**3GPP TSG-WG2 Meeting #166-AH-E *S2-2501139***

**20th – 24th January 2025, Elbonia**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **273** | **CR** | **0643** | **rev** | **1** | **Current version:** | **1.0** |  |
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| *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:*** | Updates to AI/ML-based positioning procedures | | | | | | | | | |
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| ***Source to WG:*** | Apple, vivo | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | AIML\_CN | | | | |  | ***Date:*** | | | 2025-14-01 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **C** |  | | | | | ***Release:*** | | | *Rel-19* |
|  | *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-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
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| ***Reason for change:*** | | This CR proposes a number of changes addressing the ENs below and completing/clarifying some aspects in the procedures for AIML-based positioning, related to the exception sheet approved in SP-241513.  In addition, other miscellaneous changes are proposed to clarify the specification as described below. | | | | | | | | |
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| ***Summary of changes:*** | | Following changes are proposed for 6.22.2:   * Clarifications on user consent are proposed indicating LMF behaviour when user consent is not provided or revoked   Following changes are proposed for 6.22.4:   * A NOTE is added indicating the input data for AIML-based positioning is not in the scope of this specification. * User consent revocation is clarified | | | | | | | | |
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| ***Consequences if not approved:*** | | Specification of AI/ML based positioning won’t be completed on time. | | | | | | | | |
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| ***Clauses affected:*** | | 6.22.2, 6.22.4 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS 23.273 CR 0642 | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS 23.273 CR 0644 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

\* \* \* Start of Changes \* \* \*

### 6.22.2 Data Collection at LMF for the LMF-based AI/ML positioning based on UE measurements

The LMF needs to obtain input data for LMF-based AI/ML Positioning model training, performance monitoring and may also request the UE to provide the UE location. The LMF-based AI/ML Positioning model is trained to perform UE positioning for UEs located in an area of interest that may expand over multiple TA or cover multiple NG-RAN nodes.



Figure 6.22.2-1: Data collection at LMF for the LMF-based AI/ML positioning based on UE measurements

1. The LMF starts data collection for the purpose to train an AI/ML Model for UE Positioning (this may be based on an internal trigger in the LMF or a request from the NWDAF). The LMF invokes an Nnrf\_NFDiscovery\_Request service operation to an NRF to discover AMF(s) that served for the area of interest.

2. The LMF subscribes to AMF to retrieve the list of SUPIs located in an area of interest and the UE Positioning Capability for each UE using Namf\_EventExposure\_Subscriber\_Request (Target of Event Reporting = "any UE", Event ID = "UEs in/out area of interest" and "UE Positioning Capability".

Editor's note: Whether and how to limit the number of UEs is FFS.

3. The AMF send Namf\_EventExposure\_Subscriber\_Response ("list of SUPIs in the area of interest"). If "UE Positioning Capability" is also requested in step 1, AMF includes UE Positing Capability, UE User Plane Positioning Capabilities if available for each SUPI in the response message sent to LMF.

4. The LMF checks the user consent status from UDM for the UEs with SUPIs received in step 3 and discards UEs for which the user has not provided consent for the corresponding purpose.   
  
The LMF further determines the UEs from the list of SUPIs that received from AMF in step 2 for data collection based on UE Positioning Capability, UE User Plane Positioning Capabilities, the PRU information available in the LMF and operator's policy. The User consent check is not needed for data collection from PRU for performance monitoring.

Editor's note: Further details on user consent for data collection for a specific purpose, e.g., for model training and/or model performance monitoring for LMF-based AI/ML Model positioning will be aligned with SA WG3.

5. For each UE where the user provides consent to data collection for the corresponding purpose and the UE can support data collection, the LMF initiates a request for input data. The UE may reject the data collection request from the LMF (e.g. considering UE status, user's input). If the UE accepts data collection request, the UE may cancel the data collection later as defined in clause 6.3.4.

Editor's note: The procedure to collect the input data for AI/ML based positioning calculation by the LMF from the UE is FFS. The procedure will be coordinated with RAN WGs.

Editor's note: The input data used for AI/ML based positioning will be decided by RAN WGs.

At the time the LMF becomes aware that input data for a UE can no longer be collected, e.g. the user consent for data collection for the corresponding purpose is revoked, the LMF stops collecting the input data from the UE.

\* \* \* Next Change \* \* \*

### 6.22.4 Input data collection by NWDAF for AI/ML positioning ML model training or ML model performance monitoring

The NWDAF containing MTLF may subscribe to input data (i.e. location measurement related data) from LMF for ML model training or ML model performance monitoring for LMF-based AI/ML Positioning.

Editor's note: It is FFS how to adapt this procedure to ML model performance monitoring.



Figure 6.22.4-1: Procedure of input data collection from LMF

1. NWDAF containing MTLF determines to train a ML model for LMF-based AI/ML Positioning based on the request from LMF or internal trigger, or the NWDAF containing MTLF determines to perform ML model performance monitoring for LMF-based AI/ML Positioning.

2. The NWDAF invokes an Nnrf\_NFDiscovery\_Request service operation to an NRF to discover an LMF, the service operation includes an AoI and the Nlmf\_DataExposure service as discovery parameters. If the NWDAF wants to collect the input data of PRUs, the NWDAF may also include a PRU existence indication for discovering the LMF(s) associated with PRUs (the PRU association procedures are defined in clause 6.17). The NRF selects one or more LMFs based on the AoI, the Nlmf\_DataExposure service, and the PRU existence indication (if available), and sends an Nnrf\_NFDiscovery\_Request Response which includes the profiles of the selected LMFs to the NWDAF.

Editor's note: The input data used for LMF-based AI/ML Positioning will be decided by RAN WGs.

NOTE: The specific input data collected by LMF from UE and NG-RAN for LMF-based AI/ML Positioning are not in the scope of this specification.

3. The NWDAF subscribes to or cancels subscription to input data from LMF after having previously subscribed by invoking Nlmf\_DataExposure\_Subscribe / Nlmf\_DataExposure\_UnSubscribe service operation. The NWDAF includes an AoI and a notification target address to request the input data from LMF. The NWDAF may also include requested number for data samples and time window for data collection.

Editor's note: Whether the NWDAF needs to be aware of PRU information and indicate to obtain the PRU information from LMF is FFS. Whether the NWDAF needs to indicate Data source type (UE or RAN measurements) and/or data type(s) and/or a target ground truth label precision is also FFS.

4. The LMF performs steps 1 to 4 in clause 6.22.2, or steps 1 to 7 in clause 6.22.3.

5. The LMF sends the collected data samples to the NWDAF by invoking Nlmf\_DataExposure\_Notify service operation, then the NWDAF trains the ML model or performs ML model performance monitoring based on the data samples.

At the time the LMF becomes aware that input data for a UE can no longer be collected, e.g. the user consent for data collection for the corresponding purpose is revoked, the LMF stops collecting and sharing with NWDAF the input data from the UE.

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