**3GPP TSG-RAN WG4 Meeting # 94-e-Bis R4-2017401**

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

**Agenda item:** 4.5

**Source:** Moderator (Huawei)

**Title:** [97e][303] NR\_Conformance\_Maintenance

**Document for:** Information

# Introduction

*Briefly introduce background, the scope of this email discussion and provide some guidelines for email discussion if necessary.*

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

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

# Topic #1: CLTA

There are 2 issues related to the CLTA

1. Discussion papers and CR’s to update the CLTA definition based on the WF from last meeting.
2. New issue on co-location for adjacent operating bands

The update effects TS 37.145-2 and TS 38.141-2 so the CR’s for these 2 specification are grouped together in the tables below.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2014394 | CATT | **Proposal 1: Adopt option 2 for out-of-band CLTA as following:**  **The half-power vertical beam width of the out of band CLTA equals .**  **Where,**    **h is the test object vertical radiating length in meter.**  **is the narrowest declared (D.3) vertical beam width of test object antenna.**  **is the centre frequency of operating band of test object antenna.**  **is the centre frequency of co-located band.**  **Observation 1: The availability condition for option 1 is not clear, which may affect the selection of out-of-band CLTA and requirement verification.**  **Observation 2: For option 1, two candidate out-of-band CLTAs might be available for a specific co-located band, which will result in different out-of-band CLTA selection and different test results.**  **Observation 3: For option 1, there is the case that no candidate out-of-band CLTA for a specific co-located band is available.**  **Observation 4: 1.5m height limit could be used as the height limit for option 2.** |
| R4-2016067 | Huawei | **Proposal 1:** Update CLTA definition according to option 1.  **Observation 1:** As both CLAT definitions offer a conformance test which is either equivalent to or tougher than the existing one, both are compliant with the core definition of the co-location reference antenna and hence no modification to the core requirements are needed.  **Observation 2:** Option 1 seems to offer more flexibility and avoids having to agree a fixed max length  **Observation 3:** Option 1 does not mandate a tougher requirements where option 2 may in some circumstances. |
| R4-2016284 | Nokia | no strong preference for either of the two. Since Option 1 incurs minimum changes to the TS, it is Ok to proceed with Option 1 provided Note 2 is revised as follows |
| R4-2014395 (15)  R4-2014396 (16) | CATT | CR for TS 38.141-2: Correction on half-power vertical beam width for the out of band CLTA |
| R4-2015716  (R4-2015717 CAT A) | Ericsson | CR to TS 38.141-2: Improvement of out-of-band CLTA characteristics  (Option 1) |
| R4-2016068  (R4-2016069 CAT A)  R4-2016070  (R4-20171 CAT A) | Huawei | CR to TS 37.145-2 - Update CLTA definition, Rel-15  CR to TS 38.141-2 - Update CLTA definition, Rel-15 |
| R4-2016286  (R4-2016287 CAT A)  R4-2016282  (R4-2016283 CAT A) | Nokia | CR to TS 38.141-2: Out-of-band co-location test antenna definition  CR to TS 37.145-2: Out-of-band co-location test antenna definition |
| R4-2016072 | Huawei | **Observation 1:** For systems where the frequency are so close the co-location requirements cannot be met, there are site solution to allow co-location of non-AAS systems but not for AAS systems  (Note the summary in this paper is incorrect – please ignore) |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 1-1 – CLTA height

There are 2 options from last meetings WF, 4 companies have contributed with the following views:

Option 1: 3 companies

Option 2: 1 company

**Issue 1-1-1: CLTA max height**

* Proposals
  + Option 1 from the WF
  + Option 2 from the WF
* Recommended WF

### Sub-topic 1-2 Co-lcoation adjacent operating bands

For systems where the frequency are so close the co-location requirements cannot be met, there are site solution to allow co-location of non-AAS systems but not for AAS systems

**Issue 1-2: TBA**

* Proposals
  + Option 1: Update CLTA alignment table with note as suggested
  + Option 2: Continue to discuss alternate site solution approaches.
* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Nokia | Sub topic 1-1: 2.5m CLTA length is too much and difficult to handle and arrange next to the DUT.  Sub topic 1-1-2:  Sub topic 1-2: Placing antennas with vertical separation usually provides higher coupling loss and is the common method in real deployments at least in Europe (sectors at the same level, frequency bands with vertical separation), according the available space and how many antennas would need to be put there, example are couple cm to tens of m. This document does not separate site engineering and OTA test cases. If vertical separation is the most common site engineering method and provides higher MCL, then the distance between the antennas can be increase with the test antenna with horizontal separation.  ….  Others: |
| CATT | Sub topic 1-1-1:  **Issue 1-1-1: CLTA max height**  For option 1, we have the following points for clarification:   1. Although option1 can avoids agreeing a fixed max length in spec, but for tester, height limit is still unavoidable when determining the CLTA availability. If different tester chooses different CLTA, how to interpret the test results misalignment? 2. Option1 may also mandate tough requirement in some cases when the height of CLTA based on same beam width (existing definition) is high and not available. 3. For option 1, two candidate out-of-band CLTAs might be available for a specific co-located band, which will result in different out-of-band CLTA selection and different test results 4. For option 1, there is the case that no candidate out-of-band CLTA for a specific co-located band is available.   To Nokia: Agree that 2.5m CLTA height is too high. Considering the operability of the testing, the 1.5m height limit could be used as the height limit for option 2.  Sub topic 1-1-2:  Sub topic 1-2:  ….  Others: |
| Huawei | Sub topic 1-1-1: We support option 1, it is more flexible than fixing a max height, which would have to be relatively large for low band systems but may then mandate a larger than necessary chamber when considering high band systems. Option 1 means CLTA may be same height as DUT and hence will always be appropriate for the chamber. In response to points by CATT: 1) the modification should be tougher than the existing requirement but offer more flexibility in antenna choice, different antenna may give different results but antennas under new definition the test should be harder to pass. 2) this is true, but is also true to some extent if the height is fixed, with option 1 the choice to test with the existing definition still exists so a tougher requirement is not mandated but can be traded against test chamber simplification. 3) Yes, as long as the new length CLTA presents a tougher requirement we see no problem with this both specified antennas show compliance to the requirement. 4) The main reason for this update is size rather than availability. |

### 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** |
| R4-2014395 (15)  R4-2014396 (16) | Nokia: See comments above. This CR depends on the outcome of Sub-topic 1-1. |
| CATT: CR drafting can be discussed in the 2nd round. |
|  |
| R4-2015716 | Nokia: The same comments as R4-2014395. |
| CATT: CR drafting can be discussed in the 2nd round. |
|  |
| R4-2016068  R4-2016070 | Nokia: The same comments as R4-2014395. |
| CATT: CR drafting can be discussed in the 2nd round. |
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| R4-2016286 | Company A |
| Company B |
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## 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#1-1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |
| **Sub-topic#1-2** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |
|  |  |

*Recommendations on WF/LS assignment*

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| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

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

|  |  |
| --- | --- |
| **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: RF Corrections

Contains corrections to the RF requirements (not including test model and FRC generation) to 27.105, 37.145-2 and 37.145-2.

## Companies’ contributions summary

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| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2015949  (R4-2015950, R4-2015951, R4-2015952 CAT A) | Huawei | CR to TS 37.145-1: correction of manufacturer's declarations for test signal configurations, Rel-13 |
| R4-2015953  (R4-2015954, R4-2015955, R4-2015956 CAT A) | Huawei | CR to TS 37.145-2: correction of manufacturer's declarations for test signal configurations, Rel-13 |
| R4-2016079 | Huawei | Discussion on AAS UEM additional requirements  **Observation 1:** There is an error in the UEM addition requirements between MSR and single RAT E-UTRA  **Proposal 1:** Update the E-UTRA core requirement so the referenced requirements are basic limits like the MSR reference.  **Proposal 2:** The missing UEM addition requirements (MSR and SR E-UTRA) in 37.145-2 are copied from the MSR requirements in 37.105  **Observation 2**: Additional UEM requirements E-UTRA, MSR and AAS specification may need updating to ensure all additional requirement are still necessary. |
| R4-2016073  (R4-2016074 CAT A) | Huawei | CR to TS 37.145-1: Corrections to conformance requirements, Rel-15 |
| R4-2016075  (R4-2016076 CAT A) | Huawei | CR to TS 37.145-2: Corrections to conformance requirements including UEM additional requirements, Rel-15 |
| R4-2016077  (R4-2016078 CAT A) | Huawei | CR to TS 37.105: Corrections to core requirements including UEM additional requirements, Rel-15 |
| R4-2016080 | Huawei | CR to TS 37.145-2: Corrections to single RAT E-UTRA additional requirements for band 89, Rel-16 |
| R4-2016127  (R4-2016128 CAT A) | ZTE | CR to 37.145-2: Correction on NR REFSENS |
| R4-2016152  (R4-2016153 CAT A) | Keysight | CR to 38.141-2: Annex C correction on frequency range of FR2 TT table (C.2) |
| R4-2016202  (R4-2016203 CAT A) | Nokia | CR to 37.145-1: Correction to applicability of additional BC3 requirement (Rel-15) |
| R4-2016204  (R4-2016205 CAT A) | Nokia | CR to 37.145-2: Correction to applicability of additional BC3 requirement (Rel-15) |
| R4-2016502  (R4-2016503 CAT A) | Ericsson | TS 37.145-2: Corrections OTA SEM, OTA Rx intermod and OTA ACS |
|  |  |  |

## Open issues summary

There are a large number of correction CR’s on a number of subjects, those with technical discussion required are highlighted in the list of open issues below. Simple CR’s are only included in the CR tables.

### Sub-topic 2-1 – UEM additional requirements

There is an error between the implementation of the UEM additional requirements between MSR and E-UTRA in both the core specification. In addition the conformance specification test requirements do not correctly implement the core requirements.

**Issue 2-1-1: Correct core UEM additional limits**

* Proposals
  + Option 1: Update the E-UTRA core requirement so the referenced requirements are basic limits like the MSR reference.
* Recommended WF
  + Option 1

**Issue 2-1-2: Correct conformance UEM additional limits**

* Proposals
  + Option 1: The missing UEM addition requirements (MSR and SR E-UTRA) in 37.145-2 are copied from the MSR requirements in 37.105
* Recommended WF
  + Option 1

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Nokia | Sub topic 2-1-1: Agree in principle that when AAS spec refers to “traditional” spec it should be treated as basic limit.  Sub topic 2-1-2: Agree to add the missing UEM addition requirements.  ….  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** |
| R4-2015949 | Nokia: editorial corrections in nature; CR should not contain 'comments'. |
| Company B |
|  |
| R4-2015953 | Company A |
| Company B |
|  |
| R4-2016073 | Nokia: CR should not contain 'comments'. |
| Company B |
|  |
| R4-2016075 | Huawei: This is our CR but needs to be updated based on the removal of the band 1 additional requirements in CR’s R4-2016349 to R4-2016362 |
| Company B |
|  |
| R4-2016077 | Nokia: clause number 9.7.5.4.6.2 is skipped; CR should not contain 'comments'. |
| Huawei: This is our CR but needs to be updated based on the removal of the band 1 additional requirements in CR’s R4-2016349 to R4-2016362 |
|  |
| R4-2016080 | Company A |
| Company B |
|  |
| R4-2016127 | Company A |
| Company B |
|  |
| R4-2016152 | Company A |
| Company B |
|  |
| R4-2016202 | Company A |
| Company B |
|  |
| R4-2016204 | Company A |
| Company B |
|  |
| R4-2016502 |  |
| 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*

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| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

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

|  |  |
| --- | --- |
| **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: TRP

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2016289 | Nokia | Discussions on TRP procedures  *Observation* *1*: The TRP formula for the two orthogonal cuts with pattern multiplication requires continuous data points, which is not suitable to integrate a set of discrete data samples.  **Proposal 1: A numerical form of the TRP integral for the two orthogonal cuts with pattern multiplication is defined to allow computation of TRP estimate from discrete data samples.**  **Proposal 2: Criteria for determining whether correlation exists before applying the beam-based directions procedure should be added to the TR 37.941 as background information, which are as follows:**   1. **Maximum radiation of unwanted emissions occurs in the same direction as the wanted signal.** 2. **The main lobe of the wanted signal and the unwanted emissions with respect to the axis of maximum radiation should have the same symmetry.** 3. **HPBW in the azimuth and elevation direction for the unwanted emissions should correspond to those of the wanted signal.** 4. **The directivity-beamwidth product of the unwanted emissions should correspond to that for the wanted signal.** |
|  |  |  |

## Open issues summary

The paper makes 2 proposals for updates to the TRP calculations background.

### Sub-topic 3-1 –Two orthogonal cuts with pattern multiplication

Two orthogonal cuts with pattern multiplication

**Issue 3-1:** Two orthogonal cuts with pattern multiplication

* Proposals
  + Two orthogonal cuts with pattern multiplication.
* Recommended WF:…

### Sub-topic 3-2 –Beam-based directions

Two orthogonal cuts with pattern multiplication

**Issue 3-2:** Two orthogonal cuts with pattern multiplication

* Proposals
  + Criteria for determining whether correlation exists before applying the beam-based directions procedure should be added to the TR 37.941 as background information.
* Recommended WF:…

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Huawei | Sub topic 3-1: This clarification seems ok, but not sure its 100% necessary as we have an error term to account for the steps. Need to see CR to agree completely but probably ok.  Sub topic 3-2: We are ok with clarification, but we should not agree to add text until the text is seen, so in principle its ok but would rather not agree until we see the CR. Also its not clear that TR 37.941 is the correct place for this, the beam based methods are described in Annex F.10 of TS 37.145-2, this would seem like a more natural place for this. TR 37.941 doesn’t seem to have any background on beam based methods. |
| XXX | Sub topic 3-1:  Sub topic 3-2:  ….  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** |
|  | 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*

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| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

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

|  |  |
| --- | --- |
| **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 #4: Test model

This topic contains updates to the NR test models data content.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2015378 | Nokia | **Observation 1: Current specification is ambiguous and generation of PN23 is not clear. It can be noticed that 2 different interpretation (options) of PN23 sequence generation can exist.**  **Observation 2: It is not clear how PN sequence should be generated for TDD.**  **Proposal: It is proposed to clarify PN sequence generation for NR TMs to avoid ambiguity as proposed in CRs [10-13].** |
| R4-2015379  (R4-2015380 CAT A) | Nokia | CR to TS 38.141-1 clarification on PN23 sequence generation |
| R4-2015381  (R4-2015382 CAT A) | Nokia | CR to TS 38.141-2 clarification on PN23 sequence generation |
|  |  |  |

## Open issues summary

There are a large number of correction CR’s on a number of subjects, those with technical discussion required are highlighted in the list of open issues below. Simple CR’s are only included in the CR tables.

### Sub-topic 4-1 – PN23 sequence generation

The discussion paper on the PN23 sequence proposes a clarification.

**Issue 4-1: Clarify PN23 sequence generation**

* Proposals
* Option 1: It is proposed to clarify PN sequence generation for NR TMs to avoid ambiguity as proposed in CRs to TS 38.141-1 and TS 38.141-2 [10-13].
* Recommended WF

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Keysight | Sub topic 4-1:  …. PN23 was used instead of all zero for randomize and better signal characteristic for Tx test purpose. Based on this, proposed detail is not necessary to specify because use of PN23 from beginning or in middle doesn’t change “random” characteristic. We don’t think this proposed change is needed.  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** |
| R4-2015379 | Company A |
| Company B |
|  |
| R4-2015381 | Company A |
| Company B |
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## 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*

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| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

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

|  |  |
| --- | --- |
| **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”* |