

3GPP TSG RAN Rel-19 workshop

Taipei, June 15 - 16, 2023

Agenda Item:

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Document for:

Discussion

RWS-230256

AI/ML for air interface

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- Based on the extensive study in Rel-18, normative work on the following sub use cases should be done in Rel-19
 - Considering the workload, focused scope for each sub use case should be considered

Sub use case		Views (workload perspective)
CSF	CSI compression	Offline training can be assumed for two-side model
	Temporal CSI prediction	Focus on UE side models. Reuse reporting framework of Rel-18 MIMO if applicable
BM	Spatial domain beam prediction	Both UE side model and NW side model
	Temporal beam prediction	Both UE side model and NW side model
Pos	Direct AI/ML positioning	Focus on certain input type (e.g., CIR, PDP)
	AI/ML assisted positioning	Focus on certain output type (e.g., LOS/NLOS, TOA soft information)

- Study on new use case which has potential gain, high commercial interest and reasonable workload can also be considered in Rel-19

Use case	Views (workload perspective)
Mobility	<ul style="list-style-type: none"> • Study the sub use case for the AI/ML mobility e.g., mobility based on temporal prediction • Both UE side and NW side model can be considered

■ Focused UE-NW collaboration level in Rel-19 WI

- Level-y (signaling-based collaboration without model transfer) collaboration level can be focused as the first step of 3GPP AI/ML for air interface.
 - » Model delivery can be performed transparently in 3GPP
 - » Model/functionality at UE side is managed by NW without revealing the proprietary information of model (e.g., parameters and structure)

■ How NW guarantees that the performance of AI feature is better than legacy scheme

- To guarantee the performance without the proprietary information disclosure, performance monitoring should be supported
 - » NW configures the threshold of performance metrics for the fallback operation
 - Thresholds should be determined by NW, as the required quality of AI feature is different according to NW operation.
 - » Or NW indicates functionality/model de-activation based on the performance metric reported from UE

■ Data collection [RAN1/2]

- RS configuration request for UE side data collection
- Measurement reporting for NW side data collection
- Assistance signaling to categorize the collected data

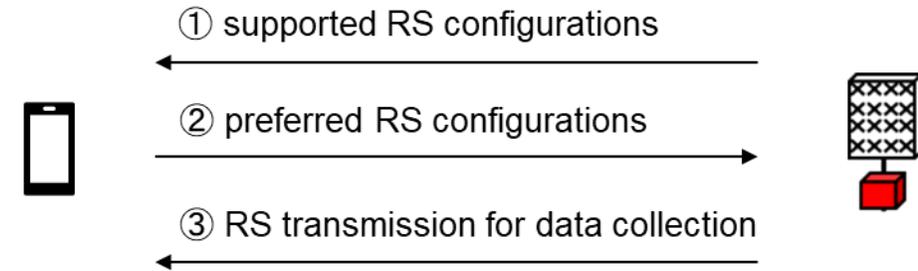
■ Model/functionality identification [RAN1/2/4]

- Procedures of model/functionality identifications [RAN1/2]
 - » Reporting of conditions for functionality/model
- Performance requirement under the conditions [RAN4]

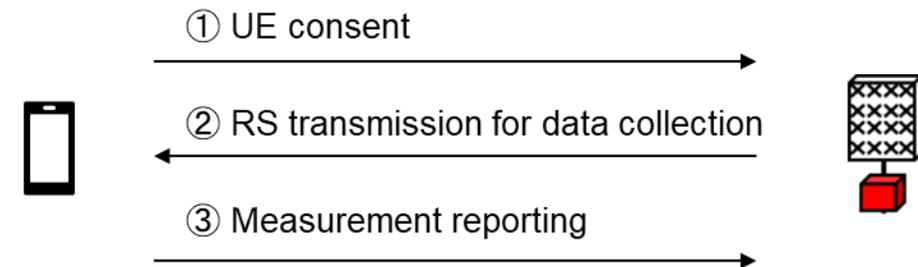
■ Model training

- Training procedure is out of scope in Rel-19 spec
 - » Offline training is assumed in Rel-19

RS configuration request for UE side data collection



Measurement reporting for NW side data collection

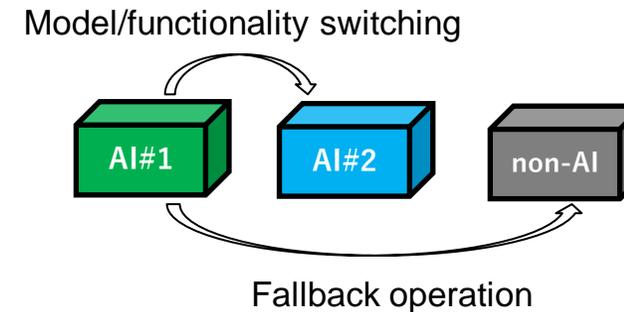
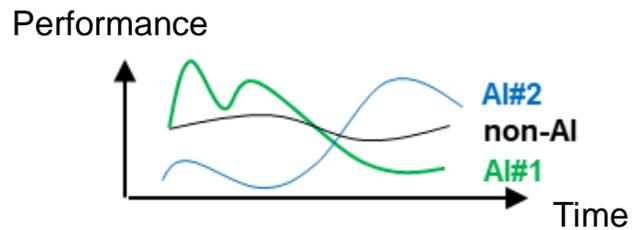


■ Model inference [RAN1/2]

- Mechanism to provide model inputs to the inference entity
- Reporting framework of inference results

■ Performance monitoring (High priority) [RAN1/2/4]

- [Near] real time performance monitoring for fast AI-enabled feature failure recovery
 - » Measurements to calculate the monitored performance metric
 - » Reporting of monitored results
 - Reporting of the calculated performance metric
 - Reporting of the event occurrence based on the calculated performance metric
 - » NW indication mechanism of model/functionality (de) activation for UE side models and fallback operation



Proposed objectives per use case

Motivation	Potential enhancements	Details
CSI feedback enhancement	<ul style="list-style-type: none">• CSI compression• CSI prediction in time domain	<ul style="list-style-type: none">• The signaling to facilitate the data collection• The procedure related to functionality/model identification• The framework of performance monitoring based on inference accuracy and system performance• Reporting framework of compressed CSI• Switching between AI/ML-enabled feature and fallback operation (e.g., legacy type II CSI reporting)
Beam management enhancement	<ul style="list-style-type: none">• Beam prediction in spatial domain(BM-Case 1)• Beam prediction in time domain(BM-Case 2)	<ul style="list-style-type: none">• The signaling to facilitate the data collection• The procedure related to functionality/model identification• The framework of performance monitoring based on inference accuracy• Reporting framework of temporal/spatial domain predicted beam quality• Beam indication framework to utilize the predicted beam quality• Switching between prediction reporting and measurement reporting
Positioning accuracy improvement	<ul style="list-style-type: none">• Direct AI/ML positioning• AI/ML assisted positioning	<ul style="list-style-type: none">• The signaling to facilitate the data collection• The procedure related to functionality/model identification• Study and (if necessary) specify the framework of performance monitoring• The signaling enhancement related to input and/or output of the AI/ML model• Study and (if necessary) specify switching between AI/ML-enabled feature and fallback operation (e.g., legacy positioning method)

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