



# Mobile Location Service Architecture

## Candidate Version 1.3 – 29 May 2012

---

**Open Mobile Alliance**  
OMA-AD-MLS-V1\_3-20120529-C

Use of this document is subject to all of the terms and conditions of the Use Agreement located at <http://www.openmobilealliance.org/UseAgreement.html>.

Unless this document is clearly designated as an approved specification, this document is a work in process, is not an approved Open Mobile Alliance™ specification, and is subject to revision or removal without notice.

You may use this document or any part of the document for internal or educational purposes only, provided you do not modify, edit or take out of context the information in this document in any manner. Information contained in this document may be used, at your sole risk, for any purposes. You may not use this document in any other manner without the prior written permission of the Open Mobile Alliance. The Open Mobile Alliance authorizes you to copy this document, provided that you retain all copyright and other proprietary notices contained in the original materials on any copies of the materials and that you comply strictly with these terms. This copyright permission does not constitute an endorsement of the products or services. The Open Mobile Alliance assumes no responsibility for errors or omissions in this document.

Each Open Mobile Alliance member has agreed to use reasonable endeavors to inform the Open Mobile Alliance in a timely manner of Essential IPR as it becomes aware that the Essential IPR is related to the prepared or published specification. However, the members do not have an obligation to conduct IPR searches. The declared Essential IPR is publicly available to members and non-members of the Open Mobile Alliance and may be found on the “OMA IPR Declarations” list at <http://www.openmobilealliance.org/ipr.html>. The Open Mobile Alliance has not conducted an independent IPR review of this document and the information contained herein, and makes no representations or warranties regarding third party IPR, including without limitation patents, copyrights or trade secret rights. This document may contain inventions for which you must obtain licenses from third parties before making, using or selling the inventions. Defined terms above are set forth in the schedule to the Open Mobile Alliance Application Form.

**NO REPRESENTATIONS OR WARRANTIES (WHETHER EXPRESS OR IMPLIED) ARE MADE BY THE OPEN MOBILE ALLIANCE OR ANY OPEN MOBILE ALLIANCE MEMBER OR ITS AFFILIATES REGARDING ANY OF THE IPR'S REPRESENTED ON THE “OMA IPR DECLARATIONS” LIST, INCLUDING, BUT NOT LIMITED TO THE ACCURACY, COMPLETENESS, VALIDITY OR RELEVANCE OF THE INFORMATION OR WHETHER OR NOT SUCH RIGHTS ARE ESSENTIAL OR NON-ESSENTIAL.**

**THE OPEN MOBILE ALLIANCE IS NOT LIABLE FOR AND HEREBY DISCLAIMS ANY DIRECT, INDIRECT, PUNITIVE, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES ARISING OUT OF OR IN CONNECTION WITH THE USE OF DOCUMENTS AND THE INFORMATION CONTAINED IN THE DOCUMENTS.**

© 2012 Open Mobile Alliance Ltd. All Rights Reserved.

Used with the permission of the Open Mobile Alliance Ltd. under the terms set forth above.

# Contents

1. SCOPE (INFORMATIVE) .....	4
2. REFERENCES .....	5
2.1 NORMATIVE REFERENCES .....	5
2.2 INFORMATIVE REFERENCES .....	5
3. TERMINOLOGY AND CONVENTIONS .....	6
3.1 CONVENTIONS .....	6
3.2 DEFINITIONS .....	6
3.3 ABBREVIATIONS .....	6
4. INTRODUCTION (INFORMATIVE).....	8
4.1 VERSION 1.0 .....	9
4.2 VERSION 1.1 .....	9
4.3 VERSION 1.2 .....	9
4.4 VERSION 1.3 .....	9
5. ARCHITECTURAL MODEL .....	10
5.1 DEPENDENCIES .....	10
5.2 ARCHITECTURAL DIAGRAM .....	10
5.3 FUNCTIONAL COMPONENTS AND INTERFACES/REFERENCE POINTS DEFINITION.....	10
5.4 SECURITY CONSIDERATIONS .....	10
5.5 CHARGING CONSIDERATIONS.....	10
APPENDIX A. CHANGE HISTORY (INFORMATIVE).....	11
A.1 APPROVED VERSION HISTORY .....	11
A.2 DRAFT/CANDIDATE VERSION 1.3 HISTORY .....	11
APPENDIX B. FLOWS (INFORMATIVE) .....	12

# Figures

Figure 1: Architectural diagram of MLS .....	8
Figure 2: Relevant Reference Points in SUPL.....	8

# 1. Scope

**(Informative)**

This document is the AD for the Mobile Location Service V1.3 (MLS V1.3), which consists of the Mobile Location Protocol (MLP) and Roaming Location Protocol (RLP).

## 2. References

### 2.1 Normative References

- [OSE] “OMA Service Environment”, Open Mobile Alliance™, OMA-AD-Service\_Environment-V1\_0\_4, URL: <http://www.openmobilealliance.org/>
- [RFC2119] “Key words for use in RFCs to Indicate Requirement Levels”, S. Bradner, March 1997, URL: <http://www.ietf.org/rfc/rfc2119.txt>
- [23.271 Rel-10] “Location Services (LCS); Service description; Stage 1”, 3GPP TS 23.271 Release 10, [http://www.3gpp.org/ftp/Specs/latest/Rel-10/23\\_series/](http://www.3gpp.org/ftp/Specs/latest/Rel-10/23_series/)
- [MLP 3.4] “Mobile Location Protocol v3.2”, Open Mobile Alliance™, OMA-TS-MLP-V3\_4, URL: <http://www.openmobilealliance.org/>
- [MLS 1.3 RD] “Mobile Location Service Requirements”, Open Mobile Alliance™, OMA-RD-MLS-V1\_3, URL: <http://www.openmobilealliance.org/>
- [PRIVACY RD] “Privacy for Mobile Services Requirements”, Open Mobile Alliance™, OMA-RD-Privacy-V1\_0, URL: <http://www.openmobilealliance.org/>
- [RFC 2616] “Hypertext Transfer Protocol –HTTP/1.1” IETF, June 1999. URL: <http://www.ietf.org/rfc/rfc2616.txt>
- [RFC2119] “Key words for use in RFCs to Indicate Requirement Levels”, S. Bradner, March 1997, URL: <http://www.ietf.org/rfc/rfc2119.txt>
- [RLP 1.2] “Roaming Location Protocol v1.0”, Open Mobile Alliance™, OMA-TS-RLP-V1\_2, URL: <http://www.openmobilealliance.org/>
- [SUPL 3.0 RD] “Secure User Plane Location Requirements”, Open Mobile Alliance™, OMA-RD-SUPL-V3\_0 URL: <http://www.openmobilealliance.org/>
- [SUPL 3.0 AD] “Secure User Plane Location Architecture”, Open Mobile Alliance™, OMA-AD-SUPL-V3\_0 URL: <http://www.openmobilealliance.org/>
- [WSDL] Web Services Description Language 1.1, W3C Note, 15 March 2001, URL: <http://www.w3.org/TR/wsd1>
- [3GPP2 X.S0002-0 V2.0] “MAP Location Services Enhancements”, Version 2.0, May 2006 URL: [http://www.3gpp2.org/Public\\_html/specs/X.S0002-0\\_v2.0\\_060531.pdf](http://www.3gpp2.org/Public_html/specs/X.S0002-0_v2.0_060531.pdf)

### 2.2 Informative References

- [OMA-DICT] “OMA Dictionary”, OMA-Dictionary-V2\_8, 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

<b>Interface</b>	See [OMA-DICT]
<b>Location Privacy Checking Entity</b>	The Location Privacy Checking Entity is responsible for resolving IDs and for privacy checking. In 3GPP context this corresponds to the Privacy Profile Register (PPR). The PPR may be a part of the GMLC.
<b>Location Server</b>	Software and/or hardware entity offering location capabilities. In 3GPP context this corresponds to the Gateway Mobile Location Center (GMLC).
<b>MLS client</b>	Software and/or hardware entity requesting location. In 3GPP context this corresponds to the LoCation Services client (LCS Client).
<b>Mobile Location Service</b>	A service with location capability
<b>Reference Point</b>	See [OMA-DICT]
<b>SUPL Enabled Terminal (SET)</b>	A device that is capable of communicating with a SUPL network. Examples of this could be a UE in UMTS, a MS in GSM or IS-95, or a PC over an IP-based transport.
<b>SUPL Location Platform (SLP)</b>	Entity responsible for SUPL Service Management and Position Determination. SLP contains the SLC and SPC Functions.
<b>SUPL Provider</b>	Mobile Network Operator, provides location assistance data to the SUPL Agent and optionally calculates the SET location. See also SUPL 3.0 RD
<b>Civic address</b>	Description of a location by means of e.g. Street name, Street number, Town and Country.

### 3.3 Abbreviations

<b>3GPP</b>	3rd Generation Partnership Project
<b>AD</b>	Architecture Document
<b>GPS</b>	Global Positioning System
<b>GSM</b>	Global System for Mobile Communication
<b>HTTP</b>	Hyper Text Transport Protocol
<b>IP</b>	Internet Protocol
<b>LCS</b>	LoCation Service
<b>LS</b>	Location Server
<b>MLP</b>	Mobile Location Protocol
<b>MLS</b>	Mobile Location Service
<b>MS</b>	Mobile Station
<b>OMA</b>	Open Mobile Alliance
<b>PCE</b>	Location Privacy Checking Entity

---

<b>PCP</b>	Location Privacy Checking Protocol
<b>RD</b>	Requirement Document
<b>RLP</b>	Roaming Location Protocol
<b>SET</b>	SUPL Enabled Terminal
<b>SLC</b>	SUPL Location Center
<b>SLP</b>	SUPL Location Platform
<b>SPC</b>	SUPL Positioning Center
<b>SUPL</b>	Secure User Plane Location
<b>TS</b>	Technical Specification
<b>UE</b>	User Equipment
<b>UMTS</b>	Universal Mobile Telecommunication System
<b>XML</b>	Extensible Markup Language

# 4. Introduction (Informative)

The OMA Mobile Location Service V1.3 (MLS V1.3) consists of a set of location specifications complying with 3GPP Release 10 LCS Specification [23.271 Rel-10]. The set of specifications in MLS V1.3 consist of MLP V3.4 [MLP 3.4] and RLP V1.2 [RLP 1.2].

MLP describes the protocol between an MLS client and the LS. In the 3GPP context, MLP was chosen to be an instantiation of the stage 3 specification for the Le reference point [23.271 Rel-10].

RLP describes the protocol between two LS. In the 3GPP context, RLP will be an instantiation of the stage 3 specification for the Lr reference point [23.271 Rel-10]. Additionally, RLP will be an instantiation of the reference point Lr as defined in [SUPL 3.0 AD] between two SLPs with the purpose to transport information between SLPs to enable positioning of roaming SUPL Enabled Terminals [SUPL 3.0 RD]. Examples of such information are coarse position used when generating GPS assistance data or the actual GPS assistance data.

The Lid/Lpp reference points as defined in [23.271 Rel-10] do not have any instantiation in MLS V1.3. The OMA Mobile Location Service V1.3 (MLS V1.3) will benefit the industry widely and not only 3GPP and more requirements have been added as needed for wireless technologies besides GSM and UMTS. One example of such an added requirement is the support of L3 interface in “TIA/EIA-41-D Location Services Enhancements” [3GPP2 X.S0002-0 V2.0].

Figure 1 shows an architectural diagram of MLS, its components and interfaces.

Figure 2 shows an architectural diagram of relevant components and interfaces in SUPL.

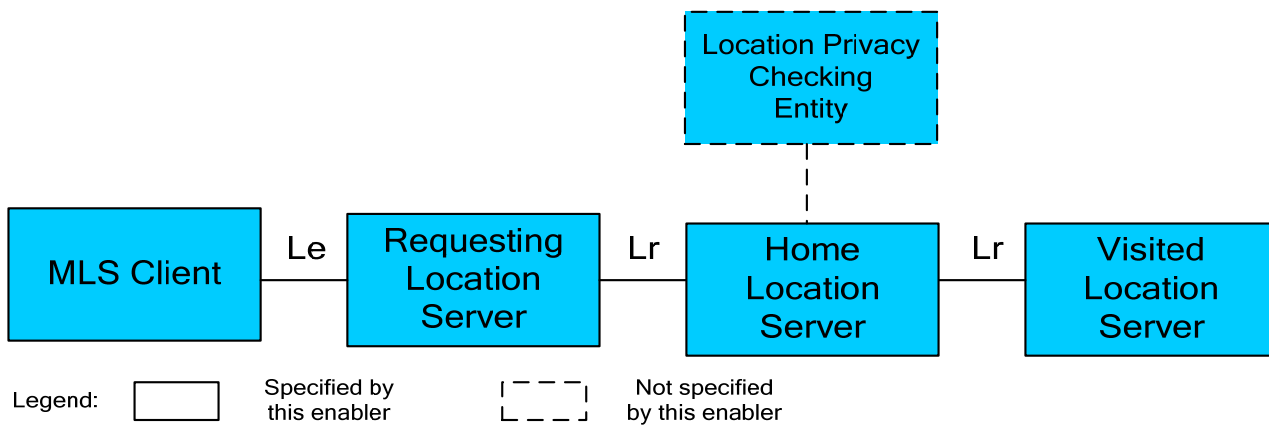


Figure 1: Architectural diagram of MLS

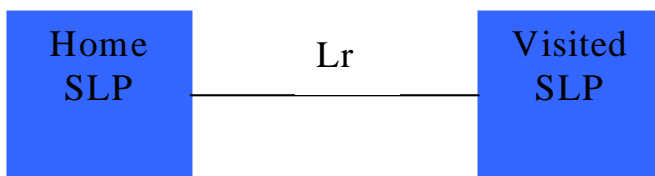


Figure 2: Relevant Reference Points in SUPL



## 4.1 Version 1.0

The OMA Mobile Location Service V1.0 (MLS V1.0) is based on the OMA MLP 3.1 enabler. The main scope of MLS V1.0 is to align with the 3GPP Release 6 LCS Specification. To achieve this a number of enhancements to MLP were made. One example of enhancement is introduction of Area Event trigger. To support the new architecture in the 3GPP Release 6 LCS Specification two protocols, RLP V1.0 and PCP V1.0, was added. The protocol specification for PCP V1.0 was however not completed in MLS V1.0.

## 4.2 Version 1.1

The protocol specification for PCP V1.0 was added to the enabler.

## 4.3 Version 1.2

MLS V1.2 is an evolution of MLS V1.1. The functional additions are:

- support of 3GPP Release 7 LCS Specification
- support of OMA SUPL V2.0
- support of the L3 interface in “TIA/EIA-41-D Location Services Enhancements”
- support of multiple responses with increasing accuracy to a location request
- support of the capability to stop location reporting for individual targets of a Triggered Location Reporting Request that included more than one target.
- Support of civic address formats.

Relative MLS V1.1 following function is removed:

- The protocol specification for reference points Lid and Lpp is removed. The system entity PCE is thus not defined in MLS V1.2.

## 4.4 Version 1.3

MLS V1.3 is an evolution of MLS V1.2. The functional additions are:

- support of 3GPP Release 10 LCS Specification
- support of OMA SUPL V3.0
- support of OMA LPPe V1.0
- improvements of trigger feature

## 5. Architectural Model

The Architectural model of MLS V1.3 is described in [23.271 Rel-10]. The Architectural model described in [23.271 Rel-10] is summarised in [Figure 1] in section 4.

### 5.1 Dependencies

MLS V1.3 has no dependencies to other architectures in OMA.

### 5.2 Architectural Diagram

The architecture for MLS V1.3 is described in [23.271Rel-10] section 6.

### 5.3 Functional Components and Interfaces/reference points definition

The Architecture of MLS V1.3 as described in [23.271 Rel-10] section 6 defines four reference points Le, Lr, Lpp and Lid. Two of these referencepoints are instantiated by two OMA protocol specifications as listed below.

- Reference point Le is instantiated by MLP [MLP 3.4]. MLP is defined using XML transported over HTTP [RFC 2616].
- Reference point Lr is instantiated by RLP [RLP 1.2]. RLP is defined using XML transported over HTTP [RFC 2616].

Reference points Lpp and Lid are not instantiated in MLS V1.3.

The Architecture of MLS V1.3 as described in [23.271 Rel-10] section 6 also describes the components in the architecture as shown in [Figure 1] in section 4. The components are:

- MLS Client that is described in [23.271 Rel-10] section 6.3.2
- Requesting Location Server, Home Location Server and Visited Location Server that are described in [23.271Rel-10] section 6.3.3

For the transport of MLP and RLP over HTTP the following mechanism applies. All Location Services are invoked by sending a request using HTTP POST. The answer to the invocation of a Location Service is returned using an HTTP response. If the MLS Client requests standard location of asynchronous mode, triggered or periodic reporting of location, the Location Server will, in addition to the answer returned in a HTTP response, return one or more reports by performing HTTP POST operations towards the client. The client must specify the URI that the report should be posted to. This is done in the service request or by having it in the LCS client profile that can be stored in the Location Server.

### 5.4 Security Considerations

MLS V1.3 does not introduce any new interfaces or mechanisms that require any modification of the security mechanisms defined in MLS V1.2

### 5.5 Charging Considerations

There are no charging considerations in MLS 1.3.

## Appendix A. Change History

(Informative)

### A.1 Approved Version History

Reference	Date	Description
OMA-AD-MLS-V1_0-20110719-A	19 Jul 2011	First Approved version
OMA-AD-MLS-V1_1-20110719-A	19 Jul 2011	First Approved version
OMA-AD-MLS-V1_2-20110719-A	19 Jul 2011	First Approved version

### A.2 Draft/Candidate Version 1.3 History

Document Identifier	Date	Sections	Description
Draft Versions OMA-AD-MLS-V1_3	28 Oct 2011	n/a	Initial draft
	22 Feb 2012	5.5	Applied CRs: OMA-LOC-2012-0027R01- CR_MLS_1_3_AD_Remove_Charging_Section OMA-LOC-2012-0034-CR_MLS_1_3_AD_IntroductionNewRelease
	25 Apr 2012	4	Editorial correction per CONRR
Candidate Version OMA-AD-MLS-V1_3	29 May 2012	n/a	Status changed to Candidate by TP TP ref # OMA-TP-2012-0202- INP_MLS_13_ERP_and_ETR_for_Candidate_Approval

## Appendix B. Flows (informative)

The flows for MLS V1.3 are described in [23.271 Rel-10] section 9.