Unified Virtual Experience Requirements

Approved Version 1.0 – 01 Dec 2015

Open Mobile Alliance

OMA-RD-UVE-V1_0-20151201-A

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1. Scope (Informative)

The requirement document (RD) contains the use cases and requirements for Unified Virtual Experience (UVE) Enabler. This covers defining the requirements for an enabler providing capabilities to enable remote consumption of various UVE applications (herein after referred as UAs). This involves having all the UAs hosted in the network and from there providing them to the users using cloud computing technologies like virtualization.

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

2.2 Informative References

[OMADICT] "Dictionary for OMA Specifications", Version x.y, Open Mobile Alliance™, OMA-ORG-Dictionary-Vx_y, 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].

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

3.2 Definitions

Local Resources	Local Resources are the various physical or logical entities, available to the devices, which need to be consumed by the UAs to perform their functions. Local Resources includes sensors (GPS, accelerometer etc.), camera, calendar, address book etc.
OS-Independent UAs	OS-Independent UAs refers to those UAs which users can use irrespective of the device OS they are using.
Remote Resources	Remote Resources are the resources available in the network including user profile data (preference, location) and hardware resources (printer, scanner).
UVE Application	UVE Application is an application hosted remotely in the network.
Watcher	Watcher is a UVE user who is authorized to monitor and/or suspend an existing UVE application session.

3.3 Abbreviations

CP	Content Provider
OMA	Open Mobile Alliance
SP	Service Provider
UA	UVE Application

4. Introduction (Informative)

With the advancement of high profile applications (e.g. games) and various available platforms, the service consumption is becoming complex and difficult. The number of devices available with different hardware and software specification is making things worse. Applications are being developed for a particular platform and with strict hardware and software requirements. These constraints mostly proved to be a hurdle for the complete value chain:

- Users can only use applications which are compliant to their device hardware and software platform specification.
- Content providers have to create multiple versions of the application depending on which hardware and software platform they want them to execute on.
- Despite of knowing this inconvenience of their users and partnered CP, service providers can't do much to help their subscribers.

In an attempt to solve the problem this work items attempts to optimize the current application usage model by providing a unified platform (cloud computing platform) which can host various applications (UAs), enabling different content and services, remotely in the cloud and provide them to the user using virtualization techniques (cloud computing). This will aid end-user to use an UA irrespective of the platform they are using with consistent user experience as compared to using UAs hosted locally on the device.

Figure 1: OS-Independent UA scenario

5. UVE release description (Informative)

UVE enabler release aims to provide a new application consumption model with the following functionalities:

- OS-Independent UAs: This functionality enables users to use UA irrespective of the OS they are using. This will increase the UA availability for users and vice versa.
- On-line UAs: This functionality allows users to use applications online instead of downloading them on to their devices. This will allow users to overcome terminal barriers (e.g. memory) and accessing UA from any terminal at any time.
- UA Monitoring: This functionality enables user to monitor an existing UVE application session and if allowed to suspend the monitored session.
- No-loss reconnection: This functionality enables users to reconnect to an abnormally suspended UVE application session without UA data being lost.

UVE enabler consists for different actors namely Users, UVE SP, Content Provider (developers) and UA Servers. Content provider provides UAs to UVE SP. UVE SP hosts those UAs in their network forming a cloud based service. Users access these services from their terminals using cloud computing technologies.

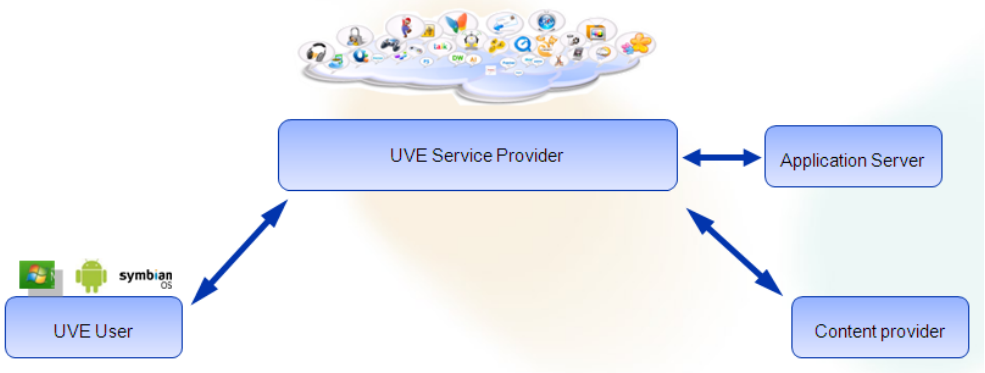

Figure 2: Actors involved in UVE ecosystem

5.1 End-to-end Service Description

With this enabler the classic application usage model (i.e. the application is installed and running in the device) may be enriched by an additional model in which a unified network platform (cloud computing platform) can host several UAs (enabling different contents and services) in the cloud and provide them to the user using virtualization techniques (cloud computing). The benefit for the end-user is that he/she can use an (remote) UA irrespective of the device platform he/she is using with a consistent user experience; the user only need to install UVE client on his/her device.

In addition to that, developers don't have to create different versions (for each mobile OS) of a single application, and service providers can offer a larger selection of applications and services to their end-users reducing costs.

6. Requirements (Normative)

6.1 High-Level Functional Requirements

This section provides the high level functional requirements for UVE enabler.

Label	Description	Release
UVE-HLF-001	UVE enabler SHALL enable online trial of UAs allowing users to have hands-on experience of the real UA before they decide to buy it.	UVE V1.0
UVE-HLF-002	UVE enabler SHALL enable device OS-Independent UAs by means of moving the application execution to the network.	UVE V1.0
UVE-HLF-003	UVE enabler SHALL enable online usage of UAs; allowing users to use UAs (hosted in the network) remotely by using their terminals.	UVE V1.0
UVE-HLF-004	UVE enabler SHALL enable UAs, hosted remotely, to access Local Resources.	UVE V1.0
UVE-HLF-005	UVE enabler SHALL be network neutral and support multiple network bearers, e.g. 3G/WLAN/LTE.	UVE V1.0
UVE-HLF-006	UVE enabler SHALL support a mechanism for the UA output (display and audio/video) to be adapted according to the device rendering capabilities (e.g. screen size, resolution, supported audio/video codecs).	UVE V1.0
UVE-HLF-007	UVE enabler SHALL support a mechanism for the device to convey user interactions to the UA.	UVE V1.0
UVE-HLF-008	UVE enabler SHALL support a mechanism to convey UAs output, as audio/video streams, to the device.	UVE V1.0
UVE-HLF-009	UVE enabler SHOULD support multiple video and audio codecs, e.g. MJPEG/H.264, LPCM/AAC/MP3.	UVE V1.0
UVE-HLF-010	The UVE Enabler SHALL allow a mechanism to control the usage of network bandwidth.	UVE V1.0
UVE-HLF-011	UVE enabler SHALL support suspend and resume the UVE application session.	UVE V1.0
UVE-HLF-012	UVE enabler SHALL enable UA usage to be continued, from the same point where it was suspended, when UVE application session is resumed.	UVE V1.0
UVE-HLF-013	UVE enabler SHALL enable UVE application session to be resumed without authorizing user again at reconnection. Note: A time-based limitation for reconnection maybe provided.	UVE V1.0
UVE-HLF-014	UVE enabler SHALL enable a user to suspend and resume a specific UVE application session when multiple UVE application sessions related to that user are involved.	UVE V1.0
UVE-HLF-015	UVE enabler SHALL support capability negotiation between UVE client and server, e.g. audio/video codecs.	UVE V1.0
UVE-HLF-016	UVE enabler SHALL enable different users to use a single instance of a particular UA simultaneously.	UVE V1.0
UVE-HLF-017	UVE enabler SHALL enable users to seamlessly switch between terminals within one UVE application session. Informational note: The terminals can be switched by users in many different ways e.g. symbian terminal to iOS terminal, mobile phone to PDA etc.	UVE V1.0

UVE-HLF-018	UVE enabler SHALL enable dynamic content adaptation depending on the terminal capabilities (e.g. screen size, codecs) / network capabilities (e.g. bitrate), when switching between terminals.	UVE V1.0
UVE-HLF-019	The UVE enabler SHALL enable assigning Watcher(s) to a particular user.	UVE V1.0
UVE-HLF-020	The UVE enabler SHALL enable Watchers to monitor an existing UA session.	UVE V1.0
UVE-HLF-021	The UVE enabler SHALL enable a Watcher to suspend an UA session which he/she is monitoring.	UVE V1.0
UVE-HLF-022	The UVE enabler SHALL ensure that at one point of time only one Watcher, among several Watchers of a single application session, shall be able to suspend the monitored application session.	UVE V1.0
UVE-HLF-023	UVE enabler SHALL enable users to invite other users to join the same (existing) UA session what they are using.	UVE V1.0
UVE-HLF-024	The invitee user SHALL have the ability to reject the invitation. The reason (if exists) of rejection SHALL be propagated to inviter user.	UVE V1.0
UVE-HLF-025	UVE enabler SHALL be able to automatically upgrade its device side components whenever an update is available, if user agrees on the update.	Future Release
UVE-HLF-026	UVE enabler SHALL enable users to share their remote resources with other permitted and acceptable users.	UVE V1.0
UVE-HLF-027	UVE enabler SHALL enable users to access shared remote resources.	UVE V1.0
UVE-HLF-028	UVE enabler MAY enable Watcher to get notifications about different actions (e.g. login, in-app purchase etc.) performed by Watchee before Watcher opts to monitor the Watchee.	UVE V1.0

Table 1: High-Level Functional Requirements

6.1.1 Applications Management Requirements

Label	Description	Release
UVE-AM-001	UVE enabler SHALL allow end user to manage UAs which includes application discovery, favourite UAs management (adding or removing), version upgrade notification. Editor's Note: Related UA management operations will be provided by re-using existing mechanisms	UVE V1.0
UVE-AM-002	UVE enabler SHALL allow users to provide feedback on the UVE enabled services (online trial, online usage, etc.). Information note: By feedback is meant the user explicit evaluation about the services obtained from UVE enabler. For example by rating them (e.g. from 0 to 5) and/or leaving a comment about them.	UVE V1.0
UVE-AM-003	UVE enabler SHALL enable UA recommendations based on user's feedback.	Future Release

Table 2: High-Level Functional Requirements – Application Management Items

6.1.2 Security

6.1.2.1 Authentication

Label	Description	Release
UVE-AUC-001	The UVE Enabler SHALL be able to authenticate users for accessing UVE enabled services.	UVE V1.0

Table 3: High-Level Functional Requirements – Authentication Items

6.1.2.2 Authorization

Label	Description	Release
UVE-AUT-001	UVE enabler SHALL provide a mechanism to authorize users for accessing UAs.	UVE V1.0
UVE-AUT-002	UVE enabler SHALL enable users to authorize UAs to access any Local Resources available in the terminals.	UVE V1.0
UVE-AUT-003	UVE enabler SHALL provide a mechanism to authorize users for accessing UVE enabled contents.	UVE V1.0
UVE-AUT-004	UVE enabler SHALL authorize an invitee user to access UVE enabled services.	UVE V1.0
UVE-AUT-005	UVE enabler SHALL be able to authorize Watchers to monitor an existing UA session.	UVE V1.0
UVE-AUT-006	UVE enabler SHALL be able to authorize a Watcher to suspend a monitored UA session.	UVE V1.0
UVE-AUT-007	The UVE enabler MAY enable explicit user consent, at runtime, for allowing another user to monitor his/her UA session. Informational Note: The requirement is optional because if the requesting user is among the Watchers then user consent is deemed implicit.	UVE V1.0
UVE-AUT-008	The UVE enabler SHALL allow users to enable or disable the function of getting explicit user consent, at runtime, for allowing another user to monitor his/her UA session.	UVE V1.0

Table 4: High-Level Functional Requirements – Authorization Items

6.1.2.3 Data Integrity

Label	Description	Release
UVE-INT-001	UVE enabler SHALL ensure integrity of data being exchanged between different components of the enabler.	UVE V1.0

Table 5: High-Level Functional Requirements – Data Integrity Items

6.1.3 Charging Events

Label	Description	Release
UVE-CHG-001	UVE enabler SHALL support the following charging events: • Duration based: as per the duration for which the content is consumed. • Time based: as per the time when the content is consumed. • Transaction based: as per the number of times the content is consumed. • Monthly subscription per content for a user or a group of users • Monthly subscription per user or a group of users for several contents	UVE V1.0

Table 6: High-Level Functional Requirements – Charging Events Items

6.1.4 Usability

Label	Description	Release
UVE-USE-001	UVE enabler SHALL enable users to interact with UAs using various type of input methods e.g. keyboard, mouse, joystick, sensors (e.g. accelerometer), etc.	UVE V1.0
UVE-USE-002	UVE enabler SHALL ensure that the user experience shall not be degraded because of the application being used remotely (online). User experience may involve latency, interactivity, look-n-feel, etc.	UVE V1.0

Table 7: High-Level Functional Requirements – Usability Items

6.1.5 Privacy

Label	Description	Release
UVE-PRV-001	UVE enabler SHALL ensure privacy of user's specific UA data according to user's policies.	UVE V1.0

Table 8: High-Level Functional Requirements – Privacy Items

Appendix A. Change History (Informative)

A.1 Approved Version History

Reference	Date	Description
OMA-RD-UVE_RD-V1_0-20151201-A	01 Dec 2015	Status changed to Approved by TP TP Ref # OMA-TP-2015-0204-INP_UVE_V1_0_ERP_for_final_Approval

Appendix B. Use Cases (Informative)

B.1 Online Application Trials

Online application trials: This use case describes how a user can try-out the application remotely on the server-side without first downloading them on his/her device.

B.1.1 Short Description

Alice goes to a SP (App Store) searching for an application related with racing games. She found one application which cost about $20. Considering the cost Alice went into dilemma whether to buy that application or not. She found a button saying "On-line Trial", she clicked that button and a window popped-up on her mobile device in which the games got initialized instantly. She tried that game, played for about 10-15 minutes and decided to buy that game. She then went for the download/buy process.

B.1.2 Market benefits

Alice doesn't have to first choose, buy, download, install, run, play the game and then in case she doesn't like it uninstall, probably ask for refund and then again start from choosing another game. Instead, she can go for online trial, make up her mind and then buy and download the game.

B.2 OS-independent application

Multi-OS support: This use case describe how a user can use any application irrespective of the device platform he/she is using and the device platform the application is built for. This is achieved by hosting applications on the network-side and allowing users to use that application remotely from their terminal.

B.2.1 Short Description

Alice is having a device with Symbian OS. She goes to an App Store with an intention to buy an application. She liked an application but found that the application is for Android device only. She was also provided with an option to use that application from any OS i.e. "Online Subscription". Alice found it feasible to go for this option and successfully subscribed for the "Online Subscription" for that application. Now Alice can use this application online as and when required irrespective of the OS that she is using.

B.2.2 Market benefits

User doesn't have to take their device platform in consideration while choosing a suitable application of their needs. Developers don't have to create different version (for each mobile OS) of a single application.

B.3 Local Resource Usage

This usecase describes usage of Local Resources (present on the terminal) while consuming application remotely.

B.3.1 Short Description

Some application requires input from the Local Resources of the terminal to function properly. The image based search application will require input from camera on the terminal; the location based application may require GPS information from the GPS module running on the terminal; the schedule planner would require calendar data (meetings, tasks) from the terminal.

Alice is using an application called "My locality" which provides a list of near-by attractions. This application makes use of GPS information, from the GPS module running in its host, to find the exact current user location. Since the application is being used remotely and hosted on the network, it needs user terminal to provide its GPS information for the application to provide correct results (near-by attractions of the user, not the server where the application is hosted). While Alice uses the application the local GPS data is sent to the server, where it is used to provide correct results.

B.3.2 Market benefits

It will further make online application more efficient and complete. The result, which is based on input from the Local Resources on the terminal, will be more accurate and complete.

B.4 Monitoring use case

This use case describes how a user can request to monitor an existing application session initiated/used by another user and then using it for purposes like parental control, onsite education, etc.

B.4.1 Short Description

Particular users can opt for monitoring existing session. This will enable several use cases like parental control, onsite education, etc.

Parents may opt to monitor what their children are doing with their mobile devices. Parents have no intention to interact with the same application with which their children are interacting but they want to just know what children are doing. This will enable parents to suspend the application session for the sake of parental control.

Beginners can opt for monitor the expert's session to learn about the online gaming.

B.4.2 Market benefits

This will enable several use cases like parental control, onsite education etc.

B.5 Application session suspend&resume

This use case describes how a user can reconnect to the UVE enabled services in case of an unexpected connection failure. This also explains what user can get (or expect) at the reconnection.

Note: There might be another use case when a user wants to suspend and resume an application session voluntarily.

B.5.1 Short Description

Alice is using a UVE enabled application. Alice is allowed to save the application state at any time.

At some point of time after getting disconnected, due to any reason (e.g. bad network), Alice tries to reconnect with the application. At the reconnection, Alice is provided with an option to reload the application from one of the saved states. Alice then continues using the application from that state.

It is possible that Alice did not save the application. In this case, at reconnection, Alice continues using the application from the point where she was disconnected.

B.5.2 Market benefits

This will enable service continuity for UVE users.