Mobile Location Service Requirements

Candidate Version 1.4 – 24 Feb 2015

Open Mobile Alliance

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1. Scope (Informative)

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

MLS V1.4 is an evolvement of MLS V1.3. A summary of the difference relative MLS V1.3 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/
[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/
[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/
[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/
[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/
[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/
[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/
[RFC2119]	"Key words for use in RFCs to Indicate Requirement Levels", S. Bradner, March 1997, URL: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/
[SUPL 3.0 RD]	"Secure User Plane Location Requirements", Open Mobile Alliance™, OMA-RD-SUPL-V3_0 URL: http://www.openmobilealliance.org/
[SUPL RD]	"Secure User Plane Location Requirements", Open Mobile Alliance™, OMA-RD-SUPL-V1_0 URL: 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/

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

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

PCP	Location Privacy Checking Protocol, the protocol for the 3GPP Lpp and Lid interfaces. See also [23.271 Rel-10].
PLMN	Public Land Mobile Network.
RLP	Roaming Location Protocol, the protocol for the 3GPP Lr interface. See also [23.271 Rel-10]
SUPL	Secure User Plane Location

4. Introduction   (Informative)

The OMA Mobile Location Service V1.4 (MLS V1.4) consists of two location specifications: 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 evolvement 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 to MLS V1.1, the following function has been 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

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

    o   Support of unspecified and unregistered target mobile devices

    o   Support of access/location network related events

    o   Support of analytic events including support of multiple conditions for location reporting

    o   Support of location relative to a specified indoor environment

    o   Support of venue specific civic location

    o   Support of triggers based on persistence of conditions

    o   Support of trigger conditions applied to a group of targets

    o   Support of venue specific target naming

–   Indication from MLS application of targets privacy information

–   Indication from MLS application of supported shapes

5. MLS V1.4 release description (Informative)

The MLS 1.4 enabler is an extension of MLS 1.3 to primarily support use cases related to Indoor Positioning defined by the In-Location Alliance (ILA).

The key capabilities added to this release are as follows:

- Definition of additional protocol procedures and information elements to support different use cases defined by the ILA, such as support of unspecified and unregistered target mobile devices, support of access/location network related events, support of analytic events and support of multiple conditions for location reporting on mobile devices

Specifically, (MLS V1.4) consists of MLP and RLP specifications.

The MLP specification defines the protocol between an MLS client and the Location Server supported by the Le reference point [23.271 Rel-10].

The RLP specification defines the protocol between two Location Servers supported by the Lr reference point [23.271 Rel-10]. Additionally, RLP will be an instantiation of a reference point between SUPL Providers 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 V1.4 (MLS V1.4) enables a location based service to act as an MLS Client and request location information of a target mobile device from a Location Server. It also enables interaction of Location Servers in order to serve the MLS Client. MLS V1.4 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
G11	MLS SHALL support location requests for unspecified and unregistered target devices.	MLS V1.4
G12	MLS SHALL support access/location network events.	MLS V1.4
G13	MLS SHALL support MLS Client to request and receive analytic events data of one or more target devices including the support of multiple conditions for reported location.	MLS V1.4
G14	MLS SHALL support MLS Client to provide and receive precise locations and target areas using high precision (e.g. sub-meter accuracy) and/or coordinates relative to a particular indoor environment.	MLS V1.4
G15	MLS SHALL support customization and use of civic location description that is venue specific for both locations and target areas.	MLS V1.4
G16	MLS SHALL support trigger events related to persistence of a trigger condition for a minimum period of time.	MLS V1.4
G17	MLS SHALL enable trigger conditions to be applied to a group of identified or unidentified target devices in which the number of target devices needed to activate a trigger event may also be specified.	MLS V1.4
G18	MLS SHALL support location requests for a target device or a group of target devices identified using a venue specific name.	MLS V1.4
G19	MLS SHALL enable an MLS Client to provide subscriber's privacy information to the Location Server.	MLS V1.4
G20	MLS SHALL allow an MLS application to indicate the shape types it	MLS V1.4

	supports for location information format and its order of preference for each of the supported shapes.	

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 version
OMA-RD-MLS-V1_1-20110719-A	19 Jul 2011	First Approved version
OMA-RD-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 OMA-RD-MLS-V1_4	21 May 2013	All	Initial Draft. Based on OMA-RD-MLS-V1_3-20120529-C. V1.3 replaced with 1.4 where applicable.
	13 Jun 2013	3.3,4,5,6.1.1, B2-B10	Implemented CRs: OMA-LOC-2013-0081-CR_MLS_1.4_Requirements OMA-LOC-2013-0082-CR_MLS_1.4_Additional_Requirements
	27 Sep 2013	6.1.1	Implemented CRs: OMA-LOC-2013-0107R02-CR_MLS_1_4_RD_Privacy_Information_Delivery OMA-LOC-2013-0145-CR_MLS1.4_RD_Supported_Shapes
	27 Nov 2013	4.5	Implemented CR: OMA-LOC-2013-0156-CR_RD_MLS_14_IntroductionUpdate
	27 Feb 2014	6.1.1	Implemented CR: OMA-LOC-2014-0007R02-CR_MLS_1_4_New_requirement_and_changes_to_existing_requirements
	06 Nov 2014	1,4.5,5,6	Implemented CRs: OMA-LOC-2014-0164R01-CR__MLS_1_4_RD_CONR_Resolutions OMA-LOC-2014-0172R01-CR_Resolution_of_CONR_comment_A001 OMA-LOC-2014-0174-CR_Resolution_of_MLS_1.4_CONR_comment_A005 Applied editorial corrections according to CONRR
Candidate Version OMA-RD-MLS-V1_4	24 Feb 2015	n/a	Status changed to Candidate by TP TP Ref # OMA-TP-2015-0061-INP_MLS_V1_4_ERP_and_ETR_for_Candidate_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.

B.3 Use Case Support of Unspecified and Unregistered Target Mobile Devices

B.3.1 Short Description

This use case addresses situations where the identity of the target mobile device is not known to the requesting MLS client at the time of the request and/or where the target mobile device is not registered in the location server. In the former case the MLS client requests the location of one or more target mobile devices not based on the target mobile devices' identity but based on specific conditions (e.g., mobile devices located within a defined target area, etc.). For instance, the MLS client may request the locations of all mobile devices within a shopping mall without specifying the identity of the target mobile devices. All mobile devices within the shopping mall would then be considered "target" mobile devices and their location would be determined by the location server. For the unregistered case, the MLS client requests the location of one or more target mobile devices that have no previous association with the location server through either registration or subscription and for which no data is currently available in the location server.

B.3.2 Market Benefits

This use case opens up a new class of services unsupported by the current releases of MLS. Services that can take advantage of this feature include mobile advertising (e.g., sending product information, product promotion, etc.), mobile alerts (e.g., emergency alerts) or any other services that require the location of unspecified and/or unregistered mobile devices.

B.4 Use Case Support of Access/Location Network Related Events

B.4.1 Short Description

In this use case target mobile devices are located based on certain access/location network related events. For instance, a shopping mall owner may provide location service throughout the entire mall including individual stores. By implementing this feature, store owners may be alerted whenever a mobile device enters or leaves their store. The store would act as the target area defined based on the coverage provided by the access/location network.

This use case may be implemented for both identified and unidentified target mobile devices.

B.4.2 Market Benefits

This use case enhances the already existing triggered area event service by defining the target area through access/location network coverage and associated events. By doing so, a more reliable and accurate triggered area event service can be offered. In particular, indoor positioning is expected to benefit from this feature.

B.5 Use Case Support of Analytic Events

B.5.1 Short Description

This use case allows an MLS Client to request and obtain analytic data related to the location of one or more target mobile devices. The target mobile devices may thereby be identified or unidentified. For instance, a store owner may want to know how many customers carrying mobile devices are frequenting his store including how much time each customer spends inside the store.

Other use cases may include the generation of alerts when certain conditions related to the target mobile devices' locations are met. For instance, a store owner may be alerted when the number of mobile devices in his store exceeds (or falls below) a certain threshold or when the average dwell time of patrons exceeds (or falls below) a certain threshold.

To support analytic events, an MLS Client may need to specify multiple conditions associated with location reporting – e.g. reporting when the number of mobile devices exceeds some threshold number (condition 1) within a defined area (condition 2) for more than some threshold duration (condition 3). Multiple conditions may be specified using a set of simpler conditions that are combined using logical operations (e.g. AND, OR, NOT etc.).

B.5.2 Market Benefits

This use case opens up a new class of services unsupported by the current releases of MLS.

B.6 Use Case Support of High Precision and Relative Location

B.6.1 Short Description

This user case allows a location and a target area to be specified with high precision and/or using relative x, y, z coordinates.

High precision location and target area description may be needed in an indoor environment where a small change in location may be significant – e.g. where a door, window, wall or display case separates two significantly different areas from a user perspective.

Relative x, y, z location and target area description may be needed in an indoor environment where relative location can be easily and accurately defined using building and floor plans as well as local measurement but where accurate absolute location may not be available.

This user case allows an MLS Client to provide and receive precise location and target area information using either absolute coordinates or coordinates relative to a particular indoor environment.

B.6.2 Market Benefits

This use case extends MLS support to indoor environments.

B.7 Use Case Support of Venue Specific Civic Location

B.7.1 Short Description

This user case allows a location and a target area to be specified using a venue specific civic location description.

Existing standards for civic location are normally intended to apply in a global context and are focused on narrowing down a location to a small area by specifying a succession of mainly outdoor related location areas of successively diminishing size (e.g. country, state, city, street name, street address, building name). In the context of a given venue, outdoor related

designations are not always needed whereas venue specific designations that are not standardized may be needed – e.g. (i) an operating theatre or ward designation in a hospital; or (ii) a cubicle, printer or fax machine designation in an office complex; or (iii) a shop name, cash register, display area or product line designation in a shopping mall.

In order to accommodate civic location description in a venue environment, MLS should support both standard, proprietary and hybrid (standard + proprietary) forms of civic location. Proprietary description would be specific to a particular venue or group of related venues and may use a simple syntax at an MLS level.

This user case allows a venue owner to customize civic location description to more precisely fit the types of location that are significant for the venue.

B.7.2 Market Benefits

This use case extends MLS support to indoor environments.

B.8 Use Case Support of Persistence of a Trigger Condition for a Minimum Time

B.8.1 Short Description

This user case allows a trigger condition or a combination of trigger conditions that have some persistence in time (e.g. being within or outside of one or more target areas) to be reported only after persisting for some minimum time.

In a venue environment, the proximity or lack of proximity of a user or group of users to a certain location may be significant – e.g. the proximity of many users to a fire exit, information desk or cash register or the lack of proximity of users to a shop display case or a blackjack table in a casino. There may be added significance if the condition persists – e.g. this may be indicative of a blocked or locked fire exit, the lack of an attendant or cashier at an information desk or cash register, or a need to redesign, replace or remove a display case or blackjack table.

Hence in a venue environment, it may be useful to enable the minimum persistence of certain trigger conditions to be defined.

B.8.2 Market Benefits

This use case extends MLS support to indoor environments.

B.9 Use Case Support of Trigger Conditions for a Group of Target Devices

B.9.1 Short Description

This user case allows trigger conditions to be applied to a group of target devices that may be either identified or unidentified and further allows specification of a minimum number of target devices within the group to which the trigger conditions must apply in order to produce a report.

An example for identified target devices would be the flight crew of a certain outbound flight at an airport where an airline wants to know when the entire flight crew or some portion of it has reached the gate area (or has not reached the gate area).

An example for unidentified target devices would be the detection of some minimum number of users at a certain location in a store where a store attendant may not currently be located. In this case, users not carrying a locatable target device would be ignored so a venue operator might set the minimum number of detectable users to be quite small – e.g. two or three.

A further example for unidentified target devices would be the detection of some minimum number of target devices in a shopping mall or shopping mall store which could act as a trigger for calling in additional shopping store staff or providing extra ventilation.

B.9.2   Market Benefits

This use case extends MLS support to indoor environments.

B.10 Use Case Support of Identification of Target Devices using a Venue specific Name

B.10.1   Short Description

This user case allows a target device or group of target devices to be identified using a venue specific name.

A venue specific name may be used to conceal and/or replace any global identity for a target device and associated user as well as provide a more convenient means for a venue operator to refer to users who may have some service subscription or service agreement with the venue.

A venue specific name may also be used when other forms of identification (e.g. IMSI, MAC address, IMEI, SIP URI) are unavailable to an MLS Client or not considered reliable – e.g. for a user who may employ one of several different target devices.

A venue specific name may not be globally unique but may be unique only in the context of a particular venue.

A venue specific name may be structured to enable application to both a group of target devices and a particular target device – e.g. "Macys staff" to refer to all staff at a Macys store or "Macys staff employee ABC" to refer to a particular Macys employee. The structuring should not be visible at the MLS level but would be a property of the naming convention used by a particular venue.

B.10.2   Market Benefits

This use case extends MLS support to indoor environments.