**3GPP TSG-RAN WG4 Meeting #94-e R4-20xxxxx**

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

**Agenda item:** 8.5.4, 8.5.4.1.2, 8.5.4.2.2

**Source:** Moderator (Samsung)

**Title:** Email discussion summary for RAN4#94e\_#83\_NR\_IAB\_RF\_Rx

**Document for:** Information

# Introduction

This is summary for email discussion topics with respect to contributions on IAB RF RX requirement except ACS and in-band blocking, which will be handled in RAN4#94e\_#81\_NR\_IAB\_Co-existence. The input is divided in to IAB-DU and IAB-MT respectively for below requirements:

1. Reference sensitivity
2. Dynamic range
3. Out-of-band blocking
4. RX intermodulation
5. In-channel selectivity
6. RX spurious emission

Considering the input is quite converged on IAB-DU and some of IAB-MT requirements the candidate target of email discussion for 1st round and 2nd round is suggested as below:

* 1st round: Focus on discussion on each specific requirement with target achieve agreement for:
  + IAB-DU RX RF requirement for both FR1 and FR2
  + IAB-MT RX RF requirement on Dynamic range, OOBB, RX IM, ICS and RX spurious emission
* 2nd round: Work on WF and/or TP to TR/TS based on achieved agreements on IAB discussion due to
  + IAB-MT REFSENS discussion may have dependency on IAB-MT classification discussion
  + TP drafting would be dependent on general discussion on the TS handling approach.

*Note 1: it is not precluded the agreement in 1st round on WF/TP without diverse opinions.*

*Note 2: For those TPs cover both IAB-MT and IAB-DU they are assigned to respective requirement under topic on IAB-MT.*

# Topic #1: IAB-DU RX RF reuquirement

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2000900 | CMCC | As listed in table the consideration on FR1 IAB-DU RX RF requirement are provided.   |  |  | | --- | --- | | **RF Requirement** | **IAB-DU** | | OTA sensitivity | OTA EIS based on BS specs | | Blocking characteristics | Based on BS specs | | Receiver spurious emissions | Based on BS specs | | Rx intermodulation | Based on BS specs | |
| R4-2000964 | Qualcomm Incorporated | *[Editor note: The proposals on topics target in this email discussion thread are abstracted as below]*  **Proposal 1. Re-use the gNB requirements for the IAB-DU as shown in Table 1.**   |  |  | | --- | --- | | **RF Requirement** | **IAB-DU** | | OTA sensitivity level | Import from BS specs | | Reference sensitivity level | Import from BS specs | | OTA out-of-band blocking | Import from BS specs | | OTA receiver spurious emissions | Import from BS specs | | OTA receiver intermodulation | Import from BS specs | | OTA in-channel selectivity | Import from BS specs | |
| R4-2001435 | Nokia, Nokia Shanghai Bell | **Proposal 1: Re-use BS type 2-O receiver requirements for IAB-DU for all receiver requirements in FR2.**  According to requirement summary shown in table 1 of the contribution, applicable requirements for FR2 IAB-DU include OTA reference sensitivity level, OTA out-of-band blocking, OTA receiver spurious emissions, OTA receiver intermodulation and OTA in-channel selectivity. |

## Open issues summary

There is common understanding the IAB-DU will reuse all BS related requirement as captured in RAN4#90bis meeting chairman note as:

Re-use BS RF requirements for IAB access link is a starting point

This meeting the contributions provided on IAB-DU further [reiterate](file:///C:\Users\liyankun\AppData\Local\youdao\dict\Application\7.5.2.0\resultui\dict\?keyword=reiterate) this agreement with explicit proposals on IAB-DU.

### Sub-topic 1-1

For FR1 IAB –DU receiver requirements except ACS and in-band blocking.

**Issue 1-1: FR1 IAB-DU conducted receiver RF requirement**

* Proposals
  + Reuse NR BS type 1-H receiver RF requirements for IAB-DU conducted receiver RF requirements including
    - Reference sensitivity level
    - Dynamic range
    - Out-of-band blocking
    - Receiver spurious emission
    - Receiver Intermodulation
    - In-channel selectivity
* Recommended WF
  + Agree on above proposals

### Sub-topic 1-2

For FR1 and FR2 IAB –DU OTA type receiver requirements except ACS and in-band blocking.

**Issue 1-2: FR1 and FR2 IAB-DU OTA receiver RF requirement**

* Proposals
  + Reuse NR gNB OTA receiver RF requirements for IAB-DU OTA receiver RF requirements including
    - OTA sensitivity level
    - OTA REFSENS
    - Dynamic range(applies for FR1 only)
    - Out-of-band blocking
    - Receiver spurious emission
    - Receiver Intermodulation
    - In-channel selectivity
* Recommended WF
  + Agree on above proposal

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1:  Sub topic 1-2:  ….  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** |
| 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:* |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **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: IAB-MT RX RF requirement

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2000280](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000280.zip) | Samsung | **REFSENS for FR2**  Proposal 1: The declaration range of BS(IAB-DU) can be applied for IAB-MT for 50MHz baseline   * + WA BS REFSENS declaration range can be applied for IAB-MT higher PC   + Small cell REFSENS declaration range can be applied for IAB-MT lower PC   + FRC of UE can be recombined to meet the declaration purpose for IAB-MT |
| [R4-2000281](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000281.zip) | Samsung | Proposal: no OTA **dynamic range** requirement would be defined for IAB receiver operating in FR2. |
| [R4-2000283](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000283.zip) | Samsung | TP provided based on previous meeting AH agreement to Reuse **Rx spurious emission** from BS for IAB |
| [R4-2000284](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000284.zip) | Samsung | Proposal 1: **In-channel selectivity** requirement should be defined for IAB-DU only.  Proposal 2: IAB TS 38.174 should be updated to remove In-channel selectivity for IAB-MT related sub-clauses. |
| [R4-2000900](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000900.zip) | CMCC | As listed in table the consideration on FR1 IAB-MT RX RF requirement are provided.   |  |  | | --- | --- | | **RF Requirement** | **IAB-MT** | | **OTA sensitivity** | OTA EIS based on BS specs | | **Blocking characteristics** | FFS depending on PC | | **Receiver spurious emissions** | Based on BS specs | | **Rx intermodulation** | Not defined for UE in FR1 | |
| [R4-2000965](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000965.zip) | Qualcomm Incorporated | **Reference sensitivity level** should follow the BS framework of using the manufacturer’s declaration which may dependent on MT classification discussion  No **Dynamic range** requirement for IAB-MT  **Receiver spurious emissions:** reuse UE requirement  **Receiver intermodulation is not** needed for the IAB-MT.  **In-channel selectivity** is not needed for the IAB-MT. |
| [R4-2000979](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000979.zip) | ZTE Corporation | Proposal: for IAB MT, to reuse the IAB DU **OOBB** requirement. |
| R4-2001019  R4-2001020  R4-2001021 | Ericsson | For FR1 IAB-Node it is reasonable to use the requirement concept from 1-H and 1-O, depending on IAB-Node type.  For IAB-Node type 2-O, the BS concept of using a declared EIS met within a declared RoAoA can be adopted for both the DU and MT. Such a requirement would capture the array antenna capability and allow for various types of implementations.  TPs provided for TS and TR for **FR2 OTA REFSENS**. |
| R4-2001022  R4-2001023  R4-2001024 | Ericsson | Since the IAB-Node is a network node, it is reasonable to assume that the IAB-Node would experience the same level of **out-of-band blocking** interferer signal as a BS. Hence, the BS out-of-band blocking requirement is a good starting point for developing requirement for the IAB-Node  TPs provided for TS and TR for **FR2 OOBB requirement** |
| [R4-2001435](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001435.zip) | Nokia, Nokia Shanghai Bell | **REFSENS**  Proposal 2: Similarly as BS, IAB-MT shall declare its reference sensitivity  Proposal 3: The range of allowed reference sensitivity declarations shall cover at least the range from lowest allowed power from wide area BS type 2-O to highest power allowed for local area BS type 2-O.  Proposal 4: IAB-MT and IAB-DU reference sensitivity declarations shall be independent of each other  **OOBB**  Proposal 6: Re-use BS OOB blocking requirements, including the in-band and out-of-band boundary, for IAB-MT. It is necessary to agree conditions when it is required to verify the requirement independently for IAB-MT and IAB-DU in the performance part of the WI.  **IM**  Proposal 7: OTA receiver intermodulation requirements shall not be specified for IAB-MT  **ICS**  Proposal 8: Given the target of forward compatible RF requirements and FDM operation being targeted in rel-17, discuss further whether in-channel selectivity requirements are needed for IAB-MT in FR2 in release 16 |

## Open issues summary

For IAB-MT receiver RF requirement targeted in this thread most contributions discuss and propose on IAB-MT requirements including:

* OTA REFSENS
* OTA dynamic range/maximum input level
* Out-of-band blocking
* OTA receiver intermodulation
* OTA receiver spurious emission
* In-channel selectivity

### Sub-topic 2-1

For OTA REFSENS requirement, all related contributions share the same baseline agreement that FR2 IAB-MT will follow the BS type 2-O liked declaration approach with declared basis level EISREFSENS\_50M within the *OTA REFSENS RoAoA*. However, several aspects still need further discussion are:

- EISREFSENS\_50M declaration range applied for IAB-MT

- Whether EISREFSENS\_50M of IAB-MT and EISREFSENS\_50M of IAB-DU can be declared independently, which may relied on IAB classification discussion

- FFS on FRC applied for IAB-MT REFSENS

For FR1 IAB-MT reference sensitivity there is preliminary discussion/idea to use the requirement concept from BS. However no specific proposal provided.

**Issue 2-1: FR2 OTA reference sensitivity**

* Proposals

- EISREFSENS\_50M declaration range applied for IAB-MT

* + Option 1: If multiple IAB-MT [power] classes agreed, multiple ranges may be defined
  + Option 2: If only one IAB-MT [power] classes agreed, single range may be enough

- EISREFSENS\_50M declaration can be independent for IAB-MT and IAB-DU

- FFS on FRC for IAB-MT EISREFSENS

* Recommended WF
  + TBA

### Sub-topic 2-2

It is agreed in RAN4#93 as captured in IAB AH minutes [R4-1916161]: Maximum input level requirement will not be defined”. Hence the proposal provided in this meeting is to clarify the under the sub-clause of OTA receiver dynamic range no requirement will be defined for IAB-MT.

**Issue 2-2: FR2 dynamic range for IAB-MT**

* Proposals
  + No requirement will be needed and defined for IAB-MT under sub-clause Receiver dynamic range.
* Recommended WF
  + Agree on above proposal

### Sub-topic 2-3

For out-of-band blocking, the necessity and applicability of BS-liked OOB requirement for IAB-MT are provided in contribution presented on this sub-topic. Almost the same proposals from different companies are shown on OOBB requirement for IAB-MT.

**Issue 2-3: Out-of-band blocking for IAB-MT for both FR1 and FR2**

* Proposals
  + OOBB interference level : reuse corresponding interference level of BS OOBB requirement
  + Frequency range applied for OOBB requirement : reuse BS boundary between in-band blocking and out-of-band blocking
* Recommended WF
  + Agree on above proposal

### Sub-topic 2-4

For receiver Intermodulation requirement the view presented in contributions from companies is aligned as that this requirement is no need to define this requirement for FR2 IAB-MT. But for FR1 IAB-MT receiver IM, the applicability of those justifications valid for FR2 IAB-MT receiver IM is not specified.

**Issue 2-4: Receiver Intermodulation requirement for FR2 IAB-MT**

* Proposals
  + Receiver intermodulation is not needed for FR2 IAB-MT
* Recommended WF
  + Agree on above proposal

### Sub-topic 2-5

It is agreed in RAN4#93 as captured in IAB AH minutes [R4-1916161]: Reuse Rx spurious emission from BS for IAB node.

**Issue 2-5: OTA Receiver spurious emission**

* Proposals
  + Option 1: Reuse BS RX spurious emission requirement for IAB
  + Option 2: Reuse UE RX spurious emission requirement for IAB
* Recommended WF
  + Option 1

### Sub-topic 2-6

In channel selectivity is defined for BS only but not for UE for both FR1 and FR2. Whether this is needed for IAB-MT is not agreed formally yet.

**Issue 2-6: In channel selectivity for IAB-MT**

* Proposals
  + Option 1: no in-channel selectivity requirement will be defined for IAB-MT
  + Option 2: FFS on In-channel selectivity for IAB-MT
* Recommended WF
  + Option 1

## Companies views’ collection for 1st round

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|  |
| YYY | Company A |
| Company B |
|  |

## Summary for 1st round

### Open issues

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| --- | --- |
|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

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

### CRs/TPs

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## Summary on 2nd round (if applicable)

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| --- | --- |
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