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Study on AI/ML for NR air interface higher layer

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- **In AI/ML for air interface WI, Several use cases are under study, e.g., beam management, CSI enhancement and positioning accuracy enhancement. AI/ML can provide performance improvement compared with legacy mechanism. These uses cases mainly focus on physical layer procedure.**
- **Other use cases on higher layers can also benefit from the utilization of AI/ML.**
- **In this contribution, we provide use cases on higher layer and give our simulation results to show the potential benefits.**

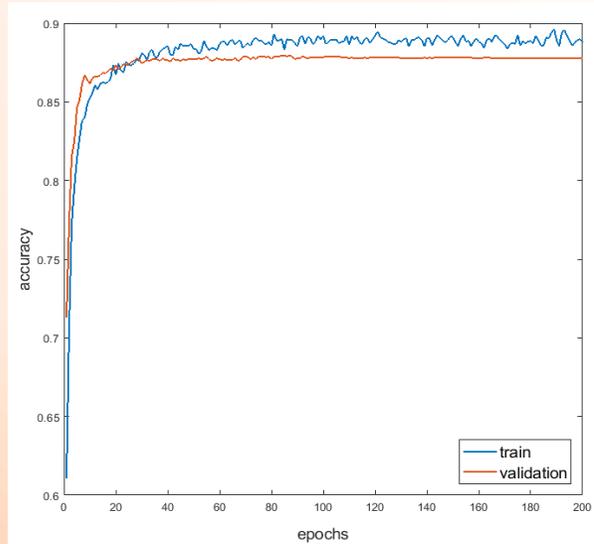
AI-based Mobility management

- **Network deployment is expected to be more dense, due to high frequency. UE may move in high speed, e.g. high way or high speed train. Radio channel changes rapidly. Reported measurement result may be outdated. Mobility performance may degrade based on legacy measurement result**
- **AI/ML can provide inference result to assist mobility management.**

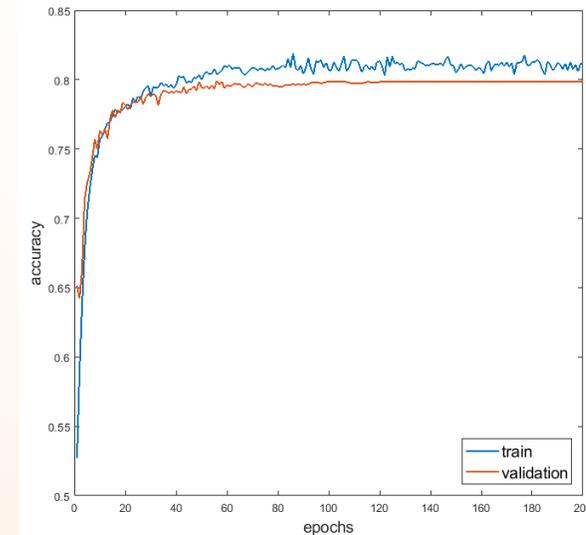
Simulation result

■ Following is the result of 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

■ **Observation: AI/ML could achieve high accuracy regarding the potential mobility failure. With this information, mobility performance could be improved significantly.**

AI-based DRX configuration

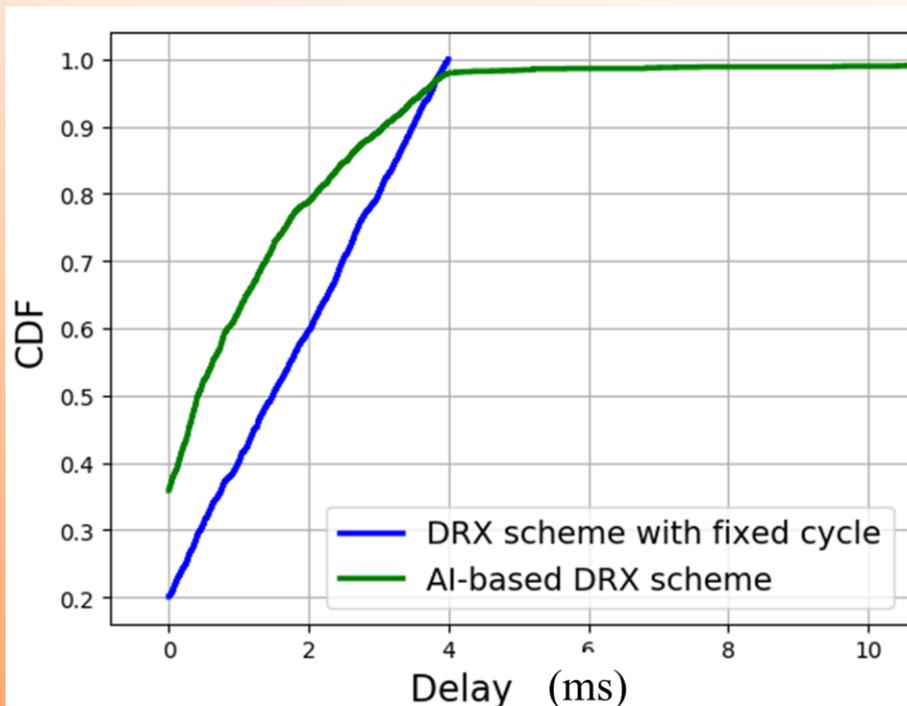
Motivation

- **The configuration of DRX highly depends on certain underlying regularity hidden in the service. If the configuration of DRX doesn't not match the underlying regularity well, large latency would be caused or inferior power saving gain is achieved**
- **Current fixed and semi-static DRX configuration scheme doesn't match regularity of most services well due to fluctuation of the traffic burst time and the traffic duration**
- **The strong power of AI algorithm in the prediction create the opportunity to extract more accurate regularity of the service. With more accurate regularity of traffic and more flexible configuration, better balance in the power saving and latency is expected**

Simulation result

Initial simulation is carried out to verify the potential gain of AI-based DRX configuration

- Baseline: the traditional DRX configuration. The cycle is 5ms and the duration time is 1ms
- AI-based DRX configuration: LSTM is utilized to predict the upcoming traffic burst. UE will turn on the receiving based on the predicated occasions



	Average Delay	On Duration Ratio
DRX scheme with fixed cycle	1.1ms	22%
AI-based DRX scheme	1.59ms	20%

- Observation:
 - With similar power consumption, the AI-based DRX configuration could reduce latency greatly.

■ RAN to study the AI/ML-based higher layer operation

- Identify use cases on higher layer
- Evaluate the performance of use cases on higher layer
- Assess the potential specification impact