**3GPP TSG-RAN WG4 Meeting #94e-Bis R4-2005318**

**Electronic Meeting, April 20th – May 1st 2020**

**Agenda item:** 6.5.3, 6.5.3.1, 6.5.3.2, 6.5.3.3, 6.5.3.4, 6.5.3.5

**Source: Moderator (**Qualcomm Incorporated)

**Title:**  [94e Bis][111] WF on NR IAB RRM requirements

**Document for:** Information

# Introduction

This WF focuses on the agreements achieved during the 1st and 2nd round of NR\_IAB\_RRM discussion.

Agreements during the 2nd round are marked as “tentative agreements” because they can be confirmed as agreements only by the chair.

# Background (Agreements during the first round)

**Topic #1: General**

Issue 1-1: Active BWP switching delay feature for IAB-MTs

Session chair: “Active BWP switching delay” feature for IAB-MTs will be discussed in RAN4 feature list session.

Tdoc decisions

|  |  |
| --- | --- |
| **Tdoc** | **Decision** |
| R4-2003531 | Noted |

**Topic #2: Details of RRC mobility control requirements**

Issue 2-1: RRC re-establishment delay

Agreement: The time to identify target cell in RRC re-establishment delay requirements for IAB-MT is derived by increasing the numerical figures in the corresponding UE’s cell identification delay for RRC re-establisment by a factor of 8.

Table 2: Time to identify target NR cell for RRC connection re-establishment to NR intra-frequency cell for IAB-MT

|  |  |  |  |
| --- | --- | --- | --- |
| Serving cell SSB Ês/Iot (dB) | Frequency range (FR) of target NR cell | Tidentify\_intra\_NR [ms] | |
| Known NR cell | Unknown NR cell |
| ≥ -8 | FR1 | MAX (1600 ms, 5 x TSMTC) | MAX (6400 ms, 10 x TSMTC) |
| ≥ -8 | FR2 | N/A | MAX (8000 ms, 80 x TSMTC)) |
| < -8 | FR1 | N/A | 6400Note1 |
| < -8 | FR2 | N/A | 28160Note1 |
| Note 1: The IAB-MT is not required to successfully identify a cell on any NR frequency layer when TSMTC >160 ms and serving cell SSB Ês/Iot < -8 dB. | | | |

Table 3: Time to identify target NR cell for RRC connection re-establishment to NR inter-frequency cell for IAB-MT

|  |  |  |  |
| --- | --- | --- | --- |
| Serving cell SSB Ês/Iot (dB) | Frequency range (FR) of target NR cell | Tidentify\_inter\_NR, i [ms] | |
| Known NR cell | Unknown NR cell |
| ≥ -8 | FR1 | MAX (1600 ms, 6 x TSMTC, i) | MAX (6400 ms, 13 x TSMTC, i) |
| ≥ -8 | FR2 | N/A | MAX (8000 ms, 104 x TSMTC, i)) |
| < -8 | FR1 | N/A | 6400Note1 |
| < -8 | FR2 | N/A | 32000Note1 |
| Note 1: The IAB-MT is not required to successfully identify a cell on any NR frequency layer when TSMTC,i >160 ms and serving cell SSB Ês/Iot < -8 dB. | | | |

Issue 2-2: RRC release with redirection delay

Agreement

* The time to identify target cell in RRC redirection delay requirements for IAB-MT is derived by increasing the numerical figures in the corresponding UE’s cell identification delay for RRC redirection by a factor of 8.

Table 5: Time to identify target NR cell for RRC connection release with redirection to NR for IAB-MT

|  |  |
| --- | --- |
| Frequency range (FR) of target NR cell | Tidentify-NR |
| FR1 | MAX (5440 ms, 11×Trs) |
| FR2 | MAX (7040 ms, 8×11×Trs) |

Issue 2-3: Applicability of higher number of SMTC windows in RRC re-establishment delay requirement

Session chair: Continue discussion in the 2nd round. Rapporteur needs to clarify exact status of discussions and decisions in RAN1. Decision on RRM requirements shall not be coupled with mandatory/optional support of the feature in RAN1. In case the feature is supported and defined as optional, and requirements are defined, then the corresponding applicability rules will be added to RAN4 specs.

Tdoc decisions

|  |  |
| --- | --- |
| **Tdoc** | **Decision** |
| R4-2004252 | Revised |
| R4-2004409 | Revised |
| R4-2004410 | Approved |
| R4-2004807 | Noted |

The following note will be added to the TP by editor: “[Editor’s note: The description regarding the relationship between Trs and SMTC configuration will be added after RAN4 finalizes the requirements regarding the number of SMTC windows]”.

**Topic #3: Details of MT Timing Related Requirements**

Tdoc decisions

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| --- | --- |
| **Tdoc** | **Decision** |
| R4-2004250 | Approved |
| R4-2004251 | Revised |

**Topic #4: RLM requirements**

Sub-topic 4-1: Relaxed RLM requirement

Agreement: Downselect from following options during the 2nd round discussion:

1. Relax the RLM evaluation period of IAB-MTs with respect to that of NR UEs

* Scale the number of samples and the lower boundary of the SSB and CSI-RS based RLM evaluation period by a factor.
* FFS: Scaling factor

1. Do not relax RLM evaluation period of IAB-MTs with respect to that of NR UEs

Continue discussion in the 2nd round.

|  |  |  |
| --- | --- | --- |
| R4-2005318 | WF on RLM requirements and sharing factor in RLM/BFD/CBD evaluation for IAB-MTs | ZTE |

Sub-topic 4-2: Sharing factor P.

Continue discussion in the 2nd round. Capture conclusions in R4-2005318

Sub-topic 4-3: Density of CSI-RS to define CSI-RS based RLM/BFD/CBD requirements.

Agreement: The CSI-RS requirements shall apply only for CSI-RS density 3 over the bandwidth ≥ 24 PRBs.

Sub-topic 4-4: Other requirements

Agreement: The following RLM related requirements, that have been defined in 38.133 for Rel-15 UEs, can be reused for IAB-MTs.

* Measurement restrictions for SSB based RLM and CSI-RS based RLM
* Minimum requirement at transitions
* Minimum requirement for L1 indication.
* Scheduling availability during RLM

**Topic #5: Link recovery requirements**

Sub-topic 5-1: Beam sweeping factor

Continue discussion in the 2nd round.

Sub-topic 5-2: Other requirements

Agreement: The following CBD related requirements, that have been defined in 38.133 for Rel-15 UEs, can be reused for IAB-MTs.

* Measurement restrictions for SSB based CBD and CSI-RS based CBD
* Scheduling availability during CBD

# Agreements during the 2nd round

## Inclusion of RRM requirements in IAB TR

### Tentative agreement

* RRM requirements will be captured in IAB TR
* The description of RRM requirements from IAB TS will be reused in the relevant sections of IAB TR.

[Note to the chair: Samsung does not prefer the RRM sections of IAB TR to be exact copies of the RRM sections of IAB TS spec. They want IAB TR to briefly describe the rationale behind introducing these requirements. But, a couple of companies think that these additional descriptions are not essential and will overburden the IAB RRM delegates. Hence, I have proposed above compromise between these two divergent views].

### Company positions

1. Should RRM requirements be captured in IAB TR?
   1. Yes: Ericsson (if answer to question number to II is Yes), Qualcomm, Samsung.
   2. No: Ericsson (if answer to question number to II is No), Huawei
2. If yes, can the description of RRM requirements from IAB TS be reused in the relevant sections of IAB TR?
   1. Yes: Qualcomm, Ericsson
   2. No: Samsung

## Number of SMTC windows for RRC re-establishment and release with redirection

### Tentative agreement

Down-select from following options during the next meeting

* Option 1: Requirements should be derived based on Rel-16 RAN1 IAB-MT related agreements, i.e., by assuming each IAB-MT can be configured up to four SMTC windows per frequency layer.
* Option 2: Requirements should be derived based on Rel-15 UE requirements, i.e., by assuming each IAB-MT can be configured up to two and one SMTC windows per intra-frequency and inter-frequency layers respectively.
* Option 3:
  + For IAB-MTs that support four SMTC configurations per frequency layer, option 1 is supported.
  + For IAB-MTs that do not support four SMTC configurations per frequency layer, option 2 is supported.
  + Note:
    - This option does not intend to influence RAN1 feature list discussion regarding whether supporting four SMTC configurations per frequency layer should be mandatory or optional. If RAN1 eventually decides to make this feature, i.e., supporting for SMTC configurations per frequency layer mandatory, mandatory then only option 1 will be supported in RAN4 requirements.

### Company positions during the 2nd round

* Option 1
* Option 2
* Option 3
  + Supported by: Samsung, Qualcomm, AT&T
* Keep FFS for the next meeting
  + Supported by: ZTE, Ericsson

### Company positions during the 1st round

* Option 1
  + Supported by: ZTE, AT&T, Qualcomm, Samsung
* Option 2
  + Supported by: Ericsson, Nokia, Huawei

## Beam sweeping factor N for FR2 during CBD evaluation period of IAB-MTs

### Tentative agreement

For IAB CBD requirement, down-select beam sweeping factor N for FR2 from following options during the next meeting

* Option 1: N = 8
  + Option 2: N = 4
  + Option 3: N = 6

### Company positions during the 2nd round

* Option 1
  + Supported by: Qualcomm, AT&T
* Option 2
  + Supported by: Samsung, ZTE
* Option 3
  + Supported by: Samsung

### Company positions during the 1st round

* Option 1
  + Supported by: Qualcomm, Nokia, Huawei, AT&T
* Option 2
  + Supported by: Samsung, ZTE

# Approved TPs during the 2nd round

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| --- | --- |
| Tdoc number and company | Status |
| R4-2005319  Huawei | Approved (tentative) |
| R4-2005320  Ericsson | Approved (tentative) |
| R4-2005321  Huawei | Approved (tentative) |
| R4-2003534  Samsung | Approved (tentative) |