**3GPP TSG-RAN WG3 Meeting #121 R3-234535**

**21-25 August 2023, Toulouse, Republic of France**

Agenda Item: 21.2

Source: Moderator (Ericsson)

Title: eRedCap offline

Document for: Other

# Discussion

# Introduction

This is the summary document for the following come back:

**CB: # R18Redcap**

**- Discuss the open issues above**

**- Provide TPs based on agreements**

(moderator – E///)

# For the Chairman’s Notes

**Topic#1 : MT-communication Handling**

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| 1. **Introduce a new IE *NR Paging Long eDRX Information for RRC INACTIVE* IE including two mandatory present IEs:**    1. **NR Paging long eDRX Cycle for RRC INACTIVE**    2. **and NR PTW for RRC INACTIVE** 2. **The value range of *NR Paging eDRX Cycle for RRC INACTIVE* IE is: “hf2, hf4, hf8, hf16, hf32, hf64, hf128, hf256, hf512, hf1024, …”** 3. **the start H\_SFN is not needed** 4. **Rename into *UE Reachability Indication* IE the *HLCom Deactivate* IE, keep same encoding**   **R3-234566 TP to NGAP is agreed** |

**Topic#2 : DL Data Notification**

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| 1. **Agree renaming of procedure to “RAN Paging Request”** 2. **Adopt corresponding change to TS 38.410** 3. **Adopt corresponding change to TS 38.300** 4. **Introduce an explicit indication *DL Signaling* IE ENUMERATED (true,…) to differentiate DL signaling and DL data in the DL DATA NOTIFICATION message.**   **R3-234564 (TP to 38.413 BL CR) is agreed**  **R3-234565 (TP to 38.410 BL CR) is agreed**  **R3-234572 (TP to 38.300 BL CR) is agreed** |

**Topic#3: signalling of RRC Inactive long eDRX over XnAP and F1AP**

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| 1. **Keep the existing *NR Paging eDRX Information for RRC INACTIVE* IE (TS 38.423 in 9.2.3.162) as it is, remove added changes in the BL CR.** 2. **Define new NR Paging long eDRX Information for RRC INACTIVE IE, containing:**  * ***NR Paging Long eDRX Cycle for RRC INACTIVE* IE: ENUMERATED (hf2, hf4, hf8, hf16, hf32, hf64, hf128, hf256, hf512, hf1024)** * ***NR Paging Time Window for RRC INACTIVE* IE: ENUMERATED (s1, s2, s3, s4, s5, s6, s7, s8, s9, s10, s11, s12, s13, s14, s15, s16, s17, s18, s19, s20, s21, s22, s23, s24, s25, s26, s27, s28, s29, s30, s31, s32,…)** * **Remove Ens**  1. **WA: the Rel-18 long eDRX info is signalled to DU** 2. **Keep the existing *NR Paging eDRX Information for RRC INACTIVE* IE (TS 38.473 in *9.3.1.259*) as it is, remove added changes in the BL CR.** 3. **Define new NR Paging long eDRX Information for RRC INACTIVE IE, containing:**  * ***NR Paging Long eDRX Cycle for RRC INACTIVE* IE: ENUMERATED (hf2, hf4, hf8, hf16, hf32, hf64, hf128, hf256, hf512, hf1024)** * ***NR Paging Time Window for RRC INACTIVE* IE: ENUMERATED (s1, s2, s3, s4, s5, s6, s7, s8, s9, s10, s11, s12, s13, s14, s15, s16, s17, s18, s19, s20, s21, s22, s23, s24, s25, s26, s27, s28, s29, s30, s31, s32,…)** * **Remove Ens**   **R3-234567 (TP to 38.423 BL CR) is agreed**  **R3-234568 (TP to 38.473 BL CR) is agreed** |

**Topic#4: NR eRedCap Indication**

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| 1. **Introduce a new *eRedCap Broadcast Information* IE in XnAP *Served Cell Information NR* IE** 2. **Introduce a new *eRedCap Broadcast Information* IE in F1AP *Served Cell Information NR* IE** 3. **FFS how to indicate HD-FDD allowed-bit indication for Rel-18 eRedCap UE** 4. **For F1AP, introduce *NR eRedCap UE indication* IE to the F1AP: INITIAL UL RRC MESSAGE TRANSFER message for the early identification(s).**   **R3-234569 (TP to 38.423 BL CR) is agreed**  **R3-234570 (TP to 38.473 BL CR) is agreed** |

**Topic#5 :LS to SA2**

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| 1. **Inform SA2 of the update of the DL DATA NOTIFICATION Procedure name and introduction of DL signalling only indication** 2. **Ask if there is need to signal  eRedCap indication in INITIAL UE MESSAGE to apply different charging policy**   **R3-234571 Reply LS to SA2 is agreed** |

# Discussion

## LS from SA2 in R3-233726

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| **1. Overall Description:**  SA2 thanks RAN3 for the progress to address the Editor's notes in TS 23.502 related to NGAP messages and has agreed the attached CR for TS 23.502 taking the progress into account.  Besides, SA2 would like to point out that:  - The CN based MT Communication Handling capability for AMF indicates that the AMF understands, supports and takes the MT Communication Handling Request into account.  - When receiving the N2 message from the NG-RAN that the UE has been or is to be moved into RRC Inactive with eDRX cycle longer than 10.24s, the AMF takes the NG-RAN input into consideration and applies High Latency Communication Functions (e.g. data buffering) for the MT signalling and data. The AMF will indicate MT Communication Handling Request has been taken into account. Whether data or signalling is buffered and for how long is determined by High Latency Communication Function handling (i.e. data or signalling can be discarded immediately, or buffered for a while and is then subsequently discarded, or buffered and not discarded).  **2. Actions:**  **To RAN3 group.**  **ACTION:** SA2 asks RAN3 group to take the above into account and provide feedback if any. |

The SA2 LS text is aligned with RAN3 NGAP stage 3 design. It is proposed to note the LS.

**Conclusion:** LS to be noted,

## MT Communication Handling procedure ENs

1. In the branch of the “CHOICE” where HLCom is enabled:
2. **Introduce a new IE *NR Paging Long eDRX Information for RRC INACTIVE* IE including two mandatory present IEs:**
   1. **NR Paging long eDRX Cycle for RRC INACTIVE**
   2. **and NR PTW for RRC INACTIVE**
3. **The value range of *NR Paging eDRX Cycle for RRC INACTIVE* IE is: “hf2, hf4, hf8, hf16, hf32, hf64, hf128, hf256, hf512, hf1024, …”**
4. **the start H\_SFN is not needed**

9.3.3.X1 NR Paging Long eDRX Information for RRC INACTIVE

This IE provides the NR Paging long eDRX parameters for RRC\_INACTIVE as defined in TS 38.304 [12].

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| NR Paging long eDRX Cycle for RRC INACTIVE | M |  | ENUMERATED (hf2, hf4, hf8, hf16, hf32, hf64, hf128, hf256, hf512, hf1024, …) | Tlong-eDRX, RAN defined in TS 38.304 [12]. Unit: [number of hyperframes]. |
| NR Paging Time Window for RRC\_INACTIVE | M |  | ENUMERATED (s1, s2, s3, s4, s5, s6, s7, s8, s9, s10, s11, s12, s13, s14, s15, s16, s17, s18, s19, s20, s21, s22, s23, s24, s25, s26, s27, s28, s29, s30, s31, s32, ...) | Unit: [1.28 seconds] |

1. In the branch of the “CHOICE” where HLCom is disabled:
2. **Rename into *UE Reachability Indication* IE the *HLCom Deactivate* IE, keep same encoding**

**Conclusion:** Agree on above proposals

TP to be worked on: by Nokia

## DL Data Notification ENs

It is proposed to rename the DL Data Notification procedure as RAN Paging Request.

1. **Agree TP to TS 38.413 in R3-234272 renaming RAN Paging Request**
2. **Agree TP to corresponding change to TS 38.410**
3. **Introduce an explicit indication *DL Signaling* IE ENUMERATED (true, …) to differentiate DL signaling and DL data in the DL Data Notification message. If agreeable, merge with R3-234272 and mention to SA2**
4. **Status of 5QI and DL Data size indication pending SA2 feedback.**

**Conclusion:** TBD…

TP to be worked on: CATT, E/// revise R3-234272 to include P3

## XnAP Rel-17 RRC\_INACTIVE eDRX and Rel-18 RRC\_INACTIVE Long eDRX

In order to align with RAN2 agreement on fallback cases:

1. Keep the existing *NR Paging eDRX Information for RRC INACTIVE* IE (TS 38.423 in 9.2.3.162) as it is, remove added changes in the BL CR.
2. Define new NR Paging long eDRX Information for RRC INACTIVE IE, containing:
   * *NR Paging Long eDRX Cycle for RRC INACTIVE* IE: ENUMERATED (hf2, hf4, hf8, hf16, hf32, hf64, hf128, hf256, hf512, hf1024)
   * *NR Paging Time Window for RRC INACTIVE* IE: ENUMERATED (s1, s2, s3, s4, s5, s6, s7, s8, s9, s10, s11, s12, s13, s14, s15, s16, s17, s18, s19, s20, s21, s22, s23, s24, s25, s26, s27, s28, s29, s30, s31, s32,…)
   * Remove ENs

**Conclusion:** TBD…

TP to be worked on: ZTE

## F1AP Rel-17 RRC\_INACTIVE eDRX and Rel-18 RRC\_INACTIVE Long eDRX

Understanding on CU and DU role for long eDRX paging – does DU need to be aware of long eDRX configuration during paging? If yes:

1. Keep the existing *NR Paging eDRX Information for RRC INACTIVE* IE (TS 38.473 in *9.3.1.259*) as it is, remove added changes in the BL CR.
2. Define new NR Paging long eDRX Information for RRC INACTIVE IE, containing:
   * *NR Paging Long eDRX Cycle for RRC INACTIVE* IE: ENUMERATED (hf2, hf4, hf8, hf16, hf32, hf64, hf128, hf256, hf512, hf1024)
   * *NR Paging Time Window for RRC INACTIVE* IE: ENUMERATED (s1, s2, s3, s4, s5, s6, s7, s8, s9, s10, s11, s12, s13, s14, s15, s16, s17, s18, s19, s20, s21, s22, s23, s24, s25, s26, s27, s28, s29, s30, s31, s32,…)
   * Remove ENs

**Conclusion:** TBD…

TP to be worked on: QC?

## eRedCap Broadcast information for barring

Considering the definition of IFRI eRedCap from RAN2 running CR:

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| SIB1-v18xy-IEs ::=               SEQUENCE {      eDRX-AllowedInactive-r18              ENUMERATED {true}                                             OPTIONAL,  -- Cond EDRX-RC      intraFreqReselection-**e**RedCap-r18      ENUMERATED {allowed, notAllowed}                              OPTIONAL,  -- Need S      redCap-ConfigCommonSIB-r18            RedCap-ConfigCommonSIB-r18                                    OPTIONAL,  -- Need R      nonCriticalExtension                  SEQUENCE {}                                                   OPTIONAL  }  ….  RedCap-ConfigCommonSIB-r18 ::= SEQUENCE {      cellBarredRedCap-r18           SEQUENCE {          cellBarred-eRedCap1Rx-r18      ENUMERATED {barred, notBarred},          cellBarred-eRedCap2Rx-r18      ENUMERATED {barred, notBarred}      }                                                                                                   OPTIONAL,  -- Need R      ...  } |
| ***intraFreqReselection-eRedCap***  Controls cell selection/reselection to intra-frequency cells for eRedCap UEs when this cell is barred, or treated as barred by the eRedCap UE, as specified in TS 38.304 [20]. If not present, an eRedCap UE treats the cell as barred, i.e., the UE considers that the cell does not support eRedCap. |

Based on the above extract, the legacy eRedCap Broadcast Information pointing to **the legacy “*intraFreqReselectionRedCap”* IEcannot be re-used for eRedCap barring indication**.

The structure of the new IE in XnAP and F1AP *Served Cell Information NR* IE can be as below:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| eRedCap Broadcast Information | O |  | BIT STRING (SIZE(8)) | The presence of this IE indicates that Rel-18 RedCap (eRedCap) UEs are allowed to access the cell, e.g., *intraFreqReselection-eRedCap* is broadcast in the SIB1 message of the corresponding cell, see TS 38.331 [10].  Each position in the bitmap indicates which eRedCap UEs are allowed access, according to the setting of eRedCap barring indicators in the SIB1 message, see TS 38.331 [10].  First bit = 1Rx,  second bit = 2Rx,  other bits reserved for future use.  Value '1' indicates 'access allowed'. Value '0' indicates 'access not allowed”. | YES | ignore |

RAN2#122:

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| * RAN2 confirms there can be cell(s) supporting Rel-18 eRedCap only, i.e., not allowing Rel-17 RedCap UE to camp and access. * We introduce R18 versions of 1Rx and 2Rx barring bits and we don’t introduce a R18 version of the HD-FDD allowed-bit, i.e., the R17 HD-FDD allowed-bit is reused for and applied by R18 eRedCap UEs. * All R18 eRedCap UEs uses the two new LCIDs for Msg3/MsgA PUSCH for CCCH/CCCH1 during Random Access, i.e., both those with peak rate reduction + BB BW reduction, and those with only peak rate reduction. |

Question based on the above RAN2 agreement: **how to signal HD-FDD allowed-bit indication??**

* 1. Re-use the third bit in the Rel-17 *RedCap Broadcast Information* IE
  2. A separate *eRedCap half-duplex Broadcast Information* IE is added:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| eRedCap half-duplex Broadcast Information | O |  | BIT STRING (SIZE(8)) | The presence of this IE indicates that the *intraFreqReselectionRedCap* IE is broadcast in SIB1 of the corresponding cell, see TS 38.331 [10].  Each position in the bitmap indicates which eRedCap UEs are allowed access, according to the setting of eRedCap barring indicators in SIB1, see TS 38.331 [10].  First bit = halfDuplex,  other bits reserved for future use. Value '1' indicates 'access allowed'. Value '0' indicates 'access not allowed”. | YES | ignore |

* 1. Use the third bit in the new **eRedCap Broadcast Information** in case that legacy **RedCap Broadcast Information** is not present.

**Conclusion:** TBD…

TP to be worked on: Huawei

## eRedCap Early Indication

For F1AP, introduce *NR eRedCap UE indication* IE to the F1AP: INITIAL UL RRC MESSAGE TRANSFER message for the early identification(s).

For NGAP, introduce *eRedCap Indication* IE to the NGAP: INITIAL UE MESSAGE message for the early identification and policy control (similar to LTE-M and Rel-17 RedCap), this has SA2 impacts.

**Extract from TS 23.501:**

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| 5.41 NR RedCap UEs differentiation  This functionality is used by the network to identify traffic to/from UEs accessing over NR RedCap, e.g. for charging differentiation.  An NR RedCap UE using NR shall provide an NR RedCap indication to the NG-RAN during RRC Connection Establishment procedure as defined in TS 38.300 [27].  When the UE has provided an NR RedCap indication to the NG-RAN during RRC Connection Establishment, the NG-RAN shall provide an NR RedCap Indication to the AMF in the Initial UE Message (see clause 4.2.2.2.1 of TS 23.502 [3] and TS 38.413 [34]).  When the AMF receives an NR RedCap Indication from NG-RAN in an Initial UE Message, the AMF shall store the NR RedCap Indication in the UE context, consider that the RAT type is NR RedCap and signal it accordingly to the SMSF during registration procedure for SMS over NAS, to the SMF during PDU Session Establishment or PDU Session Modification procedure. The PCF will also receive the NR RedCap RAT type indication when applicable, from the SMF during SM Policy Association Establishment or SM Policy Association Modification procedure.  During handover from E-UTRA to NR, the target NG-RAN (i.e. gNB) provides the NR RedCap indication to AMF in NGAP Path Switch Request message during Xn handover, or NGAP Handover Request Acknowledge message during N2 handover (including intra 5GS N2 handover and EPS to 5GS handover) based on the UE capability information provided by the source RAN to the target RAN as specified in TS 38.300 [27].  The NFs interacting with CHF shall include the NR RedCap as RAT type.  Upon AMF change, the source AMF shall provide the "NR RedCap Indication" to the target AMF |

**Conclusion:** TBD…

TP to be worked on: Ericsson on F1 impacts

## LS to SA2 and other topics

* Update of DL DATA NOTIFICATION Procedure name and DL signalling only indication
* Early eRedCap indication in INITIAL UE MESSAGE.
* Other issues?

**Conclusion:** TBD…

LS reply to be worked on: Huawei, pending consensus on topics

# Conclusion

<TBD>