**3GPP TSG-RAN Meeting # 90-e RP-2xxx**

**Electronic Meeting, December 7-11, 2020**

**Agenda item:** 9.1.2

**Source:** Moderator (Ericsson)

**Title:** Email discussion summary for UE and BS EMC

**Document for:** Information

# Introduction

The documents intent to capture companies’ comments on the following sub-topics related to RAN4 led non-spectrum Rel-17 WIs.

* Topic #1: BS EMC objectives
* Topic #2: UE EMC objectives
* Topic # 3: General aspects e.g. WI organization/structure

# Topic #1: BS EMC objectives

## Issues related to BS EMC for discussion

* Sub-topic 1-1: BS EMC core WI objectives
* Sub-topic 1-2: BS EMC performance WI objectives
* Sub-topic 1-3: Timeline
* Sub-topic 1-4: Any other issue

## Companies’ views

*Interested companies to provide comments on the sub-topics in the following sections*

### Sub-topic 1-1: BS EMC core WI objectives

1. Evaluate the amount of reduction in test configurations achieved.
2. Consolidate and Analyse the results obtained on EMC performance on different RATs for radiated and immunity testing.
3. Specify BS test configurations and capability sets (Emission and Testing) for EMC according to the results achieved in the WI.
4. Define the required adjustments in the TS 37.113 chapter 4.5 according to the outcome of the proposed WI.

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| **Company** | **Comments** |
| Xiaomi | We support the idea of “simplification”. But for the objectives, we think the test configuration and capability sets are belong to performance part. Also we think the limit should not be changed since the MSR BS has been already on the market for long time. |
| Ericsson | Regarding the definition of the objectives, the separation is considering that the study required to consolidate the test simplification is carried out as part of the Core WI objectives (goals 1 and 2). The third and fourth goals target at cover the possible modification in section 4.5 of the TS.  Our intention is not to change the limits. The first goal looks for measuring the potential of test simplification to generate benefits for the vendors. Nokia expressed some concerns about the need for understanding this potential, so we try to address this comment by proposing goal 1. When including AAS in the scope of the WID we need to consider also TS 37.114.  We could say “Investigate the potential impact of achieving an EMC test simplification for MSR/AAS BS ” |
| ZTE | We agree that it is beneficial to simply the MSR EMC testing, and the objective should only focus on the simplication of test/performance related, without limits changed. To avoid confusion, a sentence should be needed to say the limits are kept unchanged.  In addition, it seems bullet 3 and 4 can be merged since the BS test configurations and capability sets are defined in the TS 37.113 chapter 4.5. |
| Huawei | As far as the BS testing simplification is concerned, this is seem as Performance part, i.e. no Core part. Still, comments are provided below:   1. The first step shall be to look for all the potential solutions for BS EMC testing simplification. The initial proposal (i.e. Test configuration and capability set related) shall not be assumed as the only solution to be investigated. So we would suggest to modify the objective to something like: “*Evaluate the amount of potential reduction in test configurations achieved. including (if possible) evaluation of potential gains in terms of testing reduction*.”   For testing simplification gain: it may be hard to compare it if we don’t define performance metric: do we want to compare testing time (which may be lab/test site specific) or number of test cases? This may not be easily accountable/comparable.  2. This bullet is somehow unclear. We would suggest to remove it from the WID. See also comment 3 below.  3. See 1.2.2. We object to formulate bullet 3 like this as this is already provided conclusion on the solution (which shall be studied first).  4. Impacted specs not to be limited to 37.113. As this is umbrella WI, we may need to list all the existing EMC specs, with potential downscoping once the technical solution is agreed during the pre-study phase. |
| Ericsson | Thanks for the comments. As indicated in our reply to Xiaomi, we are open to adjust the proposed goals. We consider that the pre-study goals could be allocated as Core WI objectives. In that sense, we could proceed with something like:  Study phase:   1. Evaluate the amount of potential reduction achieved in test configurations and capability sets, including (if possible) an evaluation of potential gains in terms of test reduction (number of test configurations/capability sets). 2. Investigate and identify the possible alternatives to achieve a potential EMC test simplification considering both Emission and Immunity testing scenarios.   Implementation phase:   1. Identify the required adjustments (according to the outcome of the study phase the outcome of the performance part) and define the adjustments to chapter 4.5 of the EMC specification. |
| Huawei | @Ericsson: we are not sure if this (“*pre-study goals could be allocated as Core WI objectives*”) would be the proper handling, i.e. this would create confusion, and especially when reporting the progress with the SR (you need to report core and perf part progress, where applicable). We can look into this once the updated WID will be distributed fir review. |
| Nokia, Nokia Shanghai Bell | If the intention is just BS EMC simplification, there should be no impact on the core part. Presently, there are many open questions/issues concerning the BS EMC simplification, e.g., what is the approach, potential gain, etc. The purpose of the study phase to answer these open issues/questions. If the potential gain is small, then it might not worth continuing with the WI. At the moment, it is too early to specify core part objectives since the outcome of the study phase is not known. |
| Ericsson | Thanks Nokia and Huawei for your comments. Considering the current WID proposal template and the combined approach to cover UE/BS under the same proposal, we have included as core related goals those associated to the pre-study phase, considering that if the final outcome of these steps is a go-forward, the impact of the test simplification will be reflected in the Performance Part of the EMC spec. We might discuss a better approach to reflect the proposed pre-study goals in the UE/BS combined WID.. |

### Sub-topic 1-2: BS EMC performance WI objectives

1. Specify how to handle the radiated emission limits for MSR (including AAS) within an EMC-only Capability Sets and Test Configuration.
   * For BS equipment (ITU-R SM 329)
   * For Ancillary equipment (CISPR 32)
2. Specify how to handle the radiated immunity limits for MSR (including AAS) within an EMC-only Capability Sets and Test Configuration.

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| **Company** | **Comments** |
| Xiaomi | For bullet 1, we have question as are we going to define the capability set and test configuration only or the WID also want to deal with the limit? Since this is only listed in performance objective. Also as ancillary equipment is listed here, are we defining specific limit and TC for them?  For bullet 2, is it duplicated? |
| Ericsson | The intention is not to define new limits, it is to reuse what currently exists and propose a simplification by following this principle. The goals look for identifying how the emission and immunity current limits are going to be handled within the proposed test simplification |
| ZTE | For bullet 1, we suggest to delete the sub-bullet of ‘for ancillary equipment’. The radiated emission for ancillary equipment can be performed standalone, which means the simiplication for MSR test will not impact the ancillary equipment. |
| Huawei | As already indicated, we object to such formulation of the above bullets 1 and 2 as those are already implying certain solution, which was not agreed nor well studied in RAN4 (Huawei and ZTE provided comment on shortcomings of such EMC-only CS, etc.) – that is why we propose to have study phase for BS part during this WI to actually study all the potential solutions for the BS testing simplification (if any possible) for EMC.  Further concern on the wording in 1 and 2: we shall not touch “limits” as such. Our understanding is that we are discussion only testing methodology framework (Performance related, not Core related). |
| Ericsson | Agree with removing the ancillary equipment from the scope of the WID. In order to offer clarity about the limits (which we do not want to modify), we would propose something like:   1. Considering the outcome of study phase, evaluate the alternatives to achieve a potential EMC test simplification for Emission testing 2. Considering the outcome of study phase, evaluate the alternatives to achieve a potential EMC test simplification for Immunity testing. 3. Define the capability sets and test configurations to handle both emission and immunity testing. |
| Huawei | @Ericsson: Still, the above bullet 3 is not considering our comments (it implies that new CS/TC will be introduced for EMC-specific testing, which is not agreeable at this point of time). |
| Nokia, Nokia Shanghai Bell | It is not clear why there is an impact on the existing performance requirements if this is just BS EMC simplification. Unless there is a clear outcome from the study phase, it is too early to define and specify performance objectives. There is no need for a separate study phase for core and performance parts. |
| Ericsson | @Nokia: As mentioned above and in the proposed new goals, the impact on the conformance part depends on the outcome of the study phase in the core part. We are allocating the prestudy phase as core goals, but we can find a better alternative to place these goals.  @Huawei:We can formulate the bullet 3 as “Considering the outcome of the study phase, define the CS and TCs to handle both emission and immunity testing”. Based on the inputof this discussion we can prepare a new version of the WID with the proposed goals and the suitable alternative to place the study phase goals. |
| Huawei | @Ericsson: it still seems that the above proposed bullet #3 is not reflecting the comment that we have been repeating for quite some time. Anyway, let’s further continue the discussion based on the WID text review. |

### Sub-topic 1-3: Timeline e.g. TU per meeting for BS EMC

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| **Company** | **Comments** |
| Huawei | We would expect Ericsson to provide the first estimate of the TUs required. Due to the need for study and expected normative work, it is suggested to allocate sufficiently large amount of TUs.  It is suggested to spread the TU/effort as much as possible in the available Rel-17 timeline. |
| Ericsson | We have uploaded the TU sheet in the draft folder. However, this TU plan need to be aligned with the plan for UE discussion. |
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### Sub-topic 1-4: Any other issue e.g. additional objective(s)

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| **Company** | **Comments** |
| Nokia, Nokia Shanghai Bell | The focus should be on the study phase only to answer open questions/issues. What is the trade off between the amount reduction in test configurations (or test time) and test coverage? It is too early to specify both the core and performance objectives without clearly knowing what the outcome of the study phase is. The outcome of the study phase will determine whether there is a need for WI and what objectives to define. |
| Ericsson | The study phase goals are reflected in the Core-related goals section, considering a combined UE/BS WID. |
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## Summary of discussion on BS EMC

*Note: moderator to provide summary*

# Topic #2: UE EMC

## Issues related to UE EMC

* Sub-topic 2-1: Core WI objectives
* Sub-topic 2-2: Timeline e.g. TU per meeting
* Sub-topic 2-3: Any other issue

## Companies’ views

*Interested companies to provide comments on the sub-topics in the following sections*

### Sub-topic 2-1: Core WI objectives

1. Consider potential additional EMC requirements for NR UE supporting different features as defined in TS 38.101-1/-2/-3 and LTE UE supporting different features as defined in TS 36.101:

* emission requirements.
* immunity requirements.
* Limit the features which have been finished before Rel-17 to be considered

1. Define receiver exclusion band for UE supporting different features
2. Investigate current 3GPP UE EMC radiated emission limit:

* Whether current test frequency range is suitable, including the lower and upper test frequency range.

1. Investigate how to establish the communication link for NR and LTE UEs with different features. (Sub clause 4.2 of TS 36.124 and TS 38.124)

* Possible deltaRIB to be considered.
* Possible MSD to be considered.

1. Define proper test configurations for NR and LTE UEs. (Sub clause 8.1 and 9. of TS 36.124 and TS 38.124):

* Investigate whether current test configuration defined in RAN5 can be re-used in EMC tests.
* Investigate whether current OTA test configuration can be reused for radiated emission test.
* Investigate whether regulations have already defined test configurations and if these regulations can be reused.

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| **Company** | **Comments** |
| Xiaomi | We would like to further clarify that the features are limited to Rel-16 so that we don’t need to wait for Rel-17 features to be finished. Also some companies have shared concern on the work load so we would like to put NR as first priority (TS 38.124) and maybe LTE can be as lower priority so that acceptable TU can be achieved.  For test configurations, as already sub clause 8.1 and 9.1 existed in the UE EMC specification, we think RAN4 can take the responsibility to define them and we don’t need to ask RAN5 to do so since they have never discuss EMC before. |
| Ericsson | The proposal of integrating UE and BS EMC would be positively impacted if the priority is in NR. |
| ZTE | 1. For bullet 1: For some features, the leftovers in rel-16 continue to be discussed in Rel-17, for example inter-band DL CA for FR2. So how to treat this case when it say “ limit the features which have been finished before Rel-17 to be considered”? Also, we suggest to explicitly describe the “features” in the WID (maybe in the justification part). 2. For bullet 2 and 3, it seems bullet 2 can be incorporated as sub-bullet for bullet 3. 3. For bullet 4: the sub-bullets should be deleted. Since the deltaRIB/MSD may only apply to FR1 UE, also there exists some other requirements such as ΔRIB,4R for a band supporting 4Rx. Also, for FR2 UE, the requirements are different with FR1, which means the deltaRIB/MSD may not be applied. 4. For bullet 5: Are there any RAN5 work? I wonder if the current test configuration cannot be applied, what should we do? define new test configuration in RAN4 or RAN5? |
| Huawei: | All the proposed core objectives seems to be already well identified, and subject to the technical discussion during the expected WI.  5. Testing aspects seems to fall into Performance part.   1. @Xiaomi comment: we understand your motivation here, but we need to clarify relation among the Rel-16 set of features and the Rel-17 WI. In case of additional requirements added, those will be Rel-17 requirements as this is Rel-17 WI. Comments are welcome. |
| Xiaomi | Thanks all for the comments so far. I would like to give some feedback:  1, To Ericsson, we think it is ok to set NR as first priority and LTE can be enhanced later.  2, To ZTE, we can understand your concern, hence listing the features to be discussed is acceptable, For the incomplete features in Rel-16, we can put them as lower priority and the enhance work will not start unless the features are finished. For the structure of objectives, we agree with the comments.  For test configurations, yes we would like to define new test configurations in RAN4. As we can see that the sub-clause 8.1 and 9.1 is defined as legacy test configurations and it is good place for put the new TC in these two sub-clauses.  3, To Huawei: For the potential new requirements, we agree it will be Rel-17 requirements and this will make sure that no NBC issue occur. For the test configurations that we are going to deal with, they will apply for legacy requirements. |
| Apple | We need to clarify if the proposed work is based on conducted or OTA, especially for FR1.  Considering FR2, emission requirements are already verified in a radiated environment.  In fact, the study item on FR2 test methodology enhancements already includes an objective to improve the test methodology for low UL / high DL power test cases, and which include regulatory cases.  So the proposed radiated emissions work scope for FR2 seems a duplication of either existing requirements or the currently ongoing enhancements. |
| Xiaomi | Thanks Apple for the comments and we would like to give below clarification:  For the EMC requirements, there are two requirements are for “OTA” as radiated emission requirement and radiated immunity requirement. Currently the requirements cover only FR1.  For the radiated emission requirement of FR2, currently it has not been decided yet for single carrier so it will be also excluded for this WID. |
| Huawei | We share the same understanding as Xiaomi above. |

### Sub-topic 2-2: Timeline e.g. TU per meeting for UE EMC

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| **Company** | **Comments** |
| Huawei | We would expect Xiaomi to provide the first estimate of the TUs required. Due to relatively long list of objectives already listed for UE, it is suggested to allocate sufficiently large amount of TUs. |
| Xiaomi | The TU sheet has been uploaded in the draft folder as: |
| Ericsson | We have uploaded the TU plan for BS EMC topic, it would be important to align both Tus to reflect the scope of this umbrella WID. |
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### Sub-topic 2-3: Any other issue e.g. additional objective(s)

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| **Company** | **Comments** |
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## Summary of discussion on UE EMC

*Note: moderator to provide summary*

# Topic #3: General

## Issues related to BS and UE EMC

* Sub-topic 3-1: WI organization/structure
* Sub-topic 3-2: Any other issue

## Companies’ views

*Interested companies to provide comments on the sub-topics in the following sections*

### Sub-topic 3-1: WI organization/structure

Question 1: Is it ok to cover both BS EMC and UE EMC under the same WI?

* Option 1: Yes
* Option 2: No

Question 2: Indicate also motivation/reason for your selected option in question 1.

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| **Company** | **Comments** |
| Ericsson | Yes |
| ZTE | Yes |
| Huawei | As we were proposing to create an “umbrella” WI for EMC topics, we are clearly supportive of this idea: Option 1.  From Huawei point of view, the initial study phase for BS testing simplification is the pre-requisite for (BS part of) WI. First of all, we should clarify if the proposed approach (i.e. WI consisting of BS and UE parts, plus the pre-study phase for the BS part on testing simplifications) is agreeable by all interested companies. |
| Huawei | WI scope:  We need to clarify the scope of the WID in terms of specs/RATs affected (it seems NR for UE, and MSR for BS is the priority – but we shall not explicitly exclude others EMC specs from the WID, as it is expected that most of the foreseen modifications will be easily replicated to other EMC specs).  Additionally, it would be good to clarify if the UTRA EMC specs are still of any interest.  We need to clarify also on the IAB EMC relation for this WI (and not to exclude it explicitly). |
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### Sub-topic 3-2: Any other issue

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| **Company** | **Comments** |
| Huawei | Based on the previous discussions, there seems to be no major objection to the EMC WI as such (subject to the RAN discussion and decision on Rel-17 scoping). Therefore, it may be worth to trigger offline email on the WID text drafting. Timeline of such task shall account for the coming RAN4 meeting. |
| Ericsson | We agree on triggering discussion on the WID text drafting. RAN reflector could continue the main way to discuss the topic.  Even though, we have proposed in this summary some possible adjustments, we can discuss how this proposed adjustment can be reflected in the WID proposal. It is also important to adjust the TU plan considering the combination of topics UE/BS. |
| Huawei | For clarification: despite of this RAN Drafts discussion, our understanding is that the WID will be subject to further enhancements – we are willing to support the work on the WID improvements to reflect all the comments. |
| Ericsson | @Huawei, thanks for your input. The WID will be enhanced taking as principle the outcome of this initial email discussion. We appreciate your interest on contributing to improve the WID. |
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## Summary of discussion

*Note: moderator to provide summary*