

RAN-R18-WS-crossFunc-Huawei - Version 0.0.4

RAN

3GPP TSG RAN Rel-18 workshop RWS-210622

Electronic Meeting, June 28 – July 2, 2021

Source: Huawei

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

Agenda item: 4.3

Document for: Information

1 Introduction

Huawei and HiSilicon have provided the following Tdocs for cross-functionalities driven by both eMBB and non-eMBB in Rel-18:

RWS-210436 NR uplink boosting

RWS-210447 Network energy saving and green operation for NR

RWS-210448 Views on studies on AI/ML for PHY

RWS-210451 UE Aggregation

RWS-210452 Robust Compatibility Mode Communication in 5G-Advanced

RWS-210455 UE RF characteristics evolution

Questions and comments followed responses from Huawei and HiSilicon are collected in this document as per the deadlines provided by the RAN chair. Feedback forms will be opened and closed according to those deadlines.

Round 1 Q&A: Questions: June 14 08:00 UTC – June 17 8:00 UTC; Answers: June 17 8:00 UTC – June 18 23:59 UTC

Round 2 Q&A: Questions: June 21 08:00 UTC – June 23 8:00 UTC; Answers: June 23 8:00 UTC – June 24 18:00 UTC

2 [First round] Q&A

2.1 RWS-210436 NR uplink boosting

Feedback Form 1: Comments and questions to RWS-210436

1 – China Telecommunications

We also think enhancement on UL capacity is needed with the emergence of uplink centric services. For the following aspect, we share the similar view that they should be supported for UL enhancement:

- Enable flexible spectrum allocation
- Support more orthogonal DMRS ports for UL (e.g. 24)

For Flexible spectrum access on page 6 in your contribution (right part), does band 3 and band 4 only have UL carrier? For example, if band 1 and band 3 are selected, then we have 2 UL carrier and 1 DL carrier?

For multi-path connectivity UE on page 10, can you explain a bit more about the meaning of the two figures?

2 – Guangdong OPPO Mobile Telecom.

thanks for interesting paper. we agree in general that uplink enhancement is needed in Rel18. Here are few questions and comments:

Q1: FSA, TTI level switch among carriers would demands quick RF tuning, how to deal with potential glitch overhead?

Q2: FSA, how to prevent network to schedule UE beyond UE's really capability?

Q3: For L1 UE-UE CLI, is the intention to introduce aperiodic SRS for CLI L1 measurement?

Q4: for multi-path transmission/reception, is it correct understanding that up to 2 radio links are considered and at least one of them is indirect connection?

C1: more DMRS ports for UL MIMO: need take signal overhead into account

3 – China Unicom

In general, we support to study and specify the potential solutions for NR uplink boosting.

For frequency domain, both the low UE cost and high-end UE should be considered to support flexible spectrum access. Details need further discussion.

For time domain, the motivation of flexible duplex in UL/DL and flexible configuration for cells are very clear. The complexity and co-existence with legacy UE in the same carrier should be considered as well.

For space domain, UL MIMO capacity should be supported for both TDD and FDD. For multi-TRP topic, is that means both intra-cell and inter-cell scenarios are taking into account?

For power domain, considering multi-path connectivity UE topic, more details need to be clarified on relay UE to adopt L2 and/or L3 solutions as the discussion in R17 sidelink relay WI.

For FDD high power UE, it is obvious that this is an intuitive solution, and FDD high power UE for new power class should also be supported in R18.

4 – Intel Corporation (UK) Ltd

Thank you for the contribution. Please see our questions below:

[HPUE for FDD]

- 1) What are the intended frequency bands or is it a generic FDD feature?
- 2) Is it intended for smartphone or FWA/CPE device types?
- 3) How is it related to the ongoing RAN4 studies on this topic?

5 – Qualcomm communications-France

On UL enhancements, regarding UL power control enhancements for mTRP, can you elaborate a bit more on the UL scheme (TDM/FDM/SDM or single transmission received by two TRPs)? Also, is this intended for FR1, FR2, or both?

2.1.1 Answers

Feedback Form 2: Answers from Huawei to questions and comments on RWS-210436

1 – Huawei Tech.(UK) Co.. Ltd

[To China Telecom]: for your question on the flexible spectrum access concept on the slide page 6, whether band 3 and band 4 in the left hand have only UL carrier? We have the following response: serving cells configuration on band 3 and band 4 follows the existing serving cell definition in R15/16/17 CA/SUL specification, we do not intend to change the cell configuration concept of a cell. Band 3 and 4 here refer to the third band and fourth band in this example. If the band#3 is TDD or FDD band, it consists of one DL carrier and one UL carrier. In this case band 3 and band 4 may not be scheduled. If the band is SUL band, it consists of one SUL carrier without downlink.

[To China Telecom]: for your request for more details on the “multi-path connectivity UE” for UE cooperation, we have the following response:

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The left figure on slide 10 shows that for Rel-18 two (or more)-path (direct and indirect) could be established simultaneously between remote UE and gNB. With multi-path established, the data of remote UE could be split/duplicated and transmitted to gNB via multi-path and therefore improve the performance including throughput and reliability.

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The right figure on slide 10 shows that for Rel-18 path switch for service continuity could be improved by establishing target path (e.g., direct) before triggering the release of source path (e.g., indirect), thus the path switch interruption could be reduced to as low as 0ms. The similar principle is used in Rel-16 DAPS HO.

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More detail description could be found in word Tdoc

[To Guangdong OPPO Mobile Telecom]: for your question on how to deal with potential UL TX switch overhead in case of TTI level switch among multiple carriers, we have the following response: UE needs UL Tx switching to achieve RF tuning, which has been specified in Rel-16&17 in the UL TX switching feature. For uplink, the concept is an extension to more bands case, where switching time is the same as in Rel-16&17.

[To Guangdong OPPO Mobile Telecom]: for your question on how to prevent network to schedule UE beyond the UE’s real capability, we have the following response: The UE will report the configuration capability and transmission capability separately. Similar to capability handling, network should follow configuration and simultaneous transmission capability of the UE respectively.

[To Guangdong OPPO Mobile Telecom]: for your question asking whether the intention is to introduce the aperiodic SRS for CLI L1 measurement, we have the following response:

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The intention is to introduce a more flexible CLI measurement and reporting mechanism. The details obviously need to be discussed further including the possibility of introduced aperiodic SRS for CLI L1 measurement. The Rel-16 UE-UE CLI measurement is L3 measurement based on SRS resource configuration. Once the CLI-SRS resource is configured for a UE, the UE has to measure the resource regardless of whether the aggressor UE transmits the SRS or not. With such mechanism, the gNB has to ensure that the aggressor UE transmits when the victim UE is measuring the resource periodically. In addition, for accurate measurement, the UE transmit power needs to stay the same. Another issue is when there are many UEs in the network, the configured periodical CLI measurement resource will consume a large amount of resources due to periodical CLI measurement resources at the transmitter and the receiver.

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Therefore, one possibility is to introduce aperiodic L1 based UE-UE CLI measurement/reporting instead of L3 based periodic measurement/reporting. This provide more flexibility to the gNB and at the same time save the measurement resource overhead.

[To Guangdong OPPO Mobile Telecom]: for your question on the multi-path transmission/reception, whether up to 2 radio links are considered and at least one of them is indirect connection, we have the following response: multipath consists of at least 2 radio links and at least one of them is indirect connection. We can start with 2 radio links.

[To Guangdong OPPO Mobile Telecom]: for your question on UL MIMO enhancement that the more DMRS ports expansion should take the signal overhead into account, we share the similar view. The DMRS overhead should not be increased significantly and there may even be no DMRS overhead increase.

[To China Unicom]: for your comments that low UE cost and high-end UE should be considered to support flexible spectrum access and details need further discussion, we agree with you that both low-end UE and high-end UE should be considered.

[To China Unicom]: for your comments that for flexible duplex, complexity and co-existence with legacy UE in the same carrier should be considered, we have the same understanding that the complexity and co-existence with legacy UE in the same carrier should be considered in the enhancement for flexible duplex scenario. At the macro cell, legacy UEs should be able to operate normally. At the micro cell there may be no legacy UE for example for a new IIoT deployment with more UL, where UEs are IoT types of devices. In the small cell, legacy UE can still work because there are still normal UL slots that requires no change from the UE.

[To China Unicom]: for your comments that UL MIMO capacity enhancement should be supported for both TDD and FDD, we agree with you that the UL MIMO capacity enhancement should be supported for both TDD and FDD, especially for high resolution sub-band precoding.

[To China Unicom]: for your question that for multi-TRP enhancement, whether both intra-cell and inter-cell scenarios are taking into account, we think that for multi-TRP topic, both separate reception and joint reception by multi-TRP should be considered.

[To China Unicom]: for your comments that for power domain, considering multi-path connectivity UE topic, more details need to be clarified on relay UE to adopt L2 and/or L3 solutions as the discussion in R17 sidelink relay WI, we have the following response: here we consider remote UE support data split/duplication at PDCP layer, therefore, the relay UE is a L2 relay. L3 may not be feasible for multi-path aggregation due to the invisibility of the remote UEs.

[To China Unicom]: for your comment on FDD high power UE, we agree that FDD high power UE for new power class should also be supported in R18.

[To Intel]: for your question on what are the intended frequency bands or is it a generic FDD feature, the intended frequency band are at least n1 and n3, and it could be extended to more bands if there are interests.

[To Intel]: for your question on whether FDD HPUE is for smartphone or FWA/CPE device types, this is intended for smartphone primarily, and FWA and CPE can be included.

[To Intel]: for your question on how the FDD HPUE proposal is related to the ongoing RAN4 studies on this topic, we think that more bands are expected after the first specified FDD HPUE.

[To Qualcomm]: for your question on UL enhancement on power control for multiple-TRP, what is the UL scheme (TDM/FDM/SDM or single transmission received by two TRPs), and what is the intended frequency range, we have the following response. This power control is related to the single transmission received by multiple TRPs, i.e. joint uplink processing by multiple TRPs. This is intended for FR1. Since the single transmission can be received by the multiple TRPs, it is beneficial for the open loop power control to consider the path loss from multiple TRPs. In addition, the UE may be paired with other UE changing from slot to slot. This will lead to a large variation of the UE power requirement, so the close loop power control needs to be improved.

2.2 RWS-210447 Network energy saving and green operation for NR

Feedback Form 3: Comments and questions to RWS-210447

1 – MediaTek Inc.

Thanks for the quality contribution. Below please find our comments/questions:

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General comment:

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We are supportive to improve system-wise (NW + UE) energy efficiency that can reduce operator OPEX as well as improving user experience with further reduced UE power consumption. Also, UE cooperation, including timely suspension of UE UL activities and UE assistance information, are useful for effective network power saving.

o

In this regard, network energy saving can be rephrased to system energy efficiency enhancement so as to better reflect the joint network-UE considerations.

-

Specific comments/questions:

o

On **Proposal 1**, in idle-mode, UE only needs to receive SSB/SIB1/paging in PCell. Is the suggested enhancement related to HW R18 proposal of one cell of multiple non-contiguous carriers?

o

On **Proposal 2**, does reduced TRX chain include both of the following?

▪

Reduced gNB beam or TX antenna number

▪

Reduced UE antenna or panel number

o

On **Proposal 3**, what is the expected gNB/TRP power saving gain with more accurate link adaptation? It is understood that CSI enhancement in R17 URLLC is to resolve slow OLLA convergence due to rare NACKs. The issue may not exist for eMBB because of much higher target BLER (10% vs. 0.001% for URLLC)

2 – CATT

Thanks for the detail analysis on the gNB power consumption and potential techniques of network energy saving. The proposal of minimizing the power consumption of periodic always-on signal SIB/SIB1/paging in multi-carrier scenario could be achieved through implementation solution. Dynamic and semi-static adjustments of Tx chains were the study results of Rel-10 network energy saving study in LTE. We share the view that it is the main factor of gNB energy saving. The UE dynamic antenna adaptation had been studied in Rel-16 UE power saving. It would be beneficial to discuss the dynamic antenna adaptation for both UE and network together in some scenarios.

3 – Intel Corporation (UK) Ltd

Thank you for the contribution. Please see our questions below:

1. Do you consider the impact on legacy UEs due to SSB transmission turn off in a carrier?
2. Do you assume simplified RS in CC#2 have (almost) similar function as SSB?
3. What would be difference in power saving if simplified RS is used instead of SSB?

4 – Qualcomm communications-France

For power consumption calculation for SIB1 in FR2, it is written in contribution as “For multiplexing pattern 1, the overhead is about $64*14/(864*8) = 13\%$ considering a slot-based SIB1 transmission”. It seems that periodicity of 80ms for SIB1 transmission is used for calculation though it is indicated as 160ms in the contribution, on the other hand, according to TS38.331, SIB1 should have transmission repetition periodicity of 20ms with multiplexing pattern1. Could you please clarify the calculations?

5 – Beijing Lenovo Software Ltd.

Thanks for this interesting topic on network power saving. Generally, in order to help network obtain the power saving, the specific UE assistance information should be identified based on above proposals, but we hope the assistant information from UE side is to be simple and efficient.

6 – KT Corp.

Happy to see Huawei’s proposal on idle and light-load power saving case. KT also believe dynamic turning on/off method in the granularity of TTI could be a good starting point for network power saving.

7 – Spreadtrum Communications

Thanks for the quality contribution. For Proposal 1, considering the example and Figure 2, could you clarify that whether the simplified RS is deployed or configured for connected mode UEs? If so, gNB can configure P-TRS for connected mode UEs in on-demand manner.

Feedback Form 4: Answers from Huawei to questions and comments on RWS-210447

1 – HUAWEI TECHNOLOGIES Co. Ltd.

@ MediaTek

Thank you very much for your questions. Please find our reply as below:

Q1: On **Proposal 1**, in idle-mode, UE only needs to receive SSB/SIB1/paging in PCell. Is the suggested enhancement related to HW R18 proposal of one cell of multiple non-contiguous carriers?

A1: Proposal 1 and MB-SC are two independent enhancements. The target scenario for proposal 1 is the normal case with multiple non-contiguous carriers/cells, in which case enhanced mechanism for network energy saving can be done on some of the carriers, e.g. these carriers can be turned off and then woke-up by some triggering signaling from UE. Whether the enhanced network energy saving mechanism can work with MB-SC proposal are open at this stage, it would depend on the details of MB-SC.

Q2: On Proposal 2, does reduced TRX chain include both of the following?

- Reduced gNB beam or TX antenna number
- Reduced UE antenna or panel number

A2: Proposal 2 is mainly target for network energy saving, which means it mainly target for reduced gNB beam or Tx antenna number, since from network saving perspective reduced gNB beam or Tx antenna number without compromising system performance is an efficient method already.

Q3: On **Proposal 3**, what is the expected gNB/TRP power saving gain with more accurate link adaptation? It is understood that CSI enhancement in R17 URLLC is to resolve slow OLLA convergence due to rare NACKs. The issue may not exist for eMBB because of much higher target BLER (10% vs. 0.001% for URLLC)

A3: Proposal 3 is to ensure more accurate link adaptation to minimize the impact on user experience while achieving energy saving. For example, dynamic turning on-off the TR-RX chains can be used to achieve energy saving dynamic, in which case some CSI enhancements to reflect the adaptation of TR-RX chains can be done to ensure more accurate link adaptation, thus it can avoid or reduce the impact on user experience. Note that CSI enhancements here are not related to the CSI enhancements discussed in Rel-17 URLLC.

@ CATT

Thank you very much for your question. It will be appreciated if you can explain more on the implementation solution to minimize the power consumption of periodic always-on signal SIB/SIB1/paging in multi-carrier scenario. In our mind, the key problem for the multi-carrier scenario is how to enable carrier wake up dynamically for Idle UE without enlarging the access delay too much, therefore some standard work is expected, e.g. some UE triggering signaling design.

@ Intel

Thank you very much for your questions. Please find our reply as below:

Q1. Do you consider the impact on legacy UEs due to SSB transmission turn off in a carrier?

A1. Yes. For FR1, in order to minimize the impact on legacy UEs, the energy saving mechanism can be done only on some of the carriers, and leave some other carrier(s) with full transmission of channel/signals for legacy UEs to access. Of course, in this case legacy UEs there might be some impact on legacy UEs,

e.g. legacy UEs may waste some time/power to access the carriers with SSB transmission turn off but fail in the end, but this is a tradeoff that network needs to consider. For FR2 the impact on legacy UEs would be less considering the current commercial cases, therefore more aggressive design can be considered for SSB enhancements.

Q2. Do you assume simplified RS in CC#2 have (almost) similar function as SSB?

A2. Not exactly, most functions of synchronization and basic measurement can be achieved based on SSB of CC#1, so the simplified RS in CC#2 is only for very simple additional measurement.

Q3. What would be difference in power saving if simplified RS is used instead of SSB?

A3. Simplified RS can be transmitted with less beams and symbols so it can turn off the transmitters with more symbols, therefore energy saving can be achieved.

@ Qualcomm

Thank you very much for your question. Yes the calculation is based on the assumption of periodicity with 80 ms, sorry for the confusing.

@ Lenovo

Thank you very much for your comment. Yes we can further study whether/what UE assistance information is useful.

@ KT

Thank you very much for your comment. Yes it is expected dynamic adjusting can bring more gain. Let's further study how to enable this kind of dynamic manner to bring more energy saving.

@ Spreadtrum

Thank you very much for your question. Please find our reply as below:

Q1. For Proposal 1, considering the example and Figure 2, could you clarify that whether the simplified RS is deployed or configured for connected mode UEs? If so, gNB can configure P-TRS for connected mode UEs in on-demand manner.

A1: The simplified RS is mainly for idle UEs to identify proper CC and access the CC quickly.

2.3 RWS-210448 Views on studies on AI/ML for PHY

Feedback Form 5: Comments and questions to RWS-210448

1 – CAICT

In Fig.4, online and offline model training is proposed. Can you provide some typical use cases for online model learning and offline model learning?

2 – Intel Corporation (UK) Ltd

Thank you for the contribution.

Just for clarification, the proposed scope of study in Rel-18 in terms of NN is limited to input/output data

for model training/inference?
<p>3 – CATT</p> <p>Thanks for the contribution, and we have following question for clarification:</p> <p>Q1: If 3GPP channel model is used to generate training and inference data, what is the difference/relationship between the generation of training and inference data?</p>
<p>4 – Sony Corporation</p> <p>Thanks for the contribution. We have a question.</p> <p>-</p> <p>About “<i>detailed AI/ML algorithms and models shall be left for implementation</i>” in proposal 1, does this mean that 3GPP doesn’t consider detail of AI/ML network model? Could you clarify the intention of proposal 1?</p>
<p>5 – Samsung Electronics Polska</p> <p>We have some general question for AI training for MTC devices (see figure 1(b)). Since AI training requires heavy energy consumption, do you think training, inference, and measurement for an AI algorithm at such device are feasible?</p>
<p>6 – MediaTek Inc.</p> <p>Thanks for the contribution. Some questions for clarification:</p> <p>1) What are the prioritized use cases to be studied?</p> <p>2) Does Huawei think it is useful to establish the “test data set” (repository)?</p>
<p>7 – NEC Corporation</p> <p>NEC supports having SI on AI/ML for NR physical layer. Also, proposed principles and directions looks reasonable.</p>

2.3.1 Answers

Feedback Form 6: Answers from Huawei to questions and comments on RWS-210448

<p>1 – HUAWEI TECHNOLOGIES Co. Ltd.</p> <p>@ CAICT</p> <p>Thank you very much for your question. Please find our reply as below:</p> <p>Q1: In Fig.4, online and offline model training is proposed. Can you provide some typical use cases for online model learning and offline model learning?</p> <p>A1: Firstly, we want to clarify that we are not proposing either online or offline model training at this moment, just to describe the potential ways to do the model training, because different ways will have impact on the potential input/output for the model training. The main intention is to say that for the potential study of AI/ML, the input/output for model training and model inference should be studied carefully. In</p>
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addition, it is difficult to say typical use cases for online model training and offline model training at the stage, firstly sufficient evaluation should be given in order to justify whether a use case is beneficial or not with AL/ML, then if any use case identified, further study can be done on whether offline/online is more appropriate.

@ Intel

Thank you very much for your question. Please find our reply as below:

Q1: Just for clarification, the proposed scope of study in Rel-18 in terms of NN is limited to input/output data for model training/inference?

A1: We don't think the scope of the potential study of AL/ML will be limited to input/output data for model training/inference, we mean it is one of the important part for the study. In addition, some other aspects should be studied also in our understanding, e.g. high-level principles for the AL/ML study, evaluation methodology, and then sufficient evaluations in order to justify whether it is beneficial to apply AL/ML for the potential use cases, etc.

@ CATT

Thank you very much for your question. Please find our reply as below:

Q1: If 3GPP channel model is used to generate training and inference data, what is the difference/relationship between the generation of training and inference data?

A1: Inputs generated based on 3GPP channel model for AI model training and inference is just an alternative, since it is easier for companies to generate the inputs and also may be easier to calibrate in the evaluation phase, however we are also open to other ways. Generally speaking, if the inputs is generated based on 3GPP channel model, the inputs of training and inference can be generated based on different values for channel parameters, e.g. PDP profile, angles and random seeds.

@ Sony

Thank you very much for your question. Please find our reply as below:

Q1: About "*detailed AI/ML algorithms and models shall be left for implementation*" in proposal 1, does this mean that 3GPP doesn't consider detail of AI/ML network model? Could you clarify the intention of proposal 1?

A1: When we say *detailed AI/ML algorithms and models shall be left for implementation*, it means we don't need to specify the detailed AL/ML algorithm in the specs. As to the study, for sure AI/ML models needs to be considered, For example, for evaluation purpose, we need to define some reference AI/ML models in order to let companies align with the performance and the potential benefits of AI/ML approach.

@ Samsung

Thank you very much for your question. Please find our reply as below:

Q1: We have some general question for AI training for MTC devices (see figure 1(b)). Since AI training requires heavy energy consumption, do you think training, inference, and measurement for an AI algorithm at such device are feasible?

A1: We agree that AI training may require heavy computational complexity, whether it can be acceptable may depend on whether it is gNB or UE to do the job. If the training and inference is done at the gNB side, it might be ok. For the example given in Figure 1, it might be feasible to do the training and inference at the gNB side, and UE can just use the RS indicated by gNB. However, please note that here it is just a potential example, whether it is feasible or beneficial needs further study.

@ MediaTek Inc.

Thank you very much for your questions. Please find our reply as below:

Q1: What are the prioritized use cases to be studied?

A1: In our understanding, sufficient evaluation and study should be done first to check if it is beneficial to apply AI/ML for a certain use case, then if any use cases identified we can further discuss whether any use case can be prioritized. For the study itself, it might be better to check more use case as much as possible if possible.

Q2: Does Huawei think it is useful to establish the “test data set” (repository)?

A2: As mentioned in our contribution, the inputs for model training/inference should be studied. We think it can be useful to establish some common inputs for evaluation purpose.

@ NEC

Thanks for sharing your view. Yes we think it would be good to discuss and agree on the principle for the study first.

2.4 RWS-210451 UE Aggregation

Feedback Form 7: Comments and questions to RWS-210451

1 – Xiaomi Communications

We think that the multi-path connection could be SL-relay-based or Uu-relay-based or WiFi-relay-based. For the UE aggregation we have the following questions for clarification:

Question 1: Is the UE aggregation to support the simultaneous data transmission in either UL or DL in multiple links?

Question 2: Do we need to have some standard work (e.g. alike LTE LWA adaption layer) on the private link between UEs?

2 – CATT

A few question for better understanding.

- 1) Is the main motivation for higher data rate, or it is for reliabililty/latency improvement?
- 2) Does this impact DL, UL or both?
- 3) What is the assumption for the link btw UEs, e.g., does it reuse SL or how is it?

3 – Lenovo Mobile Com. Technology

Thanks for the good contribution! we have following questions for further understanding

1. we are wondering which part is proposed to be studied: multi-path SL relay or UE aggregation? or both are proposed to be studied?
2. the common part of multi-path SL relay and UE aggregation needs firstly been studied and clarified.
3. this is for only UL? or also impact DL?

4 – Qualcomm Technologies Int

1. Could the proposed UE aggregation feature accommodate proprietary wireless link between aggregated UEs?
2. What is the latency requirement for the proprietary UE to UE link for UE aggregation?

5 – Asia Pacific Telecom co. Ltd

Thanks for sharing the interesting proposals and few question for clarification:

1. Per the scenario of transmitting real-time video in emergency you mentioned, may you elaborate more on the requirements of the scenario, for example, latency on activating/triggering the aggregation is also critical? And how the data flow works between the aggregated UEs in illustration of Figure 1. Does it apply PC5 interface?
2. Continue with the data flow, the data transmitted by the aggregated UEs are duplicated or you expect they were modeled as split bearer with flow control?

2.4.1 Answers

Feedback Form 8: Answers from Huawei to questions and comments on RWS-210451

1 – HuaWei Technologies Co.

Xiaomi Communications

[HW]

For Q1, we think the uplink is the main bottleneck in our described scenarios, and therefore UE aggregation on UL seems more beneficial and is a more important enhancement. On the other hand, the principle can also be applied to DL, and in this case it requires extra impact on UE side to handle aggregation or duplication detection. There is no need to combine UL and DL together always, but if we want, they can be combined.

For Q2, We don't think there is a need to specify non-3GPP link between UEs. If 3GPP standardized interface is considered, Rel-17 L2 relay could be reused.

CATT

[HW]

Q1: We think higher data rate is the main motivation (e.g. using data split). On the other hand, reliability/latency could also be improved by this solution (e.g., using data duplication).

Q2: See answers to Xiaomi Q1

Q3: The link between UE could be private link or using PC5 link. If it is PC5 link, L2 SL relay can be reused as one path. Irrespective of either link between UEs, we think the specification work is similar on common aspects as below:

- The configuration of multi-path data aggregation criteria and parameters
- The L2 functions and procedures to enable multi-path data split/duplication and aggregation

Lenovo Mobile Com. Technology

[HW]

For Q1 and Q2, our view is that Irrespective of either multi-path relay or UE aggregation, they share commonality as we replied to CATT.

For Q3: See answers to Xiaomi Q1

Qualcomm Technologies Int

[HW]

For Q1: Yes, the link between UE could be proprietary wireless or wireline links and our view is that regardless of what link is used between UEs, the common aspects need to be specified.

For Q2: Our main motivation is to improve the UL throughput, which is not necessarily relevant to the latency. Are you considering the URLLC scenarios?

Asia Pacific Telecom co. Ltd

[HW]

For Q1: The requirement is from 3GPP TR22866: enhanced Relays for Energy Efficiency and Extensive of Coverage for the firefighter to send back live video stream at fire scene to the commander. The end-to-end latency is 30 ms as shown in the table 1. The UE aggregation could be activating/triggering ahead of time instead of dynamically done. As shown in Figure 1, the data originated from one UE (video camera) could be split/duplicated and transmitted to gNB directly by this UE and indirectly by the other UE, thus improve the throughput and robustness. The link between UEs could use PC5 interface as L2 relay specified in Rel-17. Actually we think using L2 relay to have such multi-path aggregation is better as the PC5 interface is also under control as a standardized interface.

For Q2: If reliability is more critical, the data could be duplicated and transmitted by both UEs. From network side, gNB need to have data duplication detection. If throughput is more important, the data could be split and transmitted via both UEs and gNB could just aggregate the data. In this case split bearer could be used.

2.5 RWS-210452 Robust Compatibility Mode Communication in 5G-Advanced

Feedback Form 9: Comments and questions to RWS-210452

1 – Intel Corporation (UK) Ltd

Thank you for the contribution. Please see our question below:

1. What are the minimal UE/gNB functionalities considered for the Robust Compatibility Mode?

2.5.1 Answers

Feedback Form 10: Answers from Huawei to questions and comments on RWS-210452

1 – HuaWei Technologies Co.

Thanks for your question. In the robust compatibility mode, the minimal UE functionalities include essential system information receiving, paging receiving and performing initial access to the network. Correspondingly, the minimal gNB functionalities include identifying the robust compatibility mode UE via some mechanism, e.g., dedicated RACH resources, supporting the UE initial access and maintaining the connection with the UE to send the most essential information to help recovery of the UE.

2.6 RWS-210455 UE RF characteristics evolution

Feedback Form 11: Comments and questions to RWS-210455

1 – Intel Corporation (UK) Ltd

Thank you for the contribution. Please see our questions below:

1. For Simultaneous Tx and Rx on 700+800+900 MHz bands, it not clear how much Rx RF benefit compared to CA. Further clarifications could be helpful.
2. For 4Tx proposal, considering RF components, it is unlikely to implement 2 or 3 Tx chains in low bands for handheld UE. Any data to be shared for further discussion from Huawei? What are the target bands?
3. For 8RX proposal, in LTE design when 8RX were introduced the RRM requirements were not affected. What is the rationale to improve RRM requirements for NR?

2 – Samsung Electronics Polska

[FR2 UL 256 QAM]

- for UE RF requirements, are they targeted for FWA (PC1) or all power classes?
- in the motivation part, body proximity sensor is one of the factor to achieve higher SNR, but we are not sure body proximity sensor is adopted for FWA or not.
- in the motivation part, power booting technology is another factor to chaieve higher SNR, could you clarify more about power boosting and its relationship with 256QAM?

2.6.1 Answers

Feedback Form 12: Answers from Huawei to questions and comments on RWS-210455

1 – Huawei Technologies France

1 – Answers to Intel Corporation (UK) Ltd

Thanks for your comments.

1. For Simultaneous Tx and Rx on 700+800+900 MHz bands, it not clear how much Rx RF benefit compared to CA. Further clarifications could be helpful.

[Huawei]: The proposal of simultaneous Tx and Rx on 700+800+900MHz covers all the possible features operating on that band combination, including CA, DC, and new proposal of multi-band serving cell. The purpose of proposed work is to enable smart phone with limited form factor to support simultaneous Rx. So far in our understanding, the downlink simultaneous reception for CA and EN-DC can only be supported by CPE with larger form factor.

2. For 4Tx proposal, considering RF components, it is unlikely to implement 2 or 3 Tx chains in low bandsfor handheld UE. Any data to be shared for further discussion from Huawei? What are the target bands?

[Huawei]: In our proposal, we propose 4Tx mainly for CPE with larger form factor. We agree that it is difficult to implement more than 2Tx for handheld UE.

What kind of data do the company want to look into? Please clarify.

Our target is the higher band, e.g., the bands which mandatorily support 4Rx.

3. For 8RX proposal, in LTE design when 8RX were introduced the RRM requirements were not affected.

What is the rationale to improve RRM requirements for NR?

[Huawei]: In LTE 8Rx, we mainly investigate the SNR thresholds for RLM requirements. In our paper, "RRM requirements" is a general term. For NR 8Rx, we mainly consider the similar study and specification work for RLM.

Regarding the enhancement of RRM, we may need consider shortening the measurement time. 8Rx is utilized. Then measurement accuracy could be improved. So it would be possible to shorten the measurement time.

2 – Answers to Samsung Electronics Polska

Thanks for your comments.

- for UE RF requirements, are they targeted for FWA (PC1) or all power classes?

[Huawei]: We would like to consider all the power classes, but could prioritize FWA (PC1 and/or PC5).

- in the motivation part, body proximity sensor is one of the factor to achieve higher SNR, but we are not sure body proximity sensor is adopted for FWA or not.

[Huawei]: Body proximity sensor is used for handheld UE and can help to boost Tx power for it. For FWA (there is lower power FWA PC5), the body proximity could also be used to further boost the power and at same time to avoid harm to human body. But we agree for FWA more consideration would be needed with respect to regulation if power boosting is used.

- in the motivation part, power booting technology is another factor to chaieve higher SNR, could you clarify more about power boosting and its relationship with 256QAM?

[Huawei]: In our view, if UE can boost the power and at same time keep good Tx signal quality, then the achievable SNR at BS receiver would be higher. As a result, it could help increasing the possibility where 256QAM can be scheduled.

3 [Second round] Q&A

3.1 RWS-210436 NR uplink boosting

Feedback Form 13: Further questions on RWS-210436

1 – Xiaomi Communications

Thanks for the contribution. Does *multi-path connection in proposal 4* mean *multi-connections*? How many connections would be considered in your intention?

2 – VODAFONE Group Plc

Thank you for the contribution. We are supportive of studying potential solutions for NR uplink boosting. For the multi-path connectivity UE feature, how do you envision inter-UE consent for the aggregation of resource working? I.e. a UE agreeing to sacrifice battery life to help another...

3 – China Unicom

Thanks for the contribution and response, we discussed the potential solution if uplink boosting in frequency domain, time domain, space domain and power domain. We are interested in the time domain enhancement, please explain UL muting resource for BS-BS CLI measurement in detail.

3.1.1 Answers

Feedback Form 14: Answers from Huawei to questions and comments on RWS-210436

1 – Huawei Tech.(UK) Co.. Ltd

1 – Xiaomi Communications

Thanks for the contribution. Does *multi-path connection in proposal 4* mean *multi-connections*? How many connections would be considered in your intention?

[Huawei] We think the principle of supporting 2 or more multi-path is the same. We can start from 2 paths and extend this to >2 paths with potential more optimizations, this also depends on UE capability on how many paths can be supported.

2 – VODAFONE

Thank you for the contribution. We are supportive of studying potential solutions for NR uplink boosting. For the multi-path connectivity UE feature, how do you envision inter-UE consent for the aggregation of resource working? I.e. a UE agreeing to sacrifice battery life to help another...

[Huawei] For multi-path connectivity, if it is the relay scenario in general, the relay UE would be willing to use some of its battery life to help the remote UE due to its role, and the relay UE may be charged differently.

If it is the UE aggregation scenario, we could start with use cases in which these terminals belong to the same user, and therefore, sacrificing their battery life to help each other won't be an issue. In the future, we could consider to extend this to more general scenarios where terminals belong to different users could be aggregated and help each other. In that case, new ways of charging/billing could be considered.

3 – China Unicom

Thanks for the contribution and response, we discussed the potential solution if uplink boosting in frequency domain, time domain, space domain and power domain. We are interested in the time domain enhancement, please explain UL muting resource for BS-BS CLI measurement in detail.

[Huawei]: Thanks for the further question. Regarding to your question on the details of the BS-BS CLI

measurement detail, BS-BS CLI is the key to apply the flexible duplex in reality. Here in our proposed example of the BS-BS CLI measurement is for the receiver to suppress the CLI when CLI exists instead of avoiding the CLI by coordination scheduling. The proposed muting resource is a kind of accurate CLI measurement for BS receiver. The receiver usually needs the CLI information. However, in reality, there are several types of the CLI, such as CLI caused by broadcast signals (SSB, SIB1, PDCCH, etc.), dedicated signals (PDSCH, dedicated PDCCH, etc.) and some sparse CLI (CSI-RS etc.) those signals are differently precoded by the aggressor BS, hence have different interference characteristics (e.g. covariance). To suppress these signals, the interference characteristics should be measured timely and accurately. One method in our contribution is to mute some of the REs in the uplink signal, and using these muting resources to measure the interference. Since there is no uplink signal transmission on the muting REs, the measured signal will be only interference and noise. So the measurement is accurate. Through this we could achieve an excellent CLI suppression effect. Furthermore, for sparse CLI, such as the CSI RS, which may only occupy some sparse REs in one OFDM symbol, it may cost high complexity to suppress such interference, the most straightforward way is to avoid these REs by muting the RE in the uplink, so that there is only minor loss but without impact to the overall demodulation and decoding.

3.2 RWS-210447 Network energy saving and green operation for NR

Feedback Form 15: Further questions on RWS-210447

1 – CATT

Thanks for further questions on implementation solution of network energy saving in minimizing always ON signals for CA. Most of networks could configure the SSB/CORESET#0/paging at one cell as PCell for all UEs to reduce the power consumption of other cells.

2 – Spreadtrum Communications

Thanks for the clarification. If the simplified RS is used for idle mode UEs, it means that some idle mode UEs can camp on the CC with the simplified RS. We think if these idle mode UEs camp on a "primary" CC together with other idle mode UEs and gNB shuts down the unused CC(s), the power consumption at gNB can be more reduced. But, you may mean the offloading (e.g. paging/RACH/...) in idle mode. However, in our view, power saving at gNB and the offloading in idle mode may be tradeoff. If we have two objectives, such as power saving at gNB and the offloading in idle mode, we may trade one for the other.

3 – VODAFONE Group Plc

We are supportive of work that reduces the base station site energy consumption as it is the major component of the overall network + UE power consumption. The proposed study items look interesting, but, can the study also ensure that DSS (i.e. LTE+NR) can be maintained efficiently on at least one (low band) carrier?

3.2.1 Answers

Feedback Form 16: Answers from Huawei to questions and comments on RWS-210447

1 – HUAWEI TECHNOLOGIES Co. Ltd.

@ CATT

Thank you very much for the further clarifications. It is true that removing SSB/CORESET#0/paging transmission from a cell can help reduce the power consumption. However, if we totally leave it to implementation without any enhancement, it will result in longer access delay at the UE side and thus result in bad UE experience. It would be better to adopt some solution that can reduce network power consumption and meanwhile reduce/avoid the impact on user experience. For example, some simplified RS can be considered on the cell for UEs to maintain synchronization and some basic system information for the cell can be transmitted on other active cell, which can avoid enlarging the access delay.

@ Spreadtrum

The main motivation for transmitting simplified RS is to enable some basic measurement for the CC at the UE side and also for UEs to maintain the synchronization, and thus UE can still access to this kind of CC quickly.

@ VODAFONE

For multiple carrier case, we also think that it would be good to only apply the energy saving mechanisms on some of the carriers, and leave no change on the other cell(s) to keep small impact on legacy UE and probably maintain efficiently DSS operation as you mentioned here. We can further study whether any other way to maintain DSS efficiently if needed.

3.3 RWS-210448 Views on studies on AI/ML for PHY

Feedback Form 17: Further questions on RWS-210448

1 – vivo Mobile Communication Co.

Thanks for your contribution.

For evaluation purpose, we notice the following way of constructing data set is mentioned. Can you elaborate how to construct data set through AI/ML models? For data set constructed with field test, can you share your view on how to organize such data collection activity in 3GPP with reasonable effort?

“Besides the 3GPP channel models, other options of inputs can also be considered, e.g., field test, generated by other AI/ML models.”

3.3.1 Answers

Feedback Form 18: Answers from Huawei to questions and comments on RWS-210448

1 – HUAWEI TECHNOLOGIES Co. Ltd.

@ Vivo

Thank you very much for the question. For constructing data set through AI/ML models, one example is to use generative AI/ML models for data augmentation if the original data set is too small, which means the inputs of the training is generated by some other AI/ML models. For data set constructed with field test, if we will apply it seems good for companies to contribute field test data if possible, then we can use these field test data to further study whether AI/ML is beneficial.

3.4 RWS-210451 UE Aggregation

Feedback Form 19: Further questions on RWS-210451

1 – China Telecommunications

Thanks for the interesting topic.

- 1) Could you elaborate a bit more about how could the UE aggregate accommodate non-3GPP link. wifi direct between UE.
- 2) Could the SL relay based multi-path connection support the condition that both paths are side link relay?

2 – VODAFONE Group Plc

Thank you for the contribution. This is an interesting topic. How do you envision inter-UE consent for the aggregation of resource working? I.e. a UE agreeing to sacrifice battery life to help another... (same question from NR uplink boosting thread above)

3 – Qualcomm Technologies Int

Thank you for your responses in round 1. Here are some follow up questions for round 2.

1. If the link between the UEs can be wireless, would the added latency of the wireless link compared to the wireline, impact the Uu features that in your view would have to be specified for UE aggregation feature?
2. In case of a wireless link between aggregated UEs, would handover between aggregated UEs be allowed? For example, UE2 may be aggregated with UE 1 and then at some point UE 3 is aggregated with UE 1 and UE 2 is released.
3. Does the network schedule aggregated UEs independently, or aggregated UE is treated as a more capable, but a single UE?
4. How does the charging work? Is there an "anchor UE" whose credentials are used for billing, or each UE is billed separately? Or is aggregation only allowed for the UEs that belong the same user?

3.4.1 Answers

Feedback Form 20: Answers from Huawei to questions and comments on RWS-210451

1 – HuaWei Technologies Co.

China Telecommunications

Thanks for the interesting topic.

- 1) Could you elaborate a bit more about how could the UE aggregate accommodate non-3GPP link. wifi direct between UE.
- 2) Could the SL relay based multi-path connection support the condition that both paths are side link relay?

[HW] 1) For UE aggregation, if non-3GPP link between UEs is used, the packet from the originated UE could be routed to the helping UE via this non-3GPP link and then transmitted by the helping UE to the gNB. The data routed via non-3GPP link can be done via implementation without any specification impact.

2) For SL relay based multi-path connection, both paths can be indirect paths via sidelink based relay. In general, the multi-path could include direct/indirect paths or indirect/indirect paths.

VODAFONE Group Plc

Thank you for the contribution. This is an interesting topic. How do you envision inter-UE consent for the aggregation of resource working? I.e. a UE agreeing to sacrifice battery life to help another... (same question from NR uplink boosting thread above)

[HW] For multi-path connectivity, if it is the relay scenario in general, the relay UE would be willing to use some of its battery life to help the remote UE due to its role, and the relay UE may be charged differently. If it is the UE aggregation scenario, we could start with use cases in which these terminals belong to the same user, and therefore, sacrificing their battery life to help each other won't be an issue. In the future, we could consider to extend this to more general scenarios where terminals belong to different users could be aggregated and help each other. In that case, new ways of charging/billing could be considered.

Qualcomm Technologies Int

Thank you for your responses in round 1. Here are some follow up questions for round 2.

1. If the link between the UEs can be wireless, would the added latency of the wireless link compared to the wireline, impact the Uu features that in your view would have to be specified for UE aggregation feature?
2. In case of a wireless link between aggregated UEs, would handover between aggregated UEs be allowed? For example, UE2 may be aggregated with UE 1 and then at some point UE 3 is aggregated with UE 1 and UE 2 is released.
3. Does the network schedule aggregated UEs independently, or aggregated UE is treated as a more capable, but a single UE?
4. How does the charging work? Is there an "anchor UE" whose credentials are used for billing, or each UE is billed separately? Or is aggregation only allowed for the UEs that belong the same user?

[HW] 1 For eMBB traffic, as the latency is not an imminent requirement, the data could be routed from originated UE to the aggregated UE (helping UE) and the added latency on the link between UEs could be ignored. If it is URLLC traffic which has the stringent latency requirement, the added latency on the link between UEs could impact the data transmission from the helping UE and if here the wireless refers to sidelink, we are open to study.

2. In case of wireless link between aggregated UE, we think handover between aggregated UE as mentioned could be considered. This also depends on how many UEs can be grouped and aggregated together, in general we think we need to balance between the gains of multi-UE aggregation and solution complexity.
3. In general we think either manner can be applied to allow the flexibility. Once aggregation is triggered, the scheduling needs to consider the association of the UEs and when aggregation is disabled, they can fallback to legacy handling.
4. To start with, we could assume aggregated UEs belong to the same user, and therefore, this user could be charged/billed. In the future, UE aggregation may be extended to aggregate UEs belonging to different users and in that case, new ways of charging/billing needs to be considered. For example, helping UE could be given credits for helping the other UEs, while for the UE being helped, they could be charged more or indebted credits for the helping service.

3.5 RWS-210452 Robust Compatibility Mode Communication in 5G-Advanced

Feedback Form 21: Further questions on RWS-210452

1 – Spreadtrum Communications

It is one interesting topic. In this paper, the robust compatibility mode is introduced to help recover the legacy UEs when there exists non-compatibility issues. In light of the response of 1st round, it seems that UE still could communicate with gNB. So the necessity of the robust compatibility mode is not clear to us.

3.5.1 Answers

Feedback Form 22: Answers from Huawei to questions and comments on RWS-210452

1 – HuaWei Technologies Co.

Thanks for your interest on this topic. In our response of 1st round, we mentioned that the minimal UE functionalities include essential system information receiving, paging receiving and performing initial access to the network. It means that the UE can complete initial access to the network via the new robust compatibility mode even if it can not work normally.

Currently if some UEs faces the compatibility issues in initial access to the network, the UEs cannot establish basic connection with the network and will remain the status of failure. Therefore the intention of introducing robust compatibility mode is to provide a mechanism which still allows the UE to establish basic connection with the network even if the serious compatibility issue happens during initial access procedure. From gNB point of view, the gNB need identify the robust compatibility mode UE via some mechanisms, e.g., dedicated RACH resources, and support the UE initial access to the network via the robust compatibility mode. Then the UE can get the opportunity to report the problem and the relevant problem can be resolved via software upgrade. We are open to how to design the detailed robust compatibility mode access procedure.

3.6 RWS-210455 UE RF characteristics evolution

Feedback Form 23: Further questions on RWS-210455

1 – VODAFONE Group Plc

Thank you for the contribution. We are very supportive of the FR1 UE RF evolution, particularly the simultaneous transmission and reception on 700+800+900. In areas where there is no 3.5 GHz coverage, DL CA across low-low, low-mid and mid-mid is crucial for maintaining downlink performance. Whilst we appreciate the many challenges that a low-low-low UE architecture brings for the smartphone formfactor, we would like to see further investigation that can help drive industry towards a feasible implementation balancing cost and performance.

3.6.1 Answers

Feedback Form 24: Answers from Huawei to questions and comments on RWS-210455

1 – Huawei Tech.(UK) Co.. Ltd

Thanks to Vodafone for providing insights on operators' requirements and expectations on UE RF architecture evolution. We hope to investigate this topic further in Release 18.

4 Summary and Conclusions

RWS-210436 NR uplink boosting

There were questions on whether flexible spectrum access requires re-defining the concept of cell; it was clarified that there is no need to redefine “cell”, that the concept is an extension of UL Tx switching to more than two bands. There were question on multipath connectivity and it was clarified that multipath consists of at least 2 radio links and at least one of them is indirect connection; it can start with 2 radio links. Clarifications were also provided on questions about UL MIMO enhancements, and for cross-link interference enhancements where a macro and small cells use different DL/UL TDD configurations. It was clarified that some enhancements can apply to both CPE and eMBB UEs.

RWS-210447 Network energy saving and green operation for NR

Companies involved in the discussion are generally positive for network energy saving. The discussion mainly focused on clarifications on details of the proposals/views in the paper, e.g. network energy consumption modeling and evaluation methodology, whether/what UE assistance information is needed for network energy saving, impact on legacy UE, how to ensure efficient dynamic turning on-off TX/RX chains, benefits of CSI enhancements for dynamic turning on-off TX/RX chains, functions of simplified RS, whether to do joint network energy saving and UE power saving and whether/how to maintain efficient DSS operation. We shared our initial views but these points seem worth discussing further among the whole group.

RWS-210448 Views on studies on AI/ML for PHY

The discussion mainly focused on clarifications on details of the proposals/views in the paper, e.g. potential scope of the study for AI/ML, high-level principles for the study of AI/ML, how to generate inputs based on 3GPP channel model for AI training/inference, online/offline model training, whether/how to prioritize some use cases for further study, whether/how to establish test data set and whether/how to construct inputs (i.e. data set) through AI/ML models and/or field test. Most of these points seem worth discussing further, especially the potential scope for the study. As we shared during the discussion, the study of AI/ML can focus on evaluation methodology, general aspect of AI/ML models and potential use cases.

RWS-210451 UE Aggregation

Companies showed interest and raised questions. The major questions are for clarifying whether multi-path applies to both UL and DL, the number of paths supported and any standards work for private link. It is clarified that multi-path can apply to both UL and DL, and there is no need to specify non-3GPP link.

Some companies also asked whether this direction can be extended to UEs from different users with potential different billing, or whether can (re)select different UEs for UE aggregation among multiple UEs. It is clarified that we can start from UEs from the same user, and if later extending to different users the charging/billing can be improved. It is also clarified handover among multiple UEs can be considered. There is also a question

raised on latency requirement, it is clarified that this depends on traffic type, e.g. URLLC or eMBB.

After two rounds of clarification, people seems understanding the commonality and difference between multi-path relay and UE aggregation:

- Common: L2 data split/duplication and configuration
- Difference: Link between UEs, use cases, billing

In summary our proposal relates to the common part of multi-path relay and UE aggregation.

RWS-210452 Robust Compatibility Mode Communication in 5G-Advanced

During the discussion, the major question is what the motivation and exact mechanism is for supporting robust Compatibility mode. It is clarified that the motivation is to allow UEs having initial access problem to use a new mechanism for recovery, e.g. to always have a chance to setup the connection with the network and get recovery information by network assistance.

RWS-210455 UE RF characteristics evolution

A question on Rx RF benefit for simultaneous Tx and Rx on 700+800+900MHz was raised. It was clarified that in Rel-17 only CPE can support this band combination, and the proposed work in Rel-18 aims to enable smart phone with limited form factor to support simultaneous Rx/Tx for CA, EN-DC and other features aggregating spectrum. An operator showed a big interest. There were questions on target bands and UE form factor for FR1 UL 4Rx. It was clarified that higher bands require mandatory support of 4Rx and CPE would mainly be considered. There was a question whether and which RRM requirements should be considered for 8Rx. The response was that there would be impact on RLM requirement and some RRM enhancements to shorten measurement time could be considered. There were questions on UL 256QAM, including target device type, how to use body proximity sensor to achieve high SNR, and the relation between improved SNR and performance enhancement. It was answered that FWA is the main use case and both PC1 and PC5 could be considered. The body sensor could be used for both handheld and FWA UE to improve Tx power, which helps increasing the possibility of UL 256QAM use cases.