**SA WG2 Meeting #161 S2-2403054**

**Athens, Greece, February 26 - March 1, 2024 (Revision of S2-2402213-was1068r12)**

**Source: China Mobile, KDDI, Lenovo, vivo, Huawei, OPPO, NTT DOCOMO, Apple, ETRI, Ericsson, KDDI, Nokia**

**Title: Use case for observed service experience analytics based on VFL**

**Document for: Approval**

**Agenda Item: 19.15**

**Work Item / Release: FS\_AIML\_CN/R19**

# 1. Proposal

It is proposed to agree the following use case into TR 23.700-84.

In S2-2401068r12 which was postponed in SA2#160 AHE, we get the following EN:

*Editor’s Note: Whether/how NWDAF can provide labels during the training process when NWDAF and AF participate in VFL is FFS.*

We suggest to remove the EN because the way of obtaining the labels should be discussed in the solution phase rather than defined in the use case.

\* \* \* First change \* \* \* \*

## 5.x.2.x Use Case #X: NWDAF support for observed service experience analytics based on VFL

### 5.x.2.x.1 Description

When NWDAF provides observed service experience analytics, as in other analytics that require input data from the AF, policies in the PLMN and or the AF may prevent raw data to be exchanged directly between NWDAF and an external AF, as NWDAF is in the PLMN and the AF is outside the PLMN and the user data has high privacy protection needs.

Furthermore, NWDAF and AF may have different features of the same sample identity, which is a requirement of VFL. In such cases, VFL can be very helpful to break the data isolation and enable joint training between NWDAF and AF. However, regardless of the entities involved in VFL, the application of VFL among two entities requires alignment of samples and features to make sure the above VFL requirement is addressed.

Additionally, since the inference for VFL is also a distributed inference, no raw data will be shared in the inference as well as in the training. Each entity uses local data to do the inference. And the output will be gathered to get the final result.

The use case for observed service experience analytics is illustrated as follows. It provides the real user feedback to the network so that the network could self-optimize and offer customized services according to the true user needs. Due to the issue of data privacy, the AF(s) and NWDAF may not be able to exchange the data directly (The NWDAF may interact with several AFs, e.g. to provide Service Experience for a Network Slice). By leveraging VFL technology with the situation that the datasets of distributed nodes, NWDAF and AF can jointly participate to train an ML model for observed service experience. And they would do inference after the training respectively to generate the final result.

NWDAF and AF(s) would collect their local training data, respectively (e.g., access speed, network access delay for NWDAF, stall time, frame rate for AF). Note that data collection at the AF is out of the scope of this use case.

Two scenarios are identified in this case:

Scenario 1: NWDAF as VFL Server takes control of the training process.

Scenario 2: AF as VFL Server takes control of the training process.

This use case is also applicable for other analytics where AF and NWDAF can collaborate, e.g., DN Performance Analytics.

NOTE 1: This use case is applicable only if the AF is capable of participating in VFL procedure as a training entity. AF ML model training specification is out-of-scope.

NOTE2: Only when NWDAF initiates the VFL, there could be multiple AFs involved.

\* End of change \* \* \* \*