**3GPP TSG-RAN WG4 Meeting # 94-e-Bis R4-200XXXX**

**Electronic Meeting, 20 – 30 Apr., 2020**

**Agenda item:** 4.5, 4.8, 6.5.4

**Source:** Moderator (ZTE Corporation)

**Title:** Email discussion summary for [94e Bis] [203] NR\_EMC

**Document for:** Information

# Introduction

For the RAN4#94-e-Bis\_#203\_NR\_NewRAT\_EMC, the main topics are about BS and UE EMC including agenda item 4.5, 4.8 and 6.5.4, The discussion will separate into two parts:

Topic #1: NR EMC for agenda item 4.5

Topic #2: NR EMC for agenda item 4.8

Topic #3: IAB EMC for agenda item 6.5.4

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

* 1st round: TBA
* 2nd round: TBA

# Topic #1: UE EMC

The draftCRs of TS 38.124 tries to finalize the unfinished parts and delete the []. Before the final decision and the clean-up, more technical analysis is needed and also some agreements and open issues left in legacy discussion also need to be figured out.

## Companies’ contributions summary

As all 5 tdoc under agenda item 4.5 is draftCRs, the contribution summary is omitted. Open issues in the draftCR are captured in section 1.2. Comments on open issue will still be provided under section 1.3.1. Further comments on the draftCRs can be provided in section 1.3.2.

## Open issues summary

Currently, 5 draftCRs are provided trying to finalize the TS 38.124. However, open issues are listed below:

* Out-of-band emission definition
* NR call set-up for test
* Radiated immunity test frequency range
* Spurious emission range
* RX exclusion band
* Performance assessment
* Performance criteria

### Sub-topic 1-1

*Sub-topic description:*

In current TS 38.124, a note indicating the 250% channel bandwidth separated from centere frequency will be treated as out-of-band emission.

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

**Issue 1-1: Out-of-band emission definition**

* Proposals
  + Option 1: Delete the note
  + Option 2: TBA
* Recommended WF

### Sub-topic 1-2

*Sub-topic description:*

In current TS 38.124, NR call set-up for test has been identified. It is proposed by R4-2003988 to remove the part.

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

**Issue 1-2: NR call set-up for test**

* Proposals
  + Option 1: To remove the NR call set-up of subclause 4.2, TS 38.124
  + Option 2: TBA
* Recommended WF

### Sub-topic 1-3

*Sub-topic description*

Current test range of radiated immunity is 80 MHz – 1000 MHz and [1400] MHZ to [2700] MHz. It is proposed to remove the []. However, the test range of base station has been updated as 80--6000MHz.

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

**Issue 1-3: Radiated immunity test frequency range**

* Proposals
  + Option 1: RI test frequency range as: 80 MHz – 1000 MHz and 1400 MHZ to 2700MHz
  + Option 2: RI test frequency range as: 80 MHz – 6000 MHz
* Recommended WF

### Sub-topic 1-4

*Sub-topic description*

The radiated emission in current TS 38.124 only covers FR1. Furthermore, the boundary for radiated spurious emission follows the SM.329 requirement which defers to the OOB boundary FOOB of RF spec.

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

**Issue 1-4: Spurious emission range**

* Proposals
  + Option 1: Use the OOB boundary FOOB of the RF spec TS 38.101-1.
  + Option 2: Use the 2.5 channel bandwidth as defined in SM.329.
* Recommended WF

### Sub-topic 1-5

*Sub-topic description*

The RX exclusion band in current TS 38.124 is captured by listing all the bands. It is proposed to only capture an equation to express the exclusion band.

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

**Issue 1-5: RX exclusion band**

* Proposals
  + Option 1: Use an equation to express the RX exclusion band instead of current method as listing all the RX exclusion bands..
  + Option 2:
* Recommended WF

### Sub-topic 1-6

*Sub-topic description*

The performance assessment in current TS 38.124 is missing. It is proposed to reuse the assessment in TS 36.124.

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

**Issue 1-6: Performance assessment**

* Proposals
  + Option 1: Reuse the performance assessment in TS 36.124.
  + Option 2:
* Recommended WF

### Sub-topic 1-7

*Sub-topic description*

The performance criteria in current TS 38.124 is missing. It is proposed to reuse the assessment in TS 36.124.

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

**Issue 1-7: Performance assessment**

* Proposals
  + Option 1: Reuse the performance criteria in TS 36.124.
  + Option 2:
* Recommended WF

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1:  Sub topic 1-2:  ….  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** |
| R4-2003988 | Company A |
| Company B |
|  |
| R4-2003989 | Company A |
| Company B |
|  |
| R4-2003990 | Company A |
| Company B |
|  |
| R4-2003991 | Company A |
| Company B |
|  |
| R4-2003992 | 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: BS EMC

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2003995 | Huawei | **Proposal 1**: agree on the introduction of the direct field strength measurement test method for the EMC Radiated Emissions requirements of the BS type 1-C and BS type 1-H in TS 38.113. |
| R4-2004081 | ZTE corporation | **Observation 1:** RC is defined as the testing site for radiated immunity testing in some EMS standards, such as [2], [3], [4].  **Observation 2:** The testing sites for radiated emission testing don’t include RC in some EMI standards, such as [5], [6], [7].  **Proposal:** RC can be recommended as an alternative testing site for radiated immunity testing in [8], [9], [10]. |
| R4-2004558 | Ericsson | **Proposal 1:** Agree on the introduction of reverberation chamber as an alternative test method for receiver immunity across the BS EMC specifications, in a similar approach as in the EN standard mentioned above. |
| R4-2004562 | Ericsson | **Proposal 1:** Conducted emission and conducted immunity shall be tested only once irrespective of the RATs used by the BS. 3GPP RAN 4 should start working on the identification of alternatives to achieve this goal.  **Proposal 2:** To commit 3GPP RAN4 in reducing the test coverage over minimum amount of CS and test configurations considered for EMC testing of MSR BS *(both AAS and no AAS BS)*. |
| R4-2004563 | Ericsson | **Proposal 1:** To agree in the reduction of the CS used for MSR considering the following aspects: NB-IoT test results could cover GSM and LTE ones can cover WCDMA. |

## Open issues summary

The open issue are summarized as:

* Direct field strength measurement test method
* Using reverberation chamber to RI test
* Test configuration reduction

### Sub-topic 2-1

*Sub-topic description:*

It is proposed to add direct field strength measurement test method for the EMC Radiated Emissions requirements of the BS type 1-C and BS type 1-H in TS 38.113.

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

**Issue 2-1: Direct field strength measurement test method**

* Proposals
  + Option 1: Agree on the introduction
  + Option 2: keep current test method
* Recommended WF
  + To further discuss the direct field strength test method and the impact on current spec

### Sub-topic 2-2

*Sub-topic description*

Add reverberation chamber as another test method to RI test.

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

**Issue 2-2: Using reverberation chamber to RI test**

* Proposals
  + Option 1: To agree the proposal
* Recommended WF
  + To agree the proposal and focus on the draftCRs

### Sub-topic 2-3

*Sub-topic description*

The TC reduction of MSR BS has been discussed for two meetings, however, the proposal has been provided but the technical consideration is not explained clearly.

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

**Issue 2-3: Test configuration reduction**

* Proposals
  + Option 1: NB-IoT test results could cover GSM and LTE ones can cover WCDMA.
* Recommended WF
  + To further discuss why these reduction proposals can be accepted.

## 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** |
| R4-2004082 | Company A |
| Company B |
|  |
| R4-2004083 | Company A |
| Company B |
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| R4-2004084 | Company A |
| Company B |
|  |
| R4-2004599 | Company A |
| Company B |
|  |
| R4-2004600 | Company A |
| Company B |
|  |
| R4-2004640 | 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”* |

# Topic #3: IAB EMC

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2004090 | ZTE Corporation | **Observation 1:** The radiated emission is similar to an OTA test and we cannot differentiate the emission coming from DU or MT.  **Observation 2:** To test only DU or MT transmit cannot be accepted for FDM/SDM operation as the regulatory requirement needs the IAB work as normal cases.  **Observation 3:** For TDM IAB, it is acceptable that to test only DU or MT transmit.  **Proposal 1:** For FDM and SDM IAB-node with only one enclosure, radiated emission should be tested with new requirement as shown above.  **Proposal 2:** For TDM IAB-node with only one enclosure, radiated emission should be tested with DU or MT transmit separately.  **Proposal 3:** Agree option 2 as only define one set of requirement based on BS regulatory requirement. |
| R4-2004091 | ZTE Corporation | **Observation 1:** The exclusion band of RI test is to protect the BS receiver not being interfered by large in-band signals during the RI test.  **Proposal 1:** Reuse the Base station requirement for IAB node of one enclosure of DU and MT with two communication links established.  **Observation 2:** Even the core requirement looks easy, further discussion for conformance part of two links need further study.  **Proposal 2:** UE requirement apply to IAB MT enclosure and BS requirement apply to IAB DU enclosure for different enclosure case.  **Observation 3:** In current EN regulatory requirement, there are different requirement for indoor and outdoor use.  **Proposal 3:** Reuse the BS requirement for IAB node of immunity tests except RI test as requirement apply per port and enclosure. |
| R4-2004092 | ZTE Corporation | **Observation 1:** The IAB EMC core requirement can be finished before June.  **Observation 2:** The IAB EMC core requirement will differ from same or different enclosure.  **Observation 3:** The IAB node is different from a base station considering EMC requirement in enclosure perspective.  **Observation 4:** IAB test link establishment is different from BS and needs further analysis.  **Observation 5:** Even IAB DU reuse most of the BS requirement, still a new RF spec for IAB is reserved and similar principle should apply to IAB EMC.  **Proposal 1:** To have a new TS for IAB EMC. |

## Open issues summary

The open issue are summarized as:

* Radiated emission requirement
* Radiated immunity requirement
* Other immunity requirements except RI
* How to capture the IAB EMC requirement

### Sub-topic 3-1

*Sub-topic description:*

The radiated emission requirement for IAB with different enclosure has been agreed in RAN4#94-e. The left open issue is the radiated emission within one enclosure has been provided with two requirements considering the TDM or FDM/SDM mode for forward compatibility of Rel-17 discussion.

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

**Issue 3-1: Radiated emission requirement for TDM IAB**

* Proposals
  + Option 1: A new requirement combining the BS and UE considering simultaneous transmission is provided.
  + Option 2:
* Recommended WF
  + To further discuss the requirement as well as the out-of-band boundary.

**Issue 3-2: Radiated emission requirement for FDM/SDM IAB**

* Proposals
  + Option 1: To test the radiated emission with DU and MT transmit separately and apply BS and UE requirement respectively.
  + Option 2:
* Recommended WF
  + To further discuss the requirement.

### Sub-topic 3-2

*Sub-topic description*

The immunity requirement is divided to radiated immunity requirement and other requirement to further discuss. For radiated immunity test, the requirement has been discussed for same enclosure and different enclosure. Conformance testing issue about number of communication links is also raised.

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

**Issue 3-3: Radiated immunity test for IAB with one enclosure**

* Proposals
  + Option 1: Reuse the Base station requirement for IAB node of one enclosure of DU and MT with two communication links established
* Recommended WF
  + To further discuss the requirement

**Issue 3-4: Radiated immunity test for IAB with different enclosure**

* Proposals
  + Option 1: Apply UE and BS requirement respectively for different enclosure
* Recommended WF
  + To further discuss the requirement

### Sub-topic 3-3

*Sub-topic description*

Other immunity requirement except RI has been discussed and it is propose to reuse the BS requirement for IAB.

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

**Issue 3-5: Other immunity test except RI**

* Proposals
  + Option 1: Reuse the BS requirement for IAB node of immunity tests except RI test as requirement apply per port and enclosure
* Recommended WF
  + To further discuss the requirement

### Sub-topic 3-4

*Sub-topic description*

How to capture.

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

**Issue 3-6: How to capture the IAB EMC requirement**

* Proposals
  + Option 1: To have a new TS for IAB EMC requirement.
  + Option 2: To capture the IAB EMC requirement in TS 38.113.
* Recommended WF
  + To agree the the TS to meet the timeline of Rel-16 work.

## 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** |
| R4-2004093 | Company A |
| Company B |
|  |
| R4-2004094 | Company A |
| Company B |
|  |
| R4-2004095 | 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”* |