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

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

**Agenda item:** 6.7

**Source:** Moderator (Ericsson)

**Title:** Email discussion summary for RAN4#94e\_#75\_NR\_NewRAT\_RF\_BS

**Document for:** Information

# Introduction

The BS RF core spec TS 38.104 is fairly stable and there are not many contributions in this area. Contributions were submitted within the following Topics:

1. FR2 spurious emissions
2. EESS protection
3. Regional requirements
4. TR 38.817-2 updates
5. LTE-NR channel spacing
6. TS 38.104 editorial

Only Topic #2 introduces a new requirement, while all other Topics concern corrections of existing requirements and editorials.

# Topic #1: FR2 spurious emissions

Different FR2 spurious emission limits for Category A (global) and Category B (applicable mainly in Europe) have been agreed for Tx spurious emissions in previous meetings. Limits have also been agreed for Rx spurious emissions that apply globally, with no split between Category A and B.

The CRs submitted for 38.104 propose an update to FR2 Category B Tx limits.

NOTE: CR to test specification 38.141-2 is missing.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2001247  R4-2001248 | ZTE Corporation | CR to 38.104: The TX spurious emission table 9.7.5.3.2.3-2 has been updated with band n257, n260, n261 requirement. |

## Open issues summary

### Sub-topic 1-1

The CR reason for change: The TX spurious emission requirement step frequency is only for band n258 now while for RX spurious emission all the FR2 bands has been finalized. The principle is for cat B spurious limit, RX and TX share the same requirement. So the table for other bands for TX spurious emission has been added based on RX table.

The issue here is to determine whether the FR2 Category B limits for Tx spurious emissions are applicable for bands n257, n260 and n261.

**Issue 1-1: Applicability of FR2 Category B Tx limits for bands n257, n260 and n261**

* Proposals
  + Option 1: Apply Category B FR2 limits also for bands n257, n260 and n261.
  + Option 2: No change.
* Recommended WF
  + Option 2 (based on existing regulation)

## Companies views’ collection for 1st round

### Open issues

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

## 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.*

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| --- | --- |
|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

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

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

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| --- | --- |
| **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*

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| --- | --- |
| **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: EESS protection

At WRC-19 in Sharm el-Sheikh, a new allocation was identified for terrestrial IMT in the band 24.25 to 27.5 GHz. The new IMT allocation concerns 3GPP bands n257 and n258 for NR. In addition, WRC-19 established unwanted emission limits for protection of EESS in the band 23.6 to 24 GHz.

Several proposals and a set of CRs are submitted for implementation of the EESS protection limits for NR BS in FR2.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2001191 | NTT DOCOMO, INC. | Proposal 1: Introduce new additional OBUE requirements for the EESS (passive) (23.6 – 24 GHz) protection  Proposal 2: The requirement for the EESS (passive) protection applies to any BSs that support a frequency range that partially or completely overlaps with “Active service band” (i.e., 24.25 – 27.5 GHz).  Proposal 3: Define a limit of – 9dBm/200MHz in the frequency range 23.6 -24 GHz for the EESS (passive) protection, and add a note indicating a limit of -3dBm/200MHz may apply to BS brought into use prior 1st September 2027. |
| R4-2001250 | ZTE Corporation | Observation 1: The WRC-19 Resolution 750 has agreed specific requirement for 23.6--24GHz for band n 258.  Observation 2: The emission requirement within 23.6--24GHz agreed in WRC-19 is much more stringent than current 3GPP OBUE requirement.  Observation 3: ECC limit is 9dB more stringent than WRC-19 requirement.  Observation 4: For ECC decision(18)06, we can wait for ECC decision.  Proposal: To capture the WRC-19 requirement in 3GPP specification. |
| R4-2001686 | Ericsson | Observation 1: The limits of unwanted emissions agreed at WRC-19 are defined in two phases, with stricter limits applicable to IMT base stations brought into use after 1 September 2027.  Observation 2: The limits of unwanted emissions agreed at WRC-19 are defined as TRP using dBW. The corresponding limits using dBm for IMT base stations would be -3 dBm/200 MHz and -9 dBm/200 MHz (TRP) respectively for Phase 1 and 2.  Proposal 1: The limits of unwanted emissions in the range 23.6 GHz to 24 GHz should only apply for a BS where any part of the downlink transmission falls within the “Active service band” (24.25 GHz to 27.5 GHz) defined in Resolution 750 [1].  Proposal 2: Both Phase 1 and 2 limits from WRC-19 Resolution 750 [1] are implemented in NR BS specifications. The Phase 1 limits would apply for equipment brought into use until 1 September 2027, while Phase 2 limits would apply after that date. |
| R4-2001420 | Nokia, Nokia Shanghai Bell | CR to 38.817-02: Measurement uncertainty for FR2 OTA additional spurious emissions requirements is captured into TR by re-using the uncertainty for OBUE and mandatory spurious emissions. |
| R4-2001421  R4-2001422  R4-2001423  R4-2001424 | Nokia, Nokia Shanghai Bell | CRs to 38.104: OTA additional unwanted emission limit is added for FR2 capturing the WRC-19 agreement of EESS protection within 23.6 – 24 GHz.  CRs to 38.141-2: OTA additional unwanted emission limit is added for FR2 capturing the WRC-19 agreement of EESS protection within 23.6 – 24 GHz. Added requirements are measurement uncertainty, test procedure and test tolerance for FR2 additional transmitter spurious emissions. |

## Open issues summary

The open issues are divided into five subtopics, which are mostly independent:

1. Applicability for band n257
2. Applicability for band n258
3. OBUE or Spurious limit
4. Limits and phased approach
5. Test tolerance for limit

### Sub-topic 2-1

If the requirement is applicable for band n257, over what Tx frequency range should it apply? Note that only 1 GHz of band n257 overlaps with the “Active service band” in Resolution 750.

**Issue 2-1: Applicability for band n257**

* Proposals
  + Option 1: The requirement for the EESS (passive) protection applies to any BSs in band n257 (26.5 – 29.5 GHz) that support a frequency range that partially or completely overlaps with “Active service band” (i.e., 24.25 – 27.5 GHz).
  + Option 2: The requirement for the EESS (passive) protection applies to a BS where any part of the downlink transmission falls within the “Active service band” (24.25 GHz to 27.5 GHz) defined in Resolution 750 [1].
* Recommended WF
  + TBA

### Sub-topic 2-2

If the requirement is applicable for band n258, over what Tx frequency range should it apply? Note that band n258 fully overlaps with the “Active service band” in Resolution 750.

**Issue 2-2: Applicability for band n258**

* Proposals
  + Option 1: The requirement for the EESS (passive) protection applies to any BSs in band n258.
* Recommended WF
  + Option 1

### Sub-topic 2-3

For band n257 and n258, the OBUE limits are defined out to ΔfOBUE = 1.5 GHz from the edges of the operating band. This means that for band n258 with its edge at 24.25 GHz, the range for the EES protection limit (23.6-24 GHz) is fully within the OBUE requirement range. For band n257 with its edge at 26.5 GHz, the range for the EES protection limit (23.6-24 GHz) is fully within the spurious requirement range.

**Issue 2-3: OBUE or Spurious limit**

* Proposals
  + Option 1: Define the limit as spurious limits and have a note stating that the frequency range may in some cases fall inside the OBUE freqeuncy range.
  + Option 2: Define the limit as OBUE limits and have a note stating that the frequency range may in some cases fall inside the spurious freqeuncy range.
  + Option 3: Define the limit twice – As OBUE for band n258 and as Spurious emissions for band n257.
* Recommended WF
  + Option 2, since OBUE applies for band n258 which has the smallest offset and largest impact. Duplication of requirements will then not be needed.

### Sub-topic 2-4

The limits of unwanted emissions agreed at WRC-19 are defined in two phases, with stricter (lower) limits applicable to IMT base stations brought into use after 1 September 2027. This “phased approach” to the limits can be implemented in different ways in the BS specifications.

**Issue 2-4: Limits and phased approach**

* Proposals
  + Option 1: Define the lower limit for protection of 23.6 -24 GHz, with a note indicating that a higher limit applies to BS brought into use prior to 1 September 2027.
  + Option 2: Define the higher limit for protection of 23.6 -24 GHz, with a note indicating that a lower limit applies to BS brought into use after to 1 September 2027.
  + Option 3: Define both the lower and the higher limits for protection of 23.6 -24 GHz on an equal basis, each with a Note. The note to the lower limit would indicate that it applies to BS brought into use after 1 September 2027. The note to the higher limit would indicate that it applies to BS brought into use on or before 1 September 2027.
* Recommended WF
  + TBA

### Sub-topic 2-5

The new limit for protection of EESS is (in some options) an additional spurious emissions requirement, where it is presently not documented how test tolerances are derived.

**Issue 2-5: Test tolerance for limit**

* Proposals
  + Option 1: Apply the same analysis as for mandatory spurious emissions and derive test tolerances, where TT > 0.
  + Option 2: Set test tolerances TT = 0 as for other regulatory requirements on spurious emissions.
* Recommended WF
  + Option 2, since the requirement originates in international regulation.

## Companies views’ collection for 1st round

### Open issues

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| --- | --- |
| **Company** | **Comments** |
| ZTE | Sub topic 2-1:  For band n257, the 23.6--24GHz falls in the spurious domain and the requirement is -20dBM/10MHz. As shown in zte tdoc, the limit for resolution 750 is -33dBw/200MHz(-16dBm/10MHz) before 2027 and -39dBw/200MHz(-22dBm/MHz). So for BS operating in band n257 before 2027, the EESS protection limit is covered by spurious emission limit. The only issue is BS operating in band n257 after 2027. We think additional limit should be added for this band specifying for BS brought into use after 2027.  Sub topic 2-2: Ok with the proposal  Sub topic 2-3: Ok with the WF as to choose option 2  Sub topic 2-4: Prefer option 3, which can make the situation clearer and the requirement won’t get lost in the future.  Sub topic 2-5:Ok with the WF as to choose option 2 |

## 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.*

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| --- | --- |
|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

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|  | **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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| **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*

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

# Topic #2: NR BS Regional requirements

In the previous meeting, OTA receiver spurious emissions requirements for BS type 2-O was modified. It was stated that additional limits may apply regionally. However, it is not listed in the regional requirements table.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2001005  R4-2001006  R4-2001007  R4-2001008 | NEC | The CR Add the OTA receiver spurious emissions requirements for BS type 2-O in the regional requirements table. |

## Open issues summary

No open issues identified.

## Companies views’ collection for 1st round

### CRs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
|  |
| YYY | Company A |
| Company B |
|  |

## Summary for 1st round

### Open issues

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|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

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

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| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
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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”* |

# Topic #2: TR 38.817-2 updates

Several proposals introduce text in the TR for BS RF.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2000891 | Samsung | The CR proposes to add motivation for FR2 Category B spurious emission limits. |
| R4-2001249 | ZTE Corporation | The CR proposes to add a statement for out-of-band blocking when channel bandwidth is greater than 900MHz. |
| R4-2000659 | Nokia, Nokia Shanghai Bell | The CR adds statements about SCS for Rx dynamic range, plus makes editorial updates to many requirements. |
| R4-2001004 | NEC | The CR adds statements about SCS for Rx dynamic range |

## Open issues summary

### Sub-topic 4-1

**Issue 4-1: Motivation for FR2 Category B spurious emission (R4-2000891)**

* Proposals
  + Option 1: Add motivation for FR2 Category B spurious emission
* Recommended WF
  + Option 1

### Sub-topic 4-2

**Issue 4-2: Out-of-band blocking when channel bandwidth is greater than 900MHz**

* Proposals
  + Option 1: Add statement that the boundary should be discussed, if wider BW than 900 MHz is specified
* Recommended WF
  + TBA

### Sub-topic 4-3

**Issue 4-3: SCS for Rx dynamic range (R4-2000659, R4-2001004)**

* Proposals
  + Option 1: Add text defining the SCS according to R4-2000659
  + Option 2: Add text defining the SCS according to R4-2001004
* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| ZTE | Sub topic 4-1: For Samsung’s paper, we have modification of FR2 TX spurious emission in our CR R4-2001247 and R4-2001248 which have defined more bands than only band n258. So maybe this can be captured also in the TR. |

## Summary for 1st round

### Open issues

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|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

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|  | **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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| **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 #1: NR BS Channel spacing

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2001241  R4-2001242  R4-2001243  R4-2001244 | ZTE Corporation | CR to 37.104 makes the following observations and proposals:   * The channel spacing of current TS 37.104 for EN-DC scenario is not aligned with the agreed CR of R4-1915485. This is corrected. * CR (R4-1915485) is not captured correctly to the spec. |

## Open issues summary

### Sub-topic 5-1

The CR lists as reasons for change that the channel spacing of current TS 37.104 for EN-DC scenario is not aligned with the agreed CR of R4-1915485 (for 38.104).

**Issue 5-1: Channel spacing of current TS 37.104 for EN-DC scenario**

* Proposals
  + Option 1: Delete the 30kHz channel raster and change to 30 kHz channel raster granularity.
* Recommended WF
  + Option 1

### Sub-topic 5-2

The CR lists as reasons for change that this CR (R4-1915485) is not captured correctly to the spec Sub-topic description. There is no proposal for a correction and the CR referenced is for another specification.

**Issue 5-2: R4-1915485 not captured correctly**

* Proposals
  + ???
* Recommended WF
  + If there is no proposed change, this “reason for change” should be deleted from the cover page.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| ZTE | Sub topic 5-2: We are ok with the recommended WF to update the cover page. |

## 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.*

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| --- | --- |
|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*Recommendations on WF/LS assignment*

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|  | **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*

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| **CR/TP number** | **CRs/TPs Status update recommendation** |
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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”* |

# Topic #2: NR BS Editorial

A few CRs were submitted with editorial corrections.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2001245  R4-2001246 | ZTE Corporation | CRs makes several editorial corrections. |
| R4-2000660  R4-2000661 | Nokia, Nokia Shanghai Bell | CRs makes several editorial corrections. |

## Open issues summary

No open issues identified.

## Companies views’ collection for 1st round

### CRs 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

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| --- | --- |
|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

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

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

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