**3GPP TSG-RAN3 Meeting # 115-e *R3-222409***

**21st February – 3rd March 2022**

**Agenda Item: 11.3**

**Source: Moderator: Ericsson**

**Title: CB # RedCap3\_eDRX**

**Document for: Other**

1 Introduction

**CB: # RedCap3\_eDRX**

**- Whether to introduce separate IEs or one common IE for Paging eDRX Cycle over F1AP?**

**- Whether UE specific paging DRX and/or RAN paging DRX are needed over F1AP?**

**- Other clean up if needed**

**- Capture agreements and provide stage2/3 TPs if agreeable**

2 To the chair’s notes

**First round conclusions: (already captured)**

**Introduce two IEs "*NR Paging eDRX Information*" and "*NR Paging eDRX Information for RRC INACTIVE"* over F1 PAGING message**

Take **R3-221919** (Huawei et al.) as baseline F1 TP for review.

Discuss in second round if a *UE specific DRX* IE is needed over F1 Paging. Check how to capture the coding of both the *RAN UE Paging DRX* and *UE specific DRX* IEs.

* check IE names, procedural text, semantics for the new IEs and ASN.1, as needed
* merge with other TPs, add co-signers as needed
* Provide final revision of R3-221919 for agreement in the SoD folder

**R3-222486, R3-221744, R3-221803 and R3-221805 are agreed**

**Second round discussion:**

*[To be updated]*

3 Discussion (first round)

## 3.1 Support of Paging eDRX Cycle over F1AP

The final outstanding issue regarding eDRX support for NR/RedCap UEs is whether RAN3 should introduce separate IEs or a common IE for the eDRX Paging Cycle over F1AP.

After checking the latest updates of RAN2 regarding their running CR of TS 38.304, several companies - such as [5], [7], [8] and [10] - acknowledge that two eDRX IEs for RRC\_IDLE and RRC\_INACTIVE are needed over F1, so that we correctly capture the scenario of how T is calculated outside the CN PTW, when the IDLE eDRX cycle is greater than 10.24s and the Inactive eDRX cycle is no longer than 10.24s.

On the other hand, only one company [4] proposes to have a common IE for IDLE and INACTIVE eDRX on F1. Given the clarification provided by other companies and the fact that some companies that previously proposed to have a common IE now recognise the need for two separate IEs during F1 Paging, the moderator hopes that we can converge on the majority’s view.

3.1.2 TS 38.473 impacts

**Q1:** Do companies agree to introduce two IEs "*NR Paging eDRX Information*" and "*NR Paging eDRX Information for RRC INACTIVE"* over F1AP Paging message?

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| Ericsson | Yes | For the *NR Paging eDRX information* IE, it should be mentioned in the tabular description that is it for RRC\_IDLE eDRX, if companies prefer to not have such mention in the IE’s name.  Then some alignment is needed with CT1’s spec. This is checked further below. |
| Qualcomm | Yes | Even if it were possible to merge the information, this may cause issues sooner or later, so it seems safer to do it this way and not filter information in the CU. Also agree with Ericsson’s comments. |
| ZTE | Yes |  |
| Samsung | Yes |  |
| Huawei | Yes | We have proposed this for a few meetings. This is different to legacy DRX cases, and we need to introduce separate IEs for covering all the cases described in 38.304. |
| Radisys | No | Do not see a need to introduce separate IEs for Idle and Inactive. DU can identify the Idle Paging or Inactive Paging based on Paging Identity and hence calculate the ‘T’ or PTW accordingly. |
| CMCC | Yes | Maybe we can name two IEs with “NR Paging eDRX Information for RRC Idle" and "NR Paging eDRX Information for RRC INACTIVE". |
| Nokia | No/Yes | We think that “strictly speaking” a common IE can work: this is because the paging outside the PTW can be done with the pace inside the PTW, but we acknowledge that it is a waste of radio resources. Depends on far it is optimized. But we are also OK to go for the majority if the majority prefers to optimize this case. |
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**Moderator conclusion:** Majority of companies (7) prefer introducing two IEs "*NR Paging eDRX Information*" and "*NR Paging eDRX Information for RRC INACTIVE"* over F1 PAGING message to align with TS 38.304 cases.

In addition, it is declared necessary, to take into account the scenario where T is calculated outside the CN PTW, to also add the RAN UE Paging DRX, as motivated in [5] and [7]. Or the UE Specific DRX as mentioned in [10]. Both definitions seem to be the same, with the addition of the following semantics from [10]:

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| --- | --- | --- | --- | --- | --- | --- |
| UE specific DRX | O |  | 9.3.1.40 | This IE indicates the UE specific paging cycle as defined in 38.304 [24].  If this IE is present, the Paging DRX IE indicates RAN paging cycle defined in 38.304 [24]. | YES | ignore |

**Q2:** Do companies agree to introduce a new IE "*RAN UE Paging DRX"* [5] or "*UE specific DRX*" [10] encoded as the RAN Paging DRX over F1 Paging message? Any views on the procedural text or semantics to add/update?

**Moderator proposes to take [5] as baseline for comments on the procedural text, with possible merge from other TPs in [7], [8] [10] for agreement, since TP [5] captures the correct values of NR eDRX and NR PTW as aligned with TS 24.008 definition.**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| Ericsson | Yes | Prefer to not impact legacy Rel-15 text. So, we prefer the procedural text in [5]. |
| Qualcomm | Yes | Also fine with using [5], but can further check if any issues. |
| ZTE | Yes, but | In [10], we conclude that both RAN UE Paging DRX and UE specific DRX are all needed in F1AP paging message. if we directly use [5], UE specific DRX is missing in F1 paging. In fact, in the previous RAN3#112-e meeting, the co-signing companies in R3-211595 also agreed that UE specific DRX is needed.  we think the merged version shall be aligned with Xn RAN paging, we suggest to introduce UE specific DRX IE in F1AP paging message, and if UE specific DRX IE is present, the existing Paging DRX IE in F1AP paging message is interpreted as the RAN Paging cycle. |
| Samsung | Yes | "*UE specific DRX*" seems to be more straightforward, and it is aligned with the term in TS38.304 |
| Huawei | Yes | **Since we first observe this problem with corresponding solution since RAN3 #114-e and [5] captures the correct values of NR eDRX and NR PTW as aligned with TS 24.008 definition**, we prefer take [5] as baseline.  In the meanwhile, after checking [10], I think it seems the CN UE paging DRX is proposed to be added for a various reason (This is for handling a case where gNB may use the DRX cycle(T) of UE in RRC\_IDLE to calculate i\_s for UE in RRC\_INACTIVE). If the necessity to introduce also CN UE paging DRX is widely recognized, how about introducing two IEs (*RAN UE paging DRX* IE and *CN UE paging DRX* IE) directly? This should be clear and avoid impacting legacy IE. Anyway the coding can be discussed. |
| Radisys |  | Agree with the need to send both RAN and UE specific Paging DRX over F1. But the semantics in both [5] and [10] is unclear. For existing Paging DRX IE says min of RAN and CN DRX, whereas the new IE is for CN or RAN DRX. If misinterpreted, both the IEs may contain value for RAN or CN DRX. The semantics of legacy IE needs to be modified. |
| CMCC | Yes | Fine with the [5], the coding needs further discussion. |
| Nokia | Yes but | Agree with the need to send both RAN and UE specific Paging DRX over F1. But it may be clearer to have two separate new IEs otherwise looks like [10] is not backwards compatible. |
|  |  |  |

**Moderator conclusion:** it is proposed to take R3-221919 (Huawei et al.) as baseline F1 TP for review.

Discuss in second round if a *UE specific DRX* IE is needed over F1 Paging. Check how to capture the coding of both the *RAN UE Paging DRX* and *UE specific DRX* IEs

* check IE names, procedural text, semantics for the new IEs and ASN.1, as needed
* merge with other TPs, add co-signers as needed
* Provide final revision of R3-221919 for agreement in the SoD folder

3.1.2 TS 38.470 impacts

To align stage 2 with stage 3 agreements, some updates to TS 38.470 BL CR are needed for NR eDRX transmission during F1 Paging and calculation at gNB-DU. Three TPs have been provided for agreements:

* TP in [4] which mentions one common IE, thus it will not be considered
* TP in [6] adding the following line in section 5.2.5: “The gNB-DU may also calculate the PH, PTW\_start and PTW\_end with the paging information provided by gNB-CU for paging a RedCap UE.”
* TP in [9] adding abbreviation definitions and updating the existing text in 5.2.5 as follows: “The gNB-CU provides paging information to enable the gNB-DU to calculate the exact PH, if the eDRX is configured, and PO and PF. The gNB-CU determines the PA. The gNB-DU consolidates all the paging records for a particular PH, PO, PF and PA, and encodes the final RRC message and broadcasts the paging message on the respective PH, PO, PF in the PA.”

**Q3:** Companies are invited to provide their views to their preferred stage 2 F1 TP and proposed rewording, if needed?

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| --- | --- | --- |
| **Company** | **[6] or [9]** | **Comment** |
| Ericsson | [9] | Both are fine, but [9] makes clever re-use of existing text in 5.2.5 and adds abbreviations, which is nice. |
| Qualcomm | - | In an ideal world, the existing text could be reformulated to avoid any mention of RRC parameters, and just talk of paging occasions (including the case where eDRX is configured). But with the existing text, slight preference for [9]. |
| ZTE | [9] |  |
| Samsung | [9] |  |
| Huawei | No strong view |  |
| Radisys | 9 | But ok with 6 too. |
| CMCC | [9] |  |
| Nokia | 9 is OK |  |
|  |  |  |

**Moderator’s conclusion:** R3-222486 can be agreed

## 3.2 Other clean-ups

3.2.1 XnAP clean-up

The contribution in [1] proposes the following clean-up of the XnAP BL CR:

1. Delete the EN on possible need for revising the *RedCap Broadcast Information* IE to align with RAN2.
2. Replace mentions of TeDRX by either TeDRX, CN or TeDRX, RAN when referring to TS 38.304 for respectively idle and inactive extended paging cycles.
3. Align values of eDRX cycle and PTW (for NR idle mode eDRX) with those defined in TS 24.008.

**Q4:** Can the XnAP TP in [1], reflecting the three points above, be agreed?

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| Ericsson | Yes |  |
| Qualcomm | Yes |  |
| ZTE | Yes |  |
| Samsung | Yes |  |
| Huawei | Yes |  |
| Radisys | Yes |  |
| CMCC | Yes |  |
| Nokia | Yes |  |
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**Moderator’s conclusion:** R3-221744 can be agreed

3.2.2 NG-AP clean-up

The contribution in [2] proposes the changes to NGAP baseline CR mirroring the changes proposed in [1], minus the EN related to RedCap Broadcast info that is not relevant for NG BL CR.

**Q5:** Can the NGAP TP in [2] be agreed?

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| Ericsson | Yes |  |
| Qualcomm | Yes |  |
| ZTE | Yes |  |
| Samsung | Yes |  |
| Huawei | Yes |  |
| Radisys | Yes |  |
| CMCC | Yes |  |
| Nokia | Yes |  |
|  |  |  |

**Moderator’s conclusion:** R3-221803 can be agreed

3.2.3 TS 38.300 clean-up

The contribution in [3] proposes a clean-up to TS 38.300 BL CR by removing the existing EN and updating the text with the information sent during Xn PAGING message

**Q5:** Can the TP to TS 38.300 BL CR in [3] be agreed?

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| Ericsson | Yes |  |
| Qualcomm | Yes |  |
| ZTE | Yes |  |
| Samsung | Yes |  |
| Huawei | Yes |  |
| Radisys | Yes |  |
| CMCC | Yes |  |
| Nokia | Yes |  |
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**Moderator’s conclusion:** R3-221805 can be agreed

4 Discussion (second round)

The second-round discussion is dedicated to the verification of the TP F1AP for the addition of the eDRX paging information over PAGING message. The offline discussion with the companies involved concluded that four parameters are needed at the gNB-DU level to perform correct paging according to the formulas of TS 38.304. In fact, based on clause 7.1 of RAN2’s running CR R2-2201549 of TS38.304, there are four variables used to calculate T :

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| --- |
| **For Idle**  If eDRX not configured by upper layers   * T = min (UE Specific DRX, default DRX)   If eDRX configured by upper layers   * If eDRX < 1024, then T = eDRX value * Else T = min (UE Specific DRX, default DRX)   **For Inactive**  If eDRX configured by upper layers   * If eDRX < 1024 + TeDRX, CN, TeDRX, RAN   both configured , T = min (TeDRX, CN, TeDRX, RAN  ) ( * If eDRX < 1024 + TeDRX, CN  only configured, T = min (TeDRX, CN, RAN Paging DRX) * If eDRX > 1024 + TeDRX, CN  only configured, T = min (UE Specific DRX, Default/RAN DRX ) * If eDRX > 1024 + TeDRX, CN, TeDRX, RAN   both configured, T = min (UE Specific DRX, TeDRX, RAN   , Default/RAN DRX) |

Therefore, four variables are needed for T calculation at gNB-DU:

1. UE Specific DRX, i.e. CN UE Paging DRX
2. RAN Specific DRX
3. CN eDRX (for IDLE)
4. RAN eDRX (for INACTIVE)

A draft TP [R3-22xxxx](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_115-e/Inbox/Drafts/CB%20%23%20RedCap3_eDRX/TPs/draft_R3-22xxxx%20Supporting%20Redcap%20UEs%20over%20F1%20interface.docx), merging [5] and [10] has been dropped in the TP folder of this CB for review:

**Q6:** Can the TP available in the “TPs” folder of this CB be agreed? Are there any comments on IEs, semantics of both new and legacy IEs, procedural text or ASN.1 related comments that should be considered?

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| Ericsson | Yes | TP looks agreeable. |
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**Moderator’s conclusion:** R3-22xxxx is [TBD]

5. Conclusions

## 5.1 first round

Majority of companies prefer introducing two IEs "*NR Paging eDRX Information*" and "*NR Paging eDRX Information for RRC INACTIVE"* over F1 PAGING message to align with TS 38.304 use cases.

it is proposed to take **R3-221919** (Huawei et al.) as baseline TP for review.

Discuss in second round if a *UE specific DRX* IE is needed over F1 Paging. Check how to capture the coding of both the *RAN UE Paging DRX* and *UE specific DRX* IEs

* check IE names, procedural text, semantics for the new IEs and ASN.1, as needed
* merge with other TPs, add co-signers as needed
* Provide final revision of R3-221919 for agreement in the SoD folder

R3-222486, R3-221744, R3-221803 and R3-221805 can be agreed

## 5.2 Second round

TBD

6. References

1. R3-221744, (TP for XnAP BL CR on RedCap) Proposed updates to the XnAP BL CR (Qualcomm Incorporated, Huawei, Ericsson)
2. R3-221803, (TP for NGAP BL CR on RedCap) Proposed updates to the NGAP BL CR (Ericsson, Qualcomm Inc., Huawei)
3. R3-221805, TP to RedCap TS 38.300 BL CR: Addition of Inactive eDRX (Ericsson, Qualcomm Inc.)
4. R3-221810, (TP for TS 38.473 and 38.470) Support of eDRX for Redcap UEs (Nokia, Nokia Shanghai Bell)
5. R3-221919, Supporting Redcap UEs over F1 interface (Huawei, Qualcomm Incorporated, Ericsson)
6. R3-221920, (TP to BL CR 38.470) Paging for RedCap UEs (Huawei)
7. R3-222256, (TP for TS 38.473) Extended DRX Enhancement for RedCap Ues (CMCC)
8. R3-222317, (TP to BL CR of TS38.473) Discussion on the remaining issues of Rel-17 RedCap (Samsung)
9. R3-222486, (TP for RedCap BL CR 38.470) RedCap Paging (ZTE, Ericsson)
10. R3-222360, (TP for RedCap BL CR 38.473) RedCap Paging (ZTE)