3GPP TSG RAN Meeting #102
RP-233216
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Agenda Item: 9.1.2.4

Views on scope of AI/ML for mobility study in Rel-19

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Background - RAN chair's summary (RP-232745)

- References: RWS-230488, RP-231540, RP-232622
- Potential objectives: possible down-scoping in RAN#102
  - Type of mobility
    - L3-based mobility and L1/L2-triggered mobility (LTM) are both considered
  - HO optimization in Network side ~~[/UE side]~~, including
    - Candidate/target cell prediction in L3-based mobility, or, candidate/target beam(s) and cell(s) prediction in LTM
  - RRM measurement and event prediction, including
    - Beam-level measurement prediction
    - Cell-level measurement prediction, e.g., using intra-frequency measurement results to forecast the RRM measurement of inter-frequency/inter-RAT cells
    - HO failure/RLF prediction
    - Measurement events prediction
  - LCM framework and others
    - The conclusions in Rel-18 AI/ML study should be used as baseline
    - Other impacts are further studied
  - ~~[UE RRM enhancement, RAN4]~~
  - Note 1: no intention to change the existing framework for the mobility under connected mode
  - Note 2: In the SID, target performance metrics and impacts should be clarified
  - Note 3: Avoid overlap work with RAN3

AI/ML for Air Interface – Mobility (1/3)

Rel-19, RAN2-led SI

- Motivation for improvements
  - Efficiency
    - Reduce measurement reporting overhead, measurement interruption, and associated UE power consumptions
      - Particularly important for LTM that may require large number of L1-based measurements and reporting
    - Efficiently facilitate frequent handovers for the cases of high mobility and dense deployments
  - Robustness
    - Conventional handover decisions are made based on historical measurements and sometimes inaccurate RRM measurements and/or UE location that can impair good handover decision
      - Leading to robustness issues like RLF, throughput loss, ping-pong handover, too early/too late handover, etc

- AI/ML schemes have potential of enabling more efficient and robust mobility
  - Extensions from beam prediction study outcome in R18 AI/ML air interface SI can be investigated and leveraged for predictive mobility
    - Temporal prediction of the future characteristics of candidate beams/cells may improve handover robustness
    - Spatial prediction of the characteristics of a number of candidate beams/cells based on measurements of a subset of them may reduce number of measurements and reporting overhead, interruption, and UE power consumptions

AI/ML for Air Interface – Mobility (2/3)

Rel-19, RAN2-led SI

- AI/ML algorithms could be deployed at either NW-side or UE side
  - UE-side AI/ML model
    - Beam-level measurement prediction
      - Rel-18 RAN1 AI/ML work can be leveraged
      - Can have significant impact on reducing the interruptions/power consumption due to LTM candidate cell L1 measurements
    - Measurement events prediction
      - HO and CHO, PSCell addition/change (including conditional)
    - HO failure/RLF prediction
      - Focus on the feasibility of such prediction and then address UE action (e.g. report to the NW, use as a trigger for CHO)
  - NW-side AI/ML model
    - Support RAN3 network-side AI/ML work
    - Candidate/target cell prediction in L3-based mobility or candidate/target beam(s) and cell(s) prediction in LTM

AI/ML for Air Interface – Mobility (3/3)

Rel-19, RAN2-led SI

Proposed objectives

- Study AI/ML based predictive mobility enhancements to include:
  - Both L3 based mobility and LTM
  - UE-side models
  - Beam-level measurement prediction, HO failure/RLF prediction, and measurement events prediction
    - Temporal and spatial prediction assisted mobility leveraging Rel-18 AI/ML study
  - Coordinate with RAN3 on network-side AI/ML models
    - Candidate/target cell(s) and beam(s) prediction

- Identify specification impacts, such as
  - UE and network signaling support and assistance information
  - AI/ML functionality/model life cycle management
  - Leverage Rel-18 AI/ML study

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Thank you

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