3GPP TSG RAN Meeting #102
Edinburgh, GB, December 11-15, 2023

RP-233428

Agenda: 9.1.3.1
Document for: Discussion & Decision

Views on R19 AI/ML for NG-RAN

CMCC

Status of Rel-18 AI/ML for NG-RAN WI

R18 WI status

- In Rel-18 AI/ML for NG-RAN Work Item, the data collection enhancements and signaling support within existing NG-RAN interfaces and architecture for AI/ML-based Network Energy Saving, Load Balancing and Mobility Optimization were specified, mainly including:
  - Define new procedures over Xn, which can be used for AI/ML related information, including a new Class 1 procedure for initiating the reporting of AI/ML Related Information and a Class 2 procedure for Data Reporting of AI/ML Related Information
    - Time configuration
    - Partial reporting
    - UE performance feedback
    - UE Trajectory prediction
    - Energy Efficiency metrics
  - Continuous MDT measurements collection

- Due to the time constraint, some enhancements are not pursued in Rel-18, including:
  - Multi-hop prediction for mobility enhancement
  - Inferred energy cost for energy saving
  - Cell-level energy saving

R19 AI/ML for NG-RAN SI and follow-up WI

R19 SI/WI – Potential Scope

- In RAN#101, the potential Justification/Scope of R19 AI/ML for NG-RAN had been discussed, and the following items need to be further refined:

- Rel-18 leftovers (depends on Rel-18 outcome), e.g.:
  - Mobility optimization
    - NR-DC
    - UE Trajectory prediction
  - Energy saving
    - Prediction for energy cost
  - Continuous MDT
- ~~At least 1~~ At most 2 potential new use case/scenario which benefits from inference-based techniques
  - Coverage and Capacity Optimization
  - Potential Rel-18 use case enhancements (e.g. new scenarios for ES)
  - QoE
  - Slicing
  - Note: Model training/inference at the DU and/or F1 enhancements must be justified by the use case
- Study: Consider available functionality specified in 5GC (NWDAF, MDAS) in order to align AI/ML framework between RAN and CN

Views on R19 New Use Cases

R19 SI/WI – R19 new use cases

- Coverage and Capacity Optimization
  - Cell capacity and coverage issues prediction to enable the network make actions in advance
  - Prediction information and CCO strategy exchange between NG-RAN nodes
- QoE Optimization
  - QoE prediction
    - Consider the RAN-visible QoE information
    - QoE prediction and resources re-allocation to ensure the service has enough buffer during handover
  - QoE feedback
    - Enhance the feedback procedure to include the QoE metrics
- Slice Management
  - AI/ML based slice resource allocation
  - Slice related parameter prediction
  - Enhance the feedback procedure to include the slice related metrics

R19 AI/ML for NG-RAN SI and follow-up WI

R19 SI/WI - Arrangement

- In RAN#101, for R19 AI/ML for NG-RAN, a SI had been mentioned to evaluate each use cases before normative work, we have the similar understanding to start a 6 months SI to first study the R19 new use cases, and the new use cases propose to be discussed for AI/ML-based solutions in R19, including: (with prioritizing)
  - Coverage and Capacity Optimization
  - QoE optimization
  - Slice management
- For R19 follow-up WI:
  - R19 new use cases
  - R18 leftover issues, e.g. Mobility Optimization with multi-hops UE trajectory, NR-DC, Continuous MDT collection, Inferred Energy Cost
  - 12 months follow-up WI after R19 new SI finished

Proposal 1: A Rel-19 new SI should be approved first to discuss the AI/ML-based R19 new use cases

Views on R18 Leftovers

R19 SI/WI – R18 leftovers

- For the R18 leftovers:
  - Mobility optimization
    - NR-DC
      - Handover decision prediction to reduce the handover failure probability
      - SCG addition/change/release/activation/deactivation/failure prediction
      - Prediction information exchange between MN and SN
    - UE Trajectory prediction
      - Multi-hops UE trajectory prediction
  - Continuous MDT
    - Legacy MDT enhancements to enable the continuous MDT collection
  - Energy Saving
    - Inferred Energy Cost (EC)

R19 AI/ML for NG-RAN SI

R19 SI - Potential Objectives

- Study the AI/ML-based solutions for new use cases, e.g. Coverage and Capacity Optimization, QoE Optimization, and Slice Management:
  - Study standardization impacts for the new use cases including: the data that may be needed by an AI model as input, data that may be produced by an AI model as output, and feedback data, which is interpretable for multi-vendor support.
  - Study standardization impacts on the node/interface in current NG-RAN architecture to convey the input/output/feedback data among nodes.
- Coordination based on LSs with other groups, if needed, e.g. SA3, RAN1/RAN2, SA2 and SA5.

Proposal 2: It's proposed RAN to take the above as the baseline to discuss potential objectives for R19 SI

R19 AI/ML for NG-RAN follow-up WI

R19 WI - Potential Objectives

- Specify data collection enhancements and signaling support within existing NG-RAN interfaces and architecture (including non-split architecture and split architecture) for AI/ML-based new use cases, including:
  - Coverage and Capacity Optimization
  - QoE optimization
  - Slice management
- Specify further enhancement of R18 leftover issues:
  - Mobility Optimization
    - NR-DC
    - Multi-hops UE trajectory prediction
  - Continuous MDT
  - Energy Saving
    - Inferred Energy Cost (EC)

Proposal 3: It's proposed RAN to take the above as the baseline to discuss potential objectives for R19 WI

THANK YOU !