

3GPP TSG RAN Rel-18 Workshop RWS-210625

Electronic Meeting, June 28 - July 2, 2021

Agenda Item: 4.3

Source: InterDigital, Inc.

Title: Email discussion summary for [RAN-R18-WS-eMBB-InterDigital]

1 Introduction

This document is the report from the email discussion prior to the Rel-18 Workshop of the contributions submitted by InterDigital to agenda item 4.3 'Cross-Functionalities for both eMBB and Non-eMBB Evolution'.

InterDigital submitted the following tdocs to the agenda item 4.3:

RWS-210429 Positioning Enhancements for Rel-18

RWS-210430 On Studying AI/ML for the NR Physical Layer for Rel-18

2 General questions/comments

In addition to the 2 tdocs submitted to AI 4.3, InterDigital submitted an overview of Rel-18 to AI 4 [RWS-210422] which includes some additional Cross-Functionalities for both eMBB and Non-eMBB Evolution aspects. General questions/comments to InterDigital related to Cross-Functionalities for both eMBB and Non-eMBB Evolution can be raised in this section

2.1 Round 1 Questions

Feedback Form 1: General questions/comments related to Cross-Functionalities for both eMBB and Non-eMBB Evolution

2.2 Round 1 Answers

2.3 Round 2 Questions

Feedback Form 2: General questions/comments related to Cross-Functionalities for both eMBB and Non-eMBB Evolution (Round 2)

2.4 Round 2 Answers

3 Rel-18 Positioning Enhancement

Questions related to RWS-210429 'Positioning Enhancements for Rel-18' can be raised in this section

3.1 Round 1 Question

Feedback Form 3: Questions related to RWS-210429 'Positioning Enhancements for Rel-18'

<p>1 – Intel</p> <p>What problem should be solved for positioning during mobility/handover?</p>
<p>2 – CATT</p> <p>In general CATT shares the similar views with Interdigital on the issues that needs to be considered for SL Positioning and R18 positioning enhancements.</p> <p>We would like to have a further understanding on the proposal related to the support of positioning during mobility and handover. Could you please specify the mobility/ seamless handover between outdoor to indoor for RAT-Dependent or hybrid positioning methods? What's the observed issues?</p>
<p>3 – Huawei Tech.(UK) Co.. Ltd</p> <p>Higher frequency involves higher hardware complexity, and the practical imperfection factors may deteriorate the positioning accuracy. Is there any validation of high accuracy on the high frequency (>52.6) positioning?</p>
<p>4 – Beijing Xiaomi Mobile Software</p> <p>-</p> <p>Q1: Do you think the commercial and public safety use cases and requirements identified in SA1 Ranging WI(TR22.855/TS22.261) should be taken into account?</p> <p>-</p> <p>Q2: According to the definition and the KPI requirements of relative positioning and ranging in TS22.261(see below), do you agree that relative positioning and ranging are different, i.e. relative positioning requires to acquire the 2D/3D coordinates(e.g. the horizontal accuracy of relative positioning set requirements on both distance accuracy and angle accuracy) while Ranging requires to</p>

acquire only one component of 2D/3D coordinates(either distance or angle) and thereby only set requirements on one component(either distance or angle)?
<ul style="list-style-type: none"> ○ Relative positioning: relative positioning is to estimate position relatively to other network elements or relatively to other UEs.
<ul style="list-style-type: none"> ○ Ranging: refers to the determination of the distance between two UEs and/or the direction of one UE from the other one via direct communication connection.
- Q3: Do you think is there a need to define new accuracy requirement for RedCap positioning or just reuse the requirement defined for eMBB?
- Q4: Do you think is there a need to have a short study phase to clarify the requirement for RedCap and perform the evaluation to see if there is gap to reach that requirement?
- Q5: For positioning during handover, does it mean that the UE locates in serving cell when positioning is requested and UE moves to a target cell when location is estimated (after handover), is my understanding correct? Or you just want to reduce the positioning latency for UE during mobility and handover? Can you provide more information about this?
5 – Qualcomm Incorporated Is mobility and handover support during positioning specific to Sidelink or Uu?
6 – Sony Europe B.V. We have common views in some aspects, such as support sidelink positioning, RedCap UE, and integrity for RAT dependent as part of rel-18. 1) What would be the missing parts of the current spec to support positioning above 52.6 GHz? 2) On supporting positioning during mobility and handover, we have similar comments/questions as other companies above. In addition, do you consider high-speed scenario?
7 – LG Electronics Inc. Q1: For clarification, regarding unlicensed band assisted positioning, if you have any ideas such as new RS design and/or procedures, let us to know about them briefly.
8 – Nokia France When mentioning seamless positioning during handover, do you have in mind any particular requirements on the maximum positioning interruption time?

3.2 Round 1 Answers

Answers to Intel:

The UE may experience disruption in measurements during the handover. This may cause degradation in

accuracy and handover may also cost additional latency and interruption. The aim of the study is to provide seamless positioning handover.

Answers to CATT:

The UE may experience disruption in measurements during the handover. This may cause degradation in accuracy and handover may also cost additional latency. The aim of the study is to provide seamless positioning handover. For outdoor to indoor handover, it may be a problem if the UE is using GNSS outside and switch to RAT dependent positioning for indoor. There needs to be a solution that accurate positioning achieved at outdoor can be seamlessly handed over to indoor positioning methods.

Answers to Huawei:

It is true that above 52.6GHz based positioning may be sensitive to hardware inaccuracies, influencing accuracies of timing/angle based positioning.. We believe identification of error sources should be part of the study for above 52.6GHz positioning.

Answers to Xiaomi:

Q1 : We agree that existing use cases and requirements should be used as the reference for performance target of enhanced positioning techniques.

Q2 : The distance between 2 objects should obtained from relative positioning or ranging. Horizontal and vertical distance should be obtained using positioning methods as 3D information is useful for locating objects at different levels or positioning drones. Thus we are not sure whether the difference between two terms (relative positioning/ranging) is important for a study on positioning methods.

Q3 : As Rel. 17 focuses on IIoT scenarios, it may be beneficial to study whether RedCap UEs can satisfy the IIoT accuracy/latency requirements.

Q4 : Yes

Q5 : Yes your understanding is correct about the intention. Our intention is not to cause degradation in accuracy and latency during the handover.

Answers to Qualcomm:

For now, our proposal is to focus on Uu.

Answers to Sony:

1) We can study whether we have sufficient number of parameters for PRS/SRS for positioning (e.g., comb patterns, periodicity) for above 52.6GHz.

2) The UE may experience disruption in measurements during the handover. This may cause degradation in accuracy and handover may also cost additional latency and interruption. The aim of the study is to provide seamless positioning handover. Positioning for high-speed scenario should be studied in general, not limited to handover.

Answers to LG Electronics:

As for RS design, our intention is to reuse Rel.16 PRS designs. Firstly, we can study whether additional

procedure for LBT is needed, specifically for positioning.

Answers to Nokia:

The interruption time can be dependent on target accuracy and latency requirements. Whether the interruption time corresponds to interruption for loss of RRC connection or positioning should be clarified in the study. In an example, for the UE moving at 30km/h, 10ms interruption in positioning will correspond to 8.3cm inaccuracy. Whether N ms interruption in positioning is tolerable for the latency requirement should also be investigated based on the Rel. 17 solutions. In any case, definition of the maximum positioning interruption time and values should be studied further.

3.3 Round 2 Questions

Please let us know if you have any follow-up question

Feedback Form 4: Questions related to RWS-210429 'Positioning Enhancements for Rel-18' (Round 2)

1 – LG Electronics Inc.

Thank you for clarification. We also support SL positioning.

Q1: Regarding positioning above 52.6GHz, do you think that a single panel based positioning in the current specification is sufficient, or some enhancement to support multiple panel based positioning can be considered?

3.4 Round 2 Answers

Answers to LG:

Given the short wavelength in the frequency range, multi-panel deployment will be beneficial for robust positioning. In addition, for SL positioning for vehicles in the frequency range, front & back panel installation of panels, providing diversity in positioning/ranging measurements, can be envisioned for collision avoidance. Details of enhancement for positioning methods or specification support for multi-panel positioning requires studies.

4 AI/ML for PHY

Questions related to RWS-210430 'On Studying AI/ML for the NR Physical Layer for Rel-18' can be raised in this section

4.1 Round 1 Question

Feedback Form 5: Questions related to RWS-210430 'On Studying AI/ML for the NR Physical Layer for Rel-18'

<p>1 – Rakuten Mobile</p> <p>We support all the proposals in RWS-210422.</p> <p>Thank you for summarizing requirements for AI/ML study Item quite comprehensively.</p> <p>We recommend to start the Study Item with proper scoping and characterization.</p>
<p>2 – Futurewei Technologies</p> <p>FUTUREWEI supports the view of introducing potential AI/ML-based PHY layer use cases as part of Rel-18 SI, studying their standards impact, and studying evaluation methodology as described in RWS-210038, https://www.3gpp.org/ftp/TSG_RAN/TSG_RAN/TSGR_AHs/2021_06_RAN_Rel18_WS/Docs/RWS-210038.zip.</p> <p>Regarding the evaluation metrics, some clarification may be needed in terms of metrics for evaluating AI/ML-based function. We suggest defining metrics that are directly pertinent to AI/ML-based functionality performance, e.g., accuracy if it is a prediction outcome, or overhead reduction if the AI/ML function is used to reduce say CSI feedback overhead. There are other aspects that are important from network performance perspective, however, they may be impacted by other factors which are not directly related to AI/ML algorithms and should be avoided as direct indicators in evaluating AI/ML-based functions. Feel free to share your view at: https://nwm-trial.etsi.org/#/documents/4751</p>
<p>3 – Sony Corporation</p> <p>Thanks for the contribution. We have a question.</p> <hr/> <p>-</p> <p>Considering the CSI compression, gNB and UEs need to have trained AI/ML model. Can “<i>OEM AI black box</i>” and “<i>UE-based AI black box</i>” category realize the CSI compression?</p>

4.2 Round 1 Answers

Answers to Rakuten:

We agree with starting the study item with proper scoping and characterization.

Answers to Futurewei:

We agree that evaluation metrics can be discussed case-by-case basis.

Answers to Sony:

We don't think all categories apply to all the use cases, at least not with same performance. We think for CSI compression use case joint AI makes more sense.

4.3 Round 2 Questions

Please let us know if you have any follow-up question

Feedback Form 6: Questions related to RWS-210430 'On Studying AI/ML for the NR Physical Layer for Rel-18' (Round 2)

4.4 Round 2 Answers