Device Profile Requirements

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Open Mobile Alliance

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Contents

Tables

1. Scope   (Informative)

This document describes the requirements for managing the publication of a device's hardware, software, and network properties as they change over the course of a data session.

Information about these Dynamic Device Properties is used by Application Service Providers to tailor content appropriately for the target device.

Note that these requirements are aimed at Dynamic Device Properties. Existing technology, namely OMA's User Agent Profile [UAProf], is capable of conveying information about static device properties.

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
[Privacy]	OMA Privacy for Mobile Services Requirements
	URL: http://www.openmobilealliance.org

2.2   Informative References

[DCI]	"Delivery Context Interfaces (DCI) : Accessing Static and Dynamic Properties", K. Waters et. al, Nov 11 2005, W3C
	URL: http://www.w3.org/TR/DPF/
[OMADICT]	Dictionary for OMA Specifications, Open Mobile Alliance, OMA-ORG-Dictionary-V2_4-20060725-A
	URL: http://www.openmobilealliance.org
[UAPROF]	"User Agent Profile", 20 May 2003, Open Mobile Alliance; OMA-UAProf-V2_0-20030520-C.PDF
	URL: http://www.openmobilealliance.org;
[ESMP]	"Ecmascript Mobile Profile", 14 June 2005, Open Mobile Alliance; OMA-WAP-ESMP-V1_0-20050614-C
	URL: http://www.openmobilealliance.org;
[GPM]	OMA Global Permissions Management
	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.

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

3.2 Definitions

Application Service Provider	An entity that manages and distributes software-based services and solutions to the end user. Application Service Provider may or may not be network or content provider.
Authorized Principal	A Principal (see [OMA-DICT]) with permissions to perform specific action(s) or receive specific information. For the purpose of DPE an Authorised Principal might for example be an Application Service Provider requesting and receiving Dynamic Property Values
Client	See OMA Dictionary: http://www.openmobilealliance.org/ftp/Public_documents/ARCH/Permanent_documents/OMA-ORG-Dictionary-V2_3-20051220-A.zip
Device Profile	It is a set of information describing the capabilities of the device; A Device Profile may include one or more Device Properties [OMADICT]
Device Property	A hardware, software, or network characteristic that represents a capability of a device at a given point in time
DPE Client	Any client that supports the DPE enabler and is capable of communicating with an Authorised Principal for the purpose of sending Dynamic Device Properties and receiving queries.
Dynamic Device Property	A Device Property that may change its value e.g. as a result of hardware, software or configuration changes.
Modality	The type of communication channel used for interaction between a user and a device. Designates any channel where input or output interaction can occur.
Network Service Provider	The Network Service Provider, in addition to providing network access and value added services, may also be an Application Service Provider
Policy	An ordered combination of conditions and actions to be performed when those conditions are met. See [OMADICT].
Service	A selection from the portfolio of offerings made available by an Application Service Provider.
Static Device Property	A device property that does not change value. Examples are display resolution, processor type, etc.
Tethering	Establishment of a data connection by a device (e.g. laptop) through an attached mobile equipment (e.g. mobile phone), which acts as a network adapter or modem for the device.

3.3 Abbreviations

A-GPS	A-GPS - Assisted Global Positioning System
DPE	Device Profiles Evolution
MMS	Multimedia Messaging System

OMA	Open Mobile Alliance
SVG	Scalable Vector Graphics
WCSS	Wireless Cascading Style Sheets
XHTML-MP	Extensible Hypertext Markup Language, Mobile Profile

4. Introduction   (Informative)

Mobile applications and services are required to function in varying network environments with different users having devices with a wide range of capabilities. The device capabilities, and network conditions can vary dynamically and applications need to be able to respond to these changes accordingly.

The capabilities of a device are determined by its hardware characteristics, user settings, and installed software components. These capabilities are dynamic in nature, meaning that they can change instantaneously or even during the course of a single data session.

OMA's [UAProf] enabler allows the communication of static device properties to an Application Service Provider at the beginning of a data session.

The goal of the Device Profiles Evolution (DPE) enabler is to define an enhanced device profiles mechanism which allows a device to convey Dynamic Device Properties to an Application Service Provider in real time, thereby ensuring that the Application Service Provider can provide content best suited to the capabilities of the device at that time.

The DPE enabler will reuse existing technologies wherever appropriate.

5. Use Cases   (Informative)

5.1   Simple profile notification

5.1.1   Short Description

This use case describes the basic scenario of a client advertising its properties, and these being acted upon by an Application Service Provider to tailor content for that client.

5.1.2   Actors

User: The user of the device being used to access services provided by the Application Service Provider.

Application Service Provider: The Application Service Provider provides content to the user and wishes to match to the greatest extent possible the content being provided to the *current* capabilities of the device.

5.1.3   Actor Specific Issues

5.1.4   Actor Specific Benefits

5.1.5   Pre-conditions

User: The user has a DPE-enabled device.

Application Service Provider: The Application Service Provider has services available for the user to consume, and the ability to use the device profile information to tailor the content to suit the device's capabilities

5.1.6   Post-conditions

5.1.7   Normal Flow

1. The user navigates to the portal of an Application Service Provider, and selects "The Economist online edition"

2. The device notifies the Application Service Provider that the device's browsing capabilities include support for XHTML-MP, WCSS, but not inline SVG graphics.

3. The Application Service Provider uses this information to transform the content into XHTML-MP, and replaces all SVG graphics with GIF images before delivering the content to the user.

4. The user consumes the Service.

5.2   Change of Modality

5.2.1   Short Description

A user launches a Service on a client and is provided with content which is adapted to the particular capabilities of that device. The device's input and output modalities change during the course of the Service being consumed, and subsequent content is adapted to these new capabilities.

5.2.2   Actors

User: The user of the device being used to access services provided by the Application Service Provider.

Application Service Provider: The Application Service Provider provides content to the user and wishes to match to the greatest extent possible the content being provided to the *current* capabilities of the device.

5.2.3   Actor Specific Issues

User: The user wishes to have the best possible experience of the services being consumed without the common problems associated with badly adapted content (e.g. missing images, content not fitting the screen and hence being non-navigable etc.)
Application Service Provider: The Application Service Provider wishes to provide a good experience for users of their services so that they are compelling, while utilising the current capabilities of the device.

5.2.4   Actor Specific Benefits

User: The user experience is as good as the capabilities of the device and content author allow.

Application Service Provider: The Application Service Provider has provided a Service to the user that makes use only of capabilities the user's device has available at that time, thereby avoiding having the user presented with unusable content. Proper content adaptation also makes the user more likely to consume repeat and similar services from the same Application Service Provider.

5.2.5   Pre-conditions

User: The user has a device on which he/she wishes to access a service and which has the capability to change Modality.

Application Service Provider: The Application Service Provider has services available for the user to consume, and the ability to use the device profile information to tailor the content to suit the device's capabilities

5.2.6   Post-conditions

User: Has consumed a tailored Service to his/her expectations optimised for the capabilities of the device which meets his/her expectations.when its Modality is changed.

Application Service Provider: Has provided the user with a tailored Service optimised for the capabilities of the user's device which met his expectations.

5.2.7   Normal Flow

This flow describes the use case of the client's output Modality being modified in real time while a Service is being consumed.

1.   The user of a device has set that device's audio output to speaker mode.

2.   The user navigates by some means to a list of available services from an Application Service Provider (e.g. from a browser portal, search engine, etc.).

3.   The user selects an "audio sports blog" service which plays audio clips of the latest sports headlines.

4.   The DPE Client notifies the Application Service Provider of its current software, hardware and content rendering capabilities, as well as any appropriate user settings that affect content rendering.

5. The Application Service Provider receives the user's request, device profile and initiates content adaptation and delivery taking into account the user's audio playback capabilities.

6. While consuming the Service, the user enters a quiet environment and mutes the device's loudspeaker.

7. The device notifies the Application Service Provider of its modified output **Modality** resulting from the muting of the loudspeaker.

8. The Application Service Provider uses this information and changes all subsequent sports clips to text format, thereby providing a seamless experience for the user and avoiding unnecessary delivery of bandwidth-costly audio files.

9. The user consumes the textual content.

10. The user starts to drive in his/her car, and the device audio is automatically routed through Bluetooth to the in-car speakers.

11. The device notifies the Application Service Provider of the altered **Modality** of the device.

12. The Application Service Provider delivers subsequent sports clips in audio format again, given the device's changed **Modality**.

13. The user consumes the content without any interruptions in the Service.

5.2.8   Alternative Flow

This flow describes the use case of the device's input Modality being modified in real time while a Service is being consumed.

Steps 1-5 same as above.

6. While consuming the Service, the user brings his/her device within range of a Bluetooth external keyboard which is now paired with the device.

7. The device notifies the Application Service Provider of its modified input Modality resulting from the addition of the Bluetooth keyboard.

8. The Application Service Provider receives the new input Modality information, and decides to offer the user interactive "sports quiz" segments following subsequent sports clips.

9. The user listens to the audio sports clips, and enters answers to the interactive segments via his/her Bluetooth keyboard.

5.2.9   Operational and Quality of Experience Requirements

When switching input and output modalities, there should be minimal interruption to the Service.

5.3 Change in bandwidth

5.3.1 Short Description

A user launches a Service on a device and is provided with content which is adapted to the particular capabilities of that device. The device's network bandwidth changes during the course of the Service being consumed, and subsequent content is adapted to these new network conditions.

5.3.2 Actors

User: The user of the device being used to access services provided by the Application Service Provider.

Application Service Provider: The Application Service Provider provides content to the user and wishes to match to the greatest extent possible the content being provided to the *current* capabilities of the device.

5.3.3 Actor Specific Issues

User: The user wishes to have the best possible experience of the services being consumed without the common problems associated with badly adapted content (e.g. missing images, content not fitting the screen and hence being non-navigable etc.)

Application Service Provider: The Application Service Provider wishes to provide a good experience for users of their services so that they are compelling, while utilising the current capabilities of the device.

5.3.4 Actor Specific Benefits

User: The user realizes the benefits of faster access to the Service and faster delivery of content associated with the Service.

Application Service Provider: The Application Service Provider is able to offer services of a more responsive nature, with richer and more appealing content.

5.3.5 Pre-conditions

User: The user has a device on which he/she wishes to access a service.

Application Service Provider: The Application Service Provider has services available for the user to consume, and the ability to use the device profile information to tailor the content to suit the device's capabilities

5.3.6 Post-conditions

User: Has consumed a tailored service optimised for the network bandwidth available at the time.

Application Service Provider: Has provided the user with a responsive service, utilizing the richest content suitable for the network bandwidth available to the user.

5.3.7 Normal Flow

This flow describes the use case of the device's network bandwidth being modified in real time while a service is being consumed.

1. The user uses their device to browse an Application Service Provider's web site.

2. The user selects a streaming video service called "Latest News"

.

3. The user's device notifies the Application Service Provider of its current software, hardware and content rendering capabilities.

4. The Application Service Provider uses the device profile information to determine that the user is in 2G coverage and begins to provide low-quality streamed video optimized for the limited network bandwidth available to the user.

5. The user consumes the service.

6. While viewing the streaming video, the user moves into an area with 3G coverage.

7. The device notifies the Application Service Provider of the updated network status resulting from the move onto a 3G network.

8. The Application Service Provider, based on the increase in available bandwidth, decides to stream higher quality video to the user for all subsequent transactions.

9. The user continues to consume the service at a higher quality level.

5.3.8   Alternative Flow

This flow describes the use case where the device's screen orientation is changed in real time while a video service is being consumed.

Steps 1-5 same as above.

6. While viewing the streaming video, the user wishes to utilise the entire available screen width and decides to change the orientation of the screen from portrait to landscape mode.

7. The device notifies the Application Service Provider of the updated screen orientation resulting from the move to landscape mode.

8. The Application Service Provider, based on the change in screen orientation, adapts subsequent video to the appropriate aspect ratio.

9. The user consumes the content.

5.3.9   Operational and Quality of Experience Requirements

Ideally, the switch to a higher bandwidth should not cause an interruption in the service being provided. The switch to higher resolution video should be seamless.

It should be possible to manage the volume of DPE notifications to limit impacts on network and service performance.

5.4   HW Change & Dynamic Performance

5.4.1   Short Description

A user launches an application on a device which provides adapted content according to device's current capability. During the usage of the application the device's hardware and performance such as memory size, cache size, CPU load, battery life, changes continuously. Sometimes the changed performance may affect the quality of the service. So the changed performance could be notified promptly by DPE Client in some situations. The Application Service Provider could deliver

the policies or threshold of some specific performance parameters to the device when the session is set up. When the condition is satisfied, the device will notify the service provider promptly.

For example, a user begins to download an application on to a device which provides adapted content according to device's current capability. Before the application's installation, the service provider will deliver policies of some specific performance parameters to the device when the session is set up. While downloading the application, some dynamic parameters of the device can change. For example, if the memory available changes and it is not possible to support the download, some actions must be taken. Once the memory had reach the limits of the policies a notification will be triggered so the service provider could be informed at any time of the interesting changes happened at the device. If the content downloaded has the possibility of being modified to be shortest then the service provider will deliver the short version (probably reducing the quality). If this possibility is not available for the content then the service provider will stop the download waiting for a change on the configuration of the device, sending another kind of policy.

5.4.2   Actors

User: The user of the device being used to access services provided by the Application Service Provider.

Application Service Provider: The Application Service Provider provides content to the user and wishes to match to the greatest extent possible the content being provided to the *current* capabilities of the device.

5.4.3   Actor Specific Issues

User: The user wishes to have the best experience of the services being consumed, according to the device performance

Application Service Provider: The Application Service Provider wishes to provide the best experience for users avoiding blockings, while using the current capabilities of the device

5.4.4   Actor Specific Benefits

User: The user experience is as good as the capabilities and performance of the device are at each moment.

Application Service Provider: The service provider is able to provide a good experience for the user and respond the changed performance of the device in time. The user receives the contents as good as the conditions permit

5.4.5   Pre-conditions

User: The user has a terminal with a   DPE Client, capable of receiving and understanding the policies which the service provider could send. The device has the ability to get status information of the actions performed by the Client and to notify when the circumstances that prevented an action to happen, change according to the policies installed in the device.

Application Service Provider: The Network Service Provider has services available for the user to consume,   the ability to send policies to the device when needed. Also it has the capability of use the device profile information to tailor the services to the terminal. This includes the continuity of previous downloads being cancelled because of a lack of memory

5.4.6   Post-conditions

User: Has succeeded in downloading the content he/she wishes.

Application Service Provider: Has provided the user's device with a content he/she wished in the best possible way

5.4.7   Normal Flow

This use case describes a scenario where the device notifies to the application service changes of its hardware or performance which results in a better final user experience:

1. The user wishes to download a large application (10 Mb) from a service provider to his memory card.

2. The user's device notifies the Application Service Provider of its current software, hardware, performance and content rendering capabilities and its supported polices functions such as threshold-based and increment-based policy..

3. The Application Service Provider selects a threshold-based policy function as notified by the device and then transfers the necessary policy to the device. In this case the policy is 'the device should notify the Application Service Provider when the available memory size is close to the threshold of 150k'.

4. During the download the user continues to consume other services, and the device monitors the available memory size.

5. While downloading the application, the user decides to take and save a picture that reduces the available memory and hence reaches the memory limits as specified in the Application Service Provider's policy.

6. When the limit as specified in the policy is reached the device notifies the Application Service Provider of the changed performance (i.e. reduction in available memory size).

7. The Application Service Provider cancels the download and sends another policy that is 'the device should notify the Application Service Provider when the available memory size reached 10Mb. The policy will expire in 24 hours'

8. When the user purchases a larger memory card and puts it in the device, the device notifies the Application Service Provider of the changed performance (i.e. increase in available memory size).

9. When the Application Service Provider receives the notification of the increase in available memory size, the Application Service Provider starts to transfer the application again to the user

5.4.8 Alternative Flow 1

This alternative flow describes the possibility of minimizing a downloaded content so there is no need to cancel the download just to get a shortest and possibly not as with the same quality as the largest application. The steps from 1 to 7 are the same:

8. The Application Service Provider, based on the available memory space, decides to reduce the quality of the content and to restart the download without the necessity of additional memory

9. The user continues downloading the content in a transparent way

5.4.9 Alternative Flow 2

In this case, the purchased card hasn't enough space to store the new application.

8. The user tries installs new memory card into his device.

9. The memory card does not have enough space to finish the download successfully.

10. The memory does not reach the policy limits, and the notification is not triggered.

11. After a day, the user hasn't increased the memory and the policy expires.

12. The download is cancelled.

5.4.10 Alternative Flow 3

11. The Application Service Provider selects a threshold-based policy function as notified by the device and then transfers the two policies to the device: "the device should notify the Application Service Provider when the

available memory size is close to the threshold of 150k" and "The Application Service Provider also sends another policy "when the available memory size reached 10Mb. The policy will expire in 24 hours". The second policy will only be invoked when the first policy of threshold of 150K is reached.

5.4.11   Operational and Quality of Experience Requirements

To avoid a signaling load, notifications of free disk space are only sent when a threshold is exceeded.

The correct download of the application is easy and immediate to the User.

The Service Provider has an automatic mechanism to resolve download errors when it's possible.

The Application Service Provider can deliver appropriate policy which can be recognized by Client based on its support list

5.5   Periodic device properties

5.5.1   Short Description

This use case describes a scenario where the Application Service Provider requests a particular property at periodic intervals, in order to tailor a service.

5.5.2   Actors

User: The user of the device being used to access services provided by the Application Service Provider.

Application Service Provider: The Application Service Provider provides content to the user and wishes to match to the greatest extent possible the content being provided to the *current* capabilities of the device.

5.5.3   Actor Specific Issues

5.5.4   Actor Specific Benefits

5.5.5   Pre-conditions

User: The user has a DPE-enabled device which has limited battery capacity remaining.

Application Service Provider: The Application Service Provider has a graphics-intensive service which is known to be battery-intensive for the consuming device.

5.5.6   Post-conditions

5.5.7   Normal Flow

1. The user launches an online multiplayer gaming application provided by an Application Service Provider.

2. The DPE Client notifies the Application Service Provider of its capabilities.

3. The Application Service Provider notes that the DPE Client has limited battery capacity remaining, and requests the DPE Client to send a periodic status on available battery life.`

4. While the user is consuming the service, the Application Service Provider monitors the periodic batter life indicator updates.

5. When the battery life reaches a certain point, the Application Service Provider decides to notify the user via a message suggesting that they save their current position in the game or risk losing data, or alternatively plug the device into a charger before continuing.

6. The user saves the current game in progress.

5.6 Tethering

5.6.1 Short Description

A user attaches a device (e.g. laptop) to a terminal (e.g. mobile phone), and a client on the device establishes a data connection through the terminal, which acts as a network adapter or modem for the device. Network services are subsequently adapted to these new device configuration conditions.

5.6.2 Actors

User: The user of the device and terminal being used to access services provided via a Network Service Provider.

Network Service Provider: The Network Service Provider provides network access and value added services to the user, and wishes to match to the greatest extent possible the service being provided to the *current* configuration of the terminal. The Network Service Provider, in addition to providing network access and value added services, may also be an Application Service Provider

5.6.3 Actor Specific Issues

User: The user wishes to have the best possible experience of the services being consumed, without having to especially configure clients in use when a device is tethered to the user's terminal.

Network Service Provider: The Network Service Provider wishes to provide a good experience for users of their services so that they are compelling, while utilising the current configuration of the terminal.

5.6.4 Actor Specific Benefits

User: For one example value added service (transparent network-based content compression applied when Tethering), the user realizes the benefits of faster access to the service and faster delivery of content associated with the service. For another (transparent network-based content filtering and virus protection applied when Tethering), the user realizes the benefits of protection from objectionable and/or dangerous content.

Network Service Provider: The Network Service Provider is able to offer services of a more responsive nature, with richer and more appealing content. In addition, where service plan terms prohibit Tethering or result in differential charging for Tethering, the Network Service Provider is able to ensure that the user complies with the plan terms or can be appropriately charged for the service received.

5.6.5 Pre-conditions

User: The user has a terminal and device with a client through which he/she wishes to access a service.

Network Service Provider: The Network Service Provider has services available for the user to consume, and the ability to use device profile information to tailor the services to suit the configuration of the terminal.

5.6.6　Post-conditions

User: Has consumed a tailored service optimised for terminal configuration.

Network Service Provider: Has provided the user with a tailored value added service, per the terms of the user's service plan.

5.6.7　Normal Flow

This flow describes the use case of the terminal being used for Tethering while a service is being consumed.

1. The user attaches a laptop to their mobile phone.

2. The user opens a client application on the laptop, which initiates a data connection through the mobile phone.

3. The user's mobile phone notifies the Network Service Provider of its current software, hardware and configuration as a modem.

4. The Network Service Provider uses the mobile phone's profile information to apply a suite of transparent network-based value added services for the user, including content compression, content filtering, and virus protection.

5. The user consumes the service.

5.6.8　Alternative Flow

This flow describes the use case where the user's service plan offers differential billing for data usage by phone clients, and for data usage when Tethering.

1. The user's mobile phone notifies the Network Service Provider of its current software, hardware, and configuration, which in this case does not include configuration as a modem.

2. Sometime later, the user consumes a data service using a client on the mobile phone. The data service is covered by a service plan that provides unlimited data usage when only phone-based clients are being used.

3. The Network Service Provider uses the phone's device profile information to apply appropriate charges per the user's service plan.

4. The user ends the data session.

5. The user attaches a laptop to their mobile phone.

6. The user opens a client application on the laptop, which initiates a data connection through the mobile phone.

7. The user's mobile phone notifies the Network Service Provider of its current software, hardware and configuration as a modem.

8. The user consumes the data service. The data service in this case is not covered by the unlimited usage service plan, since a tethered (not mobile phone-based) client is being used.

9. The Network Service Provider uses the mobile phone's profile information to apply appropriate charges per the user's service plan.

5.6.9   Operational and Quality of Experience Requirements

The device profile information notifications should have no effect upon usage of the phone as a modem, i.e. should not affect the data service provided to the user when Tethering.

5.7   Named Property Groups Use Case

5.7.1   Short Description

A user launches an application on a device which provides adapted content according to the device's current capability. A number of Dynamic Device Properties are grouped and associated with a group name. The device records the dynamic association between group name and corresponding capabilities enabled by the Application Service Provider. During the usage of the application, the device determines whether the changed capabilities will affect corresponding services as to trigger the notification.

5.7.2   Actors

User: The user of the device being used to access services provided by the Application Service Provider.

Application Service Provider: The Application Service Provider provides content to the user and wishes to match to the greatest extent possible the content being provided to the *current* capabilities of the device.

5.7.3   Actor Specific Issues

User: The user wishes to have the best experience of the services being consumed, according to the device performance.

Application Service Provider: The Application Service Provider wishes to provide a good experience for users so that they are compelling, while utilising the current capabilities of the device.

5.7.4   Actor Specific Benefits

User: The user experience is as good as the capabilities and performance of the device.

Application Service Provider: The service provider is able to provide a good experience for the user.

5.7.5   Pre-conditions

User: The user has a device capable of understanding the association between service and corresponding properties.

Application Service Provider: The Application Service Provider has services available for the user to consume, and the ability to deliver the dynamic association to the device and tailor the content to suit the device's capabilities.

5.7.6   Post-conditions

User: Has consumed a tailored service optimised for the performance of the device which meets his/her expectations.

Application Service Provider: Has provided the user with a tailored service according to the interested capabilities of the user's device which met his expectations.

5.7.7   Normal Flow

This flow describes the use case of notifying device's capabilities according to the dynamic association in real time.

1.   The user uses their device to browse an Application Service Provider's web site.

2.   The user selects Application A, a converged application which involves a sub-set of properties relating to Location services and MMS.

3.   The user's device notifies the Application Service Provider of its current device's capabilities, including software, hardware and other capabilities.

4.   The Application Services provider is only interested in particular properties associated with Location Services and MMS that are relevant to application A.

5.   The Application Service Provider assigns the name 'Group1' to a property list which includes some properties associated with location services and MMS, including the A-GPS property.'

6.   The Application Service Provider notifies the device of this assignment.

7.   The device records the property grouping to allow the transfer of updates relative to this group.

8.   Application A uses method CELL-ID to locate the device. The user continues to consume the service.

9.   While consuming the service, the user switches A-GPS location function on.

10. The enabling of A-GPS causes a property in 'Group1' to be updated, and the device notifies the Application Service Provider that the A-GPS property has been modified.

11. Then the Application Service Provider chooses to use A-GPS, the more accurate location method, to locate the device.

12. The user continues to consume the service.

5.7.8   Alternative Flow

step 1-6 same as above

7. The user exits application A and initiates a different application B, which is detected by the Application Service Provider

8. The Application Service Provider sends a notification to the device that it is no longer interested in updates associated with

'Group1'

9. The user continues to consume application B and no updates resulting from the properties defined in 'Group1" are sent to

 the Application Service Provider.

10. The user subsequently exits application B and re-launches application A

11. The Application Service Provider sends a notification to the device that it is once again interested in receiving updates associated with 'Group1'

12. The user continues to consume the service, and property changes related to 'Group1' are sent to the Application Service Provider as relevant

6. Requirements   (Normative)

6.1   High-Level Functional Requirements

Label	Description	Enabler Release
DPE-HL-1	The DPE Client MUST support the communication of its current Dynamic Device Properties to an Authorised Principal.	DPE V1.0
DPE-HL-2	The DPE Client MUST support the communication of the value (s) of a single Dynamic Device Property or a group of Dynamic Device Properties to an Authorized Principal.	DPE V1.0
DPE-HL-3	The DPE Client MUST support the communication of particular Dynamic Device Property values in response to queries from an Authorized Principal.	DPE V1.0
DPE-HL-4	The DPE enabler MUST provide the ability for an Authorized Principal to query specific Dynamic Device Property values from a DPE Client by the property name	DPE V1.0
DPE-HL-5	The DPE enabler MUST provide the ability for an Authorized Principal to query the full list of supported Dynamic Device Properties supported by a DPE Client	DPE V1.0
DPE-HL-6	The DPE enabler MUST provide the ability for an Authorized Principal to perform queries (e.g. using a search string) for matching specific Dynamic Device Properties that are supported by a device.	DPE V1.0
DPE-HL-7	The DPE enabler MUST support the communication of an appropriate response to an Authorized Principal when, for example, a requested Dynamic Device Property does not exist or cannot be shared due to privacy settings.	DPE V1.0
DPE-HL-8	The DPE Client MUST provide the ability to communicate to an Authorized Principal any changes to its Dynamic Device Properties during an established session.	DPE V1.0
DPE-HL-9	The DPE enabler MAY provide access to a DPE Client's Dynamic Device Property values via a scripting environment such as EcmaScript Mobile Profile [ESMP]	DPE V1.0
DPE-HL-10	The DPE enabler MUST provide the ability of receiving, parsing and executing policies defined by an Authorized Principal .	DPE V1.0
DPE-HL-11	The DPE enabler MUST support the assignment and deletion of a label to an arbitrary group of property names by an Authorized Principal.	DPE V1.0
DPE-HL-12	The DPE Client MUST support the communication of any changes associated with a labelled group of Dynamic Device Properties.	DPE V1.0
DPE-HL-13	The DPE Enabler MUST provide the ability for an Authorized Principal to manage (e.g. add, change, remove) policies pertaining to a DPE client	DPE V1.0
DPE-HL-14	The DPE enabler MUST support a mechanism for a DPE Client to notify an Authorized Principal of any changes to its supported properties without any prior requests or queries from that Authorized Principal.	DPE V1.0
DPE-HL-15	The DPE Enabler SHALL support the ability for an Authorised Principal to assign policies pertaining to one or more DPE Clients	DPE V1.0
DPE-HL-16	A DPE Client MUST be uniquely identifiable, e.g. to allow an Authorized Principal to assign policies to it	DPE V1.0

Table 1: High-Level Functional Requirements

6.1.1 Security

Label	Description	Enabler Release
DPE-SEC-1	Dynamic Device Properties and values SHALL only be advertised through the DPE enabler	DPE V1.0
DPE-SEC-2	The DPE enabler MUST support mechanisms that protects against security threats, e.g. denial-of-service attacks	DPE V1.0

Table 2: Security Items

6.1.1.1 Authentication and Authorization

Label	Description	Enabler Release
DPE-Auth-1	The DPE enabler SHALL provide a mechanism to authenticate and authorise Principals and DPE enabled clients before they interact with each other	DPE V1.0
DPE-Auth-2	The DPE enabler SHALL authenticate and authorise Principals, for example, for the purpose of: • Querying supported Dynamic Device Properties and supported policies; • Requesting a notification following a status change of a Dynamic Device Property; • Defining new policies that define the criteria for the advertisement of a Dynamic Device Property or group of properties	DPE V1.0
DPE-Auth-3	The DPE enabler SHOULD authenticate and authorise a DPE enabled client e.g. for the purpose of allowing the advertisement of properties from the Client to authorised principals	DPE V1.0

Table 3: Authentication and Authorization Items

6.1.1.2 Data Integrity

Label	Description	Enabler Release
DPE-INT-1	DPE Enabler MUST support integrity of data exchanges when Dynamic Device Properties are communicated to an Authorized Principal	DPE V1.0

Table 3: Data Integrity Items

6.1.1.3 Confidentiality

Label	Description	Enabler Release
DPE-CON-1	The DPE enabler SHALL support the ability for an Authorised Principal to restrict the advertisement of certain device properties.	DPE V1.0
DPE-CON-2	The DPE enabler SHALL support the confidentiality of data exchanges when Dynamic Device Properties are communicated to an Authorized Principal	DPE V1.0

Table 4: Confidentiality Items

6.1.2 Charging

None identified

6.1.3 Administration and Configuration

Label	Description	Enabler Release
DPE-ADM-1	The DPE enabler MUST provide the ability for an Authorized Principal to specify policies for the communication of Dynamic Device Properties, e.g. thresh-hold policies for one or more DPE enabled clients.	DPE V1.0
DPE-ADM-2	The DPE Client MUST support the ability to notify its supported policies to the Authorized Principal.	DPE V1.0
DPE-ADM-3	The DPE Client MUST support the ability to communicate the appropriate device properties in accordance with the associated defined policies.	DPE V1.0

Table 5: Administration and Configuration Items

6.1.4 Usability

Label	Description	Enabler Release
DPE-USE-1	The DPE Client MUST exchange Dynamic Device Properties in a manner that is unobtrusive to the user and does not impact the usability of any service being consumed.	DPE V1.0
DPE-USE-2	The DPE enabler SHALL support communication of Dynamic Device Properties without user interaction	DPE V1.0
DPE-USE-3	DPE enabler MUST support Dynamic Device Properties notifications over different application protocols (e.g. HTTP, SIP, SMS etc.)	DPE V1.0

Table 6: Usability Items

6.1.5 Interoperability

Label	Description	Enabler Release
IOP-1	DPE Enabler SHOULD support Dynamic Device Property notifications when changing network bearers or roaming across different service providers	DPE V1.0

Table 7: Interoperability Items

6.1.6 Privacy

Label	Description	Enabler Release
DPE-PRIV-1	The DPE enabler MUST support mechanisms to protect Dynamic Device Properties from being communicated or processed.[GPM]	DPE V1.0
DPE-PRIV-2	The DPE enabler MUST comply with OMA Privacy document when applicable [Privacy]	DPE V1.0

Table 8: High-Level Functional Requirements – Privacy Items

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6.2   Overall System Requirements

None identified

Appendix A. Change History (Informative)

A.1 Approved Version History

Reference	Date	Description
n/a	n/a	No prior version –or- No previous version within OMA

A.2 Draft/Candidate Version 1.0 History

Document Identifier	Date	Sections	Description
Draft Versions OMA-RD-DPE-V1_0	08 Dec 2005	All	Initial Draft
	26 Jan 2006	All	Updated with comments received from MAE socialization in Athens and conference calls since then.
	13 Mar 2006	All	Updated with comments received from Conference calls, 7 March 2006
	03 May 2006	All	Updated with comments received from Conference calls, 2 May 2006
	17 May 2006	All	Updated with comments received from Conference calls, 16 May 2006
	20 Jun 2006	All	Updated with comments received from Osaka meeting, 16 June 2006 OMA-REQ-DPE-2006-0033R01-DPE-RD-Comments OMA-REQ-DPE-2006-0025R02--New-requirements-for-DPE-RD OMA-REQ-DPE-2006-0038R01-CR_Dynamic_Association_UC
	21 Jul 2006	All	Updated with comments received from Conference call, 18 July 2006 OMA-REQ-DPE-2006-0048-Tethering-Definition-for-RD.zip OMA-REQ-DPE-2006-0049R01-INP_Clarification_of_Network_Service_Provider.zip OMA-REQ-DPE-2006-0044-Deletion-of-User-Preferences-occurences
	25 Jul 2006	All	Updated with comments received from Conference call, 25 July 2006 OMA-REQ-DPE-2006-0046R02--New-DPE-requirements
	11 Sep 2006		Updated with comments and agreed changes during the Beijing meeting, 21-23 August 2006. OMA-REQ-DPE-2006-0060-INP_Core_Vocabulary_List.zip
	09 Oct 2006	All	Updated with comments and agreed changes during the conference calls since Beijing meeting OMA-REQ-DPE-2006-0064R01-INP_List_of_installed_softwares OMA-REQ-DPE-2006-0077-CR_Doc0073-Proprietary-Vocabulary-Addition OMA-REQ-DPE-2006-0069R03 INP_Changes to DPE requirements OMA-REQ-DPE-2006-0072R01 CR Informative Core Properties List
	09 Dec 2006	All	Updated with comments and agreed changes as captured in RDRR OMA-RDRR-DPE-V1_0-20061208-I
	11 Dec 2006	All	Updated with comments and agreed changes as captured in RDRR OMA-RDRR-DPE-V1_0-20061211-I
	14 Dec 2006	All	Updated with email comments
	15 Dec 2006	All	Updated with additional email comments
	19 Dec 2006	All	Updated with additional email and conference call comments
	20 Dec 2006	All	Updated table of content
Candidate Versions OMA-RD-DPE-V1_0	09 Feb 2007	n/a	Approved as Candidate on TP#18 2007-02-09 TP ref # OMA-TP-2007-0059-INP_RD_DPE_V1_0_for_Candidate_Approval

Appendix B.   Core Dynamic Device Properties   (Informative)

The following table shows examples of properties which might be communicated by a DPE enabled client. This is not a final list. The technical specification will provide a complete list of core properties which will be normative for all DPE Clients. This list is provided here for illustrative purposes only, to aid in the comprehension of the DPE requirements

Property	Description	Datatype	Examples
AcceptDownloadableSoftware			
ActiveScreenSize			
AttachedDevice property			
AudioInputEncoder			
AvailableStorageMemory			
BatteryStatus			
BluetoothCapable			
BluetoothProfile			
BluetoothStatus			
BrowserFontSize			
BrowserName			
BrowserVersion			
CameraPresent			
CameraResolution			
CcppAccept			
CurrentBearer			
DisplayOrientation			
DrmClass			
DrmConstraints			
FirmwareVersion			
HtmlVersion			
InputCharSet			
InputModality			
InstalledSoftwareList			
JavaAppletEnabled			
JavaEnabled			

JavaPackage			
JavaPlatform			
JavaProtocol			
JavaScriptEnabled			
JavaScriptVersion			
JVMVersion			
Keyboard,			
OSName			
OSVendor			
OSVersion			
OutputModality			
PointingResolution,			
Push-Accept			
Push-Accept-AppID			
Push-Accept-Charset			
Push-Accept-Encoding			
Push-Accept-Language			
Push-MaxPushReq			
Push-MsgSize			
SoftwareNumber			
SupportedBearers			
SupportedBluetoothVersion			
TablesCapable			
Tethering			
TotalProgramMemory			
TotalStorageMemory			
VideoInputCoder,			
VoiceINputCapable			
XhtmlModules			