**3GPP TSG-SA WG4 Meeting #128S4-241028\_r01**

**Jeju, South Korea, 20 May - 24 April 2024**

**Source: Samsung Electronics Co., Ltd.**

**Title: [FS\_AI4Media] pCR on procedure for federated learning**

**Agenda item: 9.6**

**Document for: Agreement**

**1. Introduction**

Introduces a high level procedure for distributed/federated learning.

**2. Reason for Change**

A high level procedure for distributed/federated learning is missing.

**3. Proposal**

It is proposed to agree the following changes to 3GPP TR 26.927 v0.7.0.

\* \* \* First Change \* \* \* \*

### 5.3.7 Procedure for distributed/federated learning

Figure 5.3.7-1 shows a procedure for distributed/federated learning.

Assuming that the network operator provides a distributed/federated learning service using multiple UEs for training, as well as the availability of partially trained AI models from the Media Application Provider, the procedure consists of an ingest session (where partially trained AI models are uploaded to the Media AS), a provisioning session, and an active FL (federated learning) training session, during which the Media Client can access the partially trained AI model for local AI training, after which the training results and report are sent back to the Media AS for training aggregation.



Figure 5.3.7-1: Procedure for distributed/federated learning

1. Service provisioning and announcement of federated learning service on the network side, in particular between the Media AF (application function) and the Media application provider.

2. When content hosting is offered and selected there may be interactions between the Media AF and the Media AS e.g., to configure Server Certificates and/or Content Preparation Templates and to allocate content ingest and distribution resources by providing a Content Hosting Configuration. The Media AS provides resource identifiers for the allocated resources to the Media AF, which then provides the information to the Media Application Provider. For AI/MLs services, content hosting is equivalent to AI model hosting.

3. The Media Application Provider starts the Ingest Session by ingesting the partially trained AI model.

4. NEF - Media AF interactions for the negotiation of assistance to AI/ML operations features as defined by SA2 in TS 22.501. An example of one feature is Member UE Selection Assistance, where the Media AF may be notified about changes in the subset list of UE(s) that fulfil certain filtering criteria. Another feature is that related to QoS, where the Media AF may request the network to provide a recommended time window for the active FL training session using the Planned Data Transfer with QoS (PDTQ) requirements and procedures.

5. The Media Application Provider provides the Service Announcement Information to the Media-Aware Application. The service announcement includes either the whole Service Access Information (i.e. details for AI Model Session Handling or a reference to the Service Access Information or pre-configured information. When only a reference is included, the Media Client fetches (in step 7) the Services Access Information when needed.

6. When the Media-Aware Application decides to begin the federated learning, the Service Access Information (all or a reference) is provided to the Media Client.

7. (Optional) In case the Media Client received only a reference to the Service Access Information, then it acquires the Service Access Information from the Media AF.

8. The Media Client uses the Media Session Handling API exposed by the Media AF (at M5) for federated learning training session handling, in particular for dynamic policy invocation. The Media Session Handling API is used for configuring content consumption measurement, logging, collection and reporting; configuring QoE metrics measurement, logging, collection and reporting; requesting different policy and charging treatments; or Media AF-based Network Assistance.

9. The Media Client receives the partially trained AI model/data from the Media AS.

10. The Media Client performs local training of the AI model.

11. The Media Client sends the training results/report to the Media AS.

12. The Media AS aggregates training results data from multiple UEs and updates the partially trained model. The partially trained model may also be egested to the Media Application Provider.

13. Further iterations of FL training sessions for the same UE and base AI model may occur from step 4 or step 9, depending on the service configuration.

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