**3GPP TSG- Meeting #R4-2402562**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
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|  |  | **CR** | **draft** | **rev** | **-** | **Current version:** |  |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **x** | Core Network |  |

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| ***Title:***  |  |
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| ***Source to WG:*** |  |
| ***Source to TSG:*** |  |
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| ***Work item code:*** |  |  | ***Date:*** |  |
|  |  |  |  |  |
| ***Category:*** | ***F*** |  | ***Release:*** |  |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
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| ***Reason for change:*** | * It is not clarified which of legacy IAB-MT requirements as applicable to mIAB
* mIAB-MT timer accuracy requirement is missing
* Uplink spatial relation switch delay requirement for mIAB-MT is missing
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| ***Summary of change:*** | * Applicability of RRM requirements for mIAB-MT is introduced
* mIAB-MT timer accuracy requirement is introduced
* Uplink spatial relation switch delay requirement for IAB.MT is introduced
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| ***Consequences if not approved:*** | The scope of mIAB-MT requirements is not clear and incomplete. |
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| ***Clauses affected:*** | 4.7, 12.2, 12.3B |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **x** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **x** |  Test specifications | TS/TR ... CR ... |
| ***(show related CRs)*** |  | **x** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** | Revision of R4-2402562 |

## <Start of Change #1>

## 4.7 Applicability of RRM requirements in this specification

### 4.7.1 Applicability of signalling characteristics related RRM requirements

The RRM requirements on the signalling characteristics for IAB MTs specified in section 12.3 shall apply only for the local area IAB class defined in section 4.4.

4.7.2 Applicability of RRM requirements in non-DRX

All the RRM requirements for IAB MT and mIAB-MT specified in section 12 shall apply when no DRX is used. The IAB-MT shall assume that no DRX is used provided the following conditions are met:

- DRX parameters are not configured or

- DRX parameters are configured and

- drx-InactivityTimer is running or

- drx-RetransmissionTimerDL is running or

- drx-RetransmissionTimerUL is running or

- ra-ContentionResolutionTimer is running or

- a Scheduling Request sent on PUCCH is pending or

- a PDCCH indicating a new transmission addressed to the C-RNTI of the MAC entity has not been received after successful reception of a Random Access Response for the preamble not selected by the MAC entity

### 4.7.3 Applicability of RRM requirements for mIAB-MT

All the RRM requirements specified for IAB-MT in the clauses listed below shall apply to mIAB-MT:

- 12.1.1.2 Random access

- 12.2 Timing

The following IAB-MT RRM requirements are not applicable to mIAB-MT:

- 12.1.1.1 SA: RRC Re-establishment

- 12.1.1.3 SA: RRC Connection Release with Redirection

- 12.3 Signalling Characteristics for IAB MTs

## 4.8 Requirements for contiguous and non-contiguous spectrum

A spectrum allocation where an IAB-DU or IAB-MT operates can either be contiguous or non-contiguous. Unless otherwise stated, the requirements in the present specification apply for IAB-DU and IAB-MT configured for both *contiguous spectrum* operation and *non-contiguous spectrum* operation.

For IAB-DU or IAB-MT operation in *non-contiguous spectrum*, some requirements apply both at the *IAB-DU RF Bandwidth edges* or *IAB-MT RF Bandwidth edges*, and inside the *sub-block gaps*. For each such requirement, it is stated how the limits apply relative to the *IAB-DU RF Bandwidth edges* and *IAB-MT RF Bandwidth edges* and the *sub-block* edges respectively.

## <End of Change #1>

## <Start of Change #2>

12.2.2 Void

### 12.2.2B mIAB-MT timer accuracy

#### 12.2.2B.1 Introduction

mIAB-MT timers are used in different protocol entities to control the mIAB-MT behaviour.

#### 12.2.2B.2 Requirements

For mIAB-MT timers specified in TS 38.331 [15], the mIAB-MT shall comply with the timer accuracies according to Table 12.2.2B.2-1.The requirements are only related to the actual timing measurements internally in the mIAB-MT. They do not include the following:

- Inaccuracy in the start and stop conditions of a timer (e.g. mIAB-MT reaction time to detect that start and stop conditions of a timer is fulfilled), or

- Inaccuracies due to restrictions in observability of start and stop conditions of a mIAB-MT timer (e.g. slot alignment when mIAB-MT sends messages at timer expiry).

Table 12.2.2B.2-1

|  |  |
| --- | --- |
| Timer value [s] | Accuracy |
| timer value < 4 | ± 0.1s |
| timer value ≥ 4 | ± 2.5% |

### 12.2.3 IAB-MT timing advance

#### 12.2.3.1 Timing Advance adjustment delay

The IAB-MT shall adjust the timing of its uplink transmission timing at time slot *n*+ *k+1* for a timing advance command received in time slot *n*, and the value of *k* is defined in clause 4.2 in TS 38.213 [10]. The requirements in this clause apply for IAB-MT, for ‘Case 1’ transmission timing mode specified in clause 14 of TS 38.213 [10].

## <End of Change #2>

## <Start of Change #3>

### 12.3B.4 Uplink spatial relation switch delay

#### 12.3B.4.1 Introduction

The requirements in this clause apply for a mIAB-MT configured with one or more spatial relation configurations on serving cell in MR-DC or standalone NR. There is no requirement when the mIAB-MT is requested to switch to a spatial relation with the higher layer parameter *spatialRelationInfo* associated to SRS. mIAB-MT shall complete the switch of active spatial relation within the delay defined in this clause when the mIAB-MT is requested to switch to a spatial relation with the higher layer parameter *spatialRelationInfo* associated to a DL RS.

#### 12.3B.4.2 Known conditions for spatial relation when associated with DL-RS

The spatial relation associated to DL RS is known if the following conditions are met:

- During the period from the last transmission of the DL RS resource used for the L1-RSRP measurement reporting for the target spatial relation to the completion of active spatial relation switch, where the DL RS resource for L1-RSRP measurement is the DL RS in target spatial relation or QCLed to the target spatial relation with QCL type-D.

- Spatial relation switch command is received within 1280 ms upon the last transmission of the DL RS resource for beam reporting or measurement

- The UE has sent at least 1 L1-RSRP report for the target spatial relation before the spatial relation switch command

- The DL RS configured in spatial relation remains detectable during the spatial relation switching period

- SNR of the DL RS configured in spatial relation ≥ -3dB

- The SSB associated with the spatial relation remain detectable during the spatial relation switching period

- SNR of the SSB associated with the spatial relation ≥ -3dB

Otherwise, the spatial relation is unknown.

#### 12.3B.4.3 MAC-CE based spatial relation switch delay

If the target spatial relation associated to DL RS is known, upon receiving PDSCH carrying MAC-CE activation command in slot n, for UL spatial relation switch for PUCCH or semi-persistent SRS transmission of serving cell with a target UL spatial relation, the mIAB-MT shall be able to transmit PUCCH or semi-persistent SRS with the target UL spatial relation in the slot n+ THARQ + + 1 when *beamCorrespondenceWithoutUL-BeamSweeping* is set to 1 where THARQ is the timing between DL data transmission and acknowledgement as specified in TS 38.213 [10].

If the target spatial relation associated to DL RS is unknown, upon receiving PDSCH carrying MAC-CE activation command in slot n, for UL spatial relation switch for PUCCH or semi-persistent SRS transmission of serving cell with a target UL spatial relation, the mIAB-MT shall be able to transmit PUCCH or semi-persistent SRS with the target UL spatial relation in the slot n+ THARQ + + TL1-RSRP+1 when *beamCorrespondenceWithoutUL-BeamSweeping* is set to 1.

Where

- THARQ is the timing between DL data transmission and acknowledgement as specified in TS 38.213 [10],

- T L1-RSRP is the time for Rx beam refinement in FR2, defined as

- TL1-RSPR\_Measurement\_Period\_SSB for SSB as specified in clause 12.4B.3.4.1,

- with the assumption of M=1

- with TReport = 0

- TL1-RSRP\_Measurement\_Period\_CSI-RS for CSI-RS as specified in clause 12.4B.3.4.1

- configured with higher layer parameter *repetition* set to ON

- with the assumption of M=1 for periodic CSI-RS

- for aperiodic CSI-RS if number of resources in resource set at least equal to *MaxNumberRxBeam*

- with TReport = 0

The mIAB-MT shall be able to transmit with the old UL spatial relation until slot n+ THARQ + .

When the UL spatial relation info switch for PUCCH changes both the associated DL RS and *pucch-PathlossReferenceRS* with the same MAC-CE activation, and if both the DL RS and *pucch-PathlossReferenceRS* are known as specified in clause 12.3B.4.2 and 8.14.2 of TS 38.133 [6] respectively, the mIAB-MT shall be able to transmit PUCCH with the target UL spatial relation after the delay specified in clause 12.3B.4.3. If either the associated DL RS or *pucch-PathlossReferenceRS* are unknown, a longer switching delay is allowed. The UE is not required to transmit PUCCH with the target UL spatial relation until the DL RS and pathloss reference RS switch are completed.

#### 12.3B.4.4 DCI based spatial relation switch delay

If the target spatial relation associated to DL RS is known, when a mIAB-MT receives the DCI triggering aperiodic SRS at slot n with the higher layer parameter *spatialRelationInfo*, UE shall be able to transmit aperiodic SRS with target spatial relation of the serving cell on which spatial relation switch occurs in the slot+1, where, *k* is configured via higher layer parameter *slotOffset*[15]for each triggered SRS resources set and is based on the subcarrier spacing of the triggered SRS transmission, *µSRS* and *µPDCCH* are the subcarrier spacing configurations for triggered SRS and PDCCH carrying the triggering command respectively in TS 38.214 [11].

The known condition for spatial relation associated to DL RS defined in clause 12.3B.4.2 is applied.

#### 12.3B.4.5 RRC based spatial relation switch delay

If the target spatial relation associated to DL RS is known, mIAB-MT shall be able to transmit target periodic SRS with spatial relation of the serving cell on which periodic SRS with spatial relation reconfigured in the slot n+ TRRC\_processing /*NR slot length* +1 when *beamCorrespondenceWithoutUL-BeamSweeping* is set to 1.

Where

- Slot n is the last slot overlapping with the PDSCH carrying RRC activation command,

- TRRC\_processing is the RRC processing delay defined in TS38.331 [15].

If the target spatial relation associated to DL RS is unknown, mIAB-MT shall be able to transmit target periodic SRS with spatial relation of the serving cell on which periodic SRS with spatial relation reconfigured in the slot n+ TRRC\_processing /*NR slot length* + TL1-RSRP +1 when *beamCorrespondenceWithoutUL-BeamSweeping* is set to 1.

Where

- Slot n is the last slot overlapping with the PDSCH carrying RRC activation command,

- TRRC\_processing is the RRC processing delay defined in TS38.331 [15].

- TL1-RSRP is defined in clause 12.3B.4.3.

## <End of Change #3>