**3GPP TSG-RAN WG2 Meeting #110-e R2-200xxxx**

**Electronic, 1st Jun. – 12th Jun. 2020**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **38.304** | **CR** | **0158** | **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:*** | 2020-05-21 |
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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 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-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 cellEdgeEvaluation is configured, SSearchThresholdP should be mandatory while SearchThresholdQ is optional3 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 fields7 Leave it to NW implementation to ensure that at least lowMobilityEvaluation or cellEdgeEvaluation IEs are present when relaxedMeasurement is configured. In RAN2#110-e meeting, the following conclusions are made based on the discussion: 1 The description for parameter combineRelaxedMeasCondition in TS 38.304 can be (baseline) as described in the paper in [R2-2006008](file:///C%3A%5CUsers%5Cpanidx%5CDocuments%5CTSGR2_110-e%5CDocs%5CR2-2006008.zip)*This indicates when the UE needs to fulfil both low mobility criterion and not-at-cell-edge criterion to determine whether to relax measurements.*2 For Proposal 3 in [R2-2006008](file:///C%3A%5CUsers%5Cpanidx%5CDocuments%5CTSGR2_110-e%5CDocs%5CR2-2006008.zip): case A – remove option 3, Case C and G – remove option 2 and 3.3 ASK RAN4 in general LS: The parameter *highPriorityMeasRelax*is kept and defined as follows as a baseline: *If highPriorityMeasRelax is configured and set to True, and the criterion is fulfilled,* 1. *the UE can perform relaxed measurement for higher priority frequency. How to relax measurement for higher priority frequency is up to the conclusion of RAN4*

*Otherwise (i.e. highPriorityMeasRelax is not configured,)*1. *The UE doesn’t stop measurements for higher priority frequency and the UE should continue searching according to Thigherprioritysearch. Update if RAN4 has concerns.*

4 Network configuration should ensure that SSearchThresholdP ≤ SIntraSearchP, and SSearchThresholdQ ≤ SIntraSearchQ, as well as, SSearchThresholdP ≤ SnonIntraSearchP, and SSearchThresholdQ ≤ SnonIntraSearchQ.6 Capture in TS 38.304 that “*Less than 1 hour have passed since measurements for cell selection/reselection were last performed*”. How to capture it can be discussed in CR discussion. Let RAN4 know. 7 RAN2 understands that RRM measurement relaxation method with scaling factor should be captured in RAN4 specification (TS 38.133). And RAN2 specification (TS 38.304) should refer to the relevant section in TS 38.133.8 RAN2 understands the use case, in which the UE may choose to not perform any NR inter/intra-frequencies or inter-RAT frequencies measurements, should be captured in TS 38.304In RAN4 reply LS [R2-2006132], they have the conclusions:1 The measurement relaxation method for higher priority or equal/lower priority applies to inter-RAT measurement with higher priority or equal/lower priority.3 Regarding the impact of EMR on UE power saving, RAN4’s conclusion is that measurements on EMR carriers should not be relaxed if T331 is running.4 RAN4 concludes that when network configures both low mobility and not-at-cell-edge criteria, if network indicates option b, the relaxation method corresponding to scenario #3 will be used when both relaxation criteria have been fulfilled5 When Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ and only criteria of low mobility is configured, if the low mobility criteria is fulfilled,1. UE is not required to do any lower and equal priority inter-frequency/inter-RAT measurement
2. When NW indicates that higher priority carrier measurements can be relaxed (highPriorityMeasRelax), UE measures higher priority inter-frequency/inter-RAT layers at least every 1 hour
3. When NW does not indicate that higher priority carrier measurements can be relaxed, UE measures higher priority inter-frequency/inter-RAT layers at least every Thigher\_priority\_search (60 sec)

The above conclusion should be captured in the specification.  |
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| ***Summary of change:*** | 1. In Section 5.2.4.7.0, change the terminology and description of parameter *combineRelaxedMeasCondition* to align with RRC specification and RAN2 conclusion.
2. In Section 5.2.4.7.0, change the description of parameter *highPriorityMeasRelax* to align with RAN2 conclusion.
3. 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.
4. In Section 5.2.4.9.0, change the structure for measurement relaxation criteria to capture all cases based on actual configurations of *lowMobilityEvaluation* and *cellEdgeEvaluation*.
5. In Section 5.2.4.9.0, capture the above RAN2/RAN4 conclusions on relaxed measurements methods in different use cases.
6. In Section 5.2.4.9.2, remove the condition “if SSearchThresholdP is configured” for RSRP case, and remove the corresponding 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:*** | 5.2.4.7.0, 5.2.4.9.0, 5.2.4.9.2 |
|  |  |
|  | **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 ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

Start of 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.

**combineRelaxedMeasCondition**

This indicates when the UE needs to fulfil both low mobility criterion and not-at-cell-edge criterion to determine whether to relax measurements.

**highPriorityMeasRelax**

This indicates whether measurement on higher priority frequency is allowed to be relaxed beyond Thigher\_priority\_search (see clause 4.2.2.7 in TS 38.133 [8]) 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.

**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:

- if *lowMobilityEvaluation* is configured and *cellEdgeEvaluation* is not configured; and,

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

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

- the UE may choose to perform relaxed measurements for intra-frequency, NR inter-frequency, or inter-RAT frequency cells according to relaxation methods in clauses 4.2.2.8, 4.2.2.9, and 4.2.2.10 in TS 38.133 [8];

- if *cellEdgeEvaluation* is configured and *lowMobilityEvaluation* is not configured; and,

- if the relaxed measurement criterion in clause 5.2.4.9.2 is fulfilled:

- the UE may choose to perform relaxed measurements for intra-frequency, NR inter-frequency, or inter-RAT frequency cells according to relaxation methods in clauses 4.2.2.8, 4.2.2.9, and 4.2.2.10 in TS 38.133 [8];

- if both *lowMobilityEvaluation* and *cellEdgeEvaluation* are configured; and,

- if *combineRelaxedMeasCondition* is not configured:

- if 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,

- if the relaxed measurement criterion in clause 5.2.4.9.2 is fulfilled:

- the UE may choose to perform relaxed measurements for intra-frequency, NR inter-frequency, or inter-RAT frequency cells according to relaxation methods in clauses 4.2.2.8, 4.2.2.9, and 4.2.2.10 in TS 38.133 [8];

- if both *lowMobilityEvaluation* and *cellEdgeEvaluation* are configured; and,

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

- if less than 1 hour has passed since measurements for cell (re-)selection were last performed; and,

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

- if the relaxed measurement criterion in clause 5.2.4.9.2 is fulfilled:

- the UE may choose not to perform measurement for measurements of intra-frequency, NR inter-frequencies of equal or lower priority, or inter-RAT frequency cells of equal or lower priority;

- if *highPriorityMeasRelax* is configured with value *true*:

- the UE may choose not to perform measurement for measurements of NR inter-frequencies or inter-RAT frequency cells of higher priority;

- if *lowMobilityEvaluation* is configured and *cellEdgeEvaluation* is not configured; and,

- if the serving cell fulfils Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ; and,

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

- if less than 1 hour have passed since measurements for cell (re-)selection were last performed; and,

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

- if *highPriorityMeasRelax* is configured with value *true*:

- the UE may choose not to perform measurement for measurements of NR inter-frequencies or inter-RAT frequency cells of higher priority;

- if both *lowMobilityEvaluation* and *cellEdgeEvaluation* are configured; and,

- if the serving cell fulfils Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ; and,

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

- if less than Thigher\_priority\_search (see clause 4.2.2.7 in TS 38.133 [8]) has passed since measurements for cell (re-)selection were last performed; and,

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

- if the relaxed measurement criterion in clause 5.2.4.9.2 is fulfilled; and,

- if *highPriorityMeasRelax* is not configured:

- the UE may choose not to perform measurement for measurements of NR inter-frequencies or inter-RAT frequency cells of higher priority.

The above relaxed measurements and no measurement are not applicable for frequencies that are included in *VarMeasIdleConfig*, if configured and for which the UE supports dual connectivity or carrier aggregation between those frequencies and the frequency of the current serving cell.

##### 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