



DCMO Architecture

Approved Version 1.0 – 10 Apr 2012

Open Mobile Alliance

OMA-AD-DCMO-V1_0-20120410-A

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1. Scope

(Informative)

The scope of this document is to define the architecture for the DCMO enabler. The DCMO enabler is based on OMA DM enabler and makes use of the functionalities provided by OMA DM v1.2 [DMPRO] protocol to remotely manage the device capabilities.

This document fulfils the functional capabilities needed to support this enabler as described in the DCMO Requirements document [DCMO-RD].

2. References

2.1 Normative References

- [DCMO-RD] “DCMO Requirements”, Version 1.0, Open Mobile Alliance, OMA-RD_DCMO-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/>
- [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

- [OMADICT] “Dictionary for OMA Specifications”, Version 2.5, Open Mobile Alliance™, OMA-ORG-Dictionary-V2_5, URL:<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][OMADICT].

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

3.2 Definitions

DCMO Alert	DCMO specific alerts which convey the result of DCMO Operations or report the discovery of new device capability via DM Generic Alert mechanism [DMPRO].
DCMO Operations	Operations (e.g. enable, disable) which may be invoked on a Device Capability MO.
Device	see [OMADICT]
Device Capability	Physical characteristics and related parameters supported by a device.
Management Object	A data model for information which is a logical part of the interfaces exposed by DM components

3.3 Abbreviations

DCMO	Device Capability Management Object
DM	Device Management
DPE	Device Profile Evolution
OMA	Open Mobile Alliance

4. Introduction

(Informative)

Mobile devices are becoming more and more advanced with many features, such as Cameras, Bluetooth, USB, keyboard, peripheral and more. In many circumstances Enterprises, regulations and others have policies against the usage of some features but allow the use of other features available on mobile devices. Therefore there is a need for selectively enabling and disabling device capabilities.

The DCMO enabler targets to specify the mechanisms required for the remote management of device capabilities. In particular it will address the ability of remote enablement and disablement of device capabilities. The device capability information will be exposed by DCMO to facilitate management of the device capability components.

The objective of this document is to describe the architecture for managing device capabilities.

4.1 Planned Phases

The DCMO 1.0 enabler release is expected to meet all the requirements defined in [DCMO-RD] and no additional phases are planned at this stage.

4.2 Security Considerations

The DCMO enabler depends on the security mechanisms and protections provided by the OMA DM enabler. It should normally not impact the security framework already defined in the OMA DM Enabler.

5. Architectural Model

5.1 Dependencies

The DCMO 1.0 architecture diagram indicates dependencies on the OMA DM Enabler v1.2.

5.2 Architectural Diagram

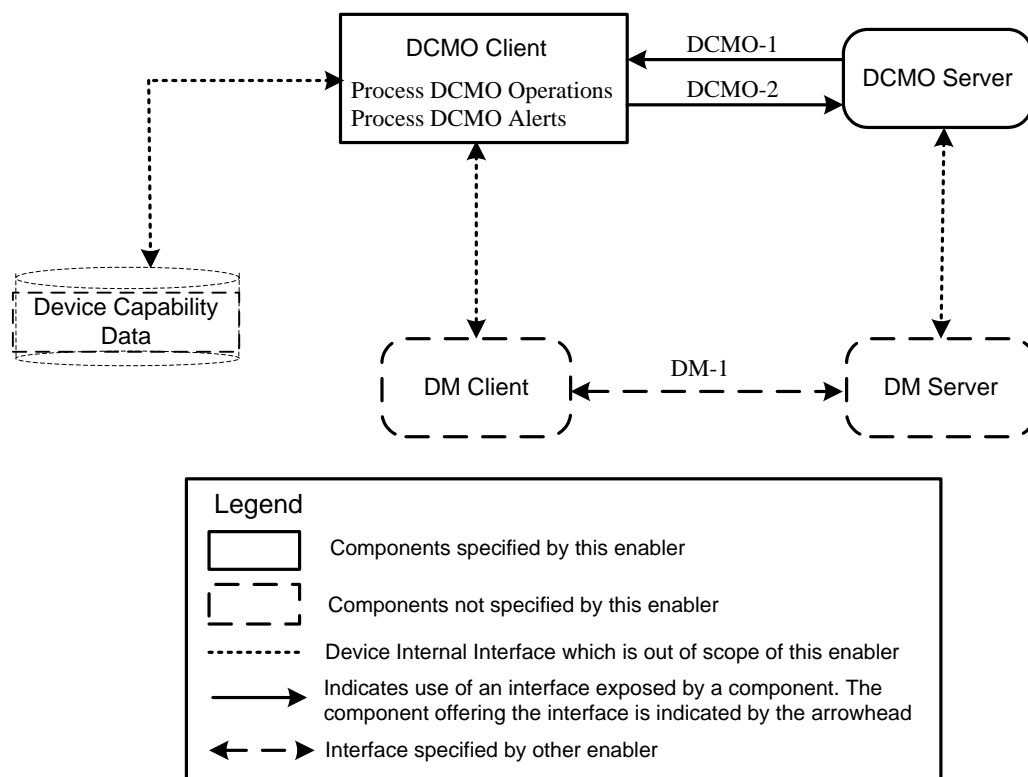


Figure 1: DCMO Architecture Diagram

5.3 Functional Components Specified by this Enabler

5.3.1 DCMO Server

The DCMO Server is a logical entity which is dedicated to issue DCMO Operations to the device or consume the DCMO Alerts from the device. When DCMO Operations are finished or new device capabilities are discovered, these events need to be reported utilizing DCMO Alert.

5.3.2 DCMO Client

The DCMO Client is a logical entity which is responsible for conducting the management activities to manage device capabilities according to the DCMO Operations received. DCMO Client is also responsible for sending DCMO Alerts to the DCMO Server.

5.4 Other Enablers and Components

5.4.1 DM Server

The DM Server is an entity which conveys the appropriate device management operations to the device over various bearer technologies, represented by the DM-1 interface. It can also receive specific alerts from the DM Client for success or failure of management activities.

5.4.2 DM Client

The DM Client is an entity which makes it possible for the DM Server to manage the device using the DM protocol defined in [DMPRO]. The DM Client can access DCMO provided by the DCMO Enabler such that the DM Server can manipulate it. The DM Client employs the DM Generic Alert mechanism [DMPRO] to send the result of the management activities to DM Server.

The DCMO is the management object representing device's information exposed by device capability components for device capability management purpose. The DCMO can also be used to expose the removable device capabilities. The DCMO is exposed by the DM Client through its DM Tree.

5.4.3 Device Capability Data

The Device Capability Data is the internal capability data stored on the device to be consumed according to different purpose.

The DPE vocabulary defined by DPE Enabler provides the set of dynamic device capabilities that is accessible for DPE Enabler and DCMO Enabler. The DCMO Enabler will provide a management object representing the device capability data (or some subset of that data) to remotely manage them. The DCMO Enabler will identify which of the DPE properties are suitable for management via DCMO and may propose new properties to be included in DPE vocabulary. The internal capability data need to be transformed according to DPE vocabulary based on the different usage by DCMO enabler and DPE enabler respectively. It is out of scope of DCMO enabler to specify how to do the transformation on the device and how these data are stored and accessed on the device.

5.5 Interfaces Specified by this Enabler

5.5.1 DCMO-1: DCMO Client <- Other Components

The DCMO-1 interface is exposed by DCMO Client which allows other components, such as DCMO Server, to perform DCMO Operations. Through this interface the DCMO Server can enable and disable device capabilities on the device. The DCMO Operations will be conveyed by DM messages through underlying DM-1 interface.

5.5.2 DCMO-2: DCMO Server <- Other Components

The DCMO-2 interface is exposed by DCMO Server which allows other components, such as DCMO Client, to send DCMO Alerts. Through this interface the DCMO Server can receive result of DCMO Operations or notification of new device capabilities on the device. The DCMO Alerts will be conveyed by DM messages through underlying DM-1 interface.

5.6 Other Interfaces

5.6.1 DM-1: DM Server <-> DM Client

The DM-1 interface is defined in the DM Enabler. It provides an interface over which DM Server may send device management operations to DM Client and DM Client may return status and alerts to DM Server.

5.7 Flows

5.7.1 Device Capability Disabled/Enabled Flow

5.7.1.1 Normal Flow

In this flow the DCMO Server would like to disable some device capabilities such as Cameras, Bluetooth, and USB which could not be enabled by the user and could only be enabled by the original DM Server.

1. The DCMO Server detects the presence of the device.
2. The DCMO Server sends notifications to DM Server to disable some device capabilities on the device with the indication that user is not allowed to enable them.
3. The DM Server notifies the DM Client to initiate the device management session and delivers the appropriate DCMO Operations to the device.
4. The DM Client executes the DM command(s) sent from DM Server.
5. The DCMO Client consumes the DCMO Operations therefore the corresponding device capabilities are disabled and user is not allowed to enable them.
6. The DM Client notifies the results to the DM Server and the results are relayed to DCMO Server as well.

5.7.1.2 Alternative Flow - 1

In this flow the DCMO Server would like to disable an abnormal device capability to protect the device against potential abnormal behaviours. The disabled capability can be enabled by the user manually or by any Device Server remotely.

1. The DCMO Server detects a specific capability on the device is abnormal or misbehaving.
2. The DCMO Server sends notifications to DM Server to disable the device capability on the device with the indication that user is allowed to enable them.
3. The DM server notifies the DM Client to initiate the device management session and delivers the appropriate DCMO Operations to the device.
4. The DM Client executes DM command(s) sent from DM Server and notifies DCMO Agent.
5. The DCMO Client consumes the DCMO Operations therefore the corresponding device capability is disabled and user is allowed to enable them.
6. The DM Client notifies the results to the DM Server and the results are relayed to External Management Infrastructure as well.

5.7.2 Expose Removable Hardware Capability Flow

5.7.2.1 Normal Flow

In this flow the updated device capability will be exposed to the DCMO Server when a removable hardware such as Camera, keyboard and removable storage is inserted or removed from the device.

1. User inserts/removes the removable hardware to/from the device.
2. The DCMO Client automatically detects the presence of the removable device capability update and notifies DM Client.
3. The DM Client updates the related information on the DCMO.
3. The DM Client initiates the device management session to expose either all or modified device capabilities to the DM Server which could be relayed to DCMO Server for further processing.

Appendix A. Change History

(Informative)

A.1 Approved Version History

Reference	Date	Description
OMA-AD-DCMO-V1_0	10 Apr 2012	Status changed to Approved by TP: OMA-TP-2012-0155-INP_DCMO_V1.0_ERP_for_final_Approval