



# **GwMO Requirements**

## **Candidate Version 1.0 – 31 Aug 2010**

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**Open Mobile Alliance**  
**OMA-RD-GwMO-V1\_0-2010831-C**

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# 1. Scope

**(Informative)**

This document lists the requirements for the OMA DM Gateway Management Object enabler. It mainly focuses on requirements to enable a DM Server to manage devices that are not directly accessible to the OMA-DM Server e.g. because the devices are deployed behind a firewall or because the devices do not support the OMA-DM protocol. This document also provides requirements for management of devices in a Machine to Machine (M2M) ecosystem (e.g. fanning out DM commands from a DM Server to multiple end devices and aggregating responses from multiple end devices so that a consolidated response is sent back to the DM Server).

The following issues are outside the scope of this document:

- Device discovery mechanisms
- Management protocol adaptation rules

## 2. References

### 2.1 Normative References

- [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)

### 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 x.y, Open Mobile Alliance™,  
OMA-ORG-Dictionary-Vx\_y,  
[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

<b>DM</b>	Device Management
<b>GwMO</b>	Gateway Management Object
<b>OMA</b>	Open Mobile Alliance

## 4. Introduction

**(Informative)**

The OMA DM protocol is used for the remote management of devices. In many instances, the OMA-DM Server and the OMA-DM Client communicate with each other directly. However, direct communication between the DM Server and the DM Client is not always possible, nor desirable, due to inaccessibility of devices behind a firewall or devices supporting a management protocol other than OMA-DM. This document provides the requirements for OMA DM to manage devices indirectly i.e. through a gateway. This gateway is managed by an OMA DM server, and in turn, the gateway manages other devices under it.



## 5. Gateway Management Object release description (Informative)

The GwMO Enabler SHALL be compatible with DM 1.3 and later versions of the OMA-DM protocol.

### 5.1 Modes of Operation

The GwMO enabler defines the following operation modes:

- **Transparent Mode**: The DM Gateway maintains a mapping between the local/private and global/public identity of the device to assist the DM server in sending a notification to the DM client deployed behind the DM Gateway.
- **Proxy Mode**: The DM Gateway manages devices on behalf of the OMA-DM Server over DM protocol.
- **Adaptation Mode**: The DM Gateway manages non-OMA-DM devices on behalf of the OMA-DM Server over a device supported protocol.

## 6. Requirements (Normative)

### 6.1 High-Level Functional Requirements

Label	Description	Release
GwMO-HLF-001	The GwMO enabler SHALL support a mechanism to allow DM sessions against a device placed behind a firewall or NAT (“Network Address Translator”).	1.0
GwMO-HLF-002	The GwMO enabler SHALL specify a mechanism to allow continuous management of devices, even if the devices are moved across networks.	1.0
GwMO-HLF-003	The GwMO enabler SHALL support adding a new Device, so that the Device can be managed through the Gateway.	1.0

**Table 1: High-Level Functional Requirements**

#### 6.1.1 Security

##### 6.1.1.1 Authentication

Label	Description	Release
GwMO-SECACATE-001	The GwMO enabler SHALL conform to the authentication requirements of OMA-DM.	1.0
GwMO-SECACATE-002	The GwMO enabler SHALL provide a mechanism to have a single authentication for a group of devices under the DM Gateway.	1.0

**Table 2: High-Level Functional Requirements – Authentication Items**

##### 6.1.1.2 Authorization

Label	Description	Release
GwMO-SECARIZE-001	The GwMO enabler SHALL conform to the authorization requirements of OMA-DM.	1.0

**Table 3: High-Level Functional Requirements – Authorization Items**

##### 6.1.1.3 Data Integrity

Label	Description	Release
GwMO-SECDI-001	The GwMO enabler SHALL conform to the data integrity requirements of OMA-DM.	1.0

**Table 4: High-Level Functional Requirements – Data Integrity Items**

##### 6.1.1.4 Confidentiality

Label	Description	Release
DM-SECCONF-001	The GwMO enabler SHALL conform to the confidentiality requirements of OMA-DM.	1.0

**Table 5: High-Level Functional Requirements – Confidentiality Items**

#### 6.1.2 Charging Events

N/A

### 6.1.3 Administration and Configuration

Label	Description	Release
GwMO-ADM-001	The GwMO enabler SHALL support the management of the DM Gateway and associated functionalities (e.g. NAT, firewall, router).	1.0

**Table 6: High-Level Functional Requirements – Administration and Configuration Items**

### 6.1.4 Usability

N/A

### 6.1.5 Interoperability

Label	Description	Release
GwMO-IOP-001	The GwMO enabler SHALL allow a device with a non OMA-DM Client to be managed by an OMA-DM Server, via a DM Gateway operating in the Protocol Adaptation mode.	1.0

**Table 7: High-Level Functional Requirements – Interoperability Items**

### 6.1.6 Privacy

N/A

## 6.2 Overall System Requirements

N/A

## 6.3 Modes of Operation

Label	Description	Release
GwMO-MOO-001	The GwMO enabler SHALL provide a mechanism to allow a DM Gateway to choose which operation modes (Transparent mode, Proxy mode or Adaptation mode) should be used.	1.0

**Table 8: Operation Modes Requirements**

### 6.3.1 Transparent Mode

Label	Description	Release
GwMO-TMode-001	The GwMO enabler SHALL enable a DM Server to send a notification to a DM Client that is running on a device that does not have a publicly routable address.	1.0

**Table 9: Transparent Mode Requirements**

### 6.3.2 Proxy Mode

Label	Description	Release
GwMO-PMode-001	The GwMO enabler SHALL support a proxy mechanism between DM Server and DM Client that is running on a device which is behind the DM Gateway.	1.0
GwMO-PMode-002	The GwMO enabler SHALL allow a DM Gateway, operating in the Proxy Mode, to bootstrap a DM Client running on the end Device.	1.0
GwMO-PMode-003	The GwMO enabler SHALL support a mechanism to enable remote management of an end device that is not bootstrapped with any external DM Server.	1.0

**Table 10: Proxy Mode Requirements**

### 6.3.3 Protocol Adaptation Mode

Label	Description	Release
GwMO-AMode-001	The GwMO enabler SHALL support the ability to manage devices that support management protocols other than OMA-DM.	1.0

Table 11: Protocol Adaptation Mode Requirements

## 6.4 Device Inventory

Label	Description	Release
GwMO-DI-001	The GwMO enabler SHALL support querying of a DM Gateway to obtain specified information of a device that is deployed behind a DM Gateway.	1.0
GwMO-DI-002	The GwMO enabler SHALL support querying of a DM Gateway to obtain summarized information pertaining to all the devices that are deployed behind the Gateway.	1.0
GwMO-DI-003	The GwMO enabler SHALL support the ability to show the status, attached or detached, of the registered device behind a DM Gateway.	1.0
GwMO-DI-004	The GwMO enabler SHALL support the ability to inform the DM Server about the newly registered devices behind a DM Gateway.	1.0
GwMO-DI-005	The GwMO enabler SHALL allow the DM Server to configure whether it will be informed for newly registered devices behind a DM Gateway.	1.0

Table 12: Device Inventory Requirements

## 6.5 Command Fan-out and Response Aggregation

Label	Description	Release
GwMO-FORA-001	The GwMO enabler SHALL support the ability to fan-out DM commands from a DM Server to a desired set of end Devices behind the Gateway.	1.0
GwMO-FORA-002	The GwMO enabler SHALL support the ability to aggregate responses from multiple end Devices and send a consolidated response back to the DM Server.	1.0

Table 13: Command Fan-out and Response Aggregation Requirements

## 6.6 Device Configuration and Image Storage

Label	Description	Release
GwMO-DCIS-001	The GwMO enabler SHALL support the ability to store data from the DM Server on the DM Gateway, e.g. Delivery Package for SCOMO, for local retrieval by devices behind this DM Gateway.	1.0
GwMO-DCIS-002	The GwMO enabler SHALL provide an optimized and configurable mechanism to store data on a DM Gateway, e.g., Delivery Package for SCOMO, if the data are the same for multiple devices behind the DM Gateway.	1.0
GwMO-DCIS-003	The GwMO enabler SHALL allow the DM Server to configure whether the data, e.g. Delivery Package for SCOMO can be stored on a DM Gateway for local retrieval by devices behind it.	1.0

Table 14: Device Configuration and Image Storage Requirements

## 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 GwMO 1.0 History

Document Identifier	Date	Sections	Description
Draft Versions OMA-RD-GwMO-V1_0	30 Apr 2010	All	Baseline document as agreed in "OMA-DM-GwMO-2010-0002-INP_Baseline_RD": Imported the gateway requirements that were deleted from OMA-RD-DM-V2_0-20100124-D Added some requirements based on OMA-DM-GwMO-2010-0001R01-INP_Use_Case_Discussion
	03 May 2010	All	Clerical change from "TS" to "document" in section 4 Re-numbering of tables in the whole document.
	25 May 2010	4, 6.1, Appendix B	Incorporated Agreed CR "OMA-DM-GwMO-2010-0005R01-CR_Additional_Requirements_for_GwMO"
	30 Jun 2010	All	Incorporated the following Agreed CRs: OMA-DM-GwMO-2010-0006R03-CR_Adding_New_Requirements OMA-DM-GwMO-2010-0007-CR_RD_Aggregation_Revised OMA-DM-GwMO-2010-0010R01-CR_Reqs_related_to_M2M OMA-DM-GwMO-2010-0012R01-CR_Clarification_Changes OMA-DM-GwMO-2010-0014R01-CR_Clarification_Changes__GwMO_HLF_007
	13 Jul 2010	All	Incorporated the following Agreed CRs: OMA-DM-GwMO-2010-0020R01-CR_GwMO_RD_Restructuring OMA-DM-GwMO-2010-0021R01-CR_RD_Appendix_Update
Candidate Version OMA-RD-GwMO-V1_0	31 Aug 2010	N/A	Status changed to Candidate by TP TP ref # OMA-TP-2010-0380- INP_GwMO_V1_0_RD_for_Candidate_approval

## Appendix B. Use Cases (Informative)

As part of the use case analysis, the DM WG prioritized the use cases for GwMO. The high priority use cases for GwMO are listed in the following sub-sections. It needs to be noted that not all the requirements in this RD have accompanying use cases.

### B.1 Server initiated session, with DM Gateway operating in Transparent Mode

John Doe has a device that sits behind a residential gateway that provides the DM Gateway functionality. The DM Gateway is operating in the Transparent Mode. A DM Server needs to perform a management action on John Doe's device. The DM Server knows beforehand that John Doe's device is sitting behind the DM Gateway. In order to trigger the device to initiate a session, the DM Server initiates a management session with the DM Gateway and obtains the publicly routable address for John Doe's device. The DM Server then uses this address to push Package 0 to John Doe's device, using OMA-Push. John Doe's device validates the notification message (checking that the digest is valid, the Server has been previously bootstrapped etc.) and establishes a management session with the DM Server.

### B.2 Server initiated session, with DM Gateway operating in Proxy Mode

Ronnie Arbuckle has a device that sits behind a residential gateway, which provides the DM Gateway functionality. The DM Gateway is operating in the Proxy Mode. A DM Server needs to perform a management action on Ronnie Arbuckle's device. The DM Server knows beforehand that Ronnie Arbuckle's device is sitting behind the DM Gateway. In order to trigger the device to initiate a session, the DM Server sends the DM notification to the DM Gateway. The notification message contains the address of the target device. The DM Gateway validates the notification message (checking that the digest is valid, the Server has been previously bootstrapped etc.) and resolves the target device address. It then forwards the notification message to Ronnie Arbuckle's device.

Ronnie Arbuckle's device also validates the notification message before establishing a management session with the DM Gateway. The DM Gateway manages Ronnie Arbuckle's device on behalf of the DM Server. The DM Gateway plays the role of the DM Server for Ronnie Arbuckle's device and the role of the DM Client for the DM Server.

### B.3 Nomadic device address change

Hans Mustermann owns a device that he plugs into different networks at different times (home, office, friend's house etc.). The device is configured in such a way that whenever the address of the device changes, the designated DM Servers receive an alert that contains the updated address, except in the case where the change in address is from one private address to another.

### B.4 LAN device inventory query

All OMA-DM enabled devices in the XYZ Corporation sit behind a DM Gateway. The DM Server queries the DM Gateway for summarized information pertaining to all the devices that are deployed behind the Gateway. The DM Gateway provides this information to the DM Server.

### B.5 Adding a new Device

Vincent purchases a new device for his home. The device is added to his home network, which is behind a residential gateway that provides the DM Gateway functionality. He needs to setup some services in his device. This requires, for example, an external DM server to perform DM account creation / management actions to setup the desired services in the device. But the DM Gateway has no a priori knowledge of the new device. The DM Gateway is provided necessary information about the new device. This will enable the DM Server to perform management actions on the device through the DM Gateway.

## B.6 Aggregation function at the DM Gateway

The Super Duper electronic security company has installed many electronic surveillance devices throughout a high-rise building. The building is serviced by a DM Gateway, and the surveillance devices are deployed behind the Gateway. The company wants to run a diagnostic test on all the devices in the building. A DM request for this purpose is sent from a DM Server to the DM Gateway. The DM Gateway fans out the request to all the surveillance devices (perhaps in a staggered manner, in order to avoid jeopardizing the security of the entire building: however, this is completely transparent to the DM Server). Each device processes the request and sends the result to the DM Gateway. The DM Gateway collects the results and sends the aggregated response to the DM Server.