**3GPP TSG-RAN WG2 Meeting #109 electronicR2-20xxxxx**

**E-Meeting, 24th Feb. – 6th Mar. 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.304** | **CR** | **0145** | **rev** | **-** | **Current version:** | **15.6.0** |  |
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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 | **X** | Core Network |  |

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| ***Title:*** | 38.304 Running CR on UE Power saving in NR | | | | | | | | | |
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| ***Source to WG:*** | vivo | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_UE\_pow\_sav-Core | | | | |  | ***Date:*** | | | 2020-02-17 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***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 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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | To capture agreements for power saving in NR into TS 38.304. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Introduction of power saving feature in NR.  This CR captures the idle/inactive aspects of power saving and it is based on the RAN2 agreements made so far. | | | | | | | | |
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| ***Consequences if not approved:*** | | Power saving feature in NR is missing in TS 38.304. | | | | | | | | |
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| ***Clauses affected:*** | | 5.2.4.2, 5.2.4.7.0, 5.2.4.X (new) | | | | | | | | |
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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 ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

Start of change

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

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

- 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 NR 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 a NR inter-frequency or inter-RAT frequency with a reselection priority higher than the reselection priority of the current NR frequency, the UE shall perform measurements of higher priority NR inter-frequency or inter-RAT frequencies according to TS 38.133 [8].

- For a NR inter-frequency with an equal or lower reselection priority than the reselection priority of the current NR frequency and for inter-RAT frequency with lower reselection priority than the reselection priority of the current NR frequency:

- If the serving cell fulfils Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ, the UE may choose not to perform measurements of NR inter-frequencies or inter-RAT frequency cells of equal or lower priority;

- Otherwise,the UE shall perform measurements of NR inter-frequencies or inter-RAT frequency cells of equal or lower priority according to TS 38.133 [8].

- If the UE supports relaxed measurement and *relaxedMeasurement* is present in *SIB2*, the UE may further relax the needed measurements, as specified in sub-clause 5.2.4.X.

Next change

#### 5.2.4.7 Cell reselection parameters in system information broadcasts

##### 5.2.4.7.0 General reselection parameters

Cell reselection parameters are broadcast in system information and are read from the serving cell as follows:

**absThreshSS-BlocksConsolidation**

This specifies minimum threshold of the beam which can be used for selection of the highest ranked cell, if *rangeToBestCell* is configured.

**cellReselectionPriority**

This specifies the absolute priority for NR frequency or E-UTRAN frequency.

**cellReselectionSubPriority**

This specifies the fractional priority value added to cellReselectionPriority for NR frequency or E-UTRAN frequency.

**Qoffsets,n**

This specifies the offsetbetween the two cells.

**Qoffsetfrequency**

Frequency specific offset for equal priority NR frequencies.

**Qhyst**

This specifies the hysteresis value for ranking criteria.

**Qoffsettemp**

This specifies the additional offset to be used for cell selection and re-selection. It is temporarily used in case the RRC Connection Establishment fails on the cell as specified in TS 38.331 [3].

**Qqualmin**

This specifies the minimum required quality level in the cell in dB.

**Qrxlevmin**

This specifies the minimum required Rx level in the cell in dBm.

**Qrxlevminoffsetcell**

This specifies the cell specific Rx level offset in dB to Qrxlevmin.

**Qqualminoffsetcell**

This specifies the cell specific quality level offset in dB to Qqualmin.

**rangeToBestCell**

This specifies the R value range which the cells whose R value is within the range can be a candidate for the highest ranked cell. It is configured in SIB2 and used for intra-frequency and equal priority inter-frequency cell reselection and among the cells on the highest priority frequency(ies) for inter-frequency cell reselection within NR.

**TreselectionRAT**

This specifies the cell reselection timer value. For each target NR frequency and for each RAT other than NR, a specific value for the cell reselection timer is defined, which is applicable when evaluating reselection within NR or towards other RAT (i.e. TreselectionRAT for NR is TreselectionNR, for E-UTRAN TreselectionEUTRA).

NOTE: TreselectionRAT is not broadcast in system information but used in reselection rules by the UE for each RAT.

**TreselectionNR**

This specifies the cell reselection timer value TreselectionRAT for NR. The parameter can be set per NR frequency as specified in TS 38.331 [3].

**TreselectionEUTRA**

This specifies the cell reselection timer value TreselectionRAT for E-UTRAN.

**ThreshX, HighP**

This specifies the Srxlev threshold (in dB) used by the UE when reselecting towards a higher priority RAT/ frequency than the current serving frequency. Each frequency of NR and E-UTRAN might have a specific threshold.

**ThreshX, HighQ**

This specifies the Squal threshold (in dB) used by the UE when reselecting towards a higher priority RAT/ frequency than the current serving frequency. Each frequency of NR and E-UTRAN might have a specific threshold.

**ThreshX, LowP**

This specifies the Srxlev threshold (in dB) used by the UE when reselecting towards a lower priority RAT/ frequency than the current serving frequency. Each frequency of NR and E-UTRAN might have a specific threshold.

**ThreshX, LowQ**

This specifies the Squal threshold (in dB) used by the UE when reselecting towards a lower priority RAT/ frequency than the current serving frequency. Each frequency of NR and E-UTRAN might have a specific threshold.

**ThreshServing, LowP**

This specifies the Srxlev threshold (in dB) used by the UE on the serving cell when reselecting towards a lower priority RAT/ frequency.

**ThreshServing, LowQ**

This specifies the Squal threshold (in dB) used by the UE on the serving cell when reselecting towards a lower priority RAT/ frequency.

**SIntraSearchP**

This specifies the Srxlev threshold (in dB) for intra-frequency measurements.

**SIntraSearchQ**

This specifies the Squal threshold (in dB) for intra-frequency measurements.

**SnonIntraSearchP**

This specifies the Srxlev threshold (in dB) for NR inter-frequency and inter-RAT measurements.

**SnonIntraSearchQ**

This specifies the Squal threshold (in dB) for NR inter-frequency and inter-RAT measurements.

**SSearchDeltaP**

This specifies the threshold (in dB) on Srxlev variation for relaxed measurement.

**SSearchThresholdP**

This specifies the Srxlev threshold (in dB) for relaxed measurement.

**SSearchThresholdQ**

This specifies the Squal threshold (in dB) for relaxed measurement.

**TSearchDeltaP**

This specifies the time period over which the Srxlev variation is evaluated forrelaxed measurement.

**highPriorityMeasRelax**

This indicates whether relaxed measurement on higher priority frequency is allowed or not [in case the relaxed measurement criteria is fulfilled].

**relaxedMeasCondition**

This indicates the conditions for the UE to relax measurements.

Next change

#### 5.2.4.X Relaxed measurement

##### 5.2.4.X.0 Relaxed measurement rules

When the UE is required to perform measurements of intra-frequency or NR inter-frequencies or inter-RAT frequency cells according to the measurement rules in sub-clause 5.2.4.2, the UE may choose to perform relaxed measurements according to TS 38.133 [8]

- for measurements of intra-frequency, NR inter-frequencies of equal or lower priority, and inter-RAT frequency cells of equal or lower priority; or,

- for measurements of NR inter-frequencies or inter-RAT frequency cells of higher priority, if *highPriorityRelax* is configured with value *true*,

When:

- The UE has performed intra-frequency or inter-frequency measurements for at least TSearchDeltaP after (re-)selecting a new cell; and,

- if *relaxedMeasCondition* is configured and set to *lowMobilityAndNotAtCellEdge*,

- the relaxed measurement criterion in sub-clause 5.2.4.X.1 is fulfilled for a period of TSearchDeltaP and, the criterion in sub-clause 5.2.4.X.2 is fulfilled;

- otherwise,

- the relaxed measurement criterion in sub-clause 5.2.4.X.1 is fulfilled for a period of TSearchDeltaP; or, the criterion in sub-clause 5.2.4.X.2 is fulfilled;

##### 5.2.4.X.1 Relaxed measurement criterion for UE with low mobility

The relaxed measurement criterion for UE with low mobility is fulfilled when:

- (SrxlevRef – Srxlev) < SSearchDeltaP,

Where:

- Srxlev = current Srxlev value of the serving cell (dB).

- SrxlevRef = reference Srxlev value of the serving cell (dB), set as follows:

- After selecting or reselecting a new cell, or

- If (Srxlev - SrxlevRef) > 0, or

- If the relaxed monitoring criterion has not been met for TSearchDeltaP:

- The UE shall set the value of SrxlevRef to the current Srxlev value of the serving cell.

##### 5.2.4.X.2 Relaxed measurement criterion for UE not at cell edge

The relaxed measurement criterion for UE not at cell edge is fulfilled when:

- Srxlev > SSearchThresholdP, if SSearchThresholdP is configured, and,

- Squal > SSearchThresholdQ, if SSearchThresholdQ is configured,

Where:

- Srxlev = current Srxlev value of the serving cell (dB).

- Squal = current Squal value of the serving cell (dB).

End of change

Annex – RAN2 agreements

### RAN2#107 meeting:

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| **Agreements**   1. Measurement relaxation criteria can consider both low mobility and UE location in the cell (e.g. whether the UE is in cell-edge). 2. UE may activate relaxed measurement criteria if at least any of the following conditions are met:   a) Serving Cell measurement does not change more than a relative threshold during a time period  - LTE relaxed monitoring criteria in 36.304 is considered as a baseline. Additional enhancements to address aspects that are specific to NR can be considered.  b) UE is not a cell edge, meaning that serving cell/beam RSRP/RSRQ/SINR is above a threshold  FFS: Whether neighbour cell RSRP should also be considered. |

### RAN2#107bis meeting:

**Agreements:**

1. Network can configure the triggering criteria independently (i.e. either cell-edge or low mobility or both)
2. Cell-edge criteria will not consider neighbour cell measurements

### RAN2#108 meeting:

**Agreements**

1. Measurement relaxation criteria is evaluated using cell quality only, and we do not define beam-specific conditions for RRM measurement relaxation.
2. For not-at-cell-edge scenario, the thresholds can be based on RSRP and/or RSRQ and is configurable by the network. For low-mobility scenario, the thresholds of the delta are only in relation to RSRP.
3. Whether higher priority frequencies can be relaxed is up to network configuration. FFS on how the configuration is done.
4. Network configures RRM measurement relaxation via broadcast only; dedicated control is not supported
5. For modifications of low-mobility scenario, TSearchDeltaP less than 5 minutes is configurable in NR.

### RAN2#109e meeting:

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| **Agreements**   1. The network broadcasts corresponding parameters of relaxation triggering criteria to enable RRM measurement relaxation feature. 2. When network configures the parameters of both low mobility and not-at-cell-edge criteria. UE can perform measurement relaxation according one of the following options, which is indicated by the network:   - Option a: UE uses both low mobility criterion and not-at-cell-edge criteria, i.e. UE can perform relaxation only when both criteria are fulfilled. And detailed relaxation behaviour is up to RAN4 discussion and decision;  - Option b: UE uses either low mobility criterion or not-at cell-edge criterion, i.e. UE can perform relaxation when either low mobility or not-at-cell-edge criterion is fulfilled. And detailed relaxation behaviours are same as case that network only configures low mobility or not-at-cell-edge criterion;   1. The values of parameter SSearchDeltaP can reuse the LTE range of values, i.e. 3, 6, 9, 12, 15 dB. 2. The infinity value for parameter SSearchDeltaP is not needed. 3. When network configures both RSRP and RSRQ thresholds for not-at-cell-edge criterion, UE can perform relaxation only when both RSRP and RSRQ based criteria are met. 4. Srxlev/Squal (Cell selection RX level value (dB)) is used to compare with threshold SsearchThresholdP/ SsearchThresholdQ. The corresponding text has been updated in running 38.304 CR. 5. The threshold SsearchThresholdP/ SsearchThresholdQ reuse the value range of ReselectionThreshold/ReselectionThresholdQ or RSRP-Range/RSRQ-Range 6. An LS is sent to RAN4 on RAN2 conclusions for the RRM measurement relaxation and ask RAN4 to discuss the measurement relaxation approach(es). 7. The parameter SrxlevRef is set according to the LTE mechanism as captured in current running 38.304 CR for power saving 8. FFS on RAN4 - if and what parameters we need (e.g. time interval for measurement relaxation since last measurement for cell reselection and the value range for the time interval) |

**RRC rapporteur should be able to use this as a baseline and companies can provide further views over email**

Proposal 1: The terminology of relaxed measurement (i.e. option 2) is used for RRM measurement relaxation in NR.

Proposal 4: The IE highPriorityMeasRelax is defined as an optional fieldIE with the value of “ENUMERATED {true}” to configure higher priority frequencies can be relaxed.

Proposal 17: The parameter SSearchDeltaP is optional and default value can be 6dB.

Proposal 7: If the indication highPriorityMeasRelax is optional and when it is not present, the legacy behaviour should be followed, i.e. no measurement relaxation is performed on the high priority frequency.

Proposal 9: If proposal 8 is agreeable, this “and/or” indication is mandatory if network configures the parameters of both low mobility and not-at-cell-edge.

Proposal 12: The parameter TSearchDeltaP is optional, and the default value can be 1 minute or 60s.

Proposal 20: Whether the parameter SsearchThresholdP/SsearchThresholdQ is optional or mandatory if RRM measurement relaxation is supported can be discussed during the meeting after the decision on Proposal 2.

Proposal 11: RAN2 have a short discussion on the detailed values and the granularity for parameter TSearchDeltaP:

- Option 2: Values in number of seconds, e.g. 5s, 10s, 20s, 30s, 60s, 120s, 180s, 240s, and 300s.