



**5G;
Mission Critical Location Management (MCLoc);
Protocol Specification
(3GPP TS 24.283 version 19.1.0 Release 19)**



ReferenceRTS/TSGC-0124283vj10

Keywords5G

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° w061004871

Important notice

The present document can be downloaded from the
[ETSI Search & Browse Standards](#) application.

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format on [ETSI deliver](#) repository.

Users should be aware that the present document may be revised or have its status changed,
this information is available in the [Milestones listing](#).

If you find errors in the present document, please send your comments to
the relevant service listed under [Committee Support Staff](#).

If you find a security vulnerability in the present document, please report it through our
[Coordinated Vulnerability Disclosure \(CVD\)](#) program.

Notice of disclaimer & limitation of liability

The information provided in the present deliverable is directed solely to professionals who have the appropriate degree of experience to understand and interpret its content in accordance with generally accepted engineering or other professional standard and applicable regulations.

No recommendation as to products and services or vendors is made or should be implied.

No representation or warranty is made that this deliverable is technically accurate or sufficient or conforms to any law and/or governmental rule and/or regulation and further, no representation or warranty is made of merchantability or fitness for any particular purpose or against infringement of intellectual property rights.

In no event shall ETSI be held liable for loss of profits or any other incidental or consequential damages.

Any software contained in this deliverable is provided "AS IS" with no warranties, express or implied, including but not limited to, the warranties of merchantability, fitness for a particular purpose and non-infringement of intellectual property rights and ETSI shall not be held liable in any event for any damages whatsoever (including, without limitation, damages for loss of profits, business interruption, loss of information, or any other pecuniary loss) arising out of or related to the use of or inability to use the software.

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2026.
All rights reserved.

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The declarations pertaining to these essential IPRs, if any, are publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the [ETSI IPR online database](#).

Pursuant to the ETSI Directives including the ETSI IPR Policy, no investigation regarding the essentiality of IPRs, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP™**, **LTE™** and **5G™** logo are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners. **oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners. **GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

Legal Notice

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

The present document may refer to technical specifications or reports using their 3GPP identities. These shall be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between 3GPP and ETSI identities can be found at [3GPP to ETSI numbering cross-referencing](#).

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Contents

Intellectual Property Rights	2
Legal Notice	2
Modal verbs terminology.....	2
Foreword.....	8
1 Scope	10
2 References	10
3 Definitions of terms, symbols and abbreviations	11
3.1 Terms.....	11
3.2 Symbols.....	11
3.3 Abbreviations	11
4 General	11
4.1 Overview	11
4.2 LMS Registration	12
4.3 Identities	12
4.3.1 General.....	12
4.3.2 MCLOC client ID	13
5 Functional entities and reference points.....	13
5.1 Introduction	13
5.2 Location management service functional architecture	13
5.3 Functional entities	14
5.3.1 MCLoc client (LMC).....	14
5.3.2 MCLoc server (LMS)	14
5.3.3 void	15
5.3.4 Configuration management server (CMS).....	15
5.4 Reference points	15
5.4.1 void	15
5.4.2 Reference point CSC-14 (between the LMS and the LMC).....	15
5.4.3 Reference point CSC-15 (between the LMS and the MC service server).....	15
5.4.4 Reference point CSC-22 (between the LMS and another LMS).....	15
5.4.5 Reference point CSC-24 (between the LMS and the configuration management server)	15
5.4.6 Reference point IWF-4 (between the LMS and the IWF).....	15
5.4.7 Reference points HTTP-1, HTTP-2 and HTTP-3	15
6 Services offered by the location management server	16
6.1 Introduction	16
6.2 LMS_Reporting service	16
6.2.1 Service description.....	16
6.2.2 Service operations.....	17
6.2.2.1 Introduction	17
6.2.2.2 RegistrationRequest	17
6.2.2.2.1 General	17
6.2.2.2.2 LMC register to LMS using RegistrationRequest operation	17
6.2.2.3 RegistrationUpdate.....	18
6.2.2.3.1 General	18
6.2.2.3.2 LMC updating registration using RegistrationUpdate operation	18
6.2.2.4 RegistrationDelete.....	19
6.2.2.4.1 General	19
6.2.2.4.2 LMC deregistering using RegistrationDelete operation	19
6.2.2.5 ConfigurationNotify	20
6.2.2.5.1 General	20
6.2.2.5.2 LMS send configuration using ConfigurationNotify operation.....	20
6.2.2.6 ConfigurationRequest	20
6.2.2.6.1 General	20

6.2.2.6.2	LMC request the location configuration using ConfigurationRequest operation	21
6.2.2.7	LocationReport.....	21
6.2.2.7.1	General	21
6.2.2.7.2	LMS send location request using LocationReportRequest	21
6.2.2.8	LocationReportPublish.....	22
6.2.2.8.1	General	22
6.2.2.8.2	LMC reports to LMS using LocationReportPublish.....	22
6.3	LMS_Information service	23
6.3.1	Service description.....	23
6.3.2	Service operations.....	24
6.3.2.1	Introduction	24
6.3.2.2	LocationRequest.....	24
6.3.2.2.1	General	24
6.3.2.2.2	Client request location information to LMS using LocationRequest operation.....	24
6.3.2.3	LocationInfoSubscribe	26
6.3.2.3.1	General	26
6.3.2.3.2	Client request subscription using LocationInfoSubscribe operation	26
6.3.2.4	LocationInfoNotify	28
6.3.2.4.1	General	28
6.3.2.4.2	LMS Notify clients using LocationInfoNotify operation	28
6.3.2.5	LocationInfoSubscribeUpdate.....	28
6.3.2.5.1	General	28
6.3.2.5.2	Client requests update of subscription using LocationInfoSubscribeUpdate operation	29
6.3.2.6	LocationInfoSubscribeDelete.....	30
6.3.2.6.1	General	30
6.3.2.6.2	Client requests unsubscribe using LMS_LocationInfoSubscribeDelete operation.....	30
6.3.2.7	LocationInfoConfigRequest	31
6.3.2.7.1	General	31
6.3.2.7.2	Client request location configuration change for another client from LMS using LocationInfoConfigRequest operation	31
7	LMS API Definitions	32
7.1	LMS_Reporting API	32
7.1.1	Introduction.....	32
7.1.2	Usage of HTTP	32
7.1.2.1	General	32
7.1.2.2	HTTP standard headers	33
7.1.2.2.1	General	33
7.1.2.2.2	Content type	33
7.1.2.3	HTTP custom headers	33
7.1.3	Resources.....	33
7.1.3.1	Overview.....	33
7.1.3.2	Resource: LMC Registrations	34
7.1.3.2.1	Description	34
7.1.3.2.2	Resource Definition.....	34
7.1.3.2.3	Resource Standard Methods	34
7.1.3.2.4	Resource Custom Operations	35
7.1.3.3	Resource: Individual LMC registration.....	35
7.1.3.3.1	Description	35
7.1.3.3.2	Resource Definition.....	35
7.1.3.3.3	Resource Standard Methods	35
7.1.3.3.4	Resource Custom Operations	38
7.1.3.4	Resource: LMC Configurations	38
7.1.3.4.1	Description	38
7.1.3.4.2	Resource Definition.....	38
7.1.3.4.3	Resource Standard Methods	38
7.1.3.4.4	Resource Custom Operations	39
7.1.3.5	Resource: LMC Location Reports.....	39
7.1.3.5.1	Description	39
7.1.3.5.2	Resource Definition.....	39
7.1.3.5.3	Resource Standard Methods	39
7.1.3.5.4	Resource Custom Operations	40

7.1.4	Custom Operations without associated resources	40
7.1.5	Notifications	40
7.1.5.1	General	40
7.1.5.2	ConfigurationNotify notification.....	40
7.1.5.2.1	Description	40
7.1.5.2.2	Target URI.....	40
7.1.5.2.3	Standard Methods	41
7.1.5.3	LocationReportRequest notification	41
7.1.5.3.1	Description	41
7.1.5.3.2	Target URI.....	41
7.1.5.3.3	Standard Methods	41
7.1.6	Data Model	42
7.1.6.1	General	42
7.1.6.2	Structured data types	43
7.1.6.2.1	Introduction	43
7.1.6.2.2	Type: LMCRegistration.....	43
7.1.6.2.3	Type: LocationConfiguration	43
7.1.6.2.4	Type: TriggeringCriteria.....	44
7.1.6.2.5	Type: CellChange	44
7.1.6.2.6	Type: AnyCellChange	44
7.1.6.2.7	Type: SpecificCellChange	45
7.1.6.2.8	Type: EutranCell	45
7.1.6.2.9	Type: NrCell.....	45
7.1.6.2.10	Type: GeographicalAreaChange	45
7.1.6.2.11	Type: MbsfnAreaChange	46
7.1.6.2.12	Type: AnyMbsfnAreaChange.....	46
7.1.6.2.13	Type: SpecificMbsfnArea.....	46
7.1.6.2.14	Type: MbsfnAreaId	46
7.1.6.2.15	Type: MbmsSaChange	46
7.1.6.2.16	Type: AnyMbmsSaChange.....	47
7.1.6.2.17	Type: SpecificMbmsSaIdentity	47
7.1.6.2.18	Type: MbmsSaIdentity	47
7.1.6.2.19	Type: NR5GMbsfsaAreaChange.....	47
7.1.6.2.20	Type: AnyNR5GMbsfsaAreaChange	47
7.1.6.2.21	Type: SpecificNR5GMbsfsaArea	48
7.1.6.2.22	Type: NR5GMbsfsaAreaIdentity.....	48
7.1.6.2.23	Type: PeriodicReport.....	48
7.1.6.2.24	Type: PlmnChange	48
7.1.6.2.25	Type: AnyPlmnChange	48
7.1.6.2.26	Type: SpecificPlmnChange	49
7.1.6.2.27	Type: Plmn	49
7.1.6.2.28	Type: TrackingAreaChange	49
7.1.6.2.29	Type: AnyTrackingAreaChange.....	49
7.1.6.2.30	Type: SpecificTrackingAreaChange	49
7.1.6.2.31	Type: TrackingArea.....	50
7.1.6.2.32	Type: TravelledDistance.....	50
7.1.6.2.33	Type: RequestedLocationInfo	50
7.1.6.2.34	Type: AdaptiveTrigger	51
7.1.6.2.35	Void.....	53
7.1.6.2.36	Type: SpecificArea	53
7.1.6.2.37	Type: RatTypeChange.....	53
7.1.6.2.38	Type: AnyRatTypeChange	53
7.1.6.2.39	Void.....	54
7.1.6.2.40	Type: SignallingEvent	54
7.1.6.2.41	Type: FunctionalAliasActivation.....	54
7.1.6.2.42	Type: FunctionalAliasDeactivation.....	54
7.1.6.2.43	Type: InitialLogOn	54
7.1.6.2.44	Type: GroupCallNonEmergency	55
7.1.6.2.45	Type: PrivateCallNonEmergency	55
7.1.6.2.46	Type: LocationConfigurationReceived	55
7.1.6.2.47	Type: LocationRequest.....	55
7.1.6.2.48	Type: RequestLocationHistory.....	56

7.1.6.2.49	Type: MCUELocation	56
7.1.6.2.50	Type: LocationInfo	57
7.1.6.2.51	Type: CurrentCoordinate	57
7.1.6.2.52	Type: LocationHistoryData	57
7.1.6.2.53	Type: LocationHistoryEvent	58
7.1.6.2.54	Type: LocationHistoryStatus	58
7.1.6.3	Simple data types and enumerations	58
7.1.6.3.1	Introduction	58
7.1.6.3.2	Simple data types.....	58
7.1.6.3.3	Enumeration: ConfigScope.....	58
7.1.6.3.4	Enumeration: ReportType	59
7.1.6.3.5	Enumeration: InterRatType	59
7.1.7	Error Handling.....	59
7.1.7.1	General	59
7.1.7.2	Protocol Errors	59
7.1.7.3	Application Errors.....	59
7.1.8	Feature negotiation	60
7.1.9	Security	60
7.1.10	HTTP redirection	60
7.2	LMS_Information API	60
7.2.1	Introduction.....	60
7.2.2	Usage of HTTP	61
7.2.2.1	General	61
7.2.2.2	HTTP standard headers	61
7.2.2.2.1	General	61
7.2.2.2.2	Content type	61
7.2.2.3	HTTP custom headers	61
7.2.3	Resources	61
7.2.3.1	Overview	61
7.2.3.2	Resource: Client location information request	62
7.2.3.2.1	Description	62
7.2.3.2.2	Resource Definition.....	62
7.2.3.2.3	Resource Standard Methods	63
7.2.3.3.4	Resource Custom Operations	63
7.2.3.3	Resource: Location information subscriptions.....	63
7.2.3.3.1	Description	63
7.2.3.3.2	Resource Definition.....	63
7.2.3.3.3	Resource Standard Methods	64
7.2.3.4	Resource: Individual location information subscription	65
7.2.3.4.1	Description	65
7.2.3.4.2	Resource Definition.....	65
7.2.3.4.3	Resource Standard Methods	65
7.2.3.4.4	Resource Custom Operations	67
7.2.3.5	Resource: Location information config request	68
7.2.3.5.1	Description	68
7.2.3.5.2	Resource Definition.....	68
7.2.3.5.3	Resource Standard Methods	68
7.2.4	Custom Operations without associated resources	68
7.2.5	Notifications	69
7.2.5.1	General	69
7.2.5.2	Location information notification	69
7.2.5.2.1	Description	69
7.2.5.2.2	Target URI.....	69
7.2.5.2.3	Standard Methods	69
7.2.6	Data Model	69
7.2.6.1	General	69
7.2.6.2	Structured data types.....	70
7.2.6.2.1	Introduction	70
7.2.6.2.2	Type: ClientOriginatingLocationRequest.....	70
7.2.6.2.3	Type: MCUserLocation.....	70
7.2.6.2.4	Type: LocationNotification	71
7.2.6.2.5	Type: LocationSubscriptionRequest.....	71

7.2.6.3	Simple data types and enumerations	71
7.2.7	Error Handling	71
7.2.7.1	General	71
7.2.7.2	Protocol Errors	71
7.2.7.3	Application Errors	71
7.2.8	Feature negotiation	72
7.2.9	Security	72
7.2.10	HTTP redirection	72
Annex A (normative): OpenAPI specification		73
A.1	General	73
A.2	LMS_Reporting API	73
A.3	LMS_Information API	88
Annex B (informative): Change history		96
History		97

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 21.900: "Technical Specification Group working methods". |
| [2] | 3GPP TR 21.905: "Vocabulary for 3GPP Specifications". |
| [3] | 3GPP TS 23.280: "Common functional architecture to support mission critical services; Stage 2". |
| [4] | 3GPP TS 23.271: "Functional stage 2 description of Location Services (LCS)". |
| [5] | 3GPP TS 23.273: "5G System (5GS) Location Services (LCS); Stage 2". |
| [6] | 3GPP TS 23.283: "Mission Critical Communication Interworking with Land Mobile Radio Systems; Stage 2". |
| [7] | 3GPP TS 24.281: "Mission Critical Video (MCVideo) signalling control; Protocol specification". |
| [8] | 3GPP TS 24.282: "Mission Critical Data (MCData) signalling control; Protocol specification". |
| [9] | 3GPP TS 24.379: "Mission Critical Push to Talk (MCPTT) call control Protocol specification". |
| [10] | 3GPP TS 24.482: "Mission Critical Services (MCS) identity management; Protocol specification". |
| [11] | 3GPP TS 24.483: "Mission Critical Services (MCS) Management Object (MO)". |
| [12] | 3GPP TS 24.484: "Mission Critical Services (MCS) configuration management Protocol specification". |
| [13] | 3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3". |
| [14] | 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3". |
| [15] | 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3". |
| [16] | 3GPP TS 29.572: "5G System; Location Management Services; Stage 3". |
| [17] | 3GPP TS 33.180: "Security of the mission critical service". |

- [18] IETF RFC 9562: "Universally Unique IDentifiers (UUIDs)".
- [19] IETF RFC 6750: "The OAuth 2.0 Authorization Framework: Bearer Token Usage".
- [20] IETF RFC 8259: "The JavaScript Object Notation (JSON) Data Interchange Format".
- [21] IETF RFC 9113: "HTTP/2".
- [22] OpenAPI: "OpenAPI Specification Version 3.0.0", <https://spec.openapis.org/oas/v3.0.0>.

3 Definitions of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in 3GPP TR 21.905 [2], 3GPP TS 23.280 [3] 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 [2] or 3GPP TS 23.280 [3].

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.

MCLOC client ID: is a globally unique identification of a specific location management client instance. MCLOC client ID is a UUID URN as specified in IETF RFC 9562 [18].

3.2 Symbols

No symbols are defined in the present document.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [2], 3GPP TS 23.280 [3], 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 [2] or 3GPP TS 23.280 [3].

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 [3]) 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 LMS Registration

In the context of this specification the LMC needs to register to the LMS prior the MCLoc services can be made available to the MC user. When the LMC has registered to the LMS, the LMC may continuously get location configuration notifications and location requests from the LMS. The LMS registration shall include a LMC contact address (as a callback URI) used by the LMS to send the requests or notifications to the LMC.

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

4.3 Identities

4.3.1 General

The LMC is provided with MC service IDs as defined 3GPP TS 23.280 [3] from the IdMS during user authentication procedure according to 3GPP TS 33.180 [17]. The MC service IDs are provided in the access tokens and ID tokens. The MC UE can get one or several access tokens and ID tokens from the IdMS depending on implementation. The MC service IDs are used in the three MC services and there is no dedicated MC service ID used by the location management server or client.

In the interaction between the LMC and LMS (e.g. location information reports) the LMC shall provide all MC service IDs that are currently available to the LMC. Other entities requesting location information for a specific MC user might only know a specific MC service ID for the MC user of interest.

Additionally, a LMC sending a request to a LMS shall also include the MCLOC client ID as defined in clause 4.3.2. The MCLOC client ID is used to distinguish multiple location management clients used by a single MC user.

4.3.2 MCLOC client ID

The LMC assigns the MCLOC client ID when the LMC is used for the first time. The LMC generates the MCLOC client ID as specified in clause 4.2 of IETF RFC 9562 [18].

The LMC preserves the MCLOC client ID:

- while the LMC is service authorized in the LMS;
- while the LMC is not service authorized in the LMS and the UE serving the MCLOC client is switched on;
- while the UE serving the MCLOC client is switched off; and
- while the UE serving the MCLOC client is power-cycled.

NOTE: MCLOC client ID is not preserved when the UE is reset to factory settings.

Other network entities (e.g. IWF, MC service servers, other LMS) that consume location information shall also assign a MCLOC client ID to be used in the APIs defined in this specification.

5 Functional entities and reference points

5.1 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 [3]).

5.2 Location management service functional architecture

Figure 5.2-1 shows the functional model for the location management service in the application plane, based on the architecture in 3GPP TS 23.280 [3] clause 7.3.

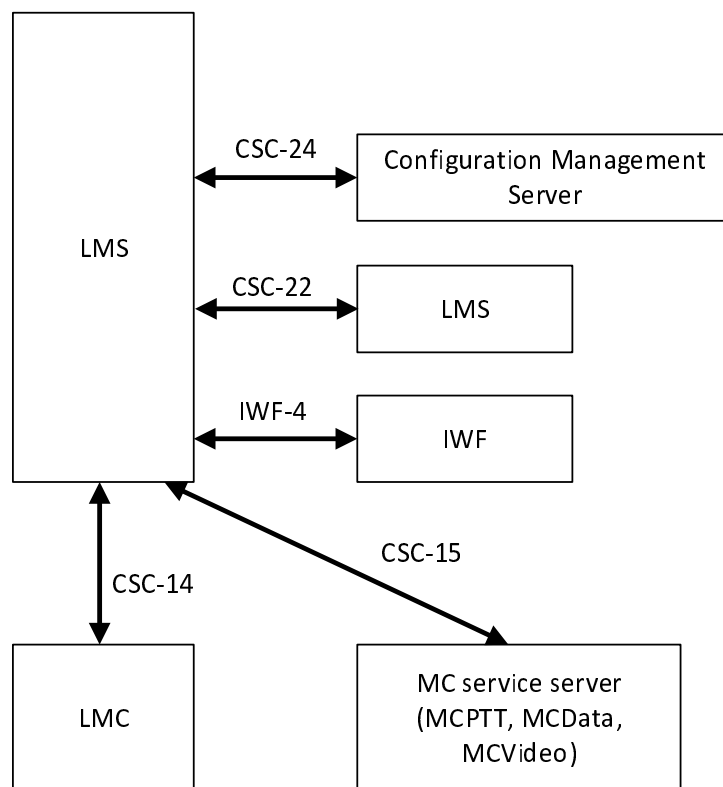


Figure 5.2-1: Location management service functional architecture

The protocol used on reference point CSC-24 is not part of this specification.

5.3 Functional entities

5.3.1 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 [3] and in the present document to register, obtain service authorization, request, receive and report location information,

5.3.2 MCLoc server (LMS)

The MCLoc server executes location related procedures defined in 3GPP TS 23.280 [3] 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.

5.3.3 void

5.3.4 Configuration management server (CMS)

See 3GPP TS 23.280 [3] clause 7.4.2.2.2.

5.4 Reference points

5.4.1 void

5.4.2 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 [3] clause 7.5.2.14.

5.4.3 Reference point CSC-15 (between the LMS and the MC service server)

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

5.4.4 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 [3] clause 7.5.2.23.

5.4.5 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 [3] clause 7.5.2.25.

5.4.6 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 [6] clause 7.4.4.

5.4.7 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 5.2-1) are described in 3GPP TS 23.280 [3] clause 7.5.3.

6 Services offered by the location management server

6.1 Introduction

The table 6.1-1 lists the location management server APIs below the service name. A service description clause for each API gives a general description of the related API.

Table 6.1-1: API Descriptions

Service Name	Service Operations	Operation Semantics	Consumer(s)
LMS_Reporting	RegistrationRequest	Request/Response	LMC
	RegistrationUpdate	Request/Response	LMC
	RegistrationDelete	Request/Response	LMC
	ConfigurationNotify	Request/Response	LMS
	ConfigurationRequest	Request/Response	LMC
	LocationReportRequest	Request/Response	LMS
	LocationReportPublish	Request/Response	LMC
LMS_Information	LocationInfoRequest	Request/Response	LMC, MC service server, IWF, LMS
	LocationInfoSubscribe	Subscribe/Notify	LMC, MC service server, IWF, LMS
	LocationInfoNotify	Subscribe/Notify	LMS
	LocationInfoSubscribeUpdate	Subscribe/Notify	LMC, MC service server, IWF, LMS
	LocationInfoSubscribeDelete	Subscribe/Notify	LMC, MC service server, IWF, LMS
	LocationInfoConfigRequest	Request/Response	LMC, MC service server, IWF, LMS

Table 6.1-2 summarizes the corresponding LMS APIs defined in this specification.

Table 6.1-2: API Descriptions

Service Name	Clause	Description	OpenAPI Specification File	apiName	Annex
LMS_Reporting	7.1	LMS registration and reporting	TS24283_Lms_Reporting.yaml	lms-reporting	A.2
LMS_Information	7.2	LMS location information	TS24283_Lms_Information.yaml	lms-information	A.3

6.2 LMS_Reporting service

6.2.1 Service description

The LMS_Reporting service allows the LMC to:

- Register, update the registration and to deregister in the LMS;
- Request location configuration and receive location configuration; and
- Receive location information requests and to send location information reports.

At registration the LMS performs the service authorization according to 3GPP TS 33.180 [17].

6.2.2 Service operations

6.2.2.1 Introduction

The service operation defined for LMS_Reporting service is shown in the table 6.2.2.1-1.

Table 6.2.2.1-1: Operations of the LMS_Reporting service

Service operation name	Description	Initiated by
RegistrationRequest	This service operation is used by the LMC to register in the LMS.	LMC
RegistrationUpdate	This service operation is used by the LMC to update a registration in the LMS.	LMC
RegistrationDelete	This service operation is used by the LMC to deregister in the LMS.	LMC
ConfigurationNotify	This service operation is a callback request used by the LMS to send location configuration to the LMC.	LMS
ConfigurationRequest	This service operation is used by the LMC to request the location configuration.	LMC
LocationReportRequest	This service operation is a callback request used by the LMS to send a location information request to the LMS.	LMS
LocationReportPublish	This service operation is used by the LMC to report the location information of the MC UE to the LMS.	LMC

6.2.2.2 RegistrationRequest

6.2.2.2.1 General

This service operation is used by LMC to register itself in a given LMS.

6.2.2.2.2 LMC register to LMS using RegistrationRequest operation

For a LMC to register in the LMS, the LMC shall send an HTTP POST message to the LMS on the LMS_Reporting collection resource (i.e., LMC registration) to create the resource associated to the registration in the LMC.

The request URI shall be set according to clause 7.1.1.

The HTTP request shall include an Authorization header field with the "Bearer" authentication scheme set to all access tokens of the "bearer" token type as specified in IETF RFC 6750 [19].

NOTE: The LMS registration is relevant for all valid MC service IDs, hence the request includes all access tokens.

Other HTTP headers shall be set according to clause 7.1.2.2.

The body of the HTTP POST message shall include the LMCRegistration as specified in clause 7.1.6.2.2. The LMCRegistration datatype:

- 1) shall include an expTime attribute containing the time and date for the registration expiry;
- 2) shall include a mclocClientId attribute identifying the instance of the LMC;
- 3) shall include a locationConfigUri attribute specifying the URI of the LMC to which location configuration request shall be sent to;
- 4) shall include a locationRequestUri attribute specifying the URI of the LMC to which location request shall be sent to;
- 5) may include a pei attribute specifying the imei of the MC UE; and
- 6) may include a supi attribute specifying the supi of the subscription.

Upon receiving the HTTP POST message from the LMC, the LMS:

- 1) shall validate the access tokens as specified in 3GPP TS 33.180 [17];
- 2) shall consider the MC service IDs derived from the bearer access tokens as the identities of the sender of the RegistrationRequest;
- 3) if the any access token is not validated successfully, the LMS shall reject the request with a HTTP 401 (Unauthorized) response and not continue with the remaining steps; and
- 4) if the access token validation is successful, then the LMS:
 - a) shall create a new resource with the LMC registration information as specified in clause 7.1.3.3.2 together with all LMS authorized MC service IDs;
 - b) may initiate a ConfigurationNotify notification as specified in clause 7.1.5.2; and
 - c) shall send a HTTP 201 Created response message to the LMC with the following clarifications:
 - i) include the LMC registration information in the body of the HTTP 201 (Created) message;
 - ii) the response message may include an updated expiration time to indicate when the LMC registration will automatically expire; and

NOTE: The updated expiration time can be shorter than what was initially provided by the LMC.

- iii) the URI of the created resource shall be returned in the "Location" HTTP header.

While the LMC is registered in the LMS, the LMS may repeatedly send:

- 1) ConfigurationNotify as specified in clause 6.2.2.5; and
- 2) LocationReportRequest as specified in clause 6.2.2.7.

The LMC shall send a Registration Update request (as described in clause 6.2.2.3) prior to the expiration time, to maintain the registration state. If a successful Registration Update request is not received prior to the expiration time, then the LMS shall treat LMC as implicitly deregistered and remove the corresponding LMC registration resource.

The LMS may use the value of *pei* or *supi* attribute when interacting over the *Le* reference point to request location information from the LCS network, see reference 3GPP TS 23.271 [4] and 3GPP TS 23.273 [5].

6.2.2.3 RegistrationUpdate

6.2.2.3.1 General

This service operation is used by the LMC to update its registration information at the LMS.

6.2.2.3.2 LMC updating registration using RegistrationUpdate operation

To update the LMC registration information at the LMS, the LMC shall send an HTTP PUT message to the LMS on resource URI identifying the individual LMC registration resource representation as specified in clause 7.1.3.3.2. The HTTP PUT message shall replace all properties of the existing resource with the LMC registration information in the request.

The request URI shall be set according to clause 7.1.1.

The HTTP request shall include an Authorization header field with the "Bearer" authentication scheme set to all access tokens of the "bearer" token type as specified in IETF RFC 6750 [19].

NOTE: The LMS registration is relevant for all valid MC service IDs, hence the request includes all access tokens.

Other HTTP headers shall be set according to clause 7.1.2.2.

The body of the HTTP PUT message shall include the LMCRegistration as specified in clause 7.1.6.2.2. The LMCRegistration datatype shall include:

- 1) an expTime attribute containing the time and date for the registration expiry;
- 2) a mclocClientId attribute identifying the instance of the LMC as defined in clause 4.3.2;
- 3) a locationConfigUri attribute specifying the URI of the LMC to which location configuration request shall be sent to; and
- 4) a locationRequestUri attribute specifying the URI of the LMC to which location request shall be sent to.

Upon receiving the PUT message from the LMC, if the resource URI does not exist, the LMS shall respond 404 Not Found error to the LMC. Otherwise, the LMS:

- 1) shall validate the access tokens as specified in 3GPP TS 33.180 [17];
- 2) shall consider the MC service IDs derived from the bearer access tokens as the identities of the sender of the RegistrationRequest;
- 3) if any access token is not validated successfully, the LMS shall reject the request with a HTTP 401 (Unauthorized) response and not continue with the remaining steps; and
- 4) if the access token validation is successful, then:
 - a) the LMS shall update the resource with the LMC registration information as specified in clause 7.1.3.3.2 together with all LMS authorized MC service IDs; and
 - b) shall return the updated LMC registration information in the response. In the response message, the LMS may send "200 OK" response code to provide an updated expiration time to indicate to the LMC when the updated registration will automatically expire. The expTime attribute shall override the current expTime attribute maintained by the LMC. Otherwise, the LMS sends "204 No Content" response code.

The LMC shall send a RegistrationUpdate request prior to the expiration time, to maintain the registration state. If a successful RegistrationUpdate request is not received prior to the expiration time, then the LMS shall treat LMC as implicitly deregistered and remove the corresponding LMC Registration resource.

6.2.2.4 RegistrationDelete

6.2.2.4.1 General

This service operation is used by LMC to deregister itself from a given LMS.

6.2.2.4.2 LMC deregistering using RegistrationDelete operation

To deregister itself from the LMS, the LMC shall send HTTP DELETE message to the LMS, on the resource URI identifying the individual LMC registration resource representation as specified in clause 7.1.3.3.2.

The request URI shall be set according to clause 7.1.1.

The HTTP request shall include an Authorization header field with the "Bearer" authentication scheme set to the access tokens of the "bearer" token type as specified in IETF RFC 6750 [19].

NOTE: The LMS registration is relevant for all valid MC service IDs, hence the request includes all access tokens.

Other HTTP headers shall be set according to clause 7.1.2.2.

Upon receiving the HTTP DELETE request, the LMS shall:

- 1) verify the identity of the LMC and check if the LMC is authorized to deregister the LMS registration information; and
- 2) if the LMC is authorized to deregister the LMS registration information, then the LMS shall
 - a) if the resource identified by registrationId is not found, return "404 Not Found" error message to the LMC;

- b) otherwise, deregister the LMC from the LMS and delete the resource representing LMC registration information; and
- c) return the "204 No Content" message to the LMC, indicating the successful deregistration of the LMC information.

6.2.2.5 ConfigurationNotify

6.2.2.5.1 General

This service operation is used by LMS to notify the LMC about a new location configuration.

6.2.2.5.2 LMS send configuration using ConfigurationNotify operation

The LMS may at any time determine to notify a registered LMC about a change in the location configuration. The location configuration is sent to the LMC according to this procedure.

To notify the LMC about a location configuration, the LMS shall send HTTP POST message to the LMC, using the Notification Destination URI received in the registration request, as specified in clause 7.1.5.2.2.

The body of the HTTP POST message shall include the LocationConfiguration data type set to the desired configuration as specified in clause 7.1.6.2.3, and with the following clarifications:

- 1) shall include the triggerId attribute, with its already assigned value, if existent and valid, or with a newly generated unique value, if not, where defined for the sub-elements defining the trigger criterion;
- 2) may include the mcServiceId attribute set to the identity of the user requesting the location information configuration;
- 3) may include the configScope attribute set to "FULL" or "UPDATE". The value "FULL" means that the configuration attributes contains the full location configuration which replaces any previous location configuration. The value "UPDATE" means that the location configuration is in addition to any previous location configuration. To remove configuration elements a "Full" configuration is needed; and
- 4) may include the locationHistory attribute set to true to indicate that location information shall be stored in the LMC during the state when the LMC is not able to report location information. If the attribute is not included or set to false location information may not be stored in the LMC if the LMC fails to report location information.

Upon receiving the HTTP POST request, the LMC shall:

When the LMC receives that location configuration, then the LMC:

- 1) shall replace or modify the stored contents of the locationConfiguration attribute, consistent with the attribute configScope value, and then store the location configuration;

NOTE: The LMC only needs to store the latest received location reporting configuration.

- 2) shall set the location reporting triggers accordingly;
- 3) shall start the minimumReportInterval timer; and
- 4) if the locationHistory attribute is set to true and if location information reports cannot be successfully sent to the LMS then the LMC shall locally store the location information reports in the MC UE for later submissions.

6.2.2.6 ConfigurationRequest

6.2.2.6.1 General

This service operation is used by LMC to request the location configuration from the LMS.

6.2.2.6.2 LMC request the location configuration using ConfigurationRequest operation

The LMC may at any time request to download the location configuration from the LMS. The location configuration is sent to the LMC according to this procedure.

To request the location configuration the LMC shall send HTTP GET message to the LMS on the LMS_Reporting collection resource (i.e., LMC configurations).

The request URI shall be set according to clause 7.1.1.

The HTTP request shall include an Authorization header field with the "Bearer" authentication scheme set to all access tokens of the "bearer" token type as specified in IETF RFC 6750 [19].

NOTE: The configuration request is relevant for all valid MC service IDs, hence the request includes all access tokens.

Other HTTP headers shall be set according to clause 7.1.2.2.

Upon receiving the HTTP GET message from the LMC, the LMS:

- 1) shall perform service authorization as described in 3GPP TS 33.180 [17];
- 2) if the LMC is service authorized, then the LMS shall send a HTTP 200 OK response message to the LMC with the body including the LocationConfiguration datatype set to the configuration that applies to the LMC service ID; and
- 3) If the LMC is not service authorized, the LMS shall reject the request with a HTTP 401 (Unauthorized) response.

6.2.2.7 LocationReport

6.2.2.7.1 General

This service operation is used by LMS to send a new location report request to a registered LMC.

6.2.2.7.2 LMS send location request using LocationReportRequest

The LMS may at any time determine to send a location report request to a registered LMC.

To request a new location report from an LMC, the LMS shall send HTTP POST message to the LMC, using the Notification Destination URI received in the registration request, as specified in clause 7.1.5.3.2.

The body of the HTTP POST message shall include the LocationRequest data type as specified in clause 7.1.6.2.47, and with the following clarifications:

- 1) shall include the requestedMcServiceId attribute set to the MC service identity of the MC user being requested to send a location report;
- 2) shall include the requestingMcServiceId attribute set to the MC service identity of the MC user that request the location information, if the request is initiated from an LMC;

NOTE: If the request is initiated from the LMS without initial triggered from an LMC then the requesting MCSERVICEID is not needed.

- 3) may include the requestedFunctionalAliasId attribute set to the activated functional alias of the MC user being requested to send a location report;
- 4) may include the requestingFunctionalAliasId attribute set to the activated functional alias of the MC user that request the location information;
- 5) may include the requestedLocationInfo attribute including details of what location information attributes that shall be included in the location report;
- 6) may include the requestedLocationHistory attribute including details of what location information history events that shall be included in the location report; and

- 7) may include the requestedLocationStatus attribute indicating that the location history status should be included in the location report.

Upon receiving the HTTP POST request, the LMC shall:

When the LMC receives that location request, then the LMC:

- 1) shall send a location report as specified in clause 6.2.2.8; and
- 2) shall reset the minimumReportInterval timer.

6.2.2.8 LocationReportPublish

6.2.2.8.1 General

This service operation is used by LMC to publish a location report to a given LMS.

If a location reporting trigger fires the LMC checks if the minimumReportInterval timer is running. If the timer is running the LMC waits until the timer expires. When the minimumReportInterval timer fires, the LMC:

- 1) shall, if any of the reporting triggers are still true, send a location report as specified in clause 6.2.2.8.2.

If the LMC receives a LocationReportRequest as specified in clause 7.1.5.3, the LMC shall publish a location report as specified in clause 6.2.2.8.2.

6.2.2.8.2 LMC reports to LMS using LocationReportPublish

For a LMC to publish a location report to the LMS, the LMC shall send an HTTP POST message to the LMS on the LMS_Reporting collection resource (i.e., LMC location reports) representing the location information of the MC UE.

The request URI shall be set according to clause 7.1.1.

The HTTP request shall include an Authorization header field with the "Bearer" authentication scheme set to all access tokens of the "bearer" token type as specified in IETF RFC 6750 [19].

NOTE: The location report is relevant for all valid MC service IDs, hence the request includes all access tokens.

Other HTTP headers shall be set according to clause 7.1.2.2.

The body of the HTTP POST message shall include the MCUELocation data type as specified in clause 7.1.6.2.49. The MCUELocation datatype shall include:

- 1) a reportID attribute if the report was triggered by a location request, set to the value of the requestID attribute in the received request;
- 2) a reportType attribute indicating if the report is sent during emergency state or not;
- 3) a locTimestamp attribute set to the date and time of the location measurement;
- 4) an array with triggerId attributes, where each item is set to the value associated with the trigger that have fired;
- 5) a mclocClientId attribute identifying the instance of the LMC; and
- 6) a locationData attribute including subitems corresponding to the location configuration, and shall include at least one of the following attributes:
 - a) currentCoordinate, containing the geospatial coordinate of the MC UE, with the following clarification:
 - i) shall include the geographicalCoordinates attribute coded as defined in 3GPP TS 29.572 [16];
 - ii) may include altitude attribute coded as defined in 3GPP TS 29.572 [16];
 - iii) may include the horizontalaccuracy attribute coded as defined in 3GPP TS 29.572 [16];
 - iv) may include the verticalaccuracy attribute coded as defined in 3GPP TS 29.572 [16]; and

- v) may include the bearingAndSpeed attribute coded as defined in 3GPP TS 29.572 [16].
- b) ecgi attribute containing the current served EUTRAN cell;
- c) neighbouringEcgi attribute containing an array of ECGI of any neighbouring cell the MC UE can detect;
- d) mbmsSaiId attribute containing the MBMS Service Area Id the LMC is located in;
- e) mbsfnArea attribute containing the MBSFN Area the LMC is located in;
- f) ncgi attribute containing the current served NR cell;
- g) neighbouringNcgi attribute containing an array of NCGI of any neighbouring cell the MC UE can detect; and
- h) nr5GMbsfsaArea attribute containing the 5G MBSFSA the MC UE is located in;

and may include:

- 1) a functionalAlias attribute containing the functional alias ID related to the functional alias status change that triggered the location measurement;
- 2) an interRatType attribute containing the inter-RAT change type;
- 3) an mcServiceUELabel attribute containing the MC Service UE label;
- 4) a locationHistoryData attribute containing multiple historical location reports if the location request indicates that historical location reports shall be included; and
- 5) a locationHistoryStatus attribute containing a location history status summary.

When the Location report publish is sent the LMC shall set the minimumReportInterval timer to the minimumReportInterval time from the location configuration and start the timer.

Upon receiving the HTTP POST message from the LMC, the LMS:

- 1) shall perform service authorization as described in 3GPP TS 33.180 [17];
- 2) if the LMC is service authorized, then the LMS:
 - a) shall store the location information received in the location report;
 - b) shall use the location information as needed; and
 - c) shall send a HTTP 201 Created to the LMC; and
- 3) If the LMC is not service authorized, the LMS shall reject the request with a HTTP 401 (Unauthorized) response.

6.3 LMS_Information service

6.3.1 Service description

The LMS_Information service allows an LMC, MC service server, IWF or an LMS to:

- request location information;
- subscribe to location notifications;
- receive location information notifications;
- update an existing subscription for location information notification;
- unsubscribe to an existing subscription for location information notifications; and
- change another LMC location configuration.

6.3.2 Service operations

6.3.2.1 Introduction

The service operation defined for LMS_Information service is shown in the table 6.3.2.1-1.

Table 6.3.2.1-1: Operations of the LMS_Information service

Service operation name	Description	Initiated by
LocationInfoRequest	This service operation is used to request location information from the LMS.	LMC, MC service server, IWF, LMS
LocationInfoSubscribe	This service operation is used by the LMC to subscribe to location information from the LMS.	LMC, MC service server, IWF, LMS
LocationInfoNotify	This service operation is used to send notification about location information.	LMS
LocationInfoSubscribeUpdate	This service operation is used by the LMC to update a subscription of location information from the LMS.	LMC, MC service server, IWF, LMS
LocationInfoSubscribeDelete	This service operation is used by the LMC to terminate the subscription of location information.	LMC, MC service server, IWF, LMS
LocationInfoConfigRequest	This services operation is used to change another LMC location configuration.	LMC, MC service server, IWF, LMS

6.3.2.2 LocationRequest

6.3.2.2.1 General

This service operation is used by the LMC, MC service server, IWF or another LMS to send a location information request to an LMS. In this clause and its sub clauses the sender of the request is referred to as the client.

6.3.2.2.2 Client request location information to LMS using LocationRequest operation

For a client to request location information from the LMS, the client shall send an HTTP POST message to the LMS on the LMS_Information collection resource (i.e., Client location information request) to create the resource associated to the request for location information.

The request URI shall be set according to clause 7.2.1.

If the client is an LMC, the HTTP request shall include an Authorization header field with the "Bearer" authentication scheme set to all access tokens of the "bearer" token type as specified in IETF RFC 6750 [19].

NOTE 1: The LocationRequest is relevant for all valid MC service IDs, hence the request includes all access tokens.

If the client is a network entity (e.g. an IWF, an MC service server or another LMS) then the client shall insert an X-3GPP-Asserted-Identity header field as specified in 3GPP TS 24.482 [10] clause A.2.1.3. The identity in the 3GPP-Asserted-Identity header field shall be set to the public service identity of the network entity.

Other HTTP headers shall be set according to clause 7.2.2.2.

The body of the HTTP POST message shall include the ClientOriginatingLocationRequest as specified in clause 7.2.6.2.2. The ClientOriginatingLocationRequest datatype shall include:

- 1) a mclocClientId attribute identifying the instance of the LMC;
- 2) a locationNotificationUri attribute specifying the URI of the LMC to which location information notification shall be sent to;
- 3) at least one of the following:
 - a) an array of MC service IDs of MC users for which location information are requested;
 - b) an array of activated functional alias IDs used to determine MC service IDs of MC users for which location information are requested; and

- c) an array of MC service group IDs used to determine the MC service groups' affiliated MC service IDs of MC users for which location information are requested;
- 4) may include a refresh attribute to indicate that the location information shall be updated immediately from the requested LMC;
- 5) may include the requestedLocationHistory attribute including details of what location information history events that shall be included in the location report; and
- 6) may include the requestedLocationStatus attribute indicating that the location history status should be included in the location report.

Upon receiving the HTTP POST message from the LMC, the LMS shall:

- 1) shall validate the access tokens as specified in 3GPP TS 33.180 [17];
- 2) consider the MC service IDs derived from the bearer access tokens as the identities of the sender of the Locationrequest;
- 3) if any access token is not validated successfully, the LMS shall reject the request with a HTTP 401 (Unauthorized) response and not continue with the remaining steps;
- 4) if the array of MC service IDs, the array of functional alias IDs and the array of MC service group IDs are all empty then the LMS shall respond with a HTTP 403 (Forbidden) response including warning text set to "Invalid location request target client list" in a Warning header field, and shall not continue with the rest of the steps; and
- 5) if the access token validation is successful, then:
 - a) the LMS shall create a new resource with the client location information request as specified in clause 7.2.3.2.3; and
 - b) shall send a HTTP 201 Created response message to the LMC;
- 6) determine that the initiating user is authorized to request group based location information for each MC service group ID in the array provided in the attribute mcServiceGroupIds according to the following:
 - a) The initiating user's location user configuration data document according to 3GPP TS 24.484 [12] shall include a <rule> element that includes:
 - i) a <condition> element containing an <identity> element that matches the MC service group ID; and
 - ii) an <action> element containing an <allow-request-location-of-groups> element with the value set to "true"; and
 - b) if the item a) above is not fulfilled the MC service group ID shall be ignored in the remaining steps;
- 7) subscribe to group dynamic data to for each MC service group ID that passes the authorization check in step 6) according to the following:
 - a) if the MC service group is a MCPTT group send a SIP SUBSCRIBE request as specified in 3GPP TS 24.379 [9] clause 9.2.2.2.16 where the LMS takes the role of an MCPTT server serving the initiating user;
 - b) if the MC service group is a MCVideo group send a SIP SUBSCRIBE request as specified in 3GPP TS 24.281 [7] clause 8.2.2.2.16 where the LMS takes the role of an MCVideo server serving the initiating user; and
 - c) if the MC service group is a MCData group send a SIP SUBSCRIBE request as specified in 3GPP TS 24.282 [8] clause 8.3.3.8 where the LMS takes the role of an MCData server serving the initiating user;
- 8) identify all MC service IDs for which location information is requested, based on the following content of the incoming request:
 - a) the MC service IDs from the array provided in the attribute mcServiceIDs;

- b) the MC service IDs of the MC users that have activated the functional alias IDs from the array provided in the attribute functionalAliasIds

NOTE 2: One way to do that is to use the functional alias status determination procedure defined in 3GPP TS 24.379 [9] clause 9A.2.1.3.

- c) the MC service IDs of each MC client that have affiliated to the MC service groups based on the notifications from the group dynamic data subscriptions;
- 9) verify that the initiating user is authorized to request the location of the MC service IDs identified in step 6, according to local policies or to the following:
- a) The initiating user's location user configuration data document according to 3GPP TS 24.484 [12] shall include a <rule> element that include:
 - i) a <condition> element containing an <identity> element that match each of identified MC service ID; and
 - ii) an <action> element containing an <allow-request-location-of-users> element with the value set to "true"; and
 - b) if the item i) above is not fulfilled the MC service ID shall be ignored in the remaining steps;
- 10) If any MC Service IDs identified in the steps above are not owned by the LMS, the LMS shall, in accordance with the procedure in this clause, generate a new HTTP request to the LMS that owns those MC Service IDs;

NOTE 3: How the LMS determines the HTTP request URI of the LMS that owns those MC Service IDs is out of scope of this specification.

- 11) verify that each target user identified from step 7 is authorized to share the location information with the initiating MC user, according to local policies or to the following:
- a) Each target user's location user configuration data document according to 3GPP TS 24.484 [12] shall include a <rule> element that include:
 - i) a <condition> element containing an <identity> element that match the identity of the initiating user MC service ID; and
 - ii) an <action> element containing an <allow-to-share-location-information> element with the value set to "true"; and
 - b) if the item i) above is not fulfilled the MC service ID shall be ignored in the remaining steps;
- 12) if the refresh attribute is present and set to true, initiate LocationReportRequest operations (see clause 6.2.2.7.2) to each LMC identified in step 8).

The LMS shall create one or multiple location information notification and send the notifications to the requesting LMC according to the procedure in clause 6.3.2.4. Each location information notification message may contain location information from one or several MC UEs.

The location information notification message shall include the MC UE location details.

6.3.2.3 LocationInfoSubscribe

6.3.2.3.1 General

This service operation is used by the LMC to subscribe to location information at the LMS.

6.3.2.3.2 Client request subscription using LocationInfoSubscribe operation

To request a subscription for location information, the client shall send an HTTP POST message to the LMS on LMS_Information collection resource (i.e, Location information subscription) to create the resources associated with the subscription in the LMS.

The request URI shall be set according to clause 7.2.1.

If the client is an LMC, The HTTP request shall include an Authorization header field with the "Bearer" authentication scheme set to all access tokens of the "bearer" token type as specified in IETF RFC 6750 [19].

NOTE: The LocationInfoSubscribe operation is relevant for all valid MC service IDs, hence the request includes all access tokens.

If the client is a network entity (e.g. an IWF, an MC service server or another LMS) then the client shall insert an x-3gpp-asserted-identity header field as specified in 3GPP TS 24.482 [10] clause A.2.1.3. The identity in the x-3gpp-asserted-identity header field shall be set to the public service identity of the network entity.

Other HTTP headers shall be set according to clause 7.2.2.2.

The body of the HTTP POST message shall include the LocationSubscriptionRequest as specified in clause 7.2.6.2.5.

The LocationSubscriptionRequest data object shall include:

- 1) a mclocClientId attribute identifying the instance of the LMC;
- 2) a locationNotificationUri attribute specifying the URI of the LMC to which location notifications shall be sent to;
- 3) at least one of the following:
 - a) an array of MC service IDs of MC users for which location information are requested;
 - b) an array of activated functional alias IDs used to determine MC service IDs of MC users for which location information are requested; or
 - c) an array of MC service group IDs used to determine the MC service groups' affiliated MC service IDs of MC users for which location information are requested; and
- 4) an expTime attribute containing the time and date for the subscription expiry;

Upon receiving the HTTP POST message from the LMC, the LMS shall:

- 1) validate the access tokens as specified in 3GPP TS 33.180 [17];
- 2) consider the MC service IDs derived from the bearer access tokens as the identities of the sender of the LMS_LocationInformation_request;
- 3) if the received HTTP request does not contain an Authorization header field with the "Bearer" authentication scheme and a bearer access token and the received HTTP request contains an x-3gpp-asserted-identity header field, the LMS shall consider the URI in the x-3gpp-asserted-identity header field as the identity of the sender of the HTTP request.
- 4) if the received HTTP request does contain an Authorization header field with the "Bearer" authentication scheme and bearer access token then:
 - a) if the received request also includes an x-3gpp-asserted-identity header field, the LMS shall reject the request with a HTTP 401 (Unauthorized) response and not continue with the remaining steps; and
 - b) if any access token is not validated successfully, the LMS shall reject the request with a HTTP 401 (Unauthorized) response and not continue with the remaining steps;
- 5) if the array of MC service IDs, the array of functional alias IDs and the array of MC service group IDs are all empty then the LMS shall respond with a HTTP 403 (Forbidden) response including warning text set to "Invalid subscription request target client list" in a Warning header field, and shall not continue with the rest of the steps;
- 6) if the MC user's location user configuration data document does not include a <rule> element including a <action> element including a <allow-subscription-on-location-information> element set to true the LMS shall respond with a HTTP 403 (Forbidden) response including warning text set to "Unauthorized for location subscription" in a Warning header field, and shall not continue with the rest of the steps;
- 7) generate a unique subscription identifier;
- 8) create a new resource with the location subscription request as specified in clause 7.2.3.3.3; and

- 9) send a HTTP 201 Created response message to the LMC and include the subscription identifier in the Location header;

The LMS shall identify all MC service IDs for which the subscription request applies according to step 6-11 in the procedure for a one-time location information request as specified in clause 6.3.2.2.2.

The LMS shall create location information notifications and send the notifications to the requesting LMC according to the procedure in clause 6.3.2.4. Each location information notification message shall contain location information for the MC UEs of the identified MC service IDs.

The identified MC service IDs may change during the subscription time if the MC service IDs are determined based on affiliated group members or activated functional aliases.

The LMS may need to update the location reporting configuration for the subscribed LMCs according to clause 6.2.2.5.

The notifications shall be sent repeatedly until the subscription expires based on the attribute expTime or until a unsubscribe message is received.

6.3.2.4 LocationInfoNotify

6.3.2.4.1 General

This service operation is used by LMS to notify the clients of a location information.

6.3.2.4.2 LMS Notify clients using LocationInfoNotify operation

The LMS use this procedure to notify an authorized user about other users' location information. The notification is used both because of a one-time location information request as well as repeatedly during a location information subscription.

To notify the LMC about other MC UEs' location information, the LMS shall send HTTP POST message to the LMC, using the notification URI received in the subscription request or in the location information request, as specified in clause 7.2.5.2.2.

The body of the HTTP POST message shall include the LocationNotification data type set to the MC UEs location information as specified in clause 7.2.6.2.4, and with the following clarifications:

- 1) shall include the requestingMcServiceId attribute set to the identity of the user requesting the location information;
- 2) may include the requestingfunctionalAliasId attribute set to the activated functional alias identity of the user requesting the location information;
- 3) shall include the mcUserResponseList attribute set to an array of MCUserLocation objects for each MC user's MC UE location.

When the LMC receives that location notification then the LMC:

- 1) shall send a HTTP 201 Created response message to the LMS; and
- 2) may use the location information as desired.

6.3.2.5 LocationInfoSubscribeUpdate

6.3.2.5.1 General

This service operation is used by clients to update the subscription of a location information.

6.3.2.5.2 Client requests update of subscription using LocationInfoSubscribeUpdate operation

To update an existing subscription the client shall send an HTTP PUT message to the LMS on the resource URI identifying the individual LMC subscription resource representation as specified in clause 7.2.3.4.2. The HTTP PUT message shall replace all properties of the existing resource with the LMS Location information subscribe request.

The request URI shall be set according to clause 7.2.1.

If the client is an LMC, The HTTP request shall include an Authorization header field with the "Bearer" authentication scheme set to all access tokens of the "bearer" token type as specified in IETF RFC 6750 [19].

NOTE: The LocationInfoSubscribeUpdate operation is relevant for all valid MC service IDs, hence the request includes all access tokens.

If the client is a network entity (e.g. an IWF, an MC service server or another LMS) then the client shall insert an x-3gpp-asserted-identity header field as specified in 3GPP TS 24.482 [10] clause A.2.1.3. The identity in the x-3gpp-asserted-identity header field shall be set to the public service identity of the network entity.

Other HTTP headers shall be set according to clause 7.2.2.2.

The body of the HTTP PUT message shall include the LocationSubscriptionRequest datatype as specified in clause 7.2.6.2.5.

The LocationSubscriptionRequest data object shall include:

- 1) a mclocClientId attribute identifying the instance of the LMC;
- 2) a locationNotificationUri attribute specifying the URI of the LMC to which location notifications shall be sent to;
- 3) at least one of the following:
 - a) an array of MC service IDs of MC users for which location information are requested;
 - b) an array of activated functional alias IDs used to determine MC service IDs of MC users for which location information are requested; or
 - c) an array of MC service group IDs used to determine the MC service groups' affiliated MC service IDs of MC users for which location information are requested; and
- 4) an expTime attribute containing the time and date for the subscription expiry;

Upon receiving the HTTP PUT message from the LMC, the LMS shall:

- 1) validate the access tokens as specified in 3GPP TS 33.180 [17];
- 2) consider the MC service IDs derived from the bearer access tokens as the identities of the sender of the LMS_LocationInformation_request;
- 3) if the received HTTP request does not contain an Authorization header field with the "Bearer" authentication scheme and a bearer access token and the received HTTP request contains an x-3gpp-asserted-identity header field, the LMS shall consider the URI in the x-3gpp-asserted-identity header field as the identity of the sender of the HTTP request.
- 4) if the received HTTP request does contain an Authorization header field with the "Bearer" authentication scheme and bearer access token then:
 - a) if the received request also includes an x-3gpp-asserted-identity header field, the LMS shall reject the request with a HTTP 401 (Unauthorized) response and not continue with the remaining steps; and
 - b) if any access token is not validated successfully, the LMS shall reject the request with a HTTP 401 (Unauthorized) response and not continue with the remaining steps;

- 5) if the array of MC service IDs, the array of functional alias IDs and the array of MC service group IDs are all empty then the LMS shall respond with a HTTP 403 (Forbidden) response including warning text set to "Invalid subscription request target client list" in a Warning header field, and shall not continue with the rest of the steps;
- 6) if the MC user's location user configuration data document does not include a <rule> element including a <action> element including a <allow-subscription-on-location-information> element set to true the LMS shall respond with a HTTP 403 (Forbidden) response including warning text set to "Unauthorized for location subscription" in a Warning header field, and shall not continue with the rest of the steps;
- 7) update the complete subscription resource with the location subscription information as specified in clause 7.2.3.3.3; and
- 8) send a HTTP 204 No Content response message to the LMC.

The LMS shall identify all MC service IDs for which the subscription request applies according to step 6-11 in the procedure for a one-time location information request as specified in clause 6.3.2.2.2.

The LMS shall create location information notifications and send the notifications to the requesting LMC according to the procedure in clause 6.3.2.4. Each location information notification message shall contain location information for the MC UEs of the identified MC service IDs.

The identified MC service IDs may change during the subscription time if the MC service IDs are determined based on affiliated group members or activated functional aliases.

The notifications shall be sent repeatedly until the subscription expires based on the attribute expTime or until a unsubscribe message is received.

6.3.2.6 LocationInfoSubscribeDelete

6.3.2.6.1 General

This service operation is used by clients to delete a subscription of a location information.

6.3.2.6.2 Client requests unsubscribe using LMS_LocationInfoSubscribeDelete operation

To delete an subscription in the LMS, the LMC shall send HTTP DELETE message to the LMS, on the resource URI identifying the individual LMC subscription resource representation as specified in clause 7.2.3.4.2.

The request URI shall be set according to clause 7.2.1.

The HTTP request shall include an Authorization header field with the "Bearer" authentication scheme set to the access tokens of the "bearer" token type as specified in IETF RFC 6750 [19].

NOTE: The LMS subscription is relevant for all valid MC service IDs, hence the request includes all access tokens.

Other HTTP headers shall be set according to clause 7.2.2.2.

Upon receiving the HTTP DELETE request, the LMS shall:

- 1) verify the identity of the LMC and check if the LMC is authorized to delete the location information subscription; and
- 2) if the LMC is authorized to delete the location information subscription, then the LMS shall
 - a) if the resource identified by subscription id is not found, return "404 Not Found" error message to the LMC;
 - b) otherwise, delete the location information subscription from the LMS and delete the resource representing location information subscription; and
 - c) return the "204 No Content" message to the LMC, indicating the successful deletion of the LMC location information subscription.

6.3.2.7 LocationInfoConfigRequest

6.3.2.7.1 General

This service operation is used by the LMC, MC service server, IWF or another LMS to request an LMS to send a location configuration change request to an LMC. In this clause and its sub clauses the sender of the request is referred to as the client.

6.3.2.7.2 Client request location configuration change for another client from LMS using LocationInfoConfigRequest operation

For a client to request location configuration change for another client via the LMS, the client shall send an HTTP POST message to the LMS on the LMS_LocationInformation collection resource (i.e., Location Info Config request) to create the resource associated to the request for configuration change.

The request URI shall be set according to clause 7.2.2.

If the client is an LMC, the HTTP request shall include an Authorization header field with the "Bearer" authentication scheme set to all access tokens of the "bearer" token type as specified in IETF RFC 6750 [19].

NOTE: The LocationInfoConfigRequest is relevant for all valid MC service IDs, hence the request includes all access tokens.

If the client is a network entity (e.g. an IWF, an MC service server or another LMS) then the client shall insert an X-3GPP-Asserted-Identity header field as specified in 3GPP TS 24.482 [10] clause A.2.1.3. The identity in the 3GPP-Asserted-Identity header field shall be set to the public service identity of the network entity.

Other HTTP headers shall be set according to clause 7.2.2.2.

The body of the HTTP POST message shall include the LocationConfiguration as specified in clause 7.1.6.2.3. The LocationConfiguration datatype shall include:

- 1) shall include the triggerId attribute, with its already assigned value, if existent and valid, or with a newly generated unique value, if not, where defined for the sub-elements defining the trigger criterion;
- 2) shall include the mcServiceId attribute set to the identity of the target user for the location information configuration update; and
- 3) may include the locationHistory attribute set to true to indicate that location information shall be stored in the LMC during the state when the LMC is not able to report location information. If the attribute is not included or set to false location information may not be stored in the LMC if the LMC fails to report location information.

Upon receiving the HTTP POST message from the LMC, the LMS shall:

- 1) shall validate the access tokens as specified in 3GPP TS 33.180 [17];
- 2) consider the MC service IDs derived from the bearer access tokens as the identities of the sender of the LocationInfoConfigRequest;
- 3) if any access token is not validated successfully, the LMS shall reject the request with a HTTP 401 (Unauthorized) response and not continue with the remaining steps;
- 4) if the access token validation is successful, then:
 - a) shall send a HTTP 200 OK response message to the LMC;
- 5) identify MC service ID for which location information configuration update is requested, based on content of the attribute mcServiceId;
- 6) verify that the initiating user is authorized to update the location information configuration of the MC service ID identified in step 5, according to local policies or to the following:
 - a) The initiating user's location user configuration data document according to 3GPP TS 24.484 [12] shall include a <rule> element that include:

- i) a <condition> element containing an <identity> element that matches identified MC service ID; and
 - ii) an <action> element containing an <allow-change-location-configuration-of-users> element with the value set to "true"; and
- b) if the item a) above is not fulfilled the MC service ID shall be ignored in the remaining steps;
- 7) Location information configuration for the target MC Service Id shall be updated with information LMS received in LocationConfiguration element:
- a) Replace value of mcServiceId attribute in the LocationConfiguration element with the MC Service ID value derived from the bearer access tokens as the identity of the requestor of location information configuration update; and
- 8) Upon successful completion of the previous steps, the LMS shall:
- a) Replace value of mcServiceId attribute in the LocationConfiguration element with the MC Service ID value derived from the bearer access tokens as the identity of the requestor of location information configuration update; and
 - b) create ConfigurationNotify message using updated configuration information, also taking into account existing LMS policies.

LMS shall send ConfigurationNotify message to the target LMC according to the procedure in clause 6.2.2.5.

7 LMS API Definitions

7.1 LMS_Reporting API

7.1.1 Introduction

The LMS_Reporting shall use the LMS_Reporting Service API.

The API URI of the LMS_Reporting API shall be:

{apiRoot}/{apiName}/{apiVersion}

The request URIs used in HTTP requests from the LMC towards the LMS shall have the Resource URI structure defined in clause 4.4.1 of 3GPP TS 29.501 [14], i.e.:

{apiRoot}/{apiName}/{apiVersion}/{apiSpecificResourceUriPart}

with the following components:

- The {apiRoot} shall be set as described in 3GPP TS 24.483 [11] clause 8.2.44D1.
- The <apiName> shall be "lms-reporting".
- The <apiVersion> shall be "v1".
- The <apiSpecificResourceUriPart> shall be set as described in clause 7.1.3.

7.1.2 Usage of HTTP

7.1.2.1 General

HTTP/2, IETF RFC 9113 [21], shall be used as specified in clause 5 of 3GPP TS 29.500 [13].

HTTP/2 shall be transported as specified in clause 5.3 of 3GPP TS 29.500 [13].

The OpenAPI [22] specification of HTTP messages and content bodies for the LMS_Reporting API is contained in clause A.2.

7.1.2.2 HTTP standard headers

7.1.2.2.1 General

See clause 5.2.2 of 3GPP TS 29.500 [13] for the usage of HTTP standard headers.

7.1.2.2.2 Content type

JSON, IETF RFC 8259 [20], shall be used as content type of the HTTP bodies specified in the present specification as specified in clause 5.4 of 3GPP TS 29.500 [13]. The use of the JSON format shall be signalled by the content type "application/json".

7.1.2.3 HTTP custom headers

The mandatory HTTP custom header fields specified in clause 5.2.3.2 of 3GPP TS 29.500 [13] shall be supported, and the optional HTTP custom header fields specified in clause 5.2.3.3 of 3GPP TS 29.500 [13] may be supported.

7.1.3 Resources

7.1.3.1 Overview

This clause describes the structure for the Resource URIs and the resources and methods used for the service.

Figure 7.1.3.1-1 depicts the resource URIs structure for the LMS_Reporting API.

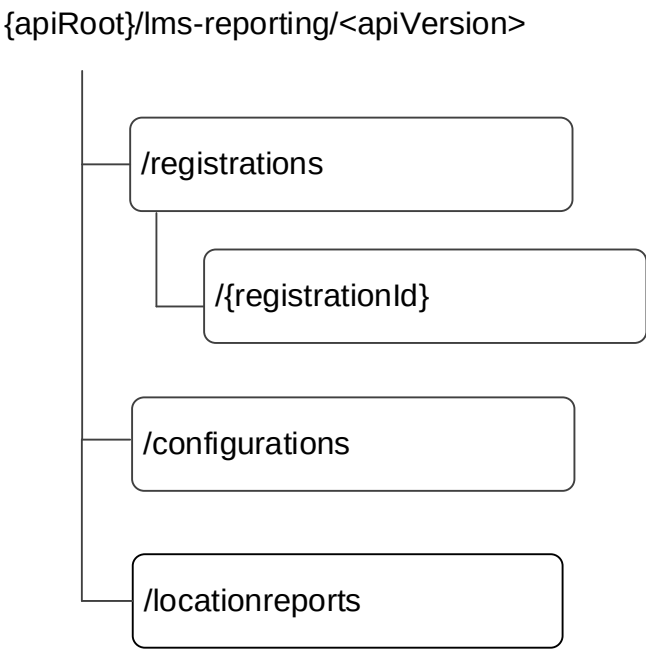


Figure 7.1.3.1-1: Resource URI structure of the LMS_Reporting API

Table 7.1.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 7.1.3.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description
LMC registrations	/registrations	POST	Create a new LMC registration.
Individual LMC registration	/registrations/{registrationId}	PUT	Update an existing LMC registration in the LMS.
		DELETE	Delete an existing LMC registration in the LMS.
LMC configurations	/configurations	GET	LMC request its location configuration from the LMS.
LMC location reports	/locationreports	POST	LMC published its location report in the LMS.

7.1.3.2 Resource: LMC Registrations

7.1.3.2.1 Description

The resource represents all LMC registrations.

7.1.3.2.2 Resource Definition

Resource URI: **{apiRoot}/lms-reporting/<apiVersion>/registrations**

This resource shall support the resource URI variables defined in table 7.1.3.2.2-1.

Table 7.1.3.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	String	See clause 7.1.1

7.1.3.2.3 Resource Standard Methods

7.1.3.2.3.1 POST

This method shall support the URI query parameters specified in table 7.1.3.2.3.1-1.

Table 7.1.3.2.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 7.1.3.2.3.1-2 and the response data structures and response codes specified in table 7.1.3.2.3.1-3.

Table 7.1.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
LMCRegistration	M	1	LMC registration details information

Table 7.1.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
LMCRegistration	M	1	201 Created	LMC registration is successfully performed to the LMS. The URI of the created resource shall be returned in the "Location" HTTP header.
NOTE: The mandatory HTTP error status code for the POST method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [13] also apply.				

Table 7.1.3.2.3.1-4: Headers supported by the POST method on this resource

Name	Data type	P	Cardinality	Description
n/a				

Table 7.1.3.2.3.1-5: Headers supported by the 201 response code on this resource

Name	Data type	P	Cardinality	Description
n/a				

7.1.3.2.4 Resource Custom Operations

None.

7.1.3.3 Resource: Individual LMC registration

7.1.3.3.1 Description

This resource represents an individual registration of an LMC.

7.1.3.3.2 Resource Definition

Resource URI: **{apiRoot}/lms-reporting//<apiVersion>/registrations/{registrationId}**

This resource shall support the resource URI variables defined in table 7.1.3.3.2-1.

Table 7.1.3.3.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	string	See clause 7.1.1
registrationId	string	The Identifier of a specific LMC registration.

7.1.3.3.3 Resource Standard Methods

7.1.3.3.3.1 PUT

This method updates the LMC registration data by completely replacing the existing registration data. This method shall support the URI query parameters specified in table 7.1.3.3.3.1-1.

Table 7.1.3.3.3.1-1: URI query parameters supported by the PUT method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 7.1.3.3.3.1-2 and the response data structures and response codes specified in table 7.1.3.3.3.1-3.

Table 7.1.3.3.3.1-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
LMCRegistration	M	1	An Individual registration resource to be updated.

Table 7.1.3.3.3.1-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
LMCRegistration	M	1	200 OK	An individual LMC registration resource updated successfully and the LMCRegistration data shall be included in the response.
n/a			204 No Content	An individual LMC registration resource updated successfully.
n/a			307 Temporary Redirect	Temporary redirection, during resource modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative LMS.
n/a			308 Permanent Redirect	Permanent redirection, during resource modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative LMS.
NOTE: The mandatory HTTP error status code for the PUT method listed in 5.2.7.1-1 of 3GPP TS 29.500 [13] also apply.				

Table 7.1.3.3.3.1-4: Headers supported by the PUT method on this resource

Name	Data type	P	Cardinality	Description
n/a				

Table 7.1.3.3.3.1-5: Headers supported by the 200 response code on this resource

Name	Data type	P	Cardinality	Description
n/a				

Table 7.1.3.3.3.1-6: Links supported by the 200 Response Code on this endpoint

Name	Resource name	HTTP method or custom operation	Link parameter(s)	Description
n/a				

Table 7.1.3.3.3.1-7: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative URI of the resource located in an alternative LMS.

Table 7.1.3.3.3.1-8: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative URI of the resource located in an alternative LMS.

7.1.3.3.3.2 DELETE

This method deregisters (removes) an existing LMC registration. This method shall support the URI query parameters specified in table 7.1.3.3.3.2-1.

Table 7.1.3.3.2-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 7.1.3.3.2-2 and the response data structures and response codes specified in table 7.1.3.3.2-3.

Table 7.1.3.3.2-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.1.3.3.2-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	An individual LMC registration resource deleted successfully.
n/a			307 Temporary Redirect	Temporary redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative LMS.
n/a			308 Permanent Redirect	Permanent redirection, during resource termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative LMS.

NOTE: The mandatory HTTP error status code for the DELETE method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [13] also apply.

Table 7.1.3.3.2-4: Headers supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
n/a				

Table 7.1.3.3.2-5: Headers supported by the 204 response code on this resource

Name	Data type	P	Cardinality	Description
n/a				

Table 7.1.3.3.2-6: Links supported by the 200 Response Code on this endpoint

Name	Resource name	HTTP method or custom operation	Link parameter(s)	Description
n/a				

Table 7.1.3.3.2-7: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative URI of the resource located in an alternative LMS.

Table 7.1.3.3.2-8: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative URI of the resource located in an alternative LMS.

7.1.3.3.4 Resource Custom Operations

None.

7.1.3.4 Resource: LMC Configurations

7.1.3.4.1 Description

The resource represents the LMC location reports collection.

7.1.3.4.2 Resource Definition

Resource URI: **{apiRoot}/lms-reporting/<apiVersion>/locationconfiguration**

This resource shall support the resource URI variables defined in table 7.1.3.4.2-1.

Table 7.1.3.4.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	String	See clause 7.1.1

7.1.3.4.3 Resource Standard Methods

7.1.3.4.3.1 GET

This method shall support the URI query parameters specified in table 7.1.3.4.3.1-1.

Table 7.1.3.4.3.1-1: URI query parameters supported by the GET method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 7.1.3.4.3.1-2 and the response data structures and response codes specified in table 7.1.3.4.3.1-3.

Table 7.1.3.4.3.1-2: Data structures supported by the GET Request Body on this resource

Data type	P	Cardinality	Description
n/a			

Table 7.1.3.4.3.1-3: Data structures supported by the GET Response Body on this resource

Data type	P	Cardinality	Response codes	Description
LocationConfiguration	M	1	200 Ok	The location configuration applicable for the MC UE.
NOTE: The mandatory HTTP error status code for the GET method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [13] also apply.				

Table 7.1.3.4.3.1-4: Headers supported by the GET method on this resource

Name	Data type	P	Cardinality	Description
n/a				

7.1.3.4.4 Resource Custom Operations

None.

7.1.3.5 Resource: LMC Location Reports

7.1.3.5.1 Description

The resource represents the LMC location reports collection.

7.1.3.5.2 Resource Definition

Resource URI: **{apiRoot}/lms-reporting/<apiVersion>/locationreports**

This resource shall support the resource URI variables defined in table 7.1.3.5.2-1.

Table 7.1.3.5.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	String	See clause 7.1.1

7.1.3.5.3 Resource Standard Methods

7.1.3.5.3.1 POST

This method shall support the URI query parameters specified in table 7.1.3.5.3.1-1.

Table 7.1.3.5.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 7.1.3.5.3.1-2 and the response data structures and response codes specified in table 7.1.3.5.3.1-3.

Table 7.1.3.5.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
MCUELocation	M	1	MC UE Location information

Table 7.1.3.5.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
MCUELocation	M	1	201 Created	MC UE Location report is successfully submitted to the LMS. The LMC location data submitted to the LMS is provided in the response body. The URI of the created resource shall be returned in the "Location" HTTP header.
NOTE: The mandatory HTTP error status code for the POST method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [13] also apply.				

Table 7.1.3.5.3.1-4: Headers supported by the POST method on this resource

Name	Data type	P	Cardinality	Description
n/a				

Table 7.1.3.5.3.1-5: Headers supported by the 201 response code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	Contains the URI of the newly created resource, according to the structure: {apiRoot}/lms-location-report/<apiVersion>/locationreports/{locationreportId}

7.1.3.5.4 Resource Custom Operations

None.

7.1.4 Custom Operations without associated resources

None.

7.1.5 Notifications

7.1.5.1 General

Table 7.1.5.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
ConfigurationNotify	{locationConfigUri}	POST	Notification to an LMC about a new Location configuration.
LocationReportRequest	{locationRequestUri}	POST	Request to an LMC about a new location report.

7.1.5.2 ConfigurationNotify notification

7.1.5.2.1 Description

ConfigurationNotify notification is used by the LMS to notify an LMC on a new location configuration.

7.1.5.2.2 Target URI

The Callback URI "{locationConfigUri}" shall be used with the callback URI variables defined in table 7.1.5.2.2-1.

Table 7.1.5.2.2-1: Callback URI variables

Name	Definition
locationConfigUri	String formatted as URI with the Callback Uri.

7.1.5.2.3 Standard Methods

7.1.5.2.3.1 POST

This method shall support the request data structures specified in table 7.1.5.2.3.1-1 and the response data structures and response codes specified in table 7.1.5.2.3.1-2.

Table 7.1.5.2.3.1-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
LocationConfiguration	M	1	Notification of LMC about a new location configuration.

Table 7.1.5.2.3.1-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The receipt of the Location configuration is acknowledged.
NOTE: The mandatory HTTP error status code for the POST method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [13] also apply.				

7.1.5.3 LocationReportRequest notification

7.1.5.3.1 Description

LocationReportRequest notification is used by the LMS to request an LMC on a new location report.

7.1.5.3.2 Target URI

The Callback URI "{locationRequestUri}" shall be used with the callback URI variables defined in table 7.1.5.3.2-1.

Table 7.1.5.3.2-1: Callback URI variables

Name	Definition
locationRequestUri	String formatted as URI with the Callback Uri.

7.1.5.3.3 Standard Methods

7.1.5.3.3.1 POST

This method shall support the request data structures specified in table 7.1.5.3.3.1-1 and the response data structures and response codes specified in table 7.1.5.3.3.1-2.

Table 7.1.5.3.3.1-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
LocationRequest	M	1	Request an LMC to send a new location report.

Table 7.1.5.3.3.1-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The receipt of the location request is acknowledged.
NOTE: The mandatory HTTP error status code for the POST method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [13] also apply.				

7.1.6 Data Model

7.1.6.1 General

This clause specifies the application data model supported by the LMS_Reporting Service API.

Table 7.1.6.1-1 specifies the data types defined for the LMS_Reporting Service interface protocol.

Table 7.1.6.1-1: LMS_Reporting Service specific Data Types

Data type	Clause defined	Description	Applicability
LMCRegistration	7.1.6.2.2	Includes details of a LMC registration request	
LocationConfiguration	7.1.6.2.3	Contains the location configuration details sent as a callback request to the LMC.	
LocationRequest	7.1.6.2.47	Contains the location request data type sent as a callback request to the LMC.	
MCUELocation	7.1.6.2.49	Includes detailed location information about a MC UE.	
LocationInfo	7.1.6.2.50	Includes all location data provided in the location report.	

Table 7.1.6.1-2 specifies data types re-used by the LMS_Reporting service based interface protocol from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the LMS_Reporting service based interface.

Table 7.1.6.1-2: LMS_Registration Service re-used Data Types

Data type	Reference	Comments	Applicability
DateTime	3GPP TS 29.571 [15]	String with format "date-time" as defined in OpenAPI Specification [22]	
Ecgi	3GPP TS 29.571 [15]	E-Utran Cell Global Identity.	
GeographicalArea	3GPP TS 29.572 [16]	Geographical area defined as Polygon or EllipsoidArc	
MbsFsald	3GPP TS 29.571 [15]	List of MBS Frequency Selection Area Identifiers, for a broadcast MBS session.	
Ncgi	3GPP TS 29.571 [15]	NR Cell Global Identity.	
Pei	3GPP TS 29.571 [15]	Permanent equipment identity.	
PlmnId	3GPP TS 29.571 [15]	PLMN Identity	
Supi	3GPP TS 29.571 [15]	Subscription permanent identifier.	
Tac	3GPP TS 29.571 [15]	Tracking Area	
Uri	3GPP TS 29.571 [15]	String providing an URI.	
MbsfnArea	3GPP TS 29.571 [15]	Represents an MBSFN area Identifier	
Altitude	3GPP TS 29.572 [16]	Double-precision float value of the altitude, expressed in meters.	
HorizontalWithVerticalVelocity	3GPP TS 29.572 [16]	Velocity estimate including horizontal speed and bearing, and also vertical speed and vertical direction.	
GeographicalCoordinates	3GPP TS 29.572 [16]	Geographical coordinates.	
Accuracy	3GPP TS 29.572 [16]	Float value of accuracy, expressed in meters.	

7.1.6.2 Structured data types

7.1.6.2.1 Introduction

This clause defines the structures to be used in resource representations.

7.1.6.2.2 Type: LMCRegistration

Table 7.1.6.2.2-1: Definition of type LMCRegistration

Attribute name	Data type	P	Cardinality	Description	Applicability
expTime	DateTime	M	1	Time and date for the registration expiry.	
mclocClientID	String	M	1	Used to identify the LMC that request registration	
locationConfigUri	Uri	M	1	URI where the Location Configuration should be delivered to.	
locationRequestUri	Uri	M	1	URI where the Location request should be delivered to.	
pei	Pei	O	0..1	Includes the permanent equipment identity.	
supi	Supi	O	0..1	Includes the imsi number.	

7.1.6.2.3 Type: LocationConfiguration

Table 7.1.6.2.3-1: Definition of type LocationConfiguration

Attribute name	Data type	P	Cardinality	Description	Applicability
emergencyTriggeringCriteria	TriggeringCriteria	O	0..1	Contains the location reporting trigger criteria used when the MC UE is in emergency state.	
emergencyLocationInformation	RequestedLocationInfo	O	0..1	Contains the details of what the location report shall include when the MC UE is in the emergency state.	
triggeringCriteria	TriggeringCriteria	O	0..1	Contains the location reporting trigger criteria used when the MC UE is not in emergency state.	
nonEmergencyLocationInformation	RequestedLocationInfo	O	0..1	Contains the details of what the location report shall include when the MC UE is not in the emergency state.	
mcServiceId	Uri	O	0..1	Optional attribute that is used to indicate the identity of the MC user requesting to set the location configuration or an identity of the MC user for which location configuration needs to be updated.	
configScope	ConfigScope	O	0..1	Used to indicate a full new location configuration or a subsequent update of an existing.	
locationHistory	boolean	O	0..1	Optional attribute that if set to true indicates that location information shall be stored in LMC if location reporting can not be done.	

NOTE: At least one of emergencyTriggeringCriteria and triggeringCriteria shall be included.

7.1.6.2.4 Type: TriggeringCriteria

Table 7.1.6.2.4-1: Definition of type TriggeringCriteria

Attribute name	Data type	P	Cardinality	Description	Applicability
adaptiveTrigger	AdaptiveTrigger	O	0..1	This attribute specifies parameters controlling adaptive combined time and distance triggers for location reporting.	
cellChange	CellChange	O	0..1	The attribute specifies which cell changes trigger location reporting.	
geographicalAreaChange	GeographicalAreaChange	O	0..1	The attribute specifies which geographical area changes trigger location reporting.	
mbsfnAreaChange	MbsfnAreaChange	O	0..1	The attribute specifies which Mbsfn area changes trigger location reporting.	
mbmsSaChange	MbmsSaChange	O	0..1	The attribute specifies which Mbms SA changes trigger location reporting.	
nr5GMbsfsaAreaChange	nr5GMbsfsaAreaChange	O	0..1	The attribute specifies which 5G Mbsfsa area changes trigger location reporting.	
periodicReport	PeriodicReport	O	0..1	The attribute specifies how frequent periodic location reports shall be sent.	
plmnChange	PlmnChange	O	0..1	The attribute specifies which PLMN changes trigger location reporting.	
ratTypeChange	RatTypeChange	O	0..1	An optional attribute specifying what inter-RAT changes triggers a location report.	
signallingEvent	SignallingEvent	O	0..1	An optional attribute specifying what signalling events triggers a location report.	
trackingAreaChange	TrackingAreaChange	O	0..1	The attribute specifies which tracking area changes trigger location reporting.	
travelledDistance	TravelledDistance	O	0..1	The attribute specifies the required travelled distance for a trigger for location reporting.	

7.1.6.2.5 Type: CellChange

Table 7.1.6.2.5-1: Definition of type CellChange

Attribute name	Data type	P	Cardinality	Description	Applicability
anyCellChange	AnyCellChange	O	1	The presence of this attribute specifies that any cell change is a trigger for location reporting.	
enterSpecificCell	SpecificCellChange	O	1	A list of cell Ids which triggers location reporting when entering the cells.	
exitSpecificCell	SpecificCellChange	O	1	A list of cell Ids which triggers location reporting when exiting the cells.	

7.1.6.2.6 Type: AnyCellChange

Table 7.1.6.2.6-1: Definition of type AnyCellChange

Attribute name	Data type	P	Cardinality	Description	Applicability
triggerId	TriggerId	M	1	The triggerId shall be set to a unique value and is returned in the location report.	

7.1.6.2.7 Type: SpecificCellChange

Table 7.1.6.2.7-1: Definition of type SpecificCellChange

Attribute name	Data type	P	Cardinality	Description	Applicability
eutranCells	array(EutranCell)	O	1..N	A list of Eutran or NR cell id that triggers a location reporting. (NOTE)	
nrCells	array(NrCell)	O	1..N	A list of Nr cell id that triggers a location reporting.(NOTE)	
NOTE: At least on of eutranCells and nrCells shall be present.					

7.1.6.2.8 Type: EutranCell

Table 7.1.6.2.8-1: Definition of type EutranCell

Attribute name	Data type	P	Cardinality	Description	Applicability
eutranCell	Ecgi	M	1	A list of Eutran or NR cell id that triggers a location reporting.	
triggerId	TriggerId	M	1	The triggerId shall be set to a unique value and is returned in the location report.	

7.1.6.2.9 Type: NrCell

Table 7.1.6.2.9-1: Definition of type NrCell

Attribute name	Data type	P	Cardinality	Description	Applicability
nrCell	Ncgi	M	1	A list of Nr cell id that triggers a location reporting.	
triggerId	TriggerId	M	1	The triggerId shall be set to a unique value and is returned in the location report.	

7.1.6.2.10 Type: GeographicalAreaChange

Table 7.1.6.2.10-1: Definition of type GeographicalAreaChange

Attribute name	Data type	P	Cardinality	Description	Applicability
enterSpecificArea	SpecificArea	O	0..1	A geographical area which triggers location reporting when entering or exiting the defined geographical area.	
exitSpecificArea	SpecificArea	O	0..1	A geographical area which triggers location reporting when entering or exiting the defined geographical area.	

7.1.6.2.11 Type: MbsfnAreaChange

Table 7.1.6.2.11-1: Definition of type MbsfnAreaChange

Attribute name	Data type	P	Cardinality	Description	Applicability
anyMbsfnAreaChange	AnyMbsfnAreaChange	O	1	The presence of this attribute specifies that any MBSFN area change is a trigger for location reporting.	
enterSpecificMbsfnArea	SpecificMbsfnArea	O	1	A list of MBSFN area Ids which triggers location reporting when entering the MBSFN area Ids.	
exitSpecificMbsfnArea	SpecificMbsfnArea	O	1	A list of MBSFN area Ids which triggers location reporting when exiting the MBSFN area Ids.	

7.1.6.2.12 Type: AnyMbsfnAreaChange

Table 7.1.6.2.12-1: Definition of type AnyMbsfnAreaChange

Attribute name	Data type	P	Cardinality	Description	Applicability
triggerId	TriggerId	M	1	The triggerId shall be set to a unique value and is returned in the location report.	

7.1.6.2.13 Type: SpecificMbsfnArea

Table 7.1.6.2.13-1: Definition of type SpecificMbsfnArea

Attribute name	Data type	P	Cardinality	Description	Applicability
mbsfnAreas	array(MbsfnAreaId)	M	1..N	A list of MBSFN area Ids that triggers location reporting when entering or exiting the MBSFN area Ids.	

7.1.6.2.14 Type: MbsfnAreaId

Table 7.1.6.2.14-1: Definition of type MbsfnAreaId

Attribute name	Data type	P	Cardinality	Description	Applicability
mbsfnArea	integer	M	1	The MBSFN area identity. Integer between 0 and 255.	
triggerId	TriggerId	M	1	The triggerId shall be set to a unique value and is returned in the location report.	

7.1.6.2.15 Type: MbmsSaChange

Table 7.1.6.2.15-1: Definition of type MbmsSaChange

Attribute name	Data type	P	Cardinality	Description	Applicability
anyMbmsSaChange	AnyMbmsSaChange	O	1	The presence of this attribute specifies that any MBMS SA change is a trigger for location reporting.	
enterSpecificMbmsSa	SpecificMbmsSaIdentity	O	1	A list of MBMS SAI which triggers location reporting when entering the MBMS SAI.	
exitSpecificMbmsSa	SpecificMbmsSaIdentity	O	1	A list of MBMS SAI which triggers location reporting when exiting the MBMS SAI.	

7.1.6.2.16 Type: AnyMbmsSaChange

Table 7.1.6.2.16-1: Definition of type AnyMbmsSaChange

Attribute name	Data type	P	Cardinality	Description	Applicability
triggerId	TriggerId	M	1	The triggerId shall be set to a unique value and is returned in the location report.	

7.1.6.2.17 Type: SpecificMbmsSaldentity

Table 7.1.6.2.17-1: Definition of type SpecificMbmsSaldentity

Attribute name	Data type	P	Cardinality	Description	Applicability
mbmsSaldentities	array(MbmsSaldentity)	M	1..N	A list of MBMS SAI that triggers location reporting when entering or exiting the MBMS SAI.	

7.1.6.2.18 Type: MbmsSaldentity

Table 7.1.6.2.18-1: Definition of type MbmsSaldentity

Attribute name	Data type	P	Cardinality	Description	Applicability
mbmsSaldentity	Integer	M	1	The MBMS SA identity. Integer between 0 and 65535.	
triggerId	TriggerId	M	1	The triggerId shall be set to a unique value and is returned in the location report.	

7.1.6.2.19 Type: NR5GMbsfsaAreaChange

Table 7.1.6.2.19-1: Definition of type NR5GMbsfsaAreaChange

Attribute name	Data type	P	Cardinality	Description	Applicability
anyNR5GMbsfsaAreaChange	AnyNR5GMbsfsaAreaChange	O	1	The presence of this element specifies that any 5G Mbsfsa area change is a trigger for location reporting.	
enterSpecificNR5GMbsfsaArea	SpecificNR5GMbsfsaArea	O	1	A list of 5G Mbsfsa area that triggers a location reporting when entering the 5G Mbsfsa area.	
exitSpecificNR5GMbsfsaArea	SpecificNR5GMbsfsaArea	O	1	A list of 5G Mbsfsa area that triggers a location reporting when exiting the 5G Mbsfsa area.	

7.1.6.2.20 Type: AnyNR5GMbsfsaAreaChange

Table 7.1.6.2.20-1: Definition of type AnyNR5GMbsfsaAreaChange

Attribute name	Data type	P	Cardinality	Description	Applicability
triggerId	TriggerId	M	1	The triggerId shall be set to a unique value and is returned in the location report.	

7.1.6.2.21 Type: SpecificNR5GMbsfsaArea

Table 7.1.6.2.21-1: Definition of type SpecificNR5GMbsfsaArea

Attribute name	Data type	P	Cardinality	Description	Applicability
nr5GMbsFsaldentities	array(NR5GMbsfsaAreaIdentity)	M	1..N	A list of 5G Mbsfsa area that triggers a location reporting when entering or exiting the 5G Mbsfsa area.	

7.1.6.2.22 Type: NR5GMbsfsaAreaIdentity

Table 7.1.6.2.22-1: Definition of type NR5GMbsfsaAreaIdentity

Attribute name	Data type	P	Cardinality	Description	Applicability
mbsfsaAreaIdentity	MbsFsald	M	1	An 5G Mbsfsa area identity that triggers location reporting.	
triggerId	TriggerId	M	1	The triggerId shall be set to a unique value and is returned in the location report.	

7.1.6.2.23 Type: PeriodicReport

Table 7.1.6.2.23-1: Definition of type PeriodicReport

Attribute name	Data type	P	Cardinality	Description	Applicability
periodicReport	integer	M	1	Value in seconds specifies the reporting interval.	
triggerId	TriggerId	M	1	The triggerId shall be set to a unique value and is returned in the location report.	

7.1.6.2.24 Type: PlmnChange

Table 7.1.6.2.24-1: Definition of type PlmnChange

Attribute name	Data type	P	Cardinality	Description	Applicability
anyPlmnChange	AnyPlmnChange	O	1	The presence of this element specifies that any PLMN change is a trigger for location reporting.	
enterSpecificPlmnArea	SpecificPlmnChange	O	1	A list of PLMNs that triggers a location reporting when entering the PLMN.	
exitSpecificPlmnArea	SpecificPlmnChange	O	1	A list of PLMNs that triggers a location reporting when exiting the PLMN.	

7.1.6.2.25 Type: AnyPlmnChange

Table 7.1.6.2.25-1: Definition of type AnyPlmnChange

Attribute name	Data type	P	Cardinality	Description	Applicability
triggerId	TriggerId	M	1	The triggerId shall be set to a unique value and is returned in the location report.	

7.1.6.2.26 Type: SpecificPlmnChange

Table 7.1.6.2.26-1: Definition of type SpecificPlmnChange

Attribute name	Data type	P	Cardinality	Description	Applicability
plmnIds	array(Plmn)	M	1..N	A list of PLMNs that triggers a location reporting when entering or exiting the PLMN.	

7.1.6.2.27 Type: Plmn

Table 7.1.6.2.27-1: Definition of type Plmn

Attribute name	Data type	P	Cardinality	Description	Applicability
plmn	PlmnId	M	1	A PLMN identity that triggers location reporting.	
triggerId	TriggerId	M	1	The triggerId shall be set to a unique value and is returned in the location report.	

7.1.6.2.28 Type: TrackingAreaChange

Table 7.1.6.2.28-1: Definition of type TrackingAreaChange

Attribute name	Data type	P	Cardinality	Description	Applicability
anyTrackingAreaChange	AnyTrackingAreaChange	O	1	The presence of this element specifies that any tracking area change is a trigger for location reporting.	
enterSpecificTrackingArea	SpecificTrackingAreaChange	O	1	A list of tracking areas that triggers a location reporting when entering the tracking area.	
exitSpecificTrackingArea	SpecificTrackingAreaChange	O	1	A list of tracking areas that triggers a location reporting when exiting the tracking area.	

7.1.6.2.29 Type: AnyTrackingAreaChange

Table 7.1.6.2.29-1: Definition of type AnyTrackingAreaChange

Attribute name	Data type	P	Cardinality	Description	Applicability
triggerId	TriggerId	M	1	The triggerId shall be set to a unique value and is returned in the location report.	

7.1.6.2.30 Type: SpecificTrackingAreaChange

Table 7.1.6.2.30-1: Definition of type SpecificTrackingAreaChange

Attribute name	Data type	P	Cardinality	Description	Applicability
trackingAreas	array(TrackingArea)	M	1..N	A list of tracking areas that triggers a location reporting when entering or exiting the tracking area.	

7.1.6.2.31 Type: TrackingArea

Table 7.1.6.2.31-1: Definition of type TrackingArea

Attribute name	Data type	P	Cardinality	Description	Applicability
trackingArea	Tac	M	1	A tracking area identity that triggers location reporting.	
triggerId	TriggerId	M	1	The triggerId shall be set to a unique value and is returned in the location report.	

7.1.6.2.32 Type: TravelledDistance

Table 7.1.6.2.32-1: Definition of type TravelledDistance

Attribute name	Data type	P	Cardinality	Description	Applicability
travelledDistance	Integer	M	1	Value in meter specifies the travelled distance for location reporting.	
triggerId	TriggerId	M	1	The triggerId shall be set to a unique value and is returned in the location report.	

7.1.6.2.33 Type: RequestedLocationInfo

Table 7.1.6.2.33-1: Definition of type RequestedLocationInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
bearingAndSpeed	boolean	O	1	The presence of this attribute indicates that the item shall be included in the location report.	
Coordinate	boolean	O	1	The presence of this attribute indicates that the item shall be included in the location report.	
mbmsSaiId	boolean	O	1	The presence of this attribute indicates that the item shall be included in the location report.	
mbsfnArea	boolean	O	1	The presence of this attribute indicates that the item shall be included in the location report.	
minimumIntervalLength	integer	O	1	Value in seconds, the minimum time between location reports.	
neighbouringEcgi	boolean	O	1	The presence of this attribute indicates that the item shall be included in the location report.	
neighbouringNcgi	boolean	O	1	The presence of this attribute indicates that the item shall be included in the location report.	
nr5GmbsfsaArea	boolean	O	1	The presence of this attribute indicates that the item shall be included in the location report.	
servingEcgi	boolean	O	1	The presence of this attribute indicates that the item shall be included in the location report.	
servingNcgi	boolean	O	1	The presence of this attribute indicates that the item shall be included in the location report.	

7.1.6.2.34

Type: AdaptiveTrigger

Table 7.1.6.2.34-1: Definition of type AdaptiveTrigger

Attribute name	Data type	P	Cardinality	Description	Applicability
triggerId	TriggerId	M	1	The triggerId shall be set to a unique value and is returned in the location report.	
minPeriod	integer	O	0..1	An optional attribute specified as a positive or 0 integer number of seconds and defaulting at 0, if not present. This attribute specifies the minimum wait period between consecutive location reports, irrespective of changes in the distance between the current location and the location of the most recent sending of a location report.	
minDistance	integer	O	0..1	An optional attribute specified as a strictly positive integer number of meters and defaulting at infinity, if not present. This attribute is used in the decision of sending a location report based on travelled distance, and specifies the minimum required distance, between the current location and the location of the most recent sending of a location report.	
persistencePeriod	integer	O	0..1	An optional attribute specified as a positive or 0 integer number of seconds and defaulting at 0, if not present. This attribute specifies the time between the moment when the LMC detected that the distance between the current location and the location of the most recent sending of a location report exceeded the minDistance attribute and the moment when the LMC will check again that the updated current location is still farther away by at least minDistance from the location of the mentioned sending of the location report. If the check is positive, a location report based on travelled distance will be sent.	
additionalTime	integer	O	0..1	An optional attribute, specified as a strictly positive integer number of seconds and defaulting at 1. If a location report is not sent based on the travelled distance, the LMC will send a location report after minPeriod + PersistencePeriod + AdditionalTime seconds after the previous location report.	
rrcInactiveMinPeriod	integer	O	0..1	An optional attribute with the same semantics and behaviour as described above for the corresponding parameter, but applicable when the UE receives MBS traffic in RRC_INACTIVE state.	
rrcInactiveMinDistance	integer	O	0..1	An optional attribute with the same semantics and behaviour as described above for the corresponding parameter, but applicable when the UE receives MBS traffic in RRC_INACTIVE state.	
rrcInactivePersistencePeriod	integer	O	0..1	An optional attribute with the same semantics and behaviour as described above for the corresponding parameter, but applicable when the UE receives MBS traffic in RRC_INACTIVE state.	

rrcInactiveadditionalTime	integer	O	0..1	An optional attribute with the same semantics and behaviour as described above for the corresponding parameter, but applicable when the UE receives MBS traffic in RRC_INACTIVE state.	
---------------------------	---------	---	------	--	--

7.1.6.2.35 Void

7.1.6.2.36 Type: SpecificArea

Table 7.1.6.2.36-1: Definition of type SpecificArea

Attribute name	Data type	P	Cardinality	Description	Applicability
geoAreas	array(Geographic Area)	M	1..N	A list of geographical areas that triggers a location reporting when entering or exiting the the geographical areas.	

7.1.6.2.37 Type: RatTypeChange

Table 7.1.6.2.37-1: Definition of type RatTypeChange

Attribute name	Data type	P	Cardinality	Description	Applicability
anyRatTypeChange	AnyRatType Change	O	0..1	The presence of this optional attribute specifying that any inter-RAT change triggers a location report.	

7.1.6.2.38 Type: AnyRatTypeChange

Table 7.1.6.2.38-1: Definition of type AnyRatTypeChange

Attribute name	Data type	P	Cardinality	Description	Applicability
triggerId	TriggerId	M	1	The triggerId shall be set to a unique value and is returned in the location report.	

7.1.6.2.39 Void

7.1.6.2.40 Type: SignallingEvent

Table 7.1.6.2.40-1: Definition of type SignallingEvent

Attribute name	Data type	P	Cardinality	Description	Applicability
functionalAliasActivation	FunctionalAliasActivation	O	0..1	This attribute specifies that a functional alias activation triggers a location report.	
functionalAliasDeactivation	FunctionalAliasDeactivation	O	0..1	This attribute specifies that a functional alias deactivation triggers a location report.	
initialLogOn	InitialLogOn	O	0..1	This attribute specifies that an initial log on triggers a location report.	
groupCallNonEmergency	GroupCallNonEmergency	O	0..1	This attribute specifies that a non-emergency group call triggers a location report.	
privateCallNonEmergency	PrivateCallNonEmergency	O	0..1	This attribute specifies that a non-emergency private call triggers a location report.	
locationConfigurationReceived	LocationConfigurationReceived	O	0..1	This attribute specifies that a received location configuration triggers a location report.	

7.1.6.2.41 Type: FunctionalAliasActivation

Table 7.1.6.2.41-1: Definition of type FunctionalAliasActivation

Attribute name	Data type	P	Cardinality	Description	Applicability
triggerId	TriggerId	M	1	The triggerId shall be set to a unique value and is returned in the location report.	

7.1.6.2.42 Type: FunctionalAliasDeactivation

Table 7.1.6.2.42-1: Definition of type FunctionalAliasDeactivation

Attribute name	Data type	P	Cardinality	Description	Applicability
triggerId	TriggerId	M	1	The triggerId shall be set to a unique value and is returned in the location report.	

7.1.6.2.43 Type: InitialLogOn

Table 7.1.6.2.43-1: Definition of type InitialLogOn

Attribute name	Data type	P	Cardinality	Description	Applicability
triggerId	TriggerId	M	1	The triggerId shall be set to a unique value and is returned in the location report.	

7.1.6.2.44 Type: GroupCallNonEmergency

Table 7.1.6.2.44-1: Definition of type GroupCallNonEmergency

Attribute name	Data type	P	Cardinality	Description	Applicability
triggerId	TriggerId	M	1	The triggerId shall be set to a unique value and is returned in the location report.	

7.1.6.2.45 Type: PrivateCallNonEmergency

Table 7.1.6.2.45-1: Definition of type PrivateCallNonEmergency

Attribute name	Data type	P	Cardinality	Description	Applicability
triggerId	TriggerId	M	1	The triggerId shall be set to a unique value and is returned in the location report.	

7.1.6.2.46 Type: LocationConfigurationReceived

Table 7.1.6.2.46-1: Definition of type LocationConfigurationReceived

Attribute name	Data type	P	Cardinality	Description	Applicability
triggerId	TriggerId	M	1	The triggerId shall be set to a unique value and is returned in the location report.	

7.1.6.2.47 Type: LocationRequest

Table 7.1.6.2.47-1: Definition of type LocationRequest

Attribute name	Data type	P	Cardinality	Description	Applicability
requestedMcServiceId	Uri	M	1	The MC service ID of the MC user being requested to send a location report.	
requestingMcServiceId	Uri	O	0..1	The MC service ID of the MC user from which location information is being requested.	
requestedFunctionalAliasId	Uri	O	0..1	The activated functional alias ID of the MC user being requested to send a location report.	
requestingFunctionalAliasId	Uri	O	0..1	The activated functional alias ID of the MC user from which location information is being requested.	
requestedLocationInfo	RequestedLocationInfo	O	0..1	Contains the details of what the location report shall include.	
requestLocationHistory	RequestLocationHistory	O	0..1	Includes details on requested location history information.	
requestHistoryStatus	boolean	O	0..1	Indicates that a location history status is requested.	

7.1.6.2.48 Type: RequestLocationHistory

Table 7.1.6.2.48-1: Definition of type RequestLocationHistory

Attribute name	Data type	P	Cardinality	Description	Applicability
numberOfReports	integer	O	0..1	Indicates the number of requested stored reports.	
startTime	DateTime	O	0..1	Indicates that the report shall include location information reports newer than this time.	
endTime	DateTime	O	0..1	Indicates that the report shall include location information reports older than this time.	
triggerCriteria	TriggerCriteria	O	0..1	Identifies the criteria when the location management client generated location information, while not reporting location information.	
minimumIntervalLength	integer	O	0..1	Value in seconds, the minimum time between location reports.	

7.1.6.2.49 Type: MCUELocation

Table 7.1.6.2.49-1: Definition of type MCUELocation

Attribute name	Data type	P	Cardinality	Description	Applicability
functionalAlias	Uri	O	0..1	Includes functional alias change that triggered the location report.	
interRatType	InterRatType	O	0..1	Includes the RAT change type.	
locationData	LocationInfo	M	1	Includes all location data provided in the location report.	
locTimestamp	DateTime	M	1	Includes the date and time the location measurement was made	
mclocClientId	MclocClientId	M	1	Used to identify the reporting LMC	
mcServiceUELabel	string	O	0..1	Used to identify the MC service UE.	
reportId	string	O	0..1	Used to return the request id when the location report is triggered by a location request.	
reportType	ReportType	M	1	Used to inform whether the LMC is sending the report in an emergency situation or not.	
triggerId	array(string)	O	1..N	TriggerId attribute associated with the location trigger that triggered the location report.	
locationHistoryData	LocationHistoryData	O	0..1	This attribute contains one or multiple time stamped location information reports.	
locationHistoryStatus	LocationHistoryStatus	O	0..1	This attribute contains a location history status information.	

7.1.6.2.50 Type: LocationInfo

Table 7.1.6.2.50-1: Definition of type locationInfo

Attribute name	Data type	P	Cardinality	Description	Applicability
currentCoordinate	CurrentCoordinate	O	0..1	Object that includes the current coordination data.	
ecgi	Ecgi	O	0..1	Attribute containing the ECGI that the LMC is located in.	
mbmsSaiId	string	O	0..1	Attribute containing the MBMS Service Area Id the LMC is located in.	
mbsfnArea	MbsfnArea	O	0..1	Attribute containing the MBSFN Area the LMC is located in.	
ncgi	Ncgi	O	0..1	Attribute containing the NGCI that the LMC is located in.	
neighbouringEcgi	array(Ecgi)	O	1..N	Attribute containing a list of ECGI of any neighbouring cell the LMC detects.	
neighbouringNcgi	array(Ncgi)	O	1..N	Attribute containing a list of NGCI of any neighbouring cell the LMC detects.	
nr5GMbsfsaArea	MbsFsaiId	O	0..1	Attribute containing the 5G MBS Frequency Selection Area Id the LMC is located in.	

7.1.6.2.51 Type: CurrentCoordinate

Table 7.1.6.2.51-1: Definition of type CurrentCoordinate

Attribute name	Data type	P	Cardinality	Description	Applicability
altitude	Altitude	O	0..1	Attribute containing the altitude.	
bearingAndSpeed	HorizontalWithVerticalVelocity	O	0..1	Attribute containing the horizontal and vertical velocity as well as the bearing.	
horizontalaccuracy	Accuracy	O	0..1	Attribute containing the accuracy expressed in meter.	
geographicalCoordinates	GeographicalCoordinates	M	1	Attribute containing the geographical coordinates e.g. in latitude and longitude.	
verticalaccuracy	Accuracy	O	0..1	Attribute containing the accuracy expressed in meter.	

7.1.6.2.52 Type: LocationHistoryData

Table 7.1.6.2.52-1: Definition of type LocationHistoryData

Attribute name	Data type	P	Cardinality	Description	Applicability
locationHistoryEvent	array(LocationHistoryEvent)	M	1..N	This object contains one or multiple time stamped location information reports.	

7.1.6.2.53 Type: LocationHistoryEvent

Table 7.1.6.2.53-1: Definition of type LocationHistoryEvent

Attribute name	Data type	P	Cardinality	Description	Applicability
locationData	LocationInfo	M	1..N	Includes location data provided in the historical location report.	
locTimestamp	DateTime	M	1	Includes the date and time the location measurements were made	
triggerId	array(string)	O	0..N	TriggerId attribute associated with the location triggers that triggered the location report.	

7.1.6.2.54 Type: LocationHistoryStatus

Table 7.1.6.2.54-1: Definition of type LocationHistoryStatus

Attribute name	Data type	P	Cardinality	Description	Applicability
storedReports	integer	M	1	Indicates the number of stored location reports that has not been reported.	
startTime	DateTime	M	1	Includes the date and time of the oldest stored location report.	
endTime	DateTime	M	1	Includes the date and time of the newest stored location report.	
triggerId	array(string)	M	0..N	TriggerId attribute associated with the location triggers that triggered the location report.	

7.1.6.3 Simple data types and enumerations

7.1.6.3.1 Introduction

This clause defines simple data types and enumerations that can be referenced from data structures defined in the previous clauses.

7.1.6.3.2 Simple data types

The simple data types defined in table 7.1.6.3.2-1 shall be supported.

Table 7.1.6.3.2-1: Simple data types

Type Name	Type Definition	Description	Applicability
TriggerId	string	The triggerId shall be set to a unique value and is returned in the location report.	

7.1.6.3.3 Enumeration: ConfigScope

The enumeration ConfigScope indicates how the location configuration shall be updated. To remove configuration elements a "Full" configuration is needed. It shall comply with the provisions defined in table 7.2.6.3.3-1.

Table 7.2.6.3.3-1: Enumeration ConfigScope

Enumeration value	Description	Applicability
FULL	The value "FULL" means that LocationConfiguration attributes contains the full location configuration which replaces any previous location configuration.	
UPDATE	The value "UPDATE" means that the LocationConfiguration is in addition to any previous location configuration.	

7.1.6.3.4 Enumeration: ReportType

The enumeration ReportType indicates if the report is done during an emergency situation or not. It shall comply with the provisions defined in table 7.1.6.3.4-1.

Table 7.1.6.3.4-1: Enumeration ReportType

Enumeration value	Description	Applicability
EMERGENCY	Indicates that the MC UE that sends the Location reports is in emergency state.	
NONEMERGENCY	Indicates that the MC UE that sends the Location reports is not in emergency state.	

7.1.6.3.5 Enumeration: InterRatType

The enumeration InterRatType indicates type of inter RAT status change. It shall comply with the provisions defined in table 7.1.6.3.5-1.

Table 7.1.6.3.5-1: Enumeration InterRatType

Enumeration value	Description	Applicability
5G_MBS_TO_LTE_MBMS	The inter RAT change is from 5G-MBS to LTE-MBMS	
5G_MBS_TO_LTE_UNICAST	The inter RAT change is from 5G-MBS to LTE-unicast	
LTE_MBMS_TO_5G_MBS	The inter RAT change is from LTE-MBMS to 5G-MBS	
LTE_MBMS_TO_5G_UNICAST	The inter RAT change is from LTE-MBMS to 5G-unicast	

7.1.7 Error Handling

7.1.7.1 General

For the LMS_Registration API, HTTP error responses shall be supported as specified in clause 4.8 of 3GPP TS 29.501 [14]. Protocol errors and application errors specified in table 5.2.7.2-1 of 3GPP TS 29.500 [13] shall be supported for an HTTP method if the corresponding HTTP status codes are specified as mandatory for that HTTP method in table 5.2.7.1-1 of 3GPP TS 29.500 [13].

In addition, the requirements in the following clauses are applicable for the LMS_Registration API.

7.1.7.2 Protocol Errors

No specific procedures for the LMS_Reporting service are specified.

7.1.7.3 Application Errors

The application errors defined for the LMS_Reporting service are listed in table 7.1.7.3-1.

Table 7.1.7.3-1: Application errors

Application Error	HTTP status code	Description

7.1.8 Feature negotiation

Table 7.1.8-1 defines the features supported by the LMS_Reporting API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [13].

No feature is defined in this release of the specification.

Table 7.1.8-1: Supported Features

Feature number	Feature Name	M/O	Description

7.1.9 Security

The LMC shall send HTTP requests over TLS connection as specified for the HTTP client in the UE in annex A of 3GPP TS 24.482 [10].

Authentication and authorization shall be as specified in 3GPP TS 33.180 [17].

The LMS shall be configured with an authorized MC service server list, containing public service identities of MC service servers.

When handling an HTTP request, the LMS shall determine the identity of the sender of the HTTP request as specified in 3GPP TS 24.482 [10], and shall use the identity of the sender of the HTTP request as an authenticated identity when performing the authorization.

7.1.10 HTTP redirection

An HTTP request may be redirected to a different LMS service instance, within the same LMS. When an HTTP server redirects an HTTP request (i.e. service request or notification/callback request) to a different target LMS service instance, the URI of the target LMS service instance towards which the request is redirected shall be given by the Location header field of the 307 Temporary Redirect or 308 Permanent Redirect response. Further details on HTTP redirection are found in 3GPP TS 29.500 [13].

7.2 LMS_Information API

7.2.1 Introduction

The LMS_Information shall use the LMS_Information Service API.

The API URI of the LMS_Information API shall be:

{apiRoot}/<apiName>/<apiVersion>

The request URIs used in HTTP requests from the LMC towards the LMS shall have the Resource URI structure defined in clause 4.4.1 of 3GPP TS 29.501 [14], i.e.:

{apiRoot}/<apiName>/<apiVersion>/<apiSpecificResourceUriPart>

with the following components:

- The {apiRoot} shall be set as described in 3GPP TS 24.483 [11] clause 8.2.44D1.

- The <apiName> shall be "lms-information".
- The <apiVersion> shall be "v1".
- The <apiSpecificResourceUriPart> shall be set as described in clause 7.2.3.

7.2.2 Usage of HTTP

7.2.2.1 General

HTTP/2, IETF RFC 9113 [21], shall be used as specified in clause 5 of 3GPP TS 29.500 [13].

HTTP/2 shall be transported as specified in clause 5.3 of 3GPP TS 29.500 [13].

The OpenAPI [22] specification of HTTP messages and content bodies for the LMS_Information API is contained in clause A.4.

7.2.2.2 HTTP standard headers

7.2.2.2.1 General

See clause 5.2.2 of 3GPP TS 29.500 [13] for the usage of HTTP standard headers.

7.2.2.2.2 Content type

JSON, IETF RFC 8259 [20], shall be used as content type of the HTTP bodies specified in the present specification as specified in clause 5.4 of 3GPP TS 29.500 [13]. The use of the JSON format shall be signalled by the content type "application/json".

7.2.2.3 HTTP custom headers

The mandatory HTTP custom header fields specified in clause 5.2.3.2 of 3GPP TS 29.500 [13] shall be supported, and the optional HTTP custom header fields specified in clause 5.2.3.3 of 3GPP TS 29.500 [13] may be supported.

7.2.3 Resources

7.2.3.1 Overview

This clause describes the structure for the Resource URIs and the resources and methods used for the service.

Figure 7.2.3.1-1 depicts the resource URIs structure for the LMS_Information API.

{apiRoot}/lms-information/<apiVersion>

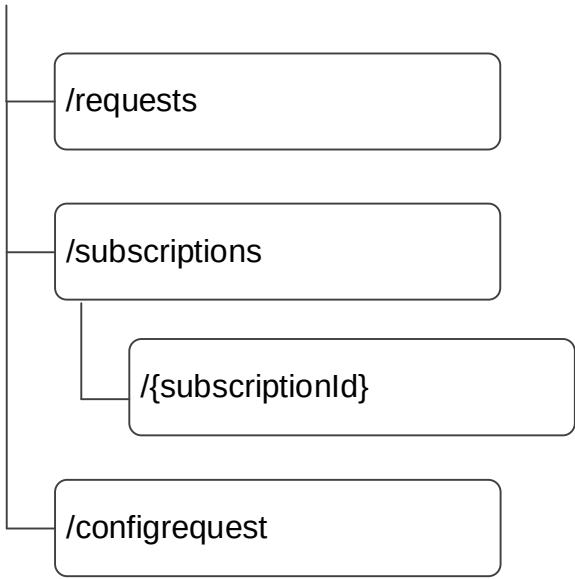


Figure 7.2.3.1-1: Resource URI structure of the LMS_Information API

Table 7.2.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 7.2.3.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description
Client location information request	/requests	POST	Create a new client location information request.
Location information subscription	/subscriptions	POST	Create a new client location information subscription.
Individual location information subscription	/subscriptions/{subscriptionId}	PUT	Update an existing subscription.
		DELETE	Delete an existing subscription.
Location information config request	/configrequest	POST	Update location configuration information of a target user

7.2.3.2 Resource: Client location information request

7.2.3.2.1 Description

The resource represents all client location information request.

7.2.3.2.2 Resource Definition

Resource URI: {apiRoot}/lms-information/<apiVersion>/requests

This resource shall support the resource URI variables defined in table 7.2.3.2.2-1.

Table 7.2.3.2.2-1: Resource URI variables for this resource

Name	Data type	Definition
apiRoot	String	See clause 7.2.1

7.2.3.2.3 Resource Standard Methods

7.2.3.2.3.1 POST

This method shall support the URI query parameters specified in table 7.2.3.2.3.1-1.

Table 7.2.3.2.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 7.2.3.2.3.1-2 and the response data structures and response codes specified in table 7.2.3.2.3.1-3.

Table 7.2.3.2.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
ClientOriginatingLocationRequest	M	1	Client originating location information details

Table 7.2.3.2.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
ClientOriginatingLocationRequest	M	1	201 Created	Client location information request is successfully created in the LMS. The URI of the created resource shall be returned in the "Location" HTTP header.
NOTE: The mandatory HTTP error status code for the POST method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [13] also apply.				

Table 7.2.3.2.3.1-4: Headers supported by the POST method on this resource

Name	Data type	P	Cardinality	Description
n/a				

Table 7.2.3.2.3.1-5: Headers supported by the 201 response code on this resource

Name	Data type	P	Cardinality	Description
n/a				

7.2.3.3.4 Resource Custom Operations

None.

7.2.3.3 Resource: Location information subscriptions

7.2.3.3.1 Description

The resource represents all location information subscriptions.

7.2.3.3.2 Resource Definition

Resource URI: **{apiRoot}/lms-information/<apiVersion>/subscriptions**

This resource shall support the resource URI variables defined in table 7.2.2.3.2-1.

Table 7.2.3.3.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	String	See clause 7.2.1

7.2.3.3.3 Resource Standard Methods

7.2.3.3.3.1 POST

This method creates the location information subscription. This method shall support the URI query parameters specified in table 7.2.3.3.3.1-1.

Table 7.2.3.3.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 7.2.3.3.3.1-2 and the response data structures and response codes specified in table 7.2.3.3.3.1-3.

Table 7.2.3.3.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
LocationSubscriptionRequest	M	1	Location information subscription details

Table 7.2.3.3.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
LocationSubscriptionResponse	M	1	201 Created	A location information subscription resource created successfully.
NOTE: The mandatory HTTP error status code for the POST method listed in 5.2.7.1-1 of 3GPP TS 29.500 [13] also apply.				

Table 7.2.3.3.3.1-4: Headers supported by the POST method on this resource

Name	Data type	P	Cardinality	Description
n/a				

Table 7.2.3.3.3.1-5: Headers supported by the 201 response code on this resource

Name	Data type	P	Cardinality	Description
Locationn	String	M	1	Contains the URI of the newly created resource, according to the structure: {apiRoot}/lms-location-information/<apiVersion>/subscriptions/{subscriptionId}

Table 7.2.3.3.3.1-6: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative URI of the resource located in an alternative LMS.

Table 7.2.3.3.1-7: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative URI of the resource located in an alternative LMS.

7.2.3.4 Resource: Individual location information subscription

7.2.3.4.1 Description

The resource represents a location information subscription.

7.2.3.4.2 Resource Definition

Resource URI: {apiRoot}/lms-information/<apiVersion>/subscription/{subscriptionID}

This resource shall support the resource URI variables defined in table 7.2.2.3.2-1.

Table 7.2.2.3.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	String	See clause 7.w.1

7.2.3.4.3 Resource Standard Methods

7.2.3.4.3.1 PUT

This method updates a location information subscription. This method shall support the URI query parameters specified in table 7.2.3.4.3.1-1.

Table 7.2.3.4.3.1-1: URI query parameters supported by the PUT method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 7.2.3.4.3.1-2 and the response data structures and response codes specified in table 7.2.3.4.3.1-3.

Table 7.2.3.4.3.1-2: Data structures supported by the PUT Request Body on this resource

Data type	P	Cardinality	Description
LocationSubscription Request	M	1	Client location information subscription details to be updated

Table 7.2.3.4.3.1-3: Data structures supported by the PUT Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	An individual location information subscription resource updated successfully.
n/a			307 Temporary Redirect	Temporary redirection, during resource modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative LMS.
n/a			308 Permanent Redirect	Permanent redirection, during resource modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative LMS.
NOTE: The mandatory HTTP error status code for the PUT method listed in 5.2.7.1-1 of 3GPP TS 29.500 [13] also apply.				

Table 7.2.3.4.3.1-4: Headers supported by the PUT method on this resource

Name	Data type	P	Cardinality	Description
n/a				

Table 7.2.3.4.3.1-5: Headers supported by the 204 response code on this resource

Name	Data type	P	Cardinality	Description
n/a				

Table 7.2.3.4.3.1-6: Links supported by the 204 Response Code on this endpoint

Name	Resource name	HTTP method or custom operation	Link parameter(s)	Description
n/a				

Table 7.2.3.4.3.1-7: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative URI of the resource located in an alternative LMS.

Table 7.2.3.4.3.1-8: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative URI of the resource located in an alternative LMS.

7.2.3.4.3.2 DELETE

This method deletes a location information subscription. This method shall support the URI query parameters specified in table 7.2.3.4.3.2-1.

Table 7.2.3.4.3.2-1: URI query parameters supported by the DELETE method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 7.2.3.4.3.2-2 and the response data structures and response codes specified in table 7.2.3.4.3.2-3.

Table 7.2.3.4.3.2-2: Data structures supported by the DELETE Request Body on this resource

Data type	P	Cardinality	Description
n/a	M	1	Client location information subscription details to be updated

Table 7.2.3.4.3.2-3: Data structures supported by the DELETE Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a	M	1	204 No Content	An individual location information subscription resource deleted successfully.
n/a			307 Temporary Redirect	Temporary redirection, during resource modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative LMS.
n/a			308 Permanent Redirect	Permanent redirection, during resource modification. The response shall include a Location header field containing an alternative URI of the resource located in an alternative LMS.
NOTE: The mandatory HTTP error status code for the DELETE method listed in 5.2.7.1-1 of 3GPP TS 29.500 [13] also apply.				

Table 7.2.3.4.3.2-4: Headers supported by the POST method on this resource

Name	Data type	P	Cardinality	Description
n/a				

Table 7.2.3.4.3.2-5: Headers supported by the 200 response code on this resource

Name	Data type	P	Cardinality	Description
n/a				

Table 7.2.3.4.3.2-6: Links supported by the 200 Response Code on this endpoint

Name	Resource name	HTTP method or custom operation	Link parameter(s)	Description
n/a				

Table 7.2.3.4.3.2-7: Headers supported by the 307 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative URI of the resource located in an alternative LMS.

Table 7.2.3.4.3.2-8: Headers supported by the 308 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	String	M	1	An alternative URI of the resource located in an alternative LMS.

7.2.3.4.4 Resource Custom Operations

None.

7.2.3.5 Resource: Location information config request

7.2.3.5.1 Description

The resource represents all location information config requests.

7.2.3.5.2 Resource Definition

Resource URI: **{apiRoot}/lms-information/<apiVersion>/configrequest**

This resource shall support the resource URI variables defined in table 7.2.3.5.2-1.

Table 7.2.3.5.2-1: Resource URI variables for this resource

Name	Data Type	Definition
apiRoot	String	See clause 7.2.1

7.2.3.5.3 Resource Standard Methods

7.2.3.5.3.1 POST

This method updates the location configuration information of a target user. This method shall support the URI query parameters specified in table 7.2.3.5.3.1-1.

Table 7.2.3.5.3.1-1: URI query parameters supported by the POST method on this resource

Name	Data type	P	Cardinality	Description
n/a				

This method shall support the request data structures specified in table 7.2.3.5.3.1-2 and the response data structures and response codes specified in table 7.2.3.5.3.1-3.

Table 7.2.3.5.3.1-2: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
LocationConfiguration	M	1	Location configuration details.

Table 7.2.3.5.3.1-3: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
LocationInfoConfig Request	M	1	201 Created	A location configuration resource updated successfully.
NOTE: The mandatory HTTP error status code for the POST method listed in 5.2.7.1-1 of 3GPP TS 29.500 [13] also apply.				

Table 7.2.3.5.3.1-4: Headers supported by the POST method on this resource

Name	Data type	P	Cardinality	Description
n/a				

7.2.4 Custom Operations without associated resources

None.

7.2.5 Notifications

7.2.5.1 General

Table 7.2.5.1-1: Notifications overview

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
Location Notification	{locationNotificationUri}	POST	Notification to a client containing location information.

7.2.5.2 Location information notification

7.2.5.2.1 Description

Location configuration notification is used by the LMS to notify a client on a new location information.

7.2.5.2.2 Target URI

The Callback URI "{locationNotificationUri}" shall be used with the callback URI variables defined in table 7.2.5.2.2-1.

Table 7.2.5.2.2-1: Callback URI variables

Name	Definition
locationNotificationUri	String formatted as URI with the Callback Uri.

7.2.5.2.3 Standard Methods

7.2.5.2.3.1 POST

This method shall support the request data structures specified in table 7.2.5.2.3.1-1 and the response data structures and response codes specified in table 7.2.5.2.3.1-2.

Table 7.2.5.2.3.1-1: Data structures supported by the POST Request Body on this resource

Data type	P	Cardinality	Description
LocationNotification	M	1	Notification containing location information.

Table 7.2.5.2.3.1-2: Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	The receipt of the Location notification is acknowledged.
NOTE: The mandatory HTTP error status code for the POST method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [13] also apply.				

7.2.6 Data Model

7.2.6.1 General

This clause specifies the application data model supported by the LMS_Information Service API.

Table 7.2.6.1-1 specifies the data types defined for the LMS_Information Service interface protocol.

Table 7.2.6.1-1: LMS_Information Service specific Data Types

Data type	Clause defined	Description	Applicability
ClientOriginatingLocationRequest	7.2.6.2.2	Includes detailed of a client location information request	

Table 7.2.6.1-2 specifies data types re-used by the LMS_Information service based interface protocol from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the LMS_Information service based interface.

Table 7.2.6.1-2: LMS_Information Service re-used Data Types

Data type	Reference	Comments	Applicability
n/a			

7.2.6.2 Structured data types

7.2.6.2.1 Introduction

This clause defines the structures to be used in resource representations.

7.2.6.2.2 Type: ClientOriginatingLocationRequest

Table 7.2.6.2.2-1: Definition of type ClientOriginatingLocationRequest

Attribute name	Data type	P	Cardinality	Description	Applicability
functionalAliasIds	array(Uri)	O	1..N	A list of activated Functional Alias Id of requested MC Users. (NOTE)	
locationNotificationUri	Uri	M	1	URI where the Location Notifications should be delivered to.	
mclocClientID	string	M	1	Used to identify the LMC that makes a subscription request.	
mcServiceIds	array(Uri)	O	1..N	A list of MC service IDs of the MC users for which location information is requested MC Users.(NOTE)	
mcServiceGroupIds	array(Uri)	O	1..N	A list of MC service group IDs of which all affiliated members' location information are being requested.	
refresh	boolean	O	0..1	Indicates that the location report shall be refreshed immediately.	
requestLocationHistory	RequestLocationHistory	O	0..1	Includes details on requested location history information.	
requestHistoryStatus	boolean	O	0..1	Indicates that a location history status is requested.	

NOTE: At least one of functionalAliasIds, mcServiceIds or mcServiceGroupIds shall be present.

7.2.6.2.3 Type: MCUserLocation

Table 7.2.6.2.3-1: Definition of type MCUserLocation

Attribute name	Data type	P	Cardinality	Description	Applicability
mcServiceIds	array(Uri)	M	1..N	A list of MC service IDs of the MC user for which location information is reported.	
functionalAliasIds	array(Uri)	O	1..N	A list of activated Functional Alias Id of the MC user for which location information is reported.	
mcServiceUELabel	String	O	0..1	Used to identify the MC service UE.	
locationInfo	LocationInfo	M	1	As defined in clause 7.2.6.2.3	

7.2.6.2.4 Type: LocationNotification

Table 7.2.6.2.4-1: Definition of type LocationNotification

Attribute name	Data type	P	Cardinality	Description	Applicability
mcUEResponseList	array(MCUser Location)	M	1..N	Represents one array of MC Users' device location information.	
requestingMcServiceId	Uri	M	1	The MC service ID of the LMC that requested the location report.	
requestingfunctionalAliasId	Uri	O	0..1	The activated Functional Alias Id of the LMC that requested the location report.	
subscriptionID	string	O	0..1	Optional attribute including the subscriptionID when the location notification is related to an existing subscription. (NOTE)	
NOTE: The subscriptionID is mandatory if the location notification is sent due to a location subscription.					

7.2.6.2.5 Type: LocationSubscriptionRequest

Table 7.2.6.2.5-1: Definition of type LocationSubscriptionRequest

Attribute name	Data type	P	Cardinality	Description	Applicability
expTime	DateTime	M	1	The subscription expiry time and date.	
functionalAliasIds	array(Uri)	O	1..N	A list of activated Functional Alias Id of subscribed MC Users. (NOTE)	
locationNotificationUri	Uri	M	1	URI where the Location Notifications should be delivered to.	
mclocClientID	string	M	1	Used to identify the LMC that makes a subscription request.	
mcServiceIds	array(Uri)	O	1..N	A list of MC service IDs of the MC users for which location information is subscribed. (NOTE)	
mcServiceGroupIds	array(Uri)	O	1..N	A list of MC service group IDs of which all affiliated members' location information are subscribed. (NOTE)	
NOTE: At least one of functionalAliasIDs, mcServiceIds or mcServiceGroupIds shall be present.					

7.2.6.3 Simple data types and enumerations

No simple data types or enumerations defined.

7.2.7 Error Handling

7.2.7.1 General

For the LMS_Information API, HTTP error responses shall be supported as specified in clause 4.8 of 3GPP TS 29.501 [14]. Protocol errors and application errors specified in table 5.2.7.2-1 of 3GPP TS 29.500 [13] shall be supported for an HTTP method if the corresponding HTTP status codes are specified as mandatory for that HTTP method in table 5.2.7.1-1 of 3GPP TS 29.500 [13].

In addition, the requirements in the following clauses are applicable for the LMS_Information API.

7.2.7.2 Protocol Errors

No specific procedures for the LMS_Information service are specified.

7.2.7.3 Application Errors

The application errors defined for the LMS_Information service are listed in table 7.2.7.3-1.

Table 7.2.7.3-1: Application errors

Application Error	HTTP status code	Description

7.2.8 Feature negotiation

Table 7.2.8-1 defines the features supported by the LMS_Information API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [13].

No feature is defined in this release of the specification.

Table 7.2.8-1: Supported Features

Feature number	Feature Name	M/O	Description

7.2.9 Security

The LMC shall send HTTP requests over TLS connection as specified for the HTTP client in the UE in annex A of 3GPP TS 24.482 [10].

Authentication and authorization shall be as specified in 3GPP TS 33.180 [17].

The LMS shall be configured with an authorized MC service server list, containing public service identities of MC service servers.

When handling an HTTP request, the LMS shall determine the identity of the sender of the HTTP request as specified in 3GPP TS 24.482 [10], and shall use the identity of the sender of the HTTP request as an authenticated identity when performing the authorization.

7.2.10 HTTP redirection

An HTTP request may be redirected to a different LMS service instance, within the same LMS. When an HTTP server redirects an HTTP request (i.e. service request or notification/callback request) to a different target LMS service instance, the URI of the target LMS service instance towards which the request is redirected shall be given by the Location header field of the 307 Temporary Redirect or 308 Permanent Redirect response. Further details on HTTP redirection are found in 3GPP TS 29.500 [13].

Annex A (normative): OpenAPI specification

A.1 General

This Annex specifies the formal definition of the API(s) defined in the present specification. It consists of OpenAPI specifications in YAML format.

This Annex takes precedence when being discrepant to other parts of the specification with respect to the encoding of information elements and methods within the API(s).

NOTE: The semantics and procedures, as well as conditions, e.g. for the applicability and allowed combinations of attributes or values, not expressed in the OpenAPI definitions but defined in other parts of the specification also apply.

Informative copies of the OpenAPI specification files contained in this 3GPP Technical Specification are available on a Git-based repository that uses the GitLab software version control system (see clause 5.3.1 of 3GPP TS 29.501 [14] and clause 5B of 3GPP TR 21.900 [1]).

A.2 LMS_Reporting API

openapi: 3.0.0

info:

title: LMS_Reporting

version: 1.0.0

description: |

API for Registration and location reporting to LMS Service.

© 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).

All rights reserved.

externalDocs:

description: 3GPP TS 24.283 V19.1.0; Mission Critical Location Management (MCLoc).

url: http://www.3gpp.org/ftp/Specs/archive/24_series/24.283/

servers:

- url: '{apiRoot}/lms-reporting/v1'

variables:

apiRoot:

default: <https://example.com>

description: apiRoot as defined in clause 8.2.44D1 of 3GPP TS 24.483

security:

- BearerAuth: []

paths:

/registrations:

post:

description: Creates a new individual LMC registration in the LMS.

security:

- BearerAuth: []

operationId: registerLMC

tags:

- LMS Registration (Collection)

requestBody:

required: true

content:

application/json:

schema:

\$ref: '#/components/schemas/LMCRegistration'

responses:

'201':

description: Successful registration of LMC.

content:

application/json:

schema:

\$ref: '#/components/schemas/LMCRegistration'

```

    headers:
      Location:
        description: Contains the URI of the newly created resource.
        required: true
        schema:
          type: string
    '400':
      $ref: 'TS29571_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29571_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29571_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29571_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29571_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29571_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29571_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29571_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29571_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29571_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29571_CommonData.yaml#/components/responses/default'
  callbacks:
    locationConfiguration:
      '{request.body#/locationConfigUri}':
        post:
          requestBody:
            required: true
            content:
              application/json:
                schema:
                  $ref: '#/components/schemas/LocationConfiguration'
          responses:
            '204':
              description: No Content (The receipt of the Configuration is acknowledged).
            '307':
              $ref: 'TS29571_CommonData.yaml#/components/responses/307'
            '308':
              $ref: 'TS29571_CommonData.yaml#/components/responses/308'
            '400':
              $ref: 'TS29571_CommonData.yaml#/components/responses/400'
            '401':
              $ref: 'TS29571_CommonData.yaml#/components/responses/401'
            '403':
              $ref: 'TS29571_CommonData.yaml#/components/responses/403'
            '404':
              $ref: 'TS29571_CommonData.yaml#/components/responses/404'
            '411':
              $ref: 'TS29571_CommonData.yaml#/components/responses/411'
            '413':
              $ref: 'TS29571_CommonData.yaml#/components/responses/413'
            '415':
              $ref: 'TS29571_CommonData.yaml#/components/responses/415'
            '429':
              $ref: 'TS29571_CommonData.yaml#/components/responses/429'
            '500':
              $ref: 'TS29571_CommonData.yaml#/components/responses/500'
            '503':
              $ref: 'TS29571_CommonData.yaml#/components/responses/503'
            default:
              $ref: 'TS29571_CommonData.yaml#/components/responses/default'
    locationRequest:
      '{request.body#/locationRequestUri}':
        post:
          requestBody:
            required: true
            content:
              application/json:
                schema:
                  $ref: '#/components/schemas/LocationRequest'
          responses:
            '200':

```

```

        description: Location report.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/MCUELocation'
      '307':
        $ref: 'TS29571_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29571_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29571_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29571_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29571_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29571_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29571_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29571_CommonData.yaml#/components/responses/415'
      '429':
        $ref: 'TS29571_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29571_CommonData.yaml#/components/responses/default'

/registrations/{registrationId}:
  put:
    description: >
      Updates an existing LMC registration in the LMS
    tags:
      - Individual LMS registration (Document)
    parameters:
      - name: registrationId
        in: path
        description: Identifies an individual LMC registration resource.
        required: true
        schema:
          type: string
    requestBody:
      description: Parameters to replace the existing subscription.
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/LMCRegistration'
    responses:
      '200':
        description: >
          OK. The individual LMC registration resource was updated successfully.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/LMCRegistration'
      '204':
        description: No Content (updated successfully).
      '400':
        $ref: 'TS29571_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29571_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29571_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29571_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29571_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29571_CommonData.yaml#/components/responses/415'
      '429':

```

```

    $ref: 'TS29571_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29571_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29571_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29571_CommonData.yaml#/components/responses/default'

delete:
  description: >
    Deletes an existing LMC reigstration identified by the registrationId.
  operationId: DeleteLMCRegistration
  tags:
    - Individual LMC registration (Document)
  parameters:
    - name: registrationId
      in: path
      description: Identifies an LMC registration resource.
      required: true
      schema:
        type: string
  responses:
    '204':
      description: >
        An individual LMC registration resource deleted successfully.
    '307':
      $ref: 'TS29571_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29571_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29571_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29571_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29571_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29571_CommonData.yaml#/components/responses/404'
    '429':
      $ref: 'TS29571_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29571_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29571_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29571_CommonData.yaml#/components/responses/default'

/locationreports:
  post:
    summary: submit a MC UE location report
    security:
      - BearerAuth: []
    operationId: submitLocationReport
    tags:
      - MC UE Location Report (Collection)
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/MCUELocation'
    responses:
      '201':
        description: Successful submission of location report.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/MCUELocation'
      '400':
        $ref: 'TS29571_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29571_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29571_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29571_CommonData.yaml#/components/responses/411'
      '413':

```

```

    $ref: 'TS29571_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29571_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29571_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29571_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29571_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29571_CommonData.yaml#/components/responses/default'

```

/configurations:

```

get:
  summary: request to download the location configuration
  security:
    - BearerAuth: []
  operationId: ConfigurationRequest
  tags:
    - LMC configurations (Collection)
  responses:
    '200':
      description: Successful submission of location report.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/LocationConfiguration'
    '307':
      $ref: 'TS29571_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29571_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29571_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29571_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29571_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29571_CommonData.yaml#/components/responses/404'
    '406':
      $ref: 'TS29571_CommonData.yaml#/components/responses/406'
    '429':
      $ref: 'TS29571_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29571_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29571_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29571_CommonData.yaml#/components/responses/default'

```

```

components:
  securitySchemes:
    BearerAuth:
      type: http
      scheme: bearer

```

API specific definitions

```

schemas:
  LMCRegistration:
    description: Represents an individual LMS registration resource.
    type: object
    properties:
      expTime:
        type: string
        format: date-time
      mclocClientID:
        type: string
        description: Identify the LMC of the MC UE
      locationConfigUri:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
      locationRequestUri:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
      pei:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Pei'
      supi:

```

```

    $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
  required:
    - mclocClientID
    - expTime
    - locationConfigUri
    - locationRequestUri

LocationConfiguration:
  description: Represents an location configuraion objects sent from LMS to an LMC
  type: object
  properties:
    emergencyTriggeringCriteria:
      $ref: '#/components/schemas/TriggeringCriteria'
    emergencyLocationInformation:
      $ref: '#/components/schemas/RequestedLocationInfo'
    triggeringCriteria:
      $ref: '#/components/schemas/TriggeringCriteria'
    nonEmergencyLocationInformation:
      $ref: '#/components/schemas/RequestedLocationInfo'
    mcServiceId:
      type: string
      format: Uri
      description: Optional attribute that is used to indicate the identity of the
        MC user requesting to set the location configuration.
    configScope:
      $ref: '#/components/schemas/ConfigScope'
    historyReporting:
      type: boolean
      description: The attribute indicates that the LMC shall store location
        information if location reporting can not be done, for example if the MC UE is out of
        coverage. The stored location information can be reported at a later time.

TriggeringCriteria:
  description: Contains the location reporting trigger criteria.
  type: object
  properties:
    adaptiveTrigger:
      $ref: '#/components/schemas/AdaptiveTrigger'
    cellChange:
      $ref: '#/components/schemas/CellChange'
    geographicalAreaChange:
      $ref: '#/components/schemas/GeographicalAreaChange'
    mbsfnAreaChange:
      $ref: '#/components/schemas/MbsfnAreaChange'
    mbmsSaChange:
      $ref: '#/components/schemas/MbmsSaChange'
    nr5GmbsfsaAreaChange:
      $ref: '#/components/schemas/NR5GmbsfsaAreaChange'
    periodicReport:
      $ref: '#/components/schemas/PeriodicReport'
    plmnChange:
      $ref: '#/components/schemas/PlmnChange'
    ratTypeChange:
      $ref: '#/components/schemas/RatTypeChange'
    signallingEvent:
      $ref: '#/components/schemas/SignallingEvent'
    trackingAreaChange:
      $ref: '#/components/schemas/TrackingAreaChange'
    travelledDistance:
      $ref: '#/components/schemas/TravelledDistance'

AdaptiveTrigger:
  description: This attribute specifies parameters controlling adaptive combined time
    and distance triggers for location reporting.
  type: object
  properties:
    triggerId:
      $ref: '#/components/schemas/TriggerId'
    minPeriod:
      type: integer
      description: An optional attribute specified as a positive or 0 integer number
        of seconds and defaulting at 0, if not present. This attribute specifies the minimum
        wait period between consecutive location reports, irrespective of changes in the
        distance between the current location and the location of the most recent sending of a

```

location report.

minDistance:

type: integer

description: An optional attribute specified as a strictly positive integer number of meters and defaulting at infinity, if not present. This attribute is used in the decision of sending a location report based on travelled distance, and specifies the minimum required distance, between the current location and the location of the most recent sending of a location report.

persistencePeriod:

type: integer

description: An optional attribute specified as a positive or 0 integer number of seconds and defaulting at 0, if not present. This attribute specifies the time between the moment when the LMC detected that the distance between the current location and the location of the most recent sending of a location report exceeded the minDistance attribute and the moment when the LMC will check again that the updated current location is still farther away by at least minDistance from the location of the mentioned sending of the location report. If the check is positive, a location report based on travelled distance will be sent.

additionalTime:

type: integer

description: An optional attribute, specified as a strictly positive integer number of seconds and defaulting at 1. If a location report is not sent based on the travelled distance, the LMC will send a location report after minPeriod + PersistencePeriod + AdditionalTime seconds after the previous location report.

rrcInactiveMinPeriod:

type: integer

description: An optional attribute with the same semantics and behaviour as described above for the corresponding parameter, but applicable when the UE receives MBS traffic in RRC_INACTIVE state.

rrcInactiveMinDistance:

type: integer

description: An optional attribute with the same semantics and behaviour as described above for the corresponding parameter, but applicable when the UE receives MBS traffic in RRC_INACTIVE state.

rrcInactivePersistencePeriod:

type: integer

description: An optional attribute with the same semantics and behaviour as described above for the corresponding parameter, but applicable when the UE receives MBS traffic in RRC_INACTIVE state.

rrcInactiveadditionalTime:

type: integer

description: An optional attribute with the same semantics and behaviour as described above for the corresponding parameter, but applicable when the UE receives MBS traffic in RRC_INACTIVE state.

CellChange:

description: The attribute specifies which cell changes trigger location reporting.

type: object

properties:

anyCellChange:

\$ref: '#/components/schemas/AnyCellChange'

enterSpecificCell:

\$ref: '#/components/schemas/SpecificCellChange'

exitSpecificCell:

\$ref: '#/components/schemas/SpecificCellChange'

AnyCellChange:

description: The presence of this attribute specifies that any cell change is a trigger for location reporting.

type: object

properties:

triggerId:

\$ref: '#/components/schemas/TriggerId'

SpecificCellChange:

description: A list of cell Ids which triggers location reporting when entering or exiting the cells.

type: object

properties:

eutranCells:

\$ref: '#/components/schemas/EutranCells'

nrCells:

\$ref: '#/components/schemas/NrCells'

anyOf:

- required: [eutranCells]
- required: [nrCells]

EutranCells:
description: A list of Eutran cell Ids which triggers location reporting when entering or exiting the cells.
type: array
items:
\$ref: '#/components/schemas/EutranCell'

NrCells:
description: A list of NR cell Ids which triggers location reporting when entering or exiting the cells.
type: array
items:
\$ref: '#/components/schemas/NrCell'

EutranCell:
description: An Eutran cell id that triggers a location reporting.
type: object
properties:
triggerId:
\$ref: '#/components/schemas/TriggerId'
eutranCell:
\$ref: 'TS29571_CommonData.yaml#/components/schemas/Ecgi'

NrCell:
description: A NR cell id that triggers location reporting.
type: object
properties:
triggerId:
\$ref: '#/components/schemas/TriggerId'
nrCell:
\$ref: 'TS29571_CommonData.yaml#/components/schemas/Ncgi'

GeographicalAreaChange:
description: The attribute specifies which geographical area changes that trigger location reporting.
type: object
properties:
enterSpecifcArea:
\$ref: '#/components/schemas/SpecificArea'
exitSpecifcArea:
\$ref: '#/components/schemas/SpecificArea'

SpecificArea:
description: A geographical area which triggers location reporting when entering or exiting the defined geographical area.
type: object
properties:
geoAreas:
type: array
items:
\$ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/GeographicArea'

MbsfnAreaChange:
description: The attribute specifies which MBSFN area changes trigger location reporting.
type: object
properties:
anyMbsfnAreaChange:
\$ref: '#/components/schemas/AnyMbsfnAreaChange'
enterSpecificMbsfnArea:
\$ref: '#/components/schemas/SpecificMbsfnArea'
exitSpecificMbsfnArea:
\$ref: '#/components/schemas/SpecificMbsfnArea'

AnyMbsfnAreaChange:
description: The precense of this attribute specifies that any MBSFN area change is a trigger for location reporting.
type: object
properties:
triggerId:
\$ref: '#/components/schemas/TriggerId'

SpecificMbsfnArea:

description: A list of MBSFN area Ids that triggers location reporting when entering or exiting the MBSFN area Ids.
type: object
properties:
 mbsfnAreas:
 type: array
 items:
 \$ref: '#/components/schemas/MbsfnAreaId'

MbsfnAreaId:
description: An MBFSN area id that triggers location reporting.
type: object
properties:
 triggerId:
 \$ref: '#/components/schemas/TriggerId'
 mbsfnArea:
 type: integer
 minimum: 0
 maximum: 255
 description: The MBSFN area identity.

MbmsSaChange:
description: The attribute specifies which MBMS SA area changes trigger location reporting.
type: object
properties:
 anyMbmsSaChange:
 \$ref: '#/components/schemas/AnyMbmsSaChange'
 enterSpecificMbmsSa:
 \$ref: '#/components/schemas/SpecificMbmsSaIdentity'
 exitSpecificMbmsSa:
 \$ref: '#/components/schemas/SpecificMbmsSaIdentity'

AnyMbmsSaChange:
description: The presence of this element specifies that any MBMS SA change is a trigger for location reporting.
type: object
properties:
 triggerId:
 \$ref: '#/components/schemas/TriggerId'

SpecificMbmsSaIdentity:
description: A list of MBMS SAI that triggers location reporting when entering or exiting the MBMS SAI.
type: object
properties:
 mbmsSaIdentities:
 type: array
 items:
 \$ref: '#/components/schemas/MbmsSaIdentity'

MbmsSaIdentity:
description: An MBMS SA identity that triggers location reporting.
type: object
properties:
 triggerId:
 \$ref: '#/components/schemas/TriggerId'
 mbmsSaIdentity:
 type: integer
 minimum: 0
 maximum: 65535
 description: The MBMS SA identity.

NR5GMbsfsaAreaChange:
description: The attribute specifies which 5G Mbsfsa area changes trigger location reporting.
type: object
properties:
 anyNR5GMbsfsaAreaChange:
 \$ref: '#/components/schemas/AnyNR5GMbsfsaAreaChange'
 enterSpecificNR5GMbsfsaArea:

```
    $ref: '#/components/schemas/SpecificNR5GMbsfsaArea'
  exitSpecificNR5GMbsfsaArea:
    $ref: '#/components/schemas/SpecificNR5GMbsfsaArea'
```

AnyNR5GMbsfsaAreaChange:

```
  description: The presence of this element specifies that any 5G Mbsfsa area change
    is a trigger for location reporting.
  type: object
  properties:
    triggerId:
      $ref: '#/components/schemas/TriggerId'
```

SpecificNR5GMbsfsaArea:

```
  description: A list of 5G Mbsfsa area that triggers a location reporting when
    entering or exiting the 5G Mbsfsa area.
  type: object
  properties:
    nr5GMbsFsaIdentities:
      type: array
      items:
        $ref: '#/components/schemas/NR5GMbsfsaAreaIdentity'
```

NR5GMbsfsaAreaIdentity:

```
  description: An 5G Mbsfsa area identity that triggers location reporting.
  type: object
  properties:
    triggerId:
      $ref: '#/components/schemas/TriggerId'
    mbsfnAreaIdentity:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/MbsFsaId'
```

PeriodicReport:

```
  description: The attribute specifies how frequent periodic location reports
    shall be sent.
  type: object
  properties:
    triggerId:
      $ref: '#/components/schemas/TriggerId'
    periodicReport:
      type: integer
      description: Value in seconds specifies the reporting interval.
```

PlmnChange:

```
  description: The attribute specifies which PLMN changes trigger
    location reporting.
  type: object
  properties:
    anyPlmnChange:
      $ref: '#/components/schemas/AnyPlmnChange'
    enterSpecificPlmnArea:
      $ref: '#/components/schemas/SpecificPlmnChange'
    exitSpecificPlmnArea:
      $ref: '#/components/schemas/SpecificPlmnChange'
```

AnyPlmnChange:

```
  description: The presence of this element specifies that any PLMN change
    is a trigger for location reporting.
  type: object
  properties:
    triggerId:
      $ref: '#/components/schemas/TriggerId'
```

SpecificPlmnChange:

```
  description: A list of PLMNs that triggers a location reporting when
    entering or exiting the PLMN.
  type: object
  properties:
    plmnIds:
      type: array
      items:
        $ref: '#/components/schemas/Plmn'
```

Plmn:

```
  description: A PLMN identity that triggers location reporting.
```

```
type: object
properties:
  triggerId:
    $ref: '#/components/schemas/TriggerId'
  plmn:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnId'
```

RatTypeChange:

description: An optional attribute specifying what inter-RAT changes triggers a location report.

type: object

properties:

anyRatTypeChange:

\$ref: '#/components/schemas/AnyRatTypeChange'

AnyRatTypeChange:

description: This attribute specifies that any inter-RAT change triggers a location report.

type: object

properties:

triggerId:

\$ref: '#/components/schemas/TriggerId'

SignallingEvent:

description: An optional attribute specifying what signalling events triggers a location report.

type: object

properties:

functionalAliasActivation:

\$ref: '#/components/schemas/FunctionalAliasActivation'

functionalAliasDeactivation:

\$ref: '#/components/schemas/FunctionalAliasDeactivation'

initialLogOn:

\$ref: '#/components/schemas/InitialLogOn'

groupCallNonEmergency:

\$ref: '#/components/schemas/GroupCallNonEmergency'

privateCallNonEmergency:

\$ref: '#/components/schemas/PrivateCallNonEmergency'

locationConfigurationReceived:

\$ref: '#/components/schemas/LocationConfigurationReceived'

FunctionalAliasActivation:

description: This attribute specifies that a functional alias activation triggers a location report.

type: object

properties:

triggerId:

\$ref: '#/components/schemas/TriggerId'

FunctionalAliasDeactivation:

description: This attribute specifies that a functional Alias deactivation triggers a location report.

type: object

properties:

triggerId:

\$ref: '#/components/schemas/TriggerId'

InitialLogOn:

description: This attribute specifies that an initial log on triggers a location report.

type: object

properties:

triggerId:

\$ref: '#/components/schemas/TriggerId'

GroupCallNonEmergency:

description: This attribute specifies that a non-emergency group call triggers a location report.

type: object

properties:

triggerId:

\$ref: '#/components/schemas/TriggerId'

PrivateCallNonEmergency:

description: This attribute specifies that a non-emergency private call triggers a location report.

```
    type: object
    properties:
      triggerId:
        $ref: '#/components/schemas/TriggerId'

LocationConfigurationReceived:
  description: This attribute specifies that a received location configuration triggers
    a location report.
  type: object
  properties:
    triggerId:
      $ref: '#/components/schemas/TriggerId'

TrackingAreaChange:
  description: The attribute specifies which tracking area changes trigger
    location reporting.
  type: object
  properties:
    anyTrackingAreaChange:
      $ref: '#/components/schemas/AnyTrackingAreaChange'
    enterSpecificTrackingArea:
      $ref: '#/components/schemas/SpecificTrackingAreaChange'
    exitSpecificTrackingArea:
      $ref: '#/components/schemas/SpecificTrackingAreaChange'

AnyTrackingAreaChange:
  description: The presence of this element specifies that any tracking area change
    is a trigger for location reporting.
  type: object
  properties:
    triggerId:
      $ref: '#/components/schemas/TriggerId'

SpecificTrackingAreaChange:
  description: A list of tracking areas that triggers a location reporting when
    entering or exiting the tracking area.
  type: object
  properties:
    trackingAreas:
      type: array
      items:
        $ref: '#/components/schemas/TrackingArea'

TrackingArea:
  description: A tracking area identity that triggers location reporting.
  type: object
  properties:
    triggerId:
      $ref: '#/components/schemas/TriggerId'
    trackingArea:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Tac'

TravelledDistance:
  description: The attribute specifies the required travelled distance for a
    trigger for location reporting.
    shall be sent.
  type: object
  properties:
    triggerId:
      $ref: '#/components/schemas/TriggerId'
    travelledDistance:
      type: integer
      description: Value in meter specifies the travelled distance
        for location reporting.

RequestedLocationInfo:
  description: Contains the details of what the location report shall include.
  type: object
  properties:
    bearingAndSpeed:
      type: boolean
      nullable: true
```

description: The presence of this attribute indicates that the item shall be included in the location report.

coordinate:
type: boolean
nullable: true
description: The presence of this attribute indicates that the item shall be included in the location report.

mbmsSaiId:
type: boolean
nullable: true
description: The presence of this attribute indicates that the item shall be included in the location report.

mbsfnArea:
type: boolean
nullable: true
description: The presence of this attribute indicates that the item shall be included in the location report.

minimumIntervalLength:
type: integer
description: Value in seconds, the minimum time between location reports.

neighbouringEcgi:
type: boolean
nullable: true
description: The presence of this attribute indicates that the item shall be included in the location report.

neighbouringNcgi:
type: boolean
nullable: true
description: The presence of this attribute indicates that the item shall be included in the location report.

nr5GmbsfsaArea:
type: boolean
nullable: true
description: The presence of this attribute indicates that the item shall be included in the location report.

servingEcgi:
type: boolean
nullable: true
description: The presence of this attribute indicates that the item shall be included in the location report.

servingNcgi:
type: boolean
nullable: true
description: The presence of this attribute indicates that the item shall be included in the location report.

TriggerId:
type: string
description: The triggerId shall be set to a unique value and is returned in the location report.

LocationRequest:
description: Represents an location request object used by LMS to request a location report from an LMC.
type: object
properties:
requestedMcServiceId:
type: string
format: uri
description: The MC service ID of the MC user being requested to send a location report.
requestingMcServiceId:
type: string
format: uri
description: The MC service ID of the MC user from which location information is being requested.
requestedFunctionalAliasId:
type: string
format: uri
description: The activated functional alias ID of the MC user being requested to send a location report.
requestingFunctionalAliasId:
type: string
format: uri

description: The activated functional alias ID of the MC user from which location information is being requested.
 requestedLocationInfo:
 \$ref: '#/components/schemas/RequestedLocationInfo'
 requestLocationHistory:
 \$ref: '#/components/schemas/RequestedLocationHistory'
 requestHistoryStatus:
 type: boolean
 description: This attributes indicates that a location history status report is requested.

ConfigScope:

description: Indicates if the location configuration shall be updated fully and replace existing configuration, or if the location configuration is added to the existing.
 anyOf:
 - type: string
 enum:
 - FULL
 - UPDATE
 - type: string
 description: This string provides forward-compatibility with future extensions to the enumeration and is not used to encode content defined in the present version of this API.

RequestedLocationHistory:

description: Includes details on requested location history information
 type: object
 properties:
 numberOfReports:
 type: integer
 description: Indicates the number of requested stored reports.
 startTime:
 \$ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
 endTime:
 \$ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
 triggerCriteria:
 \$ref: '#/components/schemas/TriggeringCriteria'
 minimumIntervalLength:
 type: integer
 description: Value in seconds, the minimum time between location reports.

MCUELocation:

description: Describes the parameters to perform LMS Location reports.
 type: object
 properties:
 functionalAlias:
 \$ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
 interRatType:
 \$ref: '#/components/schemas/InterRatType'
 locationData:
 \$ref: '#/components/schemas/LocationInfo'
 locTimestamp:
 \$ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
 mclocClientId:
 \$ref: '#/components/schemas/MclocClientId'
 mcServiceUELabel:
 type: string
 description: Used to identify the reporting MC UE for the end users, this may be used when multiple MC UEs are used by the same MC service user.
 reportId:
 type: string
 description: Attribute is used to return the value in the RequestId attribute in the an Location Request.
 reportType:
 \$ref: '#/components/schemas/ReportType'
 triggerId:
 type: array
 items:
 type: string
 description: Attribute which can occur multiple times that contain the value of the TriggerId attribute associated with a trigger that has fired.
 locationHistoryData:
 \$ref: '#/components/schemas/LocationHistoryData'
 locationHistoryStatus:
 \$ref: '#/components/schemas/LocationHistoryStatus'

MclocClientId:
type: string
format: uuid
description: Used to identify the reporting LMC, this is required when multiple location information responses for different requested LMC are sent.

LocationInfo:
description: object that includes coordinates typically obtained from GPS.
type: object
properties:
 currentCoordinate:
 \$ref: '#/components/schemas/CurrentCoordinate'
 ecgi:
 \$ref: 'TS29571_CommonData.yaml#/components/schemas/Ecgi'
 mbmsSaiId:
 type: integer
 minimum: 0
 maximum: 65535
 description: Attribute containing the MBMS Service Area Id the LMC is located in.
 mbsfnArea:
 \$ref: 'TS29571_CommonData.yaml#/components/schemas/MbsfnArea'
 ncgi:
 \$ref: 'TS29571_CommonData.yaml#/components/schemas/Ncgi'
 neighbouringEcgi:
 type: array
 items:
 \$ref: 'TS29571_CommonData.yaml#/components/schemas/Ecgi'
 neighbouringNcgi:
 type: array
 items:
 \$ref: 'TS29571_CommonData.yaml#/components/schemas/Ncgi'
 nr5GMbsfsaArea:
 \$ref: 'TS29571_CommonData.yaml#/components/schemas/MbsFsaId'

CurrentCoordinate:
description: This object contains one specific location point, speed and bearing (e.g., received from a GPS reciever).
type: object
properties:
 altitude:
 anyOf:
 - \$ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/Altitude'
 bearingAndSpeed:
 anyOf:
 - \$ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/HorizontalWithVerticalVelocity'
 geographicalCoordinate:
 anyOf:
 - \$ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/GeographicalCoordinates'
 horizontalaccuracy:
 anyOf:
 - \$ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/Accuracy'
 verticalaccuracy:
 anyOf:
 - \$ref: 'TS29572_Nlmf_Location.yaml#/components/schemas/Accuracy'

LocationHistoryData:
description: This object contains one or multiple time stamped location information reports.
type: array
items:
 \$ref: '#/components/schemas/LocationHistoryEvent'

LocationHistoryEvent:
description: This object represents a single location information report that has been stored in the LMC.
type: object
properties:
 locationData:
 \$ref: '#/components/schemas/LocationInfo'
 locTimestamp:
 \$ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
 triggerId:
 type: array
 items:
 type: string
 description: Attribute which can occur multiple times that contain the value

of the TriggerId attribute associated with a trigger that has fired.

```
LocationHistoryStatus:
  description: This object represents Location history summary status of the location reports
    that has been stored in the LMC and has not yet been reported.
  type: object
  properties:
    storedReports:
      type: integer
      description: set to the number of stored reports.
    startTime:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
    endTime:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
    triggerId:
      type: array
      items:
        type: string
        description: Attribute which can occur multiple times that contain the value
          of the TriggerId attribute associated with a trigger that has fired.
```

```
#
# Simple Types:
#
```

```
#
# Enumeration data types
#
```

```
InterRatType:
  description: Attribute containing the inter-RAT change type.
  anyOf:
    - type: string
      enum:
        - 5G_MBS_TO_LTE_MBMS
        - 5G_MBS_TO_LTE_UNICAST
        - LTE_MBMS_TO_5G_MBS
        - LTE_MBMS_TO_5G_UNICAST
    - type: string
      description: This string provides forward-compatibility with future extensions to the
        enumeration and is not used to encode content defined in the present version
        of this API.
```

```
ReportType:
  description: Used to inform whether the LMC is sending the report in an emergency
    situation or not.
  anyOf:
    - type: string
      enum:
        - EMERGENCY
        - NONEMERGENCY
    - type: string
      description: This string provides forward-compatibility with future extensions to the
        enumeration and is not used to encode content defined in the present version
        of this API.
```

A.3 LMS_Information API

openapi: 3.0.0

```
info:
  title: LMS_Information
  version: 1.0.0
  description: |
    API for Requesting and subscribing on Location Information from LMS Service.
    © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
```

```
externalDocs:
  description: 3GPP TS 24.283 V19.1.0; Mission Critical Location Management (MCLoc).
  url: http://www.3gpp.org/ftp/Specs/archive/24_series/24.283/
```

```

servers:
  - url: '{apiRoot}/lms-information/v1'
    variables:
      apiRoot:
        default: https://example.com
        description: apiRoot as defined in clause 8.2.44D1 of 3GPP TS 24.483

security:
  - BearerAuth: []

paths:
  /requests:
    post:
      description: Creates a new individual client location request in the LMS.
      security:
        - BearerAuth: []
      operationId: requestLMC
      tags:
        - LMS Location Request (Collection)
      requestBody:
        required: true
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/ClientOriginatingLocationRequest'
      responses:
        '201':
          description: Successful location request submitted from LMC.
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/ClientOriginatingLocationRequest'
          headers:
            Location:
              description: Contains the URI of the newly created resource.
              required: true
              schema:
                type: string
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '401':
          $ref: 'TS29571_CommonData.yaml#/components/responses/401'
        '403':
          $ref: 'TS29571_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
        '411':
          $ref: 'TS29571_CommonData.yaml#/components/responses/411'
        '413':
          $ref: 'TS29571_CommonData.yaml#/components/responses/413'
        '415':
          $ref: 'TS29571_CommonData.yaml#/components/responses/415'
        '429':
          $ref: 'TS29571_CommonData.yaml#/components/responses/429'
        '500':
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'
      callbacks:
        locationRequestResponse:
          '{request.body#/locationNotificationUri}':
            post:
              requestBody:
                required: true
                content:
                  application/json:
                    schema:
                      $ref: '#/components/schemas/LocationNotification'
              responses:
                '204':
                  description: No Content (The receipt of the Configuration is acknowledged).
                '307':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/307'
                '308':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/308'

```

```

    '400':
      $ref: 'TS29571_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29571_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29571_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29571_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29571_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29571_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29571_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29571_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29571_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29571_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29571_CommonData.yaml#/components/responses/default'

/subscriptions:
  post:
    description: Creates a new location subscription in the LMS.
    security:
      - BearerAuth: []
    operationId: LMSsubscriptions
    tags:
      - Location Subscription Request (Collection)
    requestBody:
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/LocationSubscriptionRequest'
    responses:
      '201':
        description: Successful location subscription request submitted to LMS.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/LocationSubscriptionRequest'
        headers:
          Location:
            description: Contains the URI of the newly created resource.
            required: true
            schema:
              type: string
      '400':
        $ref: 'TS29571_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29571_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29571_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29571_CommonData.yaml#/components/responses/411'
      '413':
        $ref: 'TS29571_CommonData.yaml#/components/responses/413'
      '415':
        $ref: 'TS29571_CommonData.yaml#/components/responses/415'
      '429':
        $ref: 'TS29571_CommonData.yaml#/components/responses/429'
      '500':
        $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      default:
        $ref: 'TS29571_CommonData.yaml#/components/responses/default'
    callbacks:
      subscriptionNotification:
        '{request.body#/subscriptionResponseUri}':
          post:
            requestBody:
              required: true

```

```

    content:
      application/json:
        schema:
          $ref: '#/components/schemas/LocationNotification'
  responses:
    '204':
      description: No Content (The receipt of the subscription notification
        is acknowledged).
    '307':
      $ref: 'TS29571_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29571_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29571_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29571_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29571_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29571_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29571_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29571_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29571_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29571_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29571_CommonData.yaml#/components/responses/500'
    '503':
      $ref: 'TS29571_CommonData.yaml#/components/responses/503'
    default:
      $ref: 'TS29571_CommonData.yaml#/components/responses/default'

/subscriptions/{subscriptionId}:
  put:
    description: >
      Updates an existing location subscription identified by the subscriptionId.
    operationId: UpdateLocationSub
    tags:
      - Update Location subscription (Document)
    parameters:
      - name: subscriptionId
        in: path
        description: Identifies an individual location subscription resource.
        required: true
        schema:
          type: string
    requestBody:
      description: Parameters to replace the existing subscription.
      required: true
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/LocationSubscriptionRequest'
    responses:
      '200':
        description: >
          OK. The location subscription resource was updated successfully.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/LocationSubscriptionRequest'
      '204':
        description: No Content (updated successfully).
      '400':
        $ref: 'TS29571_CommonData.yaml#/components/responses/400'
      '401':
        $ref: 'TS29571_CommonData.yaml#/components/responses/401'
      '403':
        $ref: 'TS29571_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '411':
        $ref: 'TS29571_CommonData.yaml#/components/responses/411'
      '413':

```

```

    $ref: 'TS29571_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29571_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29571_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29571_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29571_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29571_CommonData.yaml#/components/responses/default'

```

delete:

```

description: >
  Deletes an location subscription identified by the subscriptionId.
operationId: DeleteLocationSub
tags:
  - Delete location Subscription (Document)
parameters:
  - name: subscriptionId
    in: path
    description: Identifies an individual location subscription resource.
    required: true
    schema:
      type: string
responses:
  '204':
    description: >
      A location subscription resource deleted successfully.
  '307':
    $ref: 'TS29571_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29571_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29571_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29571_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29571_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29571_CommonData.yaml#/components/responses/404'
  '429':
    $ref: 'TS29571_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29571_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29571_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29571_CommonData.yaml#/components/responses/default'

```

/configrequest:

```

post:
  description: Requests server to update location reporting configuraton for a target user
  security:
    - BearerAuth: []
  operationId: configrequestLMC
  tags:
    - LMS Location Info Config Request (Collection)
  requestBody:
    required: true
    content:
      application/json:
        schema:
          $ref: 'TS24283_Lms_Reporting.yaml#/components/schemas/LocationConfiguration'
  responses:
    '201':
      description: Successful configuration update request submitted to LMS
      content:
        application/json:
          schema:
            $ref: 'TS24283_Lms_Reporting.yaml#/components/schemas/LocationConfiguration'
    '400':
      $ref: 'TS29571_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29571_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29571_CommonData.yaml#/components/responses/403'
    '404':

```

```

    $ref: 'TS29571_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29571_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29571_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29571_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29571_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29571_CommonData.yaml#/components/responses/500'
  '503':
    $ref: 'TS29571_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29571_CommonData.yaml#/components/responses/default'

```

components:

```

  securitySchemes:
    BearerAuth:
      type: http
      scheme: bearer

```

API specific definitions

schemas:

```

ClientOriginatingLocationRequest:
  description: Represents an location request object used to request
    location information from the LMS.
  type: object
  properties:
    functionalAliasIds:
      type: array
      items:
        type: string
        format: uri
        description: A list of activated Functional Alias Id of requested MC Users.
    locationNotificationUri:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
    mclocClientID:
      type: string
      description: Identifies the LMC of the MC UE.
    mcServiceIds:
      type: array
      items:
        type: string
        format: uri
        description: A list of MC service IDs of the MC users for which
          location information is requested MC Users.
    mcServiceGroupIds:
      type: array
      items:
        type: string
        format: uri
        description: A list of MC service Group IDs for which
          location information is requested for the affiliated MC Users.
    refresh:
      type: boolean
      nullable: true
      description: The presence of this attribute indicates that the
        location report shall be refreshed immediately.
    requestLocationHistory:
      $ref: 'TS24283_Lms_Reporting.yaml#/components/schemas/RequestedLocationHistory'
    requestHistoryStatus:
      type: boolean
      description: This attributes indicates that a location history status report is requested.
  required:
    - mclocClientID
    - locationNotificationUri
  anyOf:
    - required: [functionalAliasIds]
    - required: [mcServiceIds]
    - required: [mcServiceGroupIds]

```

LocationSubscriptionRequest:

description: Represents a location subscription request.

```

type: object
properties:
  expTime:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
  functionalAliasIds:
    type: array
    items:
      type: string
      format: uri
      description: A list of Functional Alias Id which are activated for the MC Users
        for which location information is subscribed.
  locationNotificationUri:
    $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
  mclocClientID:
    type: string
    description: Identifies the LMC of the MC UE.
  mcServiceIds:
    type: array
    items:
      type: string
      format: uri
      description: A list of MC service IDs of the MC users for which
        location information is subscribed MC Users.
  mcServiceGroupIds:
    type: array
    items:
      type: string
      format: uri
      description: A list of MC service Group IDs for which
        location information is subscribed for the affiliated MC Users.
  required:
    - expTime
    - mclocClientID
    - locationNotificationUri
  anyOf:
    - required: [functionalAliasIds]
    - required: [mcServiceIds]
    - required: [mcServiceGroupIds]

MCUserLocation:
  description: Represents one MC User's device location information.
  type: object
  properties:
    mcServiceIds:
      type: array
      items:
        type: string
        format: uri
        description: A list of MC service IDs of the MC user for which
          location information is reported.
    functionalAliasIds:
      type: array
      items:
        type: string
        format: uri
        description: A list of activated Functional Alias Id of the MC user
          for which location information is reported.
    mcServiceUELabel:
      type: string
      description: Used to identify the reporting MC UE for the end user, this may be used
        when multiple MC UEs are reporting by the same MC service user.
    locationInfo:
      $ref: 'TS24283_Lms_Reporting.yaml#/components/schemas/LocationInfo'

LocationNotification:
  description: Represents an location notification response.
  type: object
  properties:
    mcUEResponseList:
      type: array
      items:
        $ref: '#/components/schemas/MCUserLocation'
    requestingMcServiceId:
      type: string
      format: uri
      description: The MC service ID of the LMC that requested the location report.

```

requestingfunctionalAliasId:
 type: string
 format: uri
 description: The activated Functional Alias Id of the LMC that requested
 the location report.
subscriptionID:
 type: string
 description: Attribute including the subscriptionID when the location notification
 is related to an existing subscription.

Annex B (informative): Change history

Change history						
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment
2023-08	CT1#143	C1-235054				Based on initial skeleton C1-235054. Incorporates agreed pCRs C1-235056, C1-236139
2024-08	CT1#150					Incorporates agreed pCR C1-244202
2024-10	CT1#151					Incorporates agreed pCRs C1-245350, C1-245847, C1-245917
2024-11	CT1#152					Incorporates agreed pCRs C1-246230, C1-246350, C1-246352, C1-246353, C1-246913, C1-246940, C1-246941, C1-246942
2025-02	CT1#153					Incorporates agreed pCRs C1-250267, C1-250268, C1-250270, C1-250271, C1-250857
2025-04	CT1#154					Incorporates agreed pCRs C1-251684, C1-251685, C1-252277
2025-05	CT1#155					Incorporates agreed pCRs C1-253124, C1-253158, C1-253159, C1-253161, C1-253773, C1-253776, C1-253777
2025-06	CT#108	CP-251216				TS presented for information in CT#108
2025-09	CT1#156					Incorporates agreed pCRs C1-254710, C1-254711, C1-254712, C1-254713, C1-254714, C1-254718, C1-255367, C1-255369, C1-255392
2025-09	CT#109	CP-252118				Presenting 3GPP TS 24.283 to CT#109 for approval
2025-09	CT#109	CP-252118				Approved by TSG CT#109
2025-12	CT#110	CP-253088	0001	1	F	Correction to reference points
2025-12	CT#110	CP-253088	0002	1	F	Miscellaneous corrections to MCLoc
2025-12	CT#110	CP-253088	0003	1	F	Resolving EN on X-3GPP-P-Asserted-Identity
2025-12	CT#110	CP-253088	0004	1	F	Resolving EN on anyAreaChange
2025-12	CT#110	CP-253088	0005	1	F	Resolving an FFS and an Editor's note
2025-12	CT#110	CP-253088	0006	1	F	Update of info and externalDocs fields

History

Version	Date	Status
V19.0.0	January 2026	Publication
V19.1.0	February 2026	Publication