



# Mobile Location Service Requirements

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**Open Mobile Alliance**  
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# 1. Scope

**(Informative)**

This document describes the requirements for the Mobile Location Service V1.3 (MLS V1.3), which consists of the Mobile Location Protocol (MLP), Roaming Location Protocol (RLP) and Location Privacy Checking Protocol (PCP).

MLS V1.3 is an evolution of MLS V1.1. A summary of the difference relative MLS V1.1 is defined in section 4.

## 2. References

### 2.1 Normative References

- [22.071 Rel-10] “Location Services (LCS); Service description; Stage 1”, 3GPP TS 22.071 Release 10,  
[URL:http://www.3gpp.org/ftp/Specs/latest/Rel-10/22\\_series/](http://www.3gpp.org/ftp/Specs/latest/Rel-10/22_series/)
- [22.071 Rel-7] “Location Services (LCS); Service description; Stage 1”, 3GPP TS 22.071 Release 7,  
[URL:http://www.3gpp.org/ftp/Specs/latest/Rel-7/22\\_series/](http://www.3gpp.org/ftp/Specs/latest/Rel-7/22_series/)
- [22.071] “Location Services (LCS); Service description; Stage 1”, 3GPP TS 22.071 Release 6,  
[URL:http://www.3gpp.org/ftp/Specs/latest/Rel-6/22\\_series/](http://www.3gpp.org/ftp/Specs/latest/Rel-6/22_series/)
- [23.271 Rel-10] “Functional stage 2 description of Location Services (LCS)”, 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/)
- [23.271 Rel-7] “Functional stage 2 description of Location Services (LCS)”, 3GPP TS 23.271 Release 7,  
[URL:http://www.3gpp.org/ftp/Specs/latest/Rel-7/23\\_series/](http://www.3gpp.org/ftp/Specs/latest/Rel-7/23_series/)
- [23.271] “Functional stage 2 description of Location Services (LCS)”, 3GPP TS 23.271 Release 6,  
[URL:http://www.3gpp.org/ftp/Specs/latest/Rel-6/23\\_series/](http://www.3gpp.org/ftp/Specs/latest/Rel-6/23_series/)
- [3GPP2 X.S0002-0] “TIA/EIA-41-D Location Services Enhancements”, Version 1.0, dated March 2004
- [MLS 1.1 RD] “Mobile Location Service Requirements”, Open Mobile Alliance™, OMA-RD-MLS-V1\_1  
[URL:http://www.openmobilealliance.org/](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](http://www.ietf.org/rfc/rfc2119.txt)
- [SUPL 2.0 RD] “Secure User Plane Location Requirements”, Open Mobile Alliance™, OMA-RD-SUPL-V2\_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/)
- [SUPL RD] “Secure User Plane Location Requirements”, Open Mobile Alliance™, OMA-RD-SUPL-V1\_0  
[URL:http://www.openmobilealliance.org/](http://www.openmobilealliance.org/)

### 2.2 Informative References

- [29.002] “Mobile Application Part (MAP) specification“, 3GPP TS 29.002 Release 6,  
[URL:http://www.3gpp.org/ftp/Specs/latest/Rel-6/29\\_series/](http://www.3gpp.org/ftp/Specs/latest/Rel-6/29_series/)

## 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

Civic address	Description of a location by means of e.g Street name, Street number, Town and Country.
L3	Interface between MPCs in 3GPP2 mobile networks. See also [3GPP2 X.S0002-0]
Le	Interface between Location Server and LCS Client in 3GPP mobile networks. See also [23.271 Rel-10]
Lg	Interface between Location Server and Core Network in 3GPP mobile networks. See also [23.271 Rel-10]
Location Server	Software and/or hardware entity offering location capabilities.
Lr	Interface between Location Servers. See also [23.271 Rel-10]
SUPL Enabled Terminal (SET)	A device that is capable of communicating with a SUPL network using the SUPL interface. Examples of this could be a UE in UMTS, an MS in GSM or CDMAIS-95, or a PC over an IP-based transport. See also [SUPL RD]
SUPL Provider	Mobile Network Operator, provides location assistance data to the SUPL Agent and optionally calculates the SET location. See also [SUPL RD]
Target	The entity being located. Can be a child, an employee, a friend, a machine, a car etc.
Timing Advance	Parameter in GSM network indicating distance between Base Station and terminal.
Verinym	True identity, i.e. MSISDN or IMSI, of the target or requestor.

### 3.3 Abbreviations

<b>3GPP</b>	Third Generation Partnership Project
<b>3GPP2</b>	Third Generation Partnership Project 2
<b>CDMA</b>	Code Division Multiple Access
<b>GMLC</b>	Gateway Mobile Location Center. See also [23.271 Rel-10]
<b>GPS</b>	Global Positioning System
<b>IMSI</b>	International Mobile Subscriber Identity
<b>IP</b>	Internet Protocol
<b>LCS</b>	LoCation Services. See also [23.271 Rel-10]
<b>MLP</b>	Mobile Location Protocol, the protocol for the 3GPP Le interface. See also [23.271 Rel-10]
<b>MLS</b>	Mobile Location Service
<b>MPC</b>	Mobile Positioning Center
<b>MSISDN</b>	Mobile Subscriber ISDN Number
<b>OMA</b>	Open Mobile Alliance
<b>PCE</b>	Privacy Checking Entity, equivalent to 3GPP PPR (Privacy Profile Register), responsible for checking the privacy settings of a target [23.271 Rel-10].
<b>PCP</b>	Location Privacy Checking Protocol, the protocol for the 3GPP Lpp and Lid interfaces. See also [23.271 Rel-10].

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<b>PLMN</b>	Public Land Mobile Network.
<b>RLP</b>	Roaming Location Protocol, the protocol for the 3GPP Lr interface. See also [23.271 Rel-10]
<b>SUPL</b>	Secure User Plane Location

## 4. Introduction (Informative)

OMA continues the work started in LIF (Location Interoperability Forum) and, at the same time, broadens its scope and maintains all location specifications owned by OMA.

The OMA Mobile Location Service V1.3 (MLS V1.3) consists of a set of location specifications complying with defined releases of 3GPP Release 6 LCS Specification. The set of specifications in MLS V1.3 consist of MLP and RLP.

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 specifications for the Le reference point and [23.271 Rel-10].

RLP describes the protocol between two Location Servers. In the 3GPP context, RLP will be an instantiation of the stage 3 specifications for the Lr reference point and [23.271 Rel-10]. Additionally, RLP will be an instantiation of a reference point between SUPL Providers with the purpose to transport information between SUPL Providers to enable positioning of roaming SUPL Enabled Terminals. Examples of such information are coarse position used when generating GPS assistance data or the actual GPS assistance data. In the context of 3GPP2, RLP V1.1 will also be an instantiation of the L3 reference point i.e. the reference point between two MPCs [3GPP2 X.S0002-0]

### 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.

MLS V1.2 is expected to fulfill all the currently defined requirement and thus no further versions of MLS are currently planned. It is however foreseen that evolution on the location specifications supported by MLS may create a need for further releases in the future.

### 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. MLS V1.3 release description (Informative)

The OMA Mobile Location Service V1.3 (MLS V1.3) consists of a set of location specifications. The set of specifications in MLS V1.3 consist of MLP and RLP.

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 specifications for the Le reference point and [23.271 Rel-10].

RLP describes the protocol between two Location Servers. In the 3GPP context, RLP will be an instantiation of the stage 3 specifications for the Lr reference point and [23.271 Rel-10]. Additionally, RLP will be an instantiation of a reference point between SUPL Providers with the purpose to transport information between SUPL Providers to enable positioning of roaming SUPL Enabled Terminals.

### 5.1 End-to-end Service Description

The OMA Mobile Location Service V1.3 (MLS V1.3) enables an location based service to act as an MLS Client and request location information of a target from a Location Server. It also enables Location Servers to interact in order to serve the MLS Client. MLS V1.3 does also enable SUPL Providers to exchange information in order to support positioning of SUPL Enabled Terminals.

## 6. Requirements (Normative)

### 6.1 High-Level Functional Requirements

#### 6.1.1 General requirements

Label	Description	Enabler Release
G1	MLS SHALL fulfil requirements P1, P2, P3 and P4 in [MLS 1.1 RD].	Deleted
G1a	MLS SHALL fulfil requirements G1, R1, R2, R3, R4, R5, R6 and R7 in [MLS 1.1 RD].	MLS V1.2
G2	MLS SHALL fulfil the requirements related to Lid and Lpp interfaces stated in [22.071 Rel-7] and [23.271 Rel-7].	Deleted
G2a	MLS SHALL fulfil the requirements related to Le and Lr, interfaces stated in [22.071 Rel-7] and [23.271 Rel-7].	MLS V1.2
G3	MLS SHALL allow responding to a location request with multiple responses of increasing accuracy before responding with the final position result.	MLS V1.2
G4	MLS Enabler SHOULD allow an MLS application to request stopping triggered location reporting on any specific target.	MLS V1.2
G5	MLS SHOULD allow stopping of triggered location reporting of individual targets in case a Triggered Location Reporting Request included more than one target.	MLS V1.2
G6	MLS SHALL fulfil the requirements in [SUPL 2.0 RD] that are applicable to the interfaces in MLS.	MLS V1.2
G7	MLS SHALL support civic address format.	MLS V1.2
G8	MLS SHALL fulfil the requirements related to Le and Lr interfaces stated in [22.071 Rel-10] and [23.271 Rel-10].	MLS V1.3
G9	MLS SHALL fulfil the requirements in [SUPL 3.0 RD] that are applicable to the interfaces in MLS.	MLS V1.3
G10	MLS SHOULD support reporting of pausing and resuming of triggered location reporting.	MLS V1.3

**Table 1: High-Level Functional General Requirements**

#### 6.1.2 RLP specific requirements

Label	Description	Enabler Release
R1	RLP SHALL support transport of L3 interface specific parameters between MPCs [3GPP2 X.S0002-0] i.e. RLP SHALL provide an instantiation of the L3 interface.	MLS V1.2

**Table 2: High-Level Functional RLP specific Requirements**

### 6.1.3 Interoperability

Label	Description	Enabler Release
IOP1	MLS SHALL support backward compatibility with earlier releases of MLS Enabler with the restriction that interface endpoints MUST agree on the protocol version to use.	MLS V1.2

**Table 3: High-Level Functional Requirements – Interoperability Items**

## Appendix A. Change History

(Informative)

### A.1 Approved Version History

Reference	Date	Description
OMA-RD-MLS-V1_0-20110719-A	19 Jul 2011	First Approved verision
OMA-RD-MLS-V1_1-20110719-A	19 Jul 2011	First Approved verision
OMA-RD-MLS-V1_2-20110719-A	19 Jul 2011	First Approved verision
OMA-RD-MLS-V1_3-20150512-A	12 May 2015	Status changed to Approved by TP TP Ref # OMA-TP-2015-0081-INP_MLS_V1_3_ERP_for_final_Approval

## Appendix B. Use Cases (Informative)

The basic use cases for MLP and RLP are described in [22.071 Rel-10], and [23.271 Rel-10]. Specific use cases for SUPL are shown in [SUPL RD], [SUPL 2.0 RD], and [SUPL 3.0 RD]. Additional use cases are given below.

### B.1 Use Case for Multiple steps location

#### B.1.1 Short Description

An application user requests the location of a positioning target with a high accuracy positioning. The application provides a graphical interface that shows the positioning target on a map.

The Location Server may report the position results as they become available with increasing precision (coarse position results are reported first followed by more accurate position results) allowing the graphical interface to display the position result in multiple steps with increasing accuracy (i.e. "zooming in" on the final target position). Alternatively, the Location Server may only report one single position result.

#### B.1.2 Actors

- Positioning target (target to be positioned)
- Application (End-user application for location services)
- MLS Enabler implementation (Providing location data)

##### B.1.2.1 Actor Specific Issues

- Application (End-user application for location services)

The application needs to be able to handle multiple consecutive replies to the same request.

- MLS Enabler implementation (Providing location data)

MLS Enabler implementation needs to be able to handle requests generating multiple consecutive replies.

##### B.1.2.2 Actor Specific Benefits

- Application (End-user application for location services)

The application provides a enhanced user experience in that the relatively long delays for accurate positioning may be mitigated by first providing a less accurate but faster position estimate e.g in form of a map of the area surrounding the final estimate.

- MLS Enabler implementation (Providing location data)

MLS Enabler implementation can serve location requests with multiple consecutive replies with increased accuracy. Relative to having two separate requests with different requested accuracy and response time this use case allows the MLS enabler implementation to improve resource usage and to minimise delays of final position estimate.

#### B.1.3 Pre-conditions

An application asks the location server for the position of a target with a precise position.

The location server needs to be able to first provide a series of location results with increasing accuracy.

#### B.1.4 Post-conditions

The application can display the position result in multiple steps: starting with the low accuracy results and ending with the high accuracy results.

## B.1.5 Normal Flow

1. An application sends a location request to a MLS Enabler implementation for a target to be located precisely.
2. The MLS Enabler implementation selects a positioning method capable of providing this precise location.
3. The MLS Enabler implementation starts to perform the location procedure: in the normal course of this procedure, information allowing to derive the location of the positioning target is sent to the MLS Enabler implementation.
4. The MLS Enabler implementation transforms this information in a valid location information format for the application.
5. The MLS Enabler implementation sends a response to the application including a coarse location information and the associated accuracy.
6. The MLS Enabler implementation carries on with the computation of the accurate location result.
7. As the MLS Enabler implementation continues with the calculation of the final high accuracy position result, it may send interim position results of increasing accuracy to the application.
8. The MLS Enabler implementation sends the final (high accuracy) location response including the accuracy to the agent.

## B.2 Use Case Stopping Triggered Location Reporting for Individual Targets

### B.2.1 Short Description

This use case describes the procedure of stopping triggered location reporting for individual targets.

### B.2.2 Actors

- Positioning targets (targets to be positioned)
- Application (End-user application for location services)
- MLS Enabler implementation (Providing location data)

#### B.2.2.1 Actor Specific Issues

- Application (End-user application for location services)

The application asks to stop triggered location reporting for individual targets.

- MLS Enabler implementation (Providing location data)

MLS Enabler stops triggered location reporting for the individual targets.

#### B.2.2.2 Actor Specific Benefits

- Application (End-user application for location services)

The application is able to stop triggered location reporting for individual targets. This makes handling of location triggers for groups of targets more flexible from a application developers point of view.

- MLS Enabler implementation (Providing location data)

MLS Enabler implementation stops triggered location reporting for individual targets

### **B.2.3 Pre-conditions**

An application asks the MLS Enabler implementation to start triggered location reporting for a list of targets

### **B.2.4 Post-conditions**

Triggered location reporting for the individual targets included in the stop request is stopped while the reporting for the other targets continues.

### **B.2.5 Normal Flow**

1. An application sends a triggered location reporting request to a MLS Enabler implementation for a list of targets.
2. The MLS Enabler implementation starts to perform the triggered location reporting procedure.
3. The MLS Enabler implementation sends a report to the application whenever the trigger event occurs.
4. The application sends a request to the MLS Enabler implementation to stop the location reporting for some individual targets.
5. The MLS Enabler implementation terminates the triggered location reporting procedures for the individual targets included in the stop request. The MLS Enabler implementation sends a report of other targets to the application whenever the trigger event occurs.