**3GPP TSG-RAN WG4 Meeting # 109 R4-23XXXXX**

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

**Agenda item:** 8.14.7

**Source:** Man Hung Ng (Nokia)

**Title:** Topic summary for [109][303] NR\_FR1\_lessthan\_5MHz\_BW\_BSRF

**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.*

Summary for contributions submitted under agenda items 8.14.3 for NR support for dedicated spectrum less than 5MHz for FR1.

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

* 1st round: Discussion and agreement on open issues listed below.
* 2nd round: Continue discussion and agreement on open issues listed below.

# Topic #1: Core requirements

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2318474 | NTT DOCOMO, INC., SoftBank Corp., KDDI Corporation, Rakuten mobile, Inc | Proposal 1: Add additional requirement tables for band n26 and n28 in Japan as follows,  **Table 4 for BS type 1-C**  Table 6.7.2.2-2 Interfering and wanted signals for the additional transmitter intermodulation requirement for Band n26 and n28 (5 MHz and over channel bandwidth)   |  |  | | --- | --- | | **Parameter** | **Value** | | Wanted signal | NR single carrier | | Interfering signal type | NR signal of 5 MHz *channel bandwidth* | | Interfering signal level | Rated total output power in the operating band – 30 dB | | Interfering signal centre frequency offset from the lower/upper carrier centre frequency of the wanted signal | ± 2.5 MHz  ± 7.5 MHz  ± 12.5 MHz |   **Table 5 for BS type 1-H**  Table 6.7.3.3-2 Interfering and wanted signals for the additional transmitter intermodulation requirement for Band n26 and n28 (5 MHz and over channel bandwidth)   |  |  | | --- | --- | | **Parameter** | **Value** | | Wanted signal | NR single carrier | | Interfering signal type | NR signal of 5 MHz *channel bandwidth* | | Interfering signal level | *Rated total output power* per *TAB connector* (Prated,t,TABC) in the *operating band* – 30 dB | | Interfering signal centre frequency offset from the lower/upper carrier centre frequency of the wanted signal | ± 2.5 MHz  ± 7.5 MHz  ± 12.5 MHz |   **Table 6 for BS type 1-O**  Table 9.8.3-1: Interfering and wanted signals for the OTA transmitter intermodulation requirement for n26 and n28 (5 MHz and over channel bandwidth)   | Parameter | Value | | --- | --- | | Wanted signal | NR single carrier | | Interfering signal type | NR signal of 5 MHz *channel bandwidth* | | Interfering signal power level | min(46 dBm, Prated,t,TRP) | | Interfering signal centre frequency offset from the lower (upper) edge of the wanted signal or edge of *sub-block* inside a gap | ± 2.5 MHz  ± 7.5 MHz  ± 12.5 MHz |   Observation 1: By introducing 3MHz BW, Tx Intermodulation shall be tested with 3MHz BW even if the BS doesn’t support 3MHz BW in current specification.  Observation 2: In current Tx intermodulation minimum requirements, the interfering signal type and interfering signal frequency position are not matching Japanese regulation. |
| R4-2318475 | NTT DOCOMO, INC., SoftBank Corp., KDDI Corporation, Rakuten mobile, Inc | Proposal 1: CR to TS 38.104 according to R4-2318474.  Observation 1: |
| R4-2318476 | NTT DOCOMO, INC., SoftBank Corp., KDDI Corporation, Rakuten mobile, Inc | Proposal 1: CR to TS 38.141-1 according to R4-2318474.  Observation 1: |
| R4-2318477 | NTT DOCOMO, INC., SoftBank Corp., KDDI Corporation, Rakuten mobile, Inc | Proposal 1: CR to TS 38.141-2 according to R4-2318474.  Observation 1: |
| R4-2318566 | Nokia, Nokia Shanghai Bell, ZTE Corporation, Ericsson | Proposal 1: CR to TS 38.104 on clarification of applicable SS raster entries for 3 MHz channel bandwidth.  Observation 1: |
| R4-2319750 | Nokia, Nokia Shanghai Bell, ZTE Corporation, Ericsson | Proposal 1: CR to TS 38.104 on support of NB-IoT operation in NR in-band for 3 MHz channel bandwidth.  Observation 1: |

## Open issues summary

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

### Sub-topic 1-1

*Sub-topic description:*

*Open issues and candidate options before meeting:*

**Issue 1-1: R4-2318474, R4-2318475, R4-2318476, R4-2318477 (Tx intermodulation requirements maintenance in certain region)**

* Proposals: Add additional requirement tables for band n26 and n28 in Japan as follows,

**Table 4 for BS type 1-C**

Table 6.7.2.2-2 Interfering and wanted signals for the additional transmitter intermodulation requirement for Band n26 and n28 (5 MHz and over channel bandwidth)

|  |  |
| --- | --- |
| **Parameter** | **Value** |
| Wanted signal | NR single carrier |
| Interfering signal type | NR signal of 5 MHz *channel bandwidth* |
| Interfering signal level | Rated total output power in the operating band – 30 dB |
| Interfering signal centre frequency offset from the lower/upper carrier centre frequency of the wanted signal | ± 2.5 MHz  ± 7.5 MHz  ± 12.5 MHz |

**Table 5 for BS type 1-H**

Table 6.7.3.3-2 Interfering and wanted signals for the additional transmitter intermodulation requirement for Band n26 and n28 (5 MHz and over channel bandwidth)

|  |  |
| --- | --- |
| **Parameter** | **Value** |
| Wanted signal | NR single carrier |
| Interfering signal type | NR signal of 5 MHz *channel bandwidth* |
| Interfering signal level | *Rated total output power* per *TAB connector* (Prated,t,TABC) in the *operating band* – 30 dB |
| Interfering signal centre frequency offset from the lower/upper carrier centre frequency of the wanted signal | ± 2.5 MHz  ± 7.5 MHz  ± 12.5 MHz |

**Table 6 for BS type 1-O**

Table 9.8.3-1: Interfering and wanted signals for  
the OTA transmitter intermodulation requirement for n26 and n28 (5 MHz and over channel bandwidth)

| Parameter | Value |
| --- | --- |
| Wanted signal | NR single carrier |
| Interfering signal type | NR signal of 5 MHz *channel bandwidth* |
| Interfering signal power level | min(46 dBm, Prated,t,TRP) |
| Interfering signal centre frequency offset from the lower (upper) edge of the wanted signal or edge of *sub-block* inside a gap | ± 2.5 MHz  ± 7.5 MHz  ± 12.5 MHz |

* Options
  + Option 1: Approve proposals in R4-2318474, and agree R4-2318475, R4-2318476, R4-2318477
  + Option 2: Revise proposals in R4-2318474, and revise R4-2318475, R4-2318476, R4-2318477
  + Option 3: Note proposals in R4-2318474, and note R4-2318475, R4-2318476, R4-2318477
* Recommended WF
  + TBD

### Sub-topic 1-2

*Sub-topic description:*

*Open issues and candidate options before meeting:*

**Issue 1-2: R4-2318566 (CR to TS 38.104 on clarification of applicable SS raster entries for 3 MHz channel bandwidth)**

* Proposals
  + Option 1: Agree the CR
  + Option 2: Revise the CR
* Recommended WF
  + Option 1: Agree the CR (Resubmission of endorsed draft CR in R4-2315269)

### Sub-topic 1-3

*Sub-topic description:*

*Open issues and candidate options before meeting:*

**Issue 1-3: R4-2319750 (CR to TS 38.104 on support of NB-IoT operation in NR in-band for 3 MHz channel bandwidth)**

* Proposals
  + Option 1: Agree the CR
  + Option 2: Revise the CR
* Recommended WF
  + Option 1: Agree the CR (According to the agreed WF in R4-2316899)

# Topic #2: Test requirements

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2318393 | Nokia, Nokia Shanghai Bell | Proposal 1: Draft CR to TS 38.141-1 on introduction of 3 MHz channel bandwidth in clauses 4.1, 6.3 and 6.6.  Observation 1: |
| R4-2318394 | Nokia, Nokia Shanghai Bell, ZTE Corporation, Ericsson, Huawei | Proposal 1: Big CR to TS 38.141-1 on introduction of 3 MHz channel bandwidth.  Observation 1: |
| R4-2319198 | ZTE Corporation | Proposal 1: Draft CR to TS 38.141-1: Introduction of 3 MHz channel bandwidth with NB-IoT support.  Observation 1: |
| R4-2319581 | Ericsson | Proposal 1: Build NRTC1 with the narrowest supported channel bandwidth NR signal if NB-IoT is not supported and with 5 MHz channel BW signal when NB-IoT is supported. Build all other test configurations with a 5 MHz channel bandwidth signal.  Proposal 2: RAN4 should further consider building all NR test configurations (even NRTC1 when NB-IoT is not supported) using a 5 MHz channel bandwidth NR signal.  Observation 1: Except ETC1, all E-UTRA test configurations are built with a 5 MHz channel bandwidth signal.  Observation 2: Except TC2 and TC6, all E-UTRA test configurations are built with a E-UTRA 5 or 10 MHz channel bandwidth signal.  Observation 3: Only when testing a contiguous spectrum allocation and when NB-IoT operating in-band is not supported, the E-UTRA test signal used to build the TC has the narrowest supported channel bandwidth. In all other cases, 5 MHz channel bandwidth E-UTRA signal is used (or 10 MHz for NB-IoT guard band). |
| R4-2319582 | Ericsson | Proposal 1: CR to TS 38.141-1 according to proposal 1 of R4-2319581.  Observation 1: |
| R4-2319583 | Ericsson | Proposal 1: Revised in R4-2320415.  Observation 1: |
| R4-2320151 | NEC | Proposal 1: Draft CR to TS 38.141-1: Operating band unwanted emissions for 3 MHz channel bandwidth.  Observation 1: |
| R4-2320415 | Ericsson | Proposal 1: CR to TS 37.141 according to proposal 1 of R4-2319581.  Observation 1: |
| R4-2320844 | Huawei, HiSilicon | Proposal 1: Draft CR to TS 38.141-1: in-band blocking requirements for 3 MHz channel bandwidth (7.4.2) including in-band NB-IoT, Rel-18.  Observation 1: |

## Open issues summary

*Before 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 meeting:*

**Issue 2-1: R4-2318393 (Draft CR to TS 38.141-1 on introduction of 3 MHz channel bandwidth in clauses 4.1, 6.3 and 6.6)**

* Proposals
  + Option 1: Endorse the draft CR
  + Option 2: Revise the draft CR
* Recommended WF
  + Option 1: Endorse the draft CR (Resubmission of endorsed draft CR in R4-2316897)

### Sub-topic 2-2

*Sub-topic description:*

*Open issues and candidate options before meeting:*

**Issue 2-2: R4-2319198 (Draft CR to TS 38.141-1: Introduction of 3 MHz channel bandwidth with NB-IoT support)**

* Proposals
  + Option 1: Endorse the draft CR
  + Option 2: Revise the draft CR
* Recommended WF
  + Option 1: Endorse the draft CR (Resubmission of endorsed draft CR in R4-2315145 with updates according to the agreed WF in R4-2316899)

### Sub-topic 2-3

*Sub-topic description:*

*Open issues and candidate options before meeting:*

**Issue 2-3: R4-2319581, R4-2318582, R4-2318583, R4-2320415 (Spectrum less than 5 MHz - BS RF conformance considerations)**

* Proposals
  + Proposal 1: Build NRTC1 with the narrowest supported channel bandwidth NR signal if NB-IoT is not supported and with 5 MHz channel BW signal when NB-IoT is supported. Build all other test configurations with a 5 MHz channel bandwidth signal.
  + Proposal 2: RAN4 should further consider building all NR test configurations (even NRTC1 when NB-IoT is not supported) using a 5 MHz channel bandwidth NR signal.
* Options
  + Option 1: Approve proposal 1 in R4-2319581, endorse R4-2319582, agree R4-2320415
  + Option 2: Approve proposal 2 in R4-2319581, revise R4-2319582 and R4-2320415
* Recommended WF
  + TBD (TS 37.141 needs to be included in the list of impacted specifications in the WID)

### Sub-topic 2-4

*Sub-topic description*

*Open issues and candidate options before meeting:*

**Issue 2-4: R4-2320151 (Draft CR to TS 38.141-1: Operating band unwanted emissions for 3 MHz channel bandwidth)**

* Proposals
  + Option 1: Endorse the draft CR
  + Option 2: Revise the draft CR
  + Option 3: Note the draft CR
* Recommended WF
  + TBD

### Sub-topic 2-5

*Sub-topic description:*

*Open issues and candidate options before meeting:*

**Issue 2-5: R4-2320844 (Draft CR to TS 38.141-1: in-band blocking requirements for 3 MHz channel bandwidth (7.4.2) including in-band NB-IoT, Rel-18)**

* Proposals
  + Option 1: Endorse the draft CR
  + Option 2: Revise the draft CR
* Recommended WF
  + Option 1: Endorse the draft CR (Resubmission of endorsed draft CR in R4-2316844 with updates according to the agreed WF in R4-2316899)