3GPP TSG-RAN WG2 Meeting#112-e Draft\_R2-200xxxx

Online, 2nd - 13th November 2020

Agenda Item: x.x.x.x

Source: Huawei

Title: [Draft] Summary of email discussion 914 on UE identification and access restrictions (Huawei)

Document for: Discussion and Decision

# Introduction

Rel-17 SI on RedCap was started in RAN2#111-e. One of the objective in the SID is to study UE identification and access restrictions for RedCap UEs [1]:

* Study functionality that will allow devices with reduced capabilities to be explicitly identifiable to networks and network operators, and allow operators to restrict their access, if desired [RAN2, RAN1].

In RAN2#111-e, the following agreements were made for UE identification and access restrictions [2]:

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| 1. An indication in system information is needed to indicate whether a REDCAP UE can camp on the cell. FFS whether the indication is explicit or implicit. 2. UAC mechanism also apply to REDCAP UEs. 3. System information indicates whether REDCAP operation is allowed/barred on a frequency. FFS reuse the legacy intraFreqReselection or introduce separate flag 4. Further discuss enhancement of UAC for REDCAP UEs, including e.g.:    1. define new Access Identity for REDCAP UEs    2. define new Access Categories for REDCAP UEs   (for any final decision we need to check with SA1 and/or CT1) |

UE identification for RedCap UEs was also discussed in RAN1#102-e, the following agreements were made [3]:

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| Agreements:   * Further study the options for identification of RedCap UEs, including ~~at least~~ the following indication methods:   + Opt. 1: During Msg1 transmission, e.g., via separate initial UL BWP, separate PRACH resource, or PRACH preamble partitioning.   + Opt. 2: During Msg3 transmission.   + Opt. 3: Post Msg4 acknowledgment.     - E.g., during Msg5 transmission or part of UE capability reporting.   + Opt. 4: During MsgA transmission (subject to support of if 2-step RACH)   + Other options are not precluded.   + Note: This study intends to establish feasibility of, and pros and cons for the identified options from RAN1 perspective, without any intention of down-selection without guidance from RAN2.   Conclusion:   * RAN1 to wait for further progress in RAN2 on the issues of temporary access barring and congestion control. |

The following email discussion was agreed in RAN2#111-e to further discuss UE identification and access restrictions for RedCap UEs:

* [Post111-e][914][REDCAP] UE identification and access restrictions (Huawei)

Scope: Discuss UE identification and access restrictions, addressing open issues from the meeting, taking into account possible RAN1 agreements and identifying possible solutions

Intended outcome: email discussion summary

Deadline: Thursday OCT 15 0700 UTC (please respect this deadline)

# Discussion

## UE identification

In RAN2#111-e, when to identify RedCap UEs was discussed in offline discussion 110. The following options were discussed:

- Option 1: Msg1 (Separate initial UL BWP or PRACH partitioning)

- Option 2: Msg3

- Option 3: Msg5

- Option 4: MsgA for 2 step RA

Companies’ view were split and several companies did not provide any preference but suggested to wait for RAN1 input.

The same options were discussed in RAN1 also. There was no conclusion in RAN1 but according to RAN1 agreement, guidance from RAN2 is needed before down-selection:

* + Note: This study intends to establish feasibility of, and pros and cons for the identified options from RAN1 perspective, without any intention of down-selection without guidance from RAN2.

Considering that UE identification is a RAN2 led topic, we think it is useful to discuss the consequences of not having the indication at this stage for each option from RAN2 perspective and then identify RAN2 preference based on the discussion. Based on RAN2 preference, a LS can be sent to RAN1 to check the feasibility.

**Option 1: Msg1 (Separate initial UL BWP or PRACH partitioning)**

In the offline discussion 110 in last meeting, the following arguments were provided to identify the RedCap UEs during Msg1:

* For the network to schedule Msg2/3 properly, e.g. to decide whether to schedule repetition.
* If a REDCAP UE is allowed to camp on the cell with larger initial UL/DL BWP than supported by the UE, the network needs to identify the UE via Msg1 to schedule Msg3 with the BW restriction of RedCap UE.

**Question 1.** Do you think it is needed **from RAN2 perspective** to identify RedCap UEs during Msg1? What is the consequence if not?

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**Option 2: Msg3**

In the offline discussion 110 in last meeting, the following arguments were provided to identify the RedCap UEs during Msg3:

* If a RedCap UE is allowed to camp on the cell with larger initial UL/DL BWP than supported by the UE, the network needs to identify the UE at least in Msg3 to schedule Msg4/5 with the BW restriction of RedCap UE.
* If a RedCap UE is identified at least in Msg3, network can reject the RedCap UE based on the load and its strategy.

**Question 2.** Do you think it is needed **from RAN2 perspective** to identify RedCap UEs during Msg3? What is the consequence if not?

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**Option 3: Msg5**

In the offline discussion 110 in last meeting, there were company view that identifying Redcap UE in Msg5 is enough if a REDCAP UE is not allowed to camp on the cell with larger initial UL/DL BWP than supported by the UE.

**Question 3.** Do you think it is needed **from RAN2 perspective** to identify RedCap UEs during Msg5? What is the consequence if not?

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**Option 4: MsgA**

This option only applies to 2-step RA. Arguments similar to Option 1 and Option 2 in 4-step RA were provided in the last RAN2 meeting.

**Question 4.** For 2-step RA, do you think it is needed **from RAN2 perspective** to identify RedCap UEs during MsgA? What is the consequence if not?

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**Question 5.** Based on reply to Questions 1-4, please indicate your preference **from RAN2 perspective**:

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Based on reply to Questions 1-5, please comment whether a LS to RAN1 is needed, e.g.:

* To inform RAN2 conclusion
* To check the feasibility of the RAN2 preferred option (if there is RAN1 impact)
* To ask RAN1 whether they have identified the need for earlier identification from RAN1 perspective

**Question 6.** Do you agree to send LS to RAN1 including above information/question?

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## Access restrictions

### UAC

In the last meeting, RAN2 has confirmed that UAC also applies to RedCap UEs and agreed to further discuss enhancement of UAC for REDCAP UEs, including e.g.:

* 1. define new Access Identity for REDCAP UEs
  2. define new Access Categories for REDCAP UEs

Considering that UAC is SA1 scope, LS to SA1 is needed.

**Question 7.** Do you agree to send LS to SA1 (cc CT1?) about UAC enhancement for RedCap UEs? If yes, what should be included in the LS?

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### Indication in system information

In the last meeting, RAN2 has confirmed that an indication in system information is needed to indicate whether a REDCAP UE can camp on the cell. Whether the indication is explicit or implicit is FFS.

According to online comments in the last meeting, whether an explicit indication is needed depends on other design aspects on initial access, e.g. if separate initial BWP or RACH partitioning is supported, explicit indication is not needed.

**Question 8.** Please companies provide your view on the indication in system information?

* Option 1: Explicit
* Option 2: Implicit and how?
* Option 3: Too early to decide

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There is also a FFS regarding whether to reuse the legacy intraFreqReselection or introduce a separate flag.

**Question 9.** Please companies provide your view on intraFreqReselection?

* Option 1: reuse the legacy intraFreqReselection
* Option 2: introduce separate flag
* Option 3: Too early to decide

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# Conclusion

This offline discussion focused on UE identification and access restrictions for RedCap UEs:

**TBD**

# References

1. RP-201677, “Revised SID on Study on support of reduced capability NR devices”, Ericsson, RAN#89-e, Online, September 14 - 18, 2020
2. R2-2008122, “Report from Break-out session on R16 eMIMO, CLI, PRN, RACS and R17 NTN and REDCAP”, Vice Chairman (ZTE Corporation), RAN2#111-e, Online, August 17 – 28, 2020
3. RAN1 minutes for RAN1#102-e
4. R2-2008192, “Summary of offline 110 - Identification and access restriction”, Huawei, RAN2#111-e, Online, August 17 – 28, 2020

# Contact delegates

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