**3GPP TSG-RAN WG4 Meeting #98-e *R4-2103315***

Electronic meeting, January 25th – February 5th, 2021

**Agenda item:** 9.29

**Source:** Moderator (Ericsson)

**Title:** Email discussion summary for [98e][127] NR\_n85

**Document for:** Information

# Introduction

The new WI to introduce NR band n85 re-farmed LTE band 85 was agreed in last RAN#90e meeting.

This agenda item will handle all contributions related to this WI:

* BS RF requirements discussion.
* UE RF requirements discussion

# Topic #1: BS RF

This topic is aiming to agree on the proposed updates of BS RF specifications when introducing band n85.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2102171 | Ericsson | **Proposal: Agree with the changes listed in this contribution.** |
| R4-2102509 | Huawei | **Proposal 1**: Operation band n85 is introduced  **Proposal 2**: Channel bandwidth is introduced  **Proposal 3**: Channel raster and NR-ARFCN are introduced.  **Proposal 4**: synchronization raster entries for n85: |

## Open issues summary

### Sub-topic 1-1

Sub-topic description: n85 band system parameters.

**Issue 1-1: n85 band system parameters.**

* Proposals:
  + Option 1: Band n85 shall be defined as below (Huawei, Ericsson)
    - Band definition:

|  |  |  |  |
| --- | --- | --- | --- |
| NR *operating band* | Uplink (UL) *operating band* BS receive / UE transmit  FUL,low – FUL,high | Downlink (DL) *operating band* BS transmit / UE receive  FDL,low – FDL,high | Duplex mode |
| n85 | 698 MHz – 716 MHz | 728 MHz – 746 MHz | FDD |

* + - CBW

| NR band / SCS / *BS channel bandwidth* | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR Band | SCS  kHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz | 30 MHz | 40 MHz | 50 MHz | 60 MHz | 70 MHz | 80 MHz | 90 MHz | 100 MHz |
|  | 15 | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
| n85 | 30 |  | Yes |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |

* + - Channel arrangement

|  |  |  |  |
| --- | --- | --- | --- |
| NR *operating band* | ΔFRaster  (kHz) | Uplink  range of NREF  (First – <Step size> – Last) | Downlink  range of NREF  (First – <Step size> – Last) |
| n85 | 100 | 139600 – <20> – 143200 | 145600 – <20> – 149200 |

|  |  |  |  |
| --- | --- | --- | --- |
| NR *operating band* | SS Block SCS | SS Block pattern (NOTE 1) | Range of GSCN  (First – <Step size> – Last) |
| n85 | 15 kHz | Case A | 1826 – <1> – 1858 |

* Recommended WF
  + Agree with this proposal.

### Sub-topic 1-2

Sub-topic description: n85 band Tx requirements.

**Issue 1-2: n85 band Tx requirements.**

* Proposals:
  + Option 1: Tx requirements updates when introducing band n85, more details in R4-2102171: (Ericsson)
    - Output power: no update
    - OBUE: n85 shall be added to the list of bands mentioned for Wide Area cat A and cat B option 1 limits for bands below 1GHz, in clauses 6.6.4.2.1 and 6.6.4.2.2
    - Spurious: Band n85 limits shall be added to the coexistence spurious emissions limits, table 6.6.5.2.3-1 as mentioned R4-2102171.
* Recommended WF
  + Agree with this proposal.

### Sub-topic 1-3

Sub-topic description: n85 band Rx requirements.

**Issue 1-2: n85 band Rx requirements.**

* Proposals:
  + Option 1: No impact on Rx requirements when introducing band n85. (Ericsson)
* Recommended WF
  + Agree with this proposal.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1:  Sub topic 1-2:  Sub topic 1-3:  Others: |

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
|  | *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:* Proposed n85 system parameters are agreable.  *Candidate options:*  *Recommendations for 2nd round:*NA |
| **Sub-topic#2** | *Tentative agreements:* Proposed Tx requirements updates are agreable  *Candidate options:*  *Recommendations for 2nd round:* NA |
| **Sub-topic#3** | *Tentative agreements:* No impact on RX requirements  *Candidate options:*  *Recommendations for 2nd round:* NA |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1  R4-2103219 | WF on the introduction of band n85 | Ericsson |

### 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** |
| R4-2103219 | agreeable |

# Topic #2: UE RF

This topic is aiming to agree on the proposed updates of UE RF specifications when introducing band n85.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2102172 | Ericsson | **Proposal: Agree with the changes listed in this contribution.** |
| R4-2102509 | Huawei | **Proposal 1**: Operation band n85 is introduced  **Proposal 2**: Channel bandwidth is introduced  **Proposal 3**: Channel raster and NR-ARFCN are introduced.  **Proposal 4**: synchronization raster entries for n85:  **Proposal 5**: UE Tx and Rx frequency separation is introduced.  **Proposal 6**: UE maximum output power is introduced.  **Proposal 7**: Two antenna port reference sensitivity QPSK PREFSENS: |

## Open issues summary

### Sub-topic 2-1

Sub-topic description: n85 band system parameters.

**Issue 2-1: n85 band system parameters.**

* Recommended WF
  + Shall be aligned with Issue 1-1.

### Sub-topic 2-2

Sub-topic description: n85 band Tx requirements.

**Issue 2-2: n85 band Tx requirements.**

* Proposals:
  + Option 1: Tx requirements updates when introducing band n85: (Huawei, Ericsson)
    - UE Tx and Rx frequency separation is introduced.

| **NR Operating Band** | **TX – RX  carrier centre frequency separation** |
| --- | --- |
| n85 | 16 MHz |

* + - UE MOP: 23dBm shall be added to table 6.2.2-1 for n85.
    - A-MPR: NS\_06 information in table 6.2.3.1-1 shall be udpated:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Network signalling label | Requirements (clause) | NR Band | Channel bandwidth (MHz) | Resources blocks (*N*RB) | A-MPR (dB) |
| NS\_06 | 6.5.2.3.4 | n12 | 5, 10, 15 |  | N/A |
|  | n14, n85 | 5,10 |  |  |

And n85 shall be added to table 6.2.3.1-1A.

* + - Spurious coex: Band n85 shall be added to table 6.5.3.2-1.
* Recommended WF
  + Agree with this proposal.

### Sub-topic 2-3

Sub-topic description: n85 band Rx requirements.

**Issue 2-2: n85 band Rx requirements.**

* Proposals:
  + Option 1: Tx requirements updates when introducing band n85: (Huawei, Ericsson)
    - REFSENS values and RB allocations:

| Operating band / SCS / Channel bandwidth / Duplex-mode | | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Operating Band | SCS kHz | 5  MHz (dBm) | 10  MHz (dBm) | 15  MHz (dBm) | 20  MHz (dBm) | 25  MHz (dBm) | 30 MHz (dBm) | 40  MHz (dBm) | 50  MHz (dBm) | 60  MHz (dBm) | 70  MHz (dBm) | 80  MHz (dBm) | 90  MHz (dBm) | 100 MHz (dBm) | Duplex Mode |
| n85 | 15 | -97.0 | -93.8 |  |  |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  | -94.1 |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |

| Operating band / SCS / Channel bandwidth / Duplex mode | | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Operating Band | SCS kHz | 5  MHz | 10  MHz | 15  MHz | 20  MHz | 25 MHz | 30 MHz | 40  MHz | 50  MHz | 60  MHz | 70  MHz | 80  MHz | 90  MHz | 100 MHz | Duplex Mode |
| n85 | 15 | 20 | 20 |  |  |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  | 10 |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |

And n85 shall be added in table 7.3.2-4, with NS\_06.

* + - In-band blocking: n85 shall be added in table 7.6.2-2.
    - Out of band blocking: n85 shall be added in table 7.6.3-2
    - Narrow band blocking: n85 shall be added in table 7.6.4-1
* Recommended WF
  + Agree with this proposal.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Nokia | Sub topic 2-2: Tx to Rx separation is 30 MHz for n85  Sub topic 1-2:  Sub topic 1-3:  Others: |
| Apple | Sub topic 2-2:  Thanks for compiling the Tx requirements for n85.  We found that the spurious coexistence table is missing harmonic exceptions for band 51 (hit by 2nd harmonic) and band 48 (hit by 5th harmonic). Please include those exceptions in the coex tables. |
| Huawei | Sub topic 2-2: @Nokia, indeed the Tx to Rx separation for n85 is 30MHz. It will be rectified when the file is updated.  @Ericsson, please consider 5th harmonic of n85 spurious effect on bands n77 and n78 as well |
| Ericsson | Thanks to Nokia pointing this mistake, we agree Tx-Rx separation is 30MHz indeed.  Thanks also to Apple and Huawei for the careful review on spurious. |

### CRs/TPs comments collection

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| --- | --- |
| **CR/TP number** | **Comments collection** |
|  | *NA* |
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## 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:* To be aligned with 2-1  *Candidate options:*  *Recommendations for 2nd round:* NA |
| **Sub-topic#2** | *Tentative agreements:* option 1 is agreeable with the following update: Tx-Rx separation shall be 30MHz.  *Candidate options:*  *Recommendations for 2nd round:* NA |
| **Sub-topic#3** | *Tentative agreements:* option 1 is agreeable with the additional feedback provided on coex spurious (bands 51, 48, n77 and n78)  *Candidate options:*  *Recommendations for 2nd round:* NA |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 | NA  (agreements to be captured in WF proposed in 1.4.1) |  |

### 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”* |