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| Source:\* | Wolfgang Granzow, Qualcomm, wgranzow@qti.qualcomm.comPhil Hawkes, Qualcomm, phawkes@qti.qualcomm.com |
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**Introduction**

This contribution proposes following updates to TS-0032v0\_0\_4:

1. Addressing the Editor’s Notes in the text as follows:
* Clarification which oneM2Mspecific MIME Media Types are applicable
* Clarification that the MAF client or MEF client ID can be Node-ID, AE-ID or CSE-ID and that this Identifier shall be used in the ***From*** primitive parameter
	+ This implies the use of a Node-ID (which may be set to the Device ID in the *creator* attribute
* Clarification that MAF and MEF should be identified by their MAF-FQDN and MEF-FQDN, respectively, i.e. MAF-FQDN = MAF-ID and MEF-FQDN = MEF-ID. As a side effect, some corresponding updates to TS-0003 may be required.
1. Removal of placeholder sections for Annexes (no Annex is currently needed)
2. Minor editorial corrections

**Revision R01:**

* Correction: <*MAFBase*> / <*MEFBase*> resource has no resource-specific attributes
* Added *labels* attribute to <*MAFBase*> and <*MEFBase*> resource
* Added *estBaseURI* and *deviceConfigURIs* attributes <*MEFBase*> resource required for triggering of the EST certificate enrolment and Device Configuration procedures. *estBaseURI* and *deviceConfigURIs* reference and datatype to be defined

NOTE: *estBaseURI* and data type sec:*deviceConfigURI* used for *deviceConfigURIs* need to be introduced into TS-0003

* Reordered *expirationTime* attribute (for alignment with <CSEBase>)
* Renamed attribute *fqdn* to *adminFQDN* in <symmKeyReg>, <*mafClientReg*>, <*mefClientReg*> resources (for alignment with TS-0003 and TS-0022)?
* Addressed Editor”s note on TLS export mechanism in clause 8.5.2.1.
* Short names for new attributes

*======== Update of Text proposed for TS-0032 starts here =====================*

1 Scope

The present document specifies communication between the M2M Authentication Function (MAF) and MAF clients on the reference point Mmaf and between the M2M Enrolment Function (MEF) and MEF clients on the reference point Mmef.

2 References

2.1 Normative references

 References are either specific (identified by date of publication and/or edition number or version number) or non‑specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

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

1. oneM2M TS-0001: "Functional Architecture".
2. oneM2M TS-0003: "Security Solutions".
3. oneM2M TS-0004: "Service Layer Core Protocol Specification”.
4. oneM2M TS-0008: "CoAP Protocol Binding”.
5. oneM2M TS-0009: "HTTP Protocol Binding”.
6. oneM2M TS-0010: "MQTT Protocol Binding”.
7. oneM2M TS-0011: "Common Terminology”.
8. oneM2M TS-0020: "WebSocket Protocol Binding”.
9. oneM2M TS-0022: "Field Device Configuration”.

2.2 Informative references

 References are either specific (identified by date of publication and/or edition number or version number) or non‑specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] oneM2M Drafting Rules.

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

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in oneM2M TS-0011 [7], oneM2M TS-0003 [2] and the following apply:

**MAF Client:** functionality for performing MAF procedures on behalf of an associated CSE or AE, or on behalf of CSE or AE(s) present on an associated Node.

**MAF interface**: Communication interface between a MAF and a MAF Client identified by reference point Mmaf.

**MEF Client:** functionality for performing MEF procedures on behalf of an associated CSE or AE, or on behalf of CSE or AE(s) present on an associated Node, or an associated MAF.

**MEF interface**: Communication interface between a MEF and a MEF Client identified by reference point Mmef.

3.2 Abbreviations

MAF M2M Authentication Function

MEF M2M Enrolment Function

MTE M2M Trust Enabler

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 General Description

5.1 MAF Interface

5.1.1 Introduction

The MAF Interface is a simple variant of the Mcc/Mca reference points specifying the interaction of MAF Clients with a M2M Authentication Function (MAF), acting on behalf of an *administrating stakeholder* such as an M2M SP or third party M2M Trust Enabler (MTE). The present document does not specify the operation and management of the MAF required to support these procedures.

A MAF Client interacts with the MAF on behalf of Node (ADN, ASN, IN or MN), or a CSE or an AE.

Figure 5.1.1-1 defines the reference point Mmaf between MAF clients and a MAF.



**Figure 5.1.1-1: Reference Architecture for MAF**

The administrating stakeholder authorizes the MAF’s services to MAF clients, and oversees authorizing the distribution of symmetric keys. A MAF may provide its services on behalf of multiple administrating stakeholders. A MAF Client may be associated with multiple administrating stakeholders, each administrating the use of the MAF within a different scope.

NOTE 1: The administrating stakeholder could be an M2M SP administrating the registration and distribution of credentials used for SAEFs and ESPrim within the M2M SP’s Domain.

NOTE 2: The administrating stakeholder could be an MTE administrating the registration and distribution of credentials for ESPrim and ESData to MAF Clients belonging to a particular Application Service Provider, where the MAF Clients could be distributed over multiple M2M SP domains.

The present specification has no impact on the specifications in TS-0001 [1] and TS-0004 [3]. However, the MAF Interface uses much of the specification in TS-0004 [3] and in particular allows use of the HTTP binding in TS-0008 [4], the CoAP binding in TS-0009 [5] and the WebSocket binding in TS-0020 [8].

NOTE: The MQTT binding in TS-0010 [6] is not suitable for the MAF Interface, because the MAF Interface assumes a TLS or DTLS connection from the MAF Client to the MAF – which is not possible using the MQTT binding

The MAF Interface incorporates the following concepts from the Mcc/Mca reference points:

1. The concept of operations acting on resources.
2. The resource addressing from Mcc/Mca is used.
3. The universal attributes and some common attributes of resources.

The MAF Interface differs from Mcc/Mca in the following ways:

1. The MAF Client can only communicate directly with the MAF – there are no transited CSEs. Only Blocking Mode communication method is supported.
2. None of the resource types applicable on Mcc/Mca are used.
	* Access control decisions use simple access control list for Retrieve access, and <*accessControlPolicy*> resources are not used for resources hosted by the MAF. A consequence of this is that the accessControlPolicyIDs attributes are not needed in the resources hosted by the MAF.
	* The <*subscription*> resource and NOTIFY operations are not supported.
	* There is no AE registration or CSE registration, but a similar process where a MAF Client creates a *<mafClientReg>* (MAF Client registration record) resource on the MAF.
	* There are no announced resources.

The hierarchy of resources hosted by a MAF shall be as follows:

1. <*MAFBase*> resource type is the structural root for all the resources that are residing on a MAF. This resource is implicitly created by the MAF and uses the fixed resource name “maf” and contains following child resources:
	* *<mafClientReg>* resource. It confirms the MAF Client’s registration to an administrating stakeholder, and can contain configuration information to be returned to the MAF Client.
	* <*symmKeyReg*> resources. It is created by the MAF Client, and contains symmetric keys for retrieval by another MAF Client.

5.1.2 MAF Interface Overview

This MAF Interface overview is based on the specification in clause 6 of oneM2M TS-0004 [3].

Identifiers such as M2M-SP-ID, AE-ID and CSE-ID as defined in 6.2.3 of [3] also apply to the MAF Interface. M2M Trust Enablers (MTEs) are identified using an M2M-SP-ID.

Resources are addressed as specified in clause 6.2.4 in [3].

Common data types applicable to the MAF Interface are inherited from clause 6.3 of [3].

Table 5.2-1 and 5.2-2 list the request and response primitive parameters inherited from clauses 6.4.1 and 6.4.2 in [3], respectively; the data types of these parameters are unchanged. The ***From*** parameter shall include the MAF client ID which can be a Node-ID, AE-ID or CSE-ID, depending on whether the client acts on behalf of a node, AE or CSE. Note that this is in contrast to primitives on the Mca and Mca interface, where the ***From*** primitive parameter cannot include a Node-ID.NOTE: All other optional request and response primitive parameters defined in clause 6.4.1 of [3] are not used on the MAF Interface.

**Table 5.1.2-1: MAF Interface request primitive parameters**

| **Parameter** | **Multiplicity** | **Notes** |
| --- | --- | --- |
| Operation  | 1 |  |
| To | 1 |  |
| From | 0..1 | If not present, the MAF internally assigns ***From*** to be the identity of the Node, CSE or AE associated with the credential used for the MAF Handshake procedure. |
| Request Identifier | 1 |  |
| Resource Type | 0..1 |  |
| Content | 0..1 |  |
| Result Content | 0..1 |  |

**Table 5.1.2-2: MAF Interface response primitive parameters**

| **Parameter** | **Multiplicity** | **Notes** |
| --- | --- | --- |
| Response Status Code  | 1 |  |
| Request Identifier  | 1 |  |
| Content  | 0..1 |  |

Data types associated with resources applicable to the MAF Interface are defined in clause 7.

Table 5.2-3 lists the response status codes from clause 6.6 [3] which are supported by the MAF Interface.

**Table 5.1.2-3: Response status codes supported by the MAF Interface**

| **Response status codes** | **Interpretation** |
| --- | --- |
| 2000 | OK |
| 2001 | CREATED |
| 2002 | DELETED |
| 2004 | UPDATED |
| 4000 | BAD\_REQUEST |
| 4004 | NOT\_FOUND |
| 4005 | OPERATION\_NOT\_ALLOWED |
| 4103  | ACCESS\_DENIED |
| 5000 | INTERNAL\_SERVER\_ERROR |

The MIME media types defined on clause 6.7 of [3] shall be supported on the MAF interface. The notification related Media types vnd.onem2m-ntfy+json, vnd.onem2m-ntfy+cbor, vnd.onem2m-preq+xml do not apply to the MAF interface.

Virtual resources (clause 6.8 [3]) are not supported by the MAF Interface.

5.2 MEF Interface

5.2.1 Introduction

The M2M Enrolment Function (MEF) is an essential part of the oneM2M Remote Security Provisioning architecture.

Clause 6.1.2.1 of TS-0003 [2] defines the following three variants of Remote Security Provisioning Frameworks (RSPF):

Pre-Provisioned Symmetric Key RSPF,

Certificate-Based RSPF,

GBA-based RSPF.

The MEF interface defined in the present specification applies to Pre-Provisioned Symmetric Key RSPF and Certificate-Based RSPF only. For interfaces and procedures applicable to GBA-based see clause 8.3.2.3 of TS-0003 [2].

When using Pre-Provisioned Symmetric Enrolee Key RSPF or Certificate-Based RSPF, the MEF serves a number of different use cases which are summarized as follows:

1. The MEF provisions an Enrolee to perform MAF Security Framework procedures with a MAF as defined in clause 8.8.2 of TS-0003 [2].
2. The MEF provisions an Entity A and an Entity B to perform Security Association Establishment as defined in clauses 8.2.2.1 and 8.2.2.2 of TS-0003 [2].
3. The MEF provisions an originator and a receiver of a primitive with credentials to enable End-to-End Security of Primitives (ESPRIM) with security credentials as specified in clause 8.4 of TS-0003 [2].
4. The MEF provisions the source and target endpoints of End-to-End Security of Data (ESDATA) as specified in clause 8.5 of TS-0003 [2].

This specification defines messages and procedures for the above listed MEF use cases.

NOTE 1: A MEF may also be implemented as a Device Management server using device management protocols such as OMA DM, OMA LwM2M and BBF TR-069. Such procedures are defined in TS-0003 [2] and TS-0022 [9].

Like the Mmaf Interface, the Mmef Interface is a simple variant of the Mcc/Mca reference points specifying the interaction of MEF Clients with a M2M Enrolment Function (MEF), managing symmetric keys on behalf of an *administrating stakeholder* such as an M2M SP or third party M2M Trust Enabler (MTE). The present document does not specify the operation and management of the MEF required to support these procedures.

A MEF Client interacts with the MEF on behalf of Node (ADN, ASN, IN or MN), or a CSE or an AE for use case 1 and 2 in the above list. Figure 5.2.1-1 defines the reference point Mmef between MEF clients and a MEF, and between different MEFs.

**MEF**

ADN

**MEF**

**Client**

AE

AE

AE

ADN

AE

AE

AE

**MEF**

**Client**

**MEF**

**Client**

**MEF**

**Client**

Legend

:

Mcc

Mca

Mmef

Distributing keys

within a Node

IN

-

CSE

**MEF**

**Client**

AE

AE

MN

/ (

ASN

)

AE

CSE

**MEF**

**Client**

**MEF**

**Client**

**MEF**

**Client**

**MEF**

**Client**

ASN

/ (

MN

)

**MEF**

**Client**

AE

AE

AE

CSE

**MAF**

**MEF**

**Client**

**Figure 5.2.1-1: Reference Architecture for MEF**

The administrating stakeholder authorizes the MEF’s services to MEF clients. A MEF may provide its services on behalf of multiple administrating stakeholders. A MEF Client may be associated with multiple administrating stakeholders, each administrating the use of the MEF within a different scope.

NOTE 1: The administrating stakeholder could be an M2M SP administrating the registration and distribution of credentials used for SAEFs and ESPrim within the M2M SP’s Domain.

NOTE 2: The administrating stakeholder could be an MTE administrating the registration and distribution of credentials for ESPrim and ESData to MEF Clients belonging to a particular Application Service Provider, where the MEF Clients could be distributed over multiple M2M SP domains.

The present specification has no impact on the specifications in TS-0001 [1] and TS-0004 [3]. However, the MEF Interface uses much of the specification in TS-0004 [3] and in particular allows use of the HTTP binding in TS-0008 [4], the CoAP binding in TS-0009 [5] and the WebSocket binding in TS-0020 [8].

NOTE: The MQTT binding in TS-0010 [6] is not suitable for the MEF Interface, because the MEF Interface assumes a TLS or DTLS connection from the MEF Client to the MEF – which is not possible using the MQTT binding

The MEF Interface incorporates the following concepts from the Mcc/Mca reference points:

1. The concept of operations acting on resources.
2. The resource addressing from Mcc/Mca is used.
3. The universal attributes and some common attributes of resources.

The MEF Interface differs from Mcc/Mca in the following ways:

1. The MEF Client can only communicate directly with the MEF – there are no transited CSEs. Only Blocking Mode communication method is supported.
2. None of the resource types applicable on Mcc/Mca are used.
	* Access control decisions use simple access control list for Retrieve access, and <*accessControlPolicy*> resources are not used for resources hosted by the MEF. A consequence of this is that the accessControlPolicyIDs attributes are not needed in the resources hosted by the MEF.
	* The <*subscription*> resource and NOTIFY operations are not supported.
	* There is no AE registration or CSE registration, but a similar process where a MEF Client creates a *<mefClientReg>* (MEF Client registration record) resource on the MEF.
	* There are no announced resources.

The hierarchy of resources hosted by a MEF shall be as follows:

1. <*MEFBase*> resource type is the structural root for all the resources that are residing on a MEF. This resource is implicitly created by the MEF and uses the fixed resource name “mef” and contains following child resources:
	* *<mefClientReg>* resource. It confirms the MEF Client’s registration to an administrating stakeholder, and can contain configuration information to be returned to the MEF Client.
	* <*symmKeyReg*> resources. It is created by the MEF Client, and contains symmetric keys for retrieval by another MEF Client.

5.2.2 MEF Interface Overview

This MEF Interface overview is based on the specification in clause 6 of oneM2M TS-0004 [3].

Identifiers such as M2M-SP-ID, AE-ID and CSE-ID as defined in 6.2.3 of [3] also apply to the MEF Interface. M2M Trust Enablers (MTEs) are identified using an M2M-SP-ID.

Resources are addressed as specified in clause 6.2.4 in [3].

Common data types applicable to the MEF Interface are inherited from clause 6.3 of [3].

Table 5.2-1 and 5.2-2 list the request and response primitive parameters inherited from clauses 6.4.1 and 6.4.2 in [3], respectively; the data types of these parameters are unchanged. The ***From*** parameter shall include the MEF client ID which can be a Node-ID, AE-ID or CSE-ID, depending on whether the client acts on behalf of a node, AE or CSE. Note that this is in contrast to primitives on the Mca and Mca interface, where the ***From*** primitive parameter cannot include a Node-ID.

NOTE: All other optional request and response primitive parameters defined in clause 6.4.1 of [3] are not used on the MEF Interface.

**Table 5.2.2-1: MEF Interface request primitive parameters**

| **Parameter** | **Multiplicity** | **Notes** |
| --- | --- | --- |
| Operation  | 1 |  |
| To | 1 |  |
| From | 0..1 | If not present, the MEF internally assigns ***From*** to be the identity of the Node, CSE or AE associated with the credential used for the MEF Handshake procedure. |
| Request Identifier | 1 |  |
| Resource Type | 0..1 |  |
| Content | 0..1 |  |
| Result Content | 0..1 |  |

**Table 5.2.2-2: MEF Interface response primitive parameters**

| **Parameter** | **Multiplicity** | **Notes** |
| --- | --- | --- |
| Response Status Code  | 1 |  |
| Request Identifier  | 1 |  |
| Content  | 0..1 |  |

Data types associated with resources applicable to the MEF Interface are defined in clause 7.

The response status codes listed in Table 5.1.2-3 also apply to the MEF Interface.

The MIME media types defined on clause 6.7 of [3] shall be supported on the MEF interface. The notification related Media types vnd.onem2m-ntfy+json, vnd.onem2m-ntfy+cbor, vnd.onem2m-preq+xml do not apply to the MEF interface.

Virtual resources (clause 6.8 [3]) are not supported by the MEF Interface.

6 Processing and Representation of Primitives

6.1 Common aspects of the MAF and MEF interface

This clause corresponds to the specification in clause 7 and 8 of oneM2M TS-0004 [3].

Both, MAF and MEF Interface request primitive formats conform to clause 7.2.1.1 [3], constrained to the CRUD operations, with request parameters listed in Table 5.1.2-1 and Table 5.2.2-1, respectively.

Both,MAF and MEF Interface response primitive formats conform to clause 7.2.1.2 [3], constrained to the CRUD operations, with response parameters listed in Table 5.1.2-2 and Table 5.2.2-2, respectively.

6.2 MAF Interface

The MAF Interface generic resource request procedure for originators and receivers conforms to clauses 7.2.2.1 and 7.2.2.2 of [3], with the following clarification:

* The MAF Client acts as the originator, and the MAF acts as the receiver and resource hosting entity.
* The MAF Handshake procedure (clause 8.8.2.2 of oneM2M TS-0003 [3]) is used for mutual authentication of the MAF Client and MAF.
* The operation shall be one of the CRUD operations.
* The request and response parameters shall conform to Table 5.1.2-1 and Table 5.1.2-2.
* “Blocking Mode” communication method shall be used.
* The step Recv-6.3: “Check authorization of the Originator” is replaced by the authorization processes described in the MAF Interface resource-type specific procedures in clause 8.

The originator actions, receiver actions and Hosting CSE actions conform to clause 7.3 [3], with clause 7.3.3.15 [3] replaced by the authorization processes described in the MAF Interface resource-type specific procedures in clause 8.

The management common operations in clause 7.3.4 [3] do not apply to the MAF Interface.

The resource-type-specification conventions apply to the specification in clause 8, but the remainder of clause 7.4 [3] does not apply to the MAF Interface.

Clause 7.5.1 [3] (regarding Notification) does not apply to the MAF Interface. Elements contained in the Content primitive parameter conform to clause 7.5.2 [3].

The representation of MAF Interface primitives in data transfer conforms to clause 8. Clause 9 contains additional short names specific to both, the MAF and MEF Interfaces.

6.3 MEF Interface

The MEF Interface generic resource request procedure for originators and receivers conforms to clauses 7.2.2.1 and 7.2.2.2 of [3], with the following clarification:

* The MEF Client acts as the originator, and the MEF acts as the receiver and resource hosting entity.
* The MEF Handshake procedure (clause 8.3.5.2.2 of oneM2M TS-0003 [3]) is used for mutual authentication of the MEF Client and MEF.
* The operation shall be one of the CRUD operations.
* The request and response parameters shall conform to Table 5.2.2-1 and Table 5.2.2-2.
* “Blocking Mode” communication method shall be used.
* The step Recv-6.3: “Check authorization of the Originator” is replaced by the authorization processes described in the MEF Interface resource-type specific procedures in clause 8.

The originator actions, receiver actions and Hosting CSE actions conform to clause 7.3 [3], with clause 7.3.3.15 [3] replaced by the authorization processes described in the MEF Interface resource-type specific procedures in clause 8.

The management common operations in clause 7.3.4 [3] do not apply to the MEF Interface.

The resource-type-specification conventions apply to the specification in clause 8, but the remainder of clause 7.4 [3] does not apply to the MEF Interface.

Clause 7.5.1 [3] (regarding Notification) does not apply to the MEF Interface. Elements contained in the Content primitive parameter conform to clause 7.5.2 [3].

The representation of MEF Interface primitives in data transfer conforms to clause 8. Clause 9 contains additional short names specific to the both, the MAF and MEF Interfaces.

7 Resource types definitions

7.1 Namespaces used for resource and data types

Representations of resources applicable to the MAF and MEF Interfaces employ the namespace identifier “sec:” for global XML elements associated with a resource type. Data types of the attributes and complex-type elements of these resource types may use any of the name space identifiers listed in Table 7.1.-1

Any data types of XML elements defined for use in present document shall be one of name spaces in table 7.1-1.

**Table 7.1-1: Namespaces applicable to resource types defined in this document**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name space** | **prefix** | **Name space definition** | **Types defined in** |
| oneM2M Security | sec: | <http://www.onem2m.org/xml/securityProtocols>  | TS-0032 and TS-0003 |
| oneM2M protocol CDT | m2m: | <http://www.onem2m.org/xml/protocol>  | TS-0004 |
| Device Configuration | dcfg: | <http://www.onem2m.org/xml/deviceConfig>  | TS-0022 |

7.2 Resource Type <*MAFBase*>

The <*MAFBase*> resource shall represent a MAF.

The *<MAFBase>* resource shall contain the child resources specified in table 7.2-1.

**Table 7.2-1: Child resources of *<MAFBase>* resource**

| **Child Resources of *<MAFBase>*** | **Child Resource Type** | **Multiplicity** | **Description** |
| --- | --- | --- | --- |
| *[variable]* | *<mafClientReg>* | 0..n | See clause 7.3 |
| *[variable]* | *<symmKeyReg>* | 0..n | See clause 7.4 |

The *<MAFBase>* resource shall contain the attributes specified in table 7.2-2.

**Table 7.2-2: Attributes of *<MAFBase>* resource**

| **Attributes of *<MAFBase>*** | **Multiplicity** | **RW/****RO/****WO** | **Description** |
| --- | --- | --- | --- |
| *resourceType* | 1 | RO | See clause 9.6.1.3 of [1].  |
| *resourceID* | 1 | RO | See clause 9.6.1.3 of [1]. |
| *resourceName* | 1 | RO | See clause 9.6.1.3 of [1]. Shall be fixed to “maf”. |
|  |  |  |  |
| *creationTime* | 1 | RO | See clause 9.6.1.3 of [1]. |
| *labels* | 1 | RO | See clause 9.6.1.3 of [1]. |
| *expirationTime* | 1 | RO | See clause 9.6.1.3 of [1]. |

7.3 Resource Type <*MEFBase*>

The <*MEFBase*> resource shall represent a MEF.

The *<MEFBase>* resource shall contain the child resources specified in table 7.3-1.

**Table 7.3-1: Child resources of *<MEFBase>* resource**

| **Child Resources of *<MEFBase>*** | **Child Resource Type** | **Multiplicity** | **Description** |
| --- | --- | --- | --- |
| *[variable]* | *<mefClientReg>* | 0..n | See clause 7.4 |
| *[variable]* | *<symmKeyReg>* | 0..n | See clause 7.6 |

The *<MEFBase>* resource shall contain the attributes specified in table 7.3-2.

**Table 7.3-2: Attributes of *<MEFBase>* resource**

| **Attributes of *<MEFBase>*** | **Multiplicity** | **RW/****RO/****WO** | **Description** |
| --- | --- | --- | --- |
| *resourceType* | 1 | RO | See clause 9.6.1.3 of [1].  |
| *resourceID* | 1 | RO | See clause 9.6.1.3 of [1]. |
| *resourceName* | 1 | RO | See clause 9.6.1.3 of [1]. Shall be fixed to “mef”. |
|  |  |  |  |
| *creationTime* | 1 | RO | See clause 9.6.1.3 of [1]. |
| *labels* | 1 | RO | See clause 9.6.1.3 of [1]. |
| *expirationTime* | 1 | RO | See clause 9.6.1.3 of [1]. |
| *estBaseURI* | 0..1 | RO | See clause 8.3.6.2.2 of [1]. |
| *deviceConfigURIs* | 0..1(L) | RO |  See clause 12.3 of [1] |

7.4 Resource Type *<mafClientReg>*

The *<mafClientReg>* resource shall represent a MAF Client enrolled with an M2M SP or M2M Trust Enabler (MTE).

NOTE: A single MAF Client can be enrolled with at most one M2M SP and any number of MTEs (typically enabling end-to-end security to MAF Clients outside the MAF Client’s M2M SP’s domain). Consequently, a single MAF Client can be associated with multiple *<mafClientReg>* resources on multiple MAFs. It is also possible that a single MAF Client can be associated with multiple *<mafClientReg>* resources on a single MAF acting on behalf of multiple administrating stakeholders.

The *<mafClientReg>* resource shall contain no child resources.

The *<mafClientReg>* resource shall contain the attributes specified in table 7.4-1.

**Table 7.4-1: Attributes of *<mafClientReg>* resource**

| **Attributes of *<mafClientReg>*** | **Multiplicity** | **RW/****RO/****WO** | **Description** |
| --- | --- | --- | --- |
| *resourceType* | 1 | RO | See clause 9.6.1.3 of [1]. |
| *resourceID* | 1 | RO | See clause 9.6.1.3 of [1]. |
| *resourceName* | 1 | RO | See clause 9.6.1.3 of [1]. |
| *parentID* | 1 | RO | See clause 9.6.1.3 of [1]. |
|  |  |  |  |
| *creationTime* | 1 | RO | See clause 9.6.1.3 of [1]. |
| *labels* | 1 | RW | See clause 9.6.1.3 of [1]. |
| *expirationTime* | 1 | WO | See clause 9.6.1.3 of [1]. |
| *creator* | 1 | WO | This attribute shall include the identifier of the MAF client which has created this resource.  |
| *adminFQDN* | 1 | WO | FQDN of the M2M SP or MTE who is the administrating stakeholder of this enrolment |
| *assignedSymmKeylID* | 0..1 | RO | When the MAF Client uses a symmetric key to authenticate to the MAF, then the MAF may use this attribute to provide a symmetry key identifier within the domain of the MAF. Assigned by the MAF. |

7.5 Resource Type *<mefClientReg>*

The *<mefClientReg>* resource shall represent a MEF Client enrolled with an M2M SP or M2M Trust Enabler (MTE).

NOTE: A single MEF Client can be enrolled with at most one M2M SP and any number of MTEs (typically enabling end-to-end security to MEF Clients outside the MEF Client’s M2M SP’s domain). Consequently, a single MEF Client can be associated with multiple *<mefClientReg>* resources on multiple MEFs. It is also possible that a single MEF Client can be associated with multiple *<mefClientReg>* resources on a single MEF acting on behalf of multiple administrating stakeholders.

The *<mefClientReg>* resource shall contain no child resources.

The *<mefClientReg>* resource shall contain the attributes specified in table 7.5-1.

**Table 7.5-1: Attributes of *<mefClientReg>* resource**

| **Attributes of *<mefClientReg>*** | **Multiplicity** | **RW/****RO/****WO** | **Description** |
| --- | --- | --- | --- |
| *resourceType* | 1 | RO | See clause 9.6.1.3 of [1]. |
| *resourceID* | 1 | RO | See clause 9.6.1.3 of [1]. |
| *resourceName* | 1 | RO | See clause 9.6.1.3 of [1]. |
| *parentID* | 1 | RO | See clause 9.6.1.3 of [1]. |
|  |  |  |  |
| *creationTime* | 1 | RO | See clause 9.6.1.3 of [1]. |
| *labels* | 1 | RW | See clause 9.6.1.3 of [1]. |
| *expirationTime* | 1 | WO | See clause 9.6.1.3 of [1]. |
| *creator* | 1 | WO | This attribute shall include the identifier of the MAF client which has created this resource.  |
| *adminFQDN* | 1 | WO | FQDN of the M2M SP or MTE who is the administrating stakeholder of this enrolment |
| *assignedSymmKeylID* | 0..1 | RO | When the MEF Client uses a symmetric key to authenticate to the MEF, then the MEF may use this attribute to provide a symmetry key identifier within the domain of the MEF. Assigned by the MEF. |

7.6 Resource Type <*symmKeyReg*>

The <*symmKeyReg*> resource shall represent a symmetric key that a source MAF Client has established with the MAF for distributing to authorized Target MAF Clients and/or another MAF. The MAF Client provides a list of authorized Targets when the resource is created – the present document does not specify how the MAF associates the list with the resource. The MAF, in coordination with the identified administrating stakeholder (M2M SP or MTE), can modify the list of authorized Targets and the *expirationTime*.

The *<symmKeyReg>* resource shall contain no child resources.

The *<symmKeyReg>* resource shall contain the attributes specified in table 7.6-1.

**Table 7.6-1: Attributes of *<symmKeyReg>* resource**

| **Attributes of *<symmKeyReg>*** | **Multiplicity** | **RW/****RO/****WO** | **Description** |
| --- | --- | --- | --- |
| *resourceType* | 1 | RO | See clause 9.6.1.3 of [1]. |
| *resourceID* | 1 | RO | See clause 9.6.1.3 of [1]. |
| *resourceName* | 1 | RO | See clause 9.6.1.3 of [1]. This value is used as the relative part of the identifier for the symmetric key in security protocols. |
| *parentID* | 1 | RO | See clause 9.6.1.3 of [1]. |
|  |  |  |  |
| *creationTime* | 1 | RO | See clause 9.6.1.3 of [1]. |
| *labels* | 0..1 | RW | See clause 9.6.1.3 of [1]. |
| *expirationTime* | 1 | WO | See clause 9.6.1.3 of [1]. |
| *creator* | 1 | RO | See clause 9.6.1.3 of [1]. |
| *adminFQDN* | 1 | WO | FQDN of the administrating stakeholder (M2M SP or MTE) associated with this enrolment.  |
| *SUID* | 1 | WO | An SUID constraining the use of the symmetric key associated with this resource |
| *targetIDs* | 1 (L) | RW | List of AE-ID(s) and/or CSE-ID(s) and/or and/or Node-ID(s) identifying the AE(s) and/or CSE(s) and/or Node(s) authorized to retrieve the resource. Only the creator and administrating stakeholder (identified by fqdn) are authorized to access this attribute. |
| *keyValue* | 1 | WO | The value of the key to be provided to the identifier targets. May be provided in the Create request or derived by the MAF Client and MAF from the TLS handshake parameters. |

8 Resource-type specific procedures and definitions

8.1 Resource Type <MAFBase>

8.1.1 Introduction

A <*MAFBase*> resource shall represent a MAF. This <*MAFBase*> resource shall be the root for all the resources that are residing on the MAF.

**Table 8.1.1-1: Data Type Definition of <MAFBase>**

|  |  |  |
| --- | --- | --- |
| **Data Type ID** | **File Name** | **Note** |
| MAFBase | SEC-MAFBase-v2\_x\_0.xsd |  |

The <*MAFBase*> resource has no resource-specific attributes.

**Table 8.1.1-2: Child resources of <MAFBase> resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Child Resource Type**  | **Child Resource Name** | **Multiplicity** | **Ref. to Resource Type Definition** |
| *<mafClientReg>* | [variable] | 0..n | Clause 7.4 |
| <*symmKeyReg*> | [variable] | 0..n | Clause 7.6 |

8.1.2 <*MAFBase*> resource specific procedures on CRUD operations

8.1.2.1 Create

*Originator:*

The <*MAFBase*> resource shall not be created via API.

*Receiver:*

Primitive specific operation on Recv-1.0 "Check the syntax of received message":

If the request is received, the MAF shall execute the following steps in order.

1. "Create an unsuccessful Response primitive" with the ***Response Status Code*** indicating "OPERATION\_NOT\_ALLOWED" error.
2. "Send the Response primitive".

8.1.2.2 Retrieve

*Originator:*

No change from the generic procedures in clause 7.2.2.1 of [3] with clarifications discussed in clauses 5.2 and 6.

*Receiver:*

Same as the generic procedures in clause 7.2.2.2 of [3] with clarifications discussed in clauses 5.2 and 6, and performing the following step in the place of step Recv-6.3: “Check authorization of the Originator”:

The Receiver shall allow all Originator’s to retrieve this resource.

8.1.2.3 Update

*Originator:*

The *<MAFBase>* resource shall not be updated via API.

*Receiver***:**

Primitive specific operation on Recv-1.0 "Check the syntax of received message":

1. If the request is received, the MAF shall execute the following steps in order.
2. "Create an unsuccessful Response primitive" with the Response Status Code indicating "OPERATION\_NOT\_ALLOWED" error.
3. "Send the Response primitive".

8.1.2.4 Delete

*Originator:*

The <MAFBase> resource shall not be DELETEed via API.

*Receiver*:

Primitive specific operation on Recv-1.0 "Check the syntax of received message":

1. If the request is received, the MAF shall execute the following steps in order.
2. "Create an unsuccessful Response primitive" with the ***Response Status Code*** indicating "OPERATION\_NOT\_ALLOWED" error.
3. "Send the Response primitive".

8.2 Resource Type <MEFBase>

8.2.1 Introduction

A <*MEFBase*> resource shall represent a MEF. This <*MEFBase*> resource shall be the root for all the resources that are residing on the MEF.

**Table 8.2.1-1: Data Type Definition of <*MEFBase*>**

|  |  |  |
| --- | --- | --- |
| **Data Type ID** | **File Name** | **Note** |
| MEFBase | SEC-MEFBase-v2\_x\_0.xsd |  |

The <*MEFBase*> resource has thefollowing universal/common and resource-specific attributes.

**Table 8.1.1-2: Universal/Common Attributes of *<MEFBase>* resource**

|  |  |
| --- | --- |
| **Attribute Name** | **Request Optionality**  |
| **Create** | **Update** |
| @resourceName | NP | NP |
| *resourceType* | NP | NP |
| *resourceID* | NP | NP |
| *parentID* | NP | NP |
| *creationTime* | NP | NP |
| *labels* | O | O |
| *expirationTime* | M | M |
| *creator* | NP | NP |

**Table 8.2.1-3: Resource Specific Attributes of *<MEFBase>* resource**

|  |  |  |
| --- | --- | --- |
| **Attribute Name** | **Data Type** | **Default Value and Constraints** |
|
| *estBaseURI* | xs:anyURI | No default |
| *deviceConfigURIs* | List of sec:*deviceConfigURI* | No default |

**Table 8.2.1-2: Child resources of <*MEFBase*> resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Child Resource Type**  | **Child Resource Name** | **Multiplicity** | **Ref. to Resource Type Definition** |
| *<mefClientReg>* | [variable] | 0..n | Clause 7.5 |
| <*symmKeyReg*> | [variable] | 0..n | Clause 7.6 |

8.2.2 <*MEFBase*> resource specific procedures on CRUD operations

8.2.2.1 Create

*Originator:*

The <*MEFBase*> resource shall not be created via API.

*Receiver:*

Primitive specific operation on Recv-1.0 "Check the syntax of received message":

If the request is received, the MEF shall execute the following steps in order.

1. "Create an unsuccessful Response primitive" with the ***Response Status Code*** indicating "OPERATION\_NOT\_ALLOWED" error\
2. "Send the Response primitive".

8.2.2.2 Retrieve

*Originator:*

No change from the generic procedures in clause 7.2.2.1 of [3] with clarifications discussed in clauses 5.2 and 6.

*Receiver:*

Same as the generic procedures in clause 7.2.2.2 of [3] with clarifications discussed in clauses 5.2 and 6, and performing the following step in the place of step Recv-6.3: “Check authorization of the Originator”:

The Receiver shall allow all Originator’s to retrieve this resource.

8.2.2.3 Update

*Originator:*

The *<MEFBase>* resource shall not be updated via API.

*Receiver***:**

Primitive specific operation on Recv-1.0 "Check the syntax of received message":

1. If the request is received, the MEF shall execute the following steps in order.
2. "Create an unsuccessful Response primitive" with the Response Status Code indicating "OPERATION\_NOT\_ALLOWED" error.
3. "Send the Response primitive".

8.2.2.4 Delete

*Originator:*

The <MEFBase> resource shall not be DELETEed via API.

*Receiver*:

Primitive specific operation on Recv-1.0 "Check the syntax of received message":

1. If the request is received, the MEF shall execute the following steps in order.
2. "Create an unsuccessful Response primitive" with the ***Response Status Code*** indicating "OPERATION\_NOT\_ALLOWED" error.
3. "Send the Response primitive".

8.3 Resource Type *<mafClientReg>*

8.3.1 Introduction

A *<mafClientReg>* resource shall represent a MAF Client enrolled with the MAF on behalf of an M2M Service Provider or M2M Trust Enabler. A *<mafClientReg>* resource shall be a child resource of the MAF’s <*MAFBase*> resource.

**Table 8.3.1-1: Data Type Definition of <*mafClientReg*>**

|  |  |  |
| --- | --- | --- |
| **Data Type ID** | **File Name** | **Note** |
| mafClientReg | SEC-mafClientReg-v2\_x\_0.xsd |  |

**Table 8.3.1-2: Universal/Common Attributes of *<mafClientReg>* resource**

|  |  |
| --- | --- |
| **Attribute Name** | **Request Optionality**  |
| **Create** | **Update** |
| @resourceName | NP | NP |
| *resourceType* | NP | NP |
| *resourceID* | NP | NP |
| *parentID* | NP | NP |
| *creationTime* | NP | NP |
|  |  |  |
| *labels* | O | O |
| *expirationTime* | M | M |
| *creator* | NP | NP |

**Table 8.3.1-3: Resource Specific Attributes of *<mafClientReg>* resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Request Optionality**  | **Data Type** | **Default Value and Constraints** |
| **Create** | **Update** |
| *fqdn* | M | NP | xs:anyURI | No default |
| *assignedSymmKeyID* | NP | NP | sec:credentialID  | No default |

The *<mafClientReg>* resource shall contain no child resources.

8.3.2 *<mafClientReg>* resource specific procedures on CRUD operations

8.3.2.1 Create

This procedure is denoted *MAF Client Registration* in clause 8.8.2.3 of TS-0003 [2]. The ***To*** parameter of the <*mafClientReg*> create request primitive includes the MAF-FQDN and the character “–“ (dash) as a shorthand notation for the name of the <*MAFBase*> resource:

//{MAF-FQDN}/–/

Example: //maf123.mafprovider.org/–/

The MAF-FQDN represents a globally unique identifier of a MAF (aka. MAF ID).

The ***From*** parameter of the <*mafClientReg*> create request primitive shall be left empty if the MAF client does not have a MAF Client ID assigned yet. If the MAF client interfaces with the MAF on behalf of the node (cf. clause 5.1.1), the Node-ID of the respective ADN, ASN, MN or IN shall serve as MAF Client ID.

*Editor’s Note: the data type of Node-ID needs to be redefined in TS-0004 to not allow space characters in its value (cf. deviceID)*

***Originator****:*

No change from the generic procedures in clause 7.2.2.1 of [3] with clarifications discussed in clauses 5.1.2 and 6.2, and with following differences:

In step Orig-6.0: “Process Response primitive”, if the Originator used a symmetric key to authenticate to the MAF, and the *<mafClientReg>* resource in the response contained an *assignedSymmKeyID* then the originator shall use the *assignedSymmKeyID* to identify this symmetric key when it is subsequently used in authenticating to the MAF.

***Receiver****:*

Same as the generic procedures in clause 7.2.2.2 of [3] with clarifications discussed in clauses 5.1.2 and 6.2, and with following differences:

The Receiver shall perform the following steps in order in the place of Recv-6.3: “Check authorization of the Originator”:

1. The Receiver shall determine if the Originator is authorized to register with the administrating stakeholder (M2M SP or MTE) identified by *fqdn* attribute. The present document does not specify how the Receiver makes this determination.
	1. If the Originator is not authorized, then the Receiver shall execute the following steps in order.
		1. "Create an unsuccessful Response primitive" with the Response Status Code indicating "ACCESS\_DENIED" error.
		2. "Send the Response primitive".
	2. If the Originator is authorized, then the Receiver shall allow the request.

The Receiver shall perform the following steps in order as part of “Create the resource” (clause 7.3.3.5)” during Step Recv-6.5: “Create/Update/Retrieve/Delete/Notify operation is performed”:

1. If the Originator authenticated using symmetric key with a key identifier which does not use the Receiver’s FQDN, then
	1. The Receiver shall assign a symmetric key identifier with the Receiver’s FQDN and with relative part which is unique within the scope of symmetric key identifiers issued by the Receiver. The Receiver shall associate this symmetric key identifier with the symmetric key used for authenticating the Originator.
	2. The Receiver shall set the *assignedSymmKeyID* attribute to be the Credential-ID formed from the assigned symmetric key identifier as specified in clause 10.4.
2. If the Originator authenticated using a symmetric key with a key identifier which does not use the Receiver’s FQDN, or if the Originator authenticated using a certificate, then the Receiver shall not include an *assignedSymmKeyID* attribute in the created resource.
3. The Receiver shall assign the *creator* attribute to an AE-ID or CSE-ID or Node-ID on instructions from the administrating stakeholder. The present document does not specify any details of how the AE-ID or CSE-ID or Node-ID is determined.

8.3.2.2 Retrieve

This procedure is denoted *MAF Client Configuration Retrieval* in clause 8.8.2.4 of TS-0003 [2]. This procedure is used to retrieve the <*mafClientReg*> resource.

*Originator:*

No change from the generic procedures in clause 7.2.2.1 of [3] with clarifications discussed in clauses 5.1.2 and 6.2.

*Receiver:*

Same as the generic procedures in clause 7.2.2.2 of [3] with clarifications discussed in clauses 5.1.2 and 6.2, performing the following steps in order in the place of Recv-6.3: “Check authorization of the Originator”:

1. The Receiver shall determine if the Originator is authorized by checking if the Originator is the creator of the resource.
2. If the Originator is not authorized, then the Receiver shall execute the following steps in order.
	* 1. "Create an unsuccessful Response primitive" with the Response Status Code indicating "ACCESS\_DENIED" error.
		2. "Send the Response primitive".
3. If the Originator is authorized, then the Receiver shall allow the request.

8.3.2.3 Update

This procedure is denoted *MAF Client Configuration Update* in clause 8.8.2.5 of TS-0003 [2]. This procedure is used to update attributes of the <*mafClientReg*> resource, such as e.g. labels, expiration time.

*Originator:*

The *<mafClientReg>* resource shall not be updated by a MAF client via API.

*Receiver***:**

Same as the generic procedures in clause 7.2.2.2 of [3] with clarifications discussed in clauses 5.1.2 and 6.2, and with the following differences:

The Receiver shall perform the following step in the place of Recv-6.3: “Check authorization of the Originator”:

1. The Receiver shall determine if the Originator is authorized by checking if the Originator is the creator of the resource.
2. If the Originator is not authorized, then the Receiver shall execute the following steps in order.
	* 1. "Create an unsuccessful Response primitive" with the Response Status Code indicating "ACCESS\_DENIED" error.
		2. "Send the Response primitive".
3. If the Originator is authorized, then the Receiver shall allow the request.

The Receiver shall perform the following steps in order as part of “Update the resource” (clause 7.3.3.7)” during Step Recv-6.5: “Create/Update/Retrieve/Delete/Notify operation is performed”:

1. If the Originator was the Creator of the resource, then the Receiver shall perform steps 2 and 3 in clause 8.2.2.1.

8.3.2.4 Delete

This procedure is denoted *MAF Client De-Registration* in clause 8.8.2.6 of TS-0003 [2]. This procedure enables the MAF client to delete its own <*mafClientReg*> resource on a MAF.

*Originator:*

No change from the generic procedures in clause 7.2.2.1 of [3] with clarifications discussed in clauses 5.1.2 and 6.2.

*Receiver:*

Same as the generic procedures in clause 7.2.2.2 of [3] with clarifications discussed in clauses 5.1.2 and 6.2, performing the following step in the place of Recv-6.3: “Check authorization of the Originator”:

1. The Receiver shall determine if the Originator is authorized by checking if the Originator is the creator of the resource.
2. If the Originator is not authorized, then the Receiver shall execute the following steps in order.
	* 1. "Create an unsuccessful Response primitive" with the Response Status Code indicating "ACCESS\_DENIED" error.
		2. "Send the Response primitive".
3. If the Originator is authorized, then the Receiver shall allow the request.

8.4 Resource Type *<mefClientReg>*

8.4.1 Introduction

A *<mefClientReg>* resource shall represent a MEF Client enrolled with the MEF on behalf of an M2M Service Provider or M2M Trust Enabler. A *<mefClientReg>* resource shall be a child resource of the MEF’s <*MEFBase*> resource.

**Table 8.4.1-1: Data Type Definition of <*mefClientReg*>**

|  |  |  |
| --- | --- | --- |
| **Data Type ID** | **File Name** | **Note** |
| mefClientReg | SEC-mefClientReg-v2\_x\_0.xsd |  |

**Table 8.4.1-2: Universal/Common Attributes of *<mefClientReg>* resource**

|  |  |
| --- | --- |
| **Attribute Name** | **Request Optionality**  |
| **Create** | **Update** |
| @resourceName | NP | NP |
| *resourceType* | NP | NP |
| *resourceID* | NP | NP |
| *parentID* | NP | NP |
| *creationTime* | NP | NP |
|  |  |  |
| *labels* | O | O |
| *expirationTime* | M | M |
| *creator* | NP | NP |

**Table 8.4.1-3: Resource Specific Attributes of *<mefClientReg>* resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Request Optionality**  | **Data Type** | **Default Value and Constraints** |
| **Create** | **Update** |
| *fqdn* | M | NP | xs:anyURI | No default |
| *assignedSymmKeyID* | NP | NP | sec:credentialID  | No default |

The *<mefClientReg>* resource shall contain no child resources.

8.4.2 *<mefClientReg>* resource specific procedures on CRUD operations

8.4.2.1 Create

This procedure is denoted *MEF Client Registration* in clause 8.3.5.2.3 of TS-0003 [2]. The ***To*** parameter of the <*mefClientReg*> create request primitive includes the MEF-FQDN and the character “–“ (dash) as a shorthand notation for the name of the <*MEFBase*> resource:

//{MEF-FQDN}/–/

Example: //mef123.mefprovider.org/–/

The MEF-FQDN represents a globally unique identifier of a MEF (aka. MEF ID)..

The ***From*** parameter of the <*mefClientReg*> create request primitive shall be left empty if the MEF client does not have a MEF Client ID assigned yet. If the MEF client interfaces with the MEF on behalf of the node (cf. clause 5.2.1), the Node-ID of the respective ADN, ASN, MN or IN shall serve as MEF Client ID.

***Originator****:*

No change from the generic procedures in clause 7.2.2.1 of [3] with clarifications discussed in clauses 5.2.2 and 6.3, and with following differences:

In step Orig-6.0: “Process Response primitive”, if the Originator used a symmetric key to authenticate to the MEF, and the *<mefClientReg>* resource in the response contained an *assignedSymmKeyID* then the originator shall use the *assignedSymmKeyID* to identify this symmetric key when it is subsequently used in authenticating to the MEF.

***Receiver****:*

Same as the generic procedures in clause 7.2.2.2 of [3] with clarifications discussed in clauses 5.2.2 and 6.3, and with following differences:

The Receiver shall perform the following steps in order in the place of Recv-6.3: “Check authorization of the Originator”:

1. The Receiver shall determine if the Originator is authorized to register with the administrating stakeholder (M2M SP or MTE) identified by *fqdn* attribute. The present document does not specify how the Receiver makes this determination.
	1. If the Originator is not authorized, then the Receiver shall execute the following steps in order.
		1. "Create an unsuccessful Response primitive" with the Response Status Code indicating "ACCESS\_DENIED" error.
		2. "Send the Response primitive".
	2. If the Originator is authorized, then the Receiver shall allow the request.

The Receiver shall perform the following steps in order as part of “Create the resource” (clause 7.3.3.5)” during Step Recv-6.5: “Create/Update/Retrieve/Delete/Notify operation is performed”:

1. If the Originator authenticated using symmetric key with a key identifier which does not use the Receiver’s FQDN, then
	1. The Receiver shall assign a symmetric key identifier with the Receiver’s FQDN and with relative part which is unique within the scope of symmetric key identifiers issued by the Receiver. The Receiver shall associate this symmetric key identifier with the symmetric key used for authenticating the Originator.
	2. The Receiver shall set the *assignedSymmKeyID* attribute to be the Credential-ID formed from the assigned symmetric key identifier as specified in clause 10.4.
2. If the Originator authenticated using a symmetric key with a key identifier which does not use the Receiver’s FQDN, or if the Originator authenticated using a certificate, then the Receiver shall not include an *assignedSymmKeyID* attribute in the created resource.
3. The Receiver shall assign the *creator* attribute to an AE-ID or CSE-ID or Node-ID on instructions from the administrating stakeholder. The present document does not specify any details of how the AE-ID or CSE-ID or Node-ID is determined.

8.4.2.2 Retrieve

This procedure is denoted *MEF Client Configuration Retrieval* in clause 8.3.5.2.4 of TS-0003 [2]. This procedure is used to retrieve the <*mefClientReg*> resource.

*Originator:*

No change from the generic procedures in clause 7.2.2.1 of [3] with clarifications discussed in clauses 5.2.2 and 6.3.

*Receiver:*

Same as the generic procedures in clause 7.2.2.2 of [3] with clarifications discussed in clauses 5.2.2 and 6.3, performing the following steps in order in the place of Recv-6.3: “Check authorization of the Originator”:

1. The Receiver shall determine if the Originator is authorized by checking if the Originator is the creator of the resource.
2. If the Originator is not authorized, then the Receiver shall execute the following steps in order.
	* 1. "Create an unsuccessful Response primitive" with the Response Status Code indicating "ACCESS\_DENIED" error.
		2. "Send the Response primitive".
3. If the Originator is authorized, then the Receiver shall allow the request.

8.4.2.3 Update

This procedure is denoted *MEF Client Configuration Update* in clause 8.3.5.2.5 of TS-0003 [2]. This procedure is used to update attributes of the <*mefClientReg*> resource, such as e.g. labels, expiration time.

*Originator:*

The *<mefClientReg>* resource shall not be updated by a MEF client via API.

*Receiver***:**

Same as the generic procedures in clause 7.2.2.2 of [3] with clarifications discussed in clauses 5.2.2 and 6.3, and with the following differences:

The Receiver shall perform the following step in the place of Recv-6.3: “Check authorization of the Originator”:

1. The Receiver shall determine if the Originator is authorized by checking if the Originator is the creator of the resource.
2. If the Originator is not authorized, then the Receiver shall execute the following steps in order.
	* 1. "Create an unsuccessful Response primitive" with the Response Status Code indicating "ACCESS\_DENIED" error.
		2. "Send the Response primitive".
3. If the Originator is authorized, then the Receiver shall allow the request.

The Receiver shall perform the following step in order as part of “Update the resource” (clause 7.3.3.7)” during Step Recv-6.5: “Create/Update/Retrieve/Delete/Notify operation is performed”:

1. If the Originator was the Creator of the resource, then the Receiver shall perform steps 2 and 3 in clause 8.2.2.1.

8.4.2.4 Delete

This procedure is denoted *MEF Client De-Registration* in clause 8.3.5.2.6 of TS-0003 [2]. This procedure enables the MEF client to delete its own <*mefClientReg*> resource on a MEF.

*Originator:*

No change from the generic procedures in clause 7.2.2.1 of [3] with clarifications discussed in clauses 5.2.2 and 6.3.

*Receiver:*

Same as the generic procedures in clause 7.2.2.2 of [3] with clarifications discussed in clauses 5.2.2 and 6.3, performing the following step in the place of Recv-6.3: “Check authorization of the Originator”:

1. The Receiver shall determine if the Originator is authorized by checking if the Originator is the creator of the resource.
2. If the Originator is not authorized, then the Receiver shall execute the following steps in order.
	* 1. "Create an unsuccessful Response primitive" with the Response Status Code indicating "ACCESS\_DENIED" error.
		2. "Send the Response primitive".
3. If the Originator is authorized, then the Receiver shall allow the request.

8.5 Resource Type <*symmKeyReg*>

8.5.1 Introduction

A *<symmKeyReg>* resource shall represent a symmetric key registered with a MAF or MEF and administrated by the identified administrating stakeholder. A <*symmKeyReg*> resource shall be a child resource of a *<MAFBase>* or a <*MEFBase*> resource.

**Table 8.5.1-1: Data Type Definition of <*symmKeyReg*>**

|  |  |  |
| --- | --- | --- |
| **Data Type ID** | **File Name** | **Note** |
| symmKeyReg | SEC- symmKeyReg-v2\_x\_0.xsd |  |

**Table 8.5.1-2: Universal/Common Attributes of <*symmKeyReg*> resource**

|  |  |
| --- | --- |
| **Attribute Name** | **Request Optionality**  |
| **Create** | **Update** |
| @resourceName | NP | NP |
| *resourceType* | NP | NP |
| *resourceID* | NP | NP |
| *parentID* | NP | NP |
| *creationTime* | NP | NP |
|  |  |  |
| *creator* | NP | NP |
| *expirationTime* | M | M |
| *labels* | O | O |

**Table 8.5.1-3: Resource Specific Attributes of *<symmKeyReg>* resource**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Request Optionality**  | **Data Type** | **Default Value and Constraints** |
| **Create** | **Update** |
| *fqdn* | M | NP | xs:anyURI | No default |
| *SUID* | M | NP | m2m:suid | No default |
| *targetIDs* | O | O | m2m:listOfM2MID | No default |
| *keyValue* | O | NP | xs:base64binary | No default |

The *<symmKeyReg>* resource shall contain no child resources.

8.5.2 *<symmKeyReg>* resource specific procedures on CRUD operations

8.5.2.1 Create

This procedure is denoted *MAF Key Registration* in clause 8.8.2.7 of TS-0003 [2] and *MEF Key Registration* in clause 8.3.5.2.7 of TS-0003. This procedure enables a Source MAF Client or a Source MEF Client to establish a symmetric key with the MAF or MEF, respectively, which can be retrieved for use by one or more Target MAF Clients or Target MEF Clients.

*Originator:*

No change from the generic procedures in clause 7.2.2.1 of [3] with clarifications discussed in clauses 5.1.2 and 6.2 for Mmaf and in clauses 5.2.2 and 6.3 for Mmef, respectively, and with following differences:

In step Orig-1.0: “Compose of a Request primitive”, the

1. Originator shall select to either use a key derived from the TLS handshake or use another key provided by the Originator.
	1. If the Originator selects to use a key derived from the TLS handshake, then the Originator shall not include the *keyValue* attribute in the <*symmKeyReg*> resource of the request.
	2. If the Originator selects to provide a key other than a key derived from the TLS handshake, the Originator shall include the value of this key in the *keyValue* attribute in the <*symmKeyReg*> resource of the request.

In step Orig-6.0: “Process Response primitive”, the following steps shall be performed

1. If the Originator selected to use a key derived from the TLS handshake (see difference to step Orig-1.0 above), then the Originator shall perform the following steps in order to generate the value for the *keyValue* attribute
	1. The Originator shall apply the TLS export mechanism described in clause 10.3.1 of [2] to generate a TLS-export-key. For MAF Key Registration the “TLS Key Export Details for M2M Secure Connection Key”, for MAF Key Registration the “TLS Key Export Details for Enrolment Key” apply, respectively.
	2. The Originator shall apply the usage-constrained key derivation algorithm in clause 10.3.7 of [2] to derive the *keyValue* from TLS-export-key, *fqdn, SUID* and the *resourceName* assigned by the Receiver to the created resource*.*
2. The originator shall record the *resourceName* attribute of the created resource as the relative part of the key identifier for the symmetric key which is to be assigned to the value for the *keyValue* attribute.

*Receiver:*

Same as the generic procedures in clause 7.2.2.2 of [3] with clarifications discussed in clauses 5.2 and 6, and with following differences:

The Receiver shall perform the following steps in order in the place of Recv-6.3: “Check authorization of the Originator”:

1. The Receiver shall ensure that the following criteria are satisfied, with administrating stakeholder being the stakeholder matching the *fqdn* attribute of the <*symmKeyReg*> resource in the Create request:
	1. The Originator is enrolled with the administrating stakeholder; that is, there is a non-expired *<mafClientReg>* resource whose *creator* attribute matches the Originator’s AE-ID or CSE-ID or Node-ID, and whose *fqdn* attribute identifies the administrating stakeholder.
	2. The Receiver determines that the administrating stakeholder allows the creation of the resource. The present document does not specify how the Receiver makes this determination.
2. If these criteria are not met, then the Receiver shall execute the following steps in order.
	1. "Create an unsuccessful Response primitive" with the Response Status Code indicating "ACCESS\_DENIED" error.
	2. "Send the Response primitive".
3. Otherwise, then the Receiver shall allow the request.

The Receiver shall perform the following steps in order as part of “Create the resource” (clause 7.3.3.5)” during Step Recv-6.5: “Create/Update/Retrieve/Delete/Notify operation is performed”:

1. If the *keyValue* attribute is not present in the <*symmKeyReg*> resource in the request, then the Receiver shall perform the following steps in order to generate the value for the *keyValue* attribute
	1. The Receiver shall apply the TLS export mechanism described in clause 10.3.1 of [2]to generate a TLS-export-key.
	2. The Receiver shall apply the usage-constrained key derivation algorithm in clause 10.3.7 of [2] to derive the value for the *keyValue* attribute from TLS-export-key, *fqdn, SUID* and the *resourceName* assigned by the Receiver to the created resource*.*

8.5.2.2 Retrieve

This procedure is denoted *MAF Key Retrieval* in clause 8.8.2.8 of TS-0003 [2] and *MEF Key Retrieval* in clause 8.3.5.2.8 of TS-0003. It enables a Target MAF Client to retrieve the Key Value from a MAF corresponding to a RelativeKeyID available to the Target MAF Client.

*Originator:*

No change from the generic procedures in clause 7.2.2.1 of [3] with clarifications discussed in clauses 5.1.2 and 6.2 for Mmaf and in clauses 5.2.2 and 6.3 for Mmef, respectively.

*Receiver:*

Same as the generic procedures in clause 7.2.2.2 of [3] with clarifications discussed in clauses 5.2 and 6, and with following differences:

The Receiver shall perform the following steps in order in the place of Recv-6.3: “Check authorization of the Originator”:

1. The Receiver shall determine if the Originator is authorized by checking if the Originator is the creator of the resource or the Originator is identified in the *targetIDs*.
2. If the Originator is not authorized, then the Receiver shall execute the following steps in order.
	* 1. "Create an unsuccessful Response primitive" with the Response Status Code indicating "ACCESS\_DENIED" error.
		2. "Send the Response primitive".
3. If the Originator is authorized, then the Receiver shall allow the request.

8.5.2.3 Update

This procedure is denoted *MAF Key Registration Update* in clause 8.8.2.9 of TS-0003 [2] and *MEF Key Registration Update* in clause 8.3.5.2.9 of TS-0003. It enables a Source MAF Client or Source MEF Client to update the metadata associated with a registered key.

*Originator:*

No change from the generic procedures in clause 7.2.2.1 of [3] with clarifications discussed in clauses 5.1.2 and 6.2 for Mmaf and in clauses 5.2.2 and 6.3 for Mmef, respectively.

*Receiver:*

Same as the generic procedures in clause 7.2.2.2 of [3] with clarifications discussed in clauses 5.2 and 6, and performing the following step in the place of Recv-6.3: “Check authorization of the Originator”:

1. The Receiver shall determine if the Originator is authorized by checking if the Originator is the creator of the resource.
2. If the Originator is not authorized, then the Receiver shall execute the following steps in order.
	* 1. "Create an unsuccessful Response primitive" with the Response Status Code indicating "ACCESS\_DENIED" error.
		2. "Send the Response primitive".
3. If the Originator is authorized, then the Receiver shall allow the request.

8.5.2.4 Delete

This procedure is denoted *MAF Key De-Registration* in clause 8.8.2.10 of TS-0003 [2] and *MEF Key De-Registration* in clause 8.3.5.2.10 of TS-0003. It enables a Source MAF Client to request the MAF to stop distributing the registered key.

*Originator:*

No change from the generic procedures in clause 7.2.2.1 of [3] with clarifications discussed in clause 5.1.2 and 6.2 for Mmaf and in clauses 5.2.2 and 6.3 for Mmef, respectively.

*Receiver:*

Same as the generic procedures in clause 7.2.2.2 of [3] with clarifications discussed in clauses 5.2 and 6, and performing the following step in the place of Recv-6.3: “Check authorization of the Originator”:

1. The Receiver shall determine if the Originator is authorized by checking if the Originator is the creator of the resource.
2. If the Originator is not authorized, then the Receiver shall execute the following steps in order.
	* 1. "Create an unsuccessful Response primitive" with the Response Status Code indicating "ACCESS\_DENIED" error.
		2. "Send the Response primitive".
3. If the Originator is authorized, then the Receiver shall allow the request.

9 Short Names

9.1 Introduction

The short names are introduced in clause 8.2.1 of oneM2M TS-0004 [3]. The short names in oneM2M TS-0004 [3] shall apply in addition to the short names defined here.

9.2 Security-specific oneM2M Resource attributes

In protocol bindings resource attributes names shall be translated into short names of Table 9.2-1 and in Table 8.2.3-1 of oneM2M TS-0004 [3].

**Table 9.2-1: Security-specific oneM2M Attribute Short Names.**

| **Attribute Name** | **Occurs in** | **Short Name** | **Notes** |
| --- | --- | --- | --- |
| *resourceType* | All | ***ty\**** | Defined in oneM2M TS-0004 [3]. |
| *resourceID* | All | ***ri*** | Defined in oneM2M TS-0004 [3]. |
| *resourceName* | All | ***rn*** | Defined in oneM2M TS-0004 [3]. |
| *parentID* | mafClientReg, mefClientReg, symmKeyReg | ***pi*** | Defined in oneM2M TS-0004 [3]. |
| *expirationTime* | All | ***et*** | Defined in oneM2M TS-0004 [3]. |
| *creationTime* | All | ***ct*** | Defined in oneM2M TS-0004 [3]. |
| *labels* | mafClientReg, mefClientReg, symmKeyReg | ***lbl*** | Defined in oneM2M TS-0004 [3]. |
| *creator* | mafClientReg, mefClientReg, symmKeyReg | ***cr*** | Defined in oneM2M TS-0004 [3]. |
| *fqdn* | mafClientReg, mefClientReg, symmKeyReg | ***fq*** |  |
| *SUID* | symmKeyReg | ***suid*** |  |
| *assignedSymmKeyID* | mafClientReg, mefClientReg | ***aski*** |  |
| *estBaseURI* | MEFBase | ***estu*** |  |
| *deviceConfigURIs* | MEFBase | ***dcu*** |  |
| *targetIDs* | symmKeyReg | ***tgis*** |  |
| *keyValue* | symmKeyReg | ***kv*** |  |
| NOTE: Marked short names have been already assigned for primitive parameters in oneM2M TS-0004 [3]. |

9.3 Security-specific oneM2M Resource types

In protocol bindings resource type names shall be translated into short names of Table 9.3-1.

**Table 9.3-1: Security-specific Resource Type Short Names**

| **Attribute Name** | **Short Name** |
| --- | --- |
| *MAFBase* | maf |
| *MEFBase* | mef |
| *mafClientReg* | macr |
| *mefClientReg* | mecr |
| *symmKeyReg* | mkr |

9.4 Security-specific oneM2M Complex data type members

In protocol bindings complex data types member names shall be translated into short names of Table 9.4-1.

NOTE: The member names of the security configuration parameters tefclientCfg, tefClientRegCfg and tefKeyRegCfg are defined in clause 12.4 of TS-0003 [3].

**Table 9.4-1: Security-specific oneM2M Complex data type member short names**

| **Member Name** | **Occurs in** | **Short Name** | **Notes** |
| --- | --- | --- | --- |
| tefClientRegCfg | tefClientCfg | ***tcrc*** |  |
| tefKeyRegCfg | tefClientCfg | ***tkrc*** |  |
| expirationTime | tefClientRegCfg, tefKeyRegCfg | ***et\**** | Defined in oneM2M TS-0004 [3] |
| labels | tefClientRegCfg, tefKeyRegCfg | ***lbl\**** | Defined in oneM2M TS-0004 [3] |
| fqdn | tefClientRegCfg, tefKeyRegCfg | ***fq\**** |  |
| URI | tefClientRegCfg | ***uri*** | Defined in oneM2M TS-0004 [3] |
| httpPort | tefClientRegCfg | ***hpt*** |  |
| coapPort | tefClientRegCfg | ***cpt*** |  |
| websocketPort | tefClientRegCfg | ***wpt*** |  |
| ppsk | tefClientRegCfg | ***pk*** |  |
| rpsk | tefClientRegCfg | ***rk*** |  |
| certAuth | tefClientRegCfg | ***cert*** |  |
| credID | tefClientRegCfg | ***crdi*** |  |
| caCerts | tefClientRegCfg | ***cact*** |  |
| SUID | tefKeyRegCfg | ***suid\**** |  |
| targetIDs | tefKeyRegCfg | ***tgis*** |  |
| * NOTE: \* marked short names have been already assigned to an attribute in Table 9.2-1.
 |