**3GPP TSG-CT WG4 Meeting #123C4-24****2xxx**

**Hyderabad, India, 27-31 May 2024** *Revision of C4-242049, 2237*

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** |  | **rev** | **2** | **Current version:** |  |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **x** |

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| ***Title:*** |  | | | | | | | | | |
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| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** |  | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***Release:*** | | |  |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | CT4 received SA2 LS on LCS user plane connection binding to the UE (S2-2405797) and the attached agreed CR0521-TS23.273 (S2-2405532). Clauses 6.1.2/6.2 and 6.18.2 in TS 23.273 now specify the following new functionality:   * If the target UE supports the UE user plane positioning capability for LCS-UPP, the AMF shall provide the SUPI and/or GPSI of the target UE (see TS 29.572 [12]) as UE identity in the Nlmf\_Location\_DetermineLocation Request. * The AMF sends a Nlmf\_Location\_UPConfig Request towards LMF to request set up of an LCS-UP connection. The AMF shall include the target UE identity (see TS 29.572 [12]) (SUPI and/or GPSI) in the request.   This CR aligns stage 3 with stage 2. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | The optional SUPI and/or GPSI of the target UE are now conditionally sent by an AMF with Nlmf\_Location\_DetermineLocation Request, if the UE support LCS-UP capabilities. A clarification and a reference is added to the UpConfig type. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | When multiple UEs are served by the LMF and multiple TLS connections are active, the LMF cannot determine which TLS connection terminates at which UE. Therefore, the respective stage 2 requirement will not be met. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.2.2.2.2, 6.1.6.2.2, 6.1.6.2.52, A.2. | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **x** |  | Other core specifications | | | | TS 23.273 CR 0521 | | |
| ***affected:*** | |  | **x** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | This CR adds backward compatible changes to Nlmf\_Location OpenAPI. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | Rev1: the tdoc number on the cover sheet was corrected (it was pointing to CT1 tdoc). TS 24.572 CR0018 was removed from the cover sheet "Other specs affected" field, because there are few overlapping CRs at CT1 and it is not clear which one will be used as a basis for the final agreement.  Rev2: New NOTE to Table 6.1.6.2.2-1 (InputData) is corrected, as SUPI/GUTI are conditionally sent only if the UE supports LCS-UP capabilities and the OpenAPI is aligned with this. The reference is also corrected. | | | | | | | | |

\* \* \* First Change \* \* \* \*

##### 5.2.2.2.2 Retrieve UE Location

This procedure allows a consumer NF to request the location information (geodetic location and, optionally, local and/or civic location) for a target UE or to activate periodic or triggered deferred location for a target UE.



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, SUPI and/or GPSI, location QoS, mapped location QoS applicable to EPS, supported GAD shapes, LDR Type, H-GMLC address, LDR Reference, UE connectivity state per access type, TNAP identifier, TWAP identifier, scheduled location time, LpHapType, UE User Plane Positioning Capability, reporting indication, MBSR Info, Additional UE Info, integrity requirements, requested ranging\_SL location results, related UEs ….) may be included in the HTTP POST request body;

If UE geographical area identified by the country, area within a country or international area needs to be determined, the NF Service Consumer shall include UE geographical area determination indication for PLMN selection verification in the request;

If UE Unaware Positioning is required, the NF Service Consumer shall include UE unaware indication in the request;

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.

During 5GC-MT-LR multiple location procedure for regulatory location service, the AMF shall also include the indication of acceptance for intermediate response and the maximum response time, the GMLC callback address and the LIR reference number, if received from the GMLC. The AMF may overwrite the received maximum response time (e.g. to avoid HTTP service request timeout) when passing it to the LMF.

For deferred periodic or triggered 5GC-MT-LR procedures, if the NF Service Consumer requests the location reporting over user plane, the NF Service Consumer shall include the endpoint address of the location reporting over user plane, the cumulative event report timer, or the maximum number of location reports over user plane.

2a. On success, "200 OK" shall be returned. The response body shall contain the parameters related to the determined position of the UE if any (geodetic position, local location, civic location, positioning methods, LOS/NLOS measurement indication, …);

If the NF service consumer has requested to determine UE country, area within a country or international area, the LMF shall also include ueAreaInd.

If the indication of acceptance for intermediate response was received in the request, the LMF shall perform positioning procedures and determines multiple location estimates within the maximum response time. The LMF shall include the FINAL location in the content of this response message. If any intermediate location(s) are determined, the LMF shall send intermediate location reporting event notification(s) to the GMLC (see clause 5.2.2.3.3).

During deferred periodic or triggered 5GC-MT-LR procedures, if the mapped location QoS applicable to EPS was received in the request and if the access type allowed for the UE for event reporting includes "E-UTRAN connected to EPC", the LMF shall forward the mapped location QoS applicable to EPS to the UE.

2b. On failure or redirection, 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 should contain a ProblemDetails structure with the "cause" attribute set to one of the application error listed in Table 6.1.4.2.2-2.

\* \* \* 2nd Change \* \* \* \*

##### 6.1.6.2.2 Type: InputData

Table 6.1.6.2.2-1: Definition of type InputData

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Attribute name | | Data type | | P | | Cardinality | | Description | | Applicability | |
| externalClientType | | ExternalClientType | | O | | 0..1 | | When present, this IE shall carry the external client type of the requester. | |  | |
| correlationID | | CorrelationID | | O | | 0..1 | | When present, this IE shall carry the correlation ID of the request. | |  | |
| amfId | | NfInstanceId | | O | | 0..1 | | Indicates the AMF Instance serving the UE. LMF shall use the AMF Instance to forward LCS related N1/N2 messages to the UE/RAN. | |  | |
| locationQoS | | LocationQoS | | O | | 0..1 | | When present, this IE shall carry the QoS of the location request. | |  | |
| supportedGADShapes | | array(SupportedGADShapes) | | O | | 1..N | | When present, this IE shall carry the GAD shapes supported by the requester. | |  | |
| supi | | Supi | | C | | 0..1 | | Indicates the SUPI of the target UE.  (NOTE x) | |  | |
| pei | | Pei | | O | | 0..1 | | Indicates the PEI of the target UE. | |  | |
| gpsi | | Gpsi | | C | | 0..1 | | Indicates the GPSI of the target UE.  (NOTE x) | |  | |
| ecgi | | Ecgi | | O | | 0..1 | | When present, this IE shall indicate the identifier of the E-UTRAN cell serving the UE or the serving cell identifier of the Primary Cell in the Master RAN Node that is an E-UTRAN node on Dual Connectivity scenarios.  (NOTE 2) | |  | |
| ecgiOnSecondNode | | Ecgi | | O | | 0..1 | | When present, the serving cell identifier of the Primary Cell in the Secondary RAN Node that is an E-UTRAN node when available on Dual Connectivity scenarios.  (NOTE 3) (NOTE 4) | |  | |
| ncgi | | Ncgi | | O | | 0..1 | | When present, this IE shall indicate the identifier of the NR cell serving the UE or the serving cell identifier of the Primary Cell in the Master RAN Node that is a NR node on Dual Connectivity scenarios.  (NOTE 2) | |  | |
| ncgiOnSecondNode | | Ncgi | | O | | 0..1 | | When present, the serving cell identifier of the Primary Cell in the Secondary RAN Node that is a NR node when available on Dual Connectivity scenarios.  (NOTE 3) (NOTE 4) | |  | |
| priority | | LcsPriority | | O | | 0..1 | | When present, this IE shall indicate the priority of the location request. | |  | |
| velocityRequested | | VelocityRequested | | O | | 0..1 | | When present, this IE shall indicate whether velocity is requested or not. | |  | |
| ueLcsCap | | UeLcsCapability | | O | | 0..1 | | When present, this IE shall indicate the LCS capability supported by the UE. | |  | |
| lcsServiceType | | LcsServiceType | | O | | 0..1 | | The LCS service type | |  | |
| ldrType | | LdrType | | O | | 0..1 | | The type of LDR | |  | |
| hgmlcCallBackURI | | Uri | | C | | 0..1 | | Callback URI of the H-GMLC  It shall be present, if attribute LdrType is present.  This IE shall also be present for location service in PNI-NPN with signalling optimisation, as specified in 3GPP TS 23.273 [42] clause 6.1.2. | |  | |
| lirGmlcCallBackUri | | Uri | | C | | 0..1 | | This IE shall be present when the intermediateLocationInd IE is present with the value "true".  When present, this IE shall contain callback URI of the GMLC to receive the intermediate location reports. | |  | |
| vgmlcAddress | | Uri | | C | | 0..1 | | V-GMLC address that corresponds to the V-GMLC that receives Location Request  It shall be present, if attribute LdrType is present and the target UE is in roaming case. | |  | |
| ldrReference | | LdrReference | | C | | 0..1 | | LDR Reference Number  It shall be present, if attribute LdrType is present.  This IE shall be present for location service in PNI-NPN with signalling optimisation, as specified in 3GPP TS 23.273 [42] clause 6.1.2. | |  | |
| lirReference | | LirReference | | C | | 0..1 | | This IE shall be present when the intermediateLocationInd IE is present with the value "true".  When present, this IE shall contain the LIR Reference Number for a multiple location request | |  | |
| periodicEventInfo | | PeriodicEventInfo | | C | | 0..1 | | Information for periodic event reporting | |  | |
| areaEventInfo | | AreaEventInfo | | C | | 0..1 | | Information for area event reporting | |  | |
| motionEventInfo | | MotionEventInfo | | C | | 0..1 | | Information for motion event reporting | |  | |
| reportingAccessTypes | | array(ReportingAccessType) | | O | | 1..N | | Allowed access types for event reporting | |  | |
| ueConnectivityStates | | array(UeConnectivityState) | | O | | 1..N | | When present, this IE shall indicate the UE connectivity state per access type | |  | |
| ueLocationServiceInd | | UeLocationServiceInd | | C | | 0..1 | | If UE sends an MO-LR Request message, this IE shall be present and indicate the request type for a 5GC-MO-LR. | |  | |
| moAssistanceDataTypes | | LcsBroadcastAssistanceTypesData | | O | | 0..1 | | When present, this IE shall indicate a list of one or more types of location assistance data that UE subscribed. | |  | |
| lppMessage | | RefToBinaryData | | C | | 0..1 | | If UE includes the first LPP message in MO-LR Request, this IE shall be present and Indicate the binary data of LPP message.  (NOTE 5) | |  | |
| lppMessageExt | | array(RefToBinaryData) | | C | | 1..N | | If UE includes the additional LPP messages (maximum 3) in MO-LR Request, this IE shall be present and Indicates the binary data of LPP message.  (NOTE 5) | |  | |
| supportedFeatures | | SupportedFeatures | | C | | 0..1 | | This IE shall be present if at least one optional feature defined in clause 6.1.9 is supported. | |  | |
| uePositioningCap | | UePositioningCapabilities | | O | | 0..1 | | When present, this IE shall indicate the positioning capabilities supported by the UE. | |  | |
| tnapId | | TnapId | | O | | 0..1 | | When present, this IE shall contain the TNAP Identifier.  This IE may be present for non-3GPP access. | |  | |
| twapId | | TwapId | | O | | 0..1 | | When present, This IE shall contain the TWAP Identifier.  This IE may be present for non-3GPP access. | |  | |
| ueCountryDetInd | | boolean | | O | | 0..1 | | When present, This IE shall contain an indication of determining the UE geographical area identified by the country, area within a country or international area indication where UE is located for PLMN selection verification. | | SAT | |
| scheduledLocTime | | DateTime | | O | | 0..1 | | When present, this IE shall contain the scheduled time (in UTC) that the UE needs to be located. | |  | |
| reliableLocReq | | boolean | | C | | 0..1 | | This IE shall be included with the value true to indicate that reliable UE location information is required, as specified in 3GPP TS 33.256 [26] clause 5.3.2.  When present, this IE shall be set as following:  - true: the reliable UE location information is required  - false (default): the reliable UE location information is not required | |  | |
| evtRptAllowedAreas | | array(ReportingArea) | | O | | 1..250 | | When present, this IE shall contain a list of event report allowed areas, where UE is allowed to generate and send the event report to network during the deferred 5GC-MT-LR procedure for UE power saving purpose. | |  | |
| ueUnawareInd | | boolean | | C | | 0..1 | | UE Unaware Positioning indication.  If the UE Unaware Positioning is required, as specified in 3GPP TS 23.273 [19] clause 5.12, this IE shall be included and set to true; otherwise, the IE shall be absent. | |  | |
| intermediateLocationInd | | boolean | | C | | 0..1 | | This IE shall be included by the AMF if received from the GMLC, during a 5GC-MT-LR multiple location procedure for the regulatory location service (see clause 6.1.3 and clause 6.10.4 of 3GPP TS 23.273 [19]).  When present, this IE shall indicate the acceptance of intermediate location response at the GMLC:  - true: intermediate location response acceptable  - false (default): intermediate location response not acceptable | |  | |
| maxRespTime | | DurationSec | | C | | 0..1 | | This IE shall be included by the AMF if received from the GMLC.  When present, this IE shall contain the maximum response time for the GMLC to receive the final location response.  The AMF may overwrite the received maximum response time when passing it to the LMF, e.g., to avoid timeout of the HTTP service request. | |  | |
| lpHapType | | LpHapType | | C | | 0..1 | | This IE shall be included and set to "LOW\_POW\_HIGH\_ACCU\_POS" to request low power and high accuracy positioning, as specified in clause 6.1.2 of 3GPP TS 23.273 [19]. | |  | |
| ueUpPosCaps | | array(UeUpPositioningCapabilities) | | O | | 1..N | | When present, this IE shall indicate the user plane positioning capabilities supported by the UE. | |  | |
| reportingInd | | ReportingInd | | O | | 0..1 | | This IE may be present if the evtRptAllowedAreas IE is present.  When present, this IE shall indicate whether the UE is allowed to generate and send the reports inside or outside the event report allowed areas:  - Inside reporting (default)  - Outside reporting  (see 3GPP TS 23.273 [19] clause 5.14 and 6.3.1) | |  | |
| mbsrInfo | | MbsrInfo | | O | | 0..1 | | Indicates that serving cell of the UE belongs to a MBSR | | MBSR | |
| additionalUeInfo | | AdditionalUeInfo | | O | | 0..1 | | When present, this IE indicates the serving cell of the MBSR UE (i.e., IAB UE) | | MBSR | |
| integrityRequirements | | IntegrityRequirements | | O | | 0..1 | | When present, this IE shall indicate the integrity requirements. | |  | |
| requestedRangingSlResult | | array(RangingSlResult) | | O | | 1..N | | This IE shall contain the type of result requested for ranging and sidelink positioning, such as absolute locations, relative locations or distances and directions related to the UEs, etc. | |  | |
| relatedUEs | | array(RelatedUE) | | O | | 1..N | | This IE contains a list of the information for the related UEs for the ranging and sidelink positioning. | |  | |
| upLocRepAddrAf | | UpLocRepAddrAfRm | | O | | 0..1 | | This IE shall be present if the request is for the location reporting over user plane. | |  | |
| upCumEvtRptCriteria | | UpCumEvtRptCriteria | | O | | 0..1 | | This IE may be present if the upLocRepAddrAf is present. | |  | |
| mappedQoSEps | | MappedLocationQoSEps | | C | | 0..1 | | This IE shall be present if the Multiple QoS Class is indicated in the locationQoS IE.  When present, this IE shall indicate the mapped Location QoS applicable to EPS ("BEST\_EFFORT" or "ASSURED") based on the Multiple Location QoS (see clause 6.19 of 3GPP TS 23.273 [19]). | |  | |
| coordinateID | | integer | | O | | 0..1 | | This IE may be present when requestedRangingSlResult indicates "ABSOLUTE\_LOCATION".  When present, this IE represents a local coordinate (see clause 6.20.3 of 3GPP TS 23.273 [4]). | | | Ranging\_SL | |
| rangingSlCapability | | RangingSlCapability | | O | | 0..1 | | When present, this IE shall indicate that the UE supports Ranging/Sidelink Positioning Capability. | | | Ranging\_SL | |
| NOTE 1: At least one of the attributes defined in this table shall be present in the InputData structure.  NOTE 2: Attribute "ecgi" and "ncgi" shall not be present at the same time.  NOTE 3: Attribute "ecgiOnSecondNode" and "ncgiOnSecondNode" shall not be present at the same time.  NOTE 4: Attribute "ecgiOnSecondNode" or "ncgiOnSecondNode" shall not be present if neither attribute "ecgi" nor "ncgi" is present.  NOTE 5: If 3 LPP messages are received, then first LPP message shall be encoded in lppMessage IE and additional 2 LPP messages shall be encoded in lppMessageExt IE.  NOTE x: At least one of the supi or gpsi shall be present in the InputData structure if the UE support LCS-UP capabilities, see clause 6.18.2 in 3GPP TS 23.273 [19]. | | | | | | | | | |  | |

\* \* \* 3rd Change \* \* \* \*

##### 6.1.6.2.52 Type: UpConfig

Table 6.1.6.2.52-1: Definition of type UpConfig

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description |
| upNotifyCallBackUri | Uri | M | 1 | Callback URI of the NF Service Consumer |
| notifCorrelationId | CorrelationID | M | 1 | Notification correlation ID. |
| supi | Supi | C | 0..1 | SUPI (NOTE) |
| gpsi | Gpsi | C | 0..1 | GPSI (NOTE) |
| amfReallocationInd | boolean | O | 0..1 | Indicates AMF reallocation indication.  When present, it shall be set as follows:  - true: AMF reallocated.  - false (default): AMF not reallocated. |
| lcsUpConnectionInd | LcsUpConnectionInd | O | 0..1 | LCS-UP connection indication |
| targetLMFId | LMFIdentification | O | 0..1 | Target LMF identifier. |
| NOTE: At least one of the supi or gpsi shall be present in the UpConfig structure (anyOf). This also is necessary for meeting LSC requirements, see clause 6.18.2 in 3GPP TS 23.273 [19]. | | | | |

\* \* \* 4th Change \* \* \* \*

# A.2 Nlmf\_Location API

openapi: 3.0.0

info:

version: '1.3.0-alpha.6'

title: 'LMF Location'

description: |

LMF Location Service.

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externalDocs:

description: 3GPP TS 29.572 V18.5.0; 5G System; Location Management Services; Stage 3

url: 'https://www.3gpp.org/ftp/Specs/archive/29\_series/29.572/'

servers:

- url: '{apiRoot}/nlmf-loc/v1'

variables:

apiRoot:

default: https://example.com

description: apiRoot as defined in clause 4.4 of 3GPP TS 29.501

### Skipped for clarity ###

#

# COMPLEX TYPES

#

### Skipped for clarity ###

UpConfig:

description: UP Config

type: object

required:

- upNotifyCallBackUri

- notifCorrelationId

not:

required: [ecgi, ncgi]

anyOf:

- required: [supi]

- required: [gpsi]

properties:

upNotifyCallBackUri:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Uri'

notifCorrelationId:

$ref: '#/components/schemas/CorrelationID'

supi:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Supi'

gpsi:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Gpsi'

amfReallocationInd:

type: boolean

default: false

lcsUpConnectionInd:

$ref: '#/components/schemas/LcsUpConnectionInd'

targetLMFId:

$ref: '#/components/schemas/LMFIdentification'

### Skipped for clarity ###

\* \* \* End of Changes \* \* \* \*