**3GPP TSG-RAN WG4 Meeting #94-e R4-2002905**

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

**Agenda item:** 9.26

**Source:** Moderator (Globalstar)

**Title:** Email discussion summary for RAN4#92e#38\_NR\_n53

**Document for:** Information

# Introduction

In RAN86, a WID on Introduction of NR Band n53 was approved (RP-192409). The purpose of this discussion is to review CRs submitted to complete the WI and any changes required by company proposals.

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

* 1st round: Agree on any required changes to submitted CRs based upon company proposals.
* 2nd round: Finalize changes to CRs as necessary.

# Topic #1: Introduction of NR Band n53

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2000325 | Samsung | Proposal 1: NR operating band n53, SCS and channel bandwidth should be introduced to NR specification according to WID  Proposal 2: Channel raster of n53 should be defined as 100 kHz.  Proposal 3: Sync raster for n53 should be defined based on 15 kHz SSB SCS and SSB pattern A.  Proposal 4: NR-ARFCN and GSCN range of n53 should be derived based on existing global channel raster and sync raster design respectively. |
| R4-2000094 | Qualcomm | Observation 1: Coexistence managers bwteen WIFI and n53 need to be in place to account for proximity of WLAN access points and UE RX.  Proposal 1: RF requirements for n53 only apply when there are no overlapping RX/TX between n41 and n53.  Observation 2: The first 1MHz from the edge of band n53 has no relxation in the spurious mask to account for the RBs at the edge of the channel BW, so AMPR is missing for LTE band B53  Proposal 2: Apply NS\_45 Spurious mask as shown in Figure 2 and study AMPR. |
| R4-2000519 | Nokia, Globalstar | CR to 38.101-1 |
| R4-2000342 | Nokia, Globalstar | CR to 36.104 |
| R4-2000343 | Nokia, Globalstar | CR to 36.141 |
| R4-2000344 | Nokia, Globalstar | CR to 37.104 |
| R4-2000345 | Nokia, Globalstar | CR to 37.141 |
| R4-2000346 | Nokia, Globalstar | CR to 37.105 |
| R4-2000347 | Nokia, Globalstar | CR to 37.145-1 |
| R4-2000348 | Nokia, Globalstar | CR to 37.145-2 |
| R4-2000349 | Nokia, Globalstar | CR to 38.104 |
| R4-2000350 | Nokia, Globalstar | CR to 38.141-1 |
| R4-2000351 | Nokia, Globalstar | CR to 38.141-2 |
| R4-2001347 | Nokia, Globalstar | CR to 38.133 |

## Open issues summary*.*

### Sub-topic 1-1 NR Band n53

**Issue 1-1: Samsung Proposals**

Proposals

* Proposal 1: NR operating band n53, SCS and channel bandwidth should be introduced to NR specification according to WID
* Proposal 2: Channel raster of n53 should be defined as 100 kHz.
* Proposal 3: Sync raster for n53 should be defined based on 15 kHz SSB SCS and SSB pattern A.
* Proposal 4: NR-ARFCN and GSCN range of n53 should be derived based on existing global channel raster and sync raster design respectively.

Recommended WF

* Moderator believes that all Samsung proposals have already been integrated into the relevant CRs.

**Issue 1-2: Qualcomm Proposals**

Proposals

* Proposal 1: RF requirements for n53 only apply when there are no overlapping RX/TX between n41 and n53.
* Proposal 2: Apply NS\_45 Spurious mask as shown in Figure 2 and study AMPR.

Recommended WF

* Re: Proposal 1: Moderators asks for clarification if this has a RAN4 impact.
* Re: Proposal 2 (Part A): NS\_45 Spurious mask has already been applied in 38.101-1.
* Re: Proposal 2 (Part B): Following offline discussion with contributor, it appears that AMPR is not required. Closer examination of FCC rules compels the following edits to 38.101-1, Table 6.5.3.3.17:

**Table 6.5.3.3.17-1: Additional requirements**

|  |  |  |
| --- | --- | --- |
| **Frequency band**  **(MHz)** | **Channel bandwidth / Spectrum emission limit (dBm)** | **Measurement bandwidth** |
| **5** |
| 0.009 < f ≤ 2477.5 | -25 | 1 MHz |
| 2477.5 < f ≤ 2478.5 | -13 | 1 MHz |
| 2478.5< f ≤ 2483.5 | -10 | 1 MHz |
| 2495 ≤ f < 2496 | **-13** | 50 KHz |
| 2496 ≤ f < 2501 | -13 | 1 MHz |
| 2501 ≤ f ≤ 5th harmonic of the upper frequency edge of the UL operating band | -25 | 1 MHz |

|  |  |  |
| --- | --- | --- |
| **Frequency band**  **(MHz)** | **Channel bandwidth / Spectrum emission limit (dBm)** | **Measurement bandwidth** |
| **10** |
| 0.009 < f ≤ 2473.5 | -25 | 1 MHz |
| 2473.5 < f ≤ 2478.5 | -13 | 1 MHz |
| 2478.5< f ≤ 2483.5 | -10 | 1 MHz |
| 2495 ≤ f < 2496 | -13 | 100 KHz |
| 2496 ≤ f < 2505 | -13 | 1 MHz |
| 2505 ≤ f ≤ 5th harmonic of the upper frequency edge of the UL operating band | -25 | 1 MHz |

### Sub-topic 1-2

*Sub-topic description*

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

**Issue 1-2: TBA**

* Proposals
  + Option 1: TBA
  + Option 2: TBA
* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Qualcomm | Sub topic 1-1: Qualcomm would still need to verify that no AMPR is required even with the modified spurious mask that matches FCC requirements  Table x.x-x: A-MPR for NS\_45   |  |  | | --- | --- | | Modulation/Waveform | A1 | | Outer | | DFT-s-OFDM PI/2 BPSK | ≤ [1.5] | | DFT-s-OFDM QPSK | ≤ [2] | | DFT-s-OFDM 16 QAM | ≤ [2.5] | | DFT-s-OFDM 64 QAM | ≤ [3] | | DFT-s-OFDM 256 QAM | ≤ 4.5 | | CP-OFDM QPSK | ≤ [3] | | CP-OFDM 16 QAM | ≤ [3] | | CP-OFDM 64 QAM | ≤ [3.5] | | CP-OFDM 256 QAM | ≤ 6.5 |   This is subject to measurement verification, hence square brackets. We can finalize next meeting.  Sub topic 1-2:  ….  Others: |
| Sprint | **Sub topic 1-1:** Sprint would like to understand if the n53 UEs and gNBs would be operating as terrestrial low-power systems under CFR 25.149. If so, there seem to be some requirements that aren’t covered by the existing CRs, specifically items (ii), (iii) below:  (4) Applications for equipment authorization of terrestrial low-power system equipment that will operate in the 2483.5-2495 MHz band shall demonstrate the following:  (i) The transmitted signal is digitally modulated;  (ii) The 6 dB bandwidth is at least 500 kHz;  (iii) The maximum transmit power is no more than 1 W with a peak EIRP of no more than 6 dBW;  (iv) The maximum power spectral density conducted to the antenna is not greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission;  Can someone clarify if these terrestrial low-power rules are applicable to NR band n53 UEs and gNBs? |

### 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** |
| R4-2000344 | Ericsson: Something goes wrong with the format of table 6.6.1.3.1-1 |
| Company B |
|  |
| R4-2000349 | Ericsson: There is a type in the title of subclause 6.6.4.2.5.4, it should be “…band n53” and not “…band n48”. |
| Company B |
|  |
| R4-2000351 | Ericsson: If band n53 is added to 38.141-2, the additional OBUE requirements for n53 should also be added. |

## 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#1-1** | **Regarding Qualcomm Comments:**  CR to 38.101-1 will be revised to include: Table 6.5.3.3.17-1: Additional requirements.  Nokia and Qualcomm are studying A-MPR requirements. An A-MPR table may be added following completion of this work.  **Regarding Sprint Comments:**  CFR 47 Part 25.149 applies to both n53 UEs and gNBs.  (4)(ii) is an old FCC rule (widely applied in Part 15), which is designed to mandate “broadband” operations (e.g. as opposed to narrowband analog operations). It does not restrict RB allocation or other technical features of an OFDMA system.  (4)(iii) is the power rule that applies to both UEs and gNBs. The FCC has clarified that power may be measured by an averaging method to accommodate modulation types with high PAPR. LTE equipment has already been successfully certified using this method.  Following discussions with Sprint, no changes to CRs have been identified as necessary. |

*Recommendations on WF/LS assignment*

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

### CRs/TPs

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| R4-2000519 | CR to 38.101-1 will be revised to include: Table 6.5.3.3.17-1: Additional requirements.  Nokia and Qualcomm are studying A-MPR requirements. An A-MPR table may be added following completion of this work. |
| R4-2000342 | CR is agreeable. |
| R4-2000343 | CR is agreeable. |
| R4-2000344 | CR to 37.104 will be revised to reflect Ericsson comments. |
| R4-2000345 | CR is agreeable. |
| R4-2000346 | CR is agreeable. |
| R4-2000347 | CR is agreeable. |
| R4-2000348 | CR is agreeable. |
| R4-2000349 | CR to 38.104 will be revised to reflect Ericsson comments. |
| R4-2000350 | CR is agreeable. |
| R4-2000351 | CR to 38.141-2 will be revised to reflect Ericsson comments. |
| R4-2001347 | CR is agreeable. |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

Following discussions, revisions were made to CR 38.101-1 to include an A-MPR table. Editorial revisions were made to CRs to 37.104, 38.104, and 38.141-2.

All CRs necessary to complete the WI for Band n53 are now agreeable.

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| R4-2002857  (Rev of R4-2000519) | CR to 38.101-1 was revised.  CR is now agreeable. |
| R4-2000342 | CR is agreeable. |
| R4-2000343 | CR is agreeable. |
| R4-2002858  (Rev of R4-2000344) | CR to 37.104 was revised.  CR is now agreeable. |
| R4-2000345 | CR is agreeable. |
| R4-2000346 | CR is agreeable. |
| R4-2000347 | CR is agreeable. |
| R4-2000348 | CR is agreeable. |
| R4-2002859  (Rev of R4-2000349) | CR to 38.104 was revised.  CR is now agreeable. |
| R4-2000350 | CR is agreeable. |
| R4-2002860  (Rev of R4-2000351) | CR to 38.141-2 was revised.  CR is now agreeable. |
| R4-2001347 | CR is agreeable. |

# Topic #2: Title

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-20xxxxx | Company A | Proposal 1:  Observation 1: |

## 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 2-1

*Sub-topic description:*

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

**Issue 2-1: TBA**

* Proposals
  + Option 1: TBA
  + Option 2: TBA
* Recommended WF
  + TBA

### Sub-topic 2-2

*Sub-topic description*

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

**Issue 2-2: TBA**

* Proposals
  + Option 1: TBA
  + Option 2: TBA
* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 2-1:  Sub topic 2-2:  ….  Others: |

### 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** |
| XXX | Company A |
| Company B |
|  |
| YYY | 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:* |

*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*

|  |  |
| --- | --- |
| **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”* |