3GPP TSG-RAN WG2 Meeting#113-e R2-210xxxx

Online, January 25th - February 5th 2021

Agenda Item: 8.12.2.2

Source: Huawei

Title: Summary of offline 107 - [REDCAP] L2 capabilities and UE types - PHASE 2

Document for: Discussion and Decision

# Introduction

This document is to continue the discussion on P5 and P6 from R2-2102017:

* [AT113-e][107][REDCAP] L2 capabilities and UE types (Huawei)

Scope: based on the proposals in [R2-2101255](file:///C:/Data/3GPP/Extracts/R2-2101255%20Higher%20layer%20capabilities%20and%20procedural%20impacts%20of%20RedCap%20UE.doc), [R2-2100310](file:///C:/Data/3GPP/Extracts/R2-2100310_Definition%20of%20RedCap%20UEs.docx) and [R2-2100460](file:///C:/Data/3GPP/Extracts/R2-2100460_UE%20type%20definition%20and%20constraining%20for%20RedCap%20UEs.doc), discuss:

1. which "reduced L2 capabilities" can be listed as possible enhancements in the TR
2. which impacts on procedures for RedCap UEs can be described in the TR
3. which pros and cons to have only one vs multiple RedCap UE types can be listed in the TR

For all the aspects (and namely for 3), the intention of this offline is to describe options and implications in the TR, not to down-select any alternatives

Initial intended outcome: Summary of the offline discussion with:

* + - List of proposals for agreement
    - List of proposals that require online discussions
    - Corresponding TP for the TR

Initial deadline (for companies' feedback): Monday 2021-02-01 11:00 UTC

Initial deadline (for rapporteur's summary in R2-2102017): Monday 2021-02-01 17:00 UTC

Updated scope: continue the discussion on p5 and p6 from R2-2102017, also attempt to draft a recommendation from RAN2 perspective that a single RedCap UE type is preferred

Updated intended outcome: Summary of the offline discussion with:

* + - List of proposals for agreement
    - Corresponding TP for the TR

Initial deadline (for companies' feedback): Wednesday 2021-02-03 11:00 UTC

Initial deadline (for rapporteur's summary in R2-2102037): Wednesday 2021-02-03 13:00 UTC

# Discussion

The following proposal was discussed online:

**Proposal 5: Capture in the TR that paging false alarm is not a specific issue for RedCap UEs. The paging enhancements discussed in R17 Power saving are applicable to RedCap also.**

It is agreeable according to the online discussion. One company wants to improve the wording of the TP. The TP is updated as below:

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| 8 UE power saving features  8.1 Introduction to UE power saving features  The following UE power saving techniques have been studied:  - Reduced PDCCH monitoring by smaller numbers of blind decodes and CCE limits  - Extended DRX for RRC Inactive and/or Idle  - RRM relaxation for stationary devices  - Paging false alarm  The outcomes of the studies of these techniques are captured in clauses 8.2 through 8.5, respectively, and summarized in clause 13.  ================================================================================  8.4 Paging false alarm  8.4.1 Description of feature  The power consumption of RedCap UEs may be impacted because of paging false alarm and unnecessary SIB1 reading. Paging false alarm and unnecessary SIB1 reading are not specific to RedCap UEs and are discussed in R17 power saving WI. Enhancements introduced by R17power saving WI should also made applicable to RedCap UEs. |

**Question 1. Companies who do not agree with the updated TP are invited to provide their concerns.**

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| ***Company name*** | ***Concerns if any*** |
| LGE | We do not think paging false alarm is related to unnecessary SIB1 reading. We suggest to move the sentences to 8.1 rather than introducing a new section.  8.1 Introduction to UE power saving features  The following UE power saving techniques have been studied:  - Reduced PDCCH monitoring by smaller numbers of blind decodes and CCE limits  - Extended DRX for RRC Inactive and/or Idle  - RRM relaxation for stationary devices  The power consumption of RedCap UEs may be impacted because of paging false alarm and unnecessary SIB1 reading. Paging false alarm and unnecessary SIB1 reading are not specific to RedCap UEs and are discussed in R17 power saving WI. Enhancements introduced by R17power saving WI should also made applicable to RedCap UEs.  The outcomes of the studies of these techniques are captured in clauses 8.2 through 8.4, respectively, and summarized in clause 13. |
| Samsung | We are fine with the suggestion from rapporteur, and there seems typos in the last sentence which can be improved as follows:  Enhancements introduced by R17 power saving WI should also be applicable to RedCap UEs. |
| Ericsson | We are OK with the TP in general, however this does not look like a “UE power saving feature”, and as mentioned, it is not specific to RedCap. The description does not directly mention why paging false alarm would be issue of why SIB1 would be (possibly) unnecessarily read. Thus we think like LGE that a new “feature” should not be included for this in TR, however not sure if 8.1 is the right place either.  If we are to include some of the L2 parameters in the TR, perhaps we can have a section for “Higher layer impacts” or similar in the relevant section/clause?  Also, the naming could be more descriptive, if a new clause is added. |
| Apple | We are in general ok with this. Although it can be pointed out that RedCap UEs with impaired Tx/Rx can have further issues in reception of broadcast channels, we are willing to accept this text. |
| Xiaomi | We are in general ok with this. |
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The pros/cons to have only one device type v.s. multiple device types was discussed online and the following comment was received online:

* We have not discussed the need on different access control for different RedCap UEs. This can be discussed in WI phase.

Based on above comments, the TP is updated as blew:

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| From RAN2 perspective, the pros and cons to define only one device type or multiple device types are:  **Only one RedCap UE type:**  **Pros:**  - No market fragmentation of “types”  - Simpler specification, e.g. on early identification, access control, etc.  **Cons:**  - Cannot provide independent access control for different UE types, if this was deemed necessary  **Multiple RedCap UE types:**  **Pros:**  - Flexible access control is possible if necessary, e.g. independent access control for different UE types  **Cons:**  - Potential market fragmentation of “types”  - More specification complexity/effort, e.g. on early identification, access control, etc.  - May lead to non-technical discussion outside 3GPP’s scope, e.g. product management  The need on independent access control for different RedCap UE types can be discussed in WI phase. |

**Question 2. Companies who do not agree with the updated TP are invited to provide their concerns.**

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| ***Company name*** | ***Concerns if any*** |
| T-Mobile USA | Under Multiple RedCap UE types:  Cons: 3GPP abandoned UE categories for NR simply because of the great difficulty and the politics surrounding the determination of LTE categories. There’s very little difference between LTE UE categories and RedCap UE Types. |
| Intel | *“The need on independent access control for different RedCap UE types can be discussed in WI phase.”*  It implies that we will continue the discussion on multiple UE types in WI phase. But we assume that is not the intention. Therefore we can simply update this part as  “The need on independent access control for different RedCap UE types is not ~~can be~~ discussed in SI ~~WI~~ phase.” |
| OPPO | We can remove the part on “The need on independent access control for different RedCap UE types can be discussed in WI phase.” since “Flexible access control is possible if necessary, e.g. independent access control for different UE types” has well addressed this as open issue. |
| vivo | Regarding cons for multiple UE types:  May lead to non-technical discussion outside 3GPP’s scope, e.g. product management  I assume it is essential “Potential market fragmentation of “types””, can we suggest to merge them into one bullet, otherwise, it is not clear what is other non-technical outside 3GPP scope.  Regarding pros for multiple UE types, we suggest to add one more bullet:  It can meet the requirements for various RedCap use cases and optimize the tradeoff between the economics of scale and cost/power efficiency.  The reason is:   1. If we only define one device type for all use cases, e.g., if one RedCap UE type is defined for the high-end use case assuming the higher data rate (e.g. 150Mbps DL and 50Mbps in UL), it will be challenging to achieve the target on power efficiency for sensors and low-end wearable devices.   In addition, using a higher data rate modem (e.g. 150Mbps DL and 50Mbps in UL) for industrial sensors or low-end wearable devices is obviously not cost efficient. The number of low-end RedCap devices (including industrial sensors, economic video surveillances and low-end wearables) is expected to be much larger than the number of high-end RedCap devices (including high-end video surveillances and high-end wearables). |
| LGE | * We prefer removing “The need on independent access control for different RedCap UE types can be discussed in WI phase.” * We are fine to add the Pros for multiple UE types suggested by Vivo “It can meet the requirements for various RedCap use cases and optimize the tradeoff between the economics of scale and cost/power efficiency.” |
| MediaTek | We agree with Intel’s wording, i.e.:  ‘The need for independent access control for different RedCap UE types is not discussed in the SI phase’  To the comments from vivo:  Bullet ‘Potential market fragmentation…’ is related to the discussion we had in R2-111e, i.e. market fragmentation is undesirable as it leads to a loss of economies of scale and therefore increases device costs.  Bullet ‘May lead to non-technical discussions outside 3GPP scope…’ is related to the discussion we’ve had this meeting on defining suitable product categories.  If you think this is unclear, we can clarify this as below:   * Potential market fragmentation of ‘types’ leading to loss of economies of scale and increased device costs * May lead to non-technical discussion outside 3GPP’s scope, e.g. product management, similar to the discussions on LTE categories |
| DENSO | Agree on Intel’s suggestion, but we understand that “SI” phase is a typo and it is “WI” phase, according to Intel’s comment. |
| Samsung | We are okay with rapporteur's wording. |
| Ericsson | We support T-Mobile’s addition, it is similar to our earlier comment.  In our view, the “RedCap UE type” would correspond a set of minimum capabilities which all RedCap UEs support, and this set is still to be defined. On top of this, the UEs would be able to indicate support of additional capabilities using capability signaling. Therefore, we don’t agree with vivo suggestion for “pro” of multiple UE types – it should be possible to manufacture RedCap UEs of different levels of complexity. Also, “cost” is not a technical aspect we should capture in the TR. |
| ZTE | 1. Agree on Intel’s suggestion, or to remove it. 2. We suggest to update the following bullet for one UE type case.   - Cannot provide independent access control for different UE ~~types~~, if this was deemed necessary  Using “different UE types” here is confusing since only one UE type is defined for this option. |
| Apple | We agree with Intel’s wording and the corresponding response. |
| Xiaomi | We are also fine to add the pros for multiple UE types suggested by Vivo.  On different access control for different RedCap UEs, we are ok with the rapporteur's way.  But we can modify a little bit:  Flexible access control is possible if necessary, e.g. independent access control for different UE types(if introduced) |

During online discussion, it was agreed to try to achieve the following recommendation from RAN2 perspective:

**It is recommended that from RAN2 perspective only one RedCap UE type is preferred**

**Question 3. Companies who do not agree with above recommendation are invited to provide their concerns from RAN2 perspective.**

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| ***Company name*** | ***Concerns if any*** |
| Qualcomm | We support this proposal. We have only a minor suggestion to add “per FR” to the proposal as follow:  **It is recommended that from RAN2 perspective only one RedCap UE type per FR is preferred** |
| OPPO | With above pros and cons analysis, we don’t think RAN2 is ready to make recommendation and it would be sufficient to just list those pros and cons in the TR. Note that RAN1 is also discussing this. What if RAN1 comes up with different recommendation than this? |
| vivo | We disagree this proposal.  By now, we have not figured out the full picture for the capabilities for RedCap. Considering the different use cases in the justification of SID/WID for RedCap devices, it is not proper to make this recommendation from RAN2 point of view at current stage.  Meanwhile, RAN2 discussion is not urgent for this conclusion. We wonder why we need such recommendation now. Anyway, we will have some discussion on this point in the WI phase. Besides, this part is also being discussed in RAN1. We could wait for more progress in both RAN1 and RAN2 on the reduced capabilities. After that, we could make conclusion more reasonable. |
| Lenovo | It is too early to have such recommendation from RAN2 side. UE capabilities have not been fully decided yet and as in the WID, it will be determined in next RAN plenary. Our understanding is that the number of UE types might be determined by such un-determined UE capabilities. Therefore, before the UE capabilities being fully determined, recommendation from RAN2 side is not so meaningful. For now, it would be enough that RAN2 just align the understanding of the pros/cons of one type vs. two(or more) types. |
| DENSO | We support to stick to rapporteur’s original wording. It is not clear why the different UE type is needed for FR1 and FR2. Thanks to NR principle not defining UE categories, UE can anyway differentiate its capability via the support bandwidth, MIMO, modulation capabilities, etc. |
| Ericsson | We fully agree with the proposal.  On OPPOs concern, a RAN2 recommendation is a recommendation and doesn’t directly mean it is the final decision on the matter – if RAN1 has a different recommendation (or request for RAN plenary to update the WID), the way forward would be discussed in RAN plenary then.  From rapporteur perspective if would be good to have recommendations where possible so that we wouldn’t need to re-discuss everything again during the WI phase. All such discussions will take time away from defining the features for RedCap UEs and there are many such proposed features on the table – if we can’t make recommendations now, these need to be included in the WI scope, not helping with the resource situation. |
| ZTE | We agree with this proposal, and also fine with QC’s suggestion. We think from RAN2 point of view, we can recommend this. And anyway, pros and cons for both options are captured in TR. |
| Apple | We prefer Qualcomm’s view as well. |
| Xiaomi | It is not proper for RAN2 recommendation or indicate preference.  Even though majority of companies support this, there are still other companies think RAN2 should not decide but need to wait for RAN1 or RAN plenary. And I checked with our RAN1 colleague, they are discussing the 1RX and 3 dB antenna efficiency loss things which would impact the early indication. |

# Conclusion

This offline discussion is to continue the discussion on p5 and p6 from R2-2102017, also attempt to draft a recommendation from RAN2 perspective that a single RedCap UE type is preferred:

TBD

# Contact delegates

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