**3GPP TSG-RAN2 Meeting #116-bis-e *R2-220xxxx***

**Online, 17-25 January 2022**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.300** | **CR** | **CRNum** | **rev** | **RevNum** | **Current version:** | **16.8.0** |  |
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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 | **x** |

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| ***Title:*** | Running 38300 CR for RedCap | | | | | | | | | |
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| ***Source to WG:*** | Nokia, Nokia Shanghai Bell | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
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| ***Work item code:*** | NR\_redcap-Core | | | | |  | ***Date:*** | | | 2022-01-25 |
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| ***Category:*** | B |  | | | | | ***Release:*** | | | Rel-17 |
|  | *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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
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| ***Reason for change:*** | | This is a draft of the running RedCap CR for 38.300. To be updated as the work progresses. | | | | | | | | |
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| ***Summary of change:*** | | Agreements and if they have been captured:   |  |  | | --- | --- | | **RAN2#116bis:** | | | RedCap UE can optionally support 16 DRBs qualified with a capability. | No impact | | ANR feature is optional for RedCap UE; | No impact | | CHO related capabilities are applicable for RedCap UEs (understanding that CHO is already defined as an optional feature). “FFS on CHO” can be removed. | No impact | | RAN2 confirms RAN1 agreements, i.e. introduce explicit bit to indicate the support of RedCap; To be captured in Mega CR; | No impact | | RAN2 confirms RAN1 agreements, i.e. introduce capability bit on Half-duplex FDD operation type A for RedCap UEs; To be captured in Mega CR. | No impact | | RAN2 confirms that for RedCap UEs, “maxNumberMIMO-LayersPDSCH ” is still per FSPC although per band is enough. | No impact | | Clarify in the field description of shortSN and am-WithShortSN that, RedCap UE should always report "1" in TS 38.306 section 4.2.4 and 4.2.5. | No impact | | For the LTE to NR handover, in case the target NR cell is a legacy cell, the RedCap UE should trigger RRC re-establishment procedure. FFS any specification impact or purely leave to implementation | No impact | | "1 DL MIMO" vs "no MIMO" will no longer be discussed in RAN2 | No impact | | Capture “Support of RedCap early indication based on Msg1, MsgA and Msg3 for RACH” in the field description of capability bit “support of RedCap”; | MSGA part captured. | | Capture the limitation on BW, Rx and MIMO in 4.2.xx RedCap Parameters of TS38.306 running CR as:  - The maximum bandwidth is 20 MHz for FR1, and is 100 MHz for FR2; UE features and corresponding capabilities related to UE bandwidths wider than 20 MHz in FR1 or wider than 100 MHz in FR2 are not supported by RedCap UEs;  - 1 DL MIMO layer if 1 Rx branch is supported, and 2 DL MIMO layers if 2 Rx branches are supported. UE features and corresponding capabilities related to more than 2 UE Rx branches and more than 2 DL MIMO layers, as well as UE features and capabilities related to more than 2 UE Tx branches and more than 2 UL MIMO layers are not supported by RedCap UEs | No impact | | Working Assumption:  The capability “support of RedCap” is per UE capability. Take a final agreement in the next meeting based on possible further feedback from RAN1 | No impact | | A RedCap UE in idle/inactive mode monitors paging only in an initial BWP (default or RedCap specific) associated with CD-SSB and performs cell (re-)selection and measurements on the CD-SSB | Captured | | If a RedCap-specific initial UL BWP is configured for RACH, RedCap UEs shall use only the RedCap-specific initial UL BWP to perform RACH. | Captured | | If a RedCap UE in idle/inactive mode is configured with a separate initial BWP associated with no SSB (CD or NCD) for RACH, measurements are based on CD-SSB for initial RACH resource selection. | No impact | | If a RedCap UE in idle/inactive mode is configured with a separate initial BWP associated with no SSB (CD or NCD) for RACH, PDCCH-ConfigCommon of the separate initial DL BWP includes common search space configuration for RAR. | No impact | | From RAN2 perspective, if a RedCap UE in idle/inactive mode is configured with a separate initial BWP associated with no SSB (CD or NCD) for RACH, it is up to UE implementation to perform new RSRP measurement in a DL BWP associated with CD-SSB before Msg1/A retransmission. | No impact | | RedCap-specific two-step RACH, if configured, and four-step RACH are always configured in the same BWP. | No impact | | In RRC connected mode NCD-SSB may be configured for a RedCap UE in dedicated DL BWP. | Captured | | For connected mode operation NCD-SSB has the same properties (e.g., ssb-PositionsInBurst, PCI, ssb-periodicity, ssb-PBCH-BlockPower) as the corresponding CD-SSB. FFS if an additional property needs to be specified. | No impact | | For connected mode operation if NCD-SSB is configured in a dedicated DL BWP, RedCap UE assumes that “SSB” in QCL-Info IE and “ssb-Index” in RadioLinkMonitoringRS IE refer to the beam with the same index in the NCD-SSB configured in that BWP. | No impact | | For connected mode operation if NCD-SSB is configured in a dedicated DL BWP whose paired UL BWP is configured with RACH-ConfigDedicated, RACH-ConfigCommon or BeamFailureRecovery Config, SSB in that RACH configuration (e.g., in CFRA-SSB-Resource IE or in PRACH-ResourceDedicatedBFR IE) refers to the NCD-SSB configured in that DL BWP. | No impact | | The network may provide absoluteFrequencySSB and ssb-periodicity explicitly for NCD-SSB, i.e., other properties such as PCI, ssb-PBCH-BlockPower, ssb-PositionsInBurst are configured with the same values from serving cell's CD-SSB. FFS for the time offset (feedback from RAN1 might also be received) | No impact | | Send a reply LS to RAN1 (cc: RAN4) indicating that "The use of CSI-RS for cell/beam RLM and measurements is supported from RAN2 signaling standpoint as indicated earlier. RAN4 has informed RAN2 and RAN1 that CSI-RS cannot be used as a standalone mechanism for RRM measurements and existing requirements rely on the presence of SSB signals. RAN2 does not intend to introduce a new mechanism that would enable a RedCap UE to perform CSI-RS based RRM measurements and think that it is up to RAN4 to decide whether RAN1 working assumption regarding the use of CSI-RS in connected mode is acceptable based on the information provided above." | No impact. | | Send a LS to RAN4 (Cc: RAN1) to inform that "it is up to UE implementation to perform new RSRP measurement in a DL BWP associated with CD-SSB before Msg1/A retransmission if a RedCap UE in idle/inactive mode is configured with a separate initial BWP associated with no SSB (CD or NCD) for RACH." and ask them to check if they need to do anything in their specs. | No impact | | Working Assumption: The periodicity of NCD-SSB shall be not less than the periodicity of serving cell’s CD-SSB | No impact | | In MAC perspective, a RedCap UE uses MsgA PRACH early identification when it transmits preamble for CBRA if MsgA PRACH early identification is configured for RedCap by NW. | Captured | | For MsgA PRACH early identification, RAN2 confirms both dedicated ROs and dedicated PRACH preamble can be supported from signalling point of view. | No impact | | For RedCap, MsgA PRACH early identification is enabled/disabled implicitly by the presence of dedicated RACH configuration for MsgA PRACH early identification. | No impact | | As in legacy, in case the cell is barred due to being unable to acquire the MIB, intra-frequency cell reselection is considered by RedCap UE as “allowed”. | No impact | | In MAC perspective, RedCap UE uses the dedicated LCID for Msg3 early identification, when the Msg3 includes the CCCH data (no other precondition) | Captured | | Also when msg1 early identification is configured, new dedicated LCID is used for CCCH identification | Captured | | Working assumption: Msg3 early identification is mandatorily supported by RedCap UE | No impact | | For the cell barring in SIB1, RAN2 agree to use two mandatory sub-IEs with {barred, notBarred} values included in one optional parent IE cellBarredRedCap-r17 | No impact | | Working Assumption:  System information can provide information on which frequencies accept RedCap UE access (e.g. by considering whether supporting RedCap). | Captured | |  |  | | If UAI-based report is adopted, 1-bit indication (i.e., whether UE meets stationary criterion or not) is sufficient for UE to report its relaxation status. | No impact | | Define a Rel-17 indicator similar to combineRelaxedMeasCondition-r16. This indication is used to differentiate two cases 1) only stationary criterion is met and 2) both criteria (stationary and not-at-cell-edge) are met, when both criteria are configured. | No impact | | RRC Release message is not used to configure RRM relaxation for IDLE/INACTIVE UE. | No impact | | Do not discuss the issue related to CGI reading requirement. | No impact | | Introduce a separate reference Srxlev value, SrxlevRef-Stationary, for evaluating the R17 stationary criterion. | No impact | | No need to specify any restriction (e.g., not evaluate stationary criterion / not report relaxation status) in specification, in case SpCell RSRP is not lower than s-MeasureConfig. It is left to UE implementation. | No impact | | Except for the first report, UE reports are triggered only if relaxation status (i.e., whether relaxation criterion is met or not) toggles. UE triggers the first report when relaxation criterion is first met since configured (further check if there is anything to fix when drafting the running CR) | No impact | | RedCap UE cannot use CSI-RS-based measurement for stationary criterion in RRC\_CONNECTED. | No impact | | UAI is used for UE to report its relaxation status | Captured |  |  |  | | --- | --- | | **RAN2#116:** | | | RAN2 will not further discuss L2 buffer size reduction for RedCap UEs in Rel-17 (this does not prevent future discussion in future releases) | No impact | | In MAC perspective, a RedCap UE uses Msg1 early identification whenever transmitting preamble for CBRA, as long as the Msg1 early identification is configured for RedCap by NW. | No impact | | For Msg1 early identification, RAN2 confirm both dedicated ROs and dedicated PRACH preamble can be supported from signalling point of view | Captured | | For RedCap, Msg1 early identification is enabled/disabled implicitly by the presence of dedicate RACH configuration for Msg1 early identification. | No impact | | At least the dedicated LCID (i.e. the Msg3 early identification solution) can be supported for MsgA early identification. It is up to RAN1 on the need of dedicated preamble and/or dedicated PUSCH resource configuration. | No impact | | Do not support the RedCap specific UAC parameters. | No impact | | In MAC perspective, RedCap UE uses the dedicated LCID for Msg3 early identification, when the Msg3 includes the CCCH data. FFS on whether it requires no other precondition, or precondition as “when Msg1 early identification is not configured”, or precondition as “when Msg3 early identification is enabled by NW”. | No impact | | Two reserved LCIDs are used for CCCH and CCCH1 cases respectively for Msg3 early identification | No impact | | The max eDRX cycle length for RRC Inactive is 10.24s in Rel-17 | No impact | | PO determination for non-overlapping CN/RN case is applicable to eDRX | No impact | | When IDLE eDRX and INACTIVE eDRX are configured and both cycles are no longer than 10.24s, PO is determined by IDLE eDRX. | No impact | | When IDLE eDRX is configured and is no longer than 10.24s, INACITVE eDRX cycle is not configured, PO is determined by IDLE eDRX. | No impact | | During CN PTW when IDLE eDRX is configured and longer than 10.24s, and INACTIVE eDRX is configured, PO is determined by the shortest value of default paging cycle and UE specific DRX cycle if configured by upper layer. | No impact | | During CN PTW when IDLE eDRX is configure and is longer than 10.24s, INACTIVE eDRX cycle is not configured, PO is determined by the shortest value of default paging cycle and UE specific DRX cycle if configured by upper layer. | No impact | | eDRX supporting UEs are assumed to also support the UE capability on PO determination for non overlapping CN/RN case (Further discuss on the reporting of eDRX capability) | No impact | | The below working agreement is now changed to an agreement.  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 | No impact | | The same LTE hashed UE\_ID calculation is used for UE\_ID\_H for NR. | No impact | | eDRX feature can be supported by non RedCap UEs. | No impact | | A UE in idle mode requests eDRX configuration via NAS signalling. FFS if capability signalling in RAN, as part of the UE capability message, is also needed. | Partly captured, FFS removed | | eDRX support is optional for the RedCap UE. | No impact | | the UE\_ID for eDRX is defined by 5G-S-TMSI mod 4096. | No impact | | the eDRX acquisition period is the maximum configurable value of the eDRX cycle | No impact | | No eDRX specific on-demand SI enhancements are considered for Rel-17 | No impact | | For the eDRX PTW start calculation, agree to N=8. No signalling needed to CN. | No impact | | The eDRX acquisition period is the same for IDLE and INACTIVE. | No impact | | A) For RRC\_INACTIVE UE, when IDLE eDRX cycle is no longer than 10.24s and INACTIVE eDRX cycle is not configured, T is determined by the shortest of RAN paging cycle and IDLE eDRX cycle.  B) For RRC\_INACTIVE UE, when IDLE eDRX cycle is longer than 10.24s and INACTIVE eDRX cycle is not configured, outside CN PTW, T is determined by RAN paging cycle. | No impact | | UE is not allowed to relax its RRM measurements if both stationarity criterion and R17 not-at-cell-edge criterion are configured but UE meets only the R17 not-at-cell-edge criterion. | No impact | | UE reports to network when it no longer meets relaxation criteria. | Captured | | No additional signaling is introduced for network to tell UE whether and which criteria for RRM relaxation is considered satisfied when leaving RRC\_CONNECTED state. | No impact | | No need for UE to send UE Assistance Information to request network configuring it with relaxation criteria. | No impact | | UE does not report its history/state of RRM relaxation when transitioning from RRC Idle/Inactive to RRC Connected. | No impact | | Relaxation criteria for UEs in RRC Connected are configured by only dedicated signaling. | No impact | | RAN2 assume that the existing RRM measurement framework can be used as baseline for enabling and disabling RRM relaxations for UEs in RRC Connected. Other methods can be considered too based on relaxation methods agreed by RAN4. | No impact | | RAN2 understands that no prohibit timer is needed, if legacy measurement reporting framework is reused by UE to report its relaxation status | No impact | | The granularity of RRM measurement relaxations (i.e. whether it should be specified per beam, per cell or per frequency) should be handled by RAN4 | No impact |  |  |  | | --- | --- | | **RAN2#115:** | | | 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 | No impact | | 2. “RRC processing delay” is not relaxed for RedCap UE | No impact | | 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 | No impact | | 4. NE-DC, and (NG)EN-DC are not supported by RedCap UE; FFS on how to capture it in the specification | Captured | | 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; | Captured | | 1. Maximum 8 DRBs is mandatory supported by RedCap UEs. | No impact | | 2. From RAN2 perspective, inter RAT mobility related capabilities are applicable for RedCap UE; | Captured | | 3. From RAN2 perspective, measurement related capabilities are applicable for RedCap UE; | No impact | | 4. From RAN2 perspective, URLLC related capabilities are applicable for RedCap UE except those affected by CA/DC; | Partly captured | | 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; | Captured | | 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; | No impact | | 1. Msg1 identification which can be configured to be enabled/disabled can be specified from RAN2 point of view. | Captured | | 2. Solution for early identification for 2-step RACH will be specified. | No impact | | 3. Specify separate indications in SIB1 for barring RedCap UEs with 1 Rx chain and 2 Rx chains. | Captured | | 4. Specify a RedCap specific IFRI in SIB1. | Captured | | 1. IFRI for RedCap UEs in SIB1 is common for UEs with 1 Rx or 2 Rx branches. | No impact | | 2. If RedCap-specific IFRI is absent from broadcast SI, the UE considers the cell does not support RedCap. | Captured | | 1. A Msg3 early identification based on dedicated LCID is supported (if SA3 confirms there is no problem) | Captured | | 1. RedCap UE applies the existing cellBarred field in MIB | No impact | | 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. | No impact | | 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 | No impact | | 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. | No impact | | 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. | No impact | | 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. | No impact | | 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. | No impact | | 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. | No impact | | 3. The maximum PTW length is 40.96s when IDLE eDRX cycle is longer than 10.24s. | No impact | | 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. | No impact | | 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). | No impact | | 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. | No impact | | 7. For RRC\_INACTIVE UE, when IDLE eDRX cycle is longer than 10.24s and INACTIVE eDRX cycle is no longer than 10.24s, during CN PTW, T is determined by the shortest of UE specific DRX cycle, if configured by upper layer, INACTIVE eDRX cycle and default paging cycle. | No impact | | 8. eDRX feature is optional for any UE (including RedCap and non-RedCap UEs). | No impact | | 1. eDRX is optional for any gNB (either supporting RedCap or not), which means it is up to gNB implementation whether to support eDRX | No impact | | 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 | No impact | | 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. | No impact | | 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. | No impact | | 1. Do not introduce nor reuse not-at-cell-edge threshold for R17 RRC\_CONNECTED UEs. | No impact | | 1. Do not introduce beam change based criterion in Rel-17. | No impact | | 2. The network provides the configuration of stationarity criterion to the UE via dedicated signalling (e.g. RRCReconfiguration message) in RRC\_CONNECTED. | No impact | | 3. Send LS to RAN4 to inform RAN2 conclusions for RRM relaxation. | No impact | | 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” . | No impact | | 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 | No impact | | **RAN2#114:** | | | Working assumption:  1. Extend UE-NR-Capability using NCE to capture RedCap capabilities | No impact | | 2. We will continue the discussion on which capability are applicable to RedCap UE (FFS if we need to have an exhaustive check) | No impact | | 3. At least for early identification there will be only one RedCap UE (no need to define separate RedCap UE types for FR1 and FR2) | Captured | | 4. It is up to the network how to prevent RedCap UEs from using radio capabilities not intended for RedCap UEs (no specification impact is foreseen at least in RAN2. FFS whether something is needed from SA2/CT1) | Captured | | 1. RAN2 Working Assumption: by default, all non-RedCap UE capabilities are applicable for RedCap UE, and therefore only for non-RedCap capabilities that are not appliable for RedCap UE, we clarify in the definitions for parameters in TS38.306, the value or feature is not applicable for RedCap UE | No impact | | 2. We will have an email discussion until the next meeting to discuss which higher layer capabilities are not applicable for RedCap UEs (it could result in a draft 38.306 CR) and how to reflect the handling of RedCap specific capabilities (e.g. Maximum BW, Max Rx, MIMO-Layer, 256QAM, CA/DC, HD-FDD, etc) | No impact | | 3. The network needs to know if the UE is a RedCap UE or not in order to at least correctly identify the set of mandatory features (i.e. baseline capabilities) that the UE supports, including Handover case | No impact | | 4. The network needs to unambiguously know whether the UE is a RedCap or a non-RedCap UE from its reported UE capability information. | No impact | | 1. SIB1 (not MIB) indicates cell barring for 1 Rx branch and 2 Rx branches separately for RedCap UEs. Further details of the solution are FFS | Captured | | 2. The cell barring for RedCap UE is per cell (not per PLMN). | No impact | | 3. RedCap UE supports the Intra Frequency Reselection Indicator. | No impact | | 4. Either Msg1 and/or Msg3 early identification will be supported | No impact | | 1. There is no need to support Rx branches specific early identification from RAN2 perceptive (final decision up to RAN1). | No impact | | 2. Send LS to ask RAN3 to consider the coordination between gNBs on whether a neighbour/target gNB supports RedCap UEs, if needed, to avoid handover RedCap to a target cell that it can’t access. We can come back in the next meeting with discussions on other restrictions, e.g. related to number of RX | No impact | | 1. Lower bound for eDRX configuration in RRC\_IDLE and RRC\_INACTIVE is 2.56 seconds. Inform SA2/CT1 and check if there is any concern. | No impact | | 2. It is up to RAN to configure the length for PTW for RAN paging, the RAN PTW length can be different from the CN PTW length. | Partly captured | | 3. When RAN and CN paging coincide in the same PH, the PTW starting locations are the same. FFS how to calculate the PTW starting location so that it is the same for RAN and CN PTW. | No impact | | 1. Continue in the next meeting the discussion on how UE is expected to monitor RAN and CN PTW, e.g. whether UE in RRC\_INACTIVE monitors for only RAN PTW or both CN and RAN PTW when they overlap | No impact | | 1. An RSRP/RSRQ based stationarity criterion (Working Assumption: the same as in idle/inactive) can be configured for UEs in RRC Connected. If the criterion is met, this is reported to the network (FFS how/when). It is FFS whether, based on this, besides possibly reconfiguring RRM measurements (up to network implementation), the network can enable RRM measurement relaxation (FFS whether same method as in Idle/Inactive) | Partly captured | | 1. Subscription based relaxation criteria will not be considered in Rel-17 RRM relaxation | No impact | | 1. Reuse R16 low mobility criterion, as part or whole of Rel-17 stationary criterion in RRC\_IDLE/INACTIVE. When NW configures both Rel-17 stationary criterion and Rel-16 low mobility criterion, NW configures different Rel-17 thresholds (i.e., SSearchDeltaP\_stationary/TSearchDeltaP\_stationary) from Rel-16 (SSearchDeltaP / TSearchDeltaP). How to configure the criterion (e.g. more stringent) is left to NW implementation (i.e. no specification impact to RAN2). | No impact | | 2. Postpone the following discussion until RAN4 defines RRM relaxation method for Rel-17:  When NW configures both R16/R17 relaxation criteria and the UE fulfills both, UE performs:  - Option 1) UE performs Rel-17 RRM relaxation method  - Option 2) It is up to UE implementation to select either Rel-16 or Rel-17 relaxation operation | No impact | | 1. Working Assumption: If beam-level criterion is adopted for Rel-17 stationary criterion in RRC\_IDLE/INACTIVE, it is configured separately with Rel-16 low mobility criterion reused | No impact | | 2. When NW configures Rel-17 RRM relaxation for RRC\_IDLE/INACTIVE, Rel-17 stationary criterion is mandatory, and Rel-17 not-at-cell-edge criterion is optional configuration. FFS whether the same applies to RRC Connected | No impact | | 3. Continue discussion on Rel-17 not-at-cell-edge criterion in RRC\_IDLE/INACTIVE within two options:  - Option 1) Reuse Rel-16 not-at-cell-edge criterion with the same thresholds (i.e., SSearchThresholdP / SSearchThresholdQ)  - Option 2) Reuse Rel-16 not-at-cell-edge criterion with the different thresholds | No impact | | **RAN2#113bis** | | | 1. RAN decides and configures eDRX via RRC for RRC\_INACTIVE (FFS on the need and details of coordination with the CN) | Captured | | 2. At least for eDRX cycle, the configurations of the eDRX for RRC\_IDLE and RRC\_INACTIVE can be different (FFS for PTW, e.g. length and starting point, when eDRX cycles are longer than 10.24s) | No impact | | 1. RAN2 assumes that CN provides necessary assistance information on eDRX config. for RRC\_IDLE to RAN (e.g. reusing eDRX config. defined in “CN Assistance Information for RRC INACTIVE IE” for E-UTRA/5GC). | No impact. | | 2. eDRX feature, including the related parameters (i.e. PH, PTW. H-SFN) and corresponding paging operation defined for E-UTRA/5GC is used as baseline to enable eDRX >10.24sec for both RRC\_IDLE and RRC\_INACTIVE in NR/5GC | Captured | | 3. RAN2 confirms that CN paging and RAN paging use the same paging frame offset and first PDCCH monitoring occasion in PO, which are configured by RAN without involvement of CN. | No impact | | 4. RAN2 confirms that SI modification mechanism from LTE is used as a baseline for SI change (other than ETWS and CMAS), i.e. by using an eDRX acquisition period and a flag to indicate SI modification for eDRX in Short Message (e.g. systemInfoModification-eDRX) | No impact | | 1. Assuming there will be a stationary property based on subscription (which is FFS), we will not restrict to this and will continue to assume that a UE can use some RSRP/RSRQ based criteria (FFS whether reuse R16 thresholds or new ones. FFS also on the use of a beam based criteria) | No impact | | At least for RRC idle/inactive, a measurement-based R17 stationarity criterion can be configured separately from R16 low-mobility criterion for R17 UEs supporting the feature. FFS how the configuration is provided. FFS whether this stationarity criterion is based on:  - the same algorithm used in R16 low-mobility criterion but with its own specific set of thresholds; and/or  - a combination of R16 low-mobility criterion and/or beam-change based criterion. Exact details of beam change criterion are FFS. | Partly captured | | 1. Network can configure R17 stationarity criterion/criteria together with a not-at-cell-edge criterion, to trigger RRM relaxations in RRC Idle/Inactive for R17 UEs supporting the feature. FFS whether the R16 not-at-cell-edge thresholds can be reused or separate R17 not-at-cell-edge thresholds are needed. | Partly captured | | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | RedCap is not supported in 38.300 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | TBD | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS TODO CR TODO | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | This CR should be lifted to the latest version of the specification. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | This is the initial version of running CR for 38.300 for RedCap WI. | | | | | | | | |

*First Modified Subclause*

# 3 Abbreviations and Definitions

## 3.1 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1], in TS 36.300 [2] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1] and TS 36.300 [2].

5GC 5G Core Network

5GS 5G System

5QI 5G QoS Identifier

A-CSI Aperiodic CSI

AKA Authentication and Key Agreement

AMBR Aggregate Maximum Bit Rate

AMC Adaptive Modulation and Coding

AMF Access and Mobility Management Function

ARP Allocation and Retention Priority

BA Bandwidth Adaptation

BCH Broadcast Channel

BH Backhaul

BL Bandwidth reduced Low complexity

BPSK Binary Phase Shift Keying

CD-SSB Cell Defining SSB

C-RNTI Cell RNTI

CAG Closed Access Group

CAPC Channel Access Priority Class

CBRA Contention Based Random Access

CCE Control Channel Element

CD-SSB Cell Defining SSB

CFRA Contention Free Random Access

CHO Conditional Handover

CIoT Cellular Internet of Things

CLI Cross Link interference

CMAS Commercial Mobile Alert Service

CORESET Control Resource Set

CP Cyclic Prefix

CPC Conditional PSCell Change

DAG Directed Acyclic Graph

DAPS Dual Active Protocol Stack

DFT Discrete Fourier Transform

DCI Downlink Control Information

DCP DCI with CRC scrambled by PS-RNTI

DL-AoD Downlink Angle-of-Departure

DL-SCH Downlink Shared Channel

DL-TDOA Downlink Time Difference Of Arrival

DMRS Demodulation Reference Signal

DRX Discontinuous Reception

E-CID Enhanced Cell-ID (positioning method)

EHC Ethernet Header Compression

ETWS Earthquake and Tsunami Warning System

FS Feature Set

GFBR Guaranteed Flow Bit Rate

HRNN Human-Readable Network Name

H-SFN Hyper System Frame Number

IAB Integrated Access and Backhaul

IFRI Intra Frequency Reselection Indication

I-RNTI Inactive RNTI

INT-RNTI Interruption RNTI

KPAS Korean Public Alarm System

LDPC Low Density Parity Check

MDBV Maximum Data Burst Volume

MIB Master Information Block

MICO Mobile Initiated Connection Only

MFBR Maximum Flow Bit Rate

MMTEL Multimedia telephony

MNO Mobile Network Operator

MPE Maximum Permissible Exposure

MT Mobile Termination

MU-MIMO Multi User MIMO

Multi-RTT Multi-Round Trip Time

NB-IoT Narrow Band Internet of Things

NCD-SSB Non-Cell Defining SSB

NCGI NR Cell Global Identifier

NCR Neighbour Cell Relation

NCRT Neighbour Cell Relation Table

NGAP NG Application Protocol

NID Network Identifier

NPN Non-Public Network

NR NR Radio Access

P-MPR Power Management Maximum Power Reduction

P-RNTI Paging RNTI

PCH Paging Channel

PCI Physical Cell Identifier

PDCCH Physical Downlink Control Channel

PDSCH Physical Downlink Shared Channel

PLMN Public Land Mobile Network

PNI-NPN Public Network Integrated NPN

PO Paging Occasion

PH Paging Hyperframe

PRB Physical Resource Block

PTW Paging Time Window

PRACH Physical Random Access Channel

PRG Precoding Resource block Group

PS-RNTI Power Saving RNTI

PSS Primary Synchronisation Signal

PUCCH Physical Uplink Control Channel

PUSCH Physical Uplink Shared Channel

PWS Public Warning System

QAM Quadrature Amplitude Modulation

QFI QoS Flow ID

QPSK Quadrature Phase Shift Keying

RA Random Access

RA-RNTI Random Access RNTI

RACH Random Access Channel

RANAC RAN-based Notification Area Code

REG Resource Element Group

RIM Remote Interference Management

RMSI Remaining Minimum SI

RNA RAN-based Notification Area

RNAU RAN-based Notification Area Update

RNTI Radio Network Temporary Identifier

RQA Reflective QoS Attribute

RQoS Reflective Quality of Service

RS Reference Signal

RSRP Reference Signal Received Power

RSRQ Reference Signal Received Quality

RSSI Received Signal Strength Indicator

RSTD Reference Signal Time Difference

SCS SubCarrier Spacing

SD Slice Differentiator

SDAP Service Data Adaptation Protocol

SFI-RNTI Slot Format Indication RNTI

SIB System Information Block

SI-RNTI System Information RNTI

SLA Service Level Agreement

SMC Security Mode Command

SMF Session Management Function

S-NSSAI Single Network Slice Selection Assistance Information

SNPN Stand-alone Non-Public Network

SNPN ID Stand-alone Non-Public Network Identity

SPS Semi-Persistent Scheduling

SR Scheduling Request

SRS Sounding Reference Signal

SRVCC Single Radio Voice Call Continuity

SS Synchronization Signal

SSB SS/PBCH block

SSS Secondary Synchronisation Signal

SST Slice/Service Type

SU-MIMO Single User MIMO

SUL Supplementary Uplink

TA Timing Advance

TPC Transmit Power Control

TRP Transmit/Receive Point

UCI Uplink Control Information

UL-AoA Uplink Angles of Arrival

UL-RTOA Uplink Relative Time of Arrival

UL-SCH Uplink Shared Channel

UPF User Plane Function

URLLC Ultra-Reliable and Low Latency Communications

V2X Vehicle-to-Everything

Xn-C Xn-Control plane

Xn-U Xn-User plane

XnAP Xn Application Protocol

*Second Modified Subclause*

## 3.2 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1], in TS 36.300 [2] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1] and TS 36.300 [2].

**BH RLC channel**: an RLC channel between two nodes, which is used to transport backhaul packets**.**

**CAG Cell**:a PLMN cell broadcasting at least one Closed Access Group identity.

**CAG Member Cell**:for a UE, a CAG cell broadcasting the identity of the selected PLMN, registered PLMN or equivalent PLMN, and for that PLMN, a CAG identifier belonging to the Allowed CAG list of the UE for that PLMN.

**CAG-only cell**: a CAG cell that is only available for normal service for CAG UEs.

**Cell-Defining SSB**: an SSB with an RMSI associated.

**Child node**: IAB-DU's and IAB-donor-DU's next hop neighbour node; the child node is also an IAB-node.

**Conditional Handover (CHO**): a handover procedure that is executed only when execution condition(s) are met.

**CORESET#0**: the control resource set for at least SIB1 scheduling, can be configured either via MIB or via dedicated RRC signalling.

**DAPS Handover**: a handover procedure that maintains the source gNB connection after reception of RRC message for handover and until releasing the source cell after successful random access to the target gNB.

**Downstream**: Direction toward child node or UE in IAB-topology.

**Early Data Forwarding**: data forwarding that is initiated before the UE executes the handover.

**gNB**: node providing NR user plane and control plane protocol terminations towards the UE, and connected via the NG interface to the 5GC.

**IAB-donor**:gNB that provides network access to UEs via a network of backhaul and access links.

**IAB-donor-CU**: as defined in TS 38.401 [4].

**IAB-donor-DU**:as defined in TS 38.401 [4].

**IAB-DU**: gNB-DU functionality supported by the IAB-node to terminate the NR access interface to UEs and next-hop IAB-nodes, and to terminate the F1 protocol to the gNB-CU functionality, as defined in TS 38.401 [4], on the IAB-donor.

**IAB-MT**: IAB-node function that terminates the Uu interface to the parent node using the procedures and behaviours specified for UEs unless stated otherwise. IAB-MT function used in 38-series of 3GPP Specifications corresponds to IAB-UE function defined in TS 23.501 [3].

**IAB-node**: RAN node that supports NR access links to UEs and NR backhaul links to parent nodes and child nodes. The IAB-node does not support backhauling via LTE.

**Intra-system Handover**:Handover that does not involve a CN change (EPC or 5GC).

**Inter-system Handover**:Handover that involves a CN change (EPC or 5GC).

**Late Data Forwarding**: data forwarding that is initiated after the source NG-RAN node knows that the UE has successfully accessed a target NG-RAN node.

**MSG1**: preamble transmission of the random access procedure for 4-step random access (RA) type.

**MSG3**: first scheduled transmission of the random access procedure.

**MSGA**:preamble and payload transmissions of the random access procedure for 2-step RA type.

**MSGB**:response to MSGA in the 2-step random access procedure. MSGB may consist of response(s) for contention resolution, fallback indication(s), and backoff indication.

**Multi-hop backhauling**: Using a chain of NR backhaul links between an IAB-node and an IAB-donor.

**ng-eNB**: node providing E-UTRA user plane and control plane protocol terminations towards the UE, and connected via the NG interface to the 5GC.

**NG-C**: control plane interface between NG-RAN and 5GC.

**NG-U**: user plane interface between NG-RAN and 5GC.

**NG-RAN node**: either a gNB or an ng-eNB.

**Non-CAG Cell**: a PLMN cell which does not broadcast any Closed Access Group identity.

**NR backhaul link**: NR link used for backhauling between an IAB-node and an IAB-donor, and between IAB-nodes in case of a multi-hop backhauling.

**NR sidelink communication**: AS functionality enabling at least V2X communication as defined in TS 23.287 [40], between two or more nearby UEs, using NR technology but not traversing any network node.

**Numerology**: corresponds to one subcarrier spacing in the frequency domain. By scaling a reference subcarrier spacing by an integer *N*, different numerologies can be defined.

**Parent node**: IAB-MT's next hop neighbour node; the parent node can be IAB-node or IAB-donor-DU

**PLMN Cell**: a cell of the PLMN.

**RedCap UE:** The UE with reduced capabilities as specified in TS 38.306 [11] sub-clause 4.2.x.x.

**SNPN Access Mode**: mode of operation whereby a UE only accesses SNPNs.

**SNPN-only cell**: a cell that is only available for normal service for SNPN subscribers.

**SNPN Identity:** the identity of Stand-alone NPN defined by the pair (PLMN ID, NID).

**Transmit/Receive Point:** Part of the gNB transmitting and receiving radio signals to/from UE according to physical layer properties and parameters inherent to that element.

**Upstream**: Direction toward parent node in IAB-topology.

**V2X sidelink communication**: AS functionality enabling V2X communication as defined in TS 23.285 [41], between nearby UEs, using E-UTRA technology but not traversing any network node.

**Xn**: network interface between NG-RAN nodes.

*Third Modified Subclause*

## 7.9 UE Assistance Information

When configured to do so, the UE can signal the network through *UEAssistanceInformation*:

- If it prefers an adjustment in the connected mode DRX cycle length, for the purpose of delay budget reporting;

- If it is experiencing internal overheating;

- If it prefers certain DRX parameter values, and/or a reduced maximum number of secondary component carriers, and/or a reduced maximum aggregated bandwidth and/or a reduced maximum number of MIMO layers and/or minimum scheduling offsets K0 and K2 for power saving purpose;

- If it expects not to send or receive any more data in the near future, and in this case, it can provide its preference to transition out of RRC\_CONNECTED where this indication may express its preferred RRC state, or alternately, it may cancel an earlier indicated preference to transition out of RRC\_CONNECTED;

- If it prefers (not) to be provisioned with reference time information;

- The list of frequencies affected by IDC problems (see clause 23.4 of TS 36.300 [2]);

- Its RRM measurement relaxation status.

NOTE: Only the Frequency Division Multiplexing (FDM) solution as defined for E-UTRA in clause 23.4 of TS 36.300 [2] is used in NR. The requirements on RRM/RLM/CSI measurements in different phases of IDC interference defined in TS 36.300 [2] are applicable except that for NR serving cell, the requirements in TS 38.133 [13] and TS 38.101-1 [18], TS 38.101-2 [35], TS 38.101-3 [36] apply.

In the second case, the UE can express a preference for temporarily reducing the number of maximum secondary component carriers, the maximum aggregated bandwidth and the number of maximum MIMO layers. In all cases, it is up to the gNB whether to accommodate the request.

For sidelink, the UE can report SL traffic pattern(s) to NG-RAN, for periodic traffic.

*Last Modified Subclause*

## 16.x Support of Reduced Capability (RedCap) NR devices

### 16.x.1 Introduction

A RedCap UE has reduced capabilities with the intention to have lower complexity with respect to non-RedCap UEs. It is mandatory for a RedCap UE to support 20MHz maximum UE channel bandwidth in FR1 and 100MHz in FR2.

### 16.x.2 Capabilities

NR-CA, MR-DC, DAPS, CPC and IAB related capabilities are not supported by RedCap UEs, as defined together with other limitations in TS 38.306 [11]. It is up to the network to prevent RedCap UEs from using radio capabilities not intended for RedCap UEs.

### 16.x.3 Identification, access and camping restrictions

Early identification of RedCap UEs is made via MSG1/MSGA (PRACH occasion or PRACH preamble) and MSG3/MSGA (LCID). For early identification via MSG1/MSGA, RedCap specific random access configuration may be provided and also in this case MSG3/MSGA (LCID) is used for CCCH identification.

RedCap UEs with 1 Rx branch and 2 Rx branches can be barred separately via system information. A RedCap specific IFRI (Intra Freq Reselection Indication) can be provided in SIB1. When absent, the cell is considered as not supported for RedCap UEs. Information on which frequencies allow RedCap UEs can be provided in system information.

### 16.x.4 RRM relaxations

RRM relaxation is enabled and disabled by the network. In RRC\_IDLE and RRC\_INACTIVE a RedCap UE is allowed to relax neighbour cells RRM measurements when the RSRP/RSRQ stationary criterion is met or when both stationary criterion and not-at-cell-edge criterion are met. Network may configure RSRP/RSRQ based stationary criterion for a UE in RRC\_CONNECTED and the UE shall report its RRM measurement relaxation status using UE Assistance Information when the stationarity criterion is met or no longer met.

### 16.x.5 Support for NCD-SSB

A RedCap UE in RRC\_IDLE and RRC\_INACTIVE monitors paging only in an initial BWP (default or RedCap specific) associated with CD-SSB and performs cell (re-)selection and measurements on the CD-SSB. If a RedCap-specific initial UL BWP is configured for RACH, RedCap UEs shall use only the RedCap-specific initial UL BWP to perform RACH. In RRC\_CONNECTED NCD-SSB may be configured for a RedCap UE in dedicated DL BWP.

### x.x.x Extended DRX for RRC\_IDLE and RRC\_INACTIVE

When extended DRX (eDRX) is used, the following applies:

- For RRC\_INACTIVE, eDRX configuration is decided and configured by NG-RAN.

- For RRC\_IDLE, eDRX is configured by upper layers.

- For RRC\_IDLE, the DRX cycle can be extended up to 10485.76 seconds (2.91 hours) while for RRC\_INACTIVE, the maximum value of the DRX cycle is 10.24 seconds;

- The hyper SFN (H-SFN) is broadcast by the cell and increments by one when the SFN wraps around;

- Paging Hyperframe (PH) refers to the H-SFN in which the UE starts monitoring paging DRX during a Paging Time Window (PTW) used in CM-IDLE. The PH is determined based on a formula that is known by the AMF, UE and NG-RAN;

- H-SFN, PH and PTW are used if the eDRX cycle is greater than 10.24 seconds;

- When the eDRX cycle is longer than the system information modification period, the UE verifies that stored system information remains valid before establishing an RRC connection.