

ETSI TS 129 572 V15.5.0 (2019-10)



**5G;
5G System;
Location Management Services;
Stage 3
(3GPP TS 29.572 version 15.5.0 Release 15)**

PRE-STANDARD FOR REVIEW
<https://standards.iteh.ai/standards/sist/34502288-050f-4d67-9a02-78bade1ce98a/etsi-ts-129-572-v15-5-0-2019-10>



Reference

RTS/TSGC-0429572vf50

Keywords

5G

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 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

The present document can be downloaded from:
<http://www.etsi.org/standards-search>

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 at www.etsi.org/deliver.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at <https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:
<https://portal.etsi.org/People/CommiteeSupportStaff.aspx>

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 2019.
All rights reserved.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** 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.

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is 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 Web server (<https://ipr.etsi.org/>).

Pursuant to the ETSI IPR Policy, no investigation, 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.

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 under <http://webapp.etsi.org/key/queryform.asp>.

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.....	5
1 Scope	6
2 References	6
3 Definitions and abbreviations.....	7
3.1 Definitions	7
3.2 Abbreviations	7
4 Overview	7
5 Services Offered by the LMF.....	8
5.1 Introduction	8
5.2 Nlmf_Location Service	8
5.2.1 Service Description.....	8
5.2.2 Service Operations	8
5.2.2.1 Introduction.....	8
5.2.2.2 DetermineLocation.....	8
5.2.2.2.1 General	8
5.2.2.2.2 Retrieve UE Location	8
6 API Definitions	9
6.1 Nlmf_Location Service API.....	9
6.1.1 API URI.....	9
6.1.2 Usage of HTTP	9
6.1.2.1 General	9
6.1.2.2 HTTP Standard Headers	9
6.1.2.2.1 General	9
6.1.2.2.2 Content type	9
6.1.2.3 HTTP custom headers	10
6.1.2.3.1 General	10
6.1.3 Resources.....	10
6.1.3.1 Overview.....	10
6.1.4 Custom Operations without associated resources	10
6.1.4.1 Overview.....	10
6.1.4.2 Operation: determine-location.....	10
6.1.4.2.1 Description	10
6.1.4.2.2 Operation Definition.....	11
6.1.5 Notifications	11
6.1.6 Data Model	11
6.1.6.1 General	11
6.1.6.2 Structured data types	13
6.1.6.2.1 Introduction	13
6.1.6.2.2 Type: InputData.....	13
6.1.6.2.3 Type: LocationData	14
6.1.6.2.4 Type: GeographicalCoordinates	14
6.1.6.2.5 Type: GeographicArea	14
6.1.6.2.6 Type: Point	15
6.1.6.2.7 Type: PointUncertaintyCircle.....	15
6.1.6.2.8 Type: PointUncertaintyEllipse	15
6.1.6.2.9 Type: Polygon	15
6.1.6.2.10 Type: PointAltitude	15
6.1.6.2.11 Type: PointAltitudeUncertainty	16
6.1.6.2.12 Type: EllipsoidArc	16

6.1.6.2.13	Type: LocationQoS	16
6.1.6.2.14	Type: CivicAddress	17
6.1.6.2.15	Type: PositioningMethodAndUsage	19
6.1.6.2.16	Type: GnssPositioningMethodAndUsage	19
6.1.6.2.17	Type: VelocityEstimate	19
6.1.6.2.18	Type: HorizontalVelocity	20
6.1.6.2.19	Type: HorizontalWithVerticalVelocity	20
6.1.6.2.20	Type: HorizontalVelocityWithUncertainty	20
6.1.6.2.21	Type: HorizontalWithVerticalVelocityAndUncertainty	20
6.1.6.2.22	Type: UncertaintyEllipse	21
6.1.6.2.23	Type: UeLcsCapability	21
6.1.6.3	Simple data types and enumerations	21
6.1.6.3.1	Introduction	21
6.1.6.3.2	Simple data types	21
6.1.6.3.3	Enumeration: ExternalClientType	22
6.1.6.3.4	Enumeration: SupportedGADShapes	22
6.1.6.3.5	Enumeration: ResponseTime	23
6.1.6.3.6	Enumeration: PositioningMethod	23
6.1.6.3.7	Enumeration: PositioningMode	23
6.1.6.3.8	Enumeration: GnssId	23
6.1.6.3.9	Enumeration: Usage	24
6.1.6.3.10	Enumeration: LcsPriority	24
6.1.6.3.11	Enumeration: VelocityRequested	24
6.1.6.3.12	Enumeration: AccuracyFulfilmentIndicator	24
6.1.6.3.13	Enumeration: VerticalDirection	24
6.1.7	Error Handling	25
6.1.7.1	General	25
6.1.7.2	Protocol Errors	25
6.1.7.3	Application Errors	25
6.1.8	Security	25
Annex A (normative):	OpenAPI specification	25
A.1	General	25
A.2	Nlmf_Location API	26
Annex B (informative):	Change history	35
History		36

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.

PREVIEW
STANDARD
ETSI
(standards.iteh.ai)
Full standard:
<https://standards.iteh.ai/catalog/standards/sist/34502288-050f-4d67-9a02-78bade1ce989/etsi-ts-129-572-v15.5.0-2019-10>

1 Scope

The present document specifies the stage 3 protocol and data model for the Nlmf Service Based Interface. It provides stage 3 protocol definitions and message flows, and specifies the API for each service offered by the LMF.

The 5G System stage 2 architecture and procedures are specified in 3GPP TS 23.501 [2] and 3GPP TS 23.502 [3].

The Technical Realization of the Service Based Architecture and the Principles and Guidelines for Services Definition are specified in 3GPP TS 29.500 [4] and 3GPP TS 29.501 [5].

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".
- [3] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".
- [4] 3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".
- [5] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".
- [6] IETF RFC 4776: "Dynamic Host Configuration Protocol (DHCPv4 and DHCPv6) Option for Civic Addresses Configuration Information".
- [7] IETF RFC 5139: "Revised Civic Location Format for Presence Information Data Format Location Object (PIDF-LO)".
- [8] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".
- [9] 3GPP TS 33.501: "Security architecture and procedures for 5G system".
- [10] IETF RFC 6749: "The OAuth 2.0 Authorization Framework".
- [11] 3GPP TS 29.510: "Network Function Repository Services; Stage 3".
- [12] IETF RFC 7540: "Hypertext Transfer Protocol Version 2 (HTTP/2)". [13] IETF RFC 8259: "The JavaScript Object Notation (JSON) Data Interchange Format".
- [14] OpenAPI Initiative, "OpenAPI 3.0.0 Specification", <https://github.com/OAI/OpenAPI-Specification/blob/master/versions/3.0.0.md>.
- [15] IETF RFC 7807: "Problem Details for HTTP APIs".
- [16] 3GPP TR 21.900: "Technical Specification Group working methods".

3 Definitions and abbreviations

3.1 Definitions

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

3.2 Abbreviations

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

LMF Location Management Function

4 Overview

The Location Management Function (LMF) is the network entity in the 5G Core Network (5GC) supporting the following functionality:

- Supports location determination for a UE.
- Obtains downlink location measurements or a location estimate from the UE.
- Obtains uplink location measurements from the NG RAN.
- Obtains non-UE associated assistance data from the NG RAN.

Figure 4-1 provides the reference model (in service based interface representation and in reference point representation), with focus on the LMF:

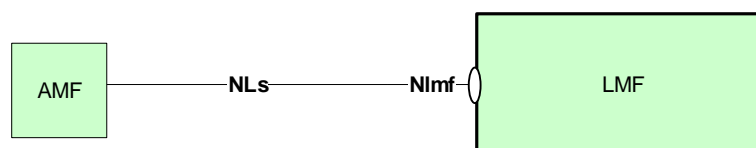


Figure 4-1: Reference model – LMF

5 Services Offered by the LMF

5.1 Introduction

The LMF offers to other NFs the following services:

- Nlmf_Location

5.2 Nlmf_Location Service

5.2.1 Service Description

The Nlmf_Location service enables an NF to request location determination (current geodetic and optionally civic location) for a target UE.

5.2.2 Service Operations

5.2.2.1 Introduction

The service operations defined for the Nlmf_Location service are as follows:

- DetermineLocation: It provides UE location information to the consumer NF.

5.2.2.2 DetermineLocation

5.2.2.2.1 General

The following procedures are defined, using the "DetermineLocation" service operation:

- Retrieve UE Location

5.2.2.2.2 Retrieve UE Location

This procedure allows a consumer NF to request the location information (geodetic location and, optionally, civic location).

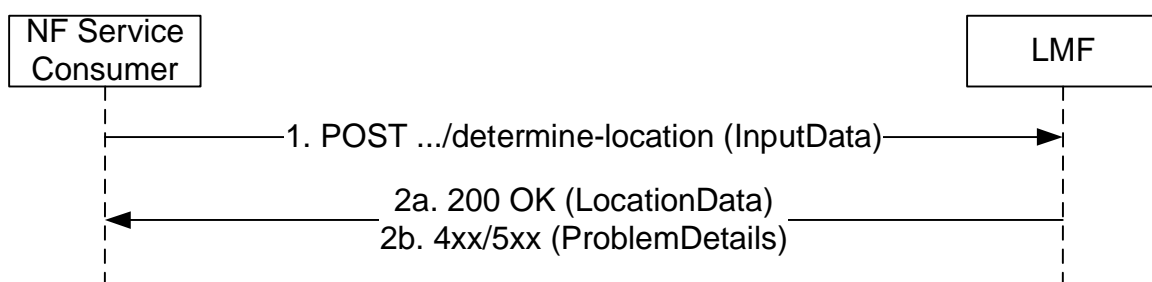


Figure 5.2.2.2.2-1: DetermineLocation Request

1. The NF Service Consumer shall send an HTTP POST request to the resource URI associated with the "determine-location" custom operation. The input parameters for the request (external client type, LCS correlation identifier, serving cell identifier, location QoS, supported GAD shapes....) shall be included in the HTTP POST request body.

If UE LCS Capability is received in the request indicating LPP is not supported by the UE, the LMF shall not send LPP messages to the UE in subsequent positioning procedures.

- 2a. On success, "200 OK" shall be returned. The response body shall contain the parameters related to the determined position of the UE (geodetic position, civic location, positioning methods...).
- 2b. On failure, one of the HTTP status code listed in Table 6.1.4.2.2-2 shall be returned. For a 4xx/5xx response, the message body shall contain a ProblemDetails structure with the "cause" attribute set to one of the application error listed in Table 6.1.4.2.2-2.

6 API Definitions

6.1 Nlmf_Location Service API

6.1.1 API URI

The Nlmf_Location service shall use the Nlmf_Location API.

The request URI used in HTTP request from the NF service consumer towards the NF service producer shall have the structure defined in clause 4.4.1 of 3GPP TS 29.501 [5], i.e.:

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

with the following components:

- The {apiRoot} shall be set as described in 3GPP TS 29.501 [5].
- The <apiName> shall be "nlmf-loc".
- The <apiVersion> shall be "v1".
- The <apiSpecificResourceUriPart> shall be set as described in clause 6.1.3.

6.1.2 Usage of HTTP

6.1.2.1 General

HTTP/2, as defined in IETF RFC 7540 [12], shall be used as specified in clause 5 of 3GPP TS 29.500 [4].

HTTP/2 shall be transported as specified in clause 5.3 of 3GPP TS 29.500 [4].

HTTP messages and bodies for the Nlmf_Location service shall comply with the OpenAPI [14] specification contained in Annex A.

6.1.2.2 HTTP Standard Headers

6.1.2.2.1 General

6.1.2.2.2 Content type

The following content types shall be supported:

- JSON, as defined in IETF RFC 8259 [13], shall be used as content type of the HTTP bodies specified in the present specification as indicated in clause 5.4 of 3GPP TS 29.500 [4].
- The Problem Details JSON Object (IETF RFC 7807 [15]). The use of the Problem Details JSON object in a HTTP response body shall be signalled by the content type "application/problem+json".

6.1.2.3 HTTP custom headers

6.1.2.3.1 General

The following HTTP custom headers shall be supported:

- 3gpp-Sbi-Message-Priority: See 3GPP TS 29.500 [4], clause 5.2.3.2.2.

This API does not define any new HTTP custom headers.

6.1.3 Resources

6.1.3.1 Overview

The structure of the Resource URIs of the Nlmf_Location service is shown in figure 6.1.3.1-1.

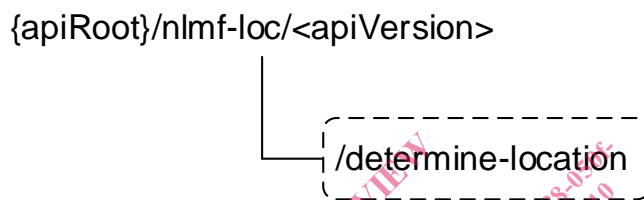


Figure 6.1.3.1-1: Resource URI structure of the Nlmf_Location API

Table 6.1.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.1.3.1-1: Resources and methods overview

Resource name	Resource URI	HTTP method or custom operation	Description
DetermineLocation (Custom operation)	{apiRoot}/nlmf-loc/<apiVersion>/determine-location	determine-location (POST)	

6.1.4 Custom Operations without associated resources

6.1.4.1 Overview

Table 6.1.4.1-1: Custom operations without associated resources

Custom operation URI	Mapped HTTP method	Description
{apiRoot}/nlmf-loc/<apiVersion>/determine-location	POST	

6.1.4.2 Operation: determine-location

6.1.4.2.1 Description

This subclause will describe the custom operation and what it is used for, and the custom operation's URI.