

15th – 16th June 2023

# AI/ML for NG-RAN in Rel-19

Agenda Item:	5
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# Introduction

- Extensive work on AI/ML in RAN was conducted during Release 17 and Release 18 addressing air interface and NG-RAN.
- Release 18 work item for AI/ML in NG-RAN was targeted to complete normative work to support network energy saving, load balancing and mobility optimization, especially over Xn interface.
- In this presentation, we discuss potential enhancements and new use cases that can be further considered from upper layer perspective, which can further improve flexibility and benefits of supporting AI/ML in RAN for Release 19.

# Potential AI/ML NG-RAN Enhancement for Rel-19

# Motivation

- During Release 18 work item, RAN3 mainly focused on standalone (SA). However, NR-DC is an important commercial deployment scenario for 5G network, supporting AI/ML NG-RAN in NR-DC is important.
- Model inference is not considered to be deployed in gNB-DU during Release 18. Expanding model inference in gNB-DU could bring more flexibility for resource optimization.
- Furthermore, during Release 18, AI/ML models are separately trained in different network entities. More accurate/precise decisions can be obtained by updating ML model to a general model with more data and model information across multiple NG-RANs.

# Potential Enhancement

- Support AI/ML in NG-RAN for NR-DC
  - Supported use cases include (but not limit to): NWES, load balancing, mobility optimization
- Support model inference at gNB-DU
  - Supported use cases include (but not limit to): NWES, load balancing

# Data/Model sharing among NG-RANs

- Data/Model sharing among NG-RANs
  - Fast and distributed data/model sharing between NG-RANs
  - Joint network optimization between NG-RANs
  - Support interoperability

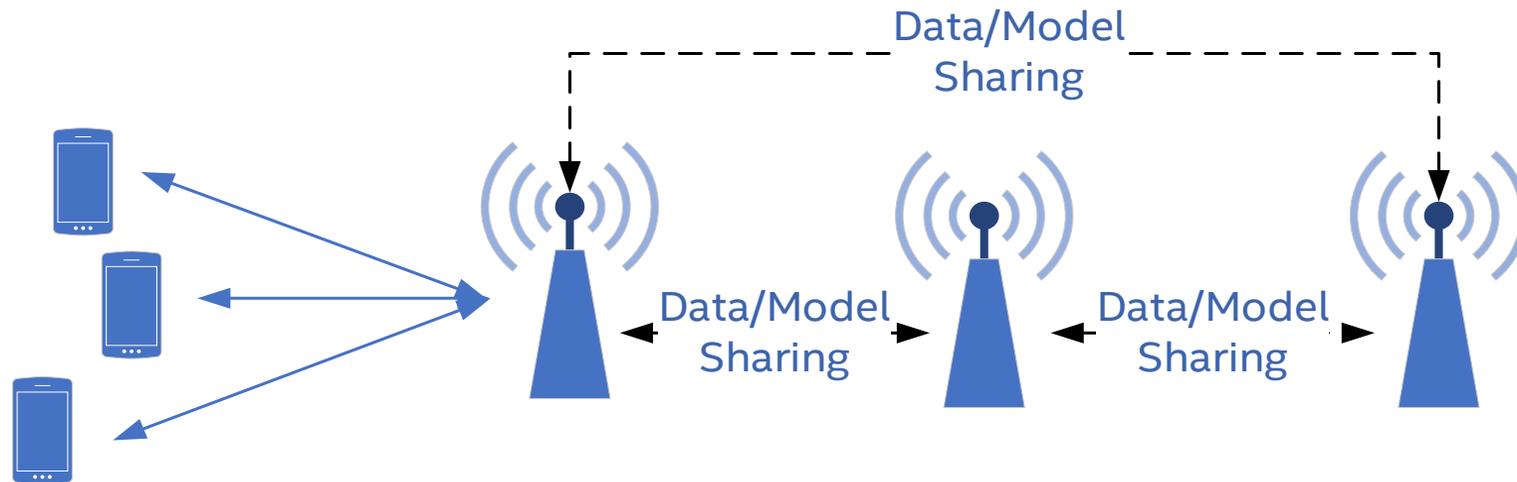


Fig. AI/ML model coordination/sharing across NG-RANs

# Potential New Use Case for Rel-19

# AI/ML for Mobility use case - Motivation

- Study benefits of AI/ML on mobility especially considering challenges in HO, e.g.
  - Power consumption/signaling overhead due to high quantity of measurements and reporting of neighboring cells
  - Increased handover failure/ping-pong ratio/service interruption in very dense/high-frequency deployments
  - Early handover command provided to UE in a more stable radio link condition than legacy HO

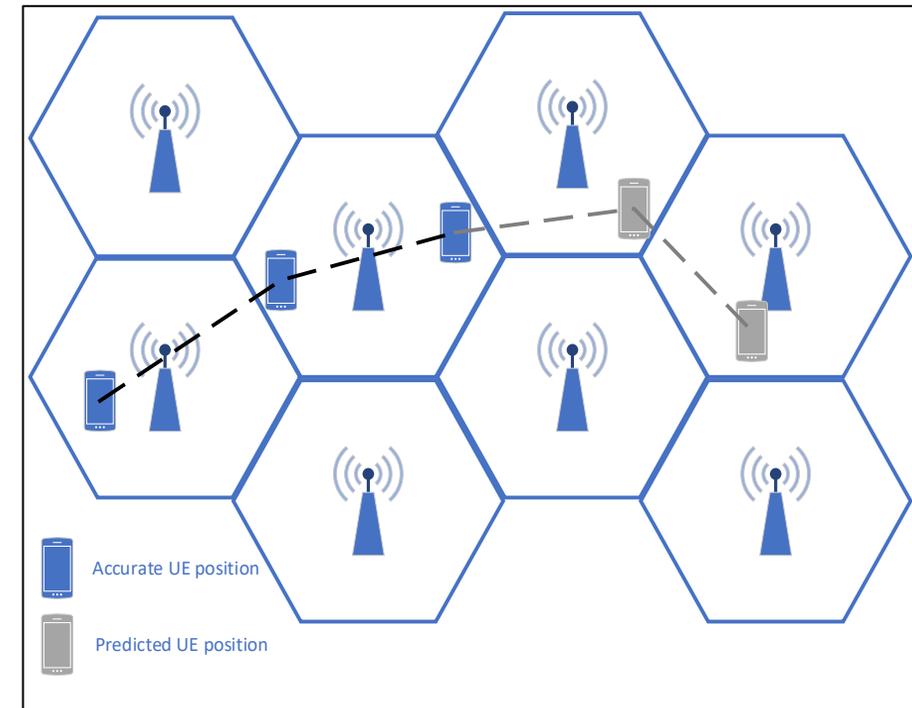


Fig. AI/ML based Mobility

# AI/ML for Mobility use case – Potential Enhancements

- Evaluate performance benefits of AI/ML based algorithms
  - AI/ML framework/evaluation methodology from Rel-18 AI/ML SI should be used as a baseline but the mobility specific AI/ML characterization should be studied
  - Performance evaluation between network-sided model (i.e. RAN3 Rel-18 AI/ML in NG-RAN enabled mobility optimization) and UE-sided model
  - Performance evaluation to focus on HOF rate, ping-pong rate, etc
- Potential applications of AI/ML to mobility use case:
  - Use AI/ML to predict UE mobility/trajectory/measurements and trigger HO based on predictions
  - Use AI/ML to dynamically select the HO parameters based on multiple factors, e.g. UE location, etc.

# Conclusion

- Proposal 1:
  - Consider support of AI/ML NG-RAN in NR-DC .
- Proposal 2:
  - Consider support of model inference at gNB-DU.
- Proposal 3:
  - Consider support of Data/Model sharing among NG-RANs, and distributed learning across NG-RANs.
- Proposal 4:
  - Consider study of AI/ML mobility use case, potential air interface impact and evaluate performance in comparison to AI/ML mobility network-sided model.

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