**3GPP TSG-RAN WG4 Meeting #94-e R4-20xxxxx**

**Electronic Meeting, Feb.24th – Mar.6th 2020**

**Agenda item:** 9.17, 9.20

**Source:** Moderator(Ericsson)

**Title:** Email discussion summary for RAN4#94e\_#30\_NR\_n1\_BW

**Document for:** Information

# Introduction

The scope of this email discussion is to specify REFSENS and A-MPR requirements when introducing 25, 30, 40 and 50MHz channel BWs in band n1.

For 25, 30 and 40 MHz, the focus of the discussion should be on finalizing the CRs (it might be possible to do this already in the 1st round), while for 50MHz, focus should be on capturing the early agreements and agree on the next steps (1st round) and approve a Way Forward (2nd round)

# Topic #1: 25, 30 and 40 MHz CBW

Main technical topic overview*:*Addition of channel BWs 25MHz, 30MHz and 40MHz in band n1.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2000825 | Huawei, HiSilicon | Simulation results for 30 and 40 MHz CBW |
| R4-2000826 | Huawei, HiSilicon | Simulation results for 25 MHz CBW |

## Open issues summary

No open issue was raised in the contributions for this meeting.

But during initial e-mail discussion on distributed draft CRs to active companies on those 2 WIs (NR\_n1\_BW and NR\_n1\_BW2), Huawei was suggesting increasing A-MPR value for area A1 with 1dB, for channel BWs 30 and 40 MHz.

As it was already agreed to slightly increase A1 area size from the initial WF R4-1916056 via this pre-meeting emails discussion, Ericsson was proposing to keep initial values (10 for DFT-s-OFDM and 11 for CP-OFDM).

### Sub-topic 1-1

*Sub-topic description:* A-MPR values and areas for 25, 30 and 40 MHz CBW.

**Issue 1-1: A-MPR values for area A1 and for 30/40 MHz**

* Proposals
  + Option 1: 10 for DFT-s-OFDM and 11 for CP-OFDM
  + Option 2: 11 for DFT-s-OFDM and 12 for CP-OFDM
* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| NA | NA (focus on finalizing and agreeing on the CRs) |

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2001203  CR#0250  TS 38.101-1 | Huawei: we can accept option 1, i.e. ok with the CR. |
| Company B |
|  |
| R4-2001204  CR#146  TS 38.104 | Company A |
| 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:* |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

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

|  |  |
| --- | --- |
| **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)

## 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** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #2: 50 MHz CBW (new)

Main technical topic overview: Addition of channel BWs 50MHz in band n1.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2000108 | Qualcomm | Proposal 1: A-MPR areas (table 2.3-1) and values (table 2.3-2) for B39/B34 protection  Proposal 2: A-MPR areas (table 2.4-1) and values (table 2.4-2)for B33/B34 protection (see tdoc) |
| R4-2000494 | ZTE | Proposal1: The REFSENS values and corresponding UL configurations defined in table 3 and table 4 shall be adopted. |
| R4-2000813 | China Unicom | Draft CR to TS 38.104 |
| R4-2000827 | Huawei, HiSilicon, China Unicom | Proposal 1: UE reference sensitivity for n1 50 MHz channel bandwidth is defined in Table 2-2 and 2-3 |

## Open issues summary

The NR\_n1\_BW2 WI has been updated in last RAN meeting to also add support for 50 MHz channel BW in band n1. UE RF requirements (A-MPR and REFSENS) should then be specified for this new channel BW.

### Sub-topic 2-1

*Sub-topic description:* REFSENS value and RB allcoation for 50MHz CBW

**Issue 2-1: REFSENS value for 50MHz CBW**

* Proposals
  + Option 1: Specify REFSENS Value via BW scaling

|  |  |  |
| --- | --- | --- |
| SCS | REFSENS value | RB allocation |
| 15 kHz | -90.6 | 128 |
| 30 kHz | -90.7 | 64 |
| 60kHz | -90.9 | 30 |

* + Option 2: Specify REFSENS Value via BW scaling

|  |  |  |
| --- | --- | --- |
| SCS | REFSENS value | RB allocation |
| 15 kHz | -89.6 | 128 |
| 30 kHz | -89.7 | 64 |
| 60kHz | -89.7 | 30 |

* Recommended WF
  + TBA

### Sub-topic 2-2

*Sub-topic description:* A-MPR simulations for 50MHz CBW

**Issue 2-2: A-MPR areas and values**

* Proposals
  + Option 1:
    - A-MPR values for each area below are those in the submitted CRs (R4-2001203 and R4-2001204)
    - B39/B4 protection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Channel Bandwidth, MHz | Carrier Center Frequency, Fc, MHz | Regions | | A-MPR |
| RBend\*12\*SCS  MHz | LCRB\*12\*SCS  MHz |
| 50 MHz | 1945 ≤ FC ≤ 1955 |  |  |  |
| ≥7.74, <14.4 | <1.08 | A5 |
| ≥36, <39.6 | <1.08 | A5 |
| <39.6 | ≥18, <max (0, 12\*SCS\*RBend – 7.74) | A2 |
| <39.6 | ≥max (0, 12\*SCS\*RBend – 7.74) | A1 |
| ≥39.6 | >0 | A1 |

* + - B33/B4 protection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Channel Bandwidth, MHz | Carrier Center Frequency, Fc, MHz | Regions | | A-MPR |
| RBend\*12\*SCS  MHz | LCRB\*12\*SCS  MHz |
| 50 MHz | 1945 ≤ FC ≤ 1955 |  |  |  |
| ≥0, <6.12 | >0 | A2 |
| ≥6.12, <20.7 | ≥max (0, 12\*SCS\*RBend - 3.6) | A4 |
| ≥20.7, <41.04 | ≥17.1 | A2 |
| ≥33.84, <41.04 | <1.08 | A5 |
| ≥41.04 | >0 | A1 |

* Recommended WF
  + - TBA

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Qualcomm | Sub topic 2-1: REFSENS value for 50MHz with 15K SCS should be -89.6dBm with RB allocation of 128. [0494] and [0827] agree within 0.1dB.  Sub topic 2-2: AMPR (25M, 30M, 40M CBW) simulated in [0825] and [0826] should be covered by the latest CR in [1203]. Extra 1dB AMPR for region A1 is negotiable.  ….  Others: |
| ZTE | Sub topic 2-1:For the calculation, same method by scaling on the transmission bandwidth configuration (number of RBs per channel bandwidth) is adopted for both [0494] and [0827], but with 0.1dB difference due to mathematics issue.  Our calculation is using 5MHz as baseline, where for 15kHz SCS, scale = 10\*LOG10(270/25)=10.334dB, then by rounded to one decimal place, i got 10.3dB. Then the REFSEN(50MHz) = 100dB - 10.3dB = 89.7dBm. NOT -89.6dBm. |
| Huawei | Sub topic 2-1:  There is 0.1 dB difference. We use round up approach with one decimal place.  Sub topic 2-2:  We can provide our simulation results next meeting. |
| Skyworks | Sub topic 2-1: For 50MHz CBW operation in n1, we expect no or little desense. If needed we can bring measurement data at next meeting to confirm. |

### 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** |
| NA | NA |
|  |

## 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:* |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

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

|  |  |
| --- | --- |
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## Discussion on 2nd round (if applicable)

## 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** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |