**3GPP TSG RAN WG4 Meeting #94-e-Bis R4-2005320**

**Electronic Meeting, April 20-30, 2020**

**Agenda Item:** 6.5.3.2

**Source:** Ericsson

**Title:** TP to TS 38.174 V0.0.1: RRC re-establishment requirements for IAB-MT

**Document for:** Approval

1. Introduction

In RAN4#92bis according to the approved WF it was agreed to introduce RRC re-establishment requirements for IAB-MT [1]. Section 2 provides text proposal on IAB-MT RRC re-establishment requirements for the IAB specification TS 38.174 V0.0.1 (Integrated access and backhaul radio transmission and reception).

# Text Proposal

--------------------------------------------------Start of TP------------------------------------------------------

12.1.1.1 SA: RRC Re-establishment

#### 12.1.1.1.1 Introduction

This clause contains requirements on the IAB-MT regarding RRC connection re-establishment procedure. RRC connection re-establishment is initiated when an IAB-MT in RRC\_CONNECTED state loses RRC connection due to any of failure cases, including radio link failure, handover failure, and RRC connection reconfiguration failure. The RRC connection re-establishment procedure is specified in clause TBD of TS 38.331 [TBD].

The requirements in this clause are applicable for RRC connection re-establishment to NR cell.

#### 12.1.1.1.2 Requirements

In RRC\_CONNECTED state the IAB-MT shall be capable of sending *RRCReestablishmentRequest* message within Tre-establish\_delay seconds from the moment it detects a loss in RRC connection. The total RRC connection delay (Tre-establish\_delay) shall be less than:

TUL\_grant: It is the time required to acquire and process uplink grant from the target PCell. The uplink grant is required to transmit *RRCReestablishmentRequest* message.

The IAB-MT re-establishment delay (TIAB-MT\_re-establish\_delay) is specified in clause 12.1.1.1.2.1.

#### 12.1.1.1.2.1 IAB MT Re-establishment delay requirement

The IAB-MT re-establishment delay (TIAB-MT\_re-establish\_delay) is the time between the moments when any of the conditions requiring RRC re-establishment as defined in clause TBD in TS 38.331 [TBD] is detected by the IAB-MT and when the IAB-MT sends PRACH to the target PCell. The IAB-MT re-establishment delay (TIAB-MT\_re-establish\_delay) requirement shall be less than:

The intra-frequency target NR cell shall be considered detectable if each relevant SSB can satisfy that:

- SS-RSRP related side conditions given in Annex TBD are fulfilled for a corresponding NR Band for FR1 and FR2, respectively, and

- the conditions of SSB\_RP and SSB Ês/Iot according to Annex TBD for a corresponding NR Band are fulfilled.

The inter-frequency target NR cell shall be considered detectable when for each relevant SSB:

- SS-RSRP related side conditions given in Annex TBD are fulfilled for a corresponding NR Band for FR1 and FR2, respectively, and

- the conditions of SSB\_RP and SSB Ês/Iot according to Annex TBD for a corresponding NR Band are fulfilled.

Tidentify\_intra\_NR: It is the time to identify the target intra-frequency NR cell and it depends on whether the target NR cell is known cell or unknown cell and on the frequency range (FR) of the target NR cell. If the IAB-MT is not configured with intra-frequency NR carrier for RRC re-establishment then Tidentify\_intra\_NR=0; otherwise Tidentify\_intra\_NR shall not exceed the values defined in Table 12.1.1.1.2.1-1.

Tidentify\_inter\_NR,i: It is the time to identify the target inter-frequency NR cell on inter-frequency carrier *i* configured for RRC re-establishment and it depends on whether the target NR cell is known cell or unknown cell and on the frequency range (FR) of the target NR cell. Tidentify\_inter\_NR,i shall not exceed the values defined in Table 12.1.1.1.2.1-2.

TSMTC: It is the periodicity of the SMTC occasion configured for the intra-frequency carrier.

TSMTC,i: It is the periodicity of the SMTC occasion configured for the inter-frequency carrier *i*. If it is not configured, the IAB-MT may assume that the target SSB periodicity is no larger than 160 ms.

TSI-NR: It is the time required for receiving all the relevant system information according to the reception procedure and the RRC procedure delay of system information blocks defined in TS 38.331 [TBD] for the target NR cell.

TPRACH: It is the delay uncertainty in acquiring the first available PRACH occasion in the target NR cell. TPRACH can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in clause 14 of TS 38.213 [TBD].

Nfreq: It is the total number of NR frequencies to be monitored for RRC re-establishment; Nfreq = 1 if the target intra-frequency NR cell is known, else Nfreq = 2 and Tidentify\_intra\_NR = 0 if the target inter-frequency NR cell is known.

There is no requirement if the target cell does not contain the IAB-MT context.

In the requirement defined in the below tables, the target FR1 cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown.

*Editor’s Note: Requirement that the IAB-MT can be configured up to 4 SMTC windows can be introduced after the IAB-MT capability discussion for this feature is finalized by RAN1. Details of such requirements are FFS.*

Table 12.1.1.1.2.1-1: Time to identify target NR cell for RRC connection re-establishment to NR intra-frequency cell

|  |  |  |
| --- | --- | --- |
| 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 successfullyidentify a cell on any NR frequency layer when TSMTC >160 ms and serving cell SSB Ês/Iot < -8 dB. |

Table 12.1.1.1.2.1-2: Time to identify target NR cell for RRC connection re-establishment to NR inter-frequency cell

|  |  |  |
| --- | --- | --- |
| 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. |

--------------------------------------------------End of TP------------------------------------------------------

1. References
2. R4-1912829, Way forward on scope on NR IAB RRM requirements, Qualcomm