**3GPP TSG RAN WG2#115-e draftR2-2109218**

**e-Meeting, 9th - 27th August, 2021**

**Title:** LS on RAN2 agreements for RedCap

**Response to:**

**Release:** Rel-17

**Work Item:** Support of reduced capability NR devices (NR\_redcap-Core)

**Source:** Ericsson (to be RAN2)

**To:** RAN1

**Cc:**

**Contact person:** Tuomas Tirronen, tuomas.tirronen (at) ericsson.com

**Send any reply LS to:** 3GPP Liaisons Coordinator, <mailto:3GPPLiaison@etsi.org>

**Attachments:** None

# 1 Overall description

RAN2 has discussed the RAN2-led features for RedCap during RAN2#115-e and agreed to send agreements and working assumptions to RAN1 and RAN4. RAN2 respectfully asks RAN1 and RAN4 to take the agreements and working assumptions into account in their further work for RedCap and provide feedback, if any.

The following have been agreed on the objective for framework for reduced capabilities:

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| Agreements:  1. The number of DRBs supported by RedCap UEs is less than legacy value (which is 16). There will be a single mandatory value (FFS if 4 or 8). FFS if it will be possible to have an optional capability  2. “RRC processing delay” is not relaxed for RedCap UE  3. PDCP/RLC AM 12 bits SN is mandatory for RedCap UE, and PDCP/RLC AM 18bits SN is optional supported by RedCap UE; FFS on how to capture this in specification  4. NE-DC, and (NG)EN-DC are not supported by RedCap UE; FFS on how to capture it in the specification[  5. DAPS and CAPC related capabilities are not applicable for RedCap UE; [8/20] FFS on CHO. FFS on how to capture this in the specification;  Agreements via email - from offline 109:  1. Maximum 8 DRBs is mandatory supported by RedCap UEs.  2. From RAN2 perspective, inter RAT mobility related capabilities are applicable for RedCap UE;  3. From RAN2 perspective, measurement related capabilities are applicable for RedCap UE;  4. From RAN2 perspective, URLLC related capabilities are applicable for RedCap UE except those affected by CA/DC;  5. From RAN2 perspective, IAB related capabilities are not applicable for RedCap UE, i.e. the RedCap UE is not expected to act as IAB node;  6. Do not introduce capability signalling on the supported Rx number for RedCap UE since the number of Rx branches for RedCap is implicitly indicated by the corresponding capability parameter maxNumberMIMO-LayersPDSCH in the existing UE capability framework; |

The following have been agreed on the objective for identification, access and camping restrictions:

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| Agreements:  1. Msg1 identification which can be configured to be enabled/disabled can be specified from RAN2 point of view.  2. Solution for early identification for 2-step RACH will be specified.  3. Specify separate indications in SIB1 for barring RedCap UEs with 1 Rx chain and 2 Rx chains.  4. Specify a RedCap specific IFRI in SIB1.  Agreements via email - from offline 104:  1. IFRI for RedCap UEs in SIB1 is common for UEs with 1 Rx or 2 Rx branches.  2. If RedCap-specific IFRI is absent from broadcast SI, the UE considers the cell does not support RedCap.  Agreements online:  1. A Msg3 early identification based on dedicated LCID is supported (if SA3 confirms there is no problem)  Agreements:  1. RedCap UE applies the existing cellBarred field in MIB |

The following have been agreed on the objective for UE power saving - eDRX:

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| Agreements:  1. When IDLE eDRX cycle is longer than 10.24s, PH calculation formula defined in LTE is re-used, i.e.  PH\_CN: H-SFN mod TeDRX,\_CN,H= (UE\_ID\_H mod TeDRX\_CN,H)  - where TeDRX\_CN,H is equal to IDLE eDRX cycle.  2. When IDLE eDRX cycle is longer than 10.24s, CN PTW\_end calculation formula defined in LTE is re-used, i.e.  PTW\_end is radio frame satisfying SFN = (PTW\_start + L\*100 - 1) mod 1024,  - where L is PTW length configured by upper layers.  3. For RRC\_IDLE UE, when eDRX cycle is no longer than 10.24s, T is determined by IDLE eDRX cycle. When eDRX cycle is longer than 10.24s, during the CN PTW, T is determined by the shortest of UE specific DRX cycle, if configured by upper layer, and default paging cycle.  4. For RRC\_INACTIVE UE, when IDLE eDRX cycle is longer than 10.24s and Inactive eDRX cycle is not configured, during CN PTW, T is determined by the shortest of UE specific DRX cycle, if configured by upper layer, RAN paging cycle and default paging cycle.  5. For RRC\_INACTIVE UE, when IDLE eDRX cycle is longer than 10.24s and Inactive eDRX cycle is no longer than 10.24s, outside CN PTW, T is determined by INACTIVE eDRX cycle.  Agreements via email - from offline 105 second round:  1. RAN2 considers the configuration as an invalid case, where INACTIVE eDRX cycle is configured but IDLE eDRX cycle is not configured. FFS whether to capture this restriction in RAN2 spec.  2. RAN2 considers the configuration as invalid case, where INACTIVE eDRX cycle is longer than IDLE eDRX cycle. FFS whether to capture this restriction in RAN2 spec.  3. The maximum PTW length is 40.96s when IDLE eDRX cycle is longer than 10.24s.  4. The minimum PTW length is 1.28s and the step length/granularity of PTW length is 1.28 when IDLE eDRX cycle is longer than 10.24s.  5. Introduce an additional new IE for INACTIVE eDRX to contain all values of INACTIVE eDRX cycles (also include values >10.24, if agreed in future).  6. For RRC\_INACTIVE UE, when IDLE eDRX cycle is no longer than 10.24s and INACTIVE eDRX cycle is no longer than 10.24s, T is determined by the shortest of IDLE eDRX cycle and INACTIVE eDRX cycle.  7. For RRC\_INACTIVE UE, when IDLE eDRX cycle is longer than 10.24s and INACTIVE eDRX cycle I s no longer than 10.24s, during CN PTW, T is determined by the shortest of UE specific DRX cycle, I f configured by upper layer, INACTIVE eDRX cycle and default paging cycle.  8. eDRX feature is optional for any UE (including RedCap and non-RedCap UEs).  Agreements via email - from offline 105 third round  1. eDRX is optional for any gNB (either supporting RedCap or not), which means it is up to gNB implementation whether to support eDRX  Working Assumption:  2. When IDLE eDRX cycle is longer than 10.24s, CN PTW\_start calculation formula defined in LTE is re-used as the baseline, as below. FFS whether CN PTW\_start position could be configurable by network and in case which node decides the N value. Note: this formula would be revisited if INACTIVE eDRX cycle can be above 10.24s  PTW\_start denotes the first radio frame of the PH that is part of the PTW and has SFN satisfying the following equation:  SFN = 1024/N\* ieDRX, where  ieDRX = floor(UE\_ID\_H /TeDRX,H) mod N  FFS N = 4 or 8, FFS if N can take other values  Agreements online:  1. For RRC\_INACTIVE UE, when IDLE eDRX cycle is no longer than 10.24s and INACTIVE eDRX cycle is not configured, FFS which option below is adopted for paging monitoring:  Option 1: T is determined by the shortest of RAN paging cycle, IDLE eDRX cycle, and default paging cycle.  Option 2: T is determined by the shortest of RAN paging cycle and IDLE eDRX cycle.  2. For RRC\_INACTIVE UE, when IDLE eDRX cycle is longer than 10.24s and INACTIVE eDRX cycle is not configured, outside CN PTW, FFS which option below is adopted for paging monitoring:  Option 1: T is determined by the shortest of RAN paging cycle and default paging cycle.  Option 2: T is determined by RAN paging cycle. |

The following have been agreed on the objective for UE power saving – RRM relaxation:

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| Agreements:  1. Do not introduce nor reuse not-at-cell-edge threshold for R17 RRC\_CONNECTED UEs.  Agreements via email - from offline 110:  1. Do not introduce beam change based criterion in Rel-17.  2. The network provides the configuration of stationarity criterion to the UE via dedicated signalling (e.g. RRCReconfiguration message) in RRC\_CONNECTED.  3. Send LS to RAN4 to inform RAN2 conclusions for RRM relaxation.  4. The LS to RAN4 includes the agreed RAN2 conclusions and “For RRC\_IDLE/INACTIVE, RAN4 is asked to study and define corresponding R17 RRM relaxation method” .  Agreements:  1. Introduce separate Rel-17 not-at-cell-edge threshold, and the new threshold is only associated with Rel-17 stationary criterion (if configured). If configured with a not-at-cell-edge criterion, the R17 stationary criterion can only be configured together with the R17 not-at-cell-edge criterion, not with the R16 one |

# 2 Actions

**To RAN1 and RAN4:**

**ACTION:** RAN2 respectfully asks RAN1 and RAN4 to take the above agreements into account in their further work for RedCap and provide feedback, if any.

# 3 Dates of next TSG-RAN WG2 meetings

TSG-RAN WG2 Meeting #116-e 1st – 11th November 2021 Online

TSG-RAN WG2 Meeting #117 2022 TBD