



# 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 V1.2 (MLS V1.2), which consists of the Mobile Location Protocol (MLP), Roaming Location Protocol (RLP) and Location Privacy Checking Protocol (PCP).

MLS V1.2 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

- [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)
- [MLS 1.1 RD] “Mobile Location Service Requirements”, Open Mobile Alliance™, OMA-RD-MLS-V1\_1  
URL: <http://www.openmobilealliance.org/>
- [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/)
- [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/)
- [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/)
- [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/)
- [SUPL RD] “Secure User Plane Location Requirements”, Open Mobile Alliance™, OMA-RD-SUPL-V1\_0  
URL: <http://www.openmobilealliance.org/>
- [SUPL 2.0 RD] “Secure User Plane Location Requirements”, Open Mobile Alliance™, OMA-RD-SUPL-V2\_0  
URL: <http://www.openmobilealliance.org/>
- [3GPP2 X.S0002-0] “TIA/EIA-41-D Location Services Enhancements”, Version 1.0, dated March 2004

### 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

<b>L3</b>	Interface between MPCs in 3GPP2 mobile networks. See also [3GPP2 X.S0002-0]
<b>Le</b>	Interface between Location Server and LCS Client in 3GPP mobile networks. See also [23.271] and [23.271 Rel-7]
<b>Lg</b>	Interface between Location Server and Core Network in 3GPP mobile networks. See also [23.271] and [23.271 Rel-7]
<b>Lr</b>	Interface between Location Servers. See also [23.271] and [23.271 Rel-7]
<b>Location Server</b>	Software and/or hardware entity offering location capabilities.
<b>SUPL Enabled Terminal (SET)</b>	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]
<b>SUPL Provider</b>	Mobile Network Operator, provides location assistance data to the SUPL Agent and optionally calculates the SET location. See also [SUPL RD]
<b>Target</b>	The entity being located. Can be a child, an employee, a friend, a machine, a car etc.
<b>Timing Advance</b>	Parameter in GSM network indicating distance between Base Station and terminal.
<b>Verinym</b>	True identity, i.e. MSISDN or IMSI, of the target or requestor.
<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>	Third Generation Partnership Project
<b>3GPP2</b>	Third Generation Partnership Project 2
<b>CDMA</b>	Code Division Multiple Access
<b>OMA</b>	Open Mobile Alliance
<b>GMLC</b>	Gateway Mobile Location Center. See also [23.271] and [23.271 Rel-7]
<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] and [23.271 Rel-7]
<b>MLP</b>	Mobile Location Protocol, the protocol for the 3GPP Le interface. See also [23.271] and [23.271 Rel-7]
<b>MLS</b>	Mobile Location Service
<b>MPC</b>	Mobile Positioning Center
<b>MSISDN</b>	Mobile Subscriber ISDN Number
<b>PCE</b>	Privacy Checking Entity, equivalent to 3GPP PPR (Privacy Profile Register), responsible for checking the privacy settings of a target [23.271] and [23.271 Rel-7].

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<b>PCP</b>	Location Privacy Checking Protocol, the protocol for the 3GPP Lpp and Lid interfaces. See also [23.271 and [23.271 Rel-7]].
<b>PLMN</b>	Public Land Mobile Network.
<b>RLP</b>	Roaming Location Protocol, the protocol for the 3GPP Lr interface. See also [23.271] and [23.271 Rel-7]
<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 V1.2 (MLS V1.2) consists of a set of location specifications complying with defined releases of 3GPP Release 6 LCS Specification. The set of specifications in MLS V1.2 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-7].

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-7]. 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]

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.



## 5. Use Cases

(Informative)

The basic use cases for MLP and RLP are described in [22.071], [23.271], [22.071 Rel-7] and [23.271 Rel-7]. Specific use cases for SUPL are shown in [SUPL RD] and [SUPL 2.0 RD]. Additional use cases are given below.

### 5.1 Use Case for Multiple steps location

#### 5.1.1 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.

#### 5.1.2 Actors

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

##### 5.1.2.1 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.

##### 5.1.2.2 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.

#### 5.1.3 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.

## 5.1.4 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.

## 5.1.5 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.

## 5.2 Use Case Stopping Triggered Location Reporting for Individual Targets

### 5.2.1 Short Description

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

### 5.2.2 Actors

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

#### 5.2.2.1 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.

### 5.2.2.2 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

### 5.2.3 Pre-conditions

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

### 5.2.4 Post-conditions

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

### 5.2.5 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.

## 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

**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_2	19 Jul 2011	No prior version –or- No previous version within OMA