Enabler Test Specification for Download 1.0

Version 1.0, 17-Mar-2004

Open Mobile Alliance
OMA-ETS-DL-OTA-v1_0-20040317-a

Contents

1. Scope

This document describes in detail conformance test cases for Download Version 1.0.

2. References

2.1. Normative References

[DL-OTA] "Generic Content Download Over The Air Specification". Open Mobile Alliance™. OMA-Download-OTA-v1_0-20021219-C. http://www.openmobilealliance.org/

[RFC2046] "Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types". N. Freed et al. November 1996. URL:http://www.ietf.org/rfc/rfc2046.txt

[RFC2119] "Key words for use in RFCs to Indicate Requirement Levels". S. Bradner. March 1997. http://www.ietf.org/rfc/rfc2119.txt

[WSP] " Wireless Session Protocol ", WAP-230-WSP, WAP Forum™, http://www.openmobilealliance.org/

[W-HTTP] " Wireless Profiled HTTP", WAP-229-HTTP, WAP Forum™, http://www.openmobilealliance.org/

[WTLS] "Wireless Transport Layer Security", WAP-261-WTLS, WAP Forum™, http://www.openmobilealliance.org/

[WAPTLS] "WAP TLS Profile and Tunneling", WAP-219-TLS, WAP Forum™, http://www.openmobilealliance.org/

2.2. Informative References

[MIDPOTA] "Over The Air User Initiated Provisioning Recommended Practice", version 1.0, 2001, SUN Microsystems. http://java.sun.com

[MIDP] "Mobile Information Device Profile", version 1.0, 2000, SUN Microsystems, http://java.sun.com/

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.

The following numbering scheme is used:

xxx-y.z-int-number where:

xxx	Name of enabler, e.g. MMS or Browsing
y.z	Version of enabler release, e.g. 1.2 or 1.2.1
int	Indicating this test is a interoperability test case
number	Leapnumber for the test case

3.2. Definitions

Content Delivery The actual delivery of the media object, for example by means of a HTTP GET, to the client device.

Content Download The whole transaction including discovery, delivery of content and confirmation of download.

Content Handler An entity in the mobile device responsible for the processing of a particular media type. The content handler typically handles issues related to installation of content, in addition to execution of content. The actual processing of retrieved content is outside the scope of this specification.

Content Storage The physical location of the media object to be downloaded.

Discovery Application A user agent in the device that discovers media on behalf of the user. The End User discovers content on the Web by using a Web browser or an application specifically created for a type of content. A picture editor may discover pictures, a melody composer may discover melodies, and an application manager may discover applications (e.g. games) on dedicated Web sites. Email and MMS messages may contain Web addresses to media objects available for downloading. These types of applications are collectively referred to as a *Discovery Application*.

Discovery Process The process by which the user or device finds a resource (i.e. a Media Object) that he wants to load onto his device. The discovery can take place for example by means of a browser, a dedicated discovery application, a received message, or some offline means (like a newspaper).

Download Agent An abbreviated form of Download User Agent.

Download Descriptor Metadata about a *media object* and instructions to the *download agent* for how to download it. The object triggers the Download Agent in the client device. It describes the media object to be downloaded and allows the client device to decide if it has the capabilities to install and render/execute the Media Object.

Download Protocol The actual delivery of an object is performed using the protocol specified in the Download Descriptor. The only mandatory protocol as defined in this specification is

	[W-HTTP] (or [WSP] if the environment is WAP 1.x). Other protocols, including full support for HTTP, may be used if supported by both parties.
Download Server	A Web server hosting *media objects* available for download. It is responsible for the download transaction from the server perspective. It handles download session management including actions triggered by the installation status report.
Download Service	The overall service that a client device is exposed to when it wants to select a media object and execute a download of it. A download service is typically constructed with the help of the abstract building blocks Presentation Server, Download Server and Content Storage.
Download User Agent	A user agent in the device responsible for downloading a *media object* described by a *downloaddescriptor*. Responsible for the download transaction from the client perspective. It is triggered by the reception or activation of a Download Descriptor.
Generic Content	The concept of Generic Content includes any MIME media type except the Java™ JAR media type. For this media type please see [MIDPOTA].
Installation Notification	A Status Report message from the client to the server. It indicates to the server that the Download Agent has successfully installed the Media Object, and that the content (to the best knowledge of the Download Agent) will be made available to the user.
Media Object	A resource on a Web server that can be downloaded. It may be a single object (often referred to as a file), or a container consisting of multiple objects. The mechanism for the latter may be MIME-multipart. There are no restrictions as to the characteristics of the media object, but the transfer encoding has to make it compatible with an HTTP (or WSP) transport. The download of a Media Object is the ultimate goal of each transaction undertaken with the protocol defined in this specification.
Media Object Installer	The Media Object Installer is responsible for the preparation for and execution of the installation of a particular media object. The Installer is often implemented as part of the Content Handler of the particular media type or as part of a file system manager.
Media Type	A MIME media type [RFC2046].
MIDP OTA Provisioning	The JAVA™ MIDP OTA Provisioning is defined in [MIDPOTA].
Presentation Server	A Web server presenting a download service to the user. It is one of the possible discovery mechanisms. The client device may browse a Web or WAP page at the presentation server and be redirected to the Download Server for the OMA Download transaction.
Server	All Servers in this specification are abstract, i.e. logical, entities. They are used in the specification only to help the reader to separate between different functional elements that may be implemented and deployed in any configuration.
Status Report	A message sent from the mobile device to a server to indicate the positive or negative outcome of a download transaction. In the context of Content Download the Status Report terminates the "download session" (or "download transaction").
Status Report Server	A WEB server accepting status reports from the download agent.
Well-intentioned attempt	A “well-intentioned attempt to send an Installation Status Report” means that the client device sends a Status Report under circumstances where the network connection is known (to the extent possible) to be present, and the Status Report is

known to be properly formatted. If there is no network connection then an attempt to send a request should not be regarded as well-intentioned.

3.3. Abbreviations

CID	Content Identifier
DD	Download Descriptor
HTTP	HyperText Transfer Protocol
JAD	Java™ Application Descriptor
JAR	Java™ Archive
J2ME	Java™ 2 Micro Edition
MIDP	Mobile Information Device Profile
MMS	Multimedia Messaging Service
OMA	Open Mobile Alliance
OTA	Over The Air
RP	Recommended Practices
SCR	Static Conformance Requirement
URL	Universal Resource Locator
URI	Universal Resource Identifier
WAP	Wireless Application Protocol
XML	Extensible Markup Language

4. Introduction

The purpose of this document is to provide test cases for Download Enabler Release 1.0.

Broadly stated, the goals of the interoperability testing effort should be to validate client/server interactions and the readily apparent behaviours and normal working of the mobile device. For instance, it may not be feasible to set up scenarios to test the error conditions for a given specification. The following sections provide more detailed instructions how to test Download functionality.

Some features in the Download enabler may optionally be implemented in mobile devices. The tests associated with these optional features are marked as [Optional] in the test specification.

When not explicitly mentioned otherwise, the delivery mechanism used in testing is Separate Delivery. Combined delivery functionality is tested in test cases DL-OTA-1.0-int-02 and DL-OTA-1.0-int-03.

The following items are needed to adequately test the Download enabler:

- An origin server configured to support the download descriptor media type (application/vnd.oma.dd+xml).
- A web page providing a link to the download descriptor (for separate delivery).
- [Optional] A web page providing a link to the combined download descriptor and media object (for co-delivery) using the MIME multipart/related content type.
- A download descriptor that can be used to test successful installation.
- A download descriptor that should generate an error condition (i.e. Attribute Mismatch).
- A download descriptor that does not contain an installNotify URL.
- For the download descriptors that contain an installNotify URL, the URL should use the “http” scheme.

The Download enabler tests are carried out using WSP and/or W-HTTP transfer protocols. Optionally also WAPTLS or WTLS may be used. This means that following SCRs are implicitly covered by other test cases: DL-OTA-C-004, DL-OTA-C-005, DL-OTA-C-006 and DL-OTA-C-007.

5. Interoperability Test Cases

There are 15 interoperability test cases for Download 1.0 Enabler. 11 of those are mandatory.

5.1. Separate Delivery

Test Case ID	DL-OTA-1.0-int-01
Test Object	Client device
Test Case Description	To test separate delivery functionality.
Specification Reference	[DL-OTA] Chapter 5.
SCR Reference	DL-OTA-C-001 and DL-OTA-C-013
Tool	None
Test Code	None
Preconditions	The client device must be able to download the download descriptor.
Test Procedure	1. User selects a URI that points to a download descriptor in a download server. 2. Download server deliveres the download descriptor to the client. The download descriptor includes an URI that references the media object. The download descriptor does not include InstallNotifyURI. 3. Client retrieves the media object from the download server. 4. Client installs the media object.
Pass-Criteria	1-2. The download descriptor is delivered to the client successfully. 3. The media object is delivered to the client successfully. 4. Client does not send Installation Notification as a result of the installation. The client releases the media object for use.

5.2. Combined Delivery

5.2.1. Combined Delivery without Status Report [Optional]

Test Case ID	DL-OTA-1.0-int-02
Test Object	Client device
Test Case Description	To test combined delivery functionality without Status Report.
Specification Reference	[DL-OTA] Chapter 5.1.1.1.
SCR Reference	DL-OTA-C-002, DL-OTA-C-003 and DL-OTA-C-013
Tool	None
Test Code	None
Preconditions	The client device must be able to download the combined download descriptor and media object.
Test Procedure	1. User selects a URI that points to a download descriptor in a download server. 2. Download server delivers the download descriptor and the media object to the client. The download descriptor does not include InstallNotifyURI. 3. Client installs the media object.
Pass-Criteria	1-2. The download descriptor and a media object are delivered to the client successfully. 3. Client does not send Installation Notification as a result of the installation. The client releases the media object for use.

Note: This test case is mandatory for devices that in the capability negotiation indicate that they support multipart/related ([RFC2387]) or application/vnd.wap.multipart.related ([WSP]).

5.2.2. Combined Delivery with Status Report [Optional]

Test Case ID	DL-OTA-1.0-int-03
Test Object	Client device
Test Case Description	To test combined delivery functionality with Status Report.
Specification Reference	[DL-OTA] Chapter 5.1.1.1.
SCR Reference	DL-OTA-C-002, DL-OTA-C-003, DL-OTA-C-013, DL-OTA-C-014 and DL-OTA-C-021
Tool	None
Test Code	None
Preconditions	The client device must be able to download the combined download descriptor and media object.
Test Procedure	1. User selects a URI that points to a download descriptor in a download server. 2. Download server delivers the download descriptor and the media object to the client. The download descriptor includes an InstallNotifyURI attribute. 3. Client installs the media object. 4. Download server acknowledges the Installation Notification with HTTP 200 series response code.
Pass-Criteria	1-2. The download descriptor and a media object are delivered to the client successfully. 3. As a result of a successful installation the client sends InstallationNotification to the download server. 4. After receiving HTTP 200 series response, the client releases the media object for use.

Note: This test case is mandatory for devices that in the capability negotiation indicate that they support multipart/related ([RFC2387]) or application/vnd.wap.multipart.related ([WSP]).

5.3. HTTP Basic Authentication [Optional]

Test Case ID	DL-OTA-1.0-int-04
Test Object	Client device
Test Case Description	To check functionality in case the download server requests auhentication.
Specification Reference	[DL-OTA] Chapter 5.6.2.
SCR Reference	DL-OTA-C-022
Tool	None
Test Code	None
Preconditions	Download server requires user authentication.
Test Procedure	1. User selects a URI that points to a download descriptor in a download server. 2. Download server responds with HTTP 401. 3. Client device requests user credentials from the user (e.g. username/password) [Optional].
Pass-Criteria	1-3. In response to HTTP 401, the client device re-sends the request for a download descriptor with user credentials. After successful authentication the download desriptor (and media object) is delivered to the client successfully.

5.4. Successful Installation with Status Report

Test Case ID	DL-OTA-1.0-int-05
Test Object	Client device
Test Case Description	To test Status Report delivery in case of a successful installation.
Specification Reference	[DL-OTA] Chapters 5.2 and 5.3.
SCR Reference	DL-OTA-C-013, DL-OTA-C-014 and DL-OTA-C-021
Tool	None
Test Code	None
Preconditions	The client device must be able to download the download descriptor.
Test Procedure	1. User selects a URI that points to a download descriptor in a download server. 2. Download server deliveres the download descriptor to the client. The download descriptor includes an InstallNotifyURI attribute and an URI that references the media object. 3. Client retrieves the media object file from the download server. 4. Client installs the media object. 5. Download server acknowledges the Installation Notification with HTTP 200 series response code.
Pass-Criteria	1-2. The download descriptor is delivered successfully. 3. The media object is delivered successfully. 4. As a result of a successful installation the client sends Installation Notification to the download server. 5. After receiving HTTP 200 series response, the client releases the media object for use.

5.5. Installation Failure with Status Report

5.5.1. (901) Insufficient memory

Test Case ID	DL-OTA-1.0-int-06
Test Object	Client device
Test Case Description	To test Status Report delivery in case of an unsuccessful installation (Insufficient memory).
Specification Reference	[DL-OTA] 5.2 and 5.3.
SCR Reference	DL-OTA-C-008, DL-OTA-C-011, DL-OTA-C-014, DL-OTA-C-015 and DL-OTA-C-021
Tool	None
Test Code	None
Preconditions	The client device must be able to download the download descriptor. There is not enough storage space in the client device for the media object i.e. the media object file is bigger than the size of the available memory.
Test Procedure	1. User selects a URI that points to a download descriptor in a download server. 2. Download server deliveres the download descriptor to the client. The download descriptor includes an InstallNotifyURI attribute and an URI that references the media object. 3. (Client retrieves the media object file from the download server.)
Pass-Criteria	1-2. The download descriptor is delivered successfully. 3. The client sends Installation Notification with errors status “901 Insufficient memory” to the download server. This event may occur before or after retrieval of the media object. The media object is not made available to the user.

5.5.2. (902) User Cancelled

Test Case ID	DL-OTA-1.0-int-07
Test Object	Client device
Test Case Description	To test Status Report delivery in case of an unsuccessful installation (User Cancelled).
Specification Reference	[DL-OTA] 5.2 and 5.3.
SCR Reference	DL-OTA-C-008, DL-OTA-C-012, DL-OTA-C-013, DL-OTA-C-014, DL-OTA-C-015 and DL-OTA-C-021
Tool	None
Test Code	None
Preconditions	The client device must be able to download the download descriptor.
Test Procedure	1. User selects a URI that points to a download descriptor in a download server. 2. Download server delivers the download descriptor to the client. The download descriptor includes an InstallNotifyURI attribute and an URI that references the media object. 3. Client request the media object file from the download server. 4. During the download the user cancels the operation.
Pass-Criteria	1-2. The download descriptor is delivered successfully. 3-4. The download operation is cancelled. The client sends Installation Notification with errors status “902 User Cancelled” to the download server. The media object is not made available to the user.

5.5.3. (906) Invalid descriptor

Test Case ID	DL-OTA-1.0-int-08
Test Object	Client device
Test Case Description	To test Status Report delivery in case the device could not interpret the download descriptor.
Specification Reference	[DL-OTA] 5.2 and 5.3.
SCR Reference	DL-OTA-C-008, DL-OTA-C-013, DL-OTA-C-014, DL-OTA-C-015 and DL-OTA-C-021
Tool	None
Test Code	None
Preconditions	The client device must be able to download the download descriptor. The download descriptor contains syntactic errors e.g. • Some of the mandatory attributes are missing (e.g. Type). • The DD file does not comply with the XML Schema defined in the chapter 8.2 (e.g. there are end tags without start tags)
Test Procedure	1. User selects a URI that points to a download descriptor in a download server. 2. Download server delivers the download descriptor to the client. The download descriptor includes an InstallNotifyURI attribute and an URI that references the media object. 3. (Client retrieves the media object file from the download server.)
Pass-Criteria	1-2. The download descriptor is delivered successfully. 3. The client sends Installation Notification with errors status “906 Invalid descriptor” to the download server. This event may occur before or after retrieval of the media object. The media object is not made available to the user.

5.5.4. (951) Invalid DDVersion

Test Case ID	DL-OTA-1.0-int-09
Test Object	Client device
Test Case Description	To test Status Report delivery in case the device is not compatible with the "major" version of the download descriptor.
Specification Reference	[DL-OTA] 5.2 and 5.3.
SCR Reference	DL-OTA-C-008, DL-OTA-C-009, DL-OTA-C-013, DL-OTA-C-014, DL-OTA-C-015 and DL-OTA-C-021
Tool	None
Test Code	None
Preconditions	The client device must be able to download the download descriptor. The client device is not compatible with the "major" version of the download descriptor, as indicated in the attribute Version (that is a parameter to the attribute Media).
Test Procedure	1. User selects a URI that points to a download descriptor in a download server. 2. Download server delivers the download descriptor to the client. The download descriptor includes an InstallNotifyURI attribute and an URI that references the media object. 3. (Client retrieves the media object file from the download server).
Pass-Criteria	1-2. The download descriptor is delivered successfully. 3. The client sends Installation Notification with errors status "951 Invalid DDVersion" to the download server. This event may occur before or after retrieval of the media object. The media object is not made available to the user.

5.5.5. Unknown media object type

Test Case ID	DL-OTA-1.0-int-10
Test Object	Client device
Test Case Description	To test Status Report delivery in case of unknown media object type
Specification Reference	[DL-OTA] 5.2 and 5.3.
SCR Reference	DL-OTA-C-008, DL-OTA-C-011, DL-OTA-C-013, DL-OTA-C-014, DL-OTA-C-015 and DL-OTA-C-021
Tool	None
Test Code	None
Preconditions	The client device must be able to download the download descriptor. The TYPE field in the download descriptor indicates an unknown media object type (e.g. something gibberish).
Test Procedure	1. User selects a URI that points to a download descriptor in a download server. 2. Download server delivers the download descriptor to the client. The download descriptor includes an InstallNotifyURI attribute and an URI that references the media object. 3. Client retrieves the media object file from the download server.
Pass-Criteria	1-2. The download descriptor is delivered successfully. 3. The Download Agent understands that the upcoming media object is not supported aborts the download and sends error code “(952) Device Aborted”. OR The download agent downloads the media object. The download agent fails to install the media object and send the error code "(953) Non-Acceptable content".

5.6. Installation Notification without Server Reply

Test Case ID	DL-OTA-1.0-int-11
Test Object	Client device
Test Case Description	To test Status Report delivery in case there is no server reply (i.e. "Well-Intentioned Attempt").
Specification Reference	[DL-OTA] Chapters 5.2.6
SCR Reference	DL-OTA-C-10, DL-OTA-C-013, DL-OTA-C-014, DL-OTA-C-018 and DL-OTA-C-021
Tool	None
Test Code	None
Preconditions	The client device must be able to download the download descriptor.
Test Procedure	1. User selects a URI that points to a download descriptor in a download server. 2. Download server delivers the download descriptor to the client. The download descriptor includes an InstallNotifyURI attribute and an URI that references the media object. 3. Client retrieves the media object file from the download server. 4. Client installs the media object. 5. Download server does not send any response to the Installation Notification.
Pass-Criteria	1-2. The download descriptor is delivered successfully. 3. The media object is delivered successfully. 4. As a result of a successful installation the client sends Installation Notification to the download server. 5. After timeout period the client releases the media object for use.

5.7. Installation Notification with Server Error

Test Case ID	DL-OTA-1.0-int-12
Test Object	Client device
Test Case Description	To test Status Report delivery in case when the server replies with other than HTTP 200-series response code.
Specification Reference	[DL-OTA] Chapters 5.2.6
SCR Reference	DL-OTA-C-013, DL-OTA-C-014, DL-OTA-C-018 and DL-OTA-C-021
Tool	None
Test Code	None
Preconditions	The client device must be able to download the download descriptor. Note: One way to generate the needed server response is to use a wrong InstallNotify URI. Other means are also possible.
Test Procedure	1. User selects a URI that points to a download descriptor in a download server. 2. Download server delivers the download descriptor to the client. The download descriptor includes an InstallNotifyURI attribute and an URI that references the media object. 3. Client retrieves the media object file from the download server. 4. Client installs the media object. 5. Download server acknowledges the Installation Notification with other than HTTP 200-series response code (i.e. with 100-, 300-, 400- or 500-series response code).
Pass-Criteria	1-2. The download descriptor is delivered successfully. 3. The media object is delivered successfully. 4. As a result of a successful installation the client sends Installation Notification to the download server. 5. The media object is not made available to the user.

5.8. Next URL [Optional]

Test Case ID	DL-OTA-1.0-int-13
Test Object	Client device
Test Case Description	To test NextURL functionality.
Specification Reference	[DL-OTA] Chapter 5.2.7.
SCR Reference	DL-OTA-C-013 and DL-OTA-C-020
Tool	None
Test Code	None
Preconditions	The client device must be able to download the download descriptor. The client device supports NextURL functionality.
Test Procedure	1. User selects a URI that points to a download descriptor in a download server. 2. Download server delivers the download descriptor to the client. The download descriptor includes an URI that references the media object. 3. Client retrieves the media object from the download server. 4. Client installs the media object. 5. User selects to continue with browsing operation.
Pass-Criteria	1-2. The download descriptor is delivered to the client successfully. 3-4. The media object is delivered and installed to the client successfully. 5. The Download Agent invokes the URL defined by the NextURL attribute.

5.9. Processing Rules

Test Case ID	DL-OTA-1.0-int-14
Test Object	Client device
Test Case Description	To test processing rules for Download Descriptor.
Specification Reference	[DL-OTA] Chapter 5.2.1.1.
SCR Reference	DL-DD-001, DL-DD-002, DL-DD-003, DL-DD-004 and DL-OTA-C-10
Tool	None
Test Code	None
Preconditions	The client device must be able to download the Download Descriptor. There are two Download Descriptor files available. Both of them contain all specified attributes [DL-OTA] and: • The first file contains multiple instances of each attribute. • The second file contains an unknown attribute and an unknown value for that attribute.
Test Procedure	1. User selects a URI that points to the first download descriptor in a download server. Download server delivers the download descriptor to the client. 2. User selects a URI that points to the second download descriptor in a download server. Download server delivers the download descriptor to the client.
Pass-Criteria	1. The download descriptor is delivered to the client successfully. The Download Descriptor file is processed so that optional attributes are ignored if not supported. If an attribute occurs more that once, all but the first occurrence must be ignored. The only exception is the attribute **Type** for which multiple instances must be supported. 2. The download descriptor is delivered to the client successfully. The Download Descriptor file is processed so that optional attributes are ignored if not supported. All unknown attributes and attribute values are ignored.

Appendix A. Change History (Informative)

A.1 Approved Version History

Reference	Date	Description
n/a	28-Mar-2003	Initial version used at Test Fest #4
	, 17-Mar-2004	Approved