



# **Mobile Location Service Architecture**

## **Candidate Version 1.4 – 24 Feb 2015**

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**Open Mobile Alliance**  
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# 1. Scope

**(Informative)**

This document is the AD for the Mobile Location Service V1.4 (MLS V1.4), which consists of the Mobile Location Protocol (MLP) and Roaming Location Protocol (RLP).

## 2. References

### 2.1 Normative References

- [23.271 Rel-10] “Location Services (LCS); Service description; Stage 1”, 3GPP TS 23.271 Release 10, [URL:http://www.3gpp.org/ftp/Specs/latest/Rel-10/23\\_series/](http://www.3gpp.org/ftp/Specs/latest/Rel-10/23_series/)
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- [SUPL 3.0 AD] “Secure User Plane Location Architecture”, Open Mobile Alliance™, OMA-AD-SUPL-V3\_0  
[URL: http://www.openmobilealliance.org/](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/](http://www.openmobilealliance.org/)
- [WSDL] Web Services Description Language 1.1, W3C Note, 15 March 2001, [URL: http://www.w3.org/TR/wsdl](http://www.w3.org/TR/wsdl)

### 2.2 Informative References

- [OMA-DICT] “OMA Dictionary”, OMA-Dictionary-V2\_8, [URL: http://www.openmobilealliance.org/](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>Civic address</b>                    | Description of a location by means of e.g. Street name, Street number, Town and Country.   |
| <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  |

### 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>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              |

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|             |   |
|-------------|---|
| <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 V1.4 (MLS V1.4) consists of a set of location specifications complying with 3GPP Release 10 LCS Specification [23.271 Rel-10]. The set of specifications in MLS V1.4 consist of MLP V3.5 [MLP 3.5] and RLP V1.2 [RLP 1.2].

MLP describes the protocol between an MLS client and the Location Server. 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 Location Server. 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 V1.4. The OMA Mobile Location Service V1.4 (MLS V1.4) 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.

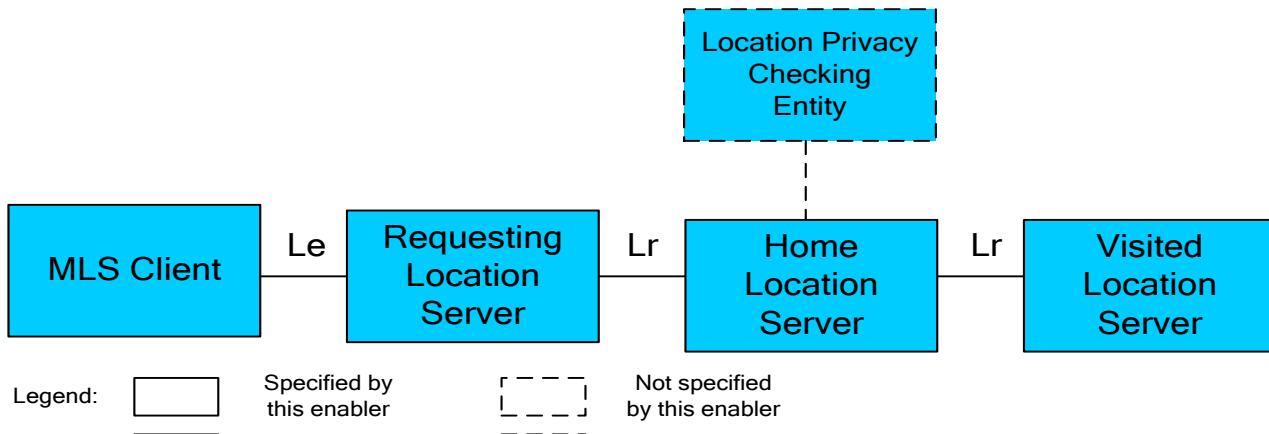


Figure 1: Architectural diagram of MLS

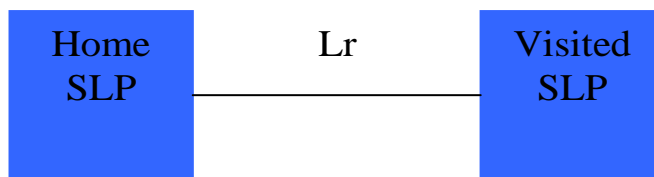


Figure 2: Relevant Reference Points in SUPL



## 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

## 4.5 Version 1.4

MLS V1.4 is an evolution of MLS 1.3. The following functions have been added:

- Support of ILA use cases
  - Support of unspecified and unregistered target mobile devices
  - Support of access/location network related events
  - Support of analytic events including support of multiple conditions for location reporting
  - Support of location relative to a specified indoor environment
  - Support of venue specific civic location
  - Support of triggers based on persistence of conditions

- Support of trigger conditions applied to a group of targets
- Support of venue specific target naming
- Indication from MLS application of targets privacy information
- Indication from MLS application of supported shapes

No change to the architecture has been made

## 5. Architectural Model

The Architectural model of MLS V1.4 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 V1.4 has no dependencies to other architectures in OMA.

### 5.2 Architectural Diagram

The architecture for MLS V1.4 is described in [23.271Rel-10] section 6.

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

The Architecture of MLS V1.4 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 3.5]. 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 V1.4.

The Architecture of MLS V1.4 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 V1.4 does not introduce any new interfaces or mechanisms that require any modification of the security mechanisms defined in MLS V1.3

## 5.5 Charging Considerations

There are no charging considerations in MLS 1.4.

## 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 1.4 History

| Document Identifier                  | Date        | Sections      | Description  |
|--------------------------------------|-------------|---------------|--|
| Draft Versions<br>OMA-AD-MLS-V1_4    | 25 Sep 2013 | n/a           | Initial draft  |
|                                      | 27 Nov 2013 | 4.5           | Incorporated CR:<br>OMA-LOC-2013-0157-CR_AD_MLS_14_IntroductionUpdate  |
|                                      | 06 Jan 2014 | A.2           | Added the change history of 2013-11-27   |
|                                      | 06 Nov 2014 | 2.1,3.1,4,5.3 | Incorporated CR:<br>OMA-LOC-2014-0165R01-CR_MLS_1_4_AD_CONR_Resolutions  |
| Candidate Version<br>OMA-AD-MLS-V1_4 | 24 Feb 2015 | n/a           | Status changed to Candidate by TP<br>TP Ref # OMA-TP-2015-0061-<br>INP_MLS_V1_4_ERP_and_ETR_for_Candidate_Approval |

## Appendix B. Flows (informative)

The flows for MLS V1.4 are described in [23.271 Rel-10] section 9.