



DM List of supported Management Object (ListMO)

Candidate Version 1.0 – 19 Oct 2011

Open Mobile Alliance
OMA-ER-ListMO-V1_0-20111019-C

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1. Scope

To enhance the adoption of OMA DM Management Objects and facilitate their management, this enabler proposes to define a standardized Management Object called List of supported Management Objects (ListMO) that lists the Management Objects supported by the OMA DM Client resident on the device and exposed by the device. It would allow a Device Management Server to easily retrieve the list of the supported MOs and specific details. Management Authorities can use this information for various management operations, for example provisioning services to capable devices through creating or updating DM Tree based on MO information.

2. References

2.1 Normative References

- [ISO8601] Data elements and interchange formats -- Information interchange -- Representation of dates and times
[URL:http://www.iso.org/](http://www.iso.org/)
- [OMA-DM] *OMA Device Management, Version 1.2*,
Open Mobile Alliance™,
[URL:http://www.openmobilealliance.org/](http://www.openmobilealliance.org/)
- [RFC2119] “Key words for use in RFCs to Indicate Requirement Levels”, S. Bradner, March 1997,
[URL:http://www.ietf.org/rfc/rfc2119.txt](http://www.ietf.org/rfc/rfc2119.txt)
- [SCRRULES] “SCR Rules and Procedures”, Open Mobile Alliance™, OMA-ORG-SCR_Rules_and_Procedures,
[URL:http://www.openmobilealliance.org/](http://www.openmobilealliance.org/)

2.2 Informative References

- [DMDICT] "OMA Device Management Dictionary", Draft Version 1.0, Open Mobile Alliance™,
[URL:http://www.openmobilealliance.org/](http://www.openmobilealliance.org/)
- [OMADICT] “Dictionary for OMA Specifications”, Version 2.8, Open Mobile Alliance™,
OMA-ORG-Dictionary-V2_8,
[URL:http://www.openmobilealliance.org/](http://www.openmobilealliance.org/)

3. Terminology and Conventions

3.1 Conventions

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in [RFC2119].

All sections and appendixes, except “Scope” and “Introduction”, are normative, unless they are explicitly indicated to be informative.

3.2 Definitions

Kindly consult [DMDICT] and [OMADICT] for all definitions used in this document.

3.3 Abbreviations

Kindly consult [DMDICT] and [OMADICT] for all abbreviations used in this document.

4. Introduction

4.1 Version 1.0

This enabler provides a list of supported Management Objects in the Device. This list consists of the Management Object ID with specific information such as the list of URIs of the Management Object instances.

In addition, ListMO provides information such as what entity can create nodes for the listed MOIDs and the date of the MO specification.

5. Requirements (Normative)

5.1 High-Level Functional Requirements

Label	Description	Release
ListMO-HLF-1	The ListMO enabler SHALL list all the Management Objects supported by the DM Client	1.0
ListMO-HLF-2	The ListMO enabler SHALL list all of the instantiated Management Objects in the DM Client, subject to ACL rules	1.0
ListMO-HLF-3	The ListMO enabler SHALL ensure ListMO is up-to-date at all times	1.0

6. Architectural Model

6.1 Dependencies

The ListMO architecture diagram indicates dependencies on the OMA DM architecture.

6.1.1 OMA Device Management [OMA-DM]

The described architecture depends upon the OMA Device Management enabler. While nothing in this architecture presupposes a particular version of that enabler, for clarity and ease of reference, assume all references to [OMA-DM] are to the Approved OMA Device Management v1.2 Enabler Release unless otherwise specified.

6.2 Architectural Diagram

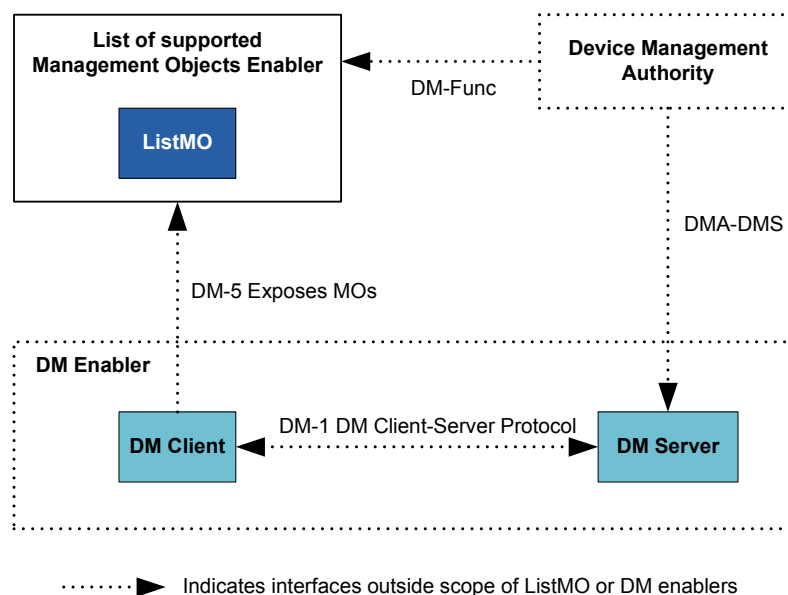


Figure 1: ListMO Architecture

6.3 Functional Components and Interfaces/reference points definition

6.3.1 Management Object

6.3.1.1 List of supported Management Object

Standardized interface to a device's list of supported Management Objects Management Object. Exposed through the {DM Client} for authorized access by {Management Authorities} utilizing {DM Servers} communicating over {DM-1} using the OMA Device Management Protocol [OMA-DM].

6.3.2 Protocol Endpoints

6.3.2.1 DM Client

The DM Client is the abstract software component that conforms to the requirements for DM Clients specified in the OMA Device Management Enabler.

6.3.2.2 DM Server

The DM Server is the abstract software component that conforms to the requirements for DM Servers specified in the OMA Device Management Enabler.

6.3.3 Interfaces

6.3.3.1 DM-1 Device Management Client-Server Protocol

This provides an interface over which DM Servers may send device management commands to DM Clients and DM Clients may return status to DM Servers. This is an interface that is bearer neutral and offers many standardized bindings including HTTP and HTTPS.

6.3.3.2 DM-5 DM Exposes Management Objects

The MO schemas are exposed by the {DM Client} through its device management tree.

6.3.3.3 DM-Func DM Functions

The {Standard Management Objects} represent interfaces to the Device's {DM Client} configuration and the Device's DM-related information which may be targeted by a {Device Management Authority} to perform Device Management Functions. The functions available depend upon the DM Standard Object specifications (e.g. Get, Replace, Add, Delete, Atomic, and Sequence), the access rights assigned to specific parameters for a given Device Management Authority, and on the specific device implementation.

6.3.3.4 DMA-DMS Interface

The interfaces between a Device Management Authority's line-of-business systems and a Device Management Server are out of scope. For purposes of illustration, this interface allows the Device Management Authority to submit device management requests to the DM Server and to be apprised of results and device-generated alerts received by the server from the DM Client. For purposes of this reference architecture description, readers should assume that an implementation-specific interface to the DM Server is used by the Device Management Authority to submit DM commands and analyze results returned by the DM Client.

6.4 Flows

The List of supported Management Objects Management Object described in this architecture document is schematic in nature and does not imply any particular protocol or data flow. The OMA Device Management Enabler [OMA-DM] specifies the protocol and data flows that are expected for client-server communication. These object schemas are utilized by and incorporated into the normal flow descriptions in that enabler and readers are referred to the OMA Device Management Enabler for further understanding.

7. ListMO Management Object

The ListMO Management Object is at the root of the DM Tree.

Protocol Compatibility: This object is compatible with OMA Device Management protocol specifications, version 1.2 and above.

Only the ListMO Client MUST update the ListMO data. The ListMO Server MUST only send Get command to the ListMO Client. The ListMO data MUST always be up-to-date.

7.1 Tree Structure

ListMO tree has a well-defined structure, with designated Ext nodes to allow non-standard extension nodes.

7.2 Figure of the Management Object (Informative)

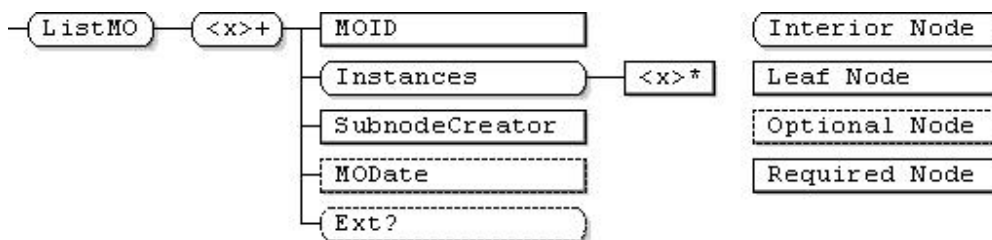


Figure 2: ListMO Management Object

7.3 List of supported Management Objects Parameters

List of supported Management Objects Management Object consists of the following parameters:

ListMO

Status	Tree Occurrence	Format	Min. Access Types
Required	One	node	Get, No Replace, No Add, No Delete

This interior node groups together the parameters of a List of supported Management Objects Management Object. This node MUST be located at the root of the DM Tree.

The type of this node MUST be the ListMO Management Object ID “urn:oma:mo:oma-listmo:1.0”.

ListMO/<x>

Status	Tree Occurrence	Format	Min. Access Types
Required	OneOrMore	node	Get, No Replace, No Add, No Delete

This placeholder node groups together the parameters of one supported Management Object.

ListMO/<x>/MOID

Status	Tree Occurrence	Format	Min. Access Types
Required	One	chr	Get, No Replace, No Add, No Delete

This value of leaf node MUST contain the Management Object ID of the listed Management Object.

ListMO/<x>/Instances

Status	Tree Occurrence	Format	Min. Access Types
Required	One	node	Get, No Replace, No Add, No Delete

This node holds all the instances of a specific MOID that the DM Server has Get access to.

ListMO/<x>/Instances/<x>

Status	Tree Occurrence	Format	Min. Access Types
Required	ZeroOrMore	chr	Get, No Replace, No Add, No Delete

The value of this leaf node specifies the Uniform Resource Identifier (URI) of the root of an instance of the MOID.

ListMO/<x>/SubnodeCreator

Status	Tree Occurrence	Format	Min. Access Types
Required	One	int	Get, No Replace, No Add, No Delete

This leaf node indicates how nodes for this MOID will be created on the DM Client. Valid values for this node are:

<u>Integer Value</u>	<u>Status</u>	<u>Description</u>
1	Client	The DM Client will create any necessary nodes.
2	Server	The DM Server will create any necessary nodes.
3	Server And Client	A hybrid situation where the DM Server will create some nodes and the DM Client will create other nodes.

ListMO/<x>/MODate

Status	Tree Occurrence	Format	Min. Access Types
Optional	One	chr	Get, No Replace, No Add, No Delete

This optional leaf node specifies the date of the MO specification. It is particularly useful for non-OMA specifications that did not update the version number in the MOID with subsequent publications (for example, 3GPP's ANDSF MO has several different documents describing their MO with different structure and data but with the same MOID). The date MUST be encoded per the UTC based [ISO8601] basic format.

ListMO/<x>/Ext

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

This optional interior node designates a branch of the MOID sub-tree into which platform or vendor extensions MAY be added, permanently or dynamically. Ext sub trees, such as this one, are included at various places in the ListMO Management Object to provide flexible points of extension for platform or implementation-specific parameters. However, vendor extensions MUST NOT be defined outside of this Ext sub-tree.

8. Release Information

8.1 Supporting File Document Listing

Doc Ref	Permanent Document Reference	Description
Supporting Files		
[ListMODDF]	OMA-SUP-MO_ListMO-V1_0-20111019-C	ListMO Device Description File. Working file in DM_MO directory: http://www.openmobilealliance.org/tech/omna/dm_mo/ListMO-V1_0.ddf

Table 1: Listing of Supporting Documents in ListMO V1.0 Release

8.2 OMNA Considerations

The OMNA registry needs to add and maintain the following in the MO registry:

MO Identifier	Description	Owner	Version	MO DDF	MO Spec
urn:oma:mo:oma-listmo:1.0	List of supported MOs	DM WG	1.0	ListMO-V1_0.ddf	OMA-ER-ListMO-V1_0-20111019-C

Appendix A. Change History (Informative)

A.1 Approved Version History

Reference	Date	Description
N/A	N/A	No prior version

A.2 Draft/Candidate Version 1.0 History

Document Identifier	Date	Sections	Description
Draft Version	15 Oct 2010	All	First draft baseline as agreed in "OMA-DM-ListMO-2010-0001-INP_ListMO_1_0_baseline"
Draft Versions OMA-ER-ListMO-V1_0	14 Dec 2010	1, 4, 5, 7 and B	Applied: OMA-DM-ListMO-2010-0002R01-CR_Requirements OMA-DM-ListMO-2010-0003R01-CR_Scope_Intro OMA-DM-ListMO-2010-0004R06-CR_ListMO_structure
	10 Jan 2011	7.2, 7.3	Applied: OMA-DM-ListMO-2010-0007-CR_Changes_to_ClientAddsNodes_node
	18 Jan 2011	2, 4, 6, 7.3	Applied: OMA-DM-ListMO-2011-0001-CR_Introduction_and_bug_fix.doc OMA-DM-ListMO-2010-0006R04-CR_architecture.doc
	25 Jan. 2011	Appendix C	Applied: OMA-DM-ListMO-2011-0002R01-CR_SCR
	26 Jan 2011	All	Language set to English UK, harmonization of fonts, copyright year changed to 2011, re-numbering of figures
	11 Feb. 2011	7.3, 8.2	Applied: OMA-DM-ListMO-2011-0005-CR_OMNA OMA-DM-ListMO-2011-0006R04-CR_MO_Updates
	01 Mar. 2011	1, 2.1, 2.2, 4, 5, 6.1, 6.2, 6.3, 7, 7.3, 8.1, 8.2, B.1.2, C.4	Applied: OMA-DM-ListMO-2011-0007R01-CR_Closure_Review_results OMA-DM-ListMO-2011-0009R01-CR_Arch_Diagram OMA-DM-ListMO-2011-0010-CR_Location
	30 Mar. 2011	7.3	Applied: OMA-DM-ListMO-2011-0013-CR_Instance_Population
	04 Apr. 2011	8.1	Updated the latest version of supporting document
Candidate Version OMA-ER-ListMO-V1_0	11 May 2011	N/A	Status changed to Candidate by TP Ref # OMA-TP-2011-0161-INP_ListMO_V1.0_ERP_and_ETR_for_Candidate_approval
Draft Versions OMA-ER-ListMO-V1_0	03 Aug 2011	2.1, 6.3.3, 7, 7.3	Applied: OMA-DM-ListMO-2011-0014R01-CR_Clerical_Improvements OMA-DM-ListMO-2011-0015R01-CR_ER_Bug_Fixes ListMO Management object diagram updated accordingly Applied Action Item DM-2011-A027: to add "No Replace, No Add, No Delete" to "Get" in the nodes in the ListMO ER Sorting of normative references in alphabetical order
	09 Sep 2011	8	Updated the latest version of supporting document
	30 Sep 2011	7.3, C.4	Applied: OMA-DM-ListMO-2011-0016-CR_Bug_fixes
Candidate Version OMA-ER-ListMO-V1_0	19 Oct 2011	N/A	Status changed to Candidate by TP Ref # OMA-TP-2011-0333-INP_ListMO_V1_0_ERP_for_notification

Appendix B. Use Cases

(Informative)

B.1 List of supported Management Objects retrieval

A Device Management Server (DMS) wants to know what Management Objects are being managed/supported by the Device Management Client on the device. For example, a DMS might want to deploy a service that requires a MO. ListMO is the central placeholder to easily retrieve a list containing the device supported MO and associated MO details. The authorized DMS would simply get this new MO and thus retrieve the required information.

B.1.1 Short Description

The DMS retrieves the ListMO subtree. ListMO provides an up-to-date list of the DM Client's supported Management Objects. The DM Client's supported Management Objects are indexed by Management Object instances.

B.1.2 Market benefits

Thanks to ListMO, DM Servers can easily and efficiently identify what Management Objects are supported by the DM Client. The DMS can also find out what MO are instantiated.

B.2 Dynamic and automatic update of ListMO

More and more Management Objects are specified and can be dynamically created on a device's DM Tree. The DM Tree used to be static and this acceleration of MO definition by multiple organizations will make the DM Tree more and more dynamic. In addition, multiple authorities can manage different instances of the same Management Object. It is the reason why ListMO must be dynamically and automatically updated.

B.2.1 Short Description

A new Management Object is installed on a device (either through new firmware or new application). The support of this MO will be automatically/dynamically added to ListMO. Thus it allows DM Management Authorities (i.e. DM Servers) to easily and efficiently obtain this information if required. It would be the same if a new instance of an existing MO is created.

B.2.2 Market benefits

Thanks to ListMO, DM Servers can easily and efficiently identify what Management Objects are supported by the DM Client as ListMO is up-to-date at all times.

Appendix C. Static Conformance Requirements (Normative)

The notation used in this appendix is specified in [SCRRULES].

C.1 ERDEF for ListMO - Client Requirements

This section is normative.

Item	Feature / Application	Requirement
OMA-ERDEF-ListMO-C-001-M	DM Client	ListMO-HLF-1
OMA-ERDEF-ListMO-C-002-M	DM Client	ListMO-HLF-2
OMA-ERDEF-ListMO-C-003-M	DM Client	ListMO-HLF-3

Table 2: ERDEF for ListMO Client-side Requirements

C.2 ERDEF for ListMO - Server Requirements

This section is normative.

Item	Feature / Application	Requirement
OMA-ERDEF-ListMO-S-001-M	DM Server	Support for the List of Supported Management Objects (ListMO)

Table 3: ERDEF for ListMO Server-side Requirements

C.3 SCR for ListMO Tree Structure

Item	Function	Reference	Requirement
ListMO-T-001-M	Use of appropriate management object identifier for the ListMO root node	Section 7.3	
ListMO-T-002-M	Support for Required nodes	Section 7.3	
ListMO-T-003-O	Support for Optional nodes	Section 7.3	

C.4 SCR for DM Client

Item	Function	Reference	Requirement
ListMO-C-001-M	Support for an always up-to-date ListMO	Section 7.3	
ListMO-C-002-M	Support listing all the DM Client supported MOs	Section 7.3	
ListMO-C-003-M	Support listing all the instantiated MOs in the DM Client, subject to the ACL rules	Section 7.3	

C.5 SCR for DM Server

Item	Function	Reference	Requirement
ListMO-S-001-M	Support for the List of	Section 7.3	

Item	Function	Reference	Requirement
	Supported Management Objects (ListMO)		