**3GPP TSG- Meeting #**

**, , -**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
|  | | | | | | | | |
| *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>.* | | | | | | | | |
|  | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** |  | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***Release:*** | | |  |
|  | *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-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | This CR introduces LP-WUR serving cell measurement and evaluation requirements.  Agreements from RAN4#116:  **Issue 1-2-1-1: Detail on LR accuracy and side conditions requirements**  <Agreement>:  Use 2.5 dB as the RF impairment margin for LP-RSRP accuracy requirements*.*  *Based on P1 remove [] of the agreements in RAN4 114bis as*  For FR1:   * + - ±3.5 dB is used for core requirements for LP-RSRQ accuracy and ±6 dB is used for core requirements for LP-RSRP accuracy, under the side conditions Ês/Iot = -3 dB     - ±3.5 dB is used for core requirements of SSB based RSRQ accuracy and ±6 dB is used for core requirements for SSB based RSRP accuracy, under the side conditions Ês/Iot = -3 dB   **Issue 1-2-4-2-3: On how to define LR evaluation requirements**  <Agreement>:  *LR evaluation duration is [x1 samples]\*LP-SS (for OOK LR) or [y1 samples] \*LO (for SSB LR), assuming x or y samples are used to satisfy accuracy requirement and x1 > x and y1>y.*  *Agree* Using x1=2\*x and y1=2\*y for the evaluation requirement.*;*  *Agree y = 2;*  *For x, x= 3;*  No RAN4 RRM requirements for LP-WUR operation with eDRX with PTW window in Rel-19.  **Issue 1-1-15 LP-WUR operation with RedCap**  <Agreement>: Specify LP-WUR related idle/inactive requirements including requirement on serving cell offloading, RRM relaxation and higher priority frequency layer search for Redcap UE.   * Existing requirements for MR offloading, RRM relaxation and higher priority frequency layer search will be reused for Redcap UE   + Confirm the MR wake up delay will apply for 2 Rx Redcap   **Issue 1-2-11: RRM requirements for FR2**  <Agreement>:  For the SSB based LR FR2 requirement   |  |  | | --- | --- | | **LO periodicity [s] Note 1** | **FR2** | | 0.32 | 8 | | 0.64 | 5 | | 1.28 | 4 | | 2.56 | 3 |   No requirement for the FR2 LP-SS based LR | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  |  | Other core specifications | | | |  | | |
| ***affected:*** | |  |  | Test specifications | | | |  | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

**<Start of change>**

4.x Low Power Wake Up Radio Requirements

4.x.2 LP-WUR serving cell measurement and evaluation requirements

4.x.2.1 General description and requirement applicability

This sub-clause specifies the serving cell measurements and evaluation requirements for a UE with LP-WUR in RRC\_IDLE State.

The requirements apply to a UE supporting *FG-62-1* or *FG-62-1a* provided that the corresponding evaluation thresholds are configured by higher layers.

Before entering LP-WUS monitoring, RRM offloading or RRM relaxation mode or after exiting LP-WUS monitoring, RRM offloading and RRM relaxation mode, it is up to UE implementation when and how to turn the LP-WUR to ON state for serving cell measurements. When LP-WUR is in the ON state, the UE may perform serving cell measurements based on LP-SS or PSS/SSS, where the requirements for LP-SS based measurements and evaluations in clause 4.x.2 apply only if the LP-SS is configured and transmitted on the same carrier frequency as the serving cell.

The requirements in section 4.2 apply when the network has not configured thresholds for RRM measurement offloading or RRM measurement relaxation, or when the corresponding conditions are not fulfilled. If the UE applies RRM measurement offloading or RRM measurement relaxation, it shall perform measurements based on LP-SS or PSS/SSS following the requirements specified in section 4.x.2.2 or 4.x.2.3.

For UE supporting FG-62-1a, the requirements specified in 4.x.2.2 apply.

For UE supporting FG-62-1 or FG-62-1a, when only LP-RSRP and/or LP-RSRQ thresholds are configured, the LP-SS measurement requirements specified in section 4.x.2.3 shall apply.

The requirements in this clause apply for Redcap UE supporting FG-62-1 or, FG-62-1a.

Prior to performing LP-WUR evaluation specified in 4.x.2.2 or 4.x.2.3, if configured, the UE shall meet the corresponding LR entry criteria at least once for:

- entry condition for LP-WUS monitoring

- entry condition for RRM relaxation

- entry condition for RRM offloading

4.x.2.2 LP-WUR measurement and evaluation requirements for PSS/SSS

Upon meeting the entry conditions for RRM offloading or RRM relaxation, the UE shall measure the SS-RSRP and SS-RSRQ level once every LO cycle and evaluate whether one or more of the following conditions defined in TS 38.304 [1], if configured, are met within Tevaluate-LP-WUR-PSS/SSS

*-* exit condition for LP-WUS monitoring

- exit condition for RRM offloading

- exit condition for RRM relaxation

The UE shall filter the SS-RSRP and SS-RSRQ measurements of the serving cell using at least 2 measurement samples. Within the set of measurements used for the filtering, at least two measurement samples shall be spaced by *LO-periodicity*/2.

**Table 4.x.2.2-1: Tevaluate-LP-WUR-PSS/SSS for FR1 and FR2**

|  |  |  |  |
| --- | --- | --- | --- |
| **LO periodicity [s] Note 1** | **Scaling Factor (NLP-WUS)** | | **Tevaluate-LP-WUR-PSS/SSS (number of LO Cycles [s])** |
| **FR1** | **FR2** |
| 0.32 | 1 | 8 | 0.32 x 4x NLP-WUS (1.28s x NLP-WUS) |
| 0.64 | 5 | 0.64 x 4 x NLP-WUS (2.56s x NLP-WUS) |
| 1.28 | 4 | 1.28 x 4 x NLP-WUS (5.12s x NLP-WUS) |
| 2.56 | 3 | 2.56 x 4 x NLP-WUS (10.24s x NLP-WUS) |
| Note 1: The LO periodicity is the same as the configured DRX cycle length | | | |

The UE shall evaluate and consider the corresponding *entry* criteria fulfilled within Tevaluate-LP-WUR-PSS/SSS, provided that the criteria is met by a margin of 6 dB for SS-RSRP and/or 3.5 dB for SS-RSRQ in FR1 and by a margin of 7.5 dB for SS-RSRP and/or 3.5 dB for SS-RSRQ in FR2 when SSB Ês/Iot ≥ -3dB

The UE shall evaluate and consider the corresponding *exit* criteria fulfilled within Tevaluate-LP-WUR- PSS/SSS, provided that the criteria is met by a margin of 6 dB for SS-RSRP and/or 3.5 dB for SS-RSRQ in FR1 and by a margin of 7.5 dB for SS-RSRP and/or 3.5 dB for SS-RSRQ in FR2 when SSB Ês/Iot ≥ -3dB.

When a configured entry or exit condition is fulfilled, the UE shall perform corresponding actions as defined in clause 5.2 in TS 38.304 [1].

4.x.2.3 LP-WUR measurement and evaluation requirements for LP-SS

Upon meeting the entry conditions for RRM offloading or RRM relaxation, the UE shall measure the LP-RSRP and LP-RSRQ level once every LP-SS cycle and evaluate whether one or more of the following conditions defined in TS 38.304 [1] are met within Tevaluate-LP-WUR-LP-SS

- exit condition for LP-WUS monitoring

- exit condition for RRM offloading

The UE shall filter the LP-SS measurements of the serving cell using at least 2 measurement samples.

**Table 4.x.2.3-1: Tevaluate-LP-WUR-LP-SS**

|  |  |
| --- | --- |
| **LP-SS periodicity [s]** | **Tevaluate-LP-WUR-LP-SS**  **(number of LP-SS Cycles [s])** |
| 0.16 | 0.16 x 6(0.96s) |
| 0.32 | 0.32 x 6 (1.92s) |

The UE shall evaluate and consider the corresponding *entry* criteria fulfilled within Tevaluate-LP-WUR-LP-SS, provided that the criteria is met by a margin of 6 dB for LP-RSRP and/or 3.5 dB for LP-RSRQ in FR1 when LP-SS Ês/Iot ≥ -3dB

The UE shall evaluate and consider the corresponding *exit* criteria fulfilled within Tevaluate-LP-WUR- LP-SS, provided that the criteria is met by a margin of 6 dB for LP-RSRP and/or 3.5 dB for LP-RSRQ in FR1 when LP-SS Ês/Iot ≥ -3dB.

When a configured entry or exit condition is fulfilled, the UE shall perform corresponding actions as defined in clause 5.2 in TS 38.304 [1].

**<End of change>**