**3GPP TSG-RAN WG4 Meeting #94-e revision of R4-2002375**

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

**Agenda item:** 8.19

**Source:** Moderator (Huawei)

**Title:** Email discussion summary for RAN4#94e\_#84\_OTA\_BS\_testing

**Document for:** Information

# Introduction

This is the email discussion summary for RAN4#94e\_#84\_OTA\_BS\_testing on OTA BS testing WI, with the following topics covered:

* Topic 1: general issues
* Topic 2: Measurement uncertainty derivation
* Topic 3: Text proposals to the TR 37.941

Conclusion of the first round should aim to decide if these TPs can be agreed or need to be revised.

# Topic #1: general issues

## Companies’ contributions summary

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| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2001806 | Huawei | Work-plan for the OTA BS testing WI  This contribution provides description of the work-plan for the TR creation. |
| R4-2001807 | Huawei | Skeleton for TR 37.941 on OTA BS testing, Rel-15  This contribution is for approval. |
| R4-2001823 | Huawei | Big TP for TR 37.941, Rel-15  This is the placeholder for the final version of the OTA BS testing TR for Rel-15, which is to be drafted based on the skeleton and TPs submitted and agreed during this e-meeting. |

## Open issues summary

### Sub-topic 1-1

## Companies views’ collection for 1st round

### Open issues

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| **Company** | **Comments** |
| R&S | Question for clarification regarding the Work Plan in R4-2001806: it is expected to continue working for PWS and add more test cases, so the MU tables and values have to be added to the corresponding sections. Is it group opinion this can be handled in upcoming meetings and only TR 37.941 needs to be updated? |
| Huawei | Please let me clarify the above question on the work-plan: basically the answer shall to this question is: yes. TR 37.941 shall be the place to capture additional PWS test cases. Related content from the legacy TRs will be voided (this was not done this meeting as the new TR is still not agreed, so there was not good motivation to remove any technical content from legacy TRs). Initially, it was planned to do cleanup of the legacy TRs once the TR 37.941 is in mature draft stage. |

### CRs/TPs comments collection

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| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2001807 | Moderator: Skeleton for agreement. |
| ZTE: For 11 and 12, I assume there is no need to differentiate in-band and out-of-band TRP measurement at least in this CR. One concern is as currently discussed 23.6--24GHz is in-band for band n258 but out-of-band for band n257.  Huawei: to address ZTE comment: the structure reflects the technical agreements and the content of the legacy TRs. Same for the MU values which differ. So it is not clear how those two sections could be merged now.  For sake of progress, it is suggested to shift this discussion to particular TP for section 11 and 12, and not to block the skeleton. |
| R4-2001823 | Moderator: placeholder for the TPs to be agreed during this e-meeting. To be revised. |

## Summary for 1st round

### Open issues

### CRs/TPs

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| **CR/TP number** | **CRs/TPs Status update recommendation** |
| R4-2001806 | noted |
| R4-2001807 | Approved |
| R4-2001823 | Revised in R4-2002430 |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

# Topic #2: Measurement uncertainty derivation

This topic is focused on the Excel spreadsheets for the MU and TT derivation for multiple requirements types. Those Excel spreadsheets are inputs to the related TP captured in topic #3.

## Companies’ contributions summary

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| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2001699 | Huawei | OTA BS testing Tx FR1 MU calculation tables  This contribution provides an Excel spreadsheet for the Tx FR1 MU values derivation, including corrections of errors and inconsistencies. This contribution if for Approval. |
| R4-2001700 | Huawei | OTA BS testing Tx FR2 MU calculation tables  This contribution provides an Excel spreadsheet for the Tx FR2 MU values derivation, including corrections of errors and inconsistencies. This contribution if for Approval. |
| R4-2001701 | Huawei | OTA BS testing RX FR1 MU calculation tables  This contribution provides an Excel spreadsheet for the Rx FR1 MU values derivation, including corrections of errors and inconsistencies. This contribution if for Approval. |
| R4-2001702 | Huawei | OTA BS testing FR1 co-location MU calculation tables  This contribution provides an Excel spreadsheet for the Rx FR1 MU values derivation, including corrections of errors and inconsistencies. This contribution if for Approval. |

## Open issues summary

## Companies views’ collection for 1st round

### Open issues

### CRs/TPs comments collection

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| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2001699 | Ericsson: Can we round the values to 2 decimal places? I doubt the accuracy of the work is having more than that. |
| Keysight: There is an error in spreadsheet. Corrected version is uploaded with “Keysight” name appended in name. where correction done is yellow highlighted. Which is EIRP tab K55 which referred by K68, and summary tab H5 column. |
| R&S: Regarding PWS, 4.2-6GHz MU values have not been analyzed yet, so they should be kept between [] and left for further modification in upcoming meetings. This should apply at least for MU terms unique to PWS: QZ ripple DUT / cal antenna, longitudinal position uncertainty, field repeatability and system non-linearity.  In addition, System non-linearity term should be kept still between [] for all frequencies since final analysis and agreement is pending.  Combined standard uncertainty and expanded uncertainty should be also kept [] until the values mentioned above are finalized. |
| R4-2001700 | Ericsson: The distribution is different in each table. i.e. Rectangular vs. Rect. Can this be aligned for consistency? |
|  |
| R4-2001701 | Ericsson: Under “TE” tab there is a co-location table, this should belong with co-location MU Excel sheet. |
| R&S: Regarding PWS and as done for Tx FR1 in R4-2001699, frequency flatness should be moved from Calibration Measurement to DUT measurement section.  Similar to Tx FR1 in R4-2001699, 4.2-6GHz MU values for PWS have not been analyzed yet, so they should be kept between [] and left for further modification in upcoming meetings. This should apply at least for MU terms unique to PWS: QZ ripple DUT / cal antenna, longitudinal position uncertainty, field repeatability and system non-linearity.  In addition, System non-linearity term should be kept still between [] for all frequencies since final analysis and agreement is pending.  Combined standard uncertainty and expanded uncertainty should be also kept [] until the values mentioned above are finalized. |
| Nokia: TE sheet contains ACLR/OBUE rows which are not for RX. |
| R4-2001702 |  |

## Summary for 1st round

### Open issues

### CRs/TPs

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| R4-2001699 | Revised in R4-2002431 |
| R4-2001700 | Revised in R4-2002432 |
| R4-2001701 | Revised in R4-2002433 |
| R4-2001702 | Approved |

## Discussion on 2nd round (if applicable)

Nokia: In Revised in R4-2002431, all MU values for FR1 absolute ACLR and OBUE MU should be kept in [] for further checking.

## Summary on 2nd round (if applicable)

# Topic #3: Text proposals to the TR 37.941

TPs to TR 37.941 are captured in this topic.

## Companies’ contributions summary

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| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2001808 | Huawei | TP to the TR 37.941: Scope |
| R4-2001809 | Huawei | TP to the TR 37.941: general sections (2, 3) |
| R4-2001810 | Huawei | TP to the TR 37.941: Coordinate system (4) |
| R4-2001811 | Huawei | TP to the TR 37.941: conformance testing framework (5) |
| R4-2001812 | Huawei | TP to the TR 37.941: measurement types (6) |
| R4-2001813 | Huawei | TP to the TR 37.941: OTA measurement systems (7) |
| R4-2001814 | Huawei | TP to the TR 37.941: measurement systems calibration (8) |
| R4-2001815 | Huawei | TP to the TR 37.941: TX directional requirements (9) |
| R4-2001816 | Huawei | TP to the TR 37.941: RX directional requirements (10) |
| R4-2001817 | Huawei | TP to the TR 37.941: In-band TRP requirements (11) |
| R4-2001818 | Huawei | TP to the TR 37.941: Out-of-band TRP requirements (12) |
| R4-2001703 | Huawei | TP to TR 37.941 : Colocation MU value derivation sub-clause updates (7.8, 8.8, 13) |
| R4-2001819 | Huawei | TP to the TR 37.941: Out-of-band blocking requirements (14) |
| R4-2001820 | Huawei | TP to the TR 37.941: Demodulation performance requirements (15) |
| R4-2001715 | ZTE | TP to OTA BS TR on EMC (16) |
| R4-2001821 | Huawei | TP to the TR 37.941: EMC requirements (16) |
| R4-2001704 | Huawei | TP to TR 37.941: Summary clauses 17 and 18 |
| R4-2001698 | Huawei | TP to TR 37.941: Test uncertainty annexes (A, B, C) |
| R4-2001822 | Huawei | TP to the TR 37.941: annex D, E, F |
| R4-2001705 | Huawei | TP to TR 37.9xx : Tx MU value derivation sub-clause updates.  This contribution provides MU tables based on the Excel spreadsheets and on top of the TPs above.  This contribution will have to be revised during the meeting to add all the other missing MU tables into the TP, once the source MU Excel spreadsheets are agreed first. |

## Open issues summary

### Sub-topic 2-1: EMC requirements

**Issue 2-1: Select the baseline TP for the EMC requirements**

* Proposals
  + Option 1: Use R4-2001715 from ZTE as the baseline
  + Option 2: Use R4-2001821 from Huawei as the baseline
* Recommended WF
  + For the worksplit purposes, it is proposed to follow Option 1.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| ZTE | Sub topic 1-1: The proposal are quite similar and either paper needs some correction on terminology issue. |
| Huawei: | For the worksplit purposes, it is proposed to use ZTE TP as baseline, as both TPs are similar. |

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2001808 | Ericsson: BS type 1-H is missing and needs to be included:   * *BS type 1-O* in single RAT NR operation in FR1, as specified in NR BS radiated testing specification TS 38.141-2 [6], * *BS type 1-H in single RAT NR …* * *BS type 2-O* in single RAT NR operation in FR2, as specified in NR BS radiated testing specification TS 38.141-2 [6].   Huawei: agree |
| ZTE: I assume the OTA AAS BS includes BS type 1-O and BS type2-O as stated “NOTE: For NR operation, an OTA AAS BS corresponds to an NR type 1-O BS” in the TS 37.145-2.  Huawei: FR2 is not included in the AAS spec, therefore it only refers to BS type 1-O (and also 1-H actually). |
| Nokia: While it is somewhat obvious from the TR name, the text in the scope section should say it covers the background information of test methods and radiated requirements, as currently it sounds like it covers the requirements itself. As this is targeted also towards external readership for which the 3GPP document types and purposes may not be known, it is better to be clear on this. Also first bullet under hybrid AAS is redundant. |
| Huawei: comments on wording to be addressed in the revision. |
| R4-2001809 | R&S: Theta and phi notation in clause 3.2 seems to be not consistent along different TPs. In this case for phi, *φ* should be replaced by *ϕ* |
| Nokia: contains errors highlighted by Word automatically. |
| Huawei: the whole concept of the coordinate system was reused from the legacy TRs. For the alignment of the angles and their notations, it is suggested to wait for the first draft of the TR to be compiled, and to run the cleanup for the whole technical report.  Any editorial corrections will be addressed in revision of R4-2001823 (big TP). |
| R4-2001810 | R&S: Theta and phi notation in clause 4.1 seems to be not consistent along different TPs. In this case:   * For theta, *Θ* should be replaced by *θ* all along the text. * For phi, *Φ* should be replaced by *ϕ* at the end of the first paragraph.   In addition, coordinate system representation could be improved by using a figure similar to IEEE Std 149. This representation is also used in UE FR2 specifications: TR 38.810 clause C.1 or TS 38.101-2 clause J.1 and R&S has the sources for these 2 so they can be easily adapted. |
| Nokia: RAN4 has discussed the reference coordinate system before, and the decision was to use the one in TR 37.842 clause 7.1 instead of the one in TR38.810 annex C.1. Note that the vertical angles are 90 degree different between the two systems. |
| Ericsson: We would also like to align coordinate system with other industries. IEEE coordinate system is used in all antenna literature and would be strange if 3GPP (RAN4) has different from all others. Additionally, the TRP equations would not be correct if we use the declarations coordinate system. |
| Huawei: the whole concept of the coordinate system was reused from the legacy TRs. Therefore it is suggested that any corrections to the coordinate system are done via separate contributions from proponents. Besides, the coordinate system was discussed in the past extensively already. We also second Nokia comment above. We are reusing the existing description of the coordinate system. Please provide contribution to correct it, if needed. |
| R4-2001811 | Ericsson:   * As Figure 5.1-2 indicates, there is an “uncertainty budget format” this needs to be included and should not be removed as part of this work. * Point 9: needs to be updated to make it general for all requirements * Point 10: since the scope for this TR is broader than TS, we need to reformulate to say "in order to demonstrate the way a budget should be defined", remove reference to the TS to make it broader. It is also a description for external use. |
| Nokia: not sure where removed text comes from. |
| Huawei: re-wording suggestions can be addressed in revision. Figure 5.1-2 was not removed – not sure what was meant by this comment. Bullet 9 and 10 to be reworded.  For the comment on text source: this was explained in the work-plan in R4-2001806, i.e. once you undelete the deleted text, the source of the text shows up (in this case TR 37.843). |
| R4-2001812 | Ericsson: For directional requirements we could also add a EIRP definition related to power density to be general. Regarding directional requirements, some information on RX directional requirements is missing; e.g. reference direction, RoAoA, OSDD, etc. |
| ZTE: For 6.3.2.5 EMC emission is mentioned. I think the TRP for OTA AAS BS radiated spurious emission covers EMC radiated emission needs to be pointed out so that no confusion for the other EIRP EMC emission. |
| Nokia: not sure where removed text comes from.  Huawei: this was explained in the work-plan in R4-2001806, i.e. once you undelete the deleted text, the source of the text shows up. |
| Huawei: wording corrections from Ericsson and ZTE to be addressed in the revision. |
| R4-2001813 | ZTE: For figure 7.2.1-2, there are two figures. I think it is better to explain one is for co-location RX test. |
| MVG: section 7.5.2.1 - this limitation does not apply to OTA EVM measurements but to the OTA RX directional requirements such as ACS, Blocking, RX intermodulation and Dynamic Range. Basically, for all the tests where a wanted signal and interfering signals must be considered (section 10.3). Proposal: Add a new section as section 7.5.2.x with title: OTA RX directional requirements and copy that limitation |
| Ericsson: We should keep both limitations; this is still relevant but maybe have 2 different sections? One for TX limitations and one for RX limitations? |
| R&S: There is a typo on clause 7.6.2, inherited from TR 37.843 that we didn’t spotted, where it should say “section” instead of “clause”.    It just seems like a general correction from the technical editor when implementing the CR, but it doesn’t apply in this case. |
| Nokia: not sure where removed text comes from.  Huawei: this was explained in the work-plan in R4-2001806, i.e. once you undelete the deleted text, the source of the text shows up. I will not repeat the same comment in all the rows below. |
| Huawei: wording corrections from ZTE to be addressed in revision. The NFTR limitation case seems to be clarified by MVG, but the exact wording to be addressed in revision, also considering Ericsson feedback.  Remaining editorial issues are suggested to be addressed in big TP (revision of R4-2001823), once the first TR draft is compiled. |
| R4-2001814 | Ericsson: 1D CATR calibration is missing. For the general chamber, we may need calibrations for co-location requirements  Huawei: it was missing it the legacy TRs as well, so it shall be provided as a separate contribution. |
| Ericsson: Yes, can we have editors note to that effect? |
| Nokia: not sure where removed text comes from.Huawei: same as in above tdocs. Will not repeat this in the rest of this table. |
| Huawei: editor’s note will be added to all empty sections (including the one for 1D calibration) in the big TP as rapporteur’s task. |
| R4-2001815 | Ericsson: EIRP = EIRPp1 + EIRPp2 then should be calculated and is missing in some procedures |
| Nokia: not sure where removed text comes from. |
| Huawei: agree. Good to align the polarization related equation and wording. |
| R4-2001816 | Nokia: not sure where removed text comes from. |
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| R4-2001817 | Ericsson: For RC test method, if change EUT to BS, then need to also update/change the equations. Otherwise there is an introduction of an uncertainty to the description. Rather here keep EUT for now at least in RC test method, we can update this later |
| MVG: In section 11.3.4.2.2 replace "relative ACLR" with "absolute ACLR". This is based on the discussion we had few days ago for the ACLR MUs. In fact, in table 11.3.4.3-1 "relative" has been already replaced with "absolute". |
| Nokia: not sure where removed text comes from. |
| Huawei: For the EUT vs. BS: we need to keep it consistent across the whole spec so we prefer to fix those equations in revision (clearly there shall be not extra uncertainty here). ACLR section to be corrected based on MVG comment. |
| R4-2001818 | Ericsson: If the calibration section is referenced for the test methods. Care needs to be taken to ensure that the calibration set up needs to also be calibrated for the whole frequency region – not just the wanted signal. |
| Nokia: not sure where removed text comes from. |
| Huawei: for the calibration comment: probably this is something worth checking, and also comparing to the TS text. TP to be revised. |
| R4-2001703 | Ericsson: some places the “CLTA” is referenced, and some places “co-location test antenna” text is used, maybe we can use one or the other throughout the text rather than both.  Huawei: this is better to fix once the whole TR is compiled as multiple TPs may be impacted by this. |
| ZTE: The “general chamber” term is used in subclause 13.2,2 and some other hw’s TP while “general OTA chamber” is used in this subclause 7.8. Need some alignment on the terminology.  Huawei: this is editorial correction and it should say “general chamber” basically. |
| Nokia: contains some untracked changes; not sure where removed text comes from. |
| Huawei: CLTA wording and untracked changes (i.e. text from legacy TR) to be fixed for clarity in the revision. |
| R4-2001819 | Ericsson: description on how you calibrate the chamber to secure that OOB interferer is correct at the text object, its not a regular calibration perhaps an editorial note as a place holder |
| Nokia: FR2 summary table is missing in 14.3; not sure where removed text comes from, as TR is currently empty. |
| Huawei: to be revised to clarify the calibration procedure. All the FR1 and FR2 summary tables were planned to be addressed by separate TP, once the Excel spreadsheets are agreed this meeting. |
| R4-2001820 | Nokia: not sure where removed text comes from. |
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| R4-2001715 | Huawei:  - there is related Huawei contribution in R4-2001821.  - section 16.1 and 16.3 seems not to be needed for the purpose of this TR.  - it is not visible which text from legacy NR TR was not incorporated into this TP (refer to the approach in R4-2001821)  - text is NR-specific, while we need to consider also the AAS BS (refer to the approach in R4-2001821) |
| Nokia: not sure where removed text comes from. |
| Huawei: see sub-topic 1-1 |
| R4-2001821 | ZTE: This paper is quite similar with ZTE proposed in 1715. The EMC port definition figure need to align the terminology to avoid BS type. |
| Nokia: not sure where removed text comes from. |
| Huawei: see sub-topic 1-1 |
| R4-2001704 | Nokia: RAN4 agreed that TR should not contain repeated contents from the TS. |
| Huawei: this was supposed to be a summary of all the values in the TR, not as the repetition of the TS. This shall be used as the cross-check tables for all calculations. With this clarification, it is proposed to agree on the TP (subject to any values corrections, if any). |
| R4-2001698 | Ericsson:   * Regarding the yellow highlighted text. This can be removed if we do not use it. However, as the majority of the descriptions relate to the TE it should be placed with the common TE description – this was missed when the discussion on the TE uncertainty came to. For example A5-7 should move to be in associated section of the common TE uncertainty. * Reference to Internal TR in (A2-13) * The background for having different MU for EIRP pointing error for BS power and TRP, is that for BS power and some TRP requirements pointing error is low, while for some emission methods pointing error can be very large. This should be captured somewhere. |
| Nokia: ACLR/OBUE MU are changed; propose to remove some unused MU elements; contains many untracked changes. |
| Huawei: revision assigned to address the above comments. |
| R4-2001822 |  |
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| R4-2001705 | Nokia: not sure where removed text comes from. |
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## Summary for 1st round

### Open issues

### CRs/TPs

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| **CR/TP number** | **CRs/TPs Status update recommendation** |
| R4-2001808 | Revised in R4-2002434 |
| R4-2001809 | Return to |
| R4-2001810 | Return to |
| R4-2001811 | Revised in R4-2002435 |
| R4-2001812 | Revised in R4-2002436 |
| R4-2001813 | Revised in R4-2002437 |
| R4-2001814 | Agreeable: editor’s note will be added to all empty sections (including the one for 1D calibration) in the big TP.  Approved |
| R4-2001815 | Revised in R4-2002438 |
| R4-2001816 | Approved |
| R4-2001817 | Revised in R4-2002439 |
| R4-2001818 | Revised in R4-2002440 |
| R4-2001703 | Revised in R4-2002442 |
| R4-2001819 | Revised in R4-2002441 |
| R4-2001820 | Approved |
| R4-2001715 | Revised in R4-2002443 |
| R4-2001821 | noted |
| R4-2001704 | Agreeable: there was comment that this content is repeated from TS. The content of this TP was supposed to be a summary of all the values in the TR, not as the repetition of the TS. This shall be used as the cross-check tables for all calculations. With this clarification, it is proposed to agree on the TP (subject to any values corrections, if any).  Approved |
| R4-2001698 | Revised in R4-2002444 |
| R4-2001822 | Approved |
| R4-2001705 | Approved |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)