**3GPP TSG-RAN WG2 Meeting #116-e *R2-2111208***

**Online, 1 – 12 November 2021**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
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|  | **36.304** | **CR** | **0835** | **rev** |  **1** | **Current version:** | **16.5.0** |  |
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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 | **X** | Radio Access Network |  | Core Network |  |

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| ***Title:***  | Removal of RSS based RSRQ measurements |
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| ***Source to WG:*** | Huawei, HiSilicon |
| ***Source to TSG:*** | R2 |
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| ***Work item code:*** | LTE\_eMTC5-Core |  | ***Date:*** | 2021-10-21 |
|  |  |  |  |  |
| ***Category:*** | F |  | ***Release:*** | Rel-16 |
|  | *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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
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| ***Reason for change:*** | RAN4 has decided not to introduce requirements for RSS-based RSRQ measurements (R2-2109366). |
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| ***Summary of change:*** | Remove RSRQ measurements from the cell selection and cell re-selection criterion when a cell is measured using RSS.**Impact analysis**Impacted functionality:Cell selection/ reselection when RSS is usedInter-operability:The CR removes a functionality which is not fully specified, no interoperability issue is foreseen. |
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| ***Consequences if not approved:*** | The specification contains a functionality which is not fully specified.  |
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| ***Clauses affected:*** | 5.2.3.2, 5.2.4.2, 5.2.4.5 |
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|  | **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 ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

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| Beginning of change |

#### 5.2.3.2 Cell Selection Criterion

For NB-IoT the cell selection criterion is defined in clause 5.2.3.2a.

If the measurements are performed using RSS as specified in [10], the cell selection criterion S in normal coverage is fulfilled when:

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| Srxlev > 0  |

Else, the cell selection criterion S in normal coverage is fulfilled when:

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| Srxlev > 0 AND Squal > 0 |

where:

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| Srxlev = Qrxlevmeas – (Qrxlevmin + Qrxlevminoffset) – Pcompensation - QoffsettempSqual = Qqualmeas – (Qqualmin + Qqualminoffset) - Qoffsettemp |

where:

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| --- | --- |
| Srxlev | Cell selection RX level value (dB) |
| Squal | Cell selection quality value (dB) |
| Qoffsettemp | Offset temporarily applied to a cell as specified in TS 36.331 [3] (dB) |
| Qrxlevmeas | Measured cell RX level value (RSRP) |
| Qqualmeas | Measured cell quality value (RSRQ) |
| Qrxlevmin | Minimum required RX level in the cell (dBm). Qrxlevmin is obtained from *q-RxLevMin* in SIB1, SIB3, SIB5, or NR SIB5.When the UE who is camped on a NR cell is evaluating an E-UTRA cell, if Qrxlevminoffsetcell is signalled in NR SIB5 in TS 38.331 [37] for the E-UTRA cell, this cell specific offset is added to *q-RxLevMin* to achieve the required minimum RX level in the E-UTRA cell. |
| Qqualmin | Minimum required quality level in the cell (dB)When the UE who is camped on a NR cell is evaluating an E-UTRA cell, if Qqualminoffsetcell is signalled in NR SIB5 in TS 38.331 [37] for the E-UTRA cell, this cell specific offset is added to achieve the required minimum quality level in the E-UTRA cell. |
| Qrxlevminoffset | Offset to the signalled Qrxlevmin taken into account in the Srxlev evaluation as a result of a periodic search for a higher priority PLMN while camped normally in a VPLMN TS 23.122 [5] |
| Qqualminoffset | Offset to the signalled Qqualmin taken into account in the Squal evaluation as a result of a periodic search for a higher priority PLMN while camped normally in a VPLMN TS 23.122 [5] |
| Pcompensation  | If the UE supports the *additionalPmax* in the *NS-PmaxList*, if present, in SIB1, SIB3 and SIB5:max(PEMAX1 –PPowerClass, 0) – (min(PEMAX2, PPowerClass) – min(PEMAX1, PPowerClass)) (dB);else:if PPowerClass is 14 dBm:max(PEMAX1 –(PPowerClass – Poffset), 0) (dB);else:max(PEMAX1 –PPowerClass, 0) (dB) |
| PEMAX1, PEMAX2 | Maximum TX power level an UE may use when transmitting on the uplink in the cell (dBm) defined as PEMAX in TS 36.101 [33]. PEMAX1 and PEMAX2 are obtained from the *p-Max* and the *NS-PmaxList* respectively in SIB1, SIB3 and SIB5 as specified in TS 36.331 [3]. |
| PPowerClass | Maximum RF output power of the UE (dBm) according to the UE power class as defined in TS 36.101 [33] |

The signalled values Qrxlevminoffset and Qqualminoffset are only applied when a cell is evaluated for cell selection as a result of a periodic search for a higher priority PLMN while camped normally in a VPLMN TS 23.122 [5]. During this periodic search for higher priority PLMN the UE may check the S criteria of a cell using parameter values stored from a different cell of this higher priority PLMN.

If cell selection criterion S in normal coverage is not fulfilled for a cell, UE shall consider itself to be in enhanced coverage if the cell selection criterion S for enhanced coverage is fulfilled, where:

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| Qrxlevmin | UE applies coverage specific value Qrxlevmin\_CE (dBm) |
| Qqualmin | UE applies coverage specific value Qqualmin\_CE (dB) |

If cell selection criteria S in normal coverage is fulfilled for a cell, UE may consider itself to be in enhanced coverage if *SystemInformationBlockType1* cannot be acquired but UE is able to acquire *MasterInformationBlock, SystemInformationBlockType1-BR* and *SystemInformationBlockType2*.

If cell selection criterion S in normal coverage is not fulfilled for a cell and UE does not consider itself in enhanced coverage based on coverage specific values Qrxlevmin\_CE and Qqualmin\_CE (when the measurements are not performed using RSS as specified in [10]), UE shall consider itself to be in enhanced coverage if UE supports CE Mode B and CE mode B is not restricted by upper layers and the cell selection criterion S for enhanced coverage is fulfilled, where:

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| --- | --- |
| Qrxlevmin | UE applies coverage specific value Qrxlevmin\_CE1 (dBm) |
| Qqualmin | UE applies coverage specific value Qqualmin\_CE1 (dB) |

For the UE in enhanced coverage, coverage specific values Qrxlevmin\_CE and Qqualmin\_CE (orQrxlevmin\_CE1 and Qqualmin\_CE1)are only applied for the suitability check in enhanced coverage (i.e. not used for measurement and reselection thresholds).

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| Next change |

#### 5.2.4.2 Measurement rules for cell re-selection

For NB-IoT measurement rules for cell re-selection is defined in clause 5.2.4.2.a.

When evaluating Srxlev and Squal of non-serving cells for reselection purposes, the UE shall use parameters provided by the serving cell.

Following rules are used by the UE to limit needed measurements:

- If the measurements are performed using RSS as specified in [10] and the serving cell fulfils Srxlev> SIntraSearchP, the UE may choose not to perform intra-frequency measurements.

- Else if the serving cell fulfils Srxlev> SIntraSearchP and Squal > SIntraSearchQ, the UE may choose not to perform intra-frequency measurements.

- Otherwise, the UE shall perform intra-frequency measurements.

- The UE shall apply the following rules for E-UTRAN inter-frequencies and inter-RAT frequencies which are indicated in system information and for which the UE has priority provided as defined in 5.2.4.1:

- For an E-UTRAN inter-frequency or inter-RAT frequency with a reselection priority higher than the reselection priority of the current E-UTRA frequency the UE shall perform measurements of higher priority E-UTRAN inter-frequency or inter-RAT frequencies according to TS 36.133 [10].

- For an E-UTRAN inter-frequency with an equal or lower reselection priority than the reselection priority of the current E-UTRA frequency and for inter-RAT frequency with lower reselection priority than the reselection priority of the current E-UTRAN frequency:

- If the measurements are performed using RSS as specified in [10] and the serving cell fulfils Srxlev > SnonIntraSearchP, the UE may choose not to perform measurements of E-UTRAN inter-frequencies or inter-RAT frequency cells of equal or lower priority unless the UE is triggered to measure an E-UTRAN inter-frequency which is configured with *redistributionInterFreqInfo*.

- Else if the serving cell fulfils Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ, the UE may choose not to perform measurements of E-UTRAN inter-frequencies or inter-RAT frequency cells of equal or lower priority unless the UE is triggered to measure an E-UTRAN inter-frequency which is configured with *redistributionInterFreqInfo*.

- Otherwise,the UE shall perform measurements of E-UTRAN inter-frequencies or inter-RAT frequency cells of equal or lower priority according to TS 36.133 [10].

- If the UE supports relaxed monitoring and *s-SearchDeltaP* is present in *SystemInformationBlockType3*, the UE may further limit the needed measurements, as specified in clause 5.2.4.12.

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|  Next change |

#### 5.2.4.5 E-UTRAN Inter-frequency and inter-RAT Cell Reselection criteria

For NB-IoT inter-frequency cell reselection shall be based on ranking as defined in clause 5.2.4.6.

If *threshServingLowQ* is provided in *SystemInformationBlockType3* and more than 1 second has elapsed since the UE camped on the current serving cell and if the measurements are not performed using RSS as specified in [10], cell reselection to a cell on a higher priority E-UTRAN frequency or inter-RAT frequency than the serving frequency shall be performed if:

- A cell of a higher priority EUTRAN, NR or UTRAN FDD RAT/ frequency fulfils Squal > ThreshX, HighQ during a time interval TreselectionRAT; or

- A cell of a higher priority UTRAN TDD, GERAN or CDMA2000 RAT/ frequency fulfils Srxlev > ThreshX, HighP during a time interval TreselectionRAT.

Otherwise, cell reselection to a cell on a higher priority E-UTRAN frequency or inter-RAT frequency than the serving frequency shall be performed if:

- A cell of a higher priority RAT/ frequency fulfils Srxlev > ThreshX, HighP during a time interval TreselectionRAT; and

- More than 1 second has elapsed since the UE camped on the current serving cell.

Cell reselection to a cell on an equal priority E-UTRAN frequency shall be based on ranking for Intra-frequency cell reselection as defined in clause 5.2.4.6.

If *threshServingLowQ* is provided in *SystemInformationBlockType3* and more than 1 second has elapsed since the UE camped on the current serving cell and if the measurements are not performed using RSS as specified in [10], cell reselection to a cell on a lower priority E-UTRAN frequency or inter-RAT frequency than the serving frequency shall be performed if:

- The serving cell fulfils Squal < ThreshServing, LowQ and a cell of a lower priority EUTRAN, NR or UTRAN FDD RAT/ frequency fulfils Squal > ThreshX, LowQ during a time interval TreselectionRAT; or

- The serving cell fulfils Squal < ThreshServing, LowQ and a cell of a lower priority UTRAN TDD, GERAN or CDMA2000 RAT/ frequency fulfils Srxlev > ThreshX, LowP during a time interval TreselectionRAT.

Otherwise, cell reselection to a cell on a lower priority E-UTRAN frequency or inter-RAT frequency than the serving frequency shall be performed if:

- The serving cell fulfils Srxlev < ThreshServing, LowP and a cell of a lower priority RAT/ frequency fulfils Srxlev > ThreshX, LowP during a time interval TreselectionRAT; and

- More than 1 second has elapsed since the UE camped on the current serving cell.

Cell reselection to a higher priority RAT/ frequency shall take precedence over a lower priority RAT/ frequency, if multiple cells of different priorities fulfil the cell reselection criteria.

The UE shall not perform cell reselection to NR or UTRAN FDD cells for which the cell selection criterion S is not fulfilled.

For cdma2000 RATs, Srxlev is equal to -FLOOR(-2 x 10 x log10 Ec/Io) in units of 0.5 dB, as defined in [18], with Ec/Io referring to the value measured from the evaluated cell.

For cdma2000 RATs, ThreshX, HighP and ThreshX, LowP are equal to -1 times the values signalled for the corresponding parameters in the system information.

In all the above criteria the value of TreselectionRAT is scaled when the UE is in the medium or high mobility state as defined in clause 5.2.4.3.1. If more than one cell meets the above criteria, the UE shall reselect a cell as follows:

- If the highest-priority frequency is an E-UTRAN frequency, a cell ranked as the best cell among the cells on the highest priority frequency(ies) meeting the criteria according to clause 5.2.4.6;

- If the highest-priority frequency is from another RAT, a cell ranked as the best cell among the cells on the highest priority frequency(ies) meeting the criteria of that RAT.

Cell reselection to another RAT, for which Squal based cell reselection parameters are broadcast in system information, shall be performed based on the Squal criteria if the UE supports Squal (RSRQ) based cell reselection to E-UTRAN from all the other RATs provided by system information which UE supports. Otherwise, cell reselection to another RAT shall be performed based on Srxlev criteria.

Cell reselection to NR, for which a cell reselection parameter, *q-RxLevMinSUL* is broadcast in system information and the UE supports SUL, shall be performed based on Srxlev criteria taking the parameter into account.