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RAN

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Electronic Meeting, June 28 - July 2, 2021

Agenda Item: 4.1

Source: Spreadtrum Communications

Title: Email discussion summary for RAN-R18-WS-eMBB-Spreadtrum Communications

Document for: Discussion and decision

1 Introduction

According to Chair's guidance [1], this email discussion summary is to collect questions/comments for RAN-R18-WS-eMBB, together with answers to classified and summarized questions/comments that are provided by moderator (Spreadtrum) in an organized manner.

This summary covers the following documents:

RWS-210053 MIMO enhancements for R18

RWS-210054 R18 Flexible/Full Duplex considerations

RWS-210055 Mobility enhancements for R18

RWS-210056 R18 UL improvement

2 Comments/Questions/Answers to the Tdocs

2.1 General comments

2.1.1 <1st Round> Comments

Following RAN chair suggestion on RAN reflector, the following feedback form is to collect general comments/view on eMBB-driven Functional Evolution from companies.

Feedback Form 1: General comments

1 – Spreadtrum Communications
From Spreadtrum's view, the eMBB enhancements and some new areas that we believe are important for

R18 eMBB evolution and revolution include the following topics:

MIMO, Flexible/Full Duplex, Mobility, UL improvement

2.1.2 <1st Round> Summary by moderator

No comments from companies.

2.2 MIMO enhancement

2.2.1 <1st Round> Comments

In the contribution **RWS-210053**, we share some considerations on MIMO enhancement with the following proposals:

Proposal 1: Consider the following MIMO enhancements in Rel-18

- Identify and specify features to facilitate UL MIMO enhancements to achieve high capacity, e.g. UL frequency-selective precoding

- Identify and specify features to facilitate beam measurement and reporting with low latency and overhead

- Identify and specify features to facilitate enhancements for stationary UE, considering the trade-off among performance, overhead, latency, and/or power consumption

Regarding the above proposals for R18 MIMO enhancement and RWS-210053, the following feedback form is to collect questions/comments from companies.

Feedback Form 2: [MIMO] Questions/comments

1 – Beijing Xiaomi Mobile Software [Xiaomi] Q1: We also think L1-event driven multi-beam operation and UE-initiated beam management should be beneficial. Q2: As for stationary Ues, from our understanding, UE initiated beam report can solve the problem. It means that the 2nd sub-bullet can cover the 3rd sub-bullet. We want to know what the special issue is for stationary UE. In addition, we think stationary Ues can be studied together with the enh. for high/med. mobility UEs by considering different moving speed.
2 – Samsung Research America Q: For UL FS precoding, do you propose to use the Rel-15 CB or design a new two-stage (W1xW2) codebook for minimizing DL control signaling overhead?
3 – Intel Corporation (UK) Ltd <Intel> Q1. Do you have estimation on the overhead required to support subband operation for CB and NCB uplink

MIMO transmission? What implication on P-MPR due to non-contiguous RA in this case and whether net gain is still positive?
4 – MediaTek Inc. For cross-slot channel estimation,is it assumed that UE always assume such cross-slot channel estimation whenever configured or it is subject to any additional constraint?
5 – vivo Communication Technology what enhancement do you envision for stationary UE on top of what is already supported in Rel-15/16/17/

2.2.2 <1st Round> Answers by moderator

Many thanks to **Xiaomi/Samsung/Intel/MediaTek/vivo** for your valuable questions and comments on R18 MIMO topic. Our answers to those questions are listed below:

Answers for **Xiaomi**:

For Q1: Thanks for being supportive on the enhancement for beam measurement and reporting, it's good to see that we have common view.

For Q2: For the question of 'what the special issue is for stationary UE', in our views, the channel property of stationary UE can be exploited to achieve low overhead/latency not only for BM, but also for CSI and data scheduling. For the comment that 'stationary Ues can be studied together with the enh. for high/med. mobility UEs by considering different moving speed', we don't have strong preference on how to organize the work, discussing stationary UE together with the enh. for high/med. mobility UE by considering zero speed is OK to us.

Answers for **Samsung**: For the codebook for UL frequency selective precoding, our thinking is that the codebook enhancement can be discussed separately. We propose to support UL frequency selective precoding based on Rel-15 codebook.

Answers for **Intel**: We also care about the overhead issue caused by indicating multiple TPMIs by DCI. Some further enhancement should be applied to mitigate the signaling overhead. We assume contiguous RA in this case.

Answers for **MediaTek**: We are open to discuss the details on cross-slot channel estimation. In our views, similar as the discussion of joint channel estimation for PUSCH in Rel-17 coverage enhancement, a window should also be defined for cross-slot channel estimation for PDSCH.

Answers for **vivo**: We expect to enhance BM, CSI, and data scheduling for stationary UE to achieve high throughput, low overhead and low latency.

2.2.3 <2nd Round> Comments/Questions

The 2nd round discussion targets clarifications to answers by moderator in section 2.2.2 and further clarifications on RWS-210053_together. Please share your further questions/comments/views in the following form.

Feedback Form 3: [MIMO][Second round] Questions/comments/views Clarifications to answers by moderator and further clarifications on RWS-210053

1 – HuaWei Technologies Co.

In Section 2.2, by "UE event-based beam measurement and reporting", does it mean that under some defined triggering conditions, UE can send in requests to ask the NW to allocate or adjust beam measurement/report resource or configuration, but the decision is still at NW side?

2.2.4 <2nd Round> Answers by moderator

Thanks to **HuaWei** for your question on R18 MIMO enhancement.

Our intention is to support a faster beam reporting mechanism. The beam measurement/report resource is pre-configured by gNB, and gNB is free to update the configuration whenever needed. Your example is more like an on-demand procedure, and additional latency is introduced without clear benefit.

2.3 Flexible/Full Duplex

2.3.1 <1st Round> Comments

In the contribution **RWS-210054**, we share some considerations on flexible/full duplex with the following proposals:

Proposal 2:

- Any full duplex schemes at the UE side should not be considered in Rel-18.

- Study and specify BS-to-BS CLI measurement, avoidance and suppression [RAN3/4/1]

- Study flexible/full duplex on TDD bands first [RAN1/4].

- From the point of implement complexity and interference avoiding/suppression, subband full duplex is the first priority [RAN1/2/4]

- BWP/subband-specific TDD UL/DL configurations may be needed for better UE-to-UE CLI suppression.

- Reuse current RF Requirements for UE at the first stage.

- It is beneficial to adopt dynamic TDD and BWP/subband-specific TDD UL/DL configurations for different use cases in subband full duplex.

Regarding the above proposals for R18 flexible/full duplex and RWS-210054, the following feedback form is to collect questions/comments from companies.

Feedback Form 4: [Flexible/Full duplex] Questions/comments

1 – LG Electronics Inc.

Thanks for the contribution. Could you elaborate more the advantage and disadvantage of each option of potential solution for Subband Full Duplex?

2 – Intel Corporation (UK) Ltd

<Intel>

Q1. Given that fundamental feasibility (including possible levels of isolation that can be achieved) needs to be studied by RAN4, what is your view on relative timing/scope for studies in RAN4 and RAN1 for FD possibilities? Can RAN1 assume feasibility of certain level of isolation even for sub-band-based FD without prior RAN4 work?

Q2. For slide 4, what is the definition of "sub-band" assumed here? Is it intended to related to channel/carrier BW in some way (e.g., for Option 2)? If so, then is the proposal to limit FD to intra-band (but separate) CCs? And if not, then if both sub-bands are within the same CC, then is there a difference between Options 1 and 2?

3 – Futurewei Technologies

We find the motivations of flexible/full duplex well-summarized by the contribution, and we share the opinion that from the point of implementation complexity and interference avoiding supression, spectrum sharing full duplex is not the priority.

We suggest adding more study points such as use cases, frequency range applicability, MIMO operation, etc. It is better to clarify whether it is really the case that same latency is expected for both SBFD and FD, as summarized in the Scenario page of the contribution. Please take a look at our contribution RWS-210036 (https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_AHs/2021_06_RAN_Rel18_WS/Docs/RWS-210036.zip) and feel free to comment at: https://nwm-trial.etsi.org/#/documents/4580

4 – Nokia Corporation

We also prefer to study BS-2-BS CLI in Rel-18 instead of complex full/flexible duplex solutions, for which it is unlikely that they can be deployed in near future.

We share your view that for flexible/full duplex studies It is important to have RAN4 included from the start of such studies. What kind of performance impacts especially in DL performance do you foresee if UEs do not support flexible duplex? How about handling and DL performance of legacy UEs?

5 – vivo Communication Technology

Thanks for the contribution. we agree that full duplex at the UE side is premature due to infeasible to implement large antenna seperation.

One quesiton, for sub-band full duplex at gNB side, do you see potential UE RF impact in order to better control the intra-cell UE CLI, or you would like to keep the existing UE RF requirement unchanged?

6 – Fraunhofer HHI

Thank you very much for your contribution on full duplex, wherein the achievable advantages in particular in latency reduction and a more flexible UL/DL resource utilization are outlined.

We'd appreciate if you could further elaborate on:

Q1: How to benefit from latency reduction for a UE, when at the same time Full Duplex operation at the UE should not be studied in R18? OR are you referring to SFFD not to be studied, while SBFD should be the focus?

Q2: You refer to the UE-2-UE CLI framework in R16. Can you elaborate if you consider this framework to be sufficient to capture inter-operator CLI in dense deployments?

7 – Xiaomi Communications

Is it in a single subband in Option 1? Could legacy UEs without RF changes work in option 1 and 2?

2.3.2 <1st Round> Answers by moderator

Many thanks to **LGE/Intel/Futurewei/Nokia/vivo/Fraunhofer HHI/xiaomi** for your valuable questions and comments on R18 flexible/full duplex topic.

Overall, there are four main question areas asked by companies. The answers are listed below:

The potential impact on UE asked by **Nokia, vivo, xiaomi**:

- As for UE RF requirement, we would like to keep the existing UE RF requirements unchanged.

- In our understanding, no matter UE support full duplex or not, UE-2-UE CLI will be introduced by SBFD or FD at gNB and DL performance of the victim UE may be degraded. With the help of CLI measurement at UE, gNB can handled appropriately to prevent/reduce performance degradation. But for legacy UEs which don't support CLI measurement, we think it is difficult to avoid the cross link interference from aggressive UEs. So subband full duplex is our first priority. And "subband" filters may be used as shown in option 2 for subband full duplex and UE-to-UE CLI can be suppressed better.

Further clarify on the two options for sub-band full duplex, including the scheme itself and pros/cons asked by **LGE/Intel/xiaomi**:

Actually, we refer to subband as part of a carrier BW.

- Option 1 for subband full duplex:

The difference of option 1 from dynamic TDD lies in that gNB can transmit and receive at the same time but on non-overlapping resources, i.e. different subbands. From the UE side, there is no difference between option 1 and dynamic TDD.

Specifically, UE1 and UE2 are configured with the same channel bandwidth (can be same as carrier BW as an example). In the flexible symbols, some RBs are scheduled for DL and some RBs for UL. The DL resources and UL resources don't overlap with each other. For different UEs, the flexible symbols can be DL or UL according to UL/DL traffic demands and required latency, e.g. DL for UE1 and UL for UE2 in the figure. In this way, both low latency and different UL/DL traffic demands can be supported efficiently.

- Option 2 for subband full duplex:

UE1 and UE2 are configured with two different non-overlapped subbands in a single carrier. As UE RF requirements are defined based on channel BW in RAN4, we suppose UE1 and UE2 to be configured with different CBW which is already supported by current spec. Compared to option 1, "subband" filters should be

used in option 2 and UE-to-UE CLI can be suppressed better. As for each UE only one subband is activated, latency is introduced due to longer waiting time (e.g. UE1 stays in subband#1) or BWP/subband switch delay (e.g. UE1 switches to subband#2).

Time and scope (**Intel/Futurewei/Nokia/ Fraunhofer HHI**) : We are not clear about the time and scope in RAN1 and RAN4 now. So sorry that we cannot answer **Intel**'s question. From our perspective, BS-2-BS CLI should be studied in R18 as commented by **Nokia**, including both inter-operator and intra-operator CLI. As a response to **Fraunhofer HHI**, we are open to both SBFD and SFFD, but SBFD is our first priority. We share the same opinion with **Futurewei** that use cases, frequency range applicability, MIMO operation need to be studied.

Latency reduction (**Futurewei/ Fraunhofer HHI**)

As HD UE is assumed, we think same latency as dynamic TDD is expected for both SBFD and FD for a UE. The latency is not as low as FD gNB & FD UE.

2.3.3 <2nd Round> Comments/Questions

The 2nd round discussion targets clarifications to answers by moderator in section 2.3.2 and further clarifications on **RWS-210054** together. Please share your further questions/comments/views in the following form.

Feedback Form 5: [Flexible/full duplex][Second round]Questions/comments/views Clarifications to answers by moderator and further clarifications on RWS-210054

2.3.4 <2nd Round> Answers by moderator

No comments from companies.

2.4 Mobility enhancements

2.4.1 <1st Round> Comments

In the contribution RWS-210055, we share some considerations on Rel-18 Mobility enhancements with the following proposals:

Proposal 3: Study mobility enhancement in Rel-18.

- Potential studies of mobility enhancement for FR2 are needed, e.g.

-CSI enhancement for mobility

-Beam management for mobility

- Potential enhancement of 0ms handover interruption, e.g. DAPS enhancement for CA, DAPS +CHO.

- Support the leftover items of L1/L2 centric mobility from Rel-17

Regarding the above proposals for R18 Mobility enhancements and RWS-210055, the following feedback form is to collect questions/comments from companies.

Feedback Form 6: [Mobility enhancements] Questions/comments

1 – ZTE Corporation The scope and benefit of CSI enhancements and beam management for mobility are not very clear. Some clarification will be highly appreciated.
2 – HuaWei Technologies Co. We share similar views that dynamic switch via L1/L2 to support inter-cell mobility can improve the performance as in RWS-210449, do you have the same idea when saying L1/L2 centric mobility from Rel-17? Do you think support DAPS with CA/DC would require even higher capabilities from the UE side, e.g. 4 legs?
3 – Intel Corporation (UK) Ltd <Intel> Q1. Which kinds of CSI/beam management enhancements will be to improve mobility?
4 – Nokia Corporation We share your view that mobility enhancement is one important area for enhancements in Rel-18. Could you please share further details what kind of CSI enhancement for mobility you are considering?

2.4.2 <1st Round> Answers by moderator

Many thanks to **ZTE/HuaWei/Intel/Nokia** for your valuable questions and comments on mobility enhancement topic. Our answers to those questions are listed below:

Regarding DAPS enhancement for CA/DC and L1/L2 mobility:

- Frankly speaking, supporting DAPS with CA/DC requires even higher capabilities. Considering the high data rate of the new traffic is demanded more and more urgently, it is significant to maintain high data rate by CA/DC in the process of mobility. Besides, we think the UE capability might not be a critical problem in the near future. We have the similar views on L1/L2 mobility with less RRC signaling exchange and without increasing UE capacity. However, the performance of high data rate is not good enough.

- In regard to DAPS enhancement for CA/DC and L1/L2 mobility, both of them focus on different requirement. It is necessary to consider DAPS enhancement for CA/DC and L1/L2 mobility for R18 mobility enhancement.

Regarding CSI enhancements/beam management for mobility:

- Our initial thinking is CSI report and beam management can only applied after HO finished. However,

before handover or during handover, there would be helpful that target cell configures or indicates the candidates RS, and UE would report CSI or beam indication during the handover procedure to expedite the handover procedure. Especially, this method can be applied to CHO and DAPS.

2.4.3 <2nd Round> Comments/Questions

The 2nd round discussion targets clarifications to answers by moderator in section 2.4.2 and further clarifications on **RWS-210055** together. Please share your further questions/comments/views in the following form.

Feedback Form 7: [Mobility][Second round] Questions/comments/views Clarifications to answers by moderator and further clarifications on RWS-210055

1 – HuaWei Technologies Co.

Thanks for the replies. Could you please indicate why do you think the ”performance of high data rate is not good enough” for L1/L2 moblity?

2.4.4 <2nd Round> Answers by moderator

Many thanks to **HuaWei** for your valuable questions and comments on mobility.

In the procedure of fast switch with L1/L2 signalling, whether it can maintain high data rate depends on the interruption time. We are not sure yet whether “0ms” interruption can be achieved with L1/L2 signalling. What is not in dispute, it is beneficial for reducing the amount of RRC signalling exchange. Anyway, we are open to discuss L1/L2 mobility.

2.5 NR UL improvement

2.5.1 <1st Round> Comments

In the contribution **RWS-210056**, we share some considerations on Rel-18 NR UL improvement with the following proposals.

Proposal 4:

- Support UL carrier switching of PUSCH carriers

-Configuration and Indication of UL carrier switching

- Impact of PUSCH processing time

- Study the feasibility and benefit of solution(s) on the UE aggregation for enhanced UL transmission, and specify the identified solutions if deemed feasible and beneficial

- Support full functional PUCCH carrier switching, e.g.

- SR or/and CSI only PUCCH carrier switching

- Considering the interaction of HARQ-ACK PUCCH carrier switching

- UL coverage enhancement postponed from Rel-17

Regarding the above proposals for R18 NR UL improvements and RWS-210066, the following form is to collect questions/comments from companies.

Feedback Form 8: [NR UL improvements] Questions/comments

1 – China Telecommunications

We share the similar view that UL coverage enhancement should be considered in Rel-18. Notice that only PUSCH type B and sequence based PUCCH are explicitly included in your contribution, so what's your view on other enhancement solutions, e.g. sub-PRB transmission with multi-slot aggregation, multiple PRACH transmission?

For UL carrier switching, we have a simple comment: in Page 4 of your contribution (the bullet of "benefits"), it seems that you miss the point, you just mention how to determine to perform dynamic UL Tx switching without explain the benefits or motivation. So, the motivation is not that clear to us.

2 – Intel Corporation (UK) Ltd

<Intel>

Q1. There were extensive studies for PUSCH repetition type B enhancement and sequence based PUCCH during CovEnh SI phase but there was no consensus to support this. Can you please clarify the motivation to reopen the discussion?

3 – vivo Communication Technology

1) On coverage enhancement, what is the baseline assumption for further enhancement in Rel-18? Re-evaluation to identify bottle-neck channel?

2) On UL carrier switching, is the motivation to more dynamic UL cross carrier scheduling?

4 – ZTE Corporation

In general, we share that UL enhancements for better UL coverage and higher UL capacity are desirable.

Regarding UL carrier switching of PUSCH carriers, could you clarify what's the difference compared to the Tx switching in Rel-16/17?

Regarding sequence based PUCCH, we also think it is helpful for improving the PUCCH coverage based on the evaluation proceeded in Rel-17 CE SI.

Regarding UE aggregation, we share similar view that it could be used to for UL enhancements.

5 – Huawei Tech.(UK) Co.. Ltd

We share the same view on UL carrier switching. For clarification, is switching among more than 2 UL bands or among more configured serving cells than UE transmission capability? It is very important for UL capacity and also benefits for XR-traffic and URLLC-traffic thanks to more available resources and low waiting delay. UL carrier/Tx switching can apply to PUSCH/SR/CSI.

For UE aggregation, how is the virtual UE formed? (by gNB or by a group of UE themselves). Does larger UL bandwidth mean L1 level aggregation? Would the virtual UE need to report its capability to gNB?

6 – China Mobile Com. Corporation

In general, we share that UL enhancements for better UL coverage and higher UL capacity are required to be studied in Release 18. Regarding the UE aggregation, as indicated in the contribution, dynamic choice of RF chains, with better Tx beam, flexible scheduling time and frequency resource can be achieved. Do you mean for the virtual UE group, the UE-specific part just the RF chains part and physical layer part?

7 – Xiaomi Communications

We share the similar view that UL coverage enhancement should be considered in Rel-18. Is the mechanism to ***Support UL carrier switching of PUSCH carriers*** based on SUL mechanism?

2.5.2 <1st Round> Answers by moderator

Many thanks to **China Telecom/Intel/vivo/ZTE/Huawei/CMCC/Xiaomi** for your valuable questions and comments on R18 UL improvement topic.

Overall, there are three main question areas asked by companies focused on:

- UL coverage enhancements, including the motivation, evaluation assumption, scope.

- UL carrier switching, including motivation, difference with UE Tx switching in Rel-16/17 and SUL carrier switching in Rel-15

- UE aggregation, including how virtual UE forms, links among UEs

The answers by moderator are listed below:

Regarding **UL coverage enhancement**:

- *Motivations* are there are remaining gaps after the implementations of Rel-17 solutions. E.g. PUSCH for eMBB/VoIP and PUCCH format 3 11 bit. Another point is for PUSCH repetition type A, it can use larger UL slot based repetition number enhance its coverage. However, PUSCH repetition type B, which would be widely used for URLLC taffic, we do not give enough discussions for it. Furthermore, even with additional MPL gain from DMRS bundling and TB processing, there are still up several dBs gap. Thus, we think UL coverage can be studied in Rel-18 to provide a better complete solution for UL coverage.

- Regarding *evaluation assumption*, we do not think there is a need to do re-evaluation, the previous evaluations and results in Rel-17 UL coverage enhancement can be reused to identify bottleneck channel. Such PUSCH for eMBB/VoIP and PUCCH format 3 11 bits.

- For the scope of *UL coverage enhancement*, we think at least PUSCH and PUCCH enhancement can be in Rel-18 scope. According to sub-PRB transmission, it has been evaluated and discussed in Rel-17. The gains varied greatly. That is why we did not list them on our paper. Regarding RACH enhancement, methods of same beam repetitions and different beam repetitions may need further study. We are open for UL coverage enhancements.

Regarding **UL carrier switching**:

- The motivation is due to UE's limited CA capability and limited Tx power, it is very hard for a UE to simultaneously transmit UL on multiple UL carriers, or difficult to support more UL carriers. Considering UE only support semi-static configured/reconfigured UL carriers, when UE's transmission capability less than operator's spectrum, only a subset of UL carriers can be configured for a UE. Thus, it is beneficial for UE to switch the subset of UL carriers among the configured UL carriers, which is beneficial for load balance, schedule delay and better spectrum efficiency.

- Regarding the mechanism of UL carrier switching, we prefer to reuse the structure of SUL carrier switching as the starting point. Additional RAN1/2 configurations and indications signaling also need to be introduced. Generally, UL carrier switching can provide a dynamic UL carrier switching method among activated UL carriers, which is possible to switch from one UL carrier subset to another UL carrier subset. We are open to discuss the scope of UL carrier switching.

Regarding **UE aggregation**:

- Virtual UE can be several terminals associated with a UE, which we think is with higher priority. We are open to several terminals associated with different UEs. UL transmission can be split or duplicated among several terminals, which would improve UL throughput, bandwidth.

- For links between UEs, we do not want to define new links between UEs. Rel-17 sidelink relay or PC5 can be used, or maybe private link without any specification.

2.5.3 <2nd Round> Comments/Questions

The 2nd round discussion targets clarifications to answers by moderator in section 2.5.2 and further clarifications on **RWS-210056** together. Please share your further questions/comments/views in the following form.

Feedback Form 9: [UL improvement][Second round] Questions/comments/views Clarifications to answers by moderator and further clarifications on RWS-210056

1 – China Telecommunications

Thanks for your replies and clarifications. For coverage, we share the same view that re-evaluation is not needed. For UE aggregation, we have one question based on your clarifications:

Q1. We understand what several terminals form a virtual UE means. But can you make some clarifications on "several terminals associated with different UEs"? And what's the typical scenario for this?

2.5.4 <2nd Round> Answers by moderator

Many thanks to **China Telecom** for your valuable questions and comments on R18 UL improvement topic.

Nice question! From our understanding, virtual UE can be several terminals associated with a UE is with higher priority. Regarding several terminals associated with different UEs, our initial thought is one UE can be another UE's backup. We do not have strong views at this association, which can be discussed at SI phase to decide whether support it or not.

3 Conclusion

Based on the collected comments/views/questions from all companies in the last two rounds Q&A, we have the following summarized observations for each topic.

Observation 1: For MIMO enhancement, comments focused on UL frequency selective precoding, event based beam measurement/reporting and stationary UE.

Observation 2: For Flexible/Full duplex, potential impact on UE of different flexible/full duplex schemes, different flexible/full duplex schemes and time/scope of R18 flexible/full duplex are three important issues.

Observation 3: For mobility enhancement, companies interested in CSI enhancements and beam management for mobility and dynamic switch via L1/L2 to support inter-cell mobility.

Observation 4: For UL improvement, UL coverage enhancements, UL carrier switching and UE aggregation can be discussed further.

4 Reference

RWS-210002 Some details for RAN Rel-18 Workshop□RAN Chair

RWS-210053 MIMO enhancements for R18 Spreadtrum communications

RWS-210054 R18 Flexible/Full Duplex considerations Spreadtrum communications

RWS-210055 Mobility enhancements for R18 Spreadtrum communications

RWS-210056 R18 UL improvement Spreadtrum communications