

**[RAN-R18-WS-crossFunc-Xiaomi] - Version 0.0.3**  
**RAN**

3GPP TSG-RAN Rel-18 Workshop

RWS-210649

Electronic Meeting, June 28 - July 2, 2021

Agenda item: 4.3

Source: Xiaomi

Title: Email discussion summary for [RAN-R18-WS-crossFunc-Xiaomi]

Document for: Discussion

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## 1 General Comments

This email discussion provides details regarding Xiaomi's proposals for cross functional enhancements proposed for adoption by 3GPP RAN for REL-18. In accordance with direction provided by the RAN chair this email is intended to run from 14 June to 24 June and serves the purpose to help with companies understanding of the proposals ahead of the RAN REL-18 Workshop, June 28th – July 2nd 2021.

This email discussion summary covers the following documents:

RWS-210086	Radio Recognition in NR
RWS-210087	Work Item on Radio Recognition in NR
RWS-210251	Motivation of study for Multi-UE coordination
RWS-210252	WID_MultiUE-coordination_draft
RWS-210265	Mobility enhancement by UE based AI

These cover the following 3 areas for consideration as proposed in this discussion.

- Multi-UE-Coordination covering motivation document RWS-210251 and draft WID in RWS-210252.
- Radio Recognition in NR covering motivation document RWS-210086 and draft WID in RWS-210087.
- Mobility enhancement by UE based AI RWS-210265

### 1.1 Question

Do you have general comments on these proposals not covered in the specific contribution sections below?

**Feedback Form 1: General Questions on Xiaomi's Proposals to  
Cross Functional enhancements for 3GPP RAN consideration  
in Release 18**

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## 2 Cross-Functional Proposals for Rel-18

### 2.1 RAN Workshop Contribution - Motivation of study for Multi-UE coordination

#### 2.1.1 Summary

The following is a summary of contributions [1]RWS-210251 (motivation) / [2]RWS-210252 (example work item), which by reference are included in their entirety to this discussion and specifically to facilitate the questions in the following related sections.

These papers present our motivation and areas for study for 3GPP RAN in REL-18, and relate to the SA1 Study supporting tactile and multi-modality communication services in 5GS (FS\_TMMIn5GS).

Multiple individual modalities can be used to provide complementary data streams that may supplement some redundancy but convey more complete information effectively, benefiting services with more accurate and faster responses. Within the multi-modality interaction system an end user may use a single device or a plurality of independent devices to separately collect modality streams e.g. video, audio, ambient and haptic data and transmit them simultaneously to the relevant servers for further processing. For multi-modality output, multiple outcomes from the server(s) may need to also reach one or more distributed UEs simultaneously.

In the referenced contributions we refer to a number of realistic commercial use cases captured in [3] TR 22.847 including but not limited to the following.

- Online concert
- Immersive Multi-modal Virtual Reality application
- Remote control robot,
- Immersive VR games
- Support of Skillset Sharing for Cooperative Perception and Manoeuvring of Robots
- Federated Machine Learning

Thus, we propose 3GPP RAN should study supporting the multi-UE coordination to support these emerging services bringing opportunities and challenges to 5G networks.

The robustness of multi-modality data, depends on the availability and the quality of the multi-modality inputs. In a resource restricted environment, e.g. mobile network, it is hard to guarantee that the multi-modality services can always acquire all the inputs with the requested QoS. In some multi-modality services some or all the modalities may be mandatory for a task or service. Noting also that the multiple

modality inputs may be provided by a single or multiple UEs, thus enhancement for only one UE cannot meet the requirement of multi-modality use cases.

e.g., access barring check can be performed for a bunch of access attempts instead of for a single access attempt. E.g., the lack of 1 out of 3 multi-modality streams will cause the application server to drop the data received from the 2 acquired multi-modality stream when 3 multi-modality streams are mandatory for an AI inference.

Assisted RRC connection release: e.g., UE suffers RLF can trigger the network to re-selection another UE, e.g., backup or alternative inputs can be considered to guarantee the Multi-modality service robustness and is more timely to responded compared by the APP layer.

Hence coordinated access control and/or connection control of UE devices involved in a multi-modality service needs to be supported across the 5G RAN.

Currently the 3GPP system can only guarantee each UE with a dedicated performance not targeting to guarantee multiple UEs in a coordinated manner. In such case, the resource allocation and scheduling have to consider the performance requirement simultaneously across multiple coordinated UEs. To support this, the RAN needs to address enhancements to support service requirement of different types of media steams with coordinated throughput, latency and reliability.

Besides the KPIs for specific use cases, e.g. data rate, latency, transfer interval, survival time, etc., the new multi-modality would have some specific information to be additionally considered to reflect the correlation between packets. QoS for multi-modality data may consist of a combination of QoS requirements for each single-modality data or the integrated QoS requirement which is under discussion in SA1. It may have impact on the current QoS framework design and MAC scheduling. Also for UEs in proximity can share RRM measurement or CQI report to achieve power saving for a group of UEs.

Thus we propose that RAN in release 18 study multi-UE coordination scenarios and use cases including for UE device(s) associated with the same end user or across end users to support multimodality. Including,

- Control plane enhancements for coordinated RRC connection management for initiated services from the UE device(s) associated with the same end user or across end users;
- User plane enhancement for coordinated scheduling to fulfil the QoS coordination, traffic synchronization from the UE device(s) associated with the same end user or across end users;
- Power saving enhancements for multi-UE coordination and operation.

### 2.1.2 Round 1 Questions

Based on the summary presented above and specifically the details of the contributions in RWS-210251 and RWS-210252, please submit below your questions for clarification or understanding according to the RAN chair guidelines, including those given in RWS-210002.

**Feedback Form 2: Multi-UE Coordination - questions for clarification or understanding, Round 1**

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### **1 – ZTE Corporation**

We share similar views that multi-UE coordination is beneficial especially for UL enhancements, e.g., by coordinated/aggregated transmission from the UE device(s) associated with the same end user.

Regarding multi-UE coordination at the RAN-level, could you clarify your thinking about at which layer the multiple transmissions can be aggregated/split? Also, could you clarify more about why and in which aspects do you explore for power saving enhancements for multi-UE coordination?

### **2 – LG Electronics Inc.**

We're generally interested in a scenario where multiple UEs are involved in the same mission while there could be some common and different technical objectives depending on the detailed scenario, i.e., targeted to personal devices or industrial area.

In the scenarios presented in RWS-210252, it seems important to enable that multiple UEs transmit and receive application layer data with a tightly synchronized manner over the radio interface. What kind of mechanisms do you consider for this? In addition, what power saving enhancements are you considering in addition to what we have today, e.g., DRX/WUS/SDT ?

### **3 – Spreadtrum Communications**

Thanks for the well-written contribution, we have some questions.

O1: We agree that scenario UE device(s) associated with the same end user under the same cell will be the high priority. We want to know what is the scenario for across end users ?

O2 and O3: We share the similar views.

O4: Can you provide some further details about Power saving? e.g. scenario or key issues?

### **4 – Lenovo Mobile Com. Technology**

Thanks for the good contribution and we think multi-UE coordination will be an interesting topic. we have some questions for further understanding

1. we think if includes both same end user and cross end user, the scope might be too large. we support to limit the scope to one of them if the study is adopted

2. for the purpose of multi-UE coordination, UE might need to discover each other first. Does this need to be studied in your mind?

3. for the control plane, only UAC is included in the objective or others are not excluded?

4. for the user plane, we would like to understand more about what is synchronized transmission and why we need that

## 2.1.3 Round 1 Answers

### **#1 ZTE Corporation**

**ANS1**> A little bit clarification for the motivation of this paper. It is for the new SA1 use cases/scenarios (e.g., multi-modality interactions [TR 22.847], federated machine learning [TR 22.874], etc.) addressing coordinated parallel transmission and imposes new requirements for 5G system on multi-UE coordination whilst current 3GPP networks schedule or consider the QoS individually for a single UE device which may not be capable to support this new requirement very well.

So, the first target is to study the control plane procedure design for multi-UE coordination, including coordinated RRC connection management for multiple UEs as well as user plane procedure including coordinated scheduling to fulfil the traffic synchronization. For the service robustness, when a UE cannot serve anymore (e.g., suffering radio link failure), a backup UE can be chosen to take over and respond in a timely way. There may be a case that a UE device will ask a neighbour UE device to transfer the multi-modality data to the server because of the limited UL UE transmission power. In that case, the aggregation part can be considered to improve the service robustness.

We also noticed that many companies also propose UE aggregation (may not be for multi-modality interaction, e.g., for UL heavy applications), but we think we can consider all these new requirements involving multiple UEs in a common project. For the detailed technique solutions on how to achieve aggregation, they can be discussed further.

**ANS2>** And we also think UEs in the same vicinity can share some processing. An example is UE's RRM measurement results can be reused by other UE to achieve RRM relaxations.

## **#2 LG Electronics Inc.**

**ANS1>** We are targeting to study the control plane procedure design for multi-UE coordination, including coordinated RRC connection management for multiple UEs as well as for user plane procedures including coordinated scheduling to fulfil the traffic synchronization.

For the control plane, we give an example of access barring check where partial allowance is not valid for this case, e.g., a lack of one out of 3 multi-modality streams will cause the application server to drop the data received from the 2 acquired multi-modality streams and hence already consumed radio resources are wasted. However, the APP layer is not aware of the radio conditions and as such may trigger the services in vain and without coordination at the access layer causing a waste of radio resources. So we think the RAN can do a better job.

For user plane, we are thinking about resource allocation and scheduling. An example is the application layer get the multi-modality data from different QoS flows in the UE(s), the 5G network has no idea whether these QoS flows are correlated and will treat packets independently and thus leads to no synchronization between the packets. In such case, the network has to consider the performance requirement simultaneously across multiple coordinated UEs. The detailed solutions can be discussed further.

**ANS2>** For the power saving enhancements, we are thinking that UEs in the same vicinity can share some processing responsibilities. An example is UE's RRM measurement results can be reused by other UE to achieve RRM relaxations. Currently, we are open to discuss the application of existing power saving features e.g. DRX/WUS/SDT for these scenarios and welcome ideas from other companies.

## **#3 Spreadtrum Communications**

**ANS1>** We think the scenarios are currently open. We can discuss them later. But in my personal view, I think devices of the end user under the same cell/gNB will be easier for coordination. That would be a good start.

**ANS2>** Please see ANS2 to LG above

## **#4 Lenovo Mobile Com. Technology**

**ANS1>** we agree

**ANS2>** Do you mean something like the sidelink sensing? This may be one solution, combined with sidelink

discovery this could be useful for multi-UE coordination. Other schemes may include the network obtaining and coordinating the positions for UE devices. We are open to discuss and welcome ideas from other companies.

**ANS3>** Yes, UAC is just one simple example. Companies are welcome to contribute more ideas.

**ANS4>** See some comments regarding scheduling in response ANS1 to LG above.

Except for the scheduling, we also thought about the KPI.

Besides the current KPIs for specific use cases, e.g. data rate, latency, transfer interval, survival time, etc., the new multi-modality would have some specific information to be additionally considered to reflect the correlation between packets. QoS for multi-modality data may consist of a combination of QoS requirements for each single-modality data or the integrated QoS requirement which is under discussion in SA1. We'll keep an eye on SA1 to see if there is impact on the current QoS framework design and MAC scheduling.

#### 2.1.4 Round 2 Questions

Any new or further questions on Multi-UE coordination?

#### **Feedback Form 3: Any further questions on Multi-UE coordination?**

##### **1 – HuaWei Technologies Co.**

1. Can you clarify what is the relation with this work compared with SL enhancements or SL relay enhancements?
2. How does RAN to guarantee the synchronization transmission of different traffic? Does RAN need to be aware of the content?
3. In Sec 2.2, it states that the gNB can choose the backup to guarantee the multi-modality robustness when the UE can not serve the multi-modality interaction anymore, can you elaborate a bit more on backup solution?
5. It mentions that this work may involve SA1/SA2/CT1. Can you elaborate a bit on the aspects that each WG need to cover?

#### 2.1.5 Round 2 Answers

##### **#1 HuaWei Technologies Co., Ltd**

**ANS1>** Thanks for the questions!

See also A1 response to ZTE. I guess what you want to propose is the UE aggregation use cases described in RWS-210451. We are also interested in this topic (See our paper on RWS-210088). Also in this proposal and your proposal have a common understanding to identify links within associated “multi-paths” along with their source and end destinations and other related performance criteria. We welcome people to consider all these new requirements involving coordination and cooperation amongst multiple UEs within a common project. If not in one project we are also fine to consider UE aggregation including the sidelink relay in a separate proposal.

Our paper is mainly based on the requirements from SA1 (TR 22.847). we believe you can contribute scenarios such as this to it to further that study.

**ANS2>** For example, it could be application layer gives RAN some assistance information on the data from multiple UEs are highly correlated to enable RAN to treat packets properly thus leads to synchronization. In such case, the resource allocation and scheduling have to consider the performance requirement simultaneously across multiple coordinated UEs.

The detailed solutions can be further studied in RAN. Currently SA1 is studying this, and at this time we are not sure new KPIs will be introduced for synchronisation. Also we are not sure whether we need to further differentiate packets within a QoS flow as in XR. We are open to discuss this.

**ANS3>** What we have in mind is that if a UE cannot serve the multi-modality interaction system anymore, e.g., running out of coverage, or suffering radio link failure, a gNB can choose the backup modality source or make alternative connection options or inputs to guarantee the Multi-modality robustness. If the gNB has some assistance information about UEs performing the same task then this is a more timely response compared to the APP layer. Whether this back up requirement is valid for multi-modality can be further discussed in SA1.

**ANS4 (to Q5.)>** we see the respective group responsibilities as follows.

SA1: Continue to study the use cases and scenarios for multi-modality in TR 22.847 and the new requirements on 5G system;

- Identify Use cases and potential requirements for immersive real time experience involving tactile and multi-modality user interactions, which includes coordinated parallel transmission of multiple modality representations associated with the same application, network reliability and availability, charging, security and privacy, and KPIs for specific use cases.

SA2: To identify the system architecture aspects related to support multi-modality. More specifically:

- Identify architecture enhancement to support for coordinated communication of Multiple UEs;
- Identify the potential enhancement for, e.g., session management etc. to support coordinated communication of multiple UEs;
- Identify the QoS enhancements and whether to define new QoS mechanism to support for coordinated communication of multiple UEs;

CT1: Once SA2 identifies the system architecture/procedural aspects, CT1 will cover the necessary stage-3 protocol enhancements to support multi-modality, for instance, necessary stage 3 enhancement to support for new QoS model and multi-UE coordination identified in SA2.

## 2.2 RAN Workshop Contribution – Radio Recognition

### 2.2.1 Summary

The following is a summary of contributions RWS-210086 (motivation) / RWS-210087 (draft WID), which by reference are included in their entirety to this discussion and specifically to facilitate the questions in the following related sections.

The RadRe (Radio Recognition) is to enable gNB/UE to detect the surround objects for the following use cases:

+ Smartphone applications:

- User identification (e.g. face/body recognition)
- Gesture-based application control (e.g. turn on/off screen)
- 3D object creation (e.g. instant 3D-object gaming)

+ Car applications:

- Auto-pilot
- 3D map creation
- Gesture-based door control

+ Robot applications:

- Obstacle detection
- Gesture-based machine control

+ Smart home applications:

- Intruder detection
- Power control

The RadRe technique have the following operation modes:

- > RadRe Mode 1: The receiver and the transmitter of the echo signal is at the same transceiver using TOF.
- > RadRe Mode 2: The receiver receives the echo signal from another transmitter using TOF.
- > RadRe Mode 3: The receiver receives the signal from the transmitter using APC.

TOF and PAC are as follows:

- > TOF (Time of Flight): The receiver uses the over-the-air transmission time of the signal to calculate the distance/coordinate between the receiver and the reflective object.
- > PAC (Phase and Amplitude Change): The receiver uses the changing history of the signal's phase and amplitude to estimate the moving pattern of the detected object.

## 2.2.2 Round 1 Questions

Based on the summary presented above and specifically the details of the contributions in RWS-210086 and RWS-210087, please submit below your questions for clarification or understanding according to the RAN chair guidelines, including those given in RWS-210002.

### **Feedback Form 4: Radio Recognition - questions for clarification or understanding, Round 1**

#### **1 – Spreadtrum Communications**

Just asking for a clarification: It seems like supporting radar in smartphone or Robot, just using the same frequency with communication?

## 2.2.3 Round 1 Answers

### **#1 Spreadtrum Communications**

**ANS>** The radio recognition is to use the same frequency with data communication. We actually have two different technical directions. One like radar uses the echo signal (i.e. TOF) to detect the coordinates of the reflective object. Another uses the changing history of phase and amplitude (i.e. PAC) to match a specific moving pattern of the object.

## 2.2.4 Round 2 Questions

Any new or further questions on Radio Recognition?

### **Feedback Form 5: Round 2 Questions - Any further questions for Radio Recognition**

#### **1 – Sony Europe B.V.**

What are the expected specification impacts of radio recognition?

[sorry, we should have asked this in round 1]

## 2.2.5 Round 2 Answers

### **1# Sony Europe B.V.**

**ANS>** For radio recognition mode-1, the UE measures the echo of its uplink signal. The transmission of the uplink signal is currently fully controlled by the gNB. Then without the UE-gNB coordination, the echo of the uplink signal is not able to fulfil the UE's requirements of detection. Here we list a few points, which need the UE-gNB interactions:

1 - If the UE needs to detect 100 meter range, the transmission of the echo signal needs to cover 200 meters RTT (between the UE and the reflective point). However if the gNB does not know the UE's detection requirement, the gNB cannot provide a proper uplink transmission configuration for the UE.

2 - To detect the moving speed of a reflective point, the UE needs to send periodic uplink signal. The gNB needs to know the UE's requirement of detecting the moving speed.

3 - Not every uplink signal can provide a good performance of detection. If the transmission bandwidth of the uplink signal is small, the UE is not able to get its desired detection accuracy of distance.

4 - Different waveform/frequency band could also provide different accuracy of detection. The gNB needs to know the UE's detection requirements before providing a proper uplink signal for radio recognition.

5 - As the coordinates/speed of the reflective point can be reported to the gNB, the UE measurements of the coordinates/speed of the reflective point should be specified so as to achieve consistent UE behaviours.

We may not be able to list all specification impacts for different radio recognition modes. However, we consider that in general, the waveform and the transmission control of the radio recognition signal would require standards work.

## 2.3 RAN Workshop Contribution - Mobility enhancement by UE based AI

### 2.3.1 Summary

The following is a summary of contribution RWS-210265, which by reference is included in its entirety to this discussion and specifically to facilitate the questions in the following related sections.

NW based AI function was discussed in RAN3 and SA. AI inference result could be used to assist NW configuration. Compared with NW based AI, UE based AI could utilize the information at UE to improve mobility performance, with the advantages in privacy, customization, radio independent and efficiency.

In Dense network deployment especially for FR2, channel quality changes rapidly and channel quality of multiple cells are similar. It's difficult to select appropriate cell based on radio channel quality. And fixed RRM parameter can't adopt to dynamically changing radio channel. Lots of signalling is required if gNB adjust parameters frequently with legacy mobility management mechanism. UE based AI could provide helpful assistance, other than radio channel quality, for gNB's consideration when selecting target cell. Furthermore, UE could adjust RRM parameters based on local AI information to adopt dynamically changing radio channel without introducing additional signalling overhead.

Thus, we propose 3GPP RAN should study supporting mobility enhancement by UE based AI. While we don't recommend to specify the AI model or algorithm, the AI inference result shall be specified to ensure consistent understanding among UEs and NW. Based on specified AI inference result, solutions could be discussed and further evaluate the performance and specification impacts

**Table 1:**

Potential solution	Specification impact
AI inference result could be provided to NW to decide radio configuration	The signalling should be specified
New event based on AI inference result	The event should be specified

AI inference result could be used as configuration scale or target cell selection criteria	The UE behaviour should be specified
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Simulation may be needed to evaluate the feasibility and performance of proposed solutions. Radio simulation assumption in TR 36.839 could be reused with necessary updates, e.g. smaller cell radius. AI model performance could be calibrated for evaluation purpose

There is no impact to RAN1, major impact on RAN2. RAN3 may be impacted depending on proposed solutions.

### 2.3.2 Round 1 Questions

Based on the summary presented above and specifically the details of the contribution in RWS-210265, please submit below your questions for clarification or understanding according to the RAN chair guidelines, including those given in RWS-210002.

#### **Feedback Form 6: Mobility Enhancement by UE based AI - questions for clarification or understanding, Round 1**

<p><b>1 – LG Electronics France</b></p> <p>Q. We agree that it is important to study UE-centric ML approach; Some side information used as input for ML processing becomes first available at UE side, and reporting to network incurs some delay, resulting in performance degradation, and in such cases, processing ML task at UE side and utilization of ML result directly by UE would be beneficial. But in general, we think it would be good to study both UE-centric and NW-centric ML approaches (and its hybrid form) in the study, and hence to study on enhancements of radio interfaces to properly adopt relevant ML-aided use cases. Do you think it is sufficient to only consider UE-centric ML approach without considering network-centric ML approach in Rel-18 study?</p>
<p><b>2 – Sony Europe B.V.</b></p> <p>We agree that it is important to study UE based mobility. We have briefly touched upon this topic in RWS-210317. Probably a question for clarification about “Input information could include UE position, history information, channel quality measurement, UE preference, traffic characteristics, etc”. Instead of saying the input is not specified, is the intention that no new input is required? if we leave the input parameters to implementation then different UE implementations may have different behaviour.</p>
<p><b>3 – Intel Corporation (UK) Ltd</b></p> <p>Thank you for the contribution. Please see our questions below:</p> <ol style="list-style-type: none"> <li>1) More details and further clarifications on the candidate AI-based mobility schemes would be encouraged to understand the actual expected RAN work based on the proposal.</li> <li>2) What are the expected roles of gNB and UE for the AI-based mobility? How will network/gNB participate in the procedure?</li> </ol>
<p><b>4 – Lenovo (Beijing) Ltd</b></p> <p>Thanks for the interesting paper.</p>

Fixed RLM/RRM parameter can't adopt to dynamically changing environment

=> Why do we need different parameters? per FR1 and FR2? If different RLM/RRM parameters are needed, what is additional role of gNB besides configuring the different parameters.

## 5 – Lenovo Mobile Com. Technology

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The AI model used to inference the result for mobility enhancement is provided by NW or upon UE implementation?

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If it's upon UE implementation, will there be problem with UE fairness? E.g. the inference result could be some predicted RSRP result, and if different UEs are using different AI model and produce prediction result of different accuracy, NW could be misled to wrong HO decision. It is also possible for UE to manipulate the prediction result and force the NW to HO the UE to a target cell that the UE wants.

### 2.3.3 Round 1 Answers

#### 1# LG Electronics France

**ANS1**> We understand NW centric AI is under study in RAN3. If R18 could be well scoped to avoid overlapping between R17 and R18 study, we are open to both UE and NW based AI. We see UE based AI has advantages in UE privacy, customization, and efficiency, compared with NW based AI. UE based AI could be a starting point for R18 study. But even in UE based AI mechanism, there may be impact at NW side.

#### 2# Sony Europe B.V.

**ANS1**> The input is closely related to the selected AI model. In our understanding, AI model selection is out of 3GPP scope. UE could choose AI model based on its capability and available information. Furthermore, the input is only used at UE internally. In this sense, the input may not need to be specified.

**ANS2**> Yes, there may be different UE behaviour, but only for model selection and model running. 3GPP should define requirement on the inference accuracy to ensure trustable inference result, which is similar as current RRM requirement defined in RAN4. The inference result shall be specified to ensure consistent understand between UEs and gNB. In our understanding the AI model running at UE internally, which is out of 3GPP, the inference result acts as assistant information to mobility management.

#### 3# Intel Corporation (UK) Ltd

**ANS1**> UE based AI could provide inference result to assistant mobility management. The inference result shall be specified to ensure consistent understand between UEs and gNB. The inference result could be successful access probability, etc. The candidate schemes may include,

1. UE reports inference result directly to gNB.
2. UE reports measurement result based on new event, whose trigger is AI inference result.
3. UE scale the RRM parameters or select CHO target cell according to inference result.

**ANS2>** UE maintains AI model and obtain the inference result. Depending on candidate schemes, gNB may participate in different ways as below,

1. UE reports inference result directly to gNB. gNB consider the reported inference result during mobility management.
2. UE reports measurement result based on new event, whose trigger is AI inference result. gNB is responsible for the event configuration.
3. UE scale the RRM parameters or select CHO target cell according to inference result. gNB is responsible for the criteria configuration.

#### **#4 Lenovo (Beijing) Ltd**

**ANS1>** By fixed, I mean RLM/RRM parameter can't be adjusted by UE due to radio environment change in legacy procedure. RRC signalling is required to reconfigure the RLM/RRM parameters. This design is fine for FR1 deployment, since the frequent reconfiguration is not common. However in FR2, radio channel quality changes more rapidly than FR1. More frequent reconfiguration is expected, which would result in lots of signalling overhead. It's beneficial to adjust RLM/RRM parameters without RRC signalling. UE based AI could be the way forward.

**ANS2>** UE maintains AI model and obtain the inference result. Depending on candidate schemes, gNB may participate in different ways.

1. UE reports inference result directly to gNB. gNB consider the reported inference result during mobility management.
2. UE reports measurement result based on new event, whose trigger is AI inference result. gNB is responsible for the event configuration.
3. UE scale the RRM parameters or select CHO target cell according to inference result. gNB is responsible for the criteria configuration.

#### **#5 Lenovo Mobile Com. Technology**

**ANS1>** In our understanding, AI model selection is out of 3GPP scope. UE could choose AI model based on its capability and available information.

**ANS2>** 3GPP should define requirement on the inference accuracy to ensure trustable inference result, which is similar as current RRM requirement defined in RAN4. The inference result shall be specified to ensure consistent understand between UEs and gNB.

#### **2.3.4 Round 2 Questions**

Any new or further questions on mobility enhancement by UE based AI?

## Feedback Form 7: Round 2 Questions - Any further questions for Mobility Enhancement by UE based AI?

### 2.3.5 Round 2 Answers

No further questions received in round 2.

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## 3 Summary

### 3.1 Summary for Multi-UE Coordination (RWS-210251/ RWS-210252)

4 companies participated in the first round discussion on Multi-UE Coordination RWS-210251, and 1 additional company participated in the second round discussion. 4 companies expressed an interest in multi-UE coordination.

Based on the received comments and questions, this interest can be summarized into the following related areas.

#### **Scenarios and use cases:**

4 companies support or are interested in exploring scenarios for Multi-UE Coordination. 2 companies suggests to limit the scope to UE device(s) associated with the same end user under the same cell as the higher priority objective.

#### **The control plane procedure design for multi-UE coordination:**

2 companies agree that we need to study the control plane procedure, one company mentioned the UAC, and one company asked about the introduction of UE discovery.

#### **The user plane procedure design for multi-UE coordination:**

3 companies expressed an interest in how to achieve synchronized transmission for multi-UE coordination. Suggested areas for study include enhancement to resource allocation, scheduling and QoS handling.

#### **Power saving enhancements**

3 companies are also interested in how to achieve power saving for a group of UEs providing multi-UE coordination. One company asked about applicability of DRX/WUS/SDT. It was indicated that shared UE processing or RRM relaxations may also be considered.

#### **The relation with other projects, e.g., UE aggregation**

2 companies asked whether there were related aspects with UE aggregation proposals. It was acknowledged that aspects relating to identifying associated transmitted data on different transmission paths may be similar and could be looked into to see if they could be done in a common project focused on multiple UEs.

### 3.2 Summary for Radio Recognition (RWS-210086/ RWS-210087)

Two companies provided questions. The answers provided above are to clarify the required specification changes and the relation between the radio recognition signal and the data communication signal.

### 3.3 Summary for Mobility Enhancement by UE based AI (RWS-210265)

Five companies provided questions on Mobility Enhancement by UE based AI (RWS-210265) and showed interests on this direction. Rapporteur clarified the AI model could be trained at UE or NW side. AI inference result shall be specified to ensure consistent understanding between UEs and NW. 3GPP shall define requirement on the AI model performance, such as accuracy, to guarantee trustable inference result.