**3GPP TSG-RAN WG4 Meeting # 98-bis-e R4-210XXXX**

**Electronic Meeting, 12th – 20th April, 2021**

**Agenda item:** 5.3.2

**Source:** Moderator (Huawei)

**Title:** Email discussion summary for [98-bis-e][304] NR\_IAB\_Conformance\_Part1

**Document for:** Information

# Introduction

This email discussion is for the IAB conformance general and common issues.

There are a number of TP’s to the 2 conformance specifications which focus on the skeleton, the general sections of the spec (clause 1-4) and some of the annexes.

There are also a number of technical discussion papers on the test models, test configurations and te MU values.

# Topic #1: Test models and test configurations

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2107229 | Ericsson | IAB Common test issue on test model-ConductedTable x.y.z -1: Configurations of TDD for *IAB-MT type 1-H and type I-O* test models

|  |  |
| --- | --- |
| Field name | Value  |
| referenceSubcarrierSpacing (kHz) | 15 | 30 | 60 |
| Periodicity (ms) for dl-UL-TransmissionPeriodicity | 5  | 5 | 5 |
| nrofDownlinkSlots | 3 | 7 | 14 |
| nrofDownlinkSymbols | 10 | 6 | 12 |
| nrofUplinkSlots | 1 | 2 | 4 |
| nrofUplinkSymbols | 2 | 4 | 8 |

**Proposal-1:** Adopt the above common parameter configuration for IAB-MT test model**.****Proposal-2:** Use the 2 DMRS symbol in IAB-MT test model following the BS approach.**Proposal-3:** Apply WF[1] test point definition to 256QAM. |
| R4-2107230 | Ericsson | IAB Common test issue on test model-OTA**Proposal-1:** Discuss the above core requirement classification for IAB-MT different test model design.**Observation#1:** UE and BS TDD configuration achieve the same # uplink time slot for 20ms test model definition time.**Proposal-2:** Use the BS TDD configuration.Table x.y.z-1: Configurations of TDD for *IAB type 2-O* test models

|  |  |
| --- | --- |
| Field name | Value |
| referenceSubcarrierSpacing (kHz) | 60 | 120  |
| Periodicity (ms) for dl-UL-TransmissionPeriodicity | 1.25  | 1.25  |
| nrofDownlinkSlots | 3 | 7 |
| nrofDownlinkSymbols | 10 | 6 |
| nrofUplinkSlots | 1 | 2 |
| nrofUplinkSymbols | 2 | 4 |

**Proposal-3:** Adopt the above common parameter configuration for IAB-MT test model.Table x.y.z-1: Common physical channel parameters for PUSCH for *IAB type 2*-O test models

|  |  |
| --- | --- |
| Parameter | Value |
| Mapping type | PUSCH mapping type A |
| *dmrs-TypeA-Position* for the first DM-RS symbol | pos2 |
| *dmrs-AdditionalPosition* for additional DM-RS symbol(s) | Pos0 |
| *dmrs-Type* for comb pattern | Configuration type 1 |
| *maxLength* | 1 |
| Ratio of PDSCH EPRE to DM-RS EPRE | 0 dB |
| PTRS configuration and density | LPT-RS =4KPT-RS =2$$k\_{ref}^{RE}=00$$ |
| Ratio of PT-RS EPRE to DM-RS EPRE | 0 dB |

**Proposal-4:** Adopt the above common parameter configuration for IAB-MT test model for the IAB type 2-O.**Proposal-5**: Apply WF[1] test point definition to 256QAM. |
| R4-2106322 | Nokia, Nokia Shanghai Bell | Further considerations on TDD pattern for IAB test models**Observation 1:** It would greatly help to reduce the required testing time if the IAB test methodology is specified in a way that the conformance testing for IAB-DU and IAB-MT can be performed simultaneously.**Observation 2:** Special consideration need to be placed on the used TDD UL/DL configurations to ensure sufficient measurement time slots are provisioned for IAB-DU and IAB-MT during the tests.**Proposal 1:** It is proposed to use TDD uplink/downlink configurations that have an around 1-to-1 UL/DL ratio for IAB-DU and IAB-MT conformance testing.Table 1: Configurations of TDD for IAB test models for FR1

|  |  |
| --- | --- |
| Field name | Value  |
| referenceSubcarrierSpacing (kHz) | 15 | 30 | 60 |
| Periodicity (ms) for dl-UL-TransmissionPeriodicity | 5  | 5 | 5 |
| nrofDownlinkSlots | 2 | 5 | 9 |
| nrofDownlinkSymbols | 6 | 5 | 10 |
| nrofUplinkSlots | 2 | 4 | 9 |
| nrofUplinkSymbols | 6 | 5 | 10 |

**Proposal 2:** It is proposed to agree TDD configurations for FR1 for IAB-DU and IAB-MT as in table 1.Table 2: Configurations of TDD for IAB test models for FR2

|  |  |
| --- | --- |
| Field name | Value |
| referenceSubcarrierSpacing (kHz) | 60 | 120 |
| Periodicity (ms) for dl-UL-TransmissionPeriodicity | 1.25  | 1.25  |
| nrofDownlinkSlots | 2 | 5 |
| nrofDownlinkSymbols | 6 | 5 |
| nrofUplinkSlots | 2 | 4 |
| nrofUplinkSymbols | 6 | 5 |

**Proposal 3:** It is proposed to agree TDD configurations for FR2 for IAB-DU and IAB-MT as in table 2. |
| R4-2106321 | Nokia | Further considerations on IAB test configurations with TP to 38.176-1 and 38.176-2.**Observation 1:** The main difference compared to NR is that for IAB there may be DL and UL transmission for IAB-DU and IAB-MT, respectively, thus existing NR BS TCs where only DL transmission is included and the existing NR UE TCs where only UL transmission is included are not sufficient. **Proposal 1:** It is proposed to modify existing legacy NR TCs in part related to carrier settings for TC.**Proposal 2:** It is proposed to place both DL and UL transmission for IAB-DU and IAB-MT in the same TC.**Proposal 3:** It is proposed to define the IAB TCs with the IAB-MT UL (with single PRB allocation) and IAB-DU DL (with full PRBs allocation) carrier(s) placed as the outermost carrier at both edges the IAB RF bandwidth as the more stringent case. |
| R4-2104785 | CATT | TP for TS 38.176-1: Test configurations and applicability of requirements |
| R4-2104786 | CATT | TP for TS 38.176-2: Test configurations and applicability of requirements |
| R4-2107233 | Ericsson | TP for Annex E for conducted IAB test specification |
| R4-2107234 | Ericsson | TP for Annex G and H for OTA IAB test specification |

## 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 – Test Models

Discuss the test model definitions papers and associated TP’s

**Issue 1-1-1: TDD configurations**

Ericsson and Nokia have proposed TDD configurations for FR1 and FR2 which differ, the discussion and the differences are complex so the proposals below only state the 2 options from each company – it is expected that discussion around the points in the papers will take place. The issue raised by Nokia about enabling simultaneous testing of IAB-DU and IAB-DU seems to be part of this issue also.

* Proposals
	+ Option 1: Ericsson proposal (existing BS value) (Samsung, E///, Huawei, ZTE, CATT)
	+ Option 2: Nokia proposal (TDD pattern which has similar percentile of DU and UL) (Nokia)
	+ Option 3: Something else
* Recommended WF
	+ The tables need further discussion

-----------GTW discussion---------------

Nokia: Existing BS approach is DL heavy which means more test time required for UL. Forward compatibility need to be considered.

E///: For Rel-17, we should touch that part in Rel-16 requirements since the Rel-17 feature still on discussion.

The UE pattern with 10ms time will have same DL and UL slots as BS side. We didn’t see big difference among existing BS and UE approach and we prefer to BS approach as safe and simple way to move forward.

Samsung: Nokia Pattern still assume TDM among IAB-DU and IAB-MT; but still not suitable for Rel-17 considering FDM, SDM schemes in Rel-17 on discussion.

If we reuse BS approach (FR2), no enough measurement period for FR2 IAB-MT of dynamic range. But it can be addressed in conformance test cases.

Nokia: we already provide feedback for some comments. For simultaneous operation, same DL and UL can be used.

Huawei: We can leave Rel-17 part to future as many work needed under Rel-17 WI phase.

Further check in this meeting with below options:

Option 1: Existing BS value. (Baseline)

Option2: TDD pattern which has similar percentile of DU and UL

**Issue 1-1-2: 256 QAM**

The issue of 256 QAM is raised for both conducted and OTA with the proposal being the same

* Proposals
	+ Option 1: Apply WF[1] test point definition to 256QAM
* Recommended WF

### Sub-topic 1-2 – Test configurations

The test configurations for multi-carrier testing are defined in clause 4.7, TP’s for eth conducted and OTA specifications have been submitted by the sub-topic author (CATT), in addition a paper discussing modifying the test configurations has been submitted which contains proposals for modifying the test configurations as well as a text proposal for clause 4.7.

**Issue 1-2-1: TC definition**

The proposal to combine IAB-DU and IAB-MT seems to be the biggest difference between papers

* Proposals
	+ Option 1: It is proposed to define the IAB TCs with the IAB-MT UL (with single PRB allocation) and IAB-DU DL (with full PRBs allocation) carrier(s) placed as the outermost carrier at both edges the IAB RF bandwidth as the more stringent case.
	+ Option 2:
* Recommended WF
	+ TBA

**Issue 1-2-2: TBA: TP Format**

Thera re a number of format differences between the TP’s , the name of the TC’s being a obvious one, we can discuss the general format of both proposals and decide which is most suitable.

* Proposals
	+ Option 1: Based on CATT TP
	+ Option 2: Based on Nokia TP
* 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.*

**Example 1**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1: Sub topic 1-2:….Others: |
| CATT | **Issue 1-1-1: TDD configurations**Generally, we think we need to be careful about this because it impacts both Tx and Rx tests. We support option 1 for FR1 because current FR1 UE UL and DL use the same TDD configuration which is the same as BS DL. So for FR1, it may not be necessary to have a change. FR2 may need more discussion. We think we need have an agreement that if the request of testing IAB-DU and IAB-MT simultaneously is valid. If yes, we may need to discuss new approach for FR2. Current FR2 UE UL and DL use different TDD configuration, DL configuration is the same as BS DL. I’m not clear about the discussion background of UE UL TDD configuration. If it’s ok to use the same as DL, then BS configuration can be reused.**Issue 1-1-2: 256 QAM**Does the proposal mean following BS approach? My understanding is that following BS approach may be ok. Optional is based on declaration.**Issue 1-2-1: TC definition**How to place the RB belongs to the scope of test model? And for IAB-MT, both full RB and single RB need be included. The single RB and high PSD case was excluded in the dynamic range test point discussion according to WF R4-2103977.**Issue 1-2-2: TBA: TP Format**Although we proposed the same TC name as BS, we’re ok with the IAB adaption. It’s a common issue for many aspects, such as TC, test model. |
| Ericsson | **Issue 1-1-1: TDD configurations****Option 1. The FR1 TDD config is agreed to use either BS and UE TDD config as they are the same. For FR2, SCS =60kHz , BS and UE are the same, for FR2 SCS=120kHz, the uplink time slot actually tis the same for 20ms measurement time period for both UE and BS TDD configuration due ot the periodicity of the UE TDD config is ½ of BS TDD config. Follow the logic of the FR1 TDD config agreement, BS TDD config can be used.** **Issue 1-1-2: 256 QAM****Option 1. However, the Tx dynamic range test points itself may need some modification, if agreed, the same would be applied to 256QAM.****Issue 1-2-1: TC definition****We doot think it bring any gain to define a TC with transmission alternatively between IAB-DU and IAB-MT. For a normal BS, it also can transmit full RB and signal RB alternatively in time domain and thus multiple carrier test frame work is agreed to use for IAB-MT long time ago. From hardware perspective, the IAB-DU and IAB-MT operating on shared hardware would not bring worse situation than what the BS multi-carrier does. Furthermore, we had agreed to use the same PSD power allocation for either IAB-MT and IAB-DU test. On top of all that, this new TC introduced very complex test environment setup which should be avoided.****Issue 1-2-2: TBA: TP Format****Agree we need have a common view on this.**  |
| Samsung  | **Issue 1-1-1: TDD configurations**The proposal to save testing time is attractive. However, it is not clear whether this brings additional request on TE side and related impact on other aspects such as MU/TT. Not quite confidence to complete related study within left meeting cycles for Rel-16 IAB perf part. Hence we tend to prefert to reuse existing ones if possible to avoid any unexpected issue. **Issue 1-1-2: 256 QAM**Not clear with option 1, does that refer to WF in R4-2103977 rather than R4-2103854?**Issue 1-2-1: TC definition**We share similar view as other companies as it is not convinced regarding the benefit to bring complex TC generation and power allocation for IAB node. And the delta for IAB-MT regarding DR should be based on latest agreement.  |
| ZTE | Issue 1-1-1: TDD configurationsFine with BS approach.Issue 1-1-2: 256 QAMIt’s okay to define the test model for FR1 IAB-MT and FR2 IAB-MT, this should be up to vendor;s declaration.Issue 1-2-1: TC definitionIt’s fine to reuse the existing TC defined for IAB-DU for IAB-MT.Issue 1-2-2: TBA: TP FormatIt’s fine to use the TS 38.141 as baseline to further accommodate IAB-DU and IAB-MT. |
| Huawei | Issue 1-1-1: It makes sense to use the same config for bot if possible, it seems this is almost the case anyway. The idea of testing IAB-DU and IAB-MT at the same time seems a good one but if test models need to change significantly we need to study more, At this stage go with BS seems best option.Issue 1-1-2: Up to declaration.Issue 1-2-1: We would prefer to use the BS TC if possible. Using a single PRB at the RF BW edge for IAB-MT would offer same adjacent channel power un the ACLR so maybe its ok to use the wider BS allocation.Issue 1-2-2: Probably better to rename the TC’s even if similar definition to BS. |
| Nokia | Issue 1-1-1:Please find below some replies to other companies’ comments on TDD configurations for Test models for IAB.Reply to CATT:Support of simultaneous operation (transmission and/or reception) of IAB-node’s child and parent links (i.e., MT Tx/DU Tx, MT Tx/DU Rx, MT Rx/DU Tx, MT Rx/DU Rx) is an important objective on IAB Rel-17 enhancements, this means test requirements (with corresponding TMs and TCs) for simultaneous operation should be specified in Rel-17 to test IAB for configuration in normal operating conditions. Therefore, RAN4 should consider forward compatibility of Rel-16 TMs and TCs to avoid adding new ones or updating existing ones for Rel-17. If we keep the current BS TDD configuration for IAB testing, this will mean less available UL measurement slots than DL measurement slots which in turns result in longer testing time required to allow sufficient measurements for MT TX or DU RX during the tests for simultaneous operation.Reply to Ericsson:Please see our reply to CATT above. Moreover, the significant difference between BS multi-carrier full RB and MT single RB is the higher PSD with single RB allocation. IAB passing the emission requirement tests with full RB (lower PSD) may not be able to pass such test with single RB (higher PSD) allocation. Note that UE tests require both single and full RB cases for emission requirement testing, but here we propose to only have single RB (higher PSD)case to save testing time, as we consider this is the more stringent case compared to full RB case (lower PSD).Reply to Samsung:Please see our reply to CATT above. Moreover, we think TE should already have the feasibility to configure other TDD configurations during the tests. Confirmation from TE vendors are welcome.Reply to Huawei:Please see our reply to CATT above. Only TDD configurations need to be changed to allow comparable measurement times for DL and UL slots, which we believe TE have already got the capability.Issue 1-2-1: We are fine to leave it up to declaration. Issue 1-2-2:Please find below some replies to other companies’ comments on test configurations definition for IAB.Reply to CATT:As discussed above for TDD configuration, test requirements (with corresponding TMs and TCs) for simultaneous operation will be specified in Rel-17 to test IAB for configuration in normal operating conditions. Therefore, RAN4 should consider TCs that can be used in Rel-17 to avoid adding new ones or updating existing ones for Rel-17. Moreover, the single MT RB and higher PSD case is required at least for emission requirement testing to ensure emission compatibility of IAB with this more stringent configuration (compared to full MT RB and lower PSD) in simultaneous operation (transmission and/or reception) of IAB-node’s child and parent links.Reply to Ericsson:Please see our reply to CATT above. Moreover, the significant difference between BS multi-carrier full RB and MT single RB is the higher PSD with single RB allocation. IAB passing the emission requirement tests with full RB (lower PSD) may not be able to pass such test with single RB (higher PSD) allocation. Note that UE tests require both single and full RB cases for emission requirement testing, but here we propose to only have single RB (higher PSD)case to save testing time, as we consider this is the more stringent case compared to full RB case (lower PSD).Reply to Samsung and ZTE:Please see our reply to CATT and Ericsson above.Reply to Huawei:Please see our reply to CATT and Ericsson above. Moreover, MT single RB (with higher PSD) at RF bandwidth edge would induce xIMD products with higher PSD and will require higher rejection from RF filter to meet the emission requirements compared to MT full RB (with lower PSD) at RF bandwidth edge. |

**Example 2**

Sub topic 1-1

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

Sub topic 1-2

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

### 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** |
| R4-2104785 | Ericsson: Ok |
| Hauwei: I think we should rename the TC’s as the definitions are slightly different (the minimum BS is different for example) IABTC… would be an obvious choice.Maybe a single table (with 3 columns) for req set applicability would better allow you to see difference between IAB-DU and IAB-MT, same for test configuration tables (but in this case tables are big so ok if they stay as is) |
| Nokia: Should set up both IAB-DU and IAB-MT carriers in TC for more stringent testing with partly or fully shared radio chain between IAB-DU and IAB-MT. |
| R4-2104786 | Ericsson: Ok |
| Huawei: similar comments to conducted part (4785) |
| Nokia: The same comment as above for R4-2104785. |
| R4-2106321 | CATT: the same comment as that for the **Issue 1-2-1**. |
| Ericsson:sme comment for issue 1-2-1 |
| Huawei: Discussion on issue 1-2-1 seems to indicate the CATT proposal is preferred, lets work on 4785 anyway. |
| R4-2107233 | Nokia: Typo to be corrected ‘in in’ in E.1 |
|  |
|  |
| R4-2107234 | Huawei: in general ok, but do we really have the same concept of cell for IAB? So maybe the name is not so good? As we are repeating there is ability to modify, but maybe some benefit in using identical approach to BS? |
| Nokia: Typo to be corrected ‘in in’ in E.1 |
|  |
| R4-2107229 | CATT: typo: “RF \*\*\*\*” |
| Huawei: are we keeping genral term IAB channel bandwidth – ok by me but we seem to have been removing it in the core spec in [302] in favour of “IAB-DU channel bandwidth and IAB-MY channel bandwidth”. TDD configurations for IAB-MT obviously should match the agreements we make in the discussion above. |
| Nokia: As commented in TDD pattern discussion, IAB-MT TDD configuration should have more UL slots for transmitter measurement; PN23 text is not based on most updated version with multi-users clarifications.  |
| R4-2107230 | CATT: The same comment as that for the **Issue 1-1-1**. Need to check if DL pattern can be reused by UL pattern for IAB-MT. |
| Huawei: TDD configurations for IAB-MT obviously should match the agreements we make in the discussion above. |
| Nokia: Similar comments as above for R4-2107229. |

## 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: MU and TT values

There are some discussion papers on the MU values themselves as well as some TP’s which capture the MU and the related TT values in the conformance specifications. Clearly the values themselves should be discussed first and they can then be captured in the tables.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2106669 | Nokia | Remaining test setup considerations**Proposal 1:** Test setup specification shall be left to minimum what is needed for the test purpose. Test setup shall not be used to verify other functionality which is not part of the test purpose.Proposal 2: **For IAB-MT frequency error testing allow two reference** frequencies* actual transmission from test equipment (e.g. signal generator) in case DL signals are used
* otherwise, assigned NR channel frequency

**Observation 1:** Further inputs on gNB emulator uncertainties are needed if gNB emulator is expected to be used.**Proposal 3**: In case gNB emulator uncertainty values are not available, it is assumed that gNB emulator has similar uncertainty contribution as signal generator and gNB test setup MU/TT values are re-used. |
| R4-2107050 | Keysight Technologies UK Ltd | IAB-MT conformance Test setup MU“This contribution shows new MU values for IAB-MT conformance testing with following agreed baseline, BS approach, and allowing flexible TE choice including system simulator”Withdrawn by Keysight |
| R4-2107096 | Huawei | IAB - discussion on MU values “In this paper the MU values for the BS and the UE have been compared (where possible), the reasons for the differences have been discussed and recommendations made for what is appropriate for the IAB-MT testing.”“The larger differences occur for FR2 OTA requirements where the UE uncertainty values can be significantly larger than the BS.”“The largest uncertainty values however seem to come from uncertainty of mismatch and of ancillary equipment such as amplifiers. There seems to be a fundamental difference in the approach taken to BS and UE testing here. For the BS each test set up is calibrated and then used, as such many of the uncertainties are calibrated out. For the UE it seems there are switched paths which introduce a higher level of uncertainty. It is these uncertainties which make the UE budget values so much higher than the BS.” |

## 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 – MU values

There are tables submitted by Huawei and Keysight based on the BS and UE MU analysis with recommendations for each test, there seem to be many similarities, particularly for FR1

**Issue 2-1-1: FR1 – conducted MU**

There are not so many disagreements here, it seems a combined agreeable table can be derived.

* Proposals
	+ Option 1: find compromise between proposed tables
* Recommended WF
	+ TBA

-------------------------GTW discussion---------------------

Proposal: Using BS as baseline if existing, for others reusing from UE (Moderator)

Nokia: Are planning to have same values for DU and MT. Or new values for MT only? We prefer to use BS as baseline. For details, we need to check in case by case manner.

Keysight: In order to allow the flexibility for test set-up, we agreed to choose higher values from BS and UE. If we not allow to do this, then we loss the flexibility.

Huawei: For FR1 conducted, we don’t think the difference from TE implementation difference. That’s because of introducing in different time frame. For FR2, we can further discuss where the difference from and then decide how to handle.

Keysight: For FR1, we agree; for FR2 we have different situation which need to be further discussed. For FR1, BS values not always low. We still prefer to adopt higher value.

E///: We have some IAB-MT specific requirements which means BS values not existing., reusing from UE maybe need more study.

Huawei: For conducted test, no big difference foreseen. We only focused on IAB-MT.

E///: FFS whether same value for different IAB-MT classes.

Agreement:

IAB-DU reuse BS values.

FFS whether same value for different IAB-MT classes.

Huawei volunteered to generate a table to list the all cases with MU values (both FR1(conducted and OTA) and FR2-OTA) for comparison.

**Issue 2-1-2: FR1 – OTA MU**

There are not so many disagreements here, it seems a combined agreeable table can be derived.

* Proposals
	+ Option 1: find compromise between proposed tables
* Recommended WF
	+ TBA

**Issue 2-1-3: FR2 – OTA MU**

The proposed values from Keysight are larger than existing BS values,

 Proposals

* + Option 1: Further discuss the MU budgets.
* Recommended WF
	+ TBA

---------------GTW discussion-------------------

Huawei: The difference for FR2 from UE comes from test procedure with rotation during test. Meanwhile for BS test, we have well calibration. So the automatic test set-up in UE side need to be enable for IAB test or we can use BS approach for calibration procedure during test. We prefer to use BS calibration approach to control MU/TT.

E///: Similar view as Huawei.

Nokia: Agree with Huawei. The previous agreement only considered gNB simulator impact, not for calibration procedure part. We should follow BS approach to get better MU.

Keysight: If both BS and UE set-up allowed, then we should to allow UE approach as well. Change the high-level agreement? Which part allowed, which part not allowed.

* Companies further clarify which part need to be limited to BS approach and which part allow flexibility.

### Sub-topic 2-2 – TPs on MU and TT values

The values for the tables are discussed in sub-topic 2-1 however the format of the clauses and the tables can be agreed (awaiting the values once sub-topic 2-1 is finalized)

**Issue 2-2: Format for MU clause 4.1 and TT annex B, C**

The main difference seems to be if a common table is used for IAB-DU and IAB-MT (as suggested in R4-2107097 for MU table) or separate tables (as in annex B and C R4-2104789/90). To some extent this depends if common values used for the IAB-DU and IAB-MT.

Proposals

* + Option 1: Common tables for IAB-MT and IAB-DU
	+ Option 2: Separate tables for IAB-MT and IAB-DU
* Recommended WF
	+ TBA

## Companies views’ collection for 1st round

### Open issues

**Example 1**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1: Sub topic 1-2:….Others: |
| CATT | **Issue 2-1-1: FR1 – conducted MU****Issue 2-1-2: FR1 – OTA MU****Issue 2-1-3: FR2 – OTA MU**We don’t have very strong opinion on these issues, but maybe we can discuss first which ones will be maintained and which ones will be changed compared with BS.**Issue 2-2: Format for MU clause 4.1 and TT annex B, C**Agree that it depends on how many differences. Maybe we can wait the conclusion of the issues in 2-1. |
| Ericsson | **Issue 2-1-1: FR1 – conducted MU****Ok with combined approach.** **Issue 2-1-2: FR1 – OTA MU****UE does not have FR1 OTA, so here the BS MU will be used.****Issue 2-1-3: FR2 – OTA MU****WE think the OTA MU need to be re-discussed and agree the view of the 7096 where the OTA calibration may reduce the uncertainlty of the MU where mianly contributor is OTA chamber thus combination of UE and BS may not be a correct approach. We are open to more discussion around this.** |
| Huawei | **Issue 2-1-1 and 2-1-2: difficult to discuss without going through the tables, we have made some proposals for which MU’s should be used for each requirement, that could form a starting point.****Issue 2-1-3: Need to discuss calibration and switched systems to see if BS MU can be used. This is probably our preferred option.** |
| Nokia | Sub topic 2-1:Issue 2-1-1, 2-1-2 and 2-1-3: Option 1 is reasonable but in the end does not really agree much. Is the intention to propose the actual values in WF? From our perspective, the “compromise” should be closely aligned with current BS MUs given that IAB-MT will have similar declarations about antenna system as BS, so additional OTA uncertainty is less due to not having “black box approach”. In both conducted and OTA environment additional uncertainty can be reduced by utilizing calibration similar to what is done in BS tests. Sub topic 2-2: Option 1: It might be worth trying to find a table format where both IAB-MT and IAB-DU and possible differences between them can be seen. This helps test engineers as in many cases the test setup will be the same for IAB-MT and IAB-DU. For the same reason, there should not be many differences, given that additional uncertainty allowed in UE setup can be mitigated to proper calibration and having antenna declarations in place for OTA tests. |
| Keysight | Topic 2-1-1 FR1 conducted; propose to follow WF which is to choose higher value for MU to apply on each individual numbersTopic 2-1-1 and 2-1-2, for OTA, even with FR1, need more consideration about OTA setup contribution not just TE difference. However, difficulty comes from Flexibility to allow both type setup BS approach and UE approach to determine one MU table for OTA while it looks like there are too much of differences in assumption. Cleaner approach seems to say BS approach only for OTA then this issue goes away and also for TT (regulatory limit) issue.Topic 2-2; depending on result of topic 2-1 |

**Example 2**

Sub topic 1-1

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

Sub topic 1-2

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

### 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** |
| R4-2104789 | Ericsson: need to keep the TT of MT the same as DU, putting bracket if it to be modified |
| Huawei: preference would be TT for IAB-DU and IAB-MT in same table (as we think they should in most cases be same value) – but perhaps wait until we have final agreement on values before deciding  |
|  |
| R4-2104792 | Ericsson: need to keep the TT of MT the same as DU, putting bracket if it to be modified |
| Huawei: preference would be TT for IAB-DU and IAB-MT in same table (as we think they should in most cases be same value) – but perhaps wait until we have final agreement on values before deciding |
|  |
| R4-2107097 | CATT: If common table is used, should all of the common requirements add “IAB”? There’re some NA requirements for IAB-MT, such as ICS, TAE. |
| Ericsson: ok |
| Huawei: To CATT for the common requirements the clause name is as it is written in the clause, if there are separate IAB-DU and IAB-MT requirements the listed clause is usually on sub-clause down. But its ok to add maybe an applicability column? My thinking is that if the test procedure is the same (and in many cases it is) and the test requirement is the same it makes some sense to have a common MU and hence no point in having 2 tables. But much of this will depend on what we agree about te MU values. |

## 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”.*

# Topic #3: Common sections TP’s

All the contributions in this topic are TP’s to the general sections and annexes to the conformance specifications. These sections are quite straight forward so the review can be done on the TP’s directly

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2105036 | Samsung | TP to TS38.176-1 on subclause 4.10 -5 |
| R4-2105037 | Samsung | TP to TS38.176-2 on subclause 4.10 -5 |
| R4-2106313 | Nokia | Proposal on the skeleton of TS38.176-2 |
| R4-2106595 | ZTE | TP to TS 38.xxx-1: Section 4.2~4.5 |
| R4-2106596 | ZTE | TP to TS 38.xxx-2: Section 4.2~4.5 |
| R4-2107095 | Huawei | IAB conducted conformance specification skeleton |
| R4-2107104 | Huawei | TP to TS 38.176-1 - Annex D |

## Open issues summary

All the contributions are TP’s for relatively straight forward sections so the disunions can be based around the reviews of the TP’s

## Companies views’ collection for 1st round

### Open issues

Issues are discussed in teh TP reviews.

### 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** |
| R4-2105036 |  CATT: Editorial: “A *IAB-DU* or *IAB-MT” “A”* should be *“An”.* |
| Huawei: multi-band TAB connector not multi-band connector (as we have no 1-C we dont have (or need) the general term)Multi-band ribs are mentioned but these are not part of the conducted requirements |
| Nokia: Clause 4.10 is not mentioning IAB-MT. |
| R4-2105037 | Ericsson: Typo, some squre in the text |
| Huawei: Multi-band TAB connectors are mentioned but these are not part of the OTA requirements |
| Nokia: Clause 4.10 is not mentioning IAB-MT. |
| R4-2106313 | Samsung: would like to clarify whether the sub-clause of “4.13 Referencing and relation with other specifications” should be considered or not. Seems skeleton for 716-1 and 716-2 are not aligned on this issue.  |
| Huawei: to Samsung, I think maybe as we are copying most of the text it is not needed – I can remove from part 1. |
|  |
| R4-2106595 | CATT: Typo in title 4.3.1 IAB-DU clas and 4.3.2 IAB-MT clas. The IAB-DU class maintenance CR is under discussion in this meeting. It can be updated if the maintenance CR is agreed. |
| ZTE: thanks for pointing out this, it could be updated  |
| Nokia: Spec numbers missing in references. IAB-DU class definitions refer BS-UE distance instead of IAB-DU - UE distance. |
| R4-2106596 | CATT: The same comment as 6595. |
| ZTE: thanks for pointing out this, it could be updated  |
| Nokia: Similar comments as above for R4-2106595. |
| R4-2107095 | Samsung: [the same comment to R4-2106313] would like to clarify whether the sub-clause of “4.13 Referencing and relation with other specifications” should be considered or not. Seems skeleton for 716-1 and 716-2 are not aligned on this issue. |
| Huawei: To Samsung as above, I think this can be removed from part 1. |
|  |
| R4-2107104 | Nokia: In general looks fine, but this part includes also performance requirement figures.  |
|  |
|  |

## 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”.*

# Topic #4: Test case reduction

Papers offer proposals on how to get test case reduction for systems which share hardware between IAB-DU and IAB-MT.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2106668 | Nokia, Nokia Shanghai Bell | IAB RF conformance testing coverage considerations**Observation 1:** As the use case for IAB-MT and IAB-DU is different, it is unnecessary to require all declarations to be identical for test reduction to apply **Proposal 1:** Test reduction can be applied when the test parameters result in same wanted signal power, same total transmissions bandwidth and same beam directions, and when manufacturer has declared that the RF implementation is the same or shared between IAB-DU and IAB-MT.**Proposal 2:** Adopt the test scope as captured in Table 1 to Table 4 when IAB-DU and IAB-MT use identical or shared RF HW.**Proposal 3:** One new declaration is sufficient to state RF implementation is shared or the same for IAB-DU and IAB-MT**Proposal 4:** Capture the reduced test scope as a section within initial conditions of each tests, and additional provide overview of the test scope in summary tables within clause 4 of the conformance specifications. |
| R4-2107237 | Ericsson | On IAB test case reduction for IAB Conducted conformance test**Observation#1:** Assume only TDM operation of the IAB-DU and IAB-MT for Rel-16 conformance testing.**Observation#2:** The TX test result of IAB-MT and IAB-DU is interchangeable when the test case procedure and side condition of the Tx output power are the same and the PUSCH and PDSCH use the same CP-OFDM waveform.**Observation#3:** The test reduction for the different declared output power is limited for selected TX test requirement only.**Proposal:** RAN4 discuss the Table 1 and Table 2 for possible test case reduction. |
| R4-2107238 | Ericsson | On IAB test case reduction for IAB OTA conformance test.**Observation#1:** Assume only TDM operation of the IAB-DU and IAB-MT for Rel-16 conformance testing.**Observation#2:** The TX test result of IAB-MT and IAB-DU is interchangeable when the test case procedure and side condition of the Tx output power are the same and the PUSCH and PDSCH use the same CP-OFDM waveform.**Observation#3:** There is no need on the same set of the declared directional beam as the same side condition and no need on test direction in general as one side condition.**Observation#4:** The test reduction for the different declared output power is limited for selected TX test requirement only.**Proposal:** RAN4 discuss the Table 1 and Table 3 for possible test case reduction. |

## Open issues summary

Papers make proposals on how to “share” test between IA\_MT and IAB-DU when shared HW is used.

### Sub-topic 4-1 : HW declarations

**Issue 4-1-1: Declaring shared HW**

* Proposals
	+ Option 1: One new declaration is sufficient to state RF implementation is shared or the same for IAB-DU and IAB-MT
* Recommended WF
	+ TBA

**Issue 4-1-2: When Test case reduction can be used**

* Proposals
	+ Option 1: Test reduction can be applied when the test parameters result in same wanted signal power, same total transmissions bandwidth and same beam directions, and when manufacturer has declared that the RF implementation is the same or shared between IAB-DU and IAB-MT.
	+ Option 2: The test reduction for the different declared output power is limited for selected TX test requirement only.
* Recommended WF
	+ TBA

### Sub-topic 4-2 : Tables for test case reduction

Tables of required test points are presented in the papers, each use a slightly different approach,

**Issue 4-2: Tables for test case reduction**

* Proposals
	+ Option 1: Nokia tables (share test cases between IAB-MY and IAB-DU)
	+ Option 2: Ericsson tables (IAB-DU and IAB-MY considered equivalent)
* Recommended WF
	+ TBA

## Companies views’ collection for 1st round

### Open issues

**Example 1**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1: Sub topic 1-2:….Others: |
| CATT | **Issue 4-1-1: Declaring shared HW**Seems ok.**Issue 4-1-2: When Test case reduction can be used**Seems the two options are referring two conditions and both of them are correct?**Issue 4-2: Tables for test case reduction**We slightly support Nokia proposal. |
| Ericsson | **Issue 4-1-1: Declaring shared HW****Ok****Issue 4-1-2: When Test case reduction can be used****As the test case reduction applies when certain conditions are met, adding the condition of the same delared cahnnel bandwidth is ok. The same OTA direction may not be necessary.** **Issue 4-2: Tables for test case reduction****When the test conditions all met, the IAB-MT and IAB-DU test result sould be interchangeable, we could discuss what the best format of the test reduction table for the purpose of the optimization test case.**  |
| Samsung  | **Issue 4-1-1: Declaring shared HW**Fine with it **Issue 4-1-2: When Test case reduction can be used**We tend to agree that option 1 provide the baseline scope to reduce test burden. On top of that we believe option 2 also provides reasonable point to further reduce test burden but still ensure the test coverage, which should not be precluded at current stage. **Issue 4-2: Tables for test case reduction**Prefer take more time to think about the table format within this meeting with clear and efficient version which still allow enough flexibility.  |
| ZTE | **Issue 4-1-1: Declaring shared HW**Fine with it **Issue 4-1-2: When Test case reduction can be used**Both factors could be taken into account. |
| Huawei | **Issue 4-1-1: Declaration is ok****Issue 4-1-2: 1 is ok, but if output power is differ it seem this would affect all Rx tests?****Issue 4-2: If the HW is shared and the test cases are truly equivalent then it shouldn’t matter which is done so maybe this is unnecessary. However it shouldn’t be left to tester to decide – hence maybe this sort of direction is ok.** |
| Nokia | Issue 4-1-1: Agree with option 1.Issue 4-1-2: We prefer option 1. It was mentioned in one contribution that test directions do not have to be necessarily the same. This can be further discussed. Applying the reduction with different output powers would require further clarifications. If the maximum output power capability is different, it implies different design choices in the hardware, and therefore from our point of view it cannot anymore be guaranteed that test coverage is maintained. Sub topic 4-2: In principle both approaches can be applied. However, option 2 may result e.g. in situation where basically no Tx requirements are tested for IAB-MT and this may be problematic from test coverage perspective. Otherwise, option 2 might be more straightforward, but it might need additional side condition setting that you cannot select the same way between IAB-DU and IAB-MT in all the tests. |

**Example 2**

Sub topic 1-1

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

Sub topic 1-2

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

### CRs/TPs comments collection

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|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
|  |
| YYY | 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:* |

### 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