**3GPP TSG-WG2 Meeting #166-AH-E *S2-2501136***

**20th – 24th January 2025, Elbonia**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **273** | **CR** | **0642** | **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 general descriptions | | | | | | | | | |
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| ***Source to WG:*** | Apple, CATT | | | | | | | | | |
| ***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 general clause of AIML-based positioning, related to the exception sheet approved in SP-241513.  In addition, this CR introduces and updates specification text approved at SA2#166 that was incorrectly not incorporated in the newest version of the specification | | | | | | | | |
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| ***Summary of changes:*** | | Following changes are proposed in this CR:   * 1st EN is removed, and A NOTE is added indicating the input data for AIML-based positioning is not in the scope of this specification. * The 2nd and 3rd ENs are resolved   Additional miscellaneous editorial clarifications as well as clarifying that user consent is not needed for performance monitoring data from PRU.   * Clarify the output information provided by the NWDAF for ML model provisioning. * Clarify that the LMF or NWDAF containing MTLF may trigger ML model retraining based on model performance monitoring result. | | | | | | | | |
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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:*** | | 5.18, 5.18.0 (new), 5.18.2 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | |  | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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

## 5.18 Support for UE positioning based on a ML Model at the LMF

### 5.18.0 General

The LMF may calculate the UE location and estimate the achieved accuracy by using LMF-based AI/ML Positioning. When receiving the request from AMF for determining a UE location, the LMF selects an appropriate positioning method as described in clause 5.2 to determine the result of the positioning. The result of the positioning may be calculated by using LMF-based AI/ML Positioning ML model supported by LMF. The LMF collects input data from UE or NG-RAN for the LMF-based AI/ML Positioning to perform location calculation and provide the location to the consumer.

NOTE 1: Whether to select LMF-based AI/ML Positioning for location result calculation is determined by LMF.

NOTE 2: The specific measurement data collected by LMF from UE and NG-RAN for LMF-based AI/ML Positioning are in the scope of RAN specifications and not in the scope of this specification.

Editor's note: What input data collected from UE and NG-RAN to LMF for LMF-based AI/ML Positioning will be determined by RAN WG1. How to collect the input data for LMF-based AI/ML Positioning calculation need coordination with RAN WGs.

The ML model that is used for LMF-based AI/ML Positioning may be trained by LMF. The trigger for data collection for model training in LMF is up to implementation. LMF collects input data from UE for ML model training as described in clause 6.22.2. The LMF collects input data from NG-RAN for ML model training as described in clause 6.22.3.

The LMF may also request a trained ML model for LMF-based AI/ML Positioning from NWDAF containing MTLF as described in clause 6.22.5. The LMF discovers a suitable NWDAF containing MTLF via NRF as described in clause 5.2 of TS 23.288 [37] with the following considerations:

* The LMF may provide the positioning case information.
* the LMF provides an Area of Interest, and may provide the ML Model Interoperability indicator to discover an NWDAF that can provide an AI/ML Model that the LMF can run.
* The LMF may requests a NWDAF with ML Model accuracy checking capability to be able to report to LMF that the model is degraded (i.e. for ML model performance monitoring).

NOTE 3: Other NWDAF discovery parameters listed in clause 5.2 of TS 23.288 [37] such as Analytics ID, FL capability type and related time period, S-NSSAI or any roaming capabilities are not included by LMF.

Editor's Note: The types of LMF-based AI/ML positioning model (e.g., per positioning case) is FFS, which needs to be coordinated with RAN WGs.

The LMF requests the NWDAF containing MTLF to provide an ML Model for LMF-based AI/ML Positioning as described in clause 6.2A of TS 23.288 [37] with the following considerations:

- The LMF provides the following input parameters in the Nnwdaf\_MLModelProvision\_Subscribe or Nnwdaf\_MLModelInfo\_Request:

- LMF-based AI/ML positioning indication.

- Optionally, Vendor ID, ML Model Filter Information (e.g. Area of Interest), Positioning case information, Target of ML Model Reporting, ML Model Target Period, Time when model is needed, Inference Input Data information and ML Model Monitoring Information.

- If vendor specific information is needed to allow running the ML Model, then the ML Model Interoperability Information.

- If the LMF supports multiple AI/ML Models, indication of supporting for multiple ML Models, optionally with Number of ML Models and Accuracy level(s) of Interest.

The NWDAF containing MTLF collects input data to perform the ML model training as described in clause 6.22.4, and the NWDAF containing MTLF performs ML model provision to LMF as described in clause 6.2A of TS 23.288 [37] with the following considerations:

- The NWDAF containing MTLF provides the ML Model identifier and ML Model Information for the ML Model for UE Positioning, and optionally, the following parameters:

- ML Model Filter Information and/or Target of ML Model Reporting, if the ML Model provisioning request includes multiple ML Model Filter Information and/or Target of ML Model Reporting;

- Indication of whether the ML Model identifier is updated (e.g. retrained ML model).

- Validity period, Spatial validity, Training Input Data Information, ML Model accuracy Information.

Editor's note: The collected input data for LMF-based AI/ML Positioning model training will be determined by RAN1. How to collect the input data for LMF-based AI/ML Positioning model training need coordination with RAN WGs.

Once the ML model for LMF-based AI/ML Positioning is trained and available in the LMF, the LMF may use it to perform UE Positioning after receiving a location determination request from AMF.

Editor's note: Whether user consent for UE positioning calculation is needed apart from the existing GMLC check of the LCS privacy profile is FFS.

For ML model training, performance monitoring and UE positioning calculation using LMF-based AI/ML Positioning, the LMF checks with UDM the user consent status before collecting UE related data, see clause 6.22.3 and clause 6.22.4.

Either LMF or NWDAF containing MTLF may perform performance monitoring for LMF-based AI/ML Positioning. When the ML model that is used for LMF-based AI/ML Positioning is trained by LMF the LMF monitors the performance of the ML model. When the ML model that is used for LMF-based AI/ML Positioning in LMF is trained by NWDAF containing MTLF, then the NWDAF containing MTLF monitors the performance of the ML model. LMF may determine whether to use the LMF-based AI/ML Positioning to perform location calculation based on the model performance monitoring result. LMF or the NWDAF containing MTLF may also trigger the ML model retraining based on the model performance monitoring result.

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

### 5.18.2 AI/ML model performance monitoring for LMF-based AI/ML Positioning

When the AI/ML model that is used for LMF-based AI/ML Positioning is trained by LMF, the LMF may perform performance monitoring for AI/ML model by collecting the measurements data and ground truth data of PRU(s)/UE(s) by using the procedures of data collection for LMF-based AI/ML Positioning as specified in clause 6.22.2 or clause 6.22.3. Before collecting the data from UE(s), LMF needs to check the user consent in UDM, however LMF does not need to check user consent for data collected from PRU. LMF calculates the location information based on the collected measurement data by using AI/ML model. Based on the calculated location information and ground truth data, LMF evaluates the AI/ML model performance to generate the performance monitoring result. The result may trigger LMF to change the positioning method, e.g. from LMF-based AI/ML Positioning to the legacy positioning or retrain the AI/ML model in LMF.

When the AI/ML model that is used for LMF-based AI/ML Positioning in LMF is trained by NWDAF containing MTLF, then the NWDAF containing MTLF may monitor the performance of the AI/ML model as specified in clause 6.2E.4 of TS 23.288 [37].

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