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Machine-to-Machine communications (M2M);

OMA DM Compatible Management Objects for ETSI M2M

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Foreword

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

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1 Scope

The present document contains OMA DM [DMPRO] compatible management objects for three ETSI M2M mgmtObj instances: etsiSclMo [M2M-TS102690], etsiAreaNwkInfo [M2M-TS102690], and etsiAreaNwkDeviceInfo [M2M-TS102690].

2 References

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

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

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

2.1 Normative references

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

[DMPO] OMA-WP-AC_MO-20090127-A: “White Paper on Provisioning Objects””

[DMPRO] OMA-TS-DM_Protocol-V1_2-20070209-A: “OMA Device Management Protocol”

[DMTND] OMA-TS-DM_TND-V1_2-20070209-A: “OMA Device Management Tree and Description”

[GwMO] “Gateway Management Object Technical Specification”, Version 1.0, Open Mobile Alliance™, OMA-TS-GwMO-V1_ 0, URL:http://www.openmobilealliance.org/

[M2M-TS102690] ETSI TS 102 690: "Machine to Machine Communications (M2M); Functional Architecture".

[M2M-TS102921] ETSI TS 102 921: "Machine to Machine Communications (M2M); mIa, mId, dIa Interfaces".

[ISO8601] ISO 8601:2000, Data elements and interchange formats -- Information interchange -- Representation of dates and times. URL:http://www.iso.ch/

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.

[TR102725] ETSI TR 102 725: "Machine to Machine Communications (M2M); Definitions". The acronyms and the abbreviations defined in TR 102 725 and used inside this document (TS 102 690) are normative by means of this reference.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 102 725 [7] apply.

3.2 Symbols

For the purposes of the present document, the symbols given in TR 102 725 [7] apply.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 102 725 [7] apply.The following abbreciations are introduced in the present document.

DDF	Device Description Framework
DM	Device Management
MANDMO	M2M Area Network Device Management Object
MANMO	M2M Area Network Management Object
MO	Management Object
MSCLMO	M2M Service Capability Layer Management Object
OMA	Open Mobile Alliance

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4 General Principles

In the present document, the following three OMA DM compliant MOs are developled for ETSI M2M.

- MSCLMO for ETSI M2M etsiSclMo
- MANMO for ETSI M2M etsiAreaNwkInfo
- MANDMO for ETSI M2M etsiAreaNwkDeviceInfo

Based on OMA DM specification on designing a new MO [DMPO] [DMTND], the following rules are followed in the present document

- MO Identifiers
  - MO identifier for MSCLMO is urn:oma:mo:ext-etsi-msclmo:1.0
  - MO identifier for MANMO is urn:oma:mo:ext-etsi-manmo:1.0
  - MO identifier for MANDMO is urn:oma:mo:ext-etsi-mandmo:1.0
- Special Handling of resource/attributes in etsiSclMo/etsiAreaNwkInfo/etsiAreaNwkDeviceInfo
  - Subscriptions resource in etsiSclMo/etsiAreaNwkInfo/etsiAreaNwkDeviceInfo will not be modded in MSCLMO/MANMO/MANDMO

- Several common attributes of a M2M resource in etsiSclMo/etsiAreaNwkInfo/etsiAreaNwkDeviceInfo including expirationTime, accessRightID, searchStrings, creationTime, lastModifiedTime, moID, originalMO, description, does not occur in MSCLMO/MANMO/MANDMO
- Collection instances in etsiSclMo/etsiAreaNwkInfo/etsiAreaNwkDeviceInfo are modelled as an unnamed node (i.e. <x>) in MSCLMO/MANMO/MANDMO

- Node Properties in MSCLMO/MANMO/MANDMO management tree
  - The Occurrence of a node in MSCLMO/MANMO/MANDMO management tree can be:
    - ZeroOrOne, ZeroOrMore, ZeroOrN, One, OneOrN, OneOrMore for unnamed node
    - Named node can only have ZeroOrOne, or One occurrence since OMA-DM needs each node in a management tree must have a uniqe URI.
    - Character Meaning

      + 1 ore more occurrences

      * 0 or more occurrences

      ? 0 or 1 occurences
  - Each node in MSCLMO/MANMO/MANDMO can have one or more of following access types as specified and supported by OMA-DM [DMPRO]
    - Get, Replace, Exec, Add, Delete, Copy
    - A RO (sub-) resource or an attribute is modelled as a node with Get access type
    - A RW (sub-) resource or an attribute is modelled as a node with Get and Replace access type
    - An attribute standing for an action is modelled as a node with Get and Exec access type
  - The DFFormat of a node in MSCLMO/MANMO/MANDMO management tree can be:
    - b64, bin, bool, chr, int, node, null, xml, date, time, float
      - for the leaf node of type ‘chr’ which is defined as comma separated list: when a comma is contained in an item of such a list, the comma shall be escaped by using ‘\’.
    - an interior node must have “node” as its DFFormat value
  - The Status of each node in MSCLMO/MANMO/MANDMO can be “Required” or “Optional”
    - An Optional (sub-)resource or attribute is modelled as an Optional node.
    - A Mandatory (sub-)resource or attribute is modelled as a Required node

- A node with the name “Ext” is introduced in MSCLMO/MANMO/MANDMO for vendor-specific extension

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5 M2M Service Capabilities MO

5.1 MO Description

The M2M SCL MO (MSCLMO) resides in the Management Tree of the any M2M Device or M2M Gateway which supports the M2M service capabilities (e.g. DM enablers). This MO correspondes to the etsiScloMo which is an mgmtObj resource instance as specified in ETSI M2M functional architecture [M2M-TS102690]. This MO maintains information regarding the management of the M2M service capabilities in M2M Devices and M2M Gateways.

Figure 1 gives the pictorial description of the MSCLMO. The description of the various nodes within this MO is given below.

Figure 1: OMA-DM Compatible SCL MO (MSCLMO)

<x>

Status	Tree Occurrence	Format	Min. Access Types
Required	One	node	Get

This placeholder node is the root node for the MSCLMO. The parent node of this node defines the location of this MO in the Management Tree.

The Management Object Identifier for the MSCLMO MUST be: “urn:oma:mo:ext-etsi-msclmo:1.0”.

<x>/Operations

Status	Tree Occurrence	Format	Min. Access Types
Required	One	node	Get

This interior node is the root node for operations allowed to operate on the MSCLMO.

<x>/Operations/ReRegistration

Status	Tree Occurrence	Format	Min. Access Types
Optional	ZeroOrOne	null	Exec

This leaf node is used to trigger a re-registration action.

<x>/SafPolicySets

Status	Tree Occurrence	Format	Min. Access Types
Required	One	node	Get

This interior node is the parent node for all policies related to store-and-forward (SAF).

<x>/SafPolicySets/<x>

Status	Tree Occurrence	Format	Min. Access Types
Required	OneOrMore	node	Get

This interior node is the parent node for a store-and-forward (SAF) policy.

<x>/SafPolicySets/<x>/PolicyScope

Status	Tree Occurrence	Format	Min. Access Types
Required	One	chr	Get

This leaf node stands for the scope of an SAF policy <x>.

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<x>/SafPolicySets/<x>/M2MSpPolicy

Status	Tree Occurrence	Format	Min. Access Types
Required	One	node	Get

This interior node is the parent node for all information related to an SAF-handling policy which are controlled by the M2M service provider.

<x>/SafPolicySets/<x>/M2MSpPolicy/DefaultRcatValue

Status	Tree Occurrence	Format	Min. Access Types
Required	One	chr	Get

This leaf node is the default value for a request catergories (Rcat) to use for requests to remotely hosted resources during SAF-handling when no RCAT value was specified in the request.

<x>/SafPolicySets/<x>/M2MSpPolicy/DefaultTrpdtValues

Status	Tree Occurrence	Format	Min. Access Types
Required	One	node	Get

This interrior node stands for a list of default TRPDT values to be used for requests of a given RCAT value. Each list item consists of one or more RCAT values and an associated default TRPDT value. All default TRPDT values need to be defined as time durations. Different list items must not contain overlapping RCAT values.

<x>/SafPolicySets/<x>/M2MSpPolicy/DefaultTrpdtValues/<x>

Status	Tree Occurrence	Format	Min. Access Types
Required	OneOrMore	node	Get

This interior node stands for a default TRPDT value.

<x>/SafPolicySets/<x>/M2MSpPolicy/DefaultTrpdtValues/<x>/TolerableDelay

Status	Tree Occurrence	Format	Min. Access Types
Required	One	int	Get

This leaf node stands for the duration in seconds that is tolerable for the processing of an issued request that is pending in SAF processing .

<x>/SafPolicySets/<x>/M2MSpPolicy/DefaultTrpdtValues/<x>/RcatList

Status	Tree Occurrence	Format	Min. Access Types
Required	One	chr	Get

This leaf node is the parent node for all information about a list of RCAT values with which to associate a TRPDT value. All RCAT values in this list are comma separated and each RCAT value is a string for expressing SAF handing policies.

<x>/SafPolicySets/<x>/M2MSpPolicy/MaxPendReqs

Status	Tree Occurrence	Format	Min. Access Types
Optional	ZeroOrOne	node	Get

This interior node stands for a list of SAF request threshold policy items for triggering establishment of connectivity by D/GSCL defining the maximum number of pending requests in SAF-handling associated with given ranges of RCAT values. According to the description in [M2M-TS102690], the D/GSCL shall be allowed to trigger establishment of connectivity when more requests have been stored than the configured maximum number of pending requests for a given range of RCAT values. Each SAF request threshold policy list item consists of one or more RCAT values and an associated maximum number of pending requests. Different list items must not contain overlapping RCAT values.

<x>/SafPolicySets/<x>/M2MSpPolicy/MaxPendReqs/<x>

Status	Tree Occurrence	Format	Min. Access Types
Required	OneOrMore	node	Get

This interior node is the parent node for all information about a long threshold, which associates with a given set of RCAT values.

<x>/SafPolicySets/<x>/M2MSpPolicy/MaxPendReqs/<x>/Thresh

Status	Tree Occurrence	Format	Min. Access Types
Required	One	int	Get

This leaf node stands for the value of a long threshold.

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<x>/SafPolicySets/<x>/M2MSpPolicy/MaxPendReqs/<x>/RcatList

Status	Tree Occurrence	Format	Min. Access Types
Required	One	chr	Get

This leaf node is the parent node for all information about a list of RCAT values with which to associate a TRPDT value. All RCAT values in this list are comma separated and each RCAT value is a string for expressing SAF handing policies.

<x>/SafPolicySets/<x>/M2MSpPolicy/MaxPendData

Status	Tree Occurrence	Format	Min. Access Types
Optional	One	node	Get

This interior node stands for a list of SAF data threshold policy items for triggering establishment of connectivity defining the maximum amount of data used for pending requests in SAF-handling associated with given ranges of RCAT values. According to the description in [M2M-TS102690], the D/GSCL shall be allowed to trigger establishment of connectivity when more data has been stored than the configured maximum amount of data for a given range of RCAT values. Each SAF data threshold policy list item consists of one or more RCAT values and an associated maximum amount of data. Different list items must not contain overlapping RCAT values.

<x>/SafPolicySets/<x>/M2MSpPolicy/MaxPendData/<x>

Status	Tree Occurrence	Format	Min. Access Types
Required	OneOrMore	node	Get

This interior node is the parent node for all information about a memory size threshold associating with different sets of RCAT values.

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<x>/SafPolicySets/<x>/M2MSpPolicy/MaxPendData/<x>/Mem

Status	Tree Occurrence	Format	Min. Access Types
Required	One	chr	Get

This leaf node stands for a token value to be associated with a list of RCAT values.

<x>/SafPolicySets/<x>/M2MSpPolicy/MaxPendData/<x>/RcatList

Status	Tree Occurrence	Format	Min. Access Types
Required	One	chr	Get

This leaf node is the parent node for all information about a list of RCAT values with which to associate a TRPDT value. All RCAT values in this list are comma separated and each RCAT value is a string for expressing SAF handing policies.

<x>/SafPolicySets/<x>/M2MSpPolicy/AnSelList

Status	Tree Occurrence	Format	Min. Access Types
Optional	ZeroOrOne	node	Get

This interior node stands for a list of access network selection policy items to govern selection of a preferred access network for processing requests pending in SAF-handling associated with given ranges of RCAT values. According to the description in [M2M-TS102690], the D/GSCL shall use a ranked list of preferred access networks for a given range of RCAT values. Each access network selection policy list item consists of one or more RCAT values and a ranked list of access network names in line with the "anName" attributes of <anpPolicy> resources in descending order of preference. Different list items must not contain overlapping RCAT values.

<x>/SafPolicySets/<x>/M2MSpPolicy/AnSelList/<x>

Status	Tree Occurrence	Format	Min. Access Types
Required	OneOrMore	node	Get

This interior node is the parent node for all information about an association between a ranked list of preferred access network tokens and an item-specific set of RCAT values.

<x>/SafPolicySets/<x>/M2MSpPolicy/AnSelList/<x>/RcatList

Status	Tree Occurrence	Format	Min. Access Types
Required	One	chr	Get

This leaf node is the parent node for all information about a list of RCAT values with which to associate a TRPDT value. All RCAT values in this list are comma separated and each RCAT value is a string for expressing SAF handing policies.

<x>/SafPolicySets/<x>/M2MSpPolicy/AnSelList/<x>/RankedAnList

Status	Tree Occurrence	Format	Min. Access Types
Required	One	chr	Get

This leaf node is a ranked list of preferred access networks tokens to be associated with the list of RCAT value. All tokens in this list are comma separated and each token identifies a specific access network.

<x>/SafPolicySets/<x>/M2MAnpPolicySets

Status	Tree Occurrence	Format	Min. Access Types
Required	One	node	Get

This interior node is the parent node for all information related to SAF-handling policies which are controlled by the access network provider.

<x>/SafPolicySets/<x>/M2MAnpPolicySets/<x>

Status	Tree Occurrence	Format	Min. Access Types
Required	ZeroOrMore	node	Get

This interior node is the parent node for all information related to a specific SAF-handling policy which is controlled by the access network provider.

<x>/SafPolicySets/<x>/M2MAnpPolicySets/<x>/AnName

Status	Tree Occurrence	Format	Min. Access Types
Required	One	chr	Get

This leaf node stands for an access network name that is used by the managed D/GSCL to determine for which access network the policies defined in this <anpPolicy> resource shall apply. When trying to setup connectivity, the D/GSCL needs to be able to use that name internally to establish connectivity via the associated access network.

<x>/SafPolicySets/<x>/M2MAnpPolicySets/<x>/RcatSchedule

Status	Tree Occurrence	Format	Min. Access Types
Required	One	node	Get

This interior node stands for a list of RCAT schedule policy items for defining when it is appropriate to use the access network associated with "anName" for processing requests of specific RCAT values. Each item contains one or more RCAT values and allowed time-spans, where the time spans can be defined absolute time spans or periodic time spans. Details of the format for RCAT schedule policy items are specified in [M2M-TS102921].

<x>/SafPolicySets/<x>/M2MAnpPolicySets/<x>/RcatSchedule/<x>

Status	Tree Occurrence	Format	Min. Access Types
Required	OneOrMore	node	Get

This interior node is the parent node for all information about an association between a number of allowed time spans and an item-specific set of RCAT values.

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<x>/SafPolicySets/<x>/M2MAnpPolicySets/<x>/RcatSchedule/<x>/Schedule

Status	Tree Occurrence	Format	Min. Access Types
Required	One	chr	Get

This leaf node is the comma-separated list of a set of schedule strings. A Schedule string is a string formatted according to the CRONTAB input file definition in [ISO/IEC/IEEE 9945:2009]. The schedule that is defined by the Schedule string is the sum of all absolute time spans (in one minute granularity) that match with the given CRONTAB string. Example of CRONTAB string: “* 0-6 * * 1-6” would mean the period from 0:00h to 6:00h (inclusive) on any week day (Monday through Friday) * 22-23,0-4 * * 1-6” would mean the period from 22:00h to 04:00h on any week day (Monday through Friday).

<x>/SafPolicySets/<x>/M2MAnpPolicySets/<x>/RcatSchedule/<x>/RcatList

Status	Tree Occurrence	Format	Min. Access Types
Required	One	chr	Get

This leaf node is the parent node for all information about a list of RCAT values with which to associate allowed time spans. All RCAT values in this list are comma separated and each RCAT value is a string for expressing SAF handing policies.

<x>/SafPolicySets/<x>/M2MAnpPolicySets/<x>/RcatSchedule/<x>/AbsTimeSpans

Status	Tree Occurrence	Format	Min. Access Types
Required	One	node	Get

This interior node stands for a list of allowed absolute time spans to be associated with the list of RCAT value.

<x>/SafPolicySets/<x>/M2MAnpPolicySets/<x>/RcatSchedule/<x>/AbsTimeSpans/<x

Status	Tree Occurrence	Format	Min. Access Types
Required	OneOrMore	node	Get

This interior node is the parent node for all information about a time span.

<x>/SafPolicySets/<x>/M2MAnpPolicySets/<x>/RcatSchedule/<x>/AbsTimeSpans/<x>/StartDate

Status	Tree Occurrence	Format	Min. Access Types
Required	One	date	Get

This leaf node stands for the start of time span in absolute date as defined by OMA DM.

<x>/SafPolicySets/<x>/M2MAnpPolicySets/<x>/RcatSchedule/<x>/AbsTimeSpans/<x>/StartTime

Status	Tree Occurrence	Format	Min. Access Types
Required	One	time	Get

This leaf node stands for the start of time span in absolute time as defined by OMA DM.

<x>/SafPolicySets/<x>/M2MAnpPolicySets/<x>/RcatSchedule/<x>/AbsTimeSpans/<x>/EndDate

Status	Tree Occurrence	Format	Min. Access Types
Required	One	date	Get

This leaf node stands for the end of time span in absolute date as defined by OMA DM.

<x>/SafPolicySets/<x>/M2MAnpPolicySets/<x>/RcatSchedule/<x>/AbsTimeSpans/<x>/EndTime

Status	Tree Occurrence	Format	Min. Access Types
Required	One	time	Get

This leaf node stands for the end of time span in absolute time as defined by OMA DM.

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<x>/SafPolicySets/<x>/M2MAnpPolicySets/<x>/BlockPeriods

Status	Tree Occurrence	Format	Min. Access Types
Optional	ZeroOrOne	node	Get

This interior node stands for a list of block period policy items for defining how long an D/GSCL shall wait before re-trying to establish connectivity via the access network associated with "anName" after the previous attempt has failed. Each item consists of an number of consecutive failed attempts and a duration. The number of consecutive failed attempts defines how many consecutive attempts for establishing connectivity must have failed to apply this block policy item and the duration defines how long the next attempt shall be blocked. The D/GSCL shall always apply the block policy item with the largest number of consecutive failed attempts that is smaller or equal to the actual number of consecutive failed attempts. Details of the format for block period policy items are specified in [M2M-TS102921]

<x>/SafPolicySets/<x>/M2MAnpPolicySets/<x>/BlockPeriods/<x>

Status	Tree Occurrence	Format	Min. Access Types
Required	OneOrMore	node	Get

This interior node is the parent node for all information about a number of consecutively failed access attemps and a duration that should be used to block the next access attempt.

<x>/SafPolicySets/<x>/M2MAnpPolicySets/<x>/BlockPeriods/<x>/FailedAttempts

Status	Tree Occurrence	Format	Min. Access Types
Required	One	int	Get

This leaf node stands for the numer of consecutively failed access attempts.

<x>/SafPolicySets/<x>/M2MAnpPolicySets/<x>/BlockPeriods/<x>/BlockDuration

Status	Tree Occurrence	Format	Min. Access Types
Required	One	int	Get

This leaf node stands for the duration in seconds for which to block further access attemps.

<x>/RegTargetNsclList

Status	Tree Occurrence	Format	Min. Access Types
Required	One	chr	Get

This leaf node stands for a list of NSCLs that the D/G-SCL may use in order to perform a new registration (after reboot or not). All values are comma separated and each value stands for a specific NSCL.

<x>/RegExpirationDuration

Status	Tree Occurrence	Format	Min. Access Types
Optional	ZeroOrOne	int	Get

This leaf node stands for the duration of the next registration in seconds. The value shall not be set to zero. Any negative value stands for infinite duration.

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<x>/RegAccessRightID

Status	Tree Occurrence	Format	Min. Access Types
Optional	ZeroOrOne	chr	Get

This leaf node stands for the default accessRightID to be allocated to the <scl> when the <scl> is created in the hosting NSCL during the registration procedure of the corresponding D/GSCL.

<x>/RegSearchStrings

Status	Tree Occurrence	Format	Min. Access Types
Optional	ZeroOrOne	chr	Get

This leaf node provides an approach to modify the criteria for discovery of D/G-SCL. It stands for a list of search strings, which are comma separated.

<x>/AnnouncedToSclList

Status	Tree Occurrence	Format	Min. Access Types
Required	One	chr	Get

This leaf node is used to set default announcedTo-SCL list for D/G-SCL to announce local resources to remote SCLs (especially when the application doesn't specify the announceTo attribute when creating resources). All values are comma separated and each value stands for a specific announcedTo-SCL.

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<x>/MaxNumberOfDiscovRecords

Status	Tree Occurrence	Format	Min. Access Types
Optional	ZeroOrOne	int	Get

This leaf node stands for the maximum number of resource URIs contained in a discovery result.

<x>/MaxSizeOfDiscovAnswer

Status	Tree Occurrence	Format	Min. Access Types
Optional	ZeroOrOne	int	Get

This leaf node stands for the maximum size of the discovery answer. This value is expressed in bytes and is useful for very constrained devices.

<x>/OperationStatus

Status	Tree Occurrence	Format	Min. Access Types
Required	One	node	Get

This interior node is the parent node for all information about the status of the operation "ReRegistration" (including a progress indicator, a final state and a reminder of the requested action).

<x>/OperationStatus/Operation

Status	Tree Occurrence	Format	Min. Access Types
Required	One	chr	Get

This leaf node stands for the link to the operation whose status is represented by "OperationStatus".

<x>/OperationStatus/Progress

Status	Tree Occurrence	Format	Min. Access Types
Required	One	int	Get

This leaf node stands for the progress of the operation in percentage. The range shall be between 0 to 100.

<x>/OperationStatus/FinalStatus

Status	Tree Occurrence	Format	Min. Access Types
Required	One	chr	Get

This leaf node stands for the final status of the operation. The predefined values are " SUCCESS" or "FAILURE"...

<x>/Ext

Status	Tree Occurrence	Format	Min. Access Types
Optional	ZeroOrOne	node	Get

This interior node is used for vendor-specific extensions to MSCLMO.

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6 M2M Area Network MO

6.1 MO Description

The M2M Area Netwrok MO (MANMO) resides in the Management Tree of the DM Gateway, which could function as an M2M Gateway or an M2M Device with M2M service capabilities (e.g. DM enablers) according to ETSI M2M functional architecture [M2M-TS102690]. This MO correspondes to the etsiAreaNwkInfo which is an mgmtObj resource instance as specified in [M2M-TS102690]. This MO maintains information regarding the handling of one or multiple M2M Area Networks through the DM Gateway. An M2M Area Network may be any type of local area (or short range) networks of different technologies (e.g. ZigBee, m-Bus, WiFi).

Figure 2 gives the pictorial description of the MANMO. The description of the various nodes within this MO is given below.

Figure 2: OMA-DM Compatible M2M Area Netwrok MO (MANMO)

M2MAreaNwkInfo

Status	Tree Occurrence	Format	Min. Access Types
Required	One	node	Get

This interior node is the the root node for the MANMO. The parent node of this node defines the location of this MO in the Management Tree. This node and its child nodes contain the information for managing an M2M Area Network.

The Management Object Identifier for the MANMO MUST be: “urn:oma:mo:ext-etsi-manmo:1.0”.

M2MAreaNwkInfo/NumOfAreaNwks

Status	Tree Occurrence	Format	Min. Access Types
Required	One	int	Get

This leaf node stands for the total number of M2M Area Networks behind an M2M Gateway.

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M2MAreaNwkInfo/AreaNwks

Status	Tree Occurrence	Format	Min. Access Types
Required	One	node	Get

This interior node is the parent node for all information about all M2M Area Networks connecting to the same M2M Gateway.

M2MAreaNwkInfo/AreaNwks/<x>

Status	Tree Occurrence	Format	Min. Access Types
Required	ZeroOrMore	node	Get

This interior node is the parent node for information about a specific M2M Area Networks connecting to the same M2M Gateway.

M2MAreaNwkInfo/AreaNwks/<x>/AreaNwkType

Status	Tree Occurrence	Format	Min. Access Types
Required	One	chr	Get

This leaf node stands for the type of the M2M Area Network. The following enumeration-type strings are defined in [M2M-TS102921]: 6LOWPAN, 6LOWPAN-BLUETOOTH, 6LOWPAN-WIFI, 6LOWPAN-PLC, IPV4-WPAN, IPV4-BLUETOOTH, IPV4-WIFI, IPV4-PLC, ZIGBEE. Note that other types of area networks may be added in the future.

M2MAreaNwkInfo/AreaNwks/<x>/MTU

Status	Tree Occurrence	Format	Min. Access Types
Required	One	int	Get

This leaf node stands for the Maximum Transmission Unit (MTU) of the M2M Area Network.

M2MAreaNwkInfo/AreaNwks/<x>/ListOfDevices

Status	Tree Occurrence	Format	Min. Access Types
Required	One	node	Get

This interior node contains a list of pointers to all devices in this M2M Area Network. All values in this list are comma separated. Each value stands for a reference to a specific device (i.e. the root node <x> of MANDMO as defined in Section 7.1).

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M2MAreaNwkInfo/AreaNwks/<x>/AreaNwkTypeInfo

Status	Tree Occurrence	Format	Min. Access Types
Required	One	node	Get

This interior node is the placeholder for containing parameters specific to a type of M2M Area Networks, as denoted by the “AreaNwkType”.

M2MAreaNwkInfo/AreaNwks/<x>/AreaNwkTypeInfo/<x>

Status	Tree Occurrence	Format	Min. Access Types
Required	ZeroOrMore	node	Get

This interior node stands for a specific parameter.

M2MAreaNwkInfo/AreaNwks/<x>/AreaNwkTypeInfo/<x>/ParameterName

Status	Tree Occurrence	Format	Min. Access Types
Required	One	chr	Get

This leaf node stands for the name of the parameter.

M2MAreaNwkInfo/AreaNwks/<x>/AreaNwkTypeInfo/<x>/ParameterValue

Status	Tree Occurrence	Format	Min. Access Types
Required	One	chr	Get

This leaf node stands for the value of the parameter.

M2MAreaNwkInfo/Ext

Status	Tree Occurrence	Format	Min. Access Types
Optional	ZeroOrOne	node	Get

This interior node is used for vendor-specific extensions to MANMO.

7 M2M Area Netwrok Device MO

7.1 MO Description

The M2M Area Netwrok Device MO (MANDMO) resides in the Management Tree of the DM Gateway, which could function as an M2M Gateway or an M2M Device with M2M service capabilities (e.g. DM enablers) according to ETSI M2M functional architecture [M2M-TS102690]. This MO correspondes to the etsiAreaNwkDeviceInfo which is an mgmtObj resource instance as specified in [M2M-TS102690]. This MO maintains information regarding the handling of an M2M Area Network device through the DM Gateway. An M2M Area Network device may be a legacy device or a constraioned device without M2M service capabilities. Each MANDMO maintains the device information pertaining to one or multiple M2M Area Networks that a device is associated with, including both the device characteristics and its neighboring relationship.

Figure 3 gives the pictorial description of the Device Inventory MO. The description of the various nodes within this MO is given below.

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Figure 3: OMA-DM Compatible M2M Area Netwrok Device MO (MANDMO)

<x>

Status	Tree Occurrence	Format	Min. Access Types
Required	OneOrMore	node	Get

This interior node is the root node for the MANDMO. The parent node of this node defines the location of this MO in the Management Tree. This node and its child nodes contain the information for managing an M2M Area Network device, which is associated with one or multiple M2M Area Networks.Each device behind M2M GW should have a corresponding MANDMO. The Management Object Identifier for the MANDMO MUST be: “urn:oma:mo:ext-etsi-mandmo:1.0”.

<x>/AreaNwks

Status	Tree Occurrence	Format	Min. Access Types
Required	One	node	Get

This interior node is the parent node for all information related to all M2M Area Network that the device is associated with.

<x>/AreaNwks/<x>

Status	Tree Occurrence	Format	Min. Access Types
Required	OneOrMore	node	Get

This interior node contains information related to a specific M2M Area Network that the device is associated with.

<x>/AreaNwks/<x>/AreaNwkID

Status	Tree Occurrence	Format	Min. Access Types
Required	One	chr	Get

This leaf node stands for the M2M Area Network ID that the device <x> belongs to.

<x>/AreaNwks/<x>/SleepInterval

Status	Tree Occurrence	Format	Min. Access Types
Required	One	int	Get

This leaf node stands for the sleep interval of the device <x> in seconds.

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<x>/AreaNwks/<x>/SleepDuration

Status	Tree Occurrence	Format	Min. Access Types
Required	One	int	Get

This leaf node stands for the sleep duration of the device <x> in seconds.

<x>/AreaNwks/<x>/Status

Status	Tree Occurrence	Format	Min. Access Types
Required	One	chr	Get

This leaf node stands for the status of the device <x>. It can be ASLEEP or AWAKE.

<x>/AreaNwks/<x>/Groups

Status	Tree Occurrence	Format	Min. Access Types
Required	One	node	Get

This interior node is used to contain two lists: a list of applications on the device <x> and a list of neighbours of the device <x>.

<x>/AreaNwks/<x>/Groups/ListOfDeviceApplications

Status	Tree Occurrence	Format	Min. Access Types
Required	One	chr	Get

This leaf node stands for a list of applications running on the device <x>. All values are comma separated and each value stands for a reference to a specific application running on the device <x>.

<x>/AreaNwks/<x>/Groups/ListOfDeviceNeighbors

Status	Tree Occurrence	Format	Min. Access Types
Required	One	chr	Get

This leaf node stands for a list of neighbours of the device <x>. All values are comma separated and each value stands for a reference to a specific neighbour device.

<x>/AreaNwks/<x>/AreaNwkTypeInfoOfDevice

Status	Tree Occurrence	Format	Min. Access Types
Required	One	node	Get

This interior node is the placeholder for containing parameters of the device <x> specific to a type of M2M Area Network.

<x>/AreaNwks/<x>/AreaNwkTypeInfoOfDevice/<x>

Status	Tree Occurrence	Format	Min. Access Types
Required	ZeroOrMore	node	Get

This interior node contains a specific parameter.

<x>/AreaNwks/<x>/AreaNwkTypeInfoOfDevice/<x>/ParameterName

Status	Tree Occurrence	Format	Min. Access Types
Required	One	chr	Get

This leaf node contains the name of a specific parameter.

<x>/AreaNwks/<x>/AreaNwkTypeInfoOfDevice/<x>/ParameterValue

Status	Tree Occurrence	Format	Min. Access Types
Required	One	chr	Get

This leaf node contains the value of a specific parameter.

<x>/Ext

Status	Tree Occurrence	Format	Min. Access Types
Optional	ZeroOrOne	node	Get

This interior node is used for vendor-specific extensions to MANDMO.

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History

Document history		
<Version>	<Date>	<Milestone>
V0.0.1	November 2011	Initial Draft • It incorporates comments from OMA DM working group.

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