supplied by the Originator, the M2M System supplied a globally unique value in the response if the response is applicable for the message exchange pattern. |

Table A.3.1-1 Msc: Common Request Input Parameters

# Annex B (Informative): Data Exchange Services

## B.1 Overview

This annex illustrates the usage of the services for requests to exchange data from AEs across the Mca Reference Point.

### B.2 Supporting Services

### B.2.1 Subscribe-Publish-Notify Message Exchange

This service provides the capability to exchange data using the publish and subscribe message patterns where AEs:

* Request to receive payloads from a publication resource by subscribing to the publication resource.
* Request to publish a payload to a resource.

#### B.2.1.1 Service Capabilities

##### B.2.1.1.1 subscribeRequest

This service capability provides the ability to validate a subscription request from an AE.

###### B.2.1.1.1.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a M2M Service Subscription, subscribing AE, publication resource and Broker exist.

###### B.2.1.1.1.2 Signature - subscribeRequest

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| publicationResource | IN | NO | The publication resource. See 6.4.1.1.1.1 |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.1.1.1.2 |
| retainmentPolicy | IN | YES | The retainment policy for unconnected subscribers. See 6.4.1.1.1.3 |
| transportAdapter | OUT | YES | The instance of the transport adapter service (broker) |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Originator does not have a Broker for the requested Resource * Delivery policy not supported by the transport adapter * Retainment policy not supported by the transport adapter |

Table B.2.1.1.1.2-1 Data Exchange Service – subscribeRequest capability

###### B.2.1.1.1.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Determine the Broker to be used for the originating AE and publication resource
2. Perform the Common Request Services for requests across the Mca Reference Point
3. Validate the delivery and retainment policies



Figure B.2.1.1.1.3-1 subscribeRequest and subscribeComplete Diagram

###### B.2.1.1.1.4 Post-Conditions

Success case: The request is permitted.

Failure case: The request is not permitted and a response type is transmitted back to the AE.

###### B.2.1.1.1.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### B.2.1.1.1.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 250ms

##### B.2.1.1.2 subscribeComplete

This service capability provides the ability to complete the actions required once the subscription request has been completed in the Broker.

###### B.2.1.1.2.1 Pre-conditions

Not Applicable

###### B.2.1.1.2.2 Signature - subscribeComplete

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| publicationResource | IN | NO | The publication resource. See 6.4.1.1.1.1 |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.1.1.1.2 |
| retainmentPolicy | IN | YES | The retainment policy for unconnected subscribers. See 6.4.1.1.1.3 |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table B.2.1.1.2.2-1 Data Exchange Service – subscribeComplete capability

###### B.2.1.1.2.3 Service Interactions

The interactions of service capabilities required for this service capability as shown in Figure B.2.1.1.1.3-1:

1. Upon a successful subscribe by the Broker, record the event for accounting purposes

###### B.2.1.1.2.4 Post-Conditions

Success case: The request is permitted.

Failure case: The request is not permitted and a response type is transmitted back to the AE.

###### B.2.1.1.2.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### B.2.1.1.2.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 50ms

##### B.2.1.1.3 publishRequest

This service capability provides the ability to validate a publication request from an AE..

As part of the publication, the publishing AE can provide a delivery policy to enhance the robustness of the publication to AEs that have subscribed to the Resource identified in the request.

###### B.2.1.1.3.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a M2M Service Subscription, publishing AE, resource to publish the payload and Broker exist.

###### B.2.1.1.3.2 Signature - publishRequest

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| toResource | IN | NO | The leaf node of a publication resource. See 6.4.1.1.1.1 |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.1.1.1.2 |
| transportAdapter | OUT | YES | The instance of the transport adapter service (broker) |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Originator does not have a Broker for the requested resource * Originator has requested an invalid deliveryPolicy * Originator has requested an invalid retainmentPolicy * Delivery policy not supported by the transport adapter * Exception: Request may not have been completed |

Table B.2.1.1.3.2-1 Data Exchange Service – publishRequest capability

###### B.2.1.1.3.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Determine the Broker to be used for the originating AE and resource
2. Perform the Common Request Services for requests across the Mca Reference Point
3. Validate the delivery policy for the Broker
4. Upon a successful publication to the Broker, record the event for accounting purposes



Figure B.2.1.1.3.3-1 publishRequest and publishComplete Diagram

###### B.2.1.1.3.4 Post-Conditions

Success case: The request is permitted.

Failure case: The request is not permitted and a response type is transmitted back to the AE.

###### B.2.1.1.3.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### B.2.1.1.3.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### B.2.1.1.4 publishComplete

This service capability provides the ability to complete the actions required once the publication request has been completed in the Broker.

###### B.2.1.1.4.1 Pre-conditions

Not Applicable

###### B.2.1.1.4.2 Signature - publishComplete

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| toResource | IN | NO | The leaf node of a publication resource. See 6.4.1.1.1.1 |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.1.1.1.2 |
| retainmentPolicy | IN | YES | The retainment policy for unconnected subscribers. See 6.4.1.1.1.3 |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table B.2.1.1.4.2-1 Data Exchange Service – pubishComplete capability

###### B.2.1.1.4.3 Service Interactions

The interactions of service capabilities required for this service capability as shown in Figure B.2.1.1.3.3-1:

1. Upon a successful publish by the Broker, record the event for accounting purposes

###### B.2.1.1.4.4 Post-Conditions

Success case: The request is permitted.

Failure case: The request is not permitted and a response type is transmitted back to the AE.

###### B.2.1.1.4.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### B.2.1.1.4.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 50ms

##### B.2.1.1.5 notifyRequest

This service capability provides the ability to validate a notification request to an AE.

As part of the notification, delivery policy that is requested to be used is validated and adjusted if necessary.

###### B.2.1.1.5.1 Pre-conditions

A correlation between a M2M Service Subscription, subscribing AE, subscribed resource and Broker exist.

The pre-conditions for Mca Received Requests are met.

###### B.2.1.1.5.2 Signature - notifyRequest

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| fromResource | IN | NO | The leaf node of a publication resource. See 6.4.1.1.1.1 |
| deliveryPolicy | IN-OUT | YES | The delivery policy when notifying the subscriber. See 6.4.1.1.1.2 |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Originator does not have a Broker for the requested resource * Originator has requested an invalid delivery policy * Exception: Request may not have been completed |

Table B.2.1.1.5.2-1 Data Exchange Service – notifyRequest capability

###### B.2.1.1.5.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Validate that the delivery policy requested by the Broker is allowed for the subscribing AE and M2M Service Subscription



Figure B.2.1.1.5.3-1 notifyRequest and notifyComplete Diagram

###### B.2.1.1.5.4 Post-Conditions

Success case: The request is permitted.

Failure case: The request is not permitted and a response type is transmitted back to the transport adapter.

###### B.2.1.1.5.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### B.2.1.1.5.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### B.2.1.1.6 notifyComplete

This service capability provides the ability to complete the actions required once the notification request has been completed in the Data Exchange service.

###### B.2.1.1.6.1 Pre-conditions

Not Applicable

###### B.2.1.1.6.2 Signature - notifyComplete

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| fromResource | IN | NO | The leaf node of a publication resource. See 6.4.1.1.1.1 |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.1.1.1.2 |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table B.2.1.1.6.2-1 Data Exchange Service – notifyComplete capability

###### B.2.1.1.6.3 Service Interactions

The interactions of service capabilities required for this service capability as shown in Figure B.2.1.1.5.3-1:

1. Upon a successful notification by the Data Exchange, record the event for accounting purposes

###### B.2.1.1.6.4 Post-Conditions

Success case: The request is permitted.

Failure case: The request is not permitted and a response type is transmitted back to the transport adapter.

###### B.2.1.1.6.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### B.2.1.1.6.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 50ms

### B.2.2 Request-Response Message Exchange

This service provides the capability to exchange data using the synchronous request-response message pattern where AEs request to send a message to an AE and wait for a response to the message.

#### B.2.2.1 Service Capabilities

##### B.2.2.1.1 sendMessageRequest

This service capability provides the ability to validate a send message request from an AE.

###### B.2.2.1.1.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a M2M Service Subscription, originating AE and Transport Adapter exist.

###### B.2.2.1.1.2 Signature - sendMessageRequest

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| deliveryPolicy | IN | YES | The delivery policy when sending a request. See 6.4.1.1.1.2 |
| transportAdapter | OUT | YES | The instance of the transport adapter service. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Originator does not have a transport adaptor for the requested AE. * Delivery policy not supported by the underlying transport adapter. |

Table B.2.2.1.1.2-1 Data Exchange Service – sendMessageRequest capability

###### B.2.2.1.1.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Determine the transport adapter to be used for the originating AE and target AE. This example shows the use of the Broker service for the transport adapter.
2. Perform the Common Request Services for requests across the Mca Reference Point
3. Validate the delivery policy



Figure B.2.2.1.1.3-1 sendMessageRequest and sendMessageComplete Diagram

###### B.2.2.1.1.4 Post-Conditions

Success case: The request is permitted.

Failure case: The request is not permitted and a response type is transmitted back to the AE.

###### B.2.2.1.1.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### B.2.2.1.1.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 250ms

##### B.2.2.1.2 sendMessageComplete

This service capability provides the ability to complete the actions required once the request has been completed in the Broker.

###### B.2.2.1.2.1 Pre-conditions

Not Applicable

###### B.2.2.1.2.2 Signature - sendMessageComplete

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.1.1.1.2 |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * Exception: Request may not have been completed |

Table B.2.2.1.2.2-1 Data Exchange Service – sendMessageComplete capability

###### B.2.2.1.2.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Upon a successful message send and received from the transport adapter, record the event for accounting purposes

###### B.2.2.1.2.4 Post-Conditions

Success case: The request is permitted.

Failure case: The request is not permitted and a response type is transmitted back to the AE.

###### B.2.2.1.2.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### B.2.2.1.2.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 50 ms

# Annex C (Informative): Service Subscription Administration Services

## C.1 Overview

This annex illustrates the usage of the services for requests to administer M2M Service Subscriptions from AEs across the Mca Reference Point.

### C.2 Supporting Services

This service provides the capability for AEs to administer the M2M Service Subscriptions that have been previously created by the M2M Service Provider. The following capabilities are provided.

* Retrieval of M2M Service Subscriptions based on a set of filter criteria.
* Administration of the devices associated with a M2M Service Subscriptions as well as the M2M Application associated with the device.
* Administration of the M2M Applications associated with a M2M Service Subscription.

Editor’s note: Need to consider if we should define Service Capabilities to Add/Delete Devices and Applications in Bulk.

#### C.2.1 Service Capabilities

##### C.2.1.1 getServiceSubscription

This service capability provides the ability for an AE to retrieve the M2M Service Subscription across the Mca Reference Point.

###### C.2.1.1.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

###### C.2.1.1.2 Signature – getServiceSubscription

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Mca common request attributes | - | - | See Table A.2.1-1 |
| filterCriteria | IN | NO | See Table 6.9.1.1.1-1 |
| serviceSubscriptions | OUT | NO | The resulting M2M Service Subscription entities in Table 6.9.1.1-1. |
| responseType | OUT | YES | Unique response types for this service.   * None |

Table C.2.2.1.1.2-1 Service Subscription Administration – getServiceSubscription capability

###### C.2.1.1.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the common request authorization
2. Retrieve the M2M Service Subscriptions for the supplied criteria
3. Account for the event



Figure C.2.1.1.3-1 getServiceSubscription Diagram

###### C.2.1.1.4 Post-Conditions

Not Applicable

###### C.2.1.1.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### C.2.1.1.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### C.2.1.2 addDeviceToServiceSubscription

This service capability adds a device to a M2M Service Subscription.

###### C.2.1.2.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

###### C.2.1.2.2 Signature – addDeviceToServiceSubscription

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Mca common request attributes | - | - | See Table A.2.1-1 |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription (M2M-Service-Profile-ID) to add the device |
| externalIds | IN | YES | A List of URNs that represent the external identifiers associated with this Device. |
| applicationIds | IN | YES | A list of Application identifiers (App-ID) |
| deviceId | OUT | NO | The unique device identifier in the context of the M2M Service Subscription. |
| lastModifiedTime | OUT | NO | See Table A.2.1-1 |
| responseType | OUT | YES | Unique response types for this service.   * Device exists for the M2M Service Subscription |

Table C.2.1.2.2-1 Service Subscription Administration – addDeviceToServiceSubscription capability

###### C.2.1.2.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the common request authorization
2. Add the device to the M2M Service Subscription
3. Account for the event



Figure C.2.1.2.3-1 addDeviceToServiceSubscription Diagram

###### C.2.1.2.4 Post-Conditions

The device is added to the M2M Service Subscription returning the oneM2M System defined deviceId.

###### C.2.1.2.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### C.2.1.2.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### C.2.1.3 deleteDeviceFromServiceSubscription

This service capability deletes a device from a M2M Service Subscription.

###### C.2.1.3.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

###### C.2.1.3.2 Signature – deleteDeviceFromServiceSubscription

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription (M2M-Service-Profile-ID) for the Devices |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| responseType | OUT | YES | Unique response types for this service.   * Device does not exist for M2M Service Subscription |

Table C.2.1.3.2-1 Service Subscription Administration – deleteDeviceFromServiceSubscription capability

###### C.2.1.3.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the common request authorization
2. Delete the device from the M2M Service Subscription
3. Account for the event



Figure C.2.1.3.3-1 deleteDeviceFromServiceSubscription Diagram

###### C.2.1.3.4 Post-Conditions

The device is deleted from the M2M Service Subscription.

###### C.2.1.3.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### C.2.1.3.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### C.2.1.4 getDevicesForServiceSubscription

This service capability retrieves the devices for a M2M Service Subscription.

###### C.2.1.4.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

###### C.2.1.4.2 Signature – getDevicesForServiceSubscription

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| filterCriteria | IN | NO | See Table 6.9.1.2.1-1 |
| devices | OUT | NO | The resulting Device entities in Table 6.9.1.2-1. |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service Subscription does not exist |

Table C.2.1.4.2-1 Service Subscription Administration – getDevicesForServiceSubscription capability

###### C.2.1.4.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the common request authorization
2. Retrieve the devices of the M2M Service Subscription with a filter condition
3. Account for the event



Figure C.2.1.4.3-1 getDevicesForServiceSubscription Diagram

###### C.2.1.4.4 Post-Conditions

Not Applicable

###### C.2.1.4.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### C.2.1.4.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### C.2.1.5 addApplicationsToServiceSubscription

This service capability adds M2M Applications to a M2M Service Subscription.

###### C.2.1.5.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

###### C.2.1.5.2 Signature – addApplicationsToServiceSubscription

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription (M2M-Service-Profile-ID) for the M2M Applications |
| applicationIds | IN | NO | List of M2M Application identifiers (App-ID) |
| lastModifiedTime | OUT | NO | See Table A.2.1-1 |
| responseType | OUT | YES | Unique response types for this service.   * M2M Application exists for the M2M Service Subscription |

Table C.2.1.5.2-1 Service Subscription Administration – addApplicationsToServiceSubscription capability

###### C.2.1.5.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the common request authorization
2. Add the M2M Applications to the M2M Service Subscription
3. Account for the event



Figure C.2.1.5.3-2 addApplicationsToServiceSubscription Diagram

###### C.2.1.5.4 Post-Conditions

The M2M Applications are added to the M2M Service Subscription.

###### C.2.1.5.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### C.2.1.5.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### C.2.1.6 deleteApplicationsFromServiceSubscription

This service capability deletes the M2M Applications from a M2M Service Subscription.

###### C.2.1.6.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

###### C.2.1.6.2 Signature – deleteApplicationsFromServiceSubscription

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription (M2M-Service-Profile-ID) for the Applications |
| applicationIds | IN | NO | A list of Application identifiers (App-ID). |
| responseType | OUT | YES | Unique response types for this service.   * M2M Application does not exist for the M2M Service Subscription |

Table C.2.1.6.2-1 Service Subscription Administration – deleteApplicationsFromServiceSubscription capability

###### C.2.1.6.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the common request authorization
2. Delete the M2M Application from the M2M Service Subscription
3. Account for the event



Figure C.2.1.6.3-1 deleteApplicationFromServiceSubscription Diagram

###### C.2.1.6.4 Post-Conditions

M2M Applications are deleted from the M2M Service Subscription.

###### C.2.1.6.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### C.2.1.6.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### C.2.1.7 getApplicationsForServiceSubscription

This service capability retrieves the M2M Applications for a M2M Service Subscription.

###### C.2.1.7.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

###### C.2.1.7.2 Signature – getApplicationsForServiceSubscription

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription (M2M-Service-Profile-ID) for the M2M Applications |
| applicationsIds | OUT | NO | The resulting M2M Application Ids (App-ID) |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service Subscription does not exist. |

Table C.2.1.7.2-1 Service Subscription Administration – getApplicationsForServiceSubscription capability

###### C.2.1.7.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the common request authorization
2. Retrieve the M2M Applications of the M2M Service Subscription
3. Account for the event



Figure C.2.1.7.3-1 getApplicationsForServiceSubscription Diagram

###### C.2.1.7.4 Post-Conditions

Not Applicable

###### C.2.1.7.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### C.2.1.7.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### C.2.1.8 updateApplicationForDevice

This service capability to update the M2M Applications for a device associated with a M2M Service Subscription.

###### C.2.1.8.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

###### C.2.1.8.2 Signature – addDeviceToServiceSubscription

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Mca common request attributes | - | - | See Table A.2.1-1 |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription (M2M-Service-Profile-ID) for the device |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| applicationIds | IN | NO | A list of Application identifiers (App-ID) |
| lastModifiedTime | OUT | NO | See Table A.2.1-1 |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service Subscription does not exist * Device does not exist for the M2M Service Subscription |

Table C.2.1.8.2-1 Service Subscription Administration – updateApplicationForDevice capability

###### C.2.1.8.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the common request authorization
2. Update the M2M Applications for the device by replacing the existing M2M Application list.
3. Account for the event



Figure C.2.1.8.3-1 updateApplicationForDevice Diagram

###### C.2.1.8.4 Post-Conditions

The M2M Applications for the device are replaced with the M2M Applications in the request.

###### C.2.1.8.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### C.2.1.8.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

# Annex D (Informative): Device Management Services

## D.1 Overview

This annex illustrates the usage of the services for requests to manage device from AEs across the Mca Reference Point.

### D.2 Supporting Services

### D.2.1 Message Exchange

This service provides the capability to manage device using the request-response or request-asynchronous notification message patterns where AEs:

* Request to manage device using device specific service capabilities or more complex service capabilities that the Support Service will orchestrate into the individual service capabilities according to their business process.
* Request to obtain management operation execution results or status using the reporting capability. Reports can be generated immediately or periodically based on the report policy. Reports can also be aggregated prior to reporting.

#### D.2.1.1 Service Capabilities

##### D.2.2.1.1 downloadFirmware

This service capability provides the ability to execute a downloadFirmware request from an AE.

###### D.2.2.1.1.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

###### D.2.2.1.1.2 Signature - downloadFirmware

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| firmwareInfo | IN | NO | The device firmware information.  Type FirmwareInfo, see 6.6.1.1.1.5 |
| deviceId | IN | YES | The unique device identifier in the context of the M2M M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| firmwareReport | OUT | YES | The firmware management operation execution result or status. Type FirmwareReport, see 6.6.1.1.1.3. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types. |

Table D.2.2.1.1.2-1 Device Management Service –downloadFirmware capability

###### D.2.2.1.1.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to download the firmware
4. Records the event



Figure D.2.2.1.1.3-1 downloadFirmware Diagram

###### D.2.2.1.1.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to download firmware.

The event has been recorded.

###### D.2.2.2.1.5 Exceptions

Not Applicable

###### D.2.2.2.1.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### D.2.2.1.2 installFirmware

This service capability provides the ability to execute a installFirmware request from an AE.

###### D.2.2.1.2.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

###### D.2.2.1.2.2 Signature - installFirmware

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| firmwareInfo | IN | NO | The device firmware information.  Type FirmwareInfo, see 6.6.1.1.1.5 |
| deviceId | IN | YES | The unique device identifier in the context of the M2M M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. |
| firmwareReport | OUT | YES | The firmware management operation execution result or status. Type FirmwareReport, see 6.6.1.1.1.3. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types. |

Table D.2.2.1.2.2-1 Device Management Service –installFirmware capability

###### D.2.2.1.2.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to install the firmware
4. Records the event



Figure D.2.2.1.2.3-1 installFirmware Diagram

###### D.2.2.1.2.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to install firmware.

The event has been recorded.

###### D.2.2.1.3.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### D.2.2.1.3.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### D.2.2.1.3 getFirmwareInformation

This service capability provides the ability to execute a getFirmwareInformation request from an AE.

###### D.2.2.1.3.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

###### D.2.2.1.3.2 Signature - getFirmwareInformation

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| deviceId | IN | YES | The unique device identifier in the context of the M2M M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. |
| firmwareInfo | OUT | YES | The device firmware information.  Type FirmwareInfo, see 6.6.1.1.1.5 |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types. |

Table D.2.2.1.3.2-1 Device Management Service –getFirmwareInformation capability

###### D.2.2.1.3.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to get the firmware information
4. Records the event



**Figure D.2.2.1.3.3-**1 **getFirmwareInformation Diagram**

###### D.2.2.1.3.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get firmware information.

The event is recorded

###### D.2.2.1.3.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### D.2.2.1.3.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### D.2.2.1.4 getFirmwareExecStatus

This service capability provides the ability to retrieve the execution status or result of a requested firmware operation.

###### D.2.2.1.4.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and previously submitted firmware request exist.

###### D.2.2.1.4.2 Signature - getFirmwareExecStatus

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| operationRequestId | IN | NO | The M2M Request Identifier of previously submitted firmware request (M2M-Request-ID) |
| deviceId | IN | YES | The unique device identifier in the context of the M2M M2M Service Subscription. |
| firmwareReport | OUT | YES | The firmware management operation execution result or status. Type FirmwareReport, see 6.6.1.1.1.3. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types.   * The previously submitted firmware request does not exist |

Table D.2.2.1.4.2-1 Device Management Service –getFirmwareExecStatus capability

###### D.2.2.1.4.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to retrieve the firmware operations execution status or result
4. Records the event



Figure D.2.2.1.4.3-1 getFirmwareExecStatus Diagram

###### D.2.2.1.4.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get firmware operation execution status or result.

Record the event.

###### D.2.2.1.4.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### D.2.2.1.4.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### D.2.2.1.5 reportFirmwareStatus

This service capability provides the ability to notify an AE about the status or result of a firmware operation for a previously submitted operation request.

###### D.2.2.1.5.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and previously submitted firmware requests exist.

###### D.2.2.1.5.2 Signature - reportFirmwareStatus

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| isLastReport | IN | NO | Boolean, whether it is the last report. |
| sequenceNumber | IN | NO | The report sequence number. |
| firmwareReportList | IN | NO | Array of firmwareReport.  Type FirmwareReport, see 6.6.1.1.1.3. |
| aggregationPolicy | IN | YES | The policy used to aggregate the result of the management operation prior to the reports being sent. See clause 6.6.1.1.1.2. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types. |

Table D.2.2.1.5.2-1 Device Management Service –reportFirmwareStatus capability

###### D.2.2.1.5.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Record the event.

**Figure D.2.2.1.5.3-3 reportFirmwareStatus Diagram**

###### D.2.2.1.5.4 Post-Conditions

The AE has received a report of firmware operation execution status or result.

The event is recorded.

###### D.2.2.1.5.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### D.2.2.1.5.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### D.2.2.1.6 upgradeFirmware

This service capability permits AEs to upgrade the firmware on individual device, multiple devices or a group of devices. In addition the upgrade of the firmware is permitted based on a schedule for each of the operations

###### D.2.2.1.6.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between Management Adapter, the M2M Service Capability and devices or device group exist.

###### D.2.2.1.6.2 Signature - upgradeFirmware

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| orchestrationRuleList | IN | NO | List of OrchestrationRule. Type OrchestrationRule, see clause 6.6.1.1.1.4. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| aggregationPolicy | IN | YES | The policy used to aggregate the result of the management operation prior to the reports being sent. See clause 6.6.1.1.1.2. |
| firmwareReportList | OUT | YES | List of firmware reports.  Type FirmwareReport, see 6.6.1.1.1.3. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types. |

Table D.2.2.1.6.2-1 Device Management Service –upgradeFirmware capability

###### D.2.2.1.6.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues a series of operations to the Management Adapter to upgrade the firmware on a the devices in the orchestration rule list. Each entry in the orchestration rule list contains the operation, the devices and schedule for the operation.
4. Records the event
5. Aggregate the report status or results



**Figure D.2.2.1.6.3-4 upgradeFirmware Diagram**

Editors Note: We need a common service capability for Aggregate reports. Flow needs to account for the Report Policy.Aggregate reports need further study.

###### D.2.2.1.6.4 Post-Conditions

The Management Adapter has submitted a set of requests to the Management Server to upgrade the firmware.

The event is recorded.

###### D.2.2.2.6.5 Exceptions

The reachability schedule of the device doesn’t not match the schedule of the orchestration rule.

###### D.2.2.2.6.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### D.2.1.1.7 getDeviceInformation

This service capability provides the ability for an AE to retrieve the information about a device across the Mca Reference Point.

###### D.2.1.1.7.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

###### D.2.1.1.7.2 Signature – getDeviceInformation

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| deviceInfo | OUT | NO | The device information. Type DeviceInfo, see 6.6.1.1.1.7. |
| memory | OUT | YES | The memory information. Type Memory, see 6.6.1.1.1.8. |
| battery | OUT | YES | The battery information. Type Battery, see 6.6.1.1.1.9. |
| lockStatus | OUT | YES | The device lock status. Enum LockStatus, see 6.6.1.1.1.13. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types. |

Table D.2.1.1.7.2-1 Device Management Service –getDeviceInformation capability

###### D.2.1.1.7.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to get device information
4. Records the event

**Figure D.2.1.1.7.3-1 getDeviceInformation Diagram**

###### D.2.1.1.7.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get device information.

Based on the capabilities supported by the device, the memory, battery and lock status information may or may not be returned.

The event has been recorded.

###### D.2.1.1.7.5 Exceptions

Not Applicable

###### D.2.1.1.7.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### D.2.1.1.8 getDeviceCapabilities

This service capability provides the ability to execute a getDeviceCapabilities request from an AE.

###### D.2.1.1.8.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

###### D.2.1.1.8.2 Signature – getDeviceCapabilities

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| deviceCapabilities | OUT | YES | Array of deviceCapability. Type DeviceCapability, see 6.6.1.1.1.10. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types. |

Table D.2.1.1.8.2-1 Device Management Service –getDeviceCapabilities capability

###### D.2.1.1.8.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to get device capabilities
4. Records the event

**Figure D.2.1.1.8.3-1 getDeviceCapabilities Diagram**

###### D.2.1.1.8.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get device capabilities.

The event has been recorded.

###### D.2.1.1.8.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### D.2.1.1.8.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### D.2.1.1.9 enableDeviceCapability

This service capability provides the ability to execute a enableDeviceCapability request from an AE.

###### D.2.1.1.9.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

###### D.2.1.1.9.2 Signature – enableDeviceCapability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| name | IN | NO | The name of the capability. Enum DeviceCapabilityName, see 6.6.1.1.1.12. |
| state | OUT | NO | Indicates if the capability is enabled or disabled. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types. |

Table D.2.1.1.9.2-1 Device Management Service –enableDeviceCapability capability

###### D.2.1.1.9.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to enable device capability
4. Records the event

**Figure D.2.1.1.9.3-1 enableDeviceCapability Diagram**

###### D.2.1.1.9.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to enable device capability.

The event is recorded

###### D.2.1.1.9.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### D.2.1.1.9.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### D.2.1.1.10 disableDeviceCapability

This service capability provides the ability to execute a disableDeviceCapability request from an AE.

###### D.2.1.1.10.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

###### D.2.1.1.10.2 Signature – disableDeviceCapability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| name | IN | NO | The name of the capability. Enum DeviceCapabilityName, see 6.6.1.1.1.12. |
| state | OUT | NO | Indicates if the capability is enabled or disabled. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types. |

Table D.2.1.1.10.2-1 Device Management Service –disableDeviceCapability capability

###### D.2.1.1.10.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to disable device capability
4. Records the event

**Figure D.2.1.1.10.3-1 disableDeviceCapability Diagram**

###### D.2.1.1.10.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to disable device capability.

Record the event.

###### D.2.1.1.10.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### D.2.1.1.10.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### D.2.1.1.11 getAreaNetworks

This service capability provides the ability to execute a getAreaNetworks request from an AE.

###### D.2.1.1.11.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and area network exist.

###### D.2.1.1.11.2 Signature –getAreaNetworks

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| AreaNwks | OUT | YES | Array of area network. Type AreaNwkInfo, see 6.6.1.1.1.13. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types. |

Table D.2.1.1.11.2-1 Device Management Service –getAreaNetworks capability

###### D.2.1.1.11.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to get area networks information
4. Records the event

**Figure D.2.1.1.11.3-1 getAreaNetworks Diagram**

###### D.2.1.1.11.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get area networks information.

The event has been recorded.

###### D.2.1.1.11.5 Exceptions

Not Applicable

###### D.2.1.1.11.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### D.2.1.1.12 updateDeviceForAreaNetwork

This service capability provides the ability to execute a updateDeviceForAreaNetwork request from an AE.

###### D.2.1.1.12.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability, the device and area network exist.

###### D.2.1.1.12.2 Signature –updateDeviceForAreaNetwork

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| areaNwkId | IN | NO | The unique area network identifier. |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| areaNwkDeviceInfo | IN | YES | The existing areaNwkDeviceInfo are replaced with the information in this parameter. Type AreaNwkDeviceInfo, see 6.6.1.1.1.15. |
| lastModifiedTime | OUT | NO | The modified time. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types. |

Table D.2.1.1.12.2-1 Device Management Service –updateDeviceForAreaNetwork capability

###### D.2.1.1.12.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to update device information for area network
4. Records the event

**Figure D.2.1.1.12.3-5 updateDeviceForAreaNetwork Diagram**

###### D.2.1.1.12.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to update device information for area network.

The event is recorded.

###### D.2.1.1.12.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### D.2.1.1.12.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### D.2.1.1.13 rebootDevice

This service capability provides the ability to execute a rebootDevice request from an AE.

###### D.2.1.1.13.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

###### D.2.1.1.13.2 Signature –rebootDevice

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| troubleshootingReport | OUT | YES | The troubleshooting operation execution result or status. Type TroubleshootingReport, see 6.6.1.1.1.20. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types. |

Table D.2.1.1.13.2-1 Device Management Service –rebootDevice capability

###### D.2.1.1.13.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to reboot device
4. Records the event

**Figure D.2.1.1.13.3-1 rebootDevice Interaction Diagram**

###### D.2.1.1.13.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to reboot device.

The event has been recorded.

###### D.2.1.1.13.5 Exceptions

Not Applicable

###### D.2.1.1.13.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### D.2.1.1.14 resetDevice

This service capability provides the ability to execute a resetDevice request from an AE.

###### D.2.1.1.14.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

###### D.2.1.1.14.2 Signature –resetDevice

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| troubleshootingReport | OUT | YES | The troubleshooting operation execution result or status. Type TroubleshootingReport, see 6.6.1.1.1.20. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types. |

Table D.2.1.1.14.2-1 Device Management Service –resetDevice capability

###### D.2.1.1.14.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to reset device
4. Records the event

**Figure D.2.1.1.14.3-1 resetDevice Interaction Diagram**

###### D.2.1.1.14.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to reset device.

The event has been recorded.

###### D.2.1.1.14.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### D.2.1.1.14.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### D.2.1.1.15 uploadDeviceLog

This service capability provides the ability to execute a uploadDeviceLog request from an AE.

###### D.2.1.1.15.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

###### D.2.1.1.15.2 Signature –uploadDeviceLog

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| logInfo | IN | NO | The log information. Type LogInfo, see 6.6.1.1.1.19. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| logURL | OUT | YES | The URL from which the log can be uploaded. |
| troubleshootingReport | OUT | YES | The troubleshooting operation execution result or status. Type TroubleshootingReport, see 6.6.1.1.1.20. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types. |

Table D.2.1.1.15.2-1 Device Management Service –uploadDeviceLog capability

###### D.2.1.1.15.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to upload device log
4. Records the event

**Figure D.2.1.1.15.3-1 uploadDeviceLog Interaction Diagram**

###### D.2.1.1.15.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to upload device log.

The event is recorded

###### D.2.1.1.15.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### D.2.1.1.15.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### D.2.1.1.16 reportTroubleshootingStatus

This service capability provides the ability to notify an AE about the status or result of a troubleshooting operation for a previously submitted operation request.

###### D.2.1.1.16.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and previously submitted troubleshooting requests exist.

###### D.2.1.1.16.2 Signature –reportTroubleshootingStatus

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| isLastReport | IN | NO | Boolean, whether it is the last report. |
| sequenceNumber | IN | NO | The report sequence number. |
| troubleshootingReportList | IN | NO | Array of troubleshootingReport.  Type TroubleshootingReport, see 6.6.1.1.1.20. |
| aggregationPolicy | IN | YES | The policy used to aggregate the result of the management operation prior to the reports being sent. See clause 6.6.1.1.1.2. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types. |

Table D.2.1.1.16.2-1 Device Management Service –reportTroubleshootingStatus capability

###### D.2.2.1.16.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Record the event.

**Figure D.2.1.1.16.3-1 reportTroubleshootingStatus Interaction Diagram**

###### D.2.1.1.16.4 Post-Conditions

The AE has received a report of troubleshooting operation execution status or result.

The event has been recorded.

###### D.2.1.1.16.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### D.2.1.1.16.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### D.2.1.1.17 getDeviceLogs

This service capability provides the ability to execute a getDeviceLogs request from an AE.

###### D.2.1.1.17.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

###### D.2.1.1.17.2 Signature –getDeviceLogs

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| logList | OUT | YES | Array of log. Type Log, see 6.6.1.1.1.21. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types. |

Table D.2.1.1.17.2-1 Device Management Service –getDeviceLogs capability

###### D.2.1.1.17.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to get all logs of a device
4. Records the event

**Figure D.2.1.1.17.3-1 getDeviceLogs Interaction Diagram**

###### D.2.1.1.17.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get all logs of a device.

The event is recorded

###### D.2.1.1.17.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### D.2.1.1.17.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### D.2.1.1.18 getDeviceLogInformation

This service capability provides the ability to execute a getDeviceLogInformation request from an AE.

###### D.2.1.1.18.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

###### D.2.1.1.18.2 Signature –getDeviceLogInformation

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| filterCriteria | IN | YES | See Table 6.6.1.1.1.22 |
| logURL | IN | YES | The URL from which the log can be accessed. |
| log | OUT | YES | Type Log, see 6.6.1.1.1.21. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types. |

Table D.2.1.1.18.2-1 Device Management Service –getDeviceLogInformation capability

###### D.2.1.1.18.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to get a device log information
4. Records the event

**Figure D.2.1.1.18.3-1 getDeviceLogInformation Interaction Diagram**

###### D.2.1.1.18.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get a device log information.

The event is recorded

###### D.2.1.1.18.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### D.2.1.1.18.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### D.2.1.1.19 getSoftwareInformation

This service capability provides the ability to execute a getSoftwareInformation request from an AE.

###### D.2.1.1.19.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

###### D.2.1.1.19.2 Signature –getSoftwareInformation

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| version | OUT | YES | The version of the software. |
| name | OUT | YES | The name of the software. |
| URL | OUT | YES | The URL from which the software package can be downloaded. |
| installStatus | OUT | YES | Indicates the status of the install.  Enum ActionStatus, see 6.6.1.1.1.26. |
| activeStatus | OUT | YES | The status of active or deactivate action.  Enum ActionStatus, see 6.6.1.1.1.26. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types. |

Table D.2.1.1.19.2-1 Device Management Service –getSoftwareInformation capability

###### D.2.1.1.19.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to get application software information
4. Records the event

**Figure D.2.1.1.19.3-1 getSoftwareInformation Interaction Diagram**

###### D.2.1.1.19.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get application software information.

The event has been recorded.

###### D.2.1.1.19.5 Exceptions

Not Applicable

###### D.2.1.1.19.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### D.2.1.1.20 downloadSoftware

This service capability provides the ability to execute a downloadSoftware request from an AE.

###### D.2.1.1.20.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

###### D.2.1.1.20.2 Signature –downloadSoftware

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| URL | IN | NO | The URL from which the software package can be downloaded. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| softwareReport | OUT | YES | The software management operation execution result or status. Type SoftwareReport, see 6.6.1.1.1.27. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types. |

Table D.2.1.1.20.2-1 Device Management Service –downloadSoftware capability

###### D.2.1.1.20.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to download application software
4. Records the event

**Figure D.2.1.1.20.3-1 downloadSoftware Interaction Diagram**

###### D.2.1.1.20.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to download application software.

The event has been recorded.

###### D.2.1.1.20.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### D.2.1.1.20.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### D.2.1.1.21 installSoftware

This service capability provides the ability to execute a installSoftware request from an AE.

###### D.2.1.1.21.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

###### D.2.1.1.21.2 Signature –installSoftware

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| softwareReport | OUT | YES | The software management operation execution result or status. Type SoftwareReport, see 6.6.1.1.1.27. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types. |

Table D.2.1.1.21.2-1 Device Management Service –installSoftware capability

###### D.2.1.1.21.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to install application software
4. Records the event

**Figure D.2.1.1.21.3-1 installSoftware Interaction Diagram**

###### D.2.1.1.21.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to install application software.

The event is recorded

###### D.2.1.1.21.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### D.2.1.1.21.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### D.2.1.1.22 activateSoftware

This service capability provides the ability to execute an activateSoftware request from an AE.

###### D.2.1.1.22.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

###### D.2.1.1.22.2 Signature –activateSoftware

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| softwareReport | OUT | YES | The software management operation execution result or status. Type SoftwareReport, see 6.6.1.1.1.27. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types. |

Table D.2.1.1.22.2-1 Device Management Service –activateSoftware capability

###### D.2.1.1.22.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to activate software previously installed
4. Records the event

**Figure D.2.1.1.22.3-1 activateSoftware Interaction Diagram**

###### D.2.1.1.22.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to activate software previously installed.

Record the event.

###### D.2.1.1.22.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### D.2.1.1.22.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### D.2.1.1.23 deactivateSoftware

This service capability provides the ability to execute a deactivateSoftware request from an AE.

###### D.2.1.1.23.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

###### D.2.1.1.23.2 Signature –deactivateSoftware

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| softwareReport | OUT | YES | The software management operation execution result or status. Type SoftwareReport, see 6.6.1.1.1.27. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types. |

**Table D.2.1.1.23.2-1 Device Management Service –deactivateSoftware capability**

###### D.2.1.1.23.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to deactivates software
4. Records the event



Figure D.2.1.1.23.3-6 deactivateSoftware Interaction Diagram

###### D.2.1.1.23.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to deactivates software.

The event is recorded.

###### D.2.1.1.23.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### D.2.1.1.23.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### D.2.1.1.24 removeSoftware

This service capability provides the ability to execute a removeSoftware request from an AE.

###### D.2.1.1.24.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

###### D.2.1.1.24.2 Signature –removeSoftware

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.1.1.1.1. |
| softwareReport | OUT | YES | The software management operation execution result or status. Type SoftwareReport, see 6.6.1.1.1.27. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types. |

Table D.2.1.1.24.2-1 Device Management Service –removeSoftware capability

###### D.2.1.1.24.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to uninstall the software
4. Records the event

**Figure D.2.1.1.24.3-7 removeSoftware Interaction Diagram**

###### D.2.1.1.24.4 Post-Conditions

The Management Adapter has submitted a set of requests to the Management Server to uninstall the software.

The event is recorded.

###### D.2.1.1.24.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### D.2.1.1.24.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

##### D.2.1.1.25 reportSoftwareStatus

This service capability provides the ability to notify an AE about the status or result of an application software management operation for a previously submitted operation request.

###### D.2.1.1.25.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and previously submitted application software management requests exist.

###### D.2.1.1.25.2 Signature –reportSoftwareStatus Status

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.1-1 |
| isLastReport | IN | NO | Boolean, whether it is the last report. |
| sequenceNumber | IN | NO | The report sequence number. |
| softwareReportList | IN | NO | Array of softwareReport.  Type SoftwareReport, see 6.6.1.1.1.27. |
| aggregationPolicy | IN | YES | The policy used to aggregate the result of the management operation prior to the reports being sent. See clause 6.6.1.1.1.2. |
| responseType | OUT | YES | Unique response types for this service.  Note: Consumed services also provide response types. |

Table D.2.1.1.25.2-1 Device Management Service –reportSoftwareStatus capability

###### D.2.2.1.29.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Record the event.

**Figure D.2.1.1.25.3-1 reportSoftwareStatus Interaction Diagram**

###### D.2.1.1.25.4 Post-Conditions

The AE has received a report of application software management operation execution status or result.

The event has been recorded.

###### D.2.1.1.25.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### D.2.1.1.25.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

# Annex E (Informative): Device On-boarding Service

## E.1 Overview

This annex illustrates the usage of services to onboard a device or AE when the Device or AE contacts the M2M System.

The Device On-boarding supporting service is a process by which a Device is provided the artifacts (e.g., configuration information, software and firmware) needed to successfully register an AE with the M2M Service Layer and invoke or receive the authorized service capabilities.

### E.2 Supporting Services

### E.2.1 Remote Administration

This service provides remote administration of the device and/or AE when an AE registers or registers with the M2M System. The mechanism is implemented using the first contact subscription and notification services provided/used by the Registration Service.

#### E.2.1.1 Service Capabilities

##### E.2.1.1.1 notifyRegistrationContact

This service capability provides the capability to invoke a process to update the M2M Service Layer artifacts (e.g., credentials, device firmware, and application software).

###### E.2.1.1.1.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

A correlation between a M2M Service Subscription and the contacting entity (Device, AE) exist.

The Supporting Service subscribed to receive registration events using the subscribeInitialAERegistrationEvent service capability.

###### E.2.1.1.1.2 Signature - notifyRegistrationContact

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Mca common request input attributes | - | - | See Table A.2.1-1 |
| event | IN | NO | The event that caused the registration contact.  Enumeration of:   * FirstContact |

Table E.2.1.1.1.2-1 Device On-boarding Service – notifyRegistrationContact capability

###### E.2.1.1.1.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Determine the Application information (Device, Subscription, and Application Id) for the registering AE.
3. Determine from the Device information if the device need be updated
4. Determine from the Application information if Applications need updated on the Device
5. Record the event for accounting purposes.



Figure E.2.1.1.1.3-1 notifyRegistrationContact Diagram

###### E.2.1.1.1.4 Post-Conditions

Success case: The request is permitted and the associated.

Failure case: The request is recorded as a failure.

###### E.2.1.1.1.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are recorded by this service capability.

###### E.2.1.1.1.6 Policies for Use

Message Exchange Patterns: In-Only

Transaction Pattern: Creates Transaction

Maximum Response: Not applicable for the In-Only message exchange pattern

# Annex F (Informative): Registration Services

## F.1 Overview

This annex illustrates the usage of the services for requests to register AEs across the Mca Reference Point and between M2M Service Components across the Msc Reference Point.

### F.2 Mca Registration Service Processing and Supporting Services

AEs communicate with the M2M System over the Mca Reference Point through the SE component. The SE component accepts the request from the AE and provides the request to the Supporting Service in order allow the M2M Service Provider to ensure the request is properly authorized and recorded. In addition, the M2M Service Provider is able to orchestrate other capabilities that have not been specified.

### F.2.1 Message Exchanges

#### F.2.1.2 Service Capabilities

##### F.2.1.2.1 registerAE

This service capability enables an AE or a third party provisioned with the proper authorization to register with the M2M System. This service capability shall be restricted across the Mca Reference Point

###### F.2.1.2.1.1 Pre-conditions

The AE has not registered with the M2M System.

The pre-conditions for Mca Received Requests are met.

###### F.2.1.2.1.2 Signature - registerAE

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Mca common request input attributes | - | - | See Table A.2.1-1 |
| pointOf Access | IN | NO | The point of Access of the registered AE. |
| applicationId | IN | NO | The Application Identifer (App-ID). |
| expirationTime | IN | NO | The expiration time of the registration as requested by the Originator |
| aeId | OUT | NO | AE-ID is provided back in the response |
| responseType | OUT | NO | Unique response types for this service:   * AE successfully registered * AE not successfully registered |

Table F.2.1.2.1.2-1 Registration Services – registerAE capability

###### F.2.1.2.1.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Record the event
3. Notify Device onboarding Support Service for a first registration contact with the M2M system for the AE if a subscription exists.



Figure F.2.1.2.1.3-1 Registration Services – registerAE Diagram

###### F.2.1.2.1.4 Post-Conditions

Success case: The request is permitted.

Failure case: The request is not permitted and a response type is transmitted back to the AE

###### F.2.1.2.1.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### F.2.1.2.1.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 250ms

##### F.2.1.2.2 refreshAERegistration

This service capability enables an AE or a third party provisioned with the proper authorization to refresh an existing registration with the M2M System

###### Y2.1.2.2.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

The AE is registered and allocated an AE-ID by the M2M System.

###### F.2.1.2.2.2 Signature - refreshAERegsitration

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Mca common request input attributes | - | - | See Table A.2.1-1 |
| aeId | IN | NO |  |
| pointOfAccess | IN | YES | The point of Access of the registered AE. POA is optional only if identical to the one in the refreshed registration |
| expirationTime | IN | NO | The expiration time of the registration as requested by the Originator. |
| responseType | OUT | NO | Unique response types for this service:   * AE successfully refreshed * Registration Does not exist |

Table F.2.1.2.2.2-1 Registration Services - refreshAERegistration capability

###### F.2.1.2.2.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Record the event



Figure F.2.1.2.2.3-1 Registration Services – refreshAERegistration Diagram

###### F.2.1.2.2.4 Post-Conditions

Success case: The request is permitted.

Failure case: The request is not permitted and a response type is transmitted to the AE

###### F.2.1.2.2.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### F.2.1.2.2.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 50ms

##### F.2.1.2.3 deregisterAE

This service capability enables an AE or a third party provisioned with the proper ACP to deregister from the M2M System.

###### F.2.1.2.3.1 Pre-conditions

The pre-conditions for Mca Received Requests are met.

The AE-ID is registered.

###### F.2.1.2.3.2 Signature – deregisterAE

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Mca common request input attributes | - | - | See Table A.2.1-1 |
| aeId | IN | NO |  |
| responseType | OUT | NO | Unique response types for this service:   * AE successfully De-registsred * Registration Does not exist |

Table F.2.1.2.3.2-1 RegistrationServcies – deregisterAE capability

###### F.2.1.2.3.3 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Record the event



Figure F.2.1.2.3.3-1 Registration Services – deregisterAE Diagram

###### F.2.1.2.3.4 Post-Conditions

Success case: The request is permitted.

Failure case: The request is not permitted and a response type is transmitted back to the AE

###### F.2.1.2.3.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### F.2.1.2.3.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300ms

# Annex X(Informative): M2M Service Capability Template

The M2M Service Capability template is used as a specification that defines the contract between the consumer of the service capability and the producer of the service capability. The specification contract includes documenting the provided Signature, constraints (pre-conditions, post-conditions, exceptions), policies and runtime expectations.

### X.1 <serviceCapabilityName>

<Document introductory description of the service capability>

The <serviceCapabilityName> reflects the operational functionality provided by the M2M Service Capability. M2M Service Capabilities are named using a construct [verb][noun][context] where the:

**verb**: Used to indicate what will happen to the noun

**noun**: Is the target of the noun

**context**: Is optional and further defines the service capability

### X.1.1 Signature

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Name of the parameter. | IN, OUT, IN-OUT | YES, NO | Description of the parameter in the context of the service capability. |

Table X.1.1-1 M2M Service Capability Signature

Direction: The direction is relative to the entity that provides (implements) the M2M Service Capability. The value “IN” means that the entity expects to receive a value for the parameter from the consumer (sender) of the M2M Service Capability request. The value “Out” means that the entity will send a value for the parameter to the consumer (sender) of the M2M Service Capability request. A value of “IN-OUT” means that the entity will receive the value for the parameter from the consumer and then send a value (not necessarily the same value) for the parameter back to the consumer.

Optional: Indicates if the parameter is required in requests (Direction: IN, IN-OUT) or responses (Direction: IN-OUT, OUT). A value of YES means that the parameter is optional. A value of NO means that the parameter is mandatory.

### X.1.2 Pre-conditions

<Document the pre-conditions that may only be valid to run provided some testable prior business rule check or other value to be changed is actually present and available for the service capability to act upon. Pre-conditions are documented that are in addition to that provided by the internal resource operations and procedures>

### X.1.3 Service Interactions

<Document the detail procedure for <serviceCapabilityName>. The detail procedure for the service capability is written as an Diagram in a time order and step-by-step. The Originator and what the Originator carries out (a task, function, accessing to resources or other services) are defined in each step.

### X.1.4 Post-Conditions

<Document the post-conditions of the <serviceCapabilityName>. If the service capability has no defined output that can be validated except a notification of success (or failure) to set a value in the target of the service capability, a testable post condition of the service capability is documented. Post-conditions are documented that are in addition to that provided by the internal resource operations and procedures.>

### X.1.5 Exceptions

< Document the exception or error conditions that may be returned by the <serviceCapabilityName>. Exceptions are documented that are in addition to that provided by the internal resource operations and procedures.>

### X.1.6 Policies for Use

Message Exchange Patterns : See section 5.2.2.1Message Exchange Patterns for allowable patterns

Transaction Pattern:

* Creates Transaction: This service capability starts and completes a transaction
* Participation allowed: This service capability is able to participate in a transaction without violating the ongoing transaction’s properties (i.e. Atomicity, Consistency, Isolation, Durability)
* Participation not allowed: This service capability is unable to participate in a transaction

Maximum Response: The maximum time in milliseconds permitted to complete this service capability.

### X.1.7 oneM2M Resource Interworking

<Document the related oneM2M Resources operations to <serviceCapabilityName> here. Interworking rules are defined for each Resource operation. If there is no related internal resource, this resource list can be empty (e.g., the service capability is ‘sendTrigger’).>.

# Annex Y(Informative): oneM2M Service Requirements

The primary motivation of this technical specification is to integrate oneM2M Service capabilities with existing M2M deployments without affecting that existing M2M solution’s underlying deployment framework and protocols. For example if an existing M2M solution uses a XMPP based framework to communicate between applications in the network and devices, then M2M Service capabilities are efficiently exposed to the XMPP based framework without requiring modifications to the existing M2M solution’s deployment framework or protocol. A secondary motivation for this technical specification is to offer M2M Service capabilities to M2M service provider’s who utilize service oriented architectural frameworks.

This annex defines requirements that have not been captured in the oneM2M Requirements [1].

|  |  |
| --- | --- |
| **Requirement ID** | **Description** |
| SCA-001 | The M2M System shall be capable of integrating oneM2M service capabilities with existing M2M deployments without affecting the existing M2M solution’s underlying deployment framework and protocols. |
| SCA-002 | The M2M System shall be capable of offering oneM2M service capabilities to SOA architectural frameworks. |

Annex <y>:  
Bibliography

The annex entitled "Bibliography" is optional.

It shall contain a list of standards, books, articles, or other sources on a particular subject which are not mentioned in the document itself

It shall not include references mentioned in the document.

Use the **Heading 9 style** for the title and B1+ or Normal for the text.

* <Publication>: "<Title>".

OR

<Publication>: "<Title>".

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# History

This clause shall be the last one in the document and list the main phases (all additional information will be removed at the publication stage).

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