**3GPP TSG-SA WG6 Meeting #49-Bis-e S6-221952**

**E-meeting, 22nd June – 1st July 2022 (revision of S6-221656)**

**Source: CATT**

**Title: Pseudo-CR on new solution for the KI#1: Architecture for the 5G-enabled fused location service**

**Spec: 3GPP TR 23.700-96 v0.6.0**

**Agenda item: 9.7**

**Document for: Approval**

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**1. Introduction**

This contribution provides a new solution for the KI#1.

**2. Reason for Change**

During the previous SA6 meetings, there is no architecture agreed upon. The new architecture is proposed based on the agreed part of solution#1 and solution#3.

**3. Proposal**

It is proposed to agree with the following changes to 3GPP TR 23.700-96 v0.6.0.

\* \* \* First Change (all new texts)\* \* \* \*

## 7.x Solution #x: Architecture for fused location service

### 7.x.1 Solution description

This solution addresses key issue #1: Architecture enhancement of application enablement for location.

#### 7.x.1.1 Functional architecture

Figure 7.x.1.1-1 identifies the architecture of fused location service.

Figure 7. x.1.1-1: Functional architecture of fused location service

The architecture is composed of logical function modules that are not necessarily physical entities and can reside in or co-locate with existing application layer entities as appropriate.

In the architecture, the Fused Location Function (FLF) is part of LMS (Location Management Server), the LMS and Application Specific Server can be within the MNO domain or third-party service provider domain.

FLF fuses different location information from multiple resources and provides a better location service/information to the Application Server via the LMS northbound API.

The FLF needs to get the location information from other PLMNs if the target UE is with multiple PLMN accesses.

The FLS-3 reference point is defined for storing and retrieving location information for the target UE and user profile for the target UE.

The FLS architecture supports multiple possible sources of location information including:

* LCS location retrieved from SEAL LMS (as defined in 3GPP TS 23.434 [13]);
* Retrieve the target UE positioning from 3rd party location server, e.g. the SLP (as defined in OMA AD SUPL [10]) of SUPL network;
* Retrieve the target UE Positioning via the FLS-1 interface.

#### 7. x.1.2 Functional components and reference points

The Fused Location Function(FLF) provides location information of the target UE based on positioning or location data retrieved from one or multiple location sources. The Fused Location Function can get the location information from the Fused Location Client, the SEAL LMS and 3rd party location server. The Fused Location Function selects one or more location sources, and one or more location methods based on the requested location QoS. The Fused Location Function provides a normalized description of location data to the application-specific server (e.g. of ecosystem partners) through the northbound API LM-S.

The Fused Location Client is part of the Location Management Client and represents the client of the target UE providing the UE-based positioning and location-related information (e.g. the WiFi SSID list for WiFi SSID fingerprint based UE positioning) and providing the UE location information to the Fused Location Function via an IP connection.

NOTE: How does the Fused Location Client get its UE location related information is out of the scope of 3GPP.

The SEAL Location Management Client represents the client of the requestor/sender UE for location reporting as defined in 3GPP TS 23.434 [13].

The Location Management Server is the SEAL Location Management Server enhanced with Fused Location Function. The SEAL Location Management Server is a functional entity that receives and stores user location information and provides user location information as defined in 3GPP TS 23.434 [13]. The Location Management Server acquires location information from one or more sources including:

- the NEF (as defined in 3GPP TS 23.501 [5] and 3GPP TS 23.273 [4]) via N33 reference point;

- the GMLC (as defined in 3GPP TS 23.273 [4]) via Le reference point which is not defined in 3GPP TS23.434[13];- the SEAL location management client as defined in 3GPP TS 23.434[13].

The 3rd Party Location Server provides the location of certain location technology (typically the network-based positioning).

The interfaces are described as followed:

**FLS-1:** Reference point supporting location reporting, location determination, location management, and exchange of location contextual information (e.g. UE ID, location capabilities of the target UE, the available positioning methods supported by the target UE) between the Fused Location Server and the Fused Location Client of the target UE. The FLS-1 may support HTTP or WebSocket and the IP connection between the Fused Location Client and Fused Location Server.

NOTE: FLS-1 is part of the LM-Uu, i.e. the function of the FLS-1 is included in LM-Uu.

**FLS-3:** Reference point between the FLS and a database for storing and retrieving location information for the target UE and user profile for the target UE.

NOTE: The definition of FLS-3 is out of scope of this specification.

**FLS-2:** The reference point is used for location retrieval of the target UE from that 3rd party location server. The FLS-2 can be a service-based interface. The FLS-2 may support HTTP or WebSocket.

NOTE: The definition of FLS-2 is out of scope of this specification.

**Nnef:** Service-based interface as defined in 3GPP TS 23.501 [5].

**Le:** Reference point as defined in 3GPP TS23.271 [3].

**LM-UU:** Reference point as defined in 3GPP TS 23.434 [13].

**LM-S:** Reference point as defined in 3GPP TS 23.434 [13].

NOTE: If the UE supports MUSIM, the FLS can get the UE location information from the PLMNs via the LM-S reference of each PLMN.

### 7. X.2 Solution evaluation

With this architecture, the FLF can fuse additional UE location sources to determine a better UE location. The FLF can retrieve UE location from the non-3GPP access via FLS-1 interface and 3rd party server (via FLS-2). However, how the FLF gets or retrieves the UE location from the 3rd party is out of scope of 3GPP. FLF also has Database which can be used to provide additional functionality to LMS. FLF can be used as additional source for location information to enhance the LMS.

In this architecture, the SEAL LMS is enhanced with FLF and supports the new FLS-1, FLS-2 and FLS-3 interface. FLS-2 and FLS-3 are out of scope of 3GPP.The LMC is enhanced with FLC. The LM-Uu includes all the functions of the FLS-1.