**SA WG2 Meeting #S2-152E DRAFT S2-220nnnn**

**22 – 26 August 2022, Electronic (revision of S2-220xxxx)**

**Source: MediaTek Inc.**

**Title: New Solution: LCS for peer-to-peer SL Positioning**

**Document for: Approval**

**Agenda item: 9.20**

**Work Item / Release: FS\_Ranging\_SL /Rel-18**

***Abstract of the contribution:***This contribution discusses a signalling framework for MO- and MT-LR procedures over PC5.

# Introduction

LCS articulates essentially around MT-LR[[1]](#footnote-1), MO-LR[[2]](#footnote-2) and NI-LR[[3]](#footnote-3) procedures (see TS 23.273) with misc. variants:

- 5GC-MT-LR procedure

- 5GC-MO-LR procedure

- Deferred 5GC-MT-LR procedure for periodic, triggered and UE available location events

- Low-power periodic and triggered MT-LR

- Bulk operation of LCS Service Request targeting to multiple UEs

- Regulatory support

- NI-LR

- MT-LR without UDM query

- Location continuity for HO of an emergency session from NG-RAN.

The MT-LR procedure is used when an LCS Client requests positioning of a Target UE. The LCS Client issues an LCS Service Request to a GMLC that later returns an LCS Service Response to the LCS Client including the position of the Target UE. Privacy verification may apply.

The MO-LR procedure is used when a Target UE requests the network for its position, for assistance data or for its position to be shared with an LCS Client or AF (via GMLC). The Target UE issues an MO-LR Request (in UL NAS Transport) to the AMF that later returns a MO-LR Response (in DL NAS Transport) to the UE including the requested information (i.e. as applicable: position incl. accuracy, assistance data or whether the UE position was successfully delivered to the requested LCS Client).

The NI-LR procedure is used when the serving AMF initiates the localization of the UE for regulatory purpose or location verification (NTN).

These procedures are illustrated below in Figures 1-1, 1-2 and 1-3 below. Note these are simplified versions identifying the key characteristics of these procedures, noting e.g. UDM is not shown, roaming is not shown.



Figure 1-1: MT-LR procedure (simplified)



Figure 1-2: MO-LR procedure (simplified)



Figure 1-3: NI-LR procedure (simplified)

The GMLC interacts with: LCS Clients, NEF (AF), UDM and other GMLC (as applicable), as well as the AMF. The GMLC’s primary purpose is to provide an interface to LCS Clients / AF through which LCS services can be offered. The GMLC performs authorization of the LCS Clients / AF and ensures the privacy of a Target UE is respected (as an LCS Client / AF may not be allowed to retrieve the location of a Target UE).

The LMF interacts with the AMF and UE (via AMF).

With SL Positioning/Ranging, it is important to understand whether and how these procedures map into peer-to-peer operation i.e. without network involvement. SL Positioning/Ranging should indeed be able to integrate within LCS as opposed to being a completely distinct functionality.

# Discussion

## General

Peer-to-peer operation implies no (direct) network involvement; SL Positioning and ranging are achieved between UEs only. Solution #26 at SA2#151e introduced, among others, the notion of a Location Server that can be hosted in a UE (Location Server UE), as not all UEs may be able to position themselves and a network LMF may simply not be reachable.

Peer-to-peer operation further implies:

- An LCS Client, if any, will *necessarily* operate in a UE, noting that LCS today assumes an LCS Client *may* operate in a UE; as specified in TS 23.273, an LCS Client is an "entity that interacts with GMLC for the purpose of obtaining location information for one or more UEs. The LCS Client may reside in the UE."

- GMLC, UDM and AMF are not available.

It should therefore be considered whether a UE could host GMLC/UDM-like functionality. In a network scenario, for MT‑LR, the GMLC proceeds with LCS once authorization of the LCS Clients/AF is confirmed and privacy of the Target UE is verified with the UDM.

The question in peer-to-peer scenarios is then whether a UE has authority to verify a) that an LCS Client in a third-party UE is authorized and b) the Target UE privacy wrt the third‑party UE obtaining the location of the Target UE. To keep the system design simple it is proposed NOT to introduce a distinct "GMLC/UDM UE" but that the necessary functionality be hosted either in the Target UE (*Case I.* below, preferred) or the Location Server UE (*Case II.* below, not preferred):

*I.* Target UE (with "GMLC"-like functionality): the Target UE interacts directly with LCS Clients. The Target UE itself vets any incoming location requests addressed to it and only responds to requests it successfully vets, such that "illicit" requests do not cause undue signalling, given that:

- In network-based scenarios, an LCS Client is verified to be authorized, or not, to retrieve the UE location, as a function of the Subscriber LCS Privacy Profile (SLPP) that is stored as part of the subscription data in the UDM, and LCS Client Data (e.g. location request type, client identity). The SLPP is subscriber-specific and can be updated by the UE, e.g. depending on user input; and

- In peer-to-peer scenario, it can therefore be expected that the Target UE itself holds its own Subscriber LCS Privacy Profile, and using this information and LCS Client data (such as location request type e.g. positioning/ranging, accuracy, client identity, etc.) is able to decide whether or not to authorize the LCS Client to retrieve its location.

*II.* Location Server UE (with "GMLC/UDM"-like functionality): the Location Server UE interacts with LCS Clients i.e. it acts as a "proxy" between these Clients and Target UEs. Unlike *Case I.*, the Target UEs would not interact directly with LCS Clients in this case. However like *Case I.*, it can be expected here as well that the Target UE itself holds its own Subscriber LCS Privacy profile information which can be queried/used when necessary by the Location Server UE when interacting with LCS Clients.

Given the above, the following proposals are made:

**Proposal 1:** No distinct "GMLC/UDM UE" is introduced. The necessary functionality is hosted either *I.* in the Target UE (preferred) for its own use or *II.* in the Location Server UE.

**Proposal 2:** A (Target) UE stores its own LCS Privacy Class (SLPP) information.

Furthermore, without an AMF in peer-to-peer operation, the Target UE itself will interact with the Location Server UE.

**Proposal 3:** A Target UE interacts directly with the Location Server UE.

***Case I.***

**Proposal *I.*1:** A Target UE interacts directly with LCS Clients. The Target UE itself vets any incoming location requests (i.e. MT-LR) addressed to it and only responds to those it deems authorized.

**Proposal *I.*2:** A Target UE uses its own SLPP information and LCS Client data (such as location request type e.g. positioning/ranging, accuracy, client identity, etc.) to determine whether an LCS Client is authorized and whether this Client is authorized to retrieve location information from the Target UE.

The Target UE itself will further need to select and interact with the Location Server UE (if the Target UE determines it needs assistance from a Location Server UE for positioning of the Target UE).

**Proposal *I.*2a:** The Target UE itself selects and addresses the Location Server UE if necessary to determine its location.

**Proposal *I.*2b:** The selection of the Location Server UE by the Target UE is performed using direct discovery. Both models A and B discovery can be used as follows (see TS 23.303):

- Model A: a Location Server UE ("announcing UE") announces itself at least as a Location Server UE. Target UEs ("monitoring UE") monitor such announcements.

- Model B: a Target UE ("discoverer UE") issues requests including information it wishes to discover a Location Server UE ("discoveree UE").

Once a suitable Location Server UE is identified by the Target UE, direct communication between these UEs can thereafter take place to complete the LCS procedure.

***Case II.***

**Proposal *II.*1:** A Location Server UE (with "GMLC/UDM"-like functionality) interacts with LCS Clients i.e. it acts as a "proxy" between these Clients and Target UEs. The Target UEs do not interact directly with LCS Clients. The Location Server UE can query a Target UE for its LCS Privacy Class (SLPP) information if necessary and may be able to store this information.

**Proposal *II.*2a:** An LCS Client UE selects a Location Server UE (with "GMLC/UDM"-like functionality) in order for the LCS Client to be able to issue Location Service Request.

**Proposal *II.*2b:** The selection of the Location Server UE by the LCS Client UE is performed using direct discovery. Both models A and B discovery can be used as follows (see TS 23.303), noting Model B discovery may be more adequate:

- Model A: a Location Server UE ("announcing UE") announces itself at least as a Location Server UE (with "GMLC/UDM"-like functionality). LCS Client UEs ("monitoring UE") monitor such announcements.

- Model B: an LCS Client UE ("discoverer UE") issues requests including information it wishes to discover a Location Server UE (with "GMLC/UDM"-like functionality) ("discoveree UE").

Once a suitable Location Server UE is identified by the LCS Client UE, direct communication between these UEs can thereafter take place to perform the LCS procedure.

**Proposal *II.*3:** A Location Server UE (with "GMLC/UDM"-like functionality) uses SLPP information from a Target UE, and LCS Client Data (such as location request type e.g. positioning/ranging, accuracy, client identity, etc.) to determine whether an LCS Client is authorized and whether this Client is authorized to retrieve the location information of the Target UE.

Resulting from the above proposals, a signalling framework for PC5-MO-LR and PC5-MT-LR procedures in peer-to-peer scenario is illustrated below for both *Cases I* and *II*. This signalling framework ensures the signalling exchanged with LCS Client and Location Server are aligned with what an LCS Client and Location Server would typically expect.



Figure 2-1: Case I. PC5-MT-LR Procedure



Figure 2-2: Case I. PC5-MO-LR procedure



Figure 2-3: Case II. PC5-MT-LR Procedure



Figure 2-4: Case II. PC5-MO-LR procedure

No NI-LR procedure is necessary in peer-to-peer operation.

# pCR 23.700-86

The proposals in §2 are incorporated in the following pCR.

\*\*\*\* FIRST CHANGE \*\*\*\*

## 6.0 Mapping of solutions to key issues

Editor's note: This clause describes the mapping between solutions and key issues.

Table 6.0-1: Mapping of solutions to key issues

|  |  |
| --- | --- |
|  | Key Issues |
| Solutions | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1 | X |  |  |  |  |  |  | X |
| 2 | X |  |  |  |  |  |  |  |
| 3 |  |  |  | X |  |  |  |  |
| 4 |  |  | X | X |  |  |  |  |
| 5 |  |  | X | X |  |  |  |  |
| 6 |  |  |  |  | X |  |  |  |
| 7 |  |  |  |  | X |  |  |  |
| 8 |  |  |  |  | X |  |  |  |
| 9 |  |  |  |  |  | X |  |  |
| 10 |  |  |  |  |  | X |  |  |
| 11 |  |  |  |  |  | X |  |  |
| 12 |  |  |  |  |  |  | X |  |
| 13 |  |  |  |  |  |  | X |  |
| 14 | X | X | X | X | X | X | X | X |
| X |  | X | X |  |  | X |  |  |

\*\*\*\* NEXT CHANGE (all new text) \*\*\*\*

## 6.X Solution #x: LCS framework for peer-to-peer SL Positioning and Ranging

Editor's note: This clause describes a solution addressing one or more key issues identified in clause 5. The structure of the clauses can be adjusted. The list of key issues which this solution attempts to resolve should be clearly indicated.

### 6.X.1 General

Peer-to-peer operation implies no (direct) network involvement; SL Positioning and ranging are achieved between UEs only. Solution #26 introduces, among others, the notion of a Location Server that can be hosted in a UE, as not all UEs may be able to position themselves and a network LMF may simply not be reachable.

Peer-to-peer operation further implies:

- An LCS Client, if any, will *necessarily* operate in a UE, noting that LCS today assumes an LCS Client *may* operate in a UE; as specified in TS 23.273, an LCS Client is an "entity that interacts with GMLC for the purpose of obtaining location information for one or more UEs. The LCS Client may reside in the UE."

- GMLC, UDM and AMF are not available

This solution proposes to introduce a signalling framework to enable PC5-MT-LR and PC5-MO-LR LCS procedures supporting sidelink positioning and ranging, given the above implications.

### 6.X.2 Functional descriptions

In a network scenario, it is the GMLC (with assistance from the UDM) that authorizes LCS Clients/AF and ensures the privacy of a Target UE is respected. In peer-to-peer scenario, without any network entity to rely on, it should be considered whether a UE could host GMLC/UDM functionality. A key question is then whether a UE has authority to verify a) that an LCS Client in a third-party UE is authorized and b) the Target UE privacy with respect to the third‑party UE obtaining the location of the Target UE.

This solution proposes that no distinct GMLC/UDM UE be introduced. Instead, it proposes that the necessary functionality be hosted either in the Target UE (*Case I.*) or the Location Server UE (*Case II.*) as follows:

*I.* Target UE (with "GMLC"-like functionality): the Target UE interacts directly with LCS Clients. The Target UE itself vets any incoming location requests addressed to it and only responds to requests it successfully vets, such that "illicit" requests do not cause undue signalling, given that:

- In network-based scenarios, an LCS Client is verified to be authorized, or not, to retrieve the UE location, as a function of the Subscriber LCS Privacy Profile (SLPP) that is stored as part of the subscription data in the UDM, and LCS Client Data (e.g. location request type, client identity). The SLPP is subscriber-specific and can be updated by the UE, e.g. depending on user input; and

- In peer-to-peer scenario, it can therefore be expected that the Target UE itself holds its own Subscriber LCS Privacy Profile, and using this information and LCS Client data (such as location request type e.g. positioning/ranging, accuracy, client identity, etc.) is able to decide whether or not to authorize the LCS Client to retrieve its location.

Furthermore, without an AMF, the Target UE will need taking on the "role" of the AMF. In particular, the Target UE itself will select and interact with the Location Server UE (if the Target UE determines it needs assistance from a Location Server UE for positioning of the Target UE).

This solution proposes that the selection of the Location Server UE by the Target UE is performed using direct discovery. Both models A and B discovery can be used as follows (see TS 23.303 for definitions of models A and B):

- Model A: a Location Server UE ("announcing UE") announces itself at least as a Location Server UE. Target UEs ("monitoring UE") monitor such announcements.

- Model B: a Target UE ("discoverer UE") issues requests including information it wishes to discover a Location Server UE ("discoveree UE").

Once a suitable Location Server UE is identified by the Target UE, direct communication between these UEs can thereafter take place to complete the LCS procedure.

*II.* Location Server UE (with "GMLC/UDM"-like functionality): the Location Server UE interacts with LCS Clients i.e. it acts as a "proxy" between these Clients and Target UEs. Unlike *Case I.*, the Target UEs would not interact directly with LCS Clients in this case. However like *Case I.*, it can be expected here as well that the Target UE itself holds its own Subscriber LCS Privacy profile information which can be queried/used when necessary by the Location Server UE when interacting with LCS Clients. The Location Server UE may be able to store this information.

An LCS Client UE selects a Location Server UE (with "GMLC/UDM"-like functionality) in order for the LCS Client to be able to issue Location Service Request.

The selection of the Location Server UE by the LCS Client UE is performed using direct discovery. Both models A and B discovery can be used as follows (see TS 23.303), noting Model B discovery may be more adequate:

- Model A: a Location Server UE ("announcing UE") announces itself at least as a Location Server UE (with "GMLC/UDM"-like functionality). LCS Client UEs ("monitoring UE") monitor such announcements.

- Model B: an LCS Client UE ("discoverer UE") issues requests including information it wishes to discover a Location Server UE (with "GMLC/UDM"-like functionality) ("discoveree UE").

Once a suitable Location Server UE is identified by the LCS Client UE, direct communication between these UEs can thereafter take place to perform the LCS procedure.

A Location Server UE (with "GMLC/UDM"-like functionality) uses SLPP information from a Target UE, and LCS Client Data (such as location request type e.g. positioning/ranging, accuracy, client identity, etc.) to determine whether an LCS Client is authorized and whether this Client is authorized to retrieve the location information of the Target UE.

Resulting from the above, a signalling framework for PC5-MO-LR and PC5-MT-LR procedures in peer-to-peer scenario are proposed in clause 6.X.3 below for both *Cases I* and *II* described above. No NI-LR procedure is deemed applicable in peer-to-peer scenario.

### 6.X.3 Procedures

#### 6.X.3.1 Case I: Target UE holds "GMLC" functionality

##### 6.X.3.1.1 PC5-MT-LR procedure



Figure 6.X.3.1.1-1: PC5-MT-LR Procedure

1. An LCS Client (in a UE) needs to retrieve the location information of a Target UE. The LCS Client (UE) issues an LCS Service Request message over PC5 to a Target UE in order to retrieve the location of the Target UE. The LCS Service Request message contains necessary information allowing the Target UE to identify the LCS Client data incl. the LCS Client identity, the type of location request (e.g. positioning/ranging), the accuracy of the location, etc.

2. Upon reception of a LCS Service Request message, the Target UE verifies that the originating LCS Client is authorized. The Target UE uses its own stored Subscriber LCS Privacy Profile (SLPP) information and the identified LCS Client data in Step 1. to determine whether or not to authorize the LCS Client and its location request. If the Target UE determines that the LCS Client and location request are not authorized, the Target UE does not respond to the LCS Service Request and the procedure stops, otherwise the Target UE proceeds with Step 3.

3. If the Target UE determines it requires support from a Location Server UE, the Target UE selects a Location Server UE. The selection of the Location Server UE by the Target UE is performed using direct discovery. Both models A and B discovery can be used as follows (see TS 23.303 for definitions of models A and B):

- Model A: a Location Server UE ("announcing UE") announces itself at least as a Location Server UE. Target UEs ("monitoring UE") monitor such announcements.

- Model B: a Target UE ("discoverer UE") issues requests including information it wishes to discover a Location Server UE ("discoveree UE").

Once a Location Server UE is selected, direct communication is established between the Target UE and this Location Server UE allowing the procedure to proceed (Step 4).

If the Target UE determines instead it does not need support from a Location Server UE it proceeds to Step 5.

4. The Target UE issues a Determine Location Request message to the Location Server UE, incl. necessary information as required by the LCS Client in Step 1.

5. The UE Positioning (/ranging) is performed by the Target UE or with support of the Location Server UE in order to determine the Target UE location, depending on the outcome of Step 3.

NOTE: Reference UE(s) may also be invoked at this point to assist the Target UE or Location Server UE in determining the Target UE location.

 If support from a Location Server UE was requested in Step 3, Step 6 follows, else Step 7.

6. The Location Server UE reports the calculated Target UE location information in a Determine Location Response message to the Target UE.

7. The Target UE reports its location information to the LCS Client in a LCS Service Response message.

##### 6.X.3.1.2 PC5-MO-LR procedure



Figure 6.X.3.1.2-1: PC5-MO-LR procedure

1. If the Target UE determines it requires support from a Location Server UE, the Target UE selects a Location Server UE. The selection of the Location Server UE by the Target UE is performed using direct discovery. Both models A and B discovery can be used as follows (see TS 23.303 for definitions of models A and B):

- Model A: a Location Server UE ("announcing UE") announces itself at least as a Location Server UE. Target UEs ("monitoring UE") monitor such announcements.

- Model B: a Target UE ("discoverer UE") issues requests including information it wishes to discover a Location Server UE ("discoveree UE").

Once a Location Server UE is selected, direct communication is established between the Target UE and this Location Server UE allowing the procedure to proceed (Step 2).

If the Target UE determines instead it does not need support from a Location Server UE it proceeds to Step 3.

2. The Target UE issues a Determine Location Request message to the Location Server UE, incl. necessary information as required by the intended location operation.

3. The UE Positioning (/ranging) is performed by the Target UE or with support of the Location Server UE in order to determine the Target UE location, depending on the outcome of Step 1.

NOTE: Reference UE(s) may also be invoked at this point to assist the Target UE or Location Server UE in determining the Target UE location.

 If support from a Location Server UE was requested in Step 1, Step 4 follows, else Step 5.

4. The Location Server UE reports the calculated Target UE location information in a Determine Location Response message to the Target UE.

5. If necessary (i.e. if reporting to an LCS Client is necessary), the Target UE reports the calculated Target UE location information to an authorized LCS Client.

6. The LCS Client acknowledges receipt of the Target UE location information from the Target UE.

#### 6.X.3.2 Case II: Location Server UE holds "GMLC-UDM"-like functionality

##### 6.X.3.2.1 PC5-MT-LR procedure



Figure 6.X.3.2.1-1: PC5-MT-LR procedure

1. An LCS Client (in a UE) needs to retrieve location information of a Target UE. The LCS Client UE selects a Location Server UE (with "GMLC/UDM"-like functionality). The selection of the Location Server UE by the LCS Client UE is performed using direct discovery. Both models A and B discovery can be used as follows (see TS 23.303 for definitions of models A and B):

- Model A: a Location Server UE ("announcing UE") announces itself at least as a Location Server UE (with "GMLC/UDM"-like functionality). LCS Client UEs ("monitoring UE") monitor such announcements.

- Model B: an LCS Client UE ("discoverer UE") issues requests including information it wishes to discover a Location Server UE (with "GMLC/UDM"-like functionality) ("discoveree UE").

Once a suitable Location Server UE is identified by the LCS Client UE, direct communication between these UEs can thereafter take place to perform the LCS procedure.

2. The LCS Client (UE) issues an LCS Service Request message over PC5 to the Location Server UE in order to retrieve the location of the Target UE. The LCS Service Request message contains necessary information allowing the Location Server UE to identify the LCS Client data incl. the LCS Client identity, the type of location request (e.g. positioning/ranging), the accuracy of the location, etc. as well as the Target UE.

 If the Location Server UE holds Subscriber LCS Privacy Profile information of the Target UE it proceeds to Step 5, otherwise Step 3.

3. After discovering the Target UE and establishing direct communication with the Target UE, the Location Server UE issues an SLPP Information Request message to the Target UE to retrieve its SLPP Information.

4. The Target UE upon receiving the SLPP Information Request message from the Location Server UE responds with an SLPP Information Response message including the Target UE’s SLPP information.

5. The Location Server UE verifies that the LCS Client is authorized. The Location Server UE uses the SLPP information of the Target UE and the identified LCS Client data in Step 2. to determine whether or not to authorize the LCS Client and its location request. If the LCS Client (and associated location request) is not authorized the Location Server UE may reject the Location Service Request from the LCS Client. If the LCS Client is authorized, the Location Server UE proceeds with Step 6.

6. The Location Server UE forwards the authorized LCS Service Request to the Target UE. If the Target UE determines it needs support from the Location Server UE to determine its location, it proceeds to Step 7, otherwise Step 8.

7. The Target UE issues a Determine Location Request message to the Location Server UE, incl. necessary information as required by the LCS Client in Step 1.

8. The UE Positioning (/ranging) is performed by the Target UE or with support of the Location Server UE in order to determine the Target UE location, depending on the outcome of Step 6.

NOTE: Reference UE(s) may also be invoked at this point to assist the Target UE or Location Server UE in determining the Target UE location.

 If support from a Location Server UE was requested in Step 6, Step 9 follows, else Step 10.

9. The Location Server UE reports the calculated Target UE location information in a Determine Location Response message to the Target UE.

10. The Target UE reports its location information in a LCS Service Response message to the Location Server UE which in turn forwards it to the Location Server UE.

##### 6.X.3.2.2 PC5-MO-LR procedure



Figure 6.X.3.2.2-1: PC5-MO-LR procedure

1. If the Target UE determines it requires support from a Location Server UE, the Target UE selects a Location Server UE. The selection of the Location Server UE by the Target UE is performed using direct discovery. Both models A and B discovery can be used as follows (see TS 23.303 for definitions of models A and B):

- Model A: a Location Server UE ("announcing UE") announces itself at least as a Location Server UE. Target UEs ("monitoring UE") monitor such announcements.

- Model B: a Target UE ("discoverer UE") issues requests including information it wishes to discover a Location Server UE ("discoveree UE").

Once a Location Server UE is selected, direct communication is established between the Target UE and this Location Server UE allowing the procedure to proceed (Step 2).

If the Target UE determines instead it does not need support from a Location Server UE it proceeds to Step 3.

2. The Target UE issues a Determine Location Request message to the Location Server UE, incl. necessary information as required by the intended location operation.

3. The UE Positioning (/ranging) is performed by the Target UE or with support of the Location Server UE in order to determine the Target UE location, depending on the outcome of Step 1.

NOTE: Reference UE(s) may also be invoked at this point to assist the Target UE or Location Server UE in determining the Target UE location.

 If support from a Location Server UE was requested in Step 1, Step 4 follows, else Step 5.

4. The Location Server UE reports the calculated Target UE location information in a Determine Location Response message to the Target UE.

5. If necessary (i.e. if reporting to an LCS Client is necessary), the Target UE reports the calculated Target UE location information to the Location Server UE, with necessary information allowing identification of the LCS Client. The Target UE includes its SLPP information, which, together with the LCS Client information allows the Location Server UE to determine whether the LCS Client is authorized. If so, the Location Server UE forwards the location information to the authorized LCS Client.

6. The LCS Client acknowledges receipt of the Target UE location information from the Location Server UE which in turn forwards it to the Target UE.

### 6.X.4 Impacts on services, entities, and interfaces

UE: Support of PC5-MO-LR and PC5-MT-LR procedures for Case I and/or Case II incl.

- Support of Location Server UE selection by Target UE or LCS Client UE

- Support of LCS Client authorization incl. support storage of Subscriber LCS Privacy Profile information and identification of LCS Client data by Target UE or Location Server UE

- (LCS Client) Support of location requests/responses pertaining to SL positioning/ranging

\*\*\*\* END OF CHANGES \*\*\*\*

1. Mobile-Terminated Location Request [↑](#footnote-ref-1)
2. Mobile-Originated Location Request [↑](#footnote-ref-2)
3. Network-Initiated Location Request [↑](#footnote-ref-3)