110bis-e-NWM-NR-R16-13 - Version 0.0.5
RAN1
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3GPP TSG-RAN WG1 Meeting #110bis R1-2210453

e-Meeting, October 10th – 19th, 2022

Source: Moderator (vivo)

Title: Moderator summary of [110bis-e-NR-R16-13] discussion

Agenda Item: 7.2

Document for: Discussion and Decision

1 Introduction

This document is to summarize the email discussion of LS response to the LS in R1-2208348 (R4-2214421):

[110bis-e-NR-R16-13] Discussion on incoming RAN4 LS in R1-2208348 on Pemax,c of S-SSB transmission when multiple resource pool is configured in a carrier by Oct 14 – Zichao (vivo)

2 Discussion

RAN4 has sent the following LS regarding the $P_{EMAX,c}$ parameter for S-SSB transmission:

Table 1:

1. Overall Description:

In RAN4#101-e meeting, an LS [1] was sent to RAN1 and RAN2, relating to the parameter of Pemax in the configured transmitted power for PSSCH/ PSCCH. RAN4 would like to thank RAN1 and RAN2 for the reply LS[2][3] on the Pemax issue for PSSCH/PSCCH.
However, RAN4 was also discussing the Pemax parameters for S-SSB transmission. The following question was captured as follows:

Question 1: RAN4 agreed not to define $P_{EMAX,c}$ for S-SSB configured Tx Power in TS38.101-1 as highlighted yellow below and would like to know if this can have any impact to RAN1/2, for example, Pcompensation defined in idle mode procedure in TS 38.304.
6.2E.4 Configured transmitted power for V2X
6.2E.4.1 General
The NR V2X UE is allowed to set its configured maximum output power $P_{CMAX,f,c}$ for carrier f of serving cell c in each slot. The configured maximum output power $P_{CMAX,f,c}$ is set within the following bounds:
$P_{CMAX_L,f,c} \leq P_{CMAX,f,c} \leq P_{CMAX_H,f,c}$ *with*
$P_{CMAX_L,f,c} = MIN\{P_{EMAX,c}, P_{PowerClass,\ V2X} - MAX(MAX(MPR_c, A\text{-}MPR_c) + DT_{IB,c}, P\text{-}MPR_c), P_{Regulatory,c}\}$
$P_{CMAX_H,f,c} = MIN\{P_{EMAX,c}, P_{PowerClass,\ V2X}, P_{Regulatory,c}\}$
where
- $P_{CMAX,f,c}$ is configured for PSSCH, S-SSB and PSFCH, respectively;
- For the total transmitted power $P_{CMAX,PSSCH/PSCCH}$, $P_{EMAX,c}$ is the value given by IE sl-maxTransPower, defined by TS 38.331.
- For the total transmitted power $P_{CMAX,S\text{-}SSB}$, the $P_{CMAX_L,f,c}$ and $P_{CMAX_H,f,c}$ are defined as follows:
$P_{CMAX_L,f,c} = MIN\{P_{PowerClass,\ V2X} - MAX(MAX(MPR_c, A\text{-}MPR_c) + DT_{IB,c}, P\text{-}MPR_c), P_{Regulatory,c}\}$
$P_{CMAX_H,f,c} = MIN\{P_{PowerClass,\ V2X}, P_{Regulatory,c}\}$

RAN4 would like to know if there is an impact on RAN1 and RAN2 about the agreement RAN4 made on S-SSB.

2. Actions:
To RAN1, RAN2:
ACTION: RAN4 respectfully asks RAN1 and RAN2 to provide feedback for the above question.

Based on the contributions submitted in this meeting [5 - 14], companies' views are summarized below:

1. No RAN1 spec impact due to the RAN4 agreement (i.e., not to define $P_{EMAX,c}$ for S-SSB)
    a) Supporting companies:
        i) ZTE, Sanechips, OPPO (for Rel-16), LG, Huawei, HiSilicon, Qualcomm, vivo
    b) Reasons:
        i) In RAN1 specification Only the is used whose definition is referred to the RAN4 specification
        ii) The parameter of $P_{compensation}$ (used to determine whether the cell selection criterion S is satisfied) has nothing to do with S-SSB

iii) Rel-16 NR sidelink focus on V2X on ITS band (no shared band is defined by RAN4 in Rel-16)

2. To introduce mechanism to configure the maximum transmission power of S-SSB

a) Supporting companies:

i) OPPO (for Rel-17), Nokia, Nokia Shanghai Bell, Ericsson

b) Reasons:

i) This feature is supported in LTE sidelink.

ii) If the network cannot control the maximum transmission power of S-SSB, it may cause interference to UL (at least in the case that SL and UL share the same carrier and FDMed in the same slot).

c) Candidate solutions:

i) Introducing new RRC parameter (similar as that in LTE)

ii) Defining $P_{EMAX,c}$ for S-SSB as the highest $P_{EMAX,c}$ for PSSCH of all the resource pools in the carrier

2.1 Discussion 1st round

The moderator observation is that, from RAN1 specification perspective, most companies agree that there is no RAN1 spec impact due to the RAN4 agreement. The main reason to introduce a mechanism to configure the maximum transmission power of S-SSB is to mitigate the S-SSB interference to UL transmission. However, given that no shared band is defined by RAN4 in Rel-16, this issue does not seem to be essential at least for Rel-16. Noted that RAN1 already discussed this issue in RAN4#104-e meeting with several candidate solutions (including the above-mentioned solutions), but finally agreed not to define $P_{EMAX,c}$ for S-SSB. Therefore, the moderator suggests that for Rel-16, RAN1 does not try to revert RAN4's agreement, and suggests the following proposal as RAN1 observation to be replied to RAN4:

Moderator Proposal 1-1 (for observation): In Rel-16, there is no any RAN1 specification impact due to the RAN4 agreement (i.e., not to define $P_{EMAX,c}$ for S-SSB).

Q1: Do you agree with the Moderator Proposal 1-1 above? If no, please provide your comments/updates to the proposal.

Feedback Form 1: Comments on proposal 1-1

1 – Ericsson GmbH In our view, we should inform RAN4 about the procedure in LTE for S-SSB, indicating that "For NR SL it should be possible to configure the maximum TX power for S-SSB, following a similar procedure to LTE"
2 – Samsung R&D Institute UK Based on the agreement at RAN1#AH1901, it say that "Rel-14 LTE sidelink open-loop power control is

the baseline." Therefore, we prefer to keep PEMAX,c for S-SSB. We should inform to RAN4 that RAN1 agreed to follow LTE procedure for power control.

3 – Guangdong OPPO Mobile Telecom.

we agree the proposal. at least for R16, there is no shared carried for SL and Uu defined in RAN4. Only ITS band is considered, whether to define PEMAX,c for S-SSB or not does not have impact.

4 – Nokia Corporation

We agree that the RAN1 specification does not need to be changed due to RAN4's agreement. However, we agree with Samsung and Ericsson that the LTE PC should be the baseline and it should be possible to limit the maximum UE output power.

5 – ZTE Wistron Telecom AB

We are fine with this proposal.

6 – Beijing Xiaomi Mobile Software

We agree the proosal.

7 – HiSilicon Technologies Co. Ltd

Yes, as per TS38.213, A UE determines a power *P_(S-SSB) (i)* for an S-SS/PSBCH block transmission occasion in slot *i* on active SL BWP *b* of carrier *f* as

P_S-SSB (i)=min(P_CMAX ,P_(O ,S-SSB)+10log_10(2^μ·M_RB^(S-SSB))+α_(S-SSB)□PL) [dBm]

Where *P_CMAX* is defined in [8-1, TS 38.101-1], and there is no RAN1 impact that RAN4 agrees not use a (pre-)configured value of S-SSB.

It should be assumed that RAN4 is aware of RAN1 agreement, which is only for a baseline, and then agrees to remove (pre-)configurability.

8 – vivo Communication Technology

Support the proposal.

Regarding Rel-17, this issue seems to be essential considering that shared band is defined by RAN4, and moreover, the configurability of maximum Tx power of sidelink synchronization signals has already been supported by LTE for years. On the other hand, it is a bit late to introduce new RRC parameter for Rel-17. Companies are encouraged to provide your views on whether to address this issue in Rel-17.

Q2: Do you think NR sidelink should support the configurability of maximum transmission power of S-SSB in Rel-17? Please provide your comments/reasons on why it should or should not be addressed in Rel-17.

Feedback Form 2: Comments on Q2

1 – Ericsson GmbH

Yes, we should follow the same principle as we have in LTE to avoid interferences with UL.

2 – Intel Korea

This can be addressed for Rel.17. This functionality has the target to limit the interference with UL transmissions.

3 – Samsung R&D Institute UK

Yes, we agree with comments from Ericsson and Intel.

4 – Guangdong OPPO Mobile Telecom.

Yes. agree with comments from above companies.

5 – Nokia Corporation

Yes, it should be possible to limit the maximum transmit power of S-SSB. The main motivation is to control interference. In some cases, UEs with different power classes operating on the same carrier may also cause problems, and the configurable PEMAX,c would be useful in that case.

6 – ZTE Wistron Telecom AB

We prefer not to define PEMAX,c for S-SSB in R17, i.e. it is better to align with RAN4's agreement. Even if the upper boundary of the maximum transmit power of S-SSB is different due to missing the configuration, with the power control formula for S-SSB defined in TS38.213, the actual transmit power can be controlled in purpose and the interference issue seems not a big issue.

7 – HiSilicon Technologies Co. Ltd

We can understand companies points and are aware that LTE-V have such a RRC parameter for configurability. However, our worry is if a new parameter is required to add back by RAN1, it will revert RAN4's agreement which already explained in RAN4's LS that P_EMAX,c for S-SSB will not be defined.

Additionally, the concern on S-SSB to UL interference, if SL and UL shares the same carrier, can be addressed by power control based on DL PL, as per TS38.213 *P_S-SSB(i)=min(P_CMAX ,P_(O ,S-SSB)+10log_10(2^μ·M_RB^(S-SSB))+α_(S-SSB)□PL) [dBm]*.

Therefore, we prefer not to have such a parameter.

8 – vivo Communication Technology

We prefer not to revert RAN4's agreement in RAN1.

Q3: If your answer to Q2 is yes, which solution is your preference?

- **Opt.1: Introducing a RRC parameter to configure the $P_{EMAX,c}$ for S-SSB (similar as that in LTE)**

- **Opt.2: Defining $P_{EMAX,c}$ for S-SSB as the highest $P_{EMAX,c}$ for PSSCH of all the resource pools in the carrier**
- **Opt.3: Other (please explain the details)**

Feedback Form 3: Comments to Q3

1 – Ericsson GmbH Similar to LTE we can reuse the RRC parameter sl-MaxTxPower defined in NR to define the max power of S-SSB even outside of network coverage.
2 – vivo Communication Technology A quick question to Ericsson: Would you please explain a bit more on the meaning of ”reuse the RRC parameter sl-MaxTxPower”? Unlike in LTE where a per-carrier sl-MaxTxPower is provided, in NR, the sl-MaxTxPower is configured per CBR per resource pool, while the S-SSB is out of any resource pool. Do you mean to use one of the configured sl-MaxTxPower associated to the list of CBR range to control the max Tx power of S-SSB?
3 – Intel Korea Our preference is for Option 2, which seems a reasonable approach as the network should configure the highest PSSCH TX power also with the desire to limit interference to the UL.
4 – Samsung R&D Institute UK We prefer Opt 1.
5 – Guangdong OPPO Mobile Telecom. we prefer Opt 1 which is similar mechamism as LTE.
6 – Nokia Corporation Option 1 or 2 is fine for us.
7 – HiSilicon Technologies Co. Ltd Prefer not to have a new parameter which RAN4 has already agreed to not pursue.

2.2 Discussion 2nd round

There are 9 companies providing the views during the discussion. The positions and comments are summarized below:

Moderator Proposal 1-1 (for observation): In Rel-16, there is no any RAN1 specification impact due to the RAN4 agreement (i.e., not to define $P_{EMAX,c}$ for S-SSB).

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Q1: Do you agree with the Moderator Proposal 1-1 above? If no, please provide your comments/updates to the proposal.

- Support (5):
  - OPPO, ZTE, Xiaomi, HiSilicon, vivo
- Not support (3):
  - Ericsson, Samsung, Nokia
    - RAN1 in Rel-16 agreed to reuse the LTE sidelink OLPC as baseline

Q2: Do you think NR sidelink should support the configurability of maximum transmission power of S-SSB in Rel-17? Please provide your comments/reasons on why it should or should not be addressed in Rel-17.

- Yes (5):
  - Ericsson, Intel, Samsung, OPPO, Nokia
- No (3):
  - ZTE, HiSilicon, vivo
    - The interference of S-SSB to UL transmission can be handled by network implementation (e.g., via tuning the OLPC related parameters such as P0, Alpha, etc.)
    - RAN1 should not revert the RAN4's agreement

Q3: If your answer to Q2 is yes, which solution is your preference?

- Opt.1: Introducing a RRC parameter to configure the $P_{EMAX,c}$ for S-SSB (similar as that in LTE)
    - (4) Ericsson, Samsung, OPPO, Nokia,
- Opt.2: Defining $P_{EMAX,c}$ for S-SSB as the highest $P_{EMAX,c}$ for PSSCH of all the resource pools in the carrier
    - (2) Intel, Nokia
- Opt.3: others (please explain the details)

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Based on the comments in the 1st round discussion and the submitted contributions, it seems still a majority agrees that no RAN1 spec change is needed in Rel-16. The related RAN1 agreement in AH#1901, copied below, was for unicast, groupcast and broadcast transmission, but not for S-SSB (which is in another agenda).

Agreements:

- SL open-loop power control is supported.
  - For unicast, groupcast, broadcast, it is supported that the open-loop power control is based on the pathloss between TX UE and gNB (if TX UE is in-coverage).
    - This is at least to mitigate interference to UL reception at gNB.
    - Rel-14 LTE sidelink open-loop power control is the baseline.
    - gNB should be able to enable/disable this power control.

Nevertheless, the moderate also agrees that the intention of the agreement can also be applicable to S-SSB. However, being the baseline does not mean everything in LTE OLPC should be supported in NR from Rel-16. Considering that in Rel-16, there is **no shared band defined by RAN4** (thus the UL interference issue is not essential), and given that **Rel-16 has been frozen for more than two years**, the moderate's suggestion is still not to change the Rel-16 behavior. It is highly appreciated that companies can accept this proposal for Rel-16.

Moderator Proposal 2-1 (for observation): In Rel-16, there is no any RAN1 specification impact due to the RAN4 agreement (i.e., not to define $P_{EMAX,c}$ for S-SSB in Rel-16).

Q4: Do you have any strong concern to accept this proposal 2-1?

Feedback Form 4: Comments to Q4

1 – Classon Consulting [for FUTUREWEI] We support the proposal from the moderator (which is the default if no agreement)
2 – Qualcomm Incorporated We are ok with the proposal.
3 – Guangdong OPPO Mobile Telecom. we support the proposal
4 – NTT DOCOMO INC. OK with the proposal
5 – Nokia Corporation We agree that there is no impact on the RAN1 specification if PEMAX,c is not specified in Rel-16. We also think that it is too late to introduce new RRC parameters for Rel-16, but this may cause difficulties in S-SSB power configuration in some cases.

6 – HiSilicon Technologies Co. Ltd We are fine with the proposal.
7 – Beijing Xiaomi Mobile Software OK with the proposal.

For Rel-17, it seems a majority prefers to support the configurability of maximum transmission power of S-SSB, in a way similar as LTE sidelink. Considering that shared band is defined by RAN4 in Rel-17, it seems the S-SSB-to-UL interference issue becoming essential. The implementation-based solution (i.e., tuning the OLPC related parameters for DL PL) can somehow mitigate the issue, but may have other issues. For example, the network can configure a very small value of P0 for S-SSB to reduce the S-SSB Tx power for cell edge SL UE, and thus reduce the interference to UL. However, in this case the non-cell-edge UE (i.e., the DL PL is smaller) would transmit the S-SSB with a smaller Tx power than expected, leading to SL coverage loss. Therefore, based on the preference of majority, the moderator suggests the following proposal:

***Moderator Proposal 2-2:* Inform RAN4 that in Rel-17, NR SL should be able to configure the maximum TX power for S-SSB following a similar procedure to LTE (i.e., via $P_{EMAX,c}$ for S-SSB).**

Q5: Do you have any strong concern to accept this proposal 2-2?

Feedback Form 5: Comments to Q5

1 – Classon Consulting [for FUTUREWEI] in our view this proposal is also late for Rel-17, and does not warrant overturning ran4's agreement.
2 – Qualcomm Incorporated We share the view to not overturn RAN4's agreement in RAN1
3 – Guangdong OPPO Mobile Telecom. We support the proposal.
4 – NTT DOCOMO INC. Support the proposal. Configurability is necessary.
5 – Ericsson GmbH We are supportive of the proposal.
6 – Nokia Corporation We support the proposal.

7 – HiSilicon Technologies Co. Ltd We share similar view that RAN1 should not revert RAN4's agreement.
8 – ZTE Wistron Telecom AB Considering that P0 can be configured by UE dedicated RRC signal, the enhancement on Rel-17 may not be such essential. So we still prefer not to revert RAN4's agreement.

2.3 Summary of the discussion

There are 8 companies providing their comments and views during the 2nd round discussion. For Rel-16, the proposal 2-1 is agreeable to all the companies.

Proposal 2-1 for observation (offline consensus):

In Rel-16, there is no any RAN1 specification impact due to the RAN4 agreement (i.e., not to define $P_{EMAX,c}$ for S-SSB).

For Rel-17, there are still 4 companies having strong concerns to support the configurability of maximum transmission power of S-SSB. Consequently, the proposal 2-2 is not pursued.

The draft LS reply based on the email discussion is provided in the draft folder [TSGR1_110b-e/Inbox/drafts/7.2(NR_R16_Maint)/110bis-e-NR-R16-13]:

https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_110b-e/Inbox/drafts/7.2(NR_R16_Maint)/110bis-e-NR-R16-13/R1-221xxxx%20Draft%20reply%20LS%20on%20Pemax%2Cc%20of%20S-SSB%20transmission.docx

Companies are welcome to review and provide your comments/suggestions (if any) to the draft LS reply before **Oct 13, 16:00 UTC**.

Feedback Form 6: Comments to the draft LS reply

1 – Classon Consulting (for Futurewei) It should be enough to just answer Ran4's question. Ran4 doesn't need to know that we discussed but didn't have consensus on reverting their agreements, so that paragraph can be removed. The NWM summary document will have the full record of this discussion.
2 – Samsung R&D Institute UK We prefer to include about RAN1 discussion and no consensus as the moderator suggested. Since there

was no consensus on Rel-17, we should make a room for further discussion.
3 – vivo Communication Technology To Futurewei as moderator: I understand you point. That paragraph is written basically as a compromise, reflecting the fact that during the discussion the majority prefers to support the configurability in Rel-17, but no consensus is achieved. Please let me know if you (and other companies) have strong concern on it, in which case I will remove that paragraph.
4 – ZTE Wistron Telecom AB An answer focusing on RAN4's question is better actually. Anyway, we can live with the draft LS.
5 – Ericsson GmbH We are supportive of the current version of the draft LS reply.
6 – Nokia Corporation The LS draft, which includes the statement on UL interference is acceptable to us. It should be noted that Rel-17 supports different UE power classes up to 31 dBm. It is important that the Tx power of all the channels/signals of these UEs can be limited.

3 Conclusion

Based on companies' comments, the moderator observes that proposal 2-1 is agreeable to all the companies.

Proposal 2-1 for observation (offline consensus):

In Rel-16, there is no any RAN1 specification impact due to the RAN4 agreement (i.e., not to define $P_{EMAX,c}$ for S-SSB).

Regarding the proposal 2-2 for Rel-17, there are still 4 companies having strong concerns to support the configurability of maximum transmission power of S-SSB. Consequently, the proposal 2-2 is not pursued.

The draft LS reply based on the email discussion is provided in the draft folder:

[TSGR1_110b-e/Inbox/drafts/7.2(NR_R16_Maint)/110bis-e-NR-R16-13].

Nine companies provide their comments by NWM and emails on the draft LS reply. All the comments are on the following paragraph:

- RAN1 has further discussed whether to mitigate the interference of S-SSB to UL transmission in

Rel-17, by supporting the configurability of the maximum TX power for NR S-SSB following a similar procedure to LTE (i.e., via $P_{EMAX,c}$ for S-SSB). However, no consensus is achieved in RAN1.

7 companies prefer to keep the paragraph while 2 companies (Hisilicon, Futurewei) question the necessity. One company provides the following revision that seems acceptable to the group.

- RAN1 has further discussed whether supporting the configurability of the maximum TX power for NR S-SSB in Rel-17. However, no consensus is achieved in RAN1.

The other part of the draft LS seems stable.

The moderator proposes to go with the revised paragraph following the preference of the majority. The draft LS reply is updated in R1-2210454.

The final LS is approved in R1-2210549.

4 Reference

1. R4-2120047, Draft LS on PEMAX for NR-V2X, Huawei, CATT, RAN4#101E.
2. R4-2206157(R1-2202816), Reply LS to RAN4 on PEMAX for NR-V2X, Huawei, RAN4#102-e.
3. R4-2206158(R2-2203687), Reply LS on Pemax for NR-V2X, Huawei, CATT, RAN4#102-e.
4. R1-2208348, LS on Pemax,c of S-SSB transmission when multiple resource pool is configured in a carrier RAN4, vivo
5. R1-2208584, Draft reply LS on Pemax,c of S-SSB transmission vivo
6. R1-2208714, Draft reply LS on Pemax,c of S-SSB transmission ZTE, Sanechips
7. R1-2208812, Discussion on the LS on Pemax,c of S-SSB transmission when multiple resource pool is configured in a carrier OPPO
8. R1-2208813, Draft reply LS on Pemax,c of S-SSB transmission when multiple resource pool is configured in a carrier OPPO
9. R1-2209477, Discussion on LS on Pemax,c of S-SSB transmission when multiple pools are configured in a carrier LG Electronics
10. R1-2210040, Discussion on RAN4 LS on Pemax,c of S-SSB transmission Nokia, Nokia Shanghai Bell
11. R1-2210118, [Draft] Reply LS on Pemax,c of S-SSB transmission when multiple resource pool is configured in a carrier Ericsson
12. R1-2210119, Discussion on LS on Pemax,c of S-SSB transmission when multiple resource pool is configured in a carrier Ericsson
13. R1-2210217, Discussion LS on Pemax,c of S-SSB transmission when multiple resource pool is configured in a carrier Huawei, HiSilicon
14. R1-2210236, Draft Reply to RAN4 LS on Pemax,c of S-SSB transmission when multiple resource pool is configured in a carrier Qualcomm Incorporated