



Mobility enhancement by UE based AI

小米集团技术委员会
Xiaomi Technical Committee



Motivation

- NW based AI function was discussed in RAN3 and SA. AI inference result could be used to assist NW configuration.
- Radio configuration is controlled by NW, but UE is playing more and more important role in configuration control, since UE has more local and customized information than NW,
 - Assistant information provided by UE has be introduced in many features
 - UE select CHO target cell based on local measurement
- UE based AI could utilize the information at UE to improve mobility performance.

Advantages of UE based AI



Privacy

UE information is kept locally, not exposed to other entities
AI inference result may be used locally or reported to NW

Customization

UE's preference could be considered in more customized way
Inference accuracy could be improved

Radio
Independent

Radio signaling is not mandatory to utilize UE based AI
Inference function is not impact in poor radio channel condition

Efficiency

AI inference is run at UE side
Delay and signaling overhead could be reduced



Mobility enhancement by UE based AI

- AI model training could be done at server or UE
 - If training is done at server, UE shall first obtain the AI mode
 - AI model training and obtain is not specified
- UE collects information as input to AI model
 - Input information could include UE position, history information, channel quality measurement, UE preference, traffic characteristics, etc.
 - The input is not specified
- UE run AI model and obtain AI inference result locally
 - AI model is not specified
 - Definition of AI inference result should be specified to ensure consistent understanding between UE and NW
- AI inference result is used to assist mobility management
 - AI inference result could be provided to NW to decide radio configuration. The signaling should be specified
 - New event based on AI inference result could avoid unnecessary report or handover. The event should be specified
 - AI inference result could be used as configuration scale or target cell selection criteria. The UE behavior should be specified

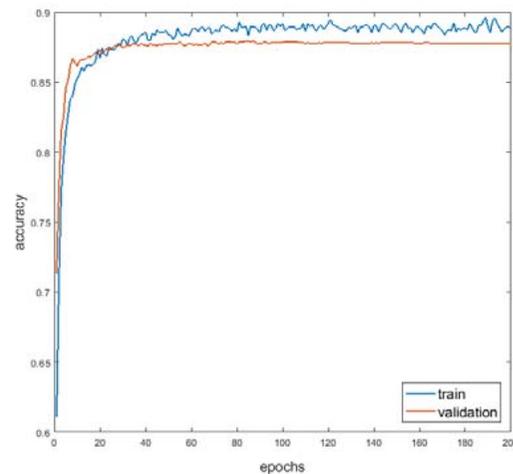


Impact analysis

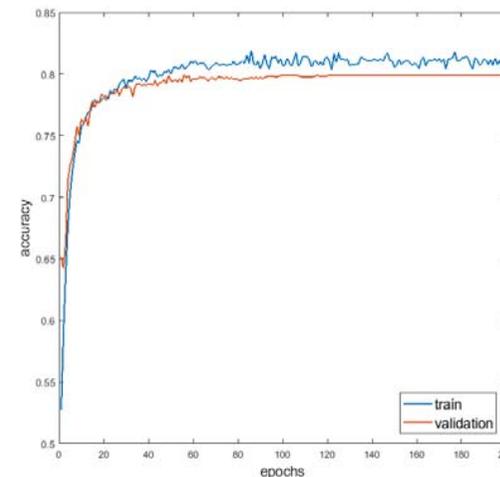
- There is no impact to RAN1, major impact on RAN2
- RAN2 as leading group work on following aspects
 - Identify potential solutions to improve mobility performance
 - Define AI inference result
 - Enhancement solutions based on defined AI inference result
 - Simulation may be needed to evaluate the feasibility and performance of proposed solutions
 - Radio simulation assumption in TR 36.839 could be reused with necessary updates, e.g. smaller cell radius
 - AI model performance could be calibrated for evaluation purpose
- RAN3 may be impacted depending on proposed solutions

Simulation result

- Following is the result of UE based AI inference on different mobility failure, including handover command loss and HOF
 - Simplified LSTM algorithm is used to adapt UE capability.
 - Information at UE is used as input, e.g. measurement of serving cell and neighbor cells in short period, e.g. 50ms.



Handover command loss inference



HOF inference

- UE based AI could achieve high accuracy regarding the potential mobility failure. With this information, mobility performance could be improved significantly.



Objective

- Study mobility enhancement by UE based AI
 - Evaluate the feasibility and performance of mobility enhancement by UE based AI
 - Identify evaluation methodology to assess UE based AI mobility enhancement
 - Identify possible solutions of mobility enhancement by UE based AI, including,
 - AI inference result definition, e.g. successful access probability
 - AI inference result based measurement report
 - AI inference result based event
 - AI inference result report
 - Configuration scale/selection based on AI inference result

