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| Technical Specification | |
| 3rd Generation Partnership Project;  Technical Specification Group Core Network and Terminals;  Mission Critical Location Management (MCLoc);  Protocol specification  (Release 18) | |
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For definitive guidance on drafting 3GPP TSs and TRs, see [3GPP TS 21.801](http://www.3gpp.org/DynaReport/21801.htm) supplemented by the 3GPP web page <http://www.3gpp.org/specifications-groups/delegates-corner/writing-a-new-spec>.

Ensure all blue guidance text is removed before submitting the TS/TR to the TSG for approval.

# Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

In the present document, modal verbs have the following meanings:

**shall** indicates a mandatory requirement to do something

**shall not** indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

**should** indicates a recommendation to do something

**should not** indicates a recommendation not to do something

**may** indicates permission to do something

**need not** indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

**can** indicates that something is possible

**cannot** indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

**will** indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

**will not** indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

**might** indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

**might not** indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

**is** (or any other verb in the indicative mood) indicates a statement of fact

**is not** (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

# 1 Scope

The present document specifies the protocols needed to support the Mission Critical Location Management service (MCLoc).

Mission critical services are services that require particular features and preferential handling compared to normal telecommunication services, e.g., in support of police or fire brigade.

The MCLoc service can be used for public safety applications as well as for some specialized commercial applications (e.g., utility companies and railways).

In the 3GPP systems, the Mission Critical Location Management service described in this document is instantiated at the application layer and involves interactions between MCLoc application clients on UEs and MCLoc application servers.

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.280: "Common functional architecture to support mission critical services; Stage 2".

[3] 3GPP TS 23.283: "Mission Critical Communication Interworking with Land Mobile Radio Systems; Stage 2".

[4] 3GPP TS 33.180: "Security of the mission critical service".

# 3 Definitions of terms, symbols and abbreviations

This clause and its three subclauses are mandatory. The contents shall be shown as "void" if the TS/TR does not define any terms, symbols, or abbreviations.

## 3.1 Terms

For the purposes of the present document, the terms given in 3GPP TR 21.905 [1], 3GPP TS 23.280 [2] or the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1] or 3GPP TS 23.280 [2].

**Location management client:** An entity typically associated with a mobile device (UE), that can request and receive location information from a location management server and can provide location information to the location management server.

**Location management server:** An entity that can request and receive location information from location management clients, from other location management servers and from IWFs and can provide location information to authorized location management clients, other location management servers and IWFs.

## 3.2 Symbols

For the purposes of the present document, the following symbols apply:

Editor’s Note: This section may end up being void.

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1], 3GPP TS 23.280 [2], or the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1] or 3GPP TS 23.280 [2].

IWF Interworking Function between a 3GPP Mission Critical system and an LMR system

LMR Land Mobile Radio

# 4 General

## 4.1 Overview

The Mission Critical Location (MCLoc) is an optional auxiliary mission critical service operating at the application plane layer and supporting the MC services: MCPTT, MCVideo and MCData. It is fully integrated with those services (see 3GPP TS 23.280 [2]) and is consistent with the general design principles of the mission critical system. Salient features include:

* **Trust domains.** MCLoc protects the privacy and confidentiality of operation for MC service users, including their identities, by having the ability to restrict the ingestion and dissemination of related information from/to only well trusted entities.
* **Controlled list of users.** MCLoc provides services only to associates of mission critical organizations (MCO) who are subscribed through their respective MCO. The MCOs have business agreements with the mission critical system operator, which avail them of control mechanisms such as pre-configuration, policy rules and user and service profiles.
* **Multiple devices**. From a user perspective, the identification and addressing is by user, rather than by device. Multiple active devices simultaneously active for the same user are supported, allowing addressing to a user at a particular active device.
* **Support for aliases.** MCLoc supports addressing by, reporting from, and notifications to, users identified via mission critical aliases.
* **Support of group operations**. Group communications is a key feature of mission critical systems. The mission critical location service is in constant contact with specific mission critical services (i.e., MCPTT, MCVideo, MCData) and, when instructed, can limit the location data collection and distribution to the members of the respective MC service groups, based on their current status (e.g., currently affiliated, currently in an active communication).
* **Rich set of** **location** **trigger types and variables.** MCLoc supports location event triggering on many various conditions and reporting of values of location variables, beyond just longitude and latitude: for example, z‑axis values, speed, etc. In addition, the time and accuracy of the measurement or data acquisition is also recorded and can be reported by the LMC and/or notified by the LMS.
* **Context sensitive and adaptive operation**. MCLoc can be informed by various subsystems of changes in the context of operations (e.g., emergency situations, changes of RRC states, etc.). In those cases, MCLoc may enable/disable certain location triggers, use different set of parameters, and report/notify different location variables.
* **Off-network / on-network operation.** The location of off-network MC users can also be determined using ProSe communications. If ProSe UE-to-Network relays are employed, the off-network and on-network populations of MC users can be notified of stay updated on each other locations, as appropriate.
* **Interworking with LMR systems.** Depending on the location features supported by an interworking LMR system (if any), MCLoc may be able to receive, process, and store location information from the LMR system and disseminate it to MC service users. If the LMR system supports notifications, location information about the MC service users could be sent via the IWF to the LMR system.

## 4.2 Registration of mission critical users

MCLoc provides location service only to users that have been authenticated and registered for MC service(s). There is some flexibility in exactly how the mission critical location service for a particular user starts up, depending on when and where the information necessary at each step of the start-up process is available. Pre-configuration and on-line configuration provided by the Configuration management system based on stored profiles can make desired information already available to the MCLoc service, resulting in certain start-up steps being skipped.

In principle, the start-up process starts with the MC user being authenticated and authorized for requested services based on user provided credentials, followed by the provision of access information (e.g., URIs of the MC servers, security tokens, etc.) to the MC service clients on the MC UE. Then the MC service client(s) can contact the respective MC server(s) and obtain unique MC client identifiers and URIs at the MC server(s). LMC follows the same process to register with the LMS. The LMC may start its registration process before, after or during other MC service client(s) registration(s). The advantage of the LMC registering after the other MC service clients have completed their registration(s) is that additional information (e.g., identity of URIs associated with the MC service servers, assigned GRUUs in case of user addressing at specific UE) becomes available and can be provided to the LMS as part of the registration message exchange. Otherwise, the information associated with the LMC will have to be incrementally expanded via registration updates.

To reduce signalling, the registration request from the LMC can be combined with a reporting configuration request, and the LMS will respond not only with an id for the LMC, but also with reporting configuration for the LMC. In turn, the LMC will reply further with the most recently available location information.

The time period during which an LMC is registered may end automatically when all other MC services have deregistered or ended their operation, or, based on local policy and configuration, may continue in order to assist with locating lost or misplaced MC UEs.

# M Functional entities and reference points

## M.1 Introduction

This clause describes the association of functional entities within a mission critical system with their roles in the mission critical location management service, consistent with the stage 2 architecture document (see 3GPP TS 23.280 [2]).

## M.2 Location management service functional architecture

Figure M.2-1 shows the functional model for the location management service in the application plane, based on the architecture in 3GPP TS 23.280 [2] clause 7.3.



Figure M.2-1: Location management service functional architecture

## M.3 MCLoc client (LMC)

The MCLoc client can exist in a UE or other device, such as a dispatcher's console. The MCLoc client:

- interacts with the user playing the role of user agent for all location management application transactions;

- interacts with the hosting device (e.g., UE) and its subsystems as well as with other mission critical clients co-located in the same device, to obtain necessary information; and

- interacts with the MCLoc server, executing procedures defined in 3GPP TS 23.280 [2] and in the present document to register, obtain service authorization, request, receive and report location information,

## M.4 MCLoc server (LMS)

The MCLoc server executes location related procedures defined in 3GPP TS 23.280 [2] and in the present document. Specifically, the MCLoc server:

- interacts with the LMCs to handle requests for location information that it needs to acquire or has stored;

- interacts with the LMCs to handle reports of location information;

- interacts with MC service servers acting as authorized LMCs, to handle requests for location information that it needs to acquire or has stored;

- interacts with MC service servers acting as authorized LMCs, to acquire and store location information that was reported to the MC service servers by MC service clients;

- interacts with KMS and CMS to obtain proper functional parameters, as necessary;

- interacts with other LMSs to request or provide location information; and

- interacts with an IWF to request or provide location information.

## M.5 Key management server (KMS)

See 3GPP TS 23.280 [2] clause 7.4.2.2.8.

## M.6 Configuration management server (CMS)

See 3GPP TS 23.280 [2] clause 7.4.2.2.2.

## M.7 Reference point CSC-9 (between the LMS and the key management server)

The CSC-9 reference point, which exists between the LMS and the key management server, is described in 3GPP TS 23.280 [2] clause 7.5.2.9.

## M.8 Reference point CSC-14 (between the LMS and the LMC)

The CSC-14 reference point, which exists between the LMC and the LMS, is described in 3GPP TS 23.280 [2] clause 7.5.2.14.

## M.9 Reference point CSC-15 (between the LMS and the MC server)

The CSC-15 reference point, which exists between the LMS and the MC server, is described in 3GPP TS 23.280 [2] clause 7.5.2.15.

## M.10 Reference point CSC-22 (between the LMS and another LMS)

The CSC-22 reference point, which exists between the LMS and another LMS, is described in 3GPP TS 23.280 [2] clause 7.5.2.23.

## M.11 Reference point CSC-24 (between the LMS and the configuration management server)

The CSC-24 reference point, which exists between the LMS and the configuration management server, is described in 3GPP TS 23.280 [2] clause 7.5.2.25.

## M.12 Reference point IWF-4 (between the LMS and the IWF)

The IWF-4 reference point, which exists between the LMS and the IWF, is described in 3GPP TS 23.283 [3] clause 7.4.4.

## M.13 Reference points HTTP-1, HTTP-2 and HTTP-3

The HTTP-1, HTTP-2 and HTTP-3 reference points, which support the location management system in the signalling control plane (not shown in Figure M.2-1) are described in 3GPP TS 23.280 [2] clause 7.5.3.

# N <*To be specified*>

## N.1 <*To be specified*>

# P Procedures

## P.1 <*To be specified*>

# Q XML body definitions

## Q.1 <To be specified>

# R <*To be specified*>

## R.1 <*To be specified*>

Annex A (informative):  
Change history

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| **Change history** | | | | | | | |
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2023-08 | CT1#143 | C1-235054  C1-235056  C1-236139 |  |  |  | Initial skeleton + clause 4 + clause M | 0.1.0 |