

3GPP TSG RAN Rel-19 workshop
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Views on AI/ML for NR Air Interface in Rel-19



Views on AI/ML LCM aspects

LCM aspects	Initial views
Data collection	<ul style="list-style-type: none">• According to the study in RAN2, current signaling frameworks (e.g., Logged MDT, Immediate MDT, L3 measurements, L1 measurement, UAI, Early measurement, and LPP) are sufficient for data collection on AI/ML over air interface• Reuse current reporting framework for data collection in Rel-19
Model/functionality identification	<ul style="list-style-type: none">• Functionality identification relies on distributed radio resource control by gNB as legacy• Model identification requires more offline/online efforts on the model registration, model transfer and centralized model management• Functionality identification can be a starting point for normative work in Rel-19
Performance monitoring	<ul style="list-style-type: none">• Due to the generalization limitation of AI/ML models, it's hard to deploy an AI/ML model for all scenarios• Define the requirements and procedures to monitor the performance on both active and inactive models/functionality
Functionality/model switching/activation/deactivation/fallback	<ul style="list-style-type: none">• Network is responsible for the radio resource control and overall performance target• Network should have a final decision on a functionality/model that is not transparent to network• Fallback mechanism is always necessary to avoid the network outage

Views on AI/ML LCM aspects

LCM aspects	Initial views
Model training	<ul style="list-style-type: none">• Offline training is assumed in the Rel-18 study phase, which can be a starting point for WI in Rel-19• There are no enough discussions for online training in Rel-18, which can be further studied in Rel-19
Model transfer/delivery	<ul style="list-style-type: none">• There are no clear motivations and benefits of model transfer for proprietary-format models• For model transfer/delivery with open-format, how to describe a model with open-format should be further studied by other working groups before RAN1 makes more progress on the model transfer• The LCM procedures without model transfer can have a higher priority in Rel-19. However, the standardization in Rel-19 should be future-proof/compatible with model transfer in the future
UE capability/dynamic mechanism	<ul style="list-style-type: none">• Specify dynamic mechanisms to enable UE to report applicable models/functionalities• Specify UE capabilities for the co-existing of both AI/ML-enabled features and non-AI/ML features

- Some of the common LCM aspects can be studied/discussed together in the SI on AI/ML for RAN.

Views on AI/ML use cases

Use cases

Initial views

Spatial-frequency domain CSI compression using two-sided AI model

- Observations
 - Not so attractive performance gains over legacy codebook even high model complexity is assumed
 - High offline co-engineering efforts between UE and network vendors for model training
 - Given the limited TU in RAN4, testing framework for the two-sided model may be hard to be finalized in Rel-18
- Further study the spatial-frequency domain CSI compression using two-sided AI model in Rel-19, including
 - Increase performance gains (e.g., via model transfer/model switching)
 - Reduce the offline co-engineering efforts (e.g., Type 3 training collaboration)
 - Define testing framework for the two-sided model in RAN4

Time domain CSI prediction using UE sided model

- Evaluation results show that time domain CSI prediction using UE sided model can achieve performance gains over different benchmark schemes (i.e., the nearest historical CSI without prediction, non-AI/ML based CSI prediction and collaboration level x AI/ML based CSI prediction approach)
- Specify the time domain CSI prediction using UE sided model in Rel-19 according to the study outcome in Rel-18
- Reuse the Rel-18 MIMO enhancements for CSI prediction as much as possible

Views on AI/ML use cases

Use cases	Initial views
Spatial-domain Downlink beam prediction for Set A of beams based on measurement results of Set B of beams	<ul style="list-style-type: none">• Evaluation results show that high beam prediction accuracy of Top-1/K beam can be achieved even with reduced number of beams for measurement.• Specify AI/ML beam management for both spatial-domain downlink beam prediction and temporal downlink beam prediction in Rel-19 according to the study outcome in Rel-18• Specify LCM aspects for AI/ML beam management on both UE-side model and network-side model
Temporal Downlink beam prediction for Set A of beams based on the historic measurement results of Set B of beams	
Direct AI/ML positioning using UE location as AI/ML model output	<ul style="list-style-type: none">• Evaluation results show that the enriched channel information (e.g., additional paths, PDP and CIR) can significantly increase the positioning performance• Focus on data collection enhancements in Rel-19 for AI/ML based positioning
AI/ML assisted positioning using new/existing measurements as AI/ML model output	

- Focus on the normative work of the existing use cases.

Thanks



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