**3GPP TSG CT WG3 Meeting #138 C3-246149**

**Orlando, US, 18 – 22 November, 2024 (revision of C3-246abc)**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **29.552** | **CR** | **0135** | **rev** | **-** | **Current version:** | **19.0.0** |  |
|  | | | | | | | | |
| *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:*** | Clarification for Horizontal Federated Learning | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, vivo, Ericsson | | | | | | | | | |
| ***Source to TSG:*** | CT3 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | AIML\_CN | | | | |  | ***Date:*** | | | 2024-10-25 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***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)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | As agreed in S2-2411193, the terminology for Federated Learning were clarified to differentiate the Horizontal Federated Learning and Vertical Federated Learning. The clarification is also needed in stage 3. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Modify the existing teminology from FL to HFL or Federated Learning to Horizontal Federated Learning. | | | | | | | | |
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| ***Consequences if not approved:*** | | The stage 2 requirement is not implemented. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 3.3, 5.10 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS/TR 23.288 CR 1198 | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

\*\*\* 1st Change \*\*\*

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

ADRF Analytics Data Repository Function

AF Application Function

AMF Access and Mobility Management Function

AnLF Analytics Logical Function

CEF Charging Enablement Function

DCCF Data Collection Coordination Function

FL Federated Learning

GMLC Gateway Mobile Location Centre

HFL Horizontal Federated Learning

LMF Location Management Function

MDAF Management Data Analytics Function

MDT Minimization of Drive Tests

MFAF Messaging Framework Adaptor Function

ML Machine Learning

MTLF Model Training Logical Function

NEF Network Exposure Function

NRF Network Repository Function

NSACF Network Slice Admission Control Function

NSSF Network Slice Selection Function

NWDAF Network Data Analytics Function

OAM Operation, Administration, and Maintenance

PCF Policy Control Function

RE-NWDAF Roaming Exchange NWDAF

SMF Session Management Function

UDM Unified Data Management

UPF User Plane Function

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

## 5.10 Horizontal Federated Learning among Multiple NWDAFs

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

### 5.10.1 General

In this clause and following sub-clauses of the specification, the Federated Learing (FL) refers to Horizontal Federated Learning (HFL).

The NWDAF containing MTLF can leverage Federated Learning (FL) technique to train an ML model. To apply FL technique for ML model training, there is no need for input data transfer (e.g. centralized into one NWDAF) but only need for cooperation among multiple NWDAFs (MTLF) distributed in different areas, i.e. sharing of ML model(s) and of the learning results among multiple NWDAFs (MTLF).

The NWDAF containing MTLF determines to train an ML model either based on local configuration or when it receives the request from NWDAF containing AnLF as described in clause 5.3 of 3GPP TS 23.288 [17]. If the NWDAF containing MTLF can act as an FL server for the ML model training, then FL procedure is initiated by the NWDAF containing MTLF as FL server NWDAF directly, otherwise, the NWDAF containing MTLF should discover an FL server NWDAF as described in clause 5.3.2.2 of 3GPP TS 29.510 [26] and request the FL server NWDAF to provide the trained ML model as described in clause 5.10.2.1.

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