**3GPP TSG-RAN WG4 Meeting # 109 R4-2318152**

**Chicago, USA, November 13 –17, 2023**

**Agenda item:** 8.31.1

**Source:** Moderator (Ericsson)

**Title:** Topic summary for [109][146] NR\_redcap\_enh\_UERF

**Document for:** Information

# Introduction

*Briefly introduce background, the scope of this email discussion (e.g. list of treated agenda items) and provide some guidelines for email discussion if necessary.*

Below topic will be covered:

1. Specification update for eRedCap RF requirement
2. LS to RAN5
3. SAW-less design RF impact

# Topic #1: UE RF

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2318359 | Sony | **Observation 1 SAW-less design is only relevant with the capability supportOfERedCap-r18 and the operation in HD-FDD mode.**  **Observation 2 For a low-cost global, one-SKU design, a SAW-less design is essential.**  **Observation 3 Cost reduction of eRedCap devices will facilitate the growth of the ecosystem.**  **Observation 4 Cheaper eRedCap devices will accelerate the market moving into 5G technology which will be easier to scale up for global deployment.**  **Observation 5 Rel-18 eRedCap class of the devices, with the capability “supportOfERedCap-r18”, made it possible meeting the Tx OOB coexistence requirements and spectrum emissions with a SAW-less design in most of the UE-coexistence scenarios.**  **Observation 6 SAW-less design doesn’t mean filter-less. There is still a filter to filter out harmonics and TX noise.**  **Observation 7 n13 Tx noise and spectrum emission into band 14 Rx band is a major problem for a NR eRedCap SAW-less design (supportOfERedCap-r18), since the offset (9MHz) is smaller than the offset in other bands and smaller than the minimum Foob limit (10MHz).**  **Observation 8 The NR eRedCap SAW-less design requires additional power backoff to meet the n13/B14 co-existence requirement when LCRB\*12\*SCS > 3.6MHz and RBstart\*12\*SCS is < 1.8 MHz.**  **Observation 9 During discussion in RAN4 #108 bis it was concluded that delta-MPR is a better way to introduce the proposed relaxation.**  **Observation 10 For eRedCap SAW-less design, the in-band blocking Case 3 and Case 5 in TS 38.101-1, Table 7.6.2-2 is very problematic to meet.**  **Proposal 1 RAN4 shall adopt PA models with good linearity to evaluate the spec impact of SAW-less implementation.**  **Proposal 2 Apply relaxation to allow reduced maximum power for eRedCap with the capability “supportOfERedCap-r18” when operating in HD-FDD mode in n13 when LCRB\*12\*SCS > 3.6MHz and RBstart\*12\*SCS is < 1.8 MHz.**  **Proposal 3 Add a note to TS 38.101-1, Table 7.6.2-2 allowing relaxation of the Case 3 (n71) and Case 5 (n105) in-band blocker level from -15dBm/-22dBm to -34 dBm for Rel-18 eRedCap devices, e.g.:  “NOTE 6: Pinterferer is -34dBm for Rel-18 eRedCap devices.”** |
| R4-2320116 | Nokia, Nokia Shanghai Bell | 1. **Certain requirements stay the same irrespective of channel bandwidths.** 2. **RAN5 decides the test cases and can inform their preference whether RAN4 opinion needs to be noted in the TS or not.** 3. Agree to send the attached LS to RAN5. |
| R4-2320529 | Ericsson | **Observation 1 The maximum TBS for eRedCap depends on numerology parameter µ .**  **Proposal-1:PRB should change to 15 so that TBS = 9992 bits (SCS=15kHz) with MCS 23 for 256QAM**  **Proposal-2:PRB should change to 7 so that TBS = 4736 bits (SCS=30kHz) with MCS 23 for 256QAM** |
| R4-2320645 | Qualcomm Inc. | **Observation 1: Specifying a new NS-value for eRedCap UEs requires a lot of specification updates and using ∆MPR is preferable**  **Observation 2: In case IBB blocking is adjusted, specification should state that the adjusted level may result in potentially harmful interference impacting performance.**  **Proposal 1: Consider using IBB2 blocking as alternative to the case 3 and case 5 blocking requirements for eRedCap UEs** |
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## Open issues summary

*Before Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

Collect companies comments on the draftCR submitted to capture the eRedCap RF requirements.

### Sub-topic 1-1: Specification update for REFSENS and UL configuration table

*Sub-topic description:*

*Open issues and candidate options before meeting:*

Collecting the companies comments if any.

**Issue 1-1: draft CR for eRedCap RF requirement**

* Proposals
  + Option 1: Agree draft CR R4-2320644
  + Option 2: TBD
* Recommended WF
  + Option 1

### Sub-topic 1-2: LS to RAN5

*Sub-topic description*

Discussing the LS needed to RAN5 about the testing aspects.

*.* **Issue 1-2-1: LS to RAN5**

* Proposals:
  + Option 1: Agree to send the attached LS to RAN5.
    - RAN4 have discussed whether this recommendation to not test repeatedly needs to be noted in the RAN4 TS or it would be enough to request RAN5 to take this into account when defining their test cases. RAN4 respectfully request RAN5 to inform whether they have any preference.
  + Option 2 : TBD
* Recommended WF
  + TBA

*.*

### Sub-topic 1-3: SAW-less design RF impact

*Sub-topic description*

Collect companies view on the companies proposal on SAW-less design for some bands for HD-FDD eRedCap UE.

**Issue 1-3-1: Co-existence requirement solution for SAW-less filter for HD-FDD eRedcap**

* Proposals
  + Option 1: (Sony) Apply relaxation to allow reduced maximum power for eRedCap with the capability “supportOfERedCap-r18” when operating in HD-FDD mode in n13 when LCRB\*12\*SCS > 3.6MHz and RBstart\*12\*SCS is < 1.8 MHz.
  + Option 2: (QC) Specifying a new NS-value for eRedCap UEs requires a lot of specification updates and using ∆MPR is preferable
  + Option 3: TBA

Recommended WF

* + TBA

**Issue 1-3-2: NR IBB requirements solution for SAW-less design for HD-FDD eRedCap**

* Proposals
  + Option 1: (Sony) Add a note to TS 38.101-1, Table 7.6.2-2 allowing relaxation of the Case 3 (n71) and Case 5 (n105) in-band blocker level from -15dBm/-22dBm to -34 dBm for Rel-18 eRedCap devices, e.g.:

“NOTE 6: Pinterferer is -34dBm for Rel-18 eRedCap devices.”

* + Option 2: (QC)
    - In case IBB blocking is adjusted, specification should state that the adjusted level may result in potentially harmful interference impacting performance.
    - Consider using IBB2 blocking as alternative to the case 3 and case 5 blocking requirements for eRedCap UEs
  + Option 3: TBA
* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

*One of the two formats, i.e. either example 1 or 2 can be used by moderators.*

Sub topic 1-1

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

Sub topic 1-2

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

Sub topic 1-3

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

Sub topic 1-4

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| **Company** | **Comments** |
| XXX |  |

Sub topic 1-5

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| **Company** | **Comments** |
| XXX |  |

### CRs/TPs comments collection

*For close-to-finalize WIs and maintenance work, comments collections can be arranged for TPs and CRs. For ongoing WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2320644 | Company A |
| Company B |
|  |
| R4-2318357 | Company A |
| Company B |
|  |
| R4-2318356 |  |
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## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic #1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

*Note: The tdoc decisions shall be provided in Section 3 and this table is optional in case moderators would like to provide additional information.*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
|  | WF on … | YYY |  |
|  | LS on … | ZZZ | To: RAN\_X; Cc: RAN\_Y |
|  |  |  |  |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-23xxxxx |  | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
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Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

## 2nd round

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-23xxxxx |  | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-23xxxxx |  | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-23xxxxx |  | LS on … | ZZZ | Agreeable, Revised, Noted |  |
|  |  |  |  |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents