**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** |
| ZTE | Sub topic 1-1: The out of band emission is used only once in the spec in subclause 8.2.3 and it refers to the out of band emission definition of SM.329. So we think current note as 2.5 channel bandwidth is correct since it aligns to SM.329 so there is no need to delete it.  Sub topic 1-2: The wording are from LTE UE EMC spec and as long as the call is still valid for 5G, we think that there is no need to delete it.  Sub topic 1-3: As current frequency bands going up, the 2700MHz frequency upper band is not enough to test the susceptibility of UE. We prefer also increase the upper bond to 6000MHz as BS.  Sub topic 1-4: We propose option 2 as the SM.329 has been applied since E-UTRA and the 2.5 channel bandwidth which is identical to SM.329 since then. Better to keep the same also in NR.  Sub topic 1-5: We are ok to use the equation anyway the 85MHz is agreed.  Sub topic 1-6/1-7: If the rapper-tour can help to clarify any consideration why these two subclauses are left blank here so that we can have more clue on discussion.  ….  Others: |
| Ericsson | Our main concern is the level of alignment of the proposed CRs with the ongoing discussions at ETSI level. Current version of part 52 is under discussion.  Subtopic 1-1: Out of band emissions should be covered by the RF spec, so removing the definition wouldn’t be harmful. If we decide to keep OOB emission in the UE EMC spec, better to keep it.  Sub topic 1-2: It would be good to have input on why is proposed to remove the call setup for testing.  Sub topic 1-3: An alignment with ETSI limits is desirable.  Sub topic 1-4: RF Radiated emissions should be covered by the RF spec. If not possible better to keep the approach and re use it in NR.  Sub topic 1-5: ETSI Part 52 considers the following  “NR FR1 SA and NSA Receiver exclusion band  As defined in clause 4.3.3 of ETSI EN 301 489-1 [1] where n=1 and Channel Width is as follows:  • NR Channel Width 100 MHz.  • E-UTRA Channel Width 20 MHz.  NOTE: For systems that support multiple channel widths, the Channel Width used should be the widest support by the EUT.  Sub topic 1-6/1-7: Ok with reusing TS 36.124 |
| Huawei | Sub topic 1-1: please check the UE RF spec: it seems the 250% rule was not used there to derive the requirements. To be clarified. This correction was just to clarify the definition itself – in my view this is not really related to the EMC requirements.  Sub topic 1-2: the motivation to remove this was that it is seems originating from the Circuit Switched legacy text, which is clearly not applicable to the NR. We can double-check if the “call setup” wording is still used in the NR under the packet-based voice services (out of RAN4). With this motivation, the “call setup” may not be needed on the LTE version of the spec either.  Sub topic 1-3: agree to double-check the ETSI spec. I was focusing on the removal of [] not on the values itself – so this may require correction up to 6GHz.  Sub topic 1-4: same as 1-1 above.  Sub topic 1-5: we are not really changing the requirement here – this is to avoid band-specific CRs in future. The referred ETSI text was disused in the past – we need to clarify the relation to 85 GHz offset, but this seems orthogonal topic to this DraftCR.  Sub topic 1-6: seems that the rapporteur is ok with the content.  Sub topic 1-7: seems that the rapporteur is ok with the content.  ETSI reference: if the EMC work should be kept in RAN4, then we shall rather keep reference with the UE RF spec. I would be careful here, as it may expose issues among misalignment of the NR UE spec and the ETSI EMC specs. Lack of communication among ETSI ERM WG EMC and RAN4 was raised offline now this topic may become fragile.  Please note that this is Rel-15 (!!) specification. Trying to align now with ETSI may not be the quickest approach to fix the 38.124 before IMT submission. This can raise the topic of the need to have UE EMC within RAN4 at all… |

### 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 | ZTE: As sub topic 1-1,1-2 and 1-3 has discussed, we think the correction is not needed for OBUE and traffic mode set-up. |
| Ericsson: A quick review of the proposal shows the need for alignment with ETSI work. |
| Huawei: see comment on the open-issues section. Despite of the commented issues, the CR also includes other modifications which seems agreeable. At least revision will be needed. |
| R4-2003989 | ZTE: As sub topic 1-4 has discussed, we think the spurious boundary should still keep identical to SM.329 so the correction is not needed. |
| Ericsson: It shouldn´t be this part of RF specification instead of EMC?. The changes are OK if we compared them to the UE RF spec. |
| Huawei: we need to clarify if we need to align with ETSI or UE RF actually.  Despite of the commented issues, the CR also includes other modifications which seems agreeable, e.g. FR2 text. At least revision will be needed. |
| R4-2003990 | ZTE: The equation method seems ok for us. |
| Ericsson: Alignment with ETSI should be considered. |
| Huawei: this is rel-15 spec, so during rel-15 it was not possible to align with the (at that time) non existing ETSI spec. anyway, the offset topic seems to be a separate issues. |
| R4-2003991 | ZTE: As commented in sub topic 1-6, further consideration is needed before reuse E-UTRA statement. |
| Ericsson: OK with reusing 36.124 |
|  |
| R4-2003992 | ZTE: As commented in sub topic 1-7, further consideration is needed before reuse E-UTRA statement. |
| Ericsson: OK with reusing 36.124 |
|  |

## 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:*  No tentative agreements yet.  *Candidate options:*  Opiton 1: To align with the definition of 3GPP RF spec  Option 2: To align with SM.329  Ericsson and Huawei agree on option 1 while ZTE agrees on option 2.  *Recommendations for 2nd round:*  To further discuss in 2nd round. |
| **Sub-topic#2** | *Tentative agreements:*  No tentative agreements yet.  *Candidate options:*  Opiton 1: To remove the call set-up in current TS 38.124.  Option 2: To keep the call set-up in current TS 38.124.  Huawei agrees on option 1 while ZTE agrees on option 2. Ericsson need some clarification on the motivation of removing the call set up.  *Recommendations for 2nd round:*  To further check weather the call set-up is valid for NR. |
| **Sub-topic#3** | *Tentative agreements:*  *Candidate options:*  Opiton 1: To extend the test frequency range up to 6GHz.  Option 2: To align with ETSI 301 489-52.  Huawei and ZTE agree on option 1 while Ericsson agrees on option 2.  *Recommendations for 2nd round:*  To further check the ETSI requirement and to see if a merged requirement can be accepted. |
| **Sub-topic#4** | *Tentative agreements:*  *Candidate options:*  Opiton 1: To keep the out-of-band boundary as SM.329.  Option 2: To align with ETSI 301 489-52.  Huawei and ZTE agree on option 1 while Ericsson agrees on option 2.  *Recommendations for 2nd round:*  To further check the ETSI requirement and to see if a merged requirement can be accepted. |
| **Sub-topic#5** | *Tentative agreements:*  *Candidate options:*  Opiton 1: To use the RX exclusion band of 85MHz.  Option 2: To align with ETSI 301 489-52.  Huawei and ZTE agree on option 1 while Ericsson agrees on option 2.  *Recommendations for 2nd round:*  To further discuss the RX exclusion band. If the exclusion band cannot be agreed, then the draftCR can be postponed. |
| **Sub-topic#6** | *Tentative agreements:*  *Candidate options:*  Huawei proposed the correction, Ericsson is fine with that. ZTE needs some clarification.  *Recommendations for 2nd round:*  ZTE to further provide the concern of current method as reusing the E-UTRA performance criteria. |
| **Sub-topic#7** | *Tentative agreements:*  *Candidate options:*  Huawei proposed the correction, Ericsson is fine with that. ZTE needs some clarification.  *Recommendations for 2nd round:*  ZTE to further provide the concern of current method as reusing the E-UTRA performance assessment. |

*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** |
| R4-2003988 | Revised |
| R4-2003989 | Revised |
| R4-2003990 | Return to  If the RX exclusion band needs to be updated, then the draftCR is not needed. |
| R4-2003991 | Return to  ZTE to provide further check if the content is OK. |
| R4-2003992 | Return to  ZTE to provide further check if the content is OK. |

## 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** |
| ZTE | Sub topic 2-1: as stated in the document that:  same settings of measuring instrument will be used. Not sure if this is a new test method as only different limit metric is used.  Also the uncertainty need to be finalized first.  Sub topic 2-2: Agree to add reveb chamber. We can focus on the draftCRs.  Sub topic 2-3: For the active RF component, usually it is the PA, but there is still different base band, even DAC/ADC and other components that are different.  Still cannot see the reason why we can reduce this RATs? |
| Ericsson | Sub topic 2-1: To use EM field strength measurement as an alternative to substitution method is a commonly used praxis today (test labs, ANSI). It seems ok.  Sub topic 2-2: If there is consensus, we are OK with updating the drafts CRs.  Sub topic 2-3: On this item, we bring an initial proposal and would like to see other companies approach. |
| Huawei | Sub topic 2-2: reverb chamber proposal seems ok as aligned with the ETSI ERM WG EMC work. Discussion paper can be Noted and we can focus on the DraftCR as proposed.  The related CR in R4-2004559 is missing in this summary? It seems that there are bugs in the numbers of some tdocs.  Comments to R4-2004559:   * Capturing the test method in Notes may not be the best approach as those are informative. * Clarify the “start frequency” wording meaning as well as the lambda itself – we can guess what is means but it is not clear in the text. Also we shall clarify how much the low frequency can be increased during the test (until the inequality is fulfilled?).   There was related DraftCR in 4561: was it withdrawn?  R4-2004081: to ne Noted and move to Draft CRs? As there is some interesting background captured, maybe this contribution can be source for the TP to the TR 37.941 on the OTA BS testing in future (Rel-15 vs. Rel-16 topic to be clarified)?  Sub topic 2-3: we still have many issues with the proposal, even though we would like to have simplified testing (R4-2004562):   * First we shall clarify that this whole concept (if agreed) would be Rel-17 topic. RAN4 is not allowed to discuss Rel-17 topics at this stage. * The referred MSR BS definition does not consider all the possible implementations. “common active RF” does not mean that there is a single active RF in the MSR BS. In such case, we need to reassure that we are not limiting the test coverage. * O6: EMC testing is independent of the RATs, but in case of different RATs using slightly different RF chains, the EMC impact may not be the same. * Proposal1: this is clearly Rel-17 area. Refer to the previous comment above. * Proposal 2: we do not understand the meaning of this proposal. How do to suppose to achieve this? It seems that we need to have more offline / email discussion on this as this topic is being resubmitted multiple times and there is similar set of concerns each meeting.   R4-2004563: the CS topic shall be discussed in the RF session as this is related to RF testing. If agreed there, we just reuse the simplification for EMC testing reduction. |
| Nokia, Nokia Shanghai Bell | Sub-topic 2-1  OATS and FSOATS need further clarifications with additional text. According to my understanding, FSOATS does not imply an open area test site but includes a semi-anechoic chamber with RF absorbers on the floor or full anechoic room that meets the VSWR requirement.  Sub-topic 2-2  No strong view.  Sub-topic 2-3  Further discussions and clarifications on the strategy used to reduce the number of test configurations. How much test time reduction can be achieved? |

### 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 | Ericsson: Thanks ZTE for your contribution. Agreement can be reachable in this point. |
| Huawei: suggest to add some more clarification as simple reference introduction is not seen as clear enough consideration of a new test method.  Also, same comments on the CatB for Rel-15 as to Ericsson – we are not allowed to have CatB for Rel-15 anymore. NOTE: in OTA BS testing WI, we allowed to introduce some test methods to Rel-15, so the approach of using CatF for Rel-15 seem to be ok.  As there is set of Draft CRs from ZTE and Ericsson, the worksplit shall be suggested. |
| Nokia: There is a similar draft CR. Further discussions are needed on how to merge with the similar draft CR if the reverberation chamber method is agreed. |
| R4-2004083 | Ericsson: We need to find an alternative for Spatial Exclusion. |
| Huawei: same as 4082 |
| Nokia: The same comment as in R4-2004082. |
| R4-2004084 | Ericsson: We need to find an alternative for Spatial Exclusion. |
| Huawei: same as 4082 |
| Nokia: The same comment as in R4-2004082. |
| R4-2004599  R4-2004559  (Moderator typo of previous tdoc number) | ZTE: Thanks Ericsson for the contribution, in our view, tote is not a good way to capture the test method. Also we are not sure about the 230MHz intention? Does it mean we don't need to go down to 80MHz? |
| Ericsson: If necessary because of limited physical size of RC, for small size equipment with dimensions below λ/4 of start frequency, start frequency is allowed to be increased. According to EN 61000-4-6, Annex B stop frequency shall be extended from 80 MHz to a frequency equal to RC start frequency but not greater than 230 MHz. So, if required the range from 80-230 MHz can be covered with the conducted immunity test |
| Huawei: Comments to R4-2004559, not 4599:   * Capturing the test method in Notes may not be the best approach as those are informative. * Clarify the “start frequency” wording meaning as well as the lambda itself – we can guess what is means but it is not clear in the text. Also we shall clarify how much the low frequency can be increased during the test (until the inequality is fulfilled?). * Similar concerns to the text range coverage. We cannot reduce the test range coverage because of the test site limitations. This needs to be clarified in the spec at least. * We are not allowed to have CatB CR to Rel-15 anymore. It shall be clarified if this can be added as CatF to Rel15, or it shall be a Rel16 Cat B CR. |
| Nokia: Further discussions on how to capture the information and how to merge with similar draft CRs. |
| R4-2004600  R4-2004560  (Moderator typo of previous tdoc number) | ZTE: Same as 4599 |
| Huawei: comments to R4-2004560 same as to 4559 |
| Nokia: The same comment as in R4-2004559. |
| R4-2004640 | ZTE: Same as 4599 |
| Huawei: same as to 4559 |
| Nokia: The same comment as in R4-2004559. |

## 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:*  Huawei proposed the change, Ericsson is ok with that. Nokia needs further clarification. ZTE argues this is not a new test method.  *Recommendations for 2nd round:*  To further clarify Nokia’s concern and discuss ZTE’s arguement. |
| **Sub-topic#2** | *Tentative agreements:*  Agree the introduction of RC while wording improvement is needed.  *Candidate options:*  Companies all agree with the introduction of RC.  *Recommendations for 2nd round:*  DrafrCRs are to be revised to capture different frequency range of RC and some reference to make the introduction more clear. Work split of TS 37.113/37.114/38.113 is provided in chapter 2.4.2. |
| **Sub-topic#3** | *Tentative agreements:*  *Candidate options:*  Huawei believe this will be Rel-17 topic. Also ZTE and Nokia are not aware of the way to do the reduction.  *Recommendations for 2nd round:*  Ericsson can have a WF to capture the work content and at least what can be agreed at this stage as well as some further steps to this work. |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 | WF on EMC test configuration reduction | Ericsson |

### 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*

The work split of adding RC into EMC specs, considering Ericsson already needs to work on a WF:

ZTE takes TS 38.113 and TS 37.114. So revise R4-2004083 and R4-2004084.

Ericsson takes TS 37.113. So revise R4-2004559.

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| R4-2004082 | Noted |
| R4-2004083 | Revised |
| R4-2004084 | Revised |
| R4-2004559 | Revised |
| R4-2004560 | Noted |
| R4-2004640 | Noted |

# 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** |
| Ericsson | Subtopic 3-1:  If one enclosure, it should be recommended to made test on all functions simultaneously (if test environment makes it possible) to do not miss intermodulation products. Use only BS requirements without UE idle mode req. It is OK but not necessary. UE functionality is in BS node.  Why to have different radiation requirements for IAB with UE function. IAB is still BS. If not BS, why do we not apply UE requirements on BS?  Subtopic 3-2:  We do not agree with proposal 2 and observation 3. We propose same BS requirements on all IAB parts. MT is not UE.  We do not agree with radiated immunity proposal. IAB UE will operate in same environment as BS, upper frequency for all kind of equipment is already generally raised to 6 GHz.  Subtopic 3-3:  OK with the other immunity requirements, we need more discussion on the radiated ones.  Subtopic 3-4: How to capture the IAB EMC requirement  We do not agree with observations 2 and 3. Treat IAB as BS for radiation. |
| Huawei | Subtopic 3-1: mixing BS and UE topics is dangerous and it was discussed many times in the RF room. It seems better to investigate to follow the BS-driven approach.  Subtopic 3-2:  Subtopic 3-3: enclosure considerations: similar to previous meeting, we are still somehow confused about this topic of single vs. dual/multiple enclosures. This seems not to be discussed in RF session, and we cannot have it discussed only under EMC topic, as the RF emissions would also be impacted. So we need some clarification from the Rapporteur on this topic – it is not clear if this is within the scope, or not. At least this kind of enclosure considerations was not found in the IAB WID.  Subtopic 3-4: same as 3-3.  Subtopic 3-5: this seems to be non-controversial topic and can be agreed.  Subtopic 3-6: Option 1 seems to be more clear considering all the topics discussed so far. |
| Nokia, Nokia Shanghai Bell | Sub-topic 3-1: IAB-Node is a network node with similar deployment conditions than BS, so we do not think UE requirements are applicable.  Sub-topic 3-2: IAB-Node is a network node with similar deployment conditions than BS, so we do not think UE requirements are applicable.  When it comes to different enclosures, the different options of separated and shared RF architectures has been discussed in length in RAN4#91 and RAN4#92 and finally in R4-1910589 it has been agreed that RF requirements will be implementation agnostic and do not take any stance on physical arrangement of the antenna arrays. Therefore, from RF requirement perspective it is fully possible that IAB-Node consist of e.g. two enclosures which are connected by a cable.  Therefore, EMC requirements for IAB shall be specified in a manner which does not preclude multiple enclosures for a single IAB-Node. |
| Huawei | Different enclosures: based on the reference provided by Nokia above for the RF requirements:  *The RF requirements shall be defined in an architecture agnostic way for backhaul and access function. Both separate and shared architecture shall be kept and no priority is adopted at this stage.*  *Can be re-visited if any issues are found with this approach*  *Different types of IAB nodes could be specified if needed*  The “separate or shared architecture” does not necessarily map to “separate or single enclosure” – I can imagine a separate IAB architecture in a single box as well (as presented in one of ZTE TPs this meeting as well).  Anyway, I would support the statement on “not preclude multiple enclosures” but not to have a specific text splitting the requirements based on the “enclosures” count, as this was not observed in any other RF work for IAB (especially the RF spurious emissions). |

### 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 | Ericsson: Why different radiation requirements for IAB with UE function. Such IAB is still BS. If not BS, why do we not apply UE requirements on BS?  We must be sure that a BS wont be tested twice if it has IAB functionalities. |
| Huawei: we need to follow the IAB RF spec arrangements here, which is BS-based. |
| Nokia: See more detailed comments above. In short, UE requirements should not be used. |
| R4-2004094 | Ericsson: See comments above. |
| Huawei: as commented above, we do not agree to the one enclosure vs. different enclosure separation, until it is recognized that this is actually considered in the WID and RF work (which seems not based on WID). |
| Nokia: See comments detailed comments above. In short, separated RF solution has been discussed in length in RF session and RF requirements are agreed to be implementation agnostic, also therefore allowing different enclosures. |
| Huawei: agree to follow the RF agreement on the implementation agnostic way, still the ”shared / separate architecture” does not directly map to “single/separate enclosures”. Aim for generic requirement and avoid TS text being enclosure-count specific. |
| R4-2004095 | Ericsson: Additional discussion on immunity requirements. |
| Huawei: referring to the 38.124 content is not encouraged – this spec is considered to be still incomplete and technical issues were found there.  This TP requires some revisions in text to account for all the other discussion point above. |
| Nokia: See comments above, UE requirements shall not apply. |

## 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**  **Issue 3-1 and issue 3-2** | *Tentative agreements:*  *Candidate options:*  Option 1: Apply a combined requirement of DU and MT.  Option 2: Apply BS requirement to DU and MT.  ZTE proposed option1. Ericsson and Nokia agrees option 2. Huawei want to follow the RF discussion.  *Recommendations for 2nd round:*  Further discuss. |
| **Sub-topic#2**  **Issue 3-3 and issue 3-4** | *Tentative agreements:*  *Candidate options:*  Option 1: Apply different requirements per enclosure.  Option 2: Apply BS requirement to DU and MT.  Option 3: EMC requirements for IAB shall be specified in a manner which does not preclude multiple enclosures for a single IAB-Node.  ZTE proposed option1. Ericsson agrees option 2. Huawei and Nokia agrees on option 3 but no view on the requirement.  *Recommendations for 2nd round:*  Further discuss. |
| **Sub-topic#3** | *Tentative agreements:*  Agree option 1.  *Candidate options:*  Option 1: Reuse the BS requirement for IAB node of immunity tests except RI test as requirement apply per port and enclosure  *Recommendations for 2nd round:*  Companies seems all agree with option 1 so the immunity part of current TP to TR may be agreeable. |
| **Sub-topic#4** | *Tentative agreements:*  *Candidate options:*  Option 1: Agree a new TS to capture the EMC for IAB  Option 2: Use TS 38.113 to capture IAB EMC.  ZTE and Huawei agree option1. Ericsson agrees option 2.  *Recommendations for 2nd round:*  Further discuss. |

*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** |
| R4-2004093 | Noted |
| R4-2004094 | Noted |
| R4-2004095 | Revised to capture the agreeable part without Radiated immunity. |

## 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”* |