**3GPP TSG-RAN WG4 Meeting #102-e *R4-2204489***

**Electronic Meeting, 21st Feb – 3rd Mar, 2022**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **-** | **rev** | **-** | **Current version:** | **17.4.0** |  |
|  | | | | | | | | |
| *For* ***[HE](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)******[LP](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)*** *on using this form: comprehensive instructions can be found at  <http://www.3gpp.org/Change-Requests>.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | Draft CR for cell re-selection for RRC\_IDLE state for NR high speed train scenario in FR2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | ZTE | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_HST\_FR2 -Core | | | | |  | ***Date:*** | | | 2022-02-10 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | B |  | | | | | ***Release:*** | | | Rel-17 |
|  | *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 can be 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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Introduction of requirements enhancements for cell re-selection of RRC\_IDLE state for NR high speed train scenario in FR2 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Mobility of cell re-selection of RRC\_IDLE state for FR2 with high speed configuration | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | No requirements for FR2 in HST scenario | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 4.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS38.533 | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

< Start of change #1 >

# 4 SA: RRC\_IDLE state mobility

## 4.2 Cell Re-selection

### 4.2.2 Requirements

#### ~~4.2.2.2 Measurement and evaluation of serving cell~~

~~The UE shall measure the SS-RSRP and SS-RSRQ level of the serving cell and evaluate the cell selection criterion S defined in TS 38.304 [1] for the serving cell at least once every M1\*N1 DRX cycle; where:~~

~~M1=2 if SMTC periodicity (T~~~~SMTC~~~~) > 20 ms and DRX cycle ≤ 0.64 second,~~

~~otherwise M1=1.~~

~~The UE shall filter the SS-RSRP and SS-RSRQ measurements of the serving cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by, at least DRX cycle/2.~~

~~If the UE has evaluated according to Table 4.2.2.2-1when [~~*~~highSpeedMeasFlagFR2-r17~~*~~] is not configured and Table 4.2.2.2-2 when [~~*~~highSpeedMeasFlagFR2-r17~~*~~] is configured in N~~~~serv~~ ~~consecutive DRX cycles that the serving cell does not fulfil the cell selection criterion S, the UE shall initiate the measurements of all neighbour cells indicated by the serving cell, regardless of the measurement rules currently limiting UE measurement activities.~~

~~If the UE in RRC\_IDLE has not found any new suitable cell based on searches and measurements using the intra-frequency, inter-frequency and inter-RAT information indicated in the system information for 10 s, the UE shall initiate cell selection procedures for the selected PLMN as defined in TS 38.304 [1].~~

~~Table 4.2.2.2-1: N~~~~serv~~

|  |  |  |  |
| --- | --- | --- | --- |
| ~~DRX cycle length [s]~~ | ~~Scaling Factor (N1)~~ | | ~~N~~~~serv~~ ~~[number of DRX cycles]~~ |
|  | ~~FR1~~ | ~~FR2~~~~Note1~~ |  |
| ~~0.32~~ | ~~1~~ | ~~8~~ | ~~M1\*N1\*4~~ |
| ~~0.64~~ |  | ~~5~~ | ~~M1\*N1\*4~~ |
| ~~1.28~~ |  | ~~4~~ | ~~N1\*2~~ |
| ~~2.56~~ |  | ~~3~~ | ~~N1\*2~~ |
| ~~Note 1: Applies for UE supporting power class 2&3&4. For UE supporting power class 1 or 5, N1 = 8 for all DRX cycle length.~~ | | | |

~~Table 4.2.2.2-2: N~~~~serv~~ ~~configured with [~~*~~highSpeedMeasFlagFR2-r17~~*~~] for FR2~~

|  |  |  |  |
| --- | --- | --- | --- |
| ~~DRX cycle length [s]~~ | ~~Scaling Factor (N1)~~ | | ~~N~~~~serv~~ ~~[number of DRX cycles]~~ |
|  | ~~FR1~~ | ~~FR2~~~~Note1~~ |  |
| ~~0.32~~ | ~~1~~ | ~~N2~~~~Note2~~ | ~~M1\*N1\*4~~ |
| ~~0.64~~ |  | ~~5~~ | ~~M1\*N1\*4~~ |
| ~~1.28~~ |  | ~~4~~ | ~~N1\*2~~ |
| ~~2.56~~ |  | ~~3~~ | ~~N1\*2~~ |
| ~~Note 1: Applies for UE supporting power class 6.~~  ~~Note 2: N2 = 2 when [~~*~~highSpeedMeasFlagFR2-r17~~*~~] = [set1]; N2 = 6 when [~~*~~highSpeedMeasFlagFR2-r17~~*~~] = [set2].~~ | | | |

#### 4.2.2.3 Measurements of intra-frequency NR cells

The UE shall be able to identify new intra-frequency cells and perform SS-RSRP and SS-RSRQ measurements of the identified intra-frequency cells without an explicit intra-frequency neighbour list containing physical layer cell identities.

The UE shall be able to evaluate whether a newly detectable intra-frequency cell meets the reselection criteria defined in TS38.304 [1] within Tdetect,NR\_Intrawhen that Treselection= 0. An intra frequency cell is considered to be detectable according to the conditions defined in Annex B.1.2 for a corresponding Band.

The UE shall measure SS-RSRP and SS-RSRQ at least every Tmeasure,NR\_Intra (see table 4.2.2.3-1, table 4.2.2.3-2 or table 4.2.2.3-3) for intra-frequency cells that are identified and measured according to the measurement rules.

The UE shall filter SS-RSRP and SS-RSRQ measurements of each measured intra-frequency cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least Tmeasure,NR\_Intra/2.

The UE shall not consider a NR neighbour cell in cell reselection, if it is indicated as not allowed in the measurement control system information of the serving cell.

For an intra-frequency cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that the intra-frequency cell has met reselection criterion defined in TS38.304 [1] within Tevaluate,NR\_Intra when Treselection = 0as specified in table 4.2.2.3-1, table 4.2.2.3-2 or table 4.2.2.3-3 provided that:

when *rangeToBestCell* is not configured:

- the cell is at least 3dB better ranked in FR1 or 4.5dB better ranked in FR2.

when *rangeToBestCell* is configured:

- the cell has the highest number of beams above the threshold *absThreshSS-BlocksConsolidation* among all detected cells whose cell-ranking criterion R value in TS38.304 [1] is within *rangeToBestCell* of the cell-ranking criterion R value of the highest ranked cell.

- if there are multiple such cells, the cell has the highest rank among them.

- the cell is at least 3dB better ranked in FR1 or 4.5dB better ranked in FR2 if the current serving cell is among them.

When evaluating cells for reselection, the SSB side conditions apply to both serving and non-serving intra-frequency cells.

If Treselection timer has a non zero value and the intra-frequency cell is satisfied with the reselection criteria which are defined in TS38.304 [1], the UE shall evaluate this intra-frequency cell for the Treselection time. If this cell remains satisfied with the reselection criteria within this duration, then the UE shall reselect that cell.

For UE neither configured with *highSpeedMeasFlag-r16* nor *[highSpeedMeasFlagFR2-r17]*, Tdetect,NR\_Intra, Tmeasure,NR\_Intra and Tevaluate, NR\_intra are specified in Table 4.2.2.3-1. For UE configured with *highSpeedMeasFlag-r16*, Tdetect,NR\_Intra, Tmeasure,NR\_Intra and Tevaluate, NR\_intra are specified in Table 4.2.2.3-2. For FR2 power class 6 UE configured with *[highSpeedMeasFlagFR2-r17]*, Tdetect,NR\_Intra, Tmeasure,NR\_Intra and Tevaluate, NR\_intra are specified in Table 4.2.2.3-3.

The requirements in Table 4.2.2.3-2 apply only when the UE supports *measurementEnhancement-r16* or[*intraRAT-MeasurementEnhancement-r16*]. For UE neither supporting either *measurementEnhancement-r16* nor[*intraRAT-MeasurementEnhancement-r16*], the UE is not required to meet the requirements specified in Table 4.2.2.3-2.

*Editor’s note: the exact signalling names in the above paragraph and in Table 4.2.2.3-2, 4.2.2.3-3 are subject to RAN2 definitions and the brackets shall be replaced by the correct signalling names according to RAN2 specification.*

Table 4.2.2.3-1: Tdetect,NR\_Intra, Tmeasure,NR\_Intra and Tevaluate,NR\_Intra

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| DRX cycle length [s] | Scaling Factor (N1) | | Tdetect,NR\_Intra [s] (number of DRX cycles) | Tmeasure,NR\_Intra [s] (number of DRX cycles) | Tevaluate,NR\_Intra  [s] (number of DRX cycles) |
|  | FR1 | FR2Note1 |  |  |  |
| 0.32 | 1 | 8 | 11.52 x N1 x M2 (36 x N1 x M2) | 1.28 x N1 x M2 (4 x N1 x M2) | 5.12 x N1 x M2 (16 x N1 x M2) |
| 0.64 |  | 5 | 17.92 x N1 (28 x N1) | 1.28 x N1 (2 x N1) | 5.12 x N1 (8 x N1) |
| 1.28 |  | 4 | 32 x N1 (25 x N1) | 1.28 x N1 (1 x N1) | 6.4 x N1 (5 x N1) |
| 2.56 |  | 3 | 58.88 x N1 (23 x N1) | 2.56 x N1 (1 x N1) | 7.68 x N1 (3 x N1) |
| Note 1: Applies for UE supporting power class 2&3&4. For UE supporting power class 1 or 5, N1 = 8 for all DRX cycle length.  Note 2: M2 = 1.5 if SMTC periodicity of measured intra-frequency cell > 20 ms; otherwise M2=1. If different SMTC periodicities are configured for different cells, the SMTC periodicity in this note is the one used by the cell being identified. During PSS/SSS detection, the periodicity of the SMTC configured for the intra-frequency carrier is assumed, and if the actual SSB transmission periodicity is greater than the SMTC configured for the intra-frequency carrier, longer Tdetect, NR\_intra is expected. | | | | | |

Table 4.2.2.3-2: Tdetect,NR\_Intra, Tmeasure,NR\_Intra and Tevaluate,NR\_Intra for UE configured with *highSpeedMeasFlag-r16* (Frequency range FR1)

|  |  |  |  |
| --- | --- | --- | --- |
| DRX cycle length [s] | Tdetect,NR\_Intra [s] (number of DRX cycles) | Tmeasure,NR\_Intra [s] (number of DRX cycles) | Tevaluate,NR\_Intra  [s] (number of DRX cycles) |
|
| 0.32 | 2.56 x M2 (8 x M2) | 0.32 x M3 (1 x M3) | 0.96 x M4 (3 x M4) |
| 0.64 | 5.12 (8) | 0.64 (1) | 1.92 (3) |
| 1.28 | 8.96 (7) | 1.28 (1) | 3.84 (3) |
| 2.56 | 58.88 (23) | 2.56 (1) | 7.68 (3) |
| Note 1: when SMTC < = 40 ms, M2 = M3 = M4 = 1; and when SMTC > 40 ms, M2 = 1.5, M3 = M4 = 2  Note 2: When *highSpeedMeasFlag-r16* is configured, the requirements apply only to UE supporting either *measurementEnhancement-r16* or *[intraRAT-MeasurementEnhancement-r16].* | | | |

Table 4.2.2.3-3: Tdetect,NR\_Intra, Tmeasure,NR\_Intra and Tevaluate,NR\_Intra for UE configured with [highSpeedMeasFlagFR2-r17 ] (Frequency range FR2)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DRX cycle length [s] | Scaling Factor (N1) | Tdetect,NR\_Intra [s] (number of DRX cycles) | Tmeasure,NR\_Intra [s] (number of DRX cycles) | Tevaluate,NR\_Intra  [s] (number of DRX cycles) |
| 0.32 | N2Note2 | 2.56 x N1 x M2 (8 x N1 x M2) | 0.32 x N1 x M3 (1 x N1 x M3) | 0.96 x N1 x M4 (3 x N1 x M4) |
| 0.64 | 5 | ~~5.12 x N1 (8 x N1)~~  17.92 x N1 (28 x N1) | ~~0.64 x N1 (1 x N1)~~  1.28 x N1 (2 x N1) | ~~1.92 x N1 (3 x N1)~~  5.12 x N1 (8 x N1) |
| 1.28 | 4 | ~~8.96 x N1 (7 x N1)~~  32 x N1 (25 x N1) | 1.28 x N1 (1 x N1) | ~~3.84 x N1 (3 x N1)~~  6.4 x N1 (5 x N1) |
| 2.56 | 3 | 58.88 x N1 (23 x N1) | 2.56 x N1 (1 x N1) | 7.68 x N1 (3 x N1) |
| Note 1: When SMTC < = 40 ms, M2 = M3 = M4 = 1; and when SMTC > 40 ms, M2 = 1.5, M3 = M4 = 2  Note 2: N2 = 2 when [*highSpeedMeasFlagFR2-r17*] = [set1]; N2 = 6 when [*highSpeedMeasFlagFR2-r17*] = [set2]. | | | | |

< End of change #1 >