**3GPP TSG-RAN WG2 Meeting #109bis-e R2-2003959**

**Electronic, 20th Apr. – 30th Apr. 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.304** | **CR** | **0152** | **rev** | **1** | **Current version:** | **16.0.0** |  |
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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:*** | CR for 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:*** | | | 2020-04-09 |
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| ***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)* | |
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| ***Reason for change:*** | | In RAN2#109bis-e meeting, the following conclusions are made based on the discussion:  1 If timer T330 is running, relaxed RRM measurement can be performed. No further specification impact  2 When cellEdgeEvalutation is configured, SSearchThresholdP should be mandatory while SearchThresholdQ is optional  3 No new behaviour for RRM relaxation needs to be captured if the parameters in SI change and UE continues legacy behaviour of SI change/update. The UE applies new configuration as in legacy behaviour.  4 Global configuration of relaxation triggers is kept. No change is needed to the current specifications from this aspect. Differentiation of scenarios can be done via the high priority frequency indication framework and no further behaviour is expected to be specified.  5 Update relaxedMeasCondition IE to a Boolean flag ‘combineRelaxedMeasConditions’  6 IEs s-SearchDeltaP and t-searchDeltaP are mandatory fields [CB if an issue is identified]  7 Leave it to NW implementation to ensure that at least lowMobilityEvalutation or cellEdgeEvalutation IEs are present when relaxedMeasurement is configured.  The above conclusion should be captured in the specification. | | | | | | | | |
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| ***Summary of change:*** | | 1. In Section 5.2.4.2, add a note to clarify that at least one of *lowMobilityEvalutation* and *cellEdgeEvalutation* is expected if relaxedMeasurement is configured. 2. In Section 5.2.4.9.0, remove the Editor’s Note for FFS whether the configruation for relaxed measurment is a constant value for all relevant frequencies or a per-frequency configured value, the Editor’s Note for FFS on the UE behaviour if T330 is running. 3. In Section 5.2.4.9.0, change the case for intra-f/inter-frequency of equal/lower priority/inter-RAT frequency “or” inter-frequency/inter-RAT of higher priority to “and” 4. In Section 5.2.4.9.0, clarify that the UE has performed intra-frequency or inter-frequency measurements for at least TSearchDeltaP after (re-)selecting a new cell, where the measurements are normal (not-relaxed) measurement. 5. In Section 5.2.4.9.0, change the configuration of parameter *relaxedMeasCondition* to align with the definition in TS 38.331. 6. In Section 5.2.4.9.2, remove the condition “if SSearchThresholdP is configured” for RSRP case, and remove the Editor’s Note on FFS whether the parameter SsearchThresholdP and/ or SsearchThresholdQ is optional or mandatory. | | | | | | | | |
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| ***Consequences if not approved:*** | | The latest conclusions for RRM measurement relaxation in power saving will not be captured in specification. | | | | | | | | |
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| ***Clauses affected:*** | | 5.2.4.2, 5.2.4.9.0, 5.2.4.9.2 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS 38.331 CR 1540 | | |
| ***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 clause 5.2.4.9.

Note: At least one of *c* and *cellEdgeEvalutation* is expected if *relaxedMeasurement* is configured.

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 the minimum threshold for beams which can be used for selection of the highest ranked cells, if *rangeToBestCell* is configured, and for beams used for derivation of cell measurement quantity. The parameter in *SIB2* applies to the current serving frequency and the parameter in *SIB4* applies to the corresponding inter-frequency.

**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.

**highPriorityMeasRelax**

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

**nrofSS-BlocksToAverage**

This specifies the number of beams which can be used for selection of the highest ranked cell, if *rangeToBestCell* is configured, and the number of beams used for derivation of cell measurement quantity. The parameter in *SIB2* applies to the current serving frequency and the parameter in *SIB4* applies to the corresponding inter-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.

**combineRelaxedMeasCondition**

This indicates whether the UE combines the configured two conditions when determining whether to relax measurements.

**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.

**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.

**TSearchDeltaP**

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

Next change

#### 5.2.4.9 Relaxed measurement

##### 5.2.4.9.0 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 clause 5.2.4.2, the UE may choose to perform relaxed measurements [FFS 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; and,

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

When:

- if *lowMobilityEvalutation* is configured and *cellEdgeEvalutation* is not configured,

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

- the relaxed measurement criterion in clause 5.2.4.9.1 is fulfilled for a period of TSearchDeltaP;

- if *cellEdgeEvalutation* is configured and *lowMobilityEvalutation* is not configured,

- the relaxed measurement criterion in clause 5.2.4.9.2 is fulfilled;

- if both *lowMobilityEvalutation* and *cellEdgeEvalutation* are configured;

- if *combineRelaxedMeasCondition*is configured and set to *True*,

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

- the relaxed measurement criterion in clause 5.2.4.9.1 is fulfilled for a period of TSearchDeltaP; and,

- the relaxed measurement criterion in clause 5.2.4.9.2 is fulfilled;

- otherwise,

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

- the relaxed measurement criterion in clause 5.2.4.9.1 is fulfilled for a period of TSearchDeltaP; or,

- the relaxed measurement criterion in clause 5.2.4.9.2 is fulfilled.

Editor's Note: FFS whether detailed methods for relaxed measurements is captured in TS 38.133.

Editor's Note: 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).

##### 5.2.4.9.1 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.

##### 5.2.4.9.2 Relaxed measurement criterion for UE not at cell edge

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

- Srxlev > SSearchThresholdP, 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