A service guarantee strategy in Federated Learning (FL) Network

Scenario & : Problems



Aggregator changes from Node#i to Node#j: UE#3 has uploaded its model to Node#i; UE#2 will upload its model to Node#j; UE#1 is in the uploading process.

2. New UEs join the FL process



UE#k join in the middle of process, the gNB has to transmit global model to UE#k (as opposed to broadcasting); all UEs have to wait

3. UEs leave the FL process



UE#1 leaves: it has finished its model updates, and gNB already allocates the radio resources. This leads to the waste of computation and communication resources.

Solution:

Because **UEs and aggregator share the same model** after global aggregation.

- 1. Handover and new UE joining must happen at the time point when global aggregation is just done;
- 2. The leave of UE must happen after uploading its local model

We can increase transmit power or lower the transmit rate (e.g. threshold of SINR, RSRP, etc)

Or

Take action in advance:

Aggregator changes from UE#i to UE#j:



 T_1 --- from now to global aggregation finished in this round T_2 --- from now to global aggregation finished in next round T_{min} --- the left time that UE#i could still serve

We can handover in advance.

Standard impact:

- **1. TR23.700-80:** Study on 5G System Support for AI/ML-based Services
- 2. TS 22.261: Service requirements for the 5G system
- **3. WID** "Study on AI/ML Model Transfer Phase 2" **SP-220439** "Distributed AI training/inference based on direct device connection".