**3GPP TSG-RAN WG4 Meeting # 99-e R4-2108432**

**Electronic Meeting, 19th – 27th May, 2021**

**Agenda item:** 6.3.2.1

**Source:** Moderator (Nokia)

**Title:** Email discussion summary for [99-e][307] NR\_IAB\_Conformance\_Part2

**Document for:** Information

# Introduction

This email discussion focuses on IAB conformance test. Following sub-AIs are covered in this discussion:

*6.3.2.3 Conducted conformance testing [NR\_IAB-Perf]*

*6.3.2.3.1 Transmitter characteristics [NR\_IAB-Perf]*

*6.3.2.3.2 Receiver characteristics [NR\_IAB-Perf]*

*6.3.2.3.3 Other test issues [NR\_IAB-Perf]*

*6.3.2.4 Radiated conformance testing [NR\_IAB-Perf]*

*6.3.2.4.1 Transmitter characteristics [NR\_IAB-Perf]*

*6.3.2.4.2 Receiver characteristics [NR\_IAB-Perf]*

*6.3.2.4.3 Other test issues [NR\_IAB-Perf]*

Most of contribution includes TPs for conducted or OTA test specification. Discussion is split for these two types of specifications.

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

* 1st round: To discuss submitted TPs to TS 38.176-1 (conducted) and TS 38.176-2 (OTA).
* 2nd round: TBA

# Topic #1: Updated TS 38.176-1 and text proposals (conducted)

This topic includes submitted contributions and mainly test proposals (TPs) to conducted IAB conformance specification 38.176-1.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2111397 | Huawei | Title: TS 38.176-1 -Updated TS 37.176-1 |
| R4-2111399 | Huawei | Title: TP to TS 38.176-1 -Clean up |
| R4-2109019 | CATT | Title: TP for TS 38.176-1: Transmitted signal quality |
| R4-2111403 | Huawei | Title: TP to TS 38.176-1 - OTA Tx dynamic range, clause 6.3 |
| R4-2111177 | Ericsson | Title: TP for IBB, OBB and RX spurious of conducted receiver test |
| R4-2111405 | Huawei | Title: TP to TS 38.176-1 - Sensitivity, clause 7.2 |
| R4-2110609 | ZTE Corporation | Title: TP to TS 38.176-1: Annex G and H: In-channel TX test |
| R4-2109832 | Nokia, Nokia Shanghai Bell | Title: TP to TS 38.176-1 Clause 4.6 Declarations for IAB conducted test specification Definition of share IAB hardware proposed:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D.IAB-1 | Shared or common RF implementation. | Declaration whether IAB-MT and IAB-DU have shared or identical RF implementation, used for testing efficiency improvement. | x | x |

 |
| R4-2111175 | Ericsson | Title: On IAB-MT dynamic range and power control test for conduct test(Moderator note: no proposal 1 and 2, only 3 and 4 in Tdoc)Proposal-3: Use the table 1 as the Tx dynamic test requirement.Proposal-4: Z = [2] dB in the test point accuracy relating to the Y (RB change).

|  |  |  |
| --- | --- | --- |
| Test point | Expected power step size (Down) | PUSCH (normal condition) |
|  | ΔP [dB] | [dB] |
| Test point 1 | 0 | Relative to the declare output power | f ≤ 3.0 GHz: ± 2.7 dB |
| 3.0 GHz < f ≤ 6.0 GHz: ± 3.0 dB |
| Test point 2 | 10 log(Maximum RB)+ 5 / 10 acc. to WA/LA IAB-MT Tx danymic range requirement  | Relative to the Test point 2’ output power | -10 log(Maximum RB)- 5/10 ± 5.5 +/- (Z +TT) |

 |
| R4-2111181 | Ericsson | Title: IAB-MT specific declaration FR1Definition of share IAB hardware proposed:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| [D.IAB-1] | Share IAB hardware | Declaration whether IAB-MT and IAB-DU share the same hardware. | x | x |

 |
| R4-2111402 | Huawei | Title: Discussion on IAB-MT TX dynamic range testing (Moderator note: Tdoc for discussion)The MU for each of the IAB types has been proposed and they are the same in all cases:±0.7 dB, BW ≤ 40MHz±1.0 dB, 40MHz < f ≤ 100MHzAnd with TT=MU the test requirement is for example FR1 conducted:The issue of merging the DR test with the relative power requirement is also discussed and whilst the 2 core requirements are not fully aligned for such a merger it sufficient to test only the final step in the relative power tolerance and hence the 2 test can be merged. It is suggested that the power control step applied to test point 2 is left to the vendor to select (it is not strictly a free choice but the 1st step that can pass both requirements, which could differ depending on accuracy capability).The test requirement is hence (for example):For Local area IAB-MT(BW≤40MHz) PTest point 1- PTest point 2≥ 9.3dB + 10log10(Max RB)AndSTEP\_max – 6.2 ≤PTest point 1- PTest point 2 + 10log10(Max RB) ≤ STEP\_max + 6.2, (40MHz < BW ≤ 100MHz)PTest point 1- PTest point 2≥ 9.0dB + 10log10(Max RB)AndSTEP\_max – 6.5 ≤PTest point 1- PTest point 2 + 10log10(Max RB) ≤ STEP\_max + 6.5, The relative power control requirement does not apply to wide area so the threshold requirement is sufficient for this. |

## 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

*Sub-topic description:*

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

**Issue 1-1: IAB declaration with definition of shared IAB hardware:**

* Proposals
	+ Option 1: Nokia proposal from R4-2109832
	+ Option 2: Ericsson proposal from R4-2111181
* Recommended WF
	+ TBA

### Sub-topic 1-2

*Sub-topic description:*

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

There are two different views on Tx dynamic range test requirements. One view is as described in Tdoc R4-2111175 and second as described in Tdoc R4-2111402.

**Issue 1-2: Tx dynamic range test requirements**

* Proposals
	+ Option 1: As proposed in R4-2111175 (Ericsson)
	+ Option 2: As proposed in R4- 2111402 (Huawei)
	+ Option 3: TBA
* Recommended WF
	+ TBA

## Companies views’ collection for 1st round

### Open issues

*One of the two formats, i.e. either example 1 or 2 can be used by moderators.*

Sub topic 1-1

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | We have a WF agreement to use the shared hardwar wording, it will be even better to align with the TR 38.809 for the RF architecture. In declaration, there is no need to mention the purpose as it will be reflected in the performance specification. |
| Huawei | The name does not have to explain exactly what it is, replacing “identical” with “common” leaves “shared or common “ which is kind of the same thing. Ericsson name is probably better.In the description I think there is no need to explain what the declaration is for (i.e. to reduce testing) only what it is, again the Ericsson proposal is probably simpler So option 2In both why have we changed the UID to D.IAB-x and not just carry on the list D.x ? ok these are IAB specific but the whole list is in the IAB spec so should be unique to this spec Both part 1 and part 2 start with D1 and they are different D1’s so its implicit that the list belongs to the spec in question, hence I don’t see the need to ass IAB to the UID – in fact its confusing as to why. |

Sub topic 1-2

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | Th dynamic range required is in place of the power control requirement for local area IAB-MT (ΔP <10 dB). There is no need to go beyond 10 dB which is TX PSD dynamic range requirement. From this perspective, the output power accuracy needs to be considered in the test requirement as the radio chain condition cannot be the same (TX gain and PA operationg point needs to be changed for different PSD ) and thus it cannot be cancel out. We are however ok with reduced the MU as the test point 1 and 2 measurment setup will be kept the same and thus the uncertainty of measurement can be cencle out.  |
| Huawei | The Ericsson proposal adds the relative power tolerance uncertainty onto the target power for the dynamic range test. As such if the accuracy is +5.5dB, the total DR is only 4.5dB hence will not meet the DR requirement (which is at least 10dB). If we merge these we need to meet both requirements5 |

### CRs/TPs comments collection

*For close-to-finalize WIs and maintenance work, comments collections can be arranged for TPs and CRs. For ongoing WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2111397Huawei | Company ACompany B |
| R4-2111399Huawei |  Ericsson: ok Company B |
| R4-2109019CATT | Ericsson: okHuawei: Freq error IAB-MT MU is different (if the current spreadsheet values re accepted)In core spec we have separate sub-clauses for IAB-DU and IAB-MT As the test req (and MU) are also different I think that would be better here also.TAE the test req its not clear its IAB-DU only (although it’s clear elsewhere maybe it’s worth pointing out here also)Still have 5MHZ channel BW in tables, also should the column header be IAB Channel BW or whatever the correct term is? |
| R4-2111403Huawei | Ericsson: need more discussion on issue 1-2 |
| R4-2111177Ericsson | Huawei: TP doesn’t actually say what document its for (probably 38.176-1). Many of the updates have been implemented in the editorial update already (R4-2111399) its better to update references in this docent (as this uses a different update of the reference list) |
| R4-2111405Huawei | Ericsson;ok |
| R4-2110609ZTE Corporation | Ericsson: CATT has a CR on corresponding core part, maybe need to double check after the CR is agreed.Huawei: As with e the CATT doc Ericsson mention, this has hanging text introduced, also references to H1 to H7 I think should be annex H1 to annex H7 |
| R4-2109832Nokia, Nokia Shanghai Bell | Ericsson: need discussion in issue 1-1Huawei: As discuses din 1-1 I think the Ericsson proposal (1181) is better |
| R4-2111175Ericsson | Huawei: ongoing discussion on issue 1-2 |
| R4-2111181Ericsson | Huawei: as per issue 1-1 this is ok |
| R4-2111402Huawei | Moderator note: This Tdoc is not a TP, but document for discussion. Included here to collect companies’ comments and views.Ericsson: need discussion in issue 1-2. |

## 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:* |

### CRs/TPs

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

*Note: The tdoc decisions shall be provided in Section 3 and this table is optional in case moderators would like to provide additional information.*

|  |  |
| --- | --- |
| **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)

# Topic #2: Updated TS 38.176-2 and text proposals (OTA)

This topic includes submitted contributions and mainly test proposals (TPs) to OTA IAB conformance specification 38.176-2.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2110944 | Nokia, Nokia Shanghai Bell | Title: TS 38.176-2 v.0.1.0 - update after RAN4#98bis meeting |
| R4-2110945 | Nokia, Nokia Shanghai Bell | Title: TP to 38.176-2 Editor update - editorials |
| R4-2109021 | CATT | Title: TP for TS 38.176-2: OTA transmitted signal quality |
| R4-2110142 | Nokia, Nokia Shanghai Bell | Title: TP to TS 38.176-2: clauses 6.1, 6.2, 6.3 and 6.7 |
| R4-2111404 | Huawei | Title: TP to TS 38.176-2 - OTA Tx dynamic range, clause 6.4 |
| R4-2110608 | ZTE Corporation | Title: TP to TS 38.176-2: RX ICS requirements |
| R4-2111178 | Ericsson | Title: TP on IBB, OBB and RX spurious for OTA receiver characteristic test |
| R4-2111406 | Huawei | Title: TP to TS 38.176-2 - OTA Sensitivity, clause 7.2, 7.3 |
| R4-2109833 | Nokia, Nokia Shanghai Bell | Title: TP to TS 38.176-2 Clause 4.6 Declarations for IAB radiated test specificationDeclaration proposed:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| D.IAB-1 | Shared or common RF implementation | Declaration whether IAB-MT and IAB-DU have shared or common RF implementation, used for testing efficiency improvement. | c | x | x |

 |
| R4-2109999 | Samsung | Title: TP to TS38.176-2 on Annex I and Annex K |
| R4-2110610 | ZTE Corporation | Title: TP to TS 38.176-2: Annex L and M: In-channel TX test |
| R4-2110818 | Qualcomm Incorporated | Title: TP to TS 38.176-2 – Clause 3 |
| R4-2111182 | Ericsson | Title: IAB-MT specific declaration FR2Proposed declarations:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| [D.IAB-1] | Share IAB hardware | Declaration whether IAB-MT and IAB-DU share the same hardware. | c | x | x |
| D.IAB-2 | IAB-MT test model PT-RS configuration | Declaration of PT-RS configuration in IAB-MT test model: without PT-RS, with PT-RS or both. |  |  | x |

 |
| R4-2111176 | Ericsson | Title: On IAB-MT dynamic range and power control test for OTA testProposal-3: Use the table 1 and 2 as the Tx dynamic test requirement.Proposal-4: Z1 = Z2 = [3] dB in the test point accuracy relating to the Y (RB change).Table 1: Test requirement of the Tx dynamic range/power control for LA IAB-MT

|  |  |  |
| --- | --- | --- |
| **Test point** | **Expected power step size (Down)** | **PUSCH (normal condition)** |
|  | **ΔP [dB]** | **[dB]** |
| Test point 1 | 0 | relative to the manufacturer's declared rated beam EIRP (D.11) value | For IAB-MT type 1-O, see table 2 below |
| For IAB-MT type 2-O, see table 2 below |
| Test point 2 | 10 log(Maximum RB) +5 / 10 acc. to WA/LA IAB-MT Tx danymic range requirement  | Relative to the Test point 2’ output power | For IAB-MT type 1-O : -10 log(Maximum RB)- 5/10 +/-5.5 +/- (Z1+ TT) |
| For IAB-MT type 2-O: -10 log(Maximum RB)- 5/10 +/-6 +/- (Z2+TT) |

**Table 2: Output power accuracy for test requirement of test point 1**

|  |  |  |
| --- | --- | --- |
|  | **Normal test environment** | **Extreme test environment** |
| IAB-MT type 1-O | f  ≤ 3 GHz: ± 3.3 dB | f  ≤ 3 GHz: ± 5.2 dB |
|  | 3 GHz < f ≤ 6 GHz: ± 3.5 dB  | 3 GHz < f ≤ 4.2 GHz: ± 5.3 dB |
|  |  | 4.2 GHz < f ≤ 6 GHz: ± 5.3 dB |
| IAB-MT type 2-O | 24.15 GHz < f ≤ 29.5 GHz: ± 5.1 dB37 GHz < f ≤ 43.5 GHz: ± 5.4 dB… | 24.15 GHz < f ≤ 29.5 GHz: ± 7.6 dB37 GHz < f ≤ 43.5 GHz: ± 7.8 dB  |

 |

## 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 2-1

*Sub-topic description:*

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

**Issue 2-1: IAB declarations**

* Proposals
	+ Option 1: Ericsson proposal from R4-2111182 (on share HW)
	+ Option 2: Nokia proposal from R4-2109833 (on share HW)
	+ Option 3: Ericsson proposal from R4-2111182 (on test model PT-RS configuration)
* Recommended WF
	+ TBA

### Sub-topic 2-2

*Sub-topic description:*

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

There are two different views on Tx dynamic range test requirements. One view is as described in Tdoc R4-2111175 and second as described in Tdoc R4-2111402 o (submitted in conducted agenda but cover both conducted and OTA parts).

**Issue 2-2: Tx dynamic range test requirements**

* Proposals
	+ Option 1: As proposed in R4-2111176 (Ericsson)
	+ Option 2: As proposed in R4- 2111402 (Huawei)
	+ Option 3: TBA
* Recommended WF
	+ TBA

## Companies views’ collection for 1st round

### Open issues

Sub topic 2-1

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | We have a WF agreement to use the shared hardwar wording, it will be even better to align with the TR 38.809 for the RF architecture. In declaration, there is no need to mention the purpose as it will be reflected in the performance specification. |
| Huawei | Similar to conduced Ericsson proposal is better. Same comment on the use of D.IAB.x for the UID the D.x list should just be continued I think. |

Sub topic 2-2

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | Th dynamic range required is in place of the power control requirement for local area IAB-MT (ΔP <10 dB). There is no need to go beyond 10 dB which is TX PSD dynamic range requirement. From this perspective, the output power accuracy needs to be considered in the test requirement as the radio chain condition cannot be the same (TX gain and PA operationg point needs to be changed for different PSD ) and thus it cannot be cancel out. We are however ok with reduced the MU as the test point 1 and 2 measurment setup will be kept the same and thus the uncertainty of measurement can be cencle out.  |
| Huawei | Same discussion as 1-2, if the tests are merged then both must be passed. |

### 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** |
| R4-2110944Nokia, Nokia Shanghai Bell | Company ACompany B |
| R4-2110945Nokia, Nokia Shanghai Bell | Company ACompany B |
| R4-2109021CATT | Ericsson: For PT-RS signal configuration for IAB-MT, should the declaration mentioned here, note there is new IAB-MT declaration for PT-RS signal to be agreed.Huawei: similar comments as conducted, Freq error I thin k separate sub-clause fo IAB-DU and IAB-MT, IAB-MT is likely different MU/TT. 5MHz Channel BW in tables. |
| R4-2110142Nokia, Nokia Shanghai Bell | Ericsson: there are some place reference to 38.174 still “x” and other place is [2].Huawei: IAB-MT type 2-H is in table 6.2.5-1. MU (and hence TT) for IAB-MT 2-O is currently proposed as different to IAB-DU 2-O this assumes they are the same. Obviously the agreemnst made about MU/TT need to be implemented.If they are different I think having separate sub-clauses for IAB-DU nd IAB-MT makes more sense (avoids direct comparison) |
| R4-2111404Huawei | Ericsson: more discussion in issue 2-2 |
| R4-2110608ZTE Corporation | Ericsson:ok |
| R4-2111178Ericsson | Huawei: again references are probably better cleared up by editor, but some other clause references cleared up so useful. |
| R4-2111406Huawei | Ericsson:ok |
| R4-2109833Nokia, Nokia Shanghai Bell | Ericsson: disccsion in issue 2-1Huawei: issue 2-1 (we prefer Ericsson approach) |
| R4-2109999Samsung | Ericsson: okHuawei: This is ok, I think it’s a direct copy form 38.141-2? However this is quite detailed technical text and is quite hotly debated and seems subject to change quite often. I wonder if its more maintenance proof just to reference 38.141-2? |
| R4-2110610ZTE Corporation | Ericsson: CATT has a CR on corresponding core part, maybe need to double check after the CR is agreed.Huawei: similar comments to conducted, hanging text, way sub-annexes are referenced. |
| R4-2110818Qualcomm Incorporated | Ericsson: okHuawei: I think this is ok or a start, the editor needs to go through identify which terms are used and which are not (and removed them) and add ny terms which have appeared (Aggregated IAB-DU channel bandwidth for example) |
| R4-2111182Ericsson | Huawei: the declaration and description are ok – as discussed earlier the UID I think should just be D.63, or even D.80 if yu want some room for potential new declarations in the NR specs which will be copied in here. Changing the D to D.IAB I think is confusing. |
| R4-2111176Ericsson |  Huawei: no spec number/version. Discuss under issue 2-2 and 1-2 |

## 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:* |

### 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)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| WF on … | YYY |  |
| LS on … | ZZZ | To: RAN\_X; Cc: RAN\_Y |
|  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
	1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
	2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

## 2nd round

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-210xxxx | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-210xxxx | LS on … | ZZZ | Agreeable, Revised, Noted |  |
|  |  |  |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
2. For the Recommendation column please include one of the following:
	1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
	2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents