

[95e-37-R17-FR2-RF] Conclusions
Variant of [95e-37-R17-FR2-RF] Version 0.0.3
RAN

3GPP TSG-RAN Meeting #95 Electronic RP-220897

Electronic Meeting, March 17 - 23, 20

Agenda item: 9.5.4.8

Source: Moderator (Nokia)

Title: Moderator summary of [95e-37-R17-FR2-RF] email discussion

1 Introduction

In this email discussion the following contributions related to the Rel-17 WID Further enhancements of NR RF requirements for frequency range 2 (FR2) and its completion are discussed: RP-220469, 0607, 0769, 0770, 0771, 0403

2 Initial Round

2.1 Status report in RP-220770

Is the status report of the Rel-17 WID Further enhancements of NR RF requirements for frequency range 2 (FR2) from the rapporteur in RP-220770 acceptable? Is the status report from the rapporteur in RP-220770 acceptable? Any comments on the SR?

Feedback Form 1: Is the status report from the rapporteur in RP-220770 acceptable? Any comments on the SR?

1 – Ericsson LM

The following open issues need to be listed under UL gaps:

UL gaps for self-calibration and monitoring:

- RF test metric (delta-EIRP) and P-MPR test procedures
- RRM procedures to be prioritized over UL gaps

2 – Nokia France

We support Ericsson's proposal in addition to the currently list of open items.

2.2 Exception sheet in RP-220771

The rapporteur is proposing an except sheet in RP-220771 to complete the remaining open items of the Rel-17 WID Further enhancements of NR RF requirements for frequency range 2 (FR2). Do companies agree to have any exception sheet? Is the exception sheet in RP-220771 acceptable?

Feedback Form 2: Do companies agree to have any exception sheet? Is the exception sheet in RP-220771 acceptable?

1 – Ericsson LM

We have following comments:

1) The following open issues related to be UL gaps should be included in the exception sheet:

UL gaps for self-calibration and monitoring:

- RF test metric (delta-EIRP) and P-MPR test procedures
- RRM procedures to be prioritized over UL gaps

2) It may be very challenging to complete UL interband CA in 1 quarter. So we prefer to remove this from R17 scope:

UL interband CA:

- UL CA MPR, relaxation values and Pmax handling for *CAn257A-n259A and CAn260-n261*

2 – TELECOM ITALIA S.p.A.

We think the scope of the exception sheet should be kept realistic, and no new topic added.

3 – Qualcomm Technologies Int

For the part:

DL interband CA:

- UE requirements for DL CA with CBM for CA_n258-n261, n257-n259, n258-n260, n260-n261,
- UE relaxation values for DL CA with IBM for CA_n258-n261

We want to remove the first bullet and notions of work for CBM. We do not see extension enabling progress.

4 – Sony Group Corporation

In the agreed WF for UL gap from last RAN4 meeting (R4-2206604), there are some FFS in test procedure and methodology section, including the P-MPR behavior with uplink duty cycle (step 3) and the P-MPR value when uplink gap is configured (step 2).

5 – LG Electronics Inc.

We're fine with this exception sheet.

DL CA with CBM has been discussed during multiple meetings. And, related RRM requirements were endorsed. So, we would like to keep the current scope for the DL inter-band CA, and UL inter-band CA including *CAn257A-n259A and CAn260-n261*.

6 – Huawei Technologies France

We are fine with the exception sheet. Regarding the DL CA with CBM, similar view with LGE, as the WI will be extended for one quarter, the group still have chance to further think how to proceed, better to be discussed based on draft CRs.

7 – Apple Italia S.R.L.

Regarding UL gap configuration optionality, capability for UL CA, test procedure and UL MIMO requirements: There was agreement on UL gap configuration optionality at the last RAN4 meeting so it should be removed. We also want to clarify if test procedure belongs to core part or perf. part.

Regarding priority of UL gaps and reporting: we are not sure what work “reporting” entails. Clarification is needed.

Given the lack of progress with the DL CA CBM objective, and in the interest of concluding the Rel-17 work in one RAN4 meeting, we suggest to remove the DL CA with CBM objective.

For a similar reason, we suggest to also remove UL CA inter-band for PC3 (i.e. explicitly indicate that UL CA MPR for PC1/5). It can be further discussed whether/how these can shift to the Rel-18 work item based on operator demand.

For the last bullet in the DC location part, we suggest correcting it to say “Handling of DL only CA”.

8 – MediaTek Inc.

Given the current situation of CBM discussion, we would suggest to drop it from the exception sheet. So that RAN4 can have a more realistic target to be finished in the next quarter. We do not think the progress in the RRM session mandates the RF session to conclude all the corresponding requirements. Whether to consider the CBM requirements in Rel-18 is a separate discussion which does not belong to this thread.

9 – Guangdong OPPO Mobile Telecom.

Regarding DC reporting suggest to replace the following bullet with the wording in the agreed WF last RAN4 meeting:

- ~~Single CC handling within or not within CA~~

->

- FFS whether R17 mechanism can also cover single CC UL (non-CA case)

10 – NTT DOCOMO INC.

We are fine with the exception sheet proposed by the rapporteur.

For inter-band UL CA with IBM, we would like to keep the content of the current exception sheet. For PC3, we had an agreements that PC3 will be discussed, and if general UL CA requirements and PC1/5 are finished, only remaining issue is delta TIB for PC3. It is premature to drop it at this time.

For DL CA with CBM, so far, we don't have strong view. If other companies are OK to drop, we are also OK with dropping to reduce the scope.

11 – Nokia France

We support Ericsson's and Qualcomm's proposals.

Comment to Apple: UE features related to UL gaps under *NRRFFR2reqenh2* still have square brackets and question marks so it does not seem that everything is complete. However, it is ok for us to reformulate the text. Regarding the remaining open test aspects, the core UE requirements use testing aspects like test metric for EIRP in case of UL gaps and therefore related testing aspects need to be completed to ensure requirement completion.

2.3 Need for WID update as proposed in RP-220469

RP-220469 proposes update the WID to have the following updated objective text:

- Specify DC location reporting scheme to cover intra-band UL CA with 2 CCs and more for FR1 and FR2, and intra-band DL CA for FR2. (RAN4, RAN2)

- NOTE: No impact on Rel-16 method (uplinkTxDC-TwoCarrierReport-r16)

Do companies agree with the WID objective update as proposed in RP-220469? Do companies agree with the WID objective update as proposed in RP-220469?

Feedback Form 3: Do companies agree with the WID objective update as proposed in RP-220469?

1 – Ericsson LM

Similar comments as for proposal 2 in section 2.4. The scope should not be broadened. Therefore we have concern to update the objective on DC location reporting.

2 – Qualcomm Technologies Int

We are proponents for this proposal. Not accepting the scope change would mean unfortunate need for a

<p>R18 project to cover all cases when DC location is needed by the receiver, be it gNB or TE. The work we have done in RAN2 and RAN4 are aligned already with this proposal so in practice the impact is very small or nothing.</p>
<p>3 – ZTE Corporation</p> <p>Ok to extend the >2CC to >=2CC for Rel-17 FR1/FR2 intra-band UL CA, since it was already agreed in RAN4 #102 meeting. However, it seems intra-band DL CA for FR2(without UL CA) was not in the scope in RAN4's previous meeting, so it might be excluded.</p>
<p>4 – Huawei Technologies France</p> <p>We are ok with the proposed update.</p>
<p>5 – vivo Communication Technology</p> <p>We support the proposed changes.</p> <p>In addition to the agreements regarding CC number in RAN4#102, we also have agreements on the influential factors on DC location as follows (WF R4-2107858) in RAN4#99e</p> <p>Factors(topic 2-1/2-4)</p> <ul style="list-style-type: none"> • For FR1, UL configured or activated outermost CCs or BWPs • For FR2, UL or DL configured or activated outermost CCs or BWPs <p>The proposed changes do have RAN4's agreements for support.</p>
<p>6 – Intel Corporation (UK) Ltd</p> <p>We support the proposed objectives update</p>
<p>7 – Guangdong OPPO Mobile Telecom.</p> <p>ok with the change.</p>
<p>8 – Nokia Japan</p> <p>Covering two CCs is OK. We, however, still need to better understand the necessity of including intra-band DL CA for FR2.</p>

2.4 Proposals in RP-220607 for completing CBM feature and revising the WID for DC-location

RP-220607 makes the following proposal for the completion of the Rel-17 WID on FR2 RF enhancements.

Proposal 1: Complete CBM feature by focusing on different frequency group with multi-chain only.

Proposal 2: Revise the WID for DC-location part from “with more than 2 CCs” to “2CCs and more”.

Do companies agree with these proposals?

Feedback Form 4: Do you agree with the proposal 1 of RP-220607?

1 – Ericsson LM

Combinations for different frequency groups (e.g. 28 + 40 GHz) for CBM is challenging and unrealistic to do in R17.

So we have concern on proposal 1. We therefore suggest to modify proposal 1 as follows:

- Complete CBM feature by focusing on combinations within the same frequency group.

2 – Qualcomm Technologies Int

We would prefer to extend the proposal 1 to remove the CBM objective completely.

For proposal 2, we are ok with it but would like to also include the DL CA as we propose in **RP-220469**.

3 – Sony Group Corporation

In general, we prefer continue the CBM discussion for one more quarter but with a narrow downed scope. Our preference is to focus on CBM within the same frequency group with single chain as Ericsson suggested. However, if majority think this is a dead-end, we can also accept the CBM with different frequency under multi chain only for the next quarter.

4 – ZTE Corporation

For proposal 1, We understand the intention to remove the inter-band DL CA CBM within same frequency range related from the objectives, indeed it is difficult to converge the discussion on the F_s_inter for CBM within same frequency range. However, it seems there were no agreements that only multiple RF chain is applied to the inter-band DL CA CBM within different frequency range since the previous RAN4's agreements said the RF requirements should consider both single RF chain and multi-RF chain and no signalling was agreed to distinguish single chain and multiple chain. Therefore, it might need to agree the RF architecture for different frequency range CBM first (i.e. multiple RF chain only or either single chain or multiple chain).

In addition, we can accept QC's comments of removing the CBM objective completely since we don't think RAN4 can achieve agreements on single chain for inter-band DL CA CBM within same frequency range (i.e. F_s_inter related discussion) in May meeting.

For proposal 2, ok.

5 – LG Electronics Inc.

For proposal 1, we think CBM needs to be completed with the same frequency group rather than the different frequency group if scope-down is needed.

6 – Huawei Technologies France

We prefer to keep the scope as it is. CBM or IBM is not affiliated to certain band group, we are discussing how to specify the RF requirements. For single RF chain or multi RF chain, what matters is how to distinguish the applicable RF requirements, even w/o indication of specific UE implementations, that is possible based on discussion for FR1. If after further discussion in May meeting, some requirements can still not be completed, we are fine to drop some features in next RANP. Then we also need to consider when/how to proceed the leftover issues as well as the impact to the feature list.

7 – vivo Communication Technology

We understand that CBM is indeed more suitable for the same frequency group scenario, but as we mentioned in the paper, it is hard to achieve compromise between different architecture a deadlock seems inevitable even we have one more meeting. From our perspective, the CBM between different frequency group is the only hope to complete some CBM in next quarter and actually only multi-chain is confirmed to be feasible in this scenario.

If we cannot agree to down scope to different frequency group, we can also accept to remove CBM completely.

8 – Apple Italia S.R.L.

Please refer to our comments to Issue 2.2. We should postpone the entire CBM feature to a release after Rel-17, and we should follow operator demand in evaluating the urgency/priority of the work.

9 – Intel Corporation (UK) Ltd

We prefer to continue the work on CBM in the next quarter and perform down-scoping as proposed by Ericsson with a focus on the same frequency group (“**Complete CBM feature by focusing on combinations within the same frequency group.**”)

10 – MediaTek Inc.

We suggest to revise Proposal 1 as “Drop CBM feature for combinations across different frequency groups.” As commented in a previous issue, we are also fine to drop the entire CBM feature.

11 – Samsung Electronics Co.

In our view, it is not urgent to enable L+H deployment with CBM where IBM is already enabled and IBM is more capable than CBM. L+H requires UE to be equipped with multi-chain and naturally it will support IBM. So we think IBM is sort of default mode for L+H.

Moreover, focusing on CBM to L+H may bring fragmented specification, i.e. there would be two sets of requirement framework between CBM L+H and CBM L+L. In our view RF requirements should not be too fragmented. The test configuration and requirements can be aligned as much as possible to allow UE implementation as long as the “minimum” requirements are met. In the beginning of this WI, requirements were discussed in the direction of different requirements for different frequency group (no matter IBM or CBM). And then the direction was changed to distinguish different requirements according to different BM capability, we are already going this way and it could not be reverted back since PSD difference configuration will be definitely different between CBM and IBM at least for single-chain architecture. So we prefer to classify two sets of inter-band CA requirements based on BM capability regardless of L+H or L+L. In this sense, CBM should be discussed covering both L+H and L+L together.

However, there are so many controversial issues for CBM that it is not possible to be completed within only one extended WG meeting. Even focusing on CBM on L+H, there is also controversial view about

requirement framework as some companies prefer 'equal' PSD for all band combinations, let alone controversial views on EIS relaxation values due to difficult beam management. **Therefore the most practical down-scope is to drop CBM totally and focusing on IBM remaining issues in Rel-17.**

12 – Guangdong OPPO Mobile Telecom.

For proposal 1, not ok with only consider multi-chain in CBM, RAN4 already have agreement that both single chain and multi-chain are considered in the requirement.

13 – Nokia France

We support Qualcomm et al to remove CBM objective and focus on completing remaining aspects for IBM.

Feedback Form 5: Do you agree with the proposal 2 of RP-220607?

1 – Qualcomm Technologies Int

For proposal 2, we are ok with it but would like to also include the DL CA as we propose in **RP-220469**.

2 – ZTE Corporation

Fine with proposal 2.

3 – Huawei Technologies France

OK with proposal 2.

4 – Intel Corporation (UK) Ltd

This should be discussed jointly with 2.3 and prefer wording in RP-220469

5 – Nokia France

WID updates depend on how the discussion will converge. In our view the whole CBM could be removed from Rel-17 scope to help the WID completion.

6 – Nokia Japan

We agree with covering two CCs. But the final text must be discussed together with RP-220469.

2.5 WID update from the rapporteur in RP-220769

The rapporteur is proposing updates to the WID in RP-220769. Are the rapporteur's WID updates acceptable?

Feedback Form 6: Are the rapporteur's WID updates in RP-220769 acceptable?

<p>1 – Ericsson LM</p> <p>Updated target dates are OK. But update to objectives depends on outcome of previous issues.</p>
<p>2 – Qualcomm Technologies Int</p> <p>We are ok with the changes proposed in 769 but further revision should be done according to outcome of the issues above.</p>
<p>3 – ZTE Corporation</p> <p>Ok to add CA_n260-n261 as one of the example inter-band UL CA band combination, it was the agreement in last meeting.</p> <p>Some other objectives may be needed to be updated pending on outcomes of the previous issues.</p>
<p>4 – LG Electronics Inc.</p> <p>We're fine with this WID update.</p>
<p>5 – Huawei Technologies France</p> <p>Ok with current WID update in 769.</p>
<p>6 – Apple Italia S.R.L.</p> <p>With CA_n260-n261 added to the objective for inter-band UL CA, the sentence thereafter should also be updated from "this configuration" to "these configurations". There has never been a basket WI for FR2 inter-band CA combinations. Maybe the sentences associated with the basket WI can be removed.</p>
<p>7 – Intel Corporation (UK) Ltd</p> <p>Updated objectives shall reflect the conclusions from the discussions on other issues. Besides that, the changes are fine for us.</p>
<p>8 – MediaTek Inc.</p> <p>pending on the conclusion of previous open issues.</p>
<p>9 – Guangdong OPPO Mobile Telecom.</p> <p>ok with the change. Further changes for DC location need to be included.</p>
<p>10 – NTT DOCOMO INC.</p> <p>OK with the changes in 769 from the rapporteur.</p>
<p>11 – Nokia France</p> <p>Yes. Additional updates can be included based on the discussions of other proposals.</p>

2.6 Summary of Initial Round

Status Report:

The following open items were proposed and supported to be added to the SR:

UL gaps for self-calibration and monitoring:

- RF test metric (delta-EIRP) and P-MPR test procedures
- RRM procedures to be prioritized over UL gaps

Exception Sheet:

Generally companies see need for exception sheet. Details for the remaining open items need further discussion.

Need for WID updated as proposed in RP-220469:

Majority of the companies support to include also 2 CC for DC location reporting objectives. More discussion needed during the Intermediate Round for the exact details of the objective updates.

Proposals in RP-220607 for completing CBM feature and revising the WID for DC-location

Proposal 1: Different views were expressed during the Initial Round whether CBM related objective should be updated and how.

Proposal 2: Majority of the companies accepted to include 2CCs and more to the objectives.

WID update from the rapporteur in RP-220769

Generally the rapporteur's WID updates were seen acceptable but further updates to the objectives may be needed based on other discussion topics under this email thread. The rapporteur's WID update will be finalized once the remaining discussions are concluded.

3 Intermediate Round

3.1 Status report in RP-220770

The moderator proposes the following open items to be added to the Status Report:

UL gaps for self-calibration and monitoring:

- RF test metric (delta-EIRP) and P-MPR test procedures
- RRM procedures to be prioritized over UL gap

Feedback Form 7: Is it acceptable to include the following open items to the status report?

1 – Guangdong OPPO Mobile Telecom.

For clarification, what is "RF test metric (delta-EIRP)" specifically? Is it about the requirement equation or others? Be more specific could be better.

2 – Apple Italia S.R.L.

Thanks for moderator's proposal. Based on the agreed WF R4-2206604, there is no open issue on delta-EIRP in the test procedure. So we suggest a small rewording of the first open item to reflect the status: RF test procedures including P-MPR reporting in the procedures.

3 – Huawei Technologies France

Thanks for the moderator's proposal. Since the agreements on UL gap for UL coherent MIMO in last RAN4 e-meeting are not captured in Task(s) within work which are not complete, we think additional bullet for the remaining work should be added:

- UL gap for UL coherent MIMO
 - o Specifying the RF requirements to enable UL gap for UL coherent MIMO and finish the corresponding signaling

4 – Huawei Technologies France

In addition, we think the following agreement should be added in the SR to align with the WF(R4-2206604) in RAN4#102e.

Agreement: Further discuss the following options in order to conclude in next meeting

- FFS: Enable implicit triggering of the UL gap for UL coherent MIMO, by defining $K2_{mincal}$ which include the PUSCH preparation time plus the calibration time.
- FFS: The calibration time is 0.25ms.
- Symbol used for calculation
 - o Option 2: DMRS RE
- Average window for relative phase and power error
 - o Option 2: The "relative phase error" and "relative amplitude" shall be calculated in frequency domain. There should not be then mention of "instantaneous" or "average over a slot".

5 – Nokia France

We are OK to add the additional open items, as well as the additional bullet proposed by Huawei ("UL gap for UL coherent MIMO etc")

3.2 Exception sheet updates

The moderator proposes the following updated open items for the exception sheet on UL gaps for self-calibration and monitoring area:

UL gaps for self-calibration and monitoring:

1. RF test metric (delta-EIRP) and P-MPR test procedures
2. RRM procedures to be prioritized over UL gap
3. UE feature and capability details for UL gap configurations, capability for UL CA, test procedure and UL MIMO requirements

The moderator proposes to check after completing the discussion on CBM and DC-location reporting objectives whether updates to the open items on these areas are needed in the exception sheet in RP-220771.

Feedback Form 8: Is the moderator's proposal for the updated open list in the exception sheet acceptable?

1 – Guangdong OPPO Mobile Telecom.

For clarification, what is "RF test metric (delta-EIRP)" specifically? Is it about the requirement equation or others? Be more specific could be better.

2 – Apple Italia S.R.L.

For UL gap, we suggest the following rewording:

- RF test procedures including P-MPR reporting in the procedures
- RRM procedures to be prioritized over UL gap
- UE feature and capability details for UL gap configurations, capability for inter-band UL CA, and UL MIMO requirements

3 – Huawei Technologies France

Thanks for the moderator's proposal. Since the agreements on UL gap for UL coherent MIMO in last RAN4 e-meeting are not captured in Task(s) within work which are not complete, we think additional bullet for the remaining work should be added:

- UL gap for UL coherent MIMO

- Specifying the RF requirements to enable UL gap for UL coherent MIMO and finish the corresponding signaling

4 – Nokia France

We are OK with the open items listed by the Moderator including the wording update provided by Apple above, as well as the additional bullet proposed by Huawei.

5 – Ericsson LM

We are fine with the open items listed by the Moderator. Also fine with Apple rewording

3.3 Objective update for DC-location reporting

Majority of the companies support to include also 2 CC for DC location reporting objectives. During the Intermediate Round the detailed objective update should be agreed. Companies are invited to propose suitable objective update taking into account the Initial Round discussion.

Feedback Form 9: Companies are invited to propose suitable objective update text here taking into account the Initial Round discussion.

1 – Qualcomm Technologies Int

Our view is that the case of UL carrier leakage falling on spectrum configured only for DL would need to be covered: the appropriate objective would be:

- *Specify DC location reporting scheme to cover intra-band UL CA with 2 CCs and more for FR1 and FR2, and intra-band DL CA for FR2. (RAN4, RAN2)*

- *NOTE: No impact on Rel-16 method (uplinkTxDC-TwoCarrierReport-r16)*

But it seems three companies (Ericsson, Nokia, ZTE) do not want to enable testing of emissions from UL CCs to frequencies that configured only for DL CCs. Could these companies be more specific what is their reason for this? If this is the final conclusion, specifications then would need to be updated accordingly that the carrier leakage and IQ Image location even after rel-17 remains unknown in this case. For example for 6.4A.2.2.1 General in 38.101-2 we can add a sentence:

Carrier leakage location when it lands on configured UL spectrum is reported with [IE name R17] but when it lands on component carrier that is configured for DL only, the location is unknown.

2 – ZTE Corporation

For including DL only CA case as mentioned by QC, we are not against to discuss it, and we know there exist a gap in the requirements if no decision on the DL CA only case but it seems there were no extension discussions on DL only CA with UL single CC in RAN4 previous meetings. So we are not sure if it is

possible to achieve the conclusion in one meeting. However, it seems majority company agree to include it, so we are also fine to include it.

3 – Guangdong OPPO Mobile Telecom.

1. We are ok with the following changes in this meeting based on the understanding that current FR2 IBE is extended to DL only CCs according to FCC regulations. Then UE DC location should be known to NW/TE to find out where the carrier leakage/IQ images are located. Now the Rel-16 2CC solution only report the DC location when it is at the UL spectrum, thus Rel-17 should cover 2CC case to make the DC location reporting known rather than only reporting 3300/3301.

- *Specify DC location reporting scheme to cover intra-band UL CA with 2 CCs and more for FR1 and FR2, and intra-band DL CA for FR2. (RAN4, RAN2)*

o *NOTE: No impact on Rel-16 method (uplinkTxDC-TwoCarrierReport-r16)*

2. Regarding the "clarification sentence:when it lands on component carriers configured for DL only, the location is unknown", this is not ok to us since this means the general requirements will be applied and it is tighten the IBE requirements. Now we have the chance to make the location clear for 2CC case, better to fix the hole in Rel-16 solution.

3. Another aspect is about the 1CC UL+1CC DL case, it should be clear that this is out the scope of Rel-17 WI, and should not be further discussed in RAN4. In last meeting we see some company further extend the DC location reporting scope to 1CC UL+1CC DL case without specific reasons. And in the WF last RAN4 meeting it says "FFS whether R17 mechanism can also cover single CC UL (non-CA case)", we suggest to stick to RAN4 WID scope to ≥ 2 CC rather than further extend to 1CC UL+1CC DL.

4 – Intel Corporation (UK) Ltd

We agree with Qualcomm's proposal on the objective formulation.

5 – vivo Communication Technology

We support Qualcomm's proposal on the WID objective update.

6 – Nokia Japan

Now we are OK with the proposal from QC.

3.4 CBM Objective

No consensus was reached during the initial round if the CBM related objective should be updated, removed, or kept as it is Companies are invited to make compromise proposals how to handle CBM objectives and remaining work.

Feedback Form 10: Companies are invited to make compromise proposals how to handle CBM objectives and remaining work.

1 – Qualcomm Technologies Int

We still think that completing CBM is infeasible with one quarter extension which means only one WG meeting. If we need to compromise, then at least limit the CBM scope to the CA on bands with same frequency group.

2 – Sony Group Corporation

Down scoping of CBM discussion is necessary if the object would be extended. In this case, CBM for the same frequency group should be the focused for the next quarter. However, if still no consensus could be achieved in the next WG meeting, we can postpone the CBM requirements to a future release.

3 – Guangdong OPPO Mobile Telecom.

In our view, actually we may still have chance to complete in RAN4 if focus on CBM in same freq group band combinations, but compromise is needed in the contentious points, i.e. Fs_inter (introduce capability or considered in the Delta Rib). Therefore, the CBM for same freq group should be included, but should cover both single chain or multi chain as RAN4 already agreed to cover both implementations.

4 – Apple Italia S.R.L.

we keep the same view as in the first round: let's remove the CBM related objective from the Rel-17 exception sheet, and we can include CBM as an enhancement in a future release based on operator demand.

5 – MediaTek Inc.

Our first preference would be to remove CBM completely. As a compromise, we are fine to limit CBM to the same frequency group and try one more meeting. If RAN4 still can not finalize all requirements, we drop in the the next RP meeting.

6 – LG Electronics Inc.

As a compromise, we're fine to limit CBM to the same frequency group and RAN4 focuses to complete it in the next meeting.

7 – Samsung Electronics Co.

RAN4 has discussed the CBM requirements in the direction of same set of requirements will be applied for different and same frequency group. In our understanding, either of keeping all the CBM discussion for both same and different frequenc group in next quarter as a compromise or removing it totally in this RAN(our preference). Having only part of discussion in Rel-17 will NOT accepted.

For keeping CBM within REI-17 scope, if still no progress until June plenary, it is well justify even after spending the entire release in RAN4 but still no much progress, we suggest not consider it at all in Rel-18.

8 – ZTE Corporation

Maybe RAN4 can try one more meeting in May although we think it is difficult to converge the discussion on CBM in next quarter (i.e. May meeting), especially Fs_inter for CBM within same frequency range.

In addition, in terms of the discussion in RAN4 meeting, some companies argued the CBM for the band combination within same frequency group due to there were no clear demands on CBM from operator's although there was band combination within same frequency requested. So we are not sure why focus on CBM scope within same frequency group as mentioned by other companies.

9 – Intel Corporation (UK) Ltd

We support defining CBM requirements within Rel-17 timeframe. We think that a compromise approach is to focus on the completion of requirements for CBM within the same frequency groups. Further decision can be made in RAN #96e depending on RAN4 progress towards this goal.

10 – vivo Communication Technology

Based on the current situation, we suggested removing all CBM related objectives from Rel-17.

As in our views in the initial round, it is admitted that the same frequency group is more "typical" for CBM, but we do not see any new reason for companies to give up their positions and the possibility to achieve consensus in one more meeting seems neglectable.

11 – Nokia France

Considering the comments, it seems unlikely that spending further time in RAN4 on CBM in Rel-17 would be a productive use of RAN4 time.

12 – Ericsson LM

As a compromise we also are fine to limit CBM to the same frequency group as commented earlier.

3.5 Summary of Intermediate Round

Status Report: The moderator's proposal for open item updates was seen quite acceptable, only minor wording updates were proposed. One company wanted to include additional text on the RAN4 agreements but the mentioned agreed WF is already listed in the SR. The details for the RAN4 agreed documents are not listed for other areas either. Therefore, the moderator does not propose these details to be added for one topic only.

Exception Sheet: Moderator's proposal for the open items for the exception sheet was seen acceptable with minor clarifications. Additional open item was proposed to be added for UL gap for UL coherent MIMO. The following slightly updated open item list is proposed for the final round review:

UL gaps for self-calibration and monitoring:

- RF test procedures including P-MPR reporting in the procedures
- RRM procedures to be prioritized over UL gap
- UE feature and capability details for UL gap configurations, capability for inter-band UL CA, and UL MIMO requirements
- UL gap for UL coherent MIMO

- Specifying the RF requirements to enable UL gap for UL coherent MIMO and finish the corresponding signaling

Objective update for DC-location reporting

Majority of the companies support the objective for DC location reporting to be updated to be as follows:

- Specify DC location reporting scheme to cover intra-band UL CA with 2 CCs and more for FR1 and FR2, and intra-band DL CA for FR2. (RAN4, RAN2)
 - NOTE: No impact on Rel-16 method (uplinkTxDC-TwoCarrierReport-r16)

The moderator proposes the above-mentioned objective text for final review during the Final Round.

CBM Objective

Slight majority of the companies felt that CBM objective should be removed from the WID due to lack of progress in RAN4. Number of companies proposed to focus on the same frequency group only as a compromise but one company did not see that proposal would acceptable at all. It was not possible to reach consensus or clear majority view on this issue. Therefore, no update to the WID objectives on CBM is proposed. Also the exception sheet is proposed to be kept unchanged.

4 Final Round

During the Final Round companies should check the updated versions for SR, exception sheet and WID update in the following folder:

[https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_95e/Inbox/Drafts/\[95e-37-R17-FR2-RF\]/Final%20Round/](https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_95e/Inbox/Drafts/[95e-37-R17-FR2-RF]/Final%20Round/)

Summary of Final Round

During the final round only small editorial updates for the SR were discussed like aligning the completion date of the core part with the exception sheet to 06/2022 as the work item is not yet complete.

5 Conclusions

The conclusions from the intermediate round can be endorsed and the corresponding updates to the SR, exception sheet and WID update can be agreed.