**3GPP TSG-RAN WG4 Meeting # 96-e R4-2011871**

**Electronic Meeting, 17-28 Aug., 2020**

**Agenda item:** 10.21

**Source:** Moderator (Huawei)

**Title:** Email discussion summary for [96e][133] NR\_n13

**Document for:** Information

# Introduction

The scope of this email discussion is to discuss the contributions submitted at agenda 10.21 to specify a new NR FDD operating band n13.

The target of 1st round is to discuss the potential agreements on A-MPR values and comments collection for the big CR to TS 38.101-1.

The target of 2nd round is to discuss the WF on A-MPR values and comments collection for the revised CR to TS 38.101-1.

# Topic #1: A-MPR for NS\_07

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2010490 | Huawei, HiSilicon | This contribution provides simulation results and A-MPR proposal on NS\_07 for NR band n13. |
| R4-2008209  (it was submitted in RAN4#95-e) | Qualcomm Incorporated | The contribution presents simulations and measurements for NR band n13.  **Proposal 1**: Use AMPR as shown in Section 2.3 of the contribution. |

## Open issues summary

### Sub-topic 1-1

**Issue 1-1: A-MPR for NS\_07**

* Proposals
  + Option 1: the A-MPR proposed in R4-2008209

Table 3: A-MPR regions for NS\_07

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Channel Bandwidth, MHz | | Carrier Frequency, MHz | | Regions | | | | A-MPR | | Meas. A-MPR DFT/CP |
| RBstart\*12\*SCS  MHz | | LCRB\*12\*SCS  MHz | |
| 5 MHz | 782 ≤ Fc ≤ 784.5 | |  | |  | |  | |  | |
|  | |  | |  | |  | |
| >0 | | ≥ 1.8 | | A3 | |  | |
| ≤ 0.9 | | ≤ 0.36 | | A4 | |  | |
|  | |  | |  | |  | |
|  | |  | |  | |  | |
| 5 MHz | | 779.5 ≤ Fc < 782 | |  | |  | |  | |  |
| ≤ 0.9 | | ≥ 0 | | A1 | | 12/12 |
| > 0.9, ≤ 1.26 | | ≥1.26 | | A2 | | 8/9 |
| > 1.26, ≤ 3.42 | | ≥ 1.8 | | A3 | | 4.5/6 |
| >3.42 | | ≤ 0.36 | | A4 | | analysis |
|  | |  | |  | |  |
| 10 MHz | | Fc = 782 | |  | |  | |  | |  |
| ≤ 2.34 | | ≥ 0 | | A1 | | 12/12 |
| >2.34, ≤ 3.24 | | ≥ 1.44 | | A2 | | 8/9 |
| > 3.24, ≤ 6.48 | | ≥ 3.24 | | A3 | | 4.5/6 |
| > 6.48 | | ≤ 0.36 | | A4 | | analysis |
|  | |  | |  | |  |

Table 4: A-MPR for modulation and waveform type

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Modulation/Waveform | A1 | A2 | A3 | A4 |
| Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner |
| DFT-s-OFDM PI/2 BPSK | [12] | [9] | [5.5] | [4] |
| DFT-s-OFDM QPSK | [12] | [9] | [5.5] | [4] |
| DFT-s-OFDM 16 QAM | [12] | [9] | [5.5] | [4] |
| DFT-s-OFDM 64 QAM | [12] | [9] | [5.5] | [4] |
| DFT-s-OFDM 256 QAM | [12] | [9] | [5.5] | [4] |
| CP-OFDM QPSK | [13] | [10] | [6.5] | [4] |
| CP-OFDM 16 QAM | [13] | [10] | [6.5] | [4] |
| CP-OFDM 64 QAM | [13] | [10] | [6.5] | [4] |
| CP-OFDM 256 QAM | [13] | [10] | [6.5] | [4] |

* + Option 2: the A-MPR proposed in R4-2010490

Table 3: A-MPR regions for NS\_07

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Channel Bandwidth, MHz | Carrier Frequency, MHz | Regions | | A-MPR |
| RBstart\*12\*SCS  MHz | LCRB\*12\*SCS  MHz |
| 5 MHz | 782 ≤ Fc ≤ 784.5 |  |  |  |
| >0 | ≥ 1.8 | A3 |
|  |  |  |
| 5 MHz | 779.5 ≤ Fc < 782 |  |  |  |
| ≤ 0.9 | ≥ 0 | A1 |
| > 0.9, ≤ 1.26 | ≥1.26 | A2 |
| > 1.26 | ≥ 1.8 | A3 |
|  |  |  |
| 10 MHz | Fc = 782 | ≤ 2.34 | ≥ 0 | A1 |
| >2.34, ≤ 3.24 | ≥ 1.44 | A2 |
| > 3.24, ≤ 7.56 | ≥ 3.24 | A3 |
| > 7.56 | ≤ 0.36 | A4 |

Table 4: A-MPR for modulation and waveform type

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Modulation/Waveform | A1 | A2 | A3 | A4 |
| Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner |
| DFT-s-OFDM PI/2 BPSK | [12] | [8] | [6] | [3] |
| DFT-s-OFDM QPSK | [12] | [8] | [6] | [3] |
| DFT-s-OFDM 16 QAM | [12] | [8] | [6] | [3] |
| DFT-s-OFDM 64 QAM | [12] | [8] | [6] | [3] |
| DFT-s-OFDM 256 QAM | [12] | [8] | [6] | [3] |
| CP-OFDM QPSK | [14] | [9] | [7] | [3] |
| CP-OFDM 16 QAM | [14] | [9] | [7] | [3] |
| CP-OFDM 64 QAM | [14] | [9] | [7] | [3] |
| CP-OFDM 256 QAM | [14] | [9] | [7] | [3] |

* Recommended WF
  + TBD

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Qualcomm | Sub topic 1-1:  We can compromise on the AMPR values.  A1: Use Huawei  A2: Use QC  A3: Use Huawei  A4: Use Huawei, due to LTE using only 3dB for low LCRB. We agree to this change.  We can only compromise partially on the regions.  For 10MHz BW, Fc=782MHz, we need to keep the threshold at 6.48MHz due to CIM3 reach at 30KHz SCS.  For 5MHz BW, Fc = 779.5MHz, there is still CIM3 reach that we cannot ignore at 30KHz SCS. Therefore, we must keep the 3.42MHz threshold. Our simulations clearly show this effect at 15KHz SCS as well, so we will not accept removal here.  For 5MHz BW 782 to 784MHz, we can agree with Huawei and remove the region A4 requirement.  Our compromise below  Table 3: A-MPR regions for NS\_07   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Channel Bandwidth, MHz | | Carrier Frequency, MHz | | Regions | | | | A-MPR | | | RBstart\*12\*SCS  MHz | | LCRB\*12\*SCS  MHz | | | 5 MHz | 782 ≤ Fc ≤ 784.5 | |  | |  | |  | | |  | |  | |  | | | >0 | | ≥ 1.8 | | A3 | | |  | |  | |  | | |  | |  | |  | | |  | |  | |  | | | 5 MHz | | 779.5 ≤ Fc < 782 | |  | |  | |  | | | ≤ 0.9 | | ≥ 0 | | A1 | | | > 0.9, ≤ 1.26 | | ≥1.26 | | A2 | | | > 1.26, ≤ 3.42 | | ≥ 1.8 | | A3 | | | >3.42 | | ≤ 0.36 | | A4 | | |  | |  | |  | | | 10 MHz | | Fc = 782 | |  | |  | |  | | | ≤ 2.34 | | ≥ 0 | | A1 | | | >2.34, ≤ 3.24 | | ≥ 1.44 | | A2 | | | > 3.24, ≤ 6.48 | | ≥ 3.24 | | A3 | | | > 6.48 | | ≤ 0.36 | | A4 | | |  | |  | |  | |   Table 4: A-MPR for modulation and waveform type   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Modulation/Waveform | A1 | A2 | A3 | A4 | | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | | DFT-s-OFDM PI/2 BPSK | [12] | [9] | [6] | [3] | | DFT-s-OFDM QPSK | [12] | [9] | [6] | [3] | | DFT-s-OFDM 16 QAM | [12] | [9] | [6] | [3] | | DFT-s-OFDM 64 QAM | [12] | [9] | [6] | [3] | | DFT-s-OFDM 256 QAM | [12] | [9] | [6] | [3] | | CP-OFDM QPSK | [14] | [10] | [7] | [3] | | CP-OFDM 16 QAM | [14] | [10] | [7] | [3] | | CP-OFDM 64 QAM | [14] | [10] | [7] | [3] | | CP-OFDM 256 QAM | [14] | [10] | [7] | [3] |   Sub topic 1-2:  ….  Others: |
| Huawei | We are ok to the compromise proposed by Qualcomm |
| Apple | Thanks for providing the simulations results and proposals. Since this is a new topic we would like to ask to postpone the final agreement on A-MPR to the next meeting, to have some time for evaluation. |

## 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**  **A-MPR for NS\_07** | *Qualcomm and Huawei made a compromise based on the evaluations in this and previous meetings. Apple request to postpone the final agreement.*  *Tentative agreements: A-MPR proposed by Qualcomm*  *Candidate options:*  *Recommendations for 2nd round: To discuss whether we can agree on the tentative agreements with A-MPR in square bracket, and indicating that companies are encouraged to provide further simulation/measurement results.* |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 | WF on A-MPR for n13 | Qualcomm |

## Discussion on 2nd round (if applicable)

**R4-2011801           WF on A-MPR for n13           Source: Qualcomm**

|  |  |
| --- | --- |
| **WF number** | **Comments collection** |
| Draft WF  R4-2011801 | Qualcomm: See draft WF here  <ftp://ftp.3gpp.org/tsg_ran/WG4_Radio/TSGR4_96_e/Inbox/Drafts/%5B133%5D%20NR_n13/draft_R4-2011801_WF_n13_AMPR.pptx> |
| Apple: Thank you for providing the WF on n13 A-MPR. |
|  |

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| R4-2011801 | Based on 2nd round of comments collection, moderator recommend to approve the WF.  To be approved |

# Topic #2: draft CR to TS 38.101-1

## Companies’ contributions summary

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| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2010491 | Huawei, HiSilicon | The contribution provides the draft CR to TS 38.101-1 on introduction of NR band n13. The requirements for n13 are added in relevant clauses. |

## Companies views’ collection for 1st round

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2010491 | Skyworks: In Table 6.5.3.2-1, we understand the band protection list is inherited from e-utra B13.   * + - Why is n77 protection not present for n13? (while it is for n12,n14 and e-utra b12,13,14,17)     - We have a CR (R4-2011521) this week that aims at removing band 10 protection from applicable e-utra bands. Is there any reason to keep protection of e-utra band 10 for n13? |
| Huawei: We agree Skyworks comments. We can revise it to add n77 protection and remove band 10 protection. |
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|  |  |
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|  |

## Summary for 1st round

### CRs/TPs

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

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| R4-2010491 | *Based on the received comments, it is suggested to revise the draft CR.* |

## Discussion on 2nd round (if applicable)

**R4-2011802 Draft CR to TS 38.101-1: introduction of NR band n13**

**Source: Huawei, HiSilicon**

|  |  |
| --- | --- |
| **CR**  **number** | **Comments collection** |
| Draft CR  R4-2011802 | Skyworks: We are fine with this revision. |
| Qualcomm: We are fine with draft CR |
|  |

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| R4-2011802 | Based on 2nd round of comments collection, moderator recommend to endorse the draft CR.  To be endorsed |