**3GPP TSG-RAN WG4 Meeting # 100-e R4-210XXXX**

**Electronic Meeting, 16th – 27th August, 2021**

**Agenda item:** 10.5

**Source:** Moderator (China Unicom)

**Title:** Email discussion summary for [100-e][146] FS\_NR\_PC2\_UE\_FDD

**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.*

*List of candidate target of email discussion for 1st round and 2nd round*

* 1st round: TBA
* 2nd round: TBA

# Topic #1: PC2 for NR FDD band

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2113001 | vivo, Huawei, HiSilicon, ZTE | TP to capture the study on performance evaluation by dynamic system level simulation. |
| R4-2113025 | vivo | Observation: The performance gain of FDD HPUE under higher resource utilization traffic model is still considerable. |
| R4-2112427 | China Unicom | Text Proposal for the SAR Scheme and conclusion part of the SI on high power UE (power class 2) for one NR FDD band. |
| R4-2112428 | China Unicom | Observation 1: In addition to P-MPR, optional report of duty cycle capability is also considered as a feasible method for SAR compliance in existing HPUEs.Observation 2: There is no restriction on network or UE behaviours by introducing optional capability of duty cycle reporting.Proposal: To include the optional duty cycle reporting feature for NR FDD. |
| R4-2112999 | vivo | Proposal 1: To avoid possible link failure, the optional UE capability for duty cycle is proposed. Proposal 2: To compatible with inter-band CA SAR solution, the capability for the duty cycle is needed for FDD HPUE. |
| R4-2113301 | Xiaomi | Proposal 1: if the dutycycle based approach is introduced for HP UE FDD bands, UE needs to report the maximum dutycycle capability to the network.Observation 1: 1Tx architecture is the best choice from implementation of view if commercial components are ready. |
| R4-2113905 | OPPO | Observation 1: To make sure UE capability can be guaranteed, NW need to calculate the duty cycle capability based on per frame window length with 1 symbol moving step.Observation 2: It is meaningless for NW to know the exact duty cycle capability of FDD UE.Proposal 1: It is proposed to conclude that the FDD duty cycle capability is not reported and is only used by UE to meet the SAR regulation requirements. |
| R4-2112834 | LGE | Text proposals to capture the expected sensitivity degradation in n1/n3 by high power transmission and wide CBW in n3. Also, we provide current RF component characteristics and parameters for PA and Duplexer in FDD band. |
| R4-2112911 | ZTE | Observation 1. For band n1, assuming additional 4dB total noise caused by increasing 3dB MOP, then ~3dB duplexer rejections on top of the existing one could be needed to guarantee the existing PC3 REFSEN requirements for PC2.Observation 2. For band n3, assuming additional 6dB total noise caused by increasing 3dB MOP, then ~5dB additional duplexer rejections on top of the existing one could be needed to guarantee the existing PC3 REFSEN requirements for PC2. |
| R4-2114695 | Skyworks | **Table 1 n3 PC2 REFSENS levels and Table 2 Uplink Configuration.**Table 1: **n3 PC2 REFSENS**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CA configuration** | **SCS****(kHz)** | **5** **MHz****(dBm)** | **10** **MHz****(dBm)** | **15** **MHz****(dBm)** | **20** **MHz****(dBm)** | **25** **MHz****(dBm)** | **30****MHz****(dBm)** | **35 MHz****(dBm)** | **40 MHz****(dBm)** | **45** **MHz****(dBm)** | **50****MHz****(dBm)** | **Duplex mode** |
| CA\_n5B | 15 | -97.0 | -93.8 | -92.0 | -90.8 | -89.7 | -88.9 | -86.0 | -81.7 | -78.8 | -76.6 | FDD |
| 30 |  | -94.1 | -92.1 | -91.0 | -89.8 | -89.0 | -86.1 | -81.8 | -78.9 | -76.7 |
| 60 |  | -94.5 | -92.4 | -91.2 | -90.0 | -89.1 | -86.2 | -82.0 | -79.0 | -76.8 |
| NOTE 1: Four Rx antenna ports shall be the baseline for this operating band except for two Rx vehicular UE. NOTE 2: The transmitter shall be set to PUMAX as defined in clause 6.2.4  |

Table 2: **n3 PC2 REFSENS Uplink Configuration**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CA configuration** | **SCS****(kHz)** | **5** **MHz****(dBm)** | **10** **MHz****(dBm)** | **15** **MHz****(dBm)** | **20** **MHz****(dBm)** | **25** **MHz****(dBm)** | **30****MHz****(dBm)** | **35 MHz****(dBm)** | **40 MHz****(dBm)** | **45** **MHz****(dBm)** | **50****MHz****(dBm)** | **Duplex mode** |
| CA\_n5B | 15 | 25 | 501 | 501 | 501 | 501 | 501 | 501 | 501 | 501 | 501 | FDD |
| 30 |  | 241 | 241 | 241 | 241 | 241 | 241 | 241 | 241 | 241 |
| 60 |  | 101 | 101 | 101 | 101 | 101 | 101 | 101 | 101 | 101 |
| NOTE 1: UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.3.2-1). |

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## Open issues summary

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

### Sub-topic 1-1 Duty Cycle in FDD bands

*Sub-topic description:*

*Open issues and candidate options before e-meeting:*

**Issue 1-1: NR FDD duty cycle**

* Proposals：The optional UE capability for duty cycle is reported to the network.

Note 1: UE-implementation based method (P-MPR) is the baseline SAR solution, which covers the method that duty cycle is not reported but used by UE implementation.

Note 2: There is no restriction on network behaviours by introducing optional capability of duty cycle reporting.

* Recommended WF
	+ To check whether duty cycle reporting as an optional capability can be introduced for FDD HPUE.

### Sub-topic 1-2 Interference

*Sub-topic description*

*Open issues and candidate options before e-meeting:*

**Issue 1-2: Interference**

The following proposals are summarized based on inputs in this meeting.

Proposal 1: To capture the available MSD values in R4-2112911 and R4-2114695 into the TR 38.861 as a reference. Alignment of calculated and measurement results will be further discussed in the WI stage.

Proposal 2: Current analyses are based on existing RF components. Parameters of new components with higher power handling capability and larger rejection capability, if available, can be considered at WI stage.

* Recommended WF
	+ TBA

### Sub-topic 1-3 SI Conclusion

*Sub-topic description*

*Open issues and candidate options before e-meeting:*

**Issue 1-3: SI Conclusion**

Comments can be made in the 1.3.2 CR/TP comments section, R4-2112427.

## Companies views’ collection for 1st round

### Open issues

Sub topic 1-1 Duty Cycle in FDD bands

|  |  |
| --- | --- |
| **Company** | **Comments** |
| OPPO | In last meeting it is agreed that “*Using UE implementation based method to handle duty cycle capability.*”, this means how the duty cycle is calculated is up to UE implementation. With this situation, there is no meaning to report this capability since BS cannot know how to use this capability in the scheduling.In our view, any capability reported to NW should have the benefits in NW side, otherwise, the capability is not meaningful even we say it is optional and UE can choose to not report. If there are many such meaningless signalling designed the NR system performance is burdened. Therefore, it is not recommend to report the never been used capability unless companies can explain how this capability will benefit the NW. |

Sub topic 1-2 Interference

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Skyworks | Please find updated measurements data in R4-2114695 (inbox). Assumptions of noise rise in R4-2112911 are aligned with our measurement data: we measure a noise rise of PC2 vs PC3 at 40MHz and 50MHz slightly higher than 6dB. So calculated MSD should be aligned with our proposal if we consider identical duplexer rejection. We propose MSD levels based on current RAN4 50dB duplexer rejection assumptions. We think duplexer Tx-Rx isolation assumptions should remain consistent between PC3 and PC2. That’s why we assume 50dB in our analysis. |

### 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** |
| R4-2113001TP on system level simulation | Company A |
| Company B |
|  |
| R4-2112427TP on SAR Scheme and SI conclusion | Company A |
| Company B |
|  |
| R4-2112834TP on interference and UE implementation | Skyworks: Thank you for the detailed breakdown analysis. * 6.1.1: we assume same duplexer Tx/Rx isolation for PC2 than for PC3, ie 50dB,
* 6.1.2: 15dB noise rise due to 3dB Tx power boosting for n3 40MHz and 50MHz seems underestimated as we measure 6dB or higher,

For the other sub-clauses, since the calculated n3 REFSENS levels are lower than the PC3 agreed levels, it may be good to adopt the delta MSD approach we have used when the measured MSD levels resulted in REFSENS levels that were lower than the legacy/agreed REFSENS levels. |
| Company B |
|  |

## 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**

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

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

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** | **Title** | **Source** | **Recommendation**  | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-210xxxx | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-210xxxx | 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

# Annex

Contact information

|  |  |  |
| --- | --- | --- |
| **Company** | **Name** | **Email address** |
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Note:

1. Please add your contact information in above table once you make comments on this email thread.
2. If multiple delegates from the same company make comments on single email thread, please add you name as suffix after company name when make comments i.e. Company A (XX, XX)