Firmware Update Management Object Architecture

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Open Mobile Alliance

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1. Scope   (Informative)

The scope of this document is the architecture for the Firmware Update Management Object (FUMO) specifications. In general, the scope includes the DM server environment, download mechanisms and devices.

2. References

2.1 Normative References

[DLOTA]	"Generic Content Download Over The Air Specification Version 1.0", Open Mobile Alliance™, OMA-Download-OTA-v1_0, URL:http://www.openmobilealliance.org/
[DMPRO]	"OMA Device Management Protocol, Version 1.2". Open Mobile Alliance™. OMA-TS-DM-Protocol-V1_2. URL:http://www.openmobilealliance.org
[DMRD]	"OMA Device Management Requirements Document, Version 1.2". Open Mobile Alliance™. OMA-RD-DM-V1_2. URL:http://www.openmobilealliance.org
[DMSTDOBJ]	"OMA Device Management Standardized Objects, Version 1.2". Open Mobile Alliance™. OMA-TS-DM-StdObj-V1_2. URL: 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

2.2 Informative References

None.

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 [**Error! Reference source not found.**].

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

This is an informative document, which is not intended to provide testable requirements to implementations.

3.2   Definitions

Firmware Update   An activity that results in updating the firmware of the device using an update package.

Update Package   A file comprising difference information that can be used to update the firmware of the device from one version to another.

3.3   Abbreviations

DLOTA   Download Over The Air

DMWSI   Device Management Web Services Interface

FUMO   Firmware Update Management Object

OMA   Open Mobile Alliance

SC   Smartcard

4. Introduction   (Informative)

Firmware update activities comprise interactions between a device, a DM server and, optionally, a download server. It may be initiated by a user, the device, or the server. A management tree object, the Firmware Update Management Object (FUMO) [DMTND] defined for firmware updates is used for setting up parameters and update packages necessary for conducting a firmware update.

4.1   Use Case

Please refer to the [DMRD] for the relevant use-case (Non-application Software Download).

4.2   Requirements

a) The firmware update architecture SHALL support the following activities in order to achieve a firmware update:

1.   Firmware Update Initiation

2.   Device Information Exchange

3.   Update Package Download

4.   Update Package Installation

5.   Notification of Firmware Update

b) The device MUST be capable of either large object downloads [DMPRO] or an alternate download mechanism.

c) The DM client in the device MUST be capable of supporting a firmware update management object (FUMO).

d) The DM server MUST be able to manage the FUMO in the device.

4.3   Planned Phases

The FUMO specification 1.0 implements all the requirements enumerated above.

5. Architectural Model

5.1 Dependencies

The firmware update architecture diagram indicates dependencies on the OMA DM architecture. It also optionally depends on an alternate download mechanism, such as OMA Download [DLOTA] architecture.
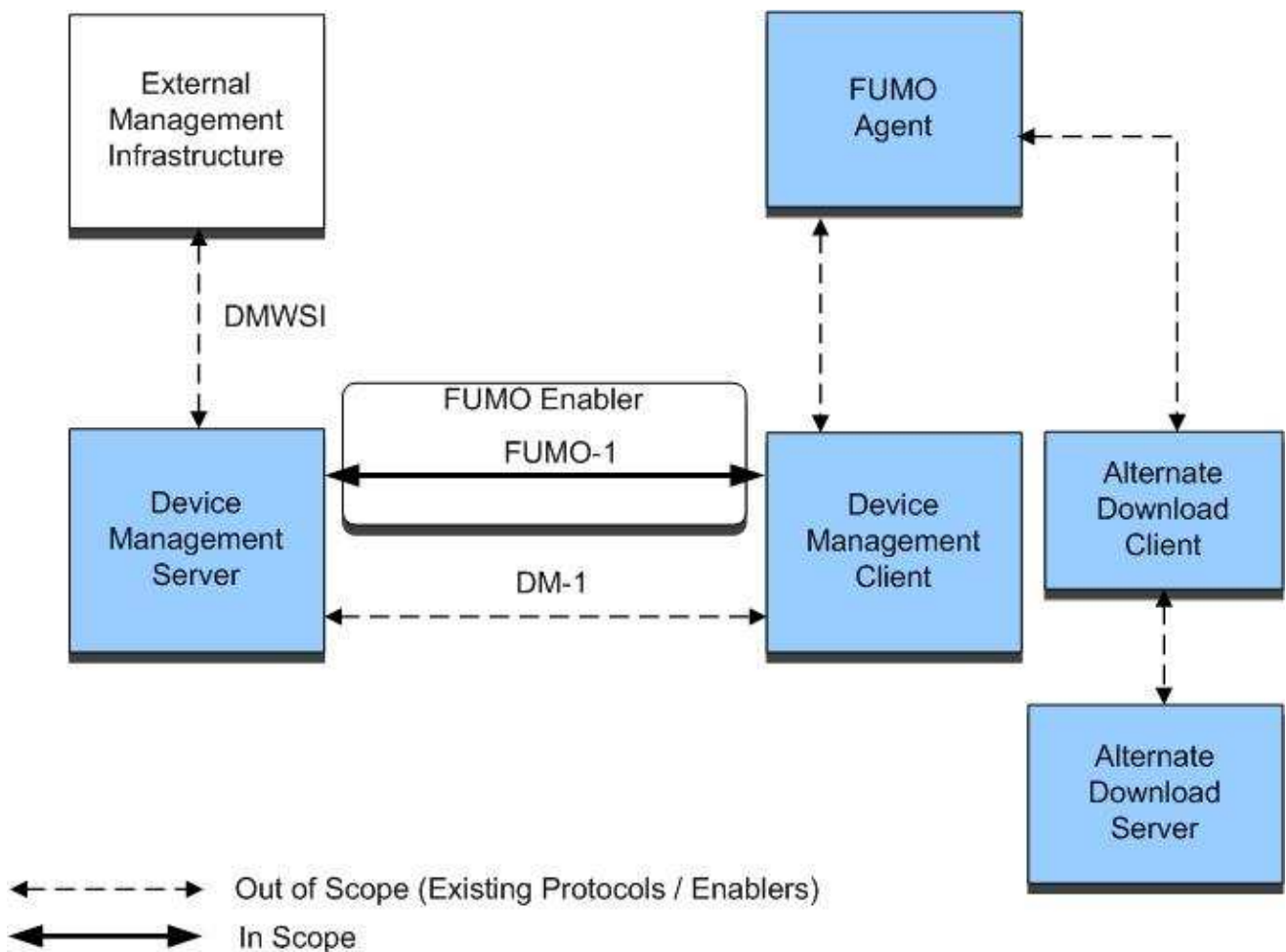
5.2 Architectural Diagram

Figure 1: Diagram of FUMO Architecture

5.3 Functional Components and Interfaces

5.3.1   The FUMO Enabler

The FUMO Enabler provides a firmware update management object (FUMO) for firmware updates that the DM Client provides access to, such that the DM server can manipulate it. The DM Client makes it possible to initiate firmware updates in the device via the firmware update management object.

5.3.1.1   The FUMO Agent Component

The FUMO agent function is responsible for the update activity. It consumes the update package delivered to the device by the OMA DM client or an alternate download client in the device. It is expected to communicate a success or failure result to the DM client at the termination of the update activity, for communication back to the DM server.

5.3.2   The DM Client Component

The DM client component makes it possible for the DM Server to manage the device using the DM-1 protocol. For firmware updates, the DM server and the DM client interact over the FUMO-1 interface as well.

5.3.2.1   The Large Object Download function of the DM Client

The large object download function is an optional feature of the DM Client that makes it possible to download update packages using the OMA-DM protocol [DMPRO].

5.3.3   The Alternate Download Client component in the device

The alternate download client component is an optional feature of the device that makes it possible to download update packages using the alternate download mechanism, such as DLOTA. The interactionof the FUMO agent with the Download client is out of scope.

5.3.4   The DM Server component

The DM server component supports device discovery, determination of an appropriate update package and delivery of an update package to the device over Large Object downloads (if the device can support that), all over the DM-1 interface. It also receives a firmware update specific notification from the DM Client, employing the Generic Alert mechanism, comprising results for an activity (update or download or both) invoked over the FUMO-1 interface.

5.3.5   The Interface FUMO-1

The interface FUMO-1 describes interactions between the DM Server and the DM Client in setting up the DM sessions, delivering update packages, and communicating results for the update activities invoked, using Generic Alerts. It is also used to setup parameters for alternate download mechanism.

5.4   Flows

5.4.1   OMA DM Download of an Update Package

This flow describes the interaction between device and the DM server wherein the DM server delivers an update package over the OMA-DM protocols to the device.

5.4.1.1   Firmware Update via OMA DM Download (Replace)

The following architectural diagram shows how OMA DM is used directly to move a firmware update package to the device using a DM "Replace" command to access a management object representing the actual firmware binary package data:
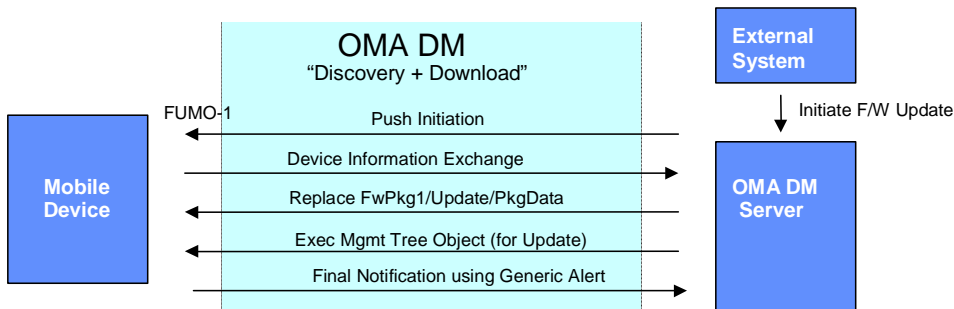
Figure 2: OMA DM Download of an Update Package

5.4.1.2   Normal Flow

1. The DM server initiates a session with the device.

2. The device provides DevInfo [DMSTDOBJ] information to the DM server.

3. The DM server determines an appropriate update package for delivery.

4. The DM server delivers the update package over large object download. A Replace command is sent to the device to replace an update package under the /x/Update/PkgData leaf node.

5. The device acknowledges the receipt of the update package.

5.4.1.3   Alternative Flow - 1

In the step 1, the device initiates a session with the DM server to request an update package for a firmware update.

5.4.1.4   Alternative Flow - 2

In the step 2, DM server optionally retrieves the DevDetail [DMSTDOBJ] to determine an appropriate update package.

5.4.2   Download of an Update Package over Alternate Download Mechanisms

This flow describes the interaction between device and the DM server wherein the DM server delivers an update package over alternate download mechanisms to the device.

5.4.2.1   Firmware Update through an Alternative Download Mechanism

The following architectural diagram shows how OMA DM is used to invoke an alternate download method, using a DM "Replace" command to specify the URL of the update package:
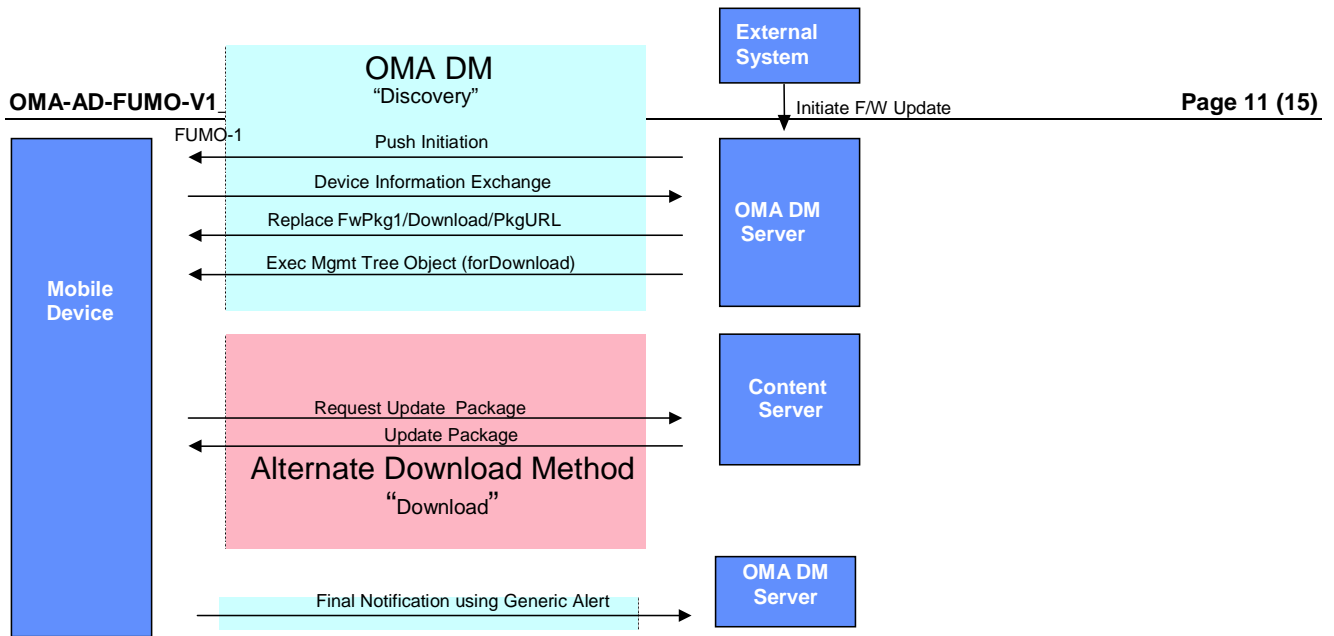
Figure 3: Alternate Download of an Update Package

5.4.2.1.1   Update Package Download via OMA DL Method

The following architectural diagram shows how OMA DM is used to invoke an <u>OMA DL</u> download method [DLOTA], using a DM "Replace" command to specify the URL of the download descriptor that describes further details concerning the firmware update package and the download method to be used:
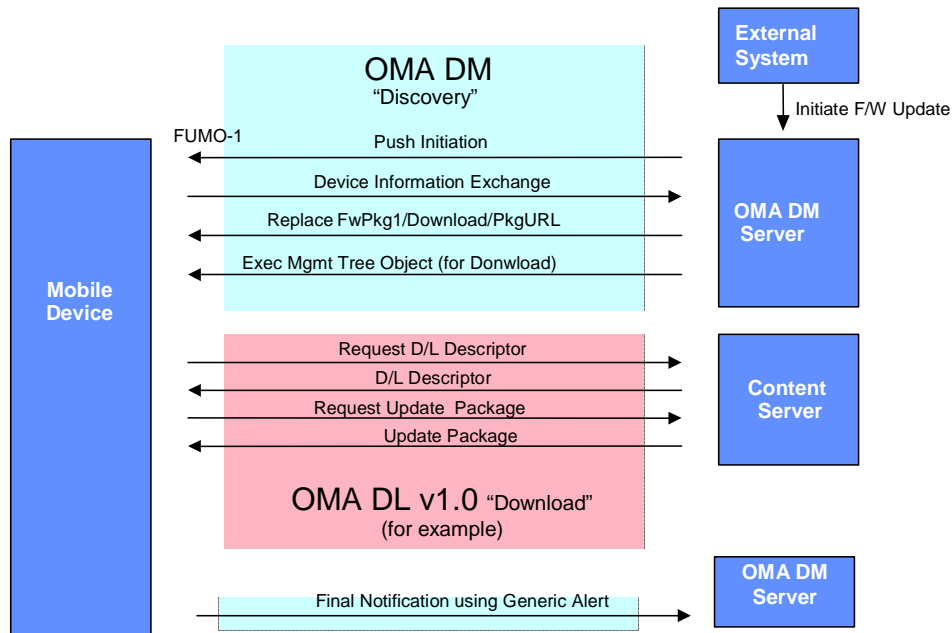

Figure 4: OMA DL Download of an Update Package

5.4.2.2   Normal Flow

1. The DM server initiates a session with the device.

2. The device provides DevInfo information to the DM server.

3. The DM server determines an appropriate update package for delivery.

4. The DM server determines an appropriate alternate download mechanism.

5. The DM Server sets the PkgURL element under the /x/Download node.

6. The DM Server sends to the Device an Exec command targeting /x/Download node.

7. The device retrieves the update package using the alternate download mechanism.

8. The device acknowledges the receipt of the update package.

5.4.2.3   Alternative Flow - 1

In the step 3, DM server optionally retrieves the DevDetail to determine an appropriate update package.

5.4.3   Server Initiating Update Activity with Device already has an Update Package

This flow describes the interaction between device and the DM server wherein the DM server initiates an update activity on the device

5.4.3.1   Normal Flow

1. [Optional] The Network Operations / Service provider provides a request to DM server for invoking an update on a device.

2. The DM server initiates a session with the device.

3. The DM server instructs the device to start an update using an Exec command on the Update node.

4. The device initiates an update activity.

5. The device completes the update activity and reports results to the DM server.

5.4.3.2   Alternative Flow - 1

In the step 1, the device initiates an update activity.

5.4.4   Server Initiating Combined Download and Update Activity

This flow describes the interaction between device and the DM server wherein the DM server initiates a combined download and update activity on the device
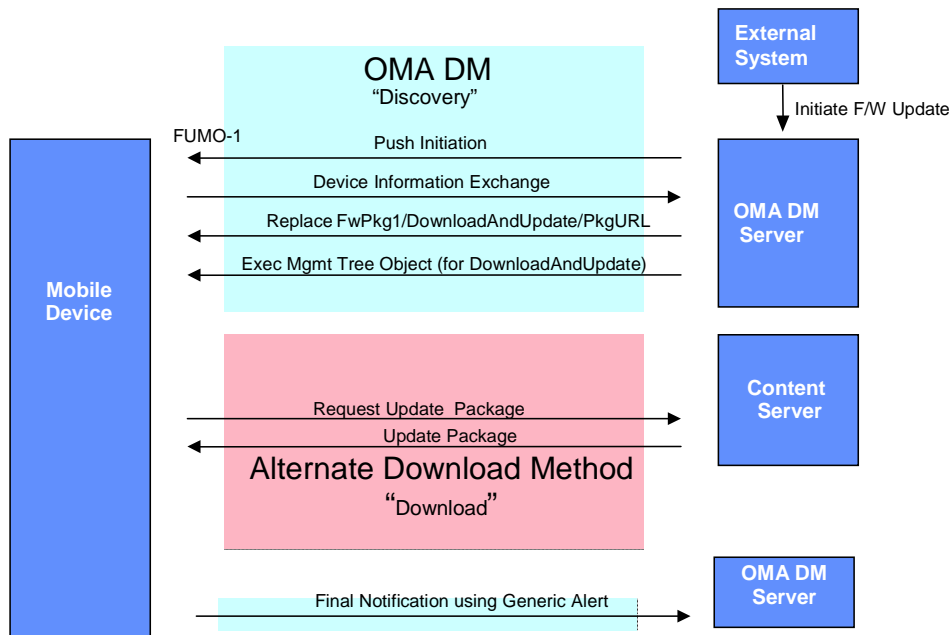
Figure 5: Alternate Download and Update of an Update Firmware Package

5.4.4.1   Normal Flow

1. [Optional] The Network Operations / Service provider provides a request to DM server for invoking an update on a device.

2. The DM server initiates a session with the device.

3. The DM server instructs the device to start a download from a PkgURL parameter provided, and then start an update. It uses an Exec command on the /x/DownloadAndUpdate node.

4. The device initiates a download activity followed by an update activity.

5. The device completes the update activity and reports results to the DM server.

5.4.4.2   Alternative Flow - 1

In the step 1, the device initiates an update activity.

5.4.5   Client Initiated Firmware Update

This flow describes the interaction between device and the DM server wherein the DM client initiates a firmware update activity on the device

5.4.5.1   Normal Flow

1. The DM client in device initiates a session with the DM server and communicates a Generic Alert with the right Alert type.

3. The DM server, based on the Alert type received, instructs the device to start a download (from a PkgURL for example) provided, and then to immediately start an update. It uses an Exec command on the /x/DownloadAndUpdate node, based on the client-initiated Alert type.

4. The device downloads an update package and then initiates a firmware update, immediately.

5. The device completes the update activity and reports results to the DM server.

5.4.5.2   Alternative Flow - 1

In the step 3, the device initiates a download activity when it receives an Exec command on a /x/Downlaod node. It then waits for the next Exec command on the /x/Update node before starting the update.

5.4.5.3   Alternative Flow - 2

In the step 3, the device initates a download activity when it receives a Replace command on /x/Update/PkgData leaf node. It then waits for an Exec command on a /x/Update node to starts an update.

Appendix A.   Change History   (Informative)

A.1   Approved Version History

Reference	Date	Description
OMA-AD-FUMO-V1_0	09 Feb 2007	Status changed to Approved by TP TP Doc ref# OMA-TP-2007-0076R01-INP_ERP_FUMO_V1.0_for_Final_Approval