3GPP TSG RAN WG2 Meeting #117-e Draft R2-2203540

**Electronic meeting, 21 Feb- 3 March, 2022**

**Agenda item:** 8.12.5.1

**Source:** Intel Corporation

**Title:** Report of [Pre117-e][107][RedCap] UE caps open issues (Intel)

**Document for:**  Discussion and decision

# Introduction

This is the report of following offline discussion:

** [AT117-e][107][RedCap] UE caps open issues (Intel)**

Initial scope: Discuss UE caps open issues based on the report in [R2-2202497](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2202497_Report%20of%20Pre117-107-P2-v11.docx)

Initial intended outcome: Summary of the offline discussion with e.g.:

  List of proposals for agreement (if any)

  List of proposals that require online discussions

  List of proposals that should not be pursued (if any)

Initial deadline (for companies' feedback): Wednesday 2022-02-23 0600 UTC

Initial deadline (for rapporteur's summary in R2-2203540): Wednesday 2022-02-23 1000 UTC

Proposals marked "for agreement" in R2-2203540 not challenged until Wednesday 2022-02-23 1200 UTC will be declared as agreed via email by the session chair (for the rest the discussion will continue during the GTW session on Thursday).

Status: To be started

# Annex: companies’ point of contact

|  |  |  |
| --- | --- | --- |
| **Company** | **Point of contact** | **Email address** |
| Intel Corporation | Yi Guo | Yi.guo@intel.com |
| Qualcomm | Linhai He | linhaihe@qti.qualcomm.com |
| Samsung | Seungbeom Jeong | s90.jeong@samsung.com |
| Huawei, HiSilicon | Yulong Shi | Shiyulong5@huawei.com |
| MediaTek | Pradeep Jose | pradeep dot jose at mediatek dot com |
| Vivo | Chenli | Chenli5g@vivo.com |
| OPPO | Haitao Li | lihaitao@oppo.com |
| Nokia, Nokia Shanhai Bell | Samuli Turtinen | samuli.turtinen@nokia.com |
| Sequans | Noam Cayron | noam.cayron@sequans.com |
| LGE | HyunJung Choe | stella.choe@lge.com |
| ZTE | LiuJing | liu.jing30@zte.com.cn |
| Apple | Naveen Palle | naveen.palle@apple.com |
| Ericsson | Tuomas Tirronen | tuomas.tirronen@ericsson.com |
| BT | Salva Diaz | salva.diazsendra@bt.com |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

# Discussion

## 3.1 Confirmation of easy proposals

As discussed in Pre117-e107, following proposals are considered as easy proposals:

**Phase 1-Proposal 3.1.2-1: [For agreements] [16/16] Rel-17 RRM relaxation for RRC\_IDLE/INACTIVE UEs is captured in TS38.306 as optional feature without capability:**

| Definitions for feature |
| --- |
| **Rel-17 relaxed measurement for RRC\_IDLE/RRC\_INACTIVE**It is optional for RedCap UE to support Rel-17 relaxed RRM measurements of neighbor cells in RRC\_IDLE/RRC\_INACTIVE as specified in TS 38.304 [21]. |

**Phase 1-Proposal 3.2.1-1: [For agreements] [16/16] Rel-17 eDRX for RRC\_IDLE UEs is captured in TS38.306 as optional feature without capability signalling, i.e.**

| Definitions for feature |
| --- |
| **Rel-17 extended DRX in RRC\_IDLE**It is optional for UE to support Rel-17 extended DRX cycle up to 10485.76 seconds and paging in extended DRX in RRC\_IDLE as specified in TS 38.331 [9] and TS 38.304 [21]. |

**Phase 1-Proposal 3.2.2-1: [For agreements] [16/16] *inactiveStatePO-Determination-r17* introduced in R2-2111586 covers eDRX scenario, and no new UE capability is needed. A UE supports eDRX shall also support *inactiveStatePO-Determination-r17*.**

**Phase 1-Proposal 3.3.1-1a: [for agreement] [12/14] remove “For FR1 RedCap UE, the bit which indicates 20MHz shall be set to 1. For FR2 RedCap UE, the bit which indicates 100MHz shall be set to 1.” .**

**Phase 1-Proposal 3.3.1-2: [for agreement] [15/15] remove “This capability is not applicable to RedCap Ues.” From the definition of channelBW-90mhz .**

**Phase 1-Proposal 3.3.2-1: [for agreement] [9/15] Follow RAN2 agreement, i.e. keep the following sentence “RedCap UE shall always report “1”.” in the definition of shorts and am-WithShortSN? .**

**Phase 1-Proposal 3.3.3-1: [for agreement] [Only 1 company wants to keep] Do not add the change “since xxx.” for the definition of supportOf16DRB-RedCap, longSN-RedCap and am-WithShortSN-RedCap.**

**Phase 1-Proposal 3.3.4-1: [for agreement] [13/14] Follow RAN2 agreements, keep the structure as it is, i.e. separate section for RedCap specific capabilities;.**

**Phase 1-Proposal 3.4-1: [for agreement] [13/15] Confirm the working assumption that Msg3 early identification is mandatorily supported by RedCap UE;.**

Note: T-Mobile USA has strong concern on this”,

**Phase 2-proposal 4.2.3-1: [For agreements] [6/7] change “RedCap Ues shall support the maximum channel bandwidth defined for the respective band up to 20 MHz for FR1 and up to 100 Mhz for FR2. ” to “For each band, RedCap UEs shall indicate~~support~~ the maximum channel bandwidth, which is the maximum one from the channel bandwidths  less than or equal to 20 MHz for FR1 and less than or equal to 100 Mhz for FR2, taking restrictions in TS 38.101-1 [2] and TS 38.101-2 [3] into consideration.” .**

**MediaTek provided the wording improvement as “For each band, RedCap UEs shall indicate the maximum of those channel bandwidths that are less than or equal to 20 MHz for FR1 and less than or equal to 100 Mhz for FR2, taking restrictions in TS 38.101-1 [2] and TS 38.101-2 [3] into consideration”. Huawei commented that “channelBWs-DL, channelBWs-UL are bitmap signalilng. supportedBandwidthDL, supportedBandwidthUL are ENUMERATED with the maximum channel bandwidth to indicate. So, at least for the latter two cases, we need to use the term “indicate the maximum channel bandwidth”, also used by legacy.”, and prefer to stick to original wording. Let’s quick agree on the text without any online discussion. We can polish the wording in later running CR review, e.g. for simplification.”**

**Phase 2-proposal 4.2.3-2: [For agreements] [7/7] remove “channelBWs-DL-v1590 is not applicable to RedCap Ues” from the corresponding field description since it is already clear in the specification.**

**Discussion point 3.1-1: Do you agree the above proposals?**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes or No?** | **Comments, if any** |
| Qualcomm | Yes except Proposal 3.4-1 | After an offline discussion with T-Mobile, we would like to change our position and make Msg3 based identification optional without signaling.As to Proposal 4.2.3-1, we have a slight preference for MediaTek’s TP. |
| Samsung | Yes | All the proposals above look fine to us. |
| Huawei, HiSilicon | Yes | As to Proposal 3.4-1, we support the proposal. In case it becomes optional, gNB cannot identify whether a UE not reporting Msg3 with dedicated LCID is a **non-RedCap** UE or **RedCap UE not supporting** Msg3 early identification. This will make the whole Msg3 early identification **useless**.Proposal 4.2.3-1 is fine. We want to highlight our comments: supportedBandwidthDL, supportedBandwidthUL are **ENUMERATED** with the maximum channel bandwidth to indicate. We need to use the term “**indicate the maximum channel bandwidth**”, also used by legacy. |
| MediaTek | Yes | Regarding Phase 2-proposal 4.2.3-1, we are ok with the principle of the change, but would like to improve on the actual text for clarity. Taking Huawei’s comments into account, we suggest the following.For the case of channelBWs-DL and channelBWs-UL which are bitmap signalling, we stick to the original text as below:*For each band, RedCap UEs shall indicate the maximum of those channel bandwidths that are less than or equal to 20 MHz for FR1 and less than or equal to 100 Mhz for FR2, taking restrictions in TS 38.101-1 [2] and TS 38.101-2 [3] into consideration*For the case of supportedBandwidthDL and supportedBandwidthUL which are enumerated to indicate the maximum channel BW, we go with the updated text as below:*For each band, RedCap UEs shall indicate ~~the~~its maximum channel bandwidth~~, which is~~ as the maximum ~~one from the~~ of those channel bandwidths that are less than or equal to 20 MHz for FR1 and less than or equal to 100 Mhz for FR2, taking restrictions in TS 38.101-1 [2] and TS 38.101-2 [3] into consideration.* |
| Vivo | Yes except P3.1.2-1 and P3.4-1 with comments | 1. For proposal 3.1.2-1, we prefer to remove “for RedCap UEs”, if the following proposal in section 3.2.1 is agreeable.
2. For proposal 3.4-1, we also prefer not to make Msg3 based identification as mandatory as mentioned before, considering Msg1 based early identification is already mandatory for RedCap UE, and supporting duplicated functionalities for a same purpose is not needed.

Besides, we have also agreed that Msg3 based identification has no other precondition.The whole design is somehow contradictory design to the WID description below:“Specify functionality that will enable RedCap UEs to be explicitly identifiable to networks through an early indication in Msg1 and/or Msg3, and Msg A if supported, including the ability for the early indication to be configurable by the network. [RAN2, RAN1]” |
| OPPO | Yes |  |
| Nokia | Yes | Regarding P3.4-1, as we agreed already in the previous meeting that RedCap UE always uses the CCCH LCIDs allocated for RedCap, this has to be mandatory capability.1. In MAC perspective, RedCap UE uses the dedicated LCID for Msg3 early identification, when the Msg3 includes the CCCH data (no other precondition)

Also when msg1 early identification is configured, new dedicated LCID is used for CCCH identification |
| Sequans | Yes | For Ph-2 P-4.2.3-1 we think the same wording is clear enough for both cases, but are fine with wording compromises.For Ph-1 P-3.4-1 we agree with HW. Additionally, we don’t see an issue – mandatorily supported by UEs does not mean the NW must enable it. |
| LGE | Yes |  |
| ZTE | Yes | We are fine with all above proposals.  |
| Apple | Yes and for Proposal 3.4-1, we voice the same views as Qualcomm and Vivo |  |
| Ericsson | Yes | Regarding P3.4-1, we support the proposal and agree with Huawei that making the indication optional would render it useless. Further there is no benefit of not including the Msg3 indication and the agreement on not having any precondition insinuates it should always be included. We wonder what is the technical concern with P3.4-1? We suggest to clarify that this proposal should consider the case where a RedCap UE connects to a cell which supports RedCap (legacy case(s) are a separate discussion). We should agree to P3.4-1 and not waste any more time on this issue. Note that Msg1 configuration might be rather costly in terms of signaling overhead and a gNB might not want to configure that unless it is absolutely necessary – in such case, there would be practically no early indication is Msg3 is not mandatory, going against the RAN2 earlier intention. On vivo concern about WID, the formulation was chosen to consider possible overhead (which we have with Msg1 indication, but not with Msg3). |
| BT | Proposal 3.4-1 | We agree with Huawei, Nokia and Ericsson. If we don’t agree on this, then what is the meaning of (no other precondition) in current agreement?We don’t understand the technical concern on this specific point. Apart from that, Msg1 can be disabled by the network. In that scenario, if Msg3 is optional without signalling early indication is gone. As it is mentioned by Huawei, there is no way to identify a non-RedCap UE from a RedCap UE non-supporting Msg3. |

## Further discussion

Following issues were discussed in Pre117-e107, and further discussion is needed.

### Can Rel-17 RRM relaxation apply to any Rel-17 UE or not?

**The discussion in pre117-e107 is**

|  |
| --- |
| **Summary: 16 companies provided inputs.**Regarding additional SI indication, most companies do not see the motivation on this;Regarding “ Rel-17 RRM relaxation can apply to any Rel-17 UE.”, same situation as last meeting, 4 companies still object it. The main concern from companies is “*The concern is this may cause more standard effort, e.g. some impact to other WI/feature to support this RRM relaxation. It may bring more CRs in the future meeting. How can RedCap session determine whether a non-RedCap UE to support a new R17 feature?*”Rapporteur believes companies will take the same position even if we continue the discussion. Therefore Rapporteur would suggest:**Phase 1-Proposal 3.1.1-1: [Further discussion] [11/16] Rel-17 RRM relaxation may apply to any Rel-17 UE, but RAN2 will not spend additional effort to enable this. That means, we will not remove “RedCap” from the field name, and will not clarify whether non-RedCap UEs support it or not.****Phase 2****Summary:** Companies still have different view. Then Rapporteur would suggest to discuss it online based on original proposal. **Phase 2-proposal 4.2.1-1: [Further discussion] (12/16) Rel-17 RRM relaxation can apply to any Rel-17 UE.** |

**Discussion point 3.2.1-1: Do you agree the following proposal ?**

**Proposal: Rel-17 RRM relaxation can apply to any Rel-17 UE..**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes or No?** | **Comments, if any** |
| Qualcomm | Yes |  |
| Samsung | Yes |   |
| Huawei, HiSilicon | No | If proponents claim there is no spec impact, the phase 1 proposal seems the only compromised way forward.**Phase 1-Proposal 3.1.1-1: [Further discussion] [11/16] Rel-17 RRM relaxation may apply to any Rel-17 UE, but RAN2 will not spend additional effort to enable this. That means, we will not remove “RedCap” from the field name, and will not clarify whether non-RedCap Ues support it or not.** |
| MediaTek | Go with Phase 1 proposal | Same comments as Huawei, i.e. if we assume that there is no spec impact, then there’s no need to do anything.  |
| Vivo | Yes | We really don’t see any motivation to excluded non-RedCap Ues to use this RRM relaxation, while this feature could also bring power saving gain, similar as Edrx.  |
| OPPO | Yes |  |
| Nokia | No  | Agree with Huawei |
| Sequans | Yes, but | Phase 1 proposal as-is is not acceptable. Leaving RedCap in the feature name, and allowing non-RedCap UEs to indicate the capability, but without it being mentioned anywhere in the spec is asking for trouble later. A non-RedCap UE implementing this may be perceived as a non-compliant UE.If we go with this compromise, then we suggest capturing in a NOTE that non-RedCap UEs may [indicate] support this feature; that way it is not normative text, but at least it’s written somewhere. |
| LGE | No | The target scenario of R17 RRM relaxation is stationary UEs which have lower mobility than the low mobility UEs considered in R16 relaxed measurements. So the R17 RRM relaxation pursues extreme power saving for truly stationary UEs. So normal NR UEs which have frequent mobility should not support R17 RRM relaxation.  |
| ZTE | Yes | The phase1 proposal 3.1.1-1 is a bit weird, if we confirm Rel-17 RRM relaxation can be applied to any Rel-17 UEs, why we keep “RedCap” in the field name? It is confusing if a non-RedCap UE reports a capability with “-RedCap”. |
| Apple | Yes |  |
| Ericsson | Yes | No strong view. However, we have a strong view to focus on completing RedCap WI and not spending any time on non-RedCap specific issues or discussion.  |

### Edrx capability for RRC\_INACTIVE Ues

**The discussion in pre117-e107 is**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Summary: 15 companies provided inputs.**8 companies commented that the capability for Edrx in RRC\_INACTIVE is not needed since “**RAN Edrx can be configured only if CN Edrx is configured. So we think there is no case that a UE supports RAN Edrx but does not support CN Edrx**”. 7 companies believes that a capability is needed for Edrx in RRC\_INACTIVE because:* IDLE and INACTIVE Edrx includes different functionality and therefore it would be natural to have separate capabilities for them.
* There is no case that a UE supports RAN Edrx but does not support CN Edrx. But there can be case that UE not supports RAN E-drx but support CN Edrx;

Rapporteur would suggest:**Phase 1-Proposal 3.2.2-2: [Further discussion] [7 vs 8]Rel-17 extended long DRX for RRC\_INACTIVE is captured in TS38.306 as optional feature with capability signaling, i.e. introduce a capability bit on this, to cover the scenario that UE does not support RAN Edrx but support CN Edrx.****Phase 1-Proposal 3.2.2-3: [Further discussion] [8/8] [15/15]For extended long DRX for RRC\_INACTIVE, introduce a new capability bit extendedLongDRX-r17 covering DRX values of 2.56s, 5.12s and 10.24s;**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Definitions for parameters | Per | M | FDD-TDD DIFF | FR1-FR2 DIFF |
| ***extendedLongDRX-Cycle-r17***Indicates whether UE in RRC\_INACTIVE supports the extended long DRX values of 256, 512 and 1024 radio frames as specified in TS 38.321 [8]. | UE | No | No | No |

Phase 2**Summary:** Companies still have different view. The basic question is whether a UE must support both Edrx in RRC\_IDLE and RRC\_INACTIVE simultaneously?If yes, we do not need to introduce Edrx capability for RRC\_INACTIVE, i.e. rely on IDLE is enough, otherwise we should introduce Edrx capability for RRC\_INACTIVE. Therefore Rapporteur would suggest:**Phase 2-proposal 4.2.2-1: [Further discussion] RAN2 to confirm whether a UE must support both Edrx in RRC\_IDLE and RRC\_INACTIVE simultaneously.**If answer is yes:**Phase 2-proposal 4.2.2-1-Yes: [Further discussion] the Edrx in RRC\_INACTIVE is introduced together with Edrx in RRC\_IDLE as**

| Definitions for feature |
| --- |
| **Rel-17 extended DRX in RRC\_IDLE and RRC\_INACTIVE**It is optional for UE to support Rel-17 extended DRX cycle values up to 10485.76 seconds for RRC\_IDLE and up to 10.24 seconds for RRC\_INACTIVE, and paging in extended DRX in RRC\_IDLE and RRC\_INACTIVE as specified in TS 38.331 [9] and TS 38.304 [21]. |

If answer is no:**Phase 2-proposal 4.2.2-1-No: [Further discussion] For extended long DRX for RRC\_INACTIVE, introduce a new capability bit extendedLongDRX-r17 covering DRX values of 2.56s, 5.12s and 10.24s;**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Definitions for parameters | Per | M | FDD-TDD DIFF | FR1-FR2 DIFF |
| ***extendedLongDRX-Cycle-r17***Indicates whether UE in RRC\_INACTIVE supports the extended long DRX values of 256, 512 and 1024 radio frames as specified in TS 38.331 [9]. | UE | No | No | No |

 |

**Discussion point 3.2.2-1: Companies are invited to provide view on whether a UE must support both Edrx in RRC\_IDLE and RRC\_INACTIVE simultaneously?**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Must or No?** | **Comments, if any** |
| Qualcomm | No | For the reasons as summarized by the rapporteur above:* IDLE and INACTIVE Edrx includes different functionality and therefore it would be natural to have separate capabilities for them.
* There is no case that a UE supports RAN Edrx but does not support CN Edrx. But there can be case that UE not supports RAN E-drx but support CN Edrx;
 |
| Samsung | No | UE needs to support AS signaling for RAN Edrx, while UE needs to support NAS signaling for CN Edrx. That is why we think they are separate capabilities. |
| Huawei, HiSilicon |  Must | Nothing wrong to assume this as it is in LTE. |
| MediaTek | No | Agree with Qualcomm and Samsung |
| Vivo | Yes | At least in R17, we think there may be no need for this separate capability, as we have following agreements in RAN2#115e meeting: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.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. |
| OPPO | Yes | Capability can be combined, but configuration for IDLE and INACTIVE can be separate. |
| Nokia | Yes |  |
| Sequans | No | Agree with QC and think that splitting the capability is useful. However, we are fine to go with majority. |
| LGE | Yes | At least in Rel-17, a UE supporting eDRX must support both eDRX in RRC\_IDLE and RRC\_INACTIVE. No reason to not support eDRX only in RRC\_INACTIVE eDRX, and we don’t see any benefit when the UE has such flexibility.  |
| ZTE | No | The second bullet mentioned by Qualcomm makes sense, a UE may support CN eDRX but does not support RAN eDRX. If this case needs to be supported, we are fine to introduce a capability bit for RAN eDRX (i.e. proposal 4.2.2-1). |
| Apple | Yes, but ok to go with majority | Atleast for Rel-17, the range of values for INACTIVE is lower than IDLE, and so UE supporting IDLE eDRX should be able to support INACTIVE..? But we can compromise and go with majority. |
| Ericsson | Yes | For Rel-17 this should be the case. Agree that there is no case where UE would only support INACTIVE eDRX but no IDLE eDRX. |
| BT | Yes | At least for Rel-17, this should be the case. It is unexpected eDRX is supported only on IDLE or INACTIVE. A different discussion is that different functionalities are required to support each of them.  |

**If answer to Discussion point 3.2.2-1 is yes:**

**Discussion point 3.2.2-2: Do you agree that the eDRX in RRC\_INACTIVE is introduced together with eDRX in RRC\_IDLE as**

| Definitions for feature |
| --- |
| **Rel-17 extended DRX in RRC\_IDLE and RRC\_INACTIVE**It is optional for UE to support Rel-17 extended DRX cycle values up to 10485.76 seconds for RRC\_IDLE and up to 10.24 seconds for RRC\_INACTIVE, and paging in extended DRX in RRC\_IDLE and RRC\_INACTIVE as specified in TS 38.331 [9] and TS 38.304 [21]. |

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes or No?** | **Comments, if any** |
| Huawei, HiSilicon | Yes |  |
| Vivo | Yes |  |
| OPPO | Yes |  |
| Nokia | Yes |  |
| Sequans | Yes |  |
| LGE | Yes |  |
| Apple | Yes |  |
| Ericsson | Yes |  |

**If answer to Discussion point 3.2.2-1 is no:**

**Discussion point 3.2.2-3: Do you agree that for extended long DRX for RRC\_INACTIVE, introduce a new capability bit extendedLongDRX-r17 covering DRX values of 2.56s, 5.12s and 10.24s;**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Definitions for parameters | Per | M | FDD-TDD DIFF | FR1-FR2 DIFF |
| ***extendedLongDRX-Cycle-r17***Indicates whether UE in RRC\_INACTIVE supports the extended long DRX values of 256, 512 and 1024 radio frames as specified in TS 38.331 [9]. | UE | No | No | No |

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes or No?** | **Comments, if any** |
| Qualcomm | Yes |  |
| Samsung | Yes but | Prefer to remove “long” in the ignaling. |
| MediaTek | Yes but | Agree with Samsung that ‘long’ can be dropped from the name and description |
| Sequans | Yes | Agree with Samsung |
| LGE | Yes |  |
| ZTE | Yes but | Agree with Samsung. |

### RRM relaxation for RRC\_CONNECTED Ues

**The discussion in pre117-e107 is**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Discussion point 3.1.3-1: Do you agree that Rel-17 RRM relaxation for RRC\_CONNECTED Ues is captured in TS38.306 as optional feature with capability ignaling, i.e. introduce a capability bit on this, e.g. *rrm-RelaxationRRC-ConnectedRedCap-r17*; Please also provide your comments on the text proposal if any.** **Text proposal:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Definitions for parameters | Per | M | FDD-TDD DIFF | FR1-FR2 DIFF |
| ***rrm-RelaxationRRC-ConnectedRedCap-r17***Indicates whether UE supports Rel-17 relaxed RRM measurements in RRC\_CONNECTED as specified in TS 38.331 [9]. | ? | ? | ? | ? |

**Note: “RedCap” should be removed from the field *rrm-RelaxationRRC-ConnectedRedCap-r17* if the compromised proposal in discussion point 3.1.1-1 is agreed.** **Summary: 16 companies provided inputs.**All companies agreed to introduce capability on RRM relaxation for RRC\_CONNECTED. Huawei and Mediatek commented that “the capability is for RRM relaxation status reporting since RAN4 has not define the new RRM relaxation behavior for RedCap Ues in RRC\_CONNECTED”. Rapporteur considers the safe way is to make it generic, i.e. not mention “the capability is for RRM relaxation status reporting.” For now since RAN4 has not finished their work. Rapporteur would suggest:**Phase 1-Proposal 3.1.3-1: [For agreements] [16/16] Rel-17 RRM relaxation for RRC\_CONNECTED Ues is captured in TS38.306 as optional feature with capability ignaling, i.e. introduce a capability bit on this;**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Definitions for parameters | Per | M | FDD-TDD DIFF | FR1-FR2 DIFF |
| ***rrm-RelaxationRRC-ConnectedRedCap-r17***Indicates whether UE supports Rel-17 relaxed RRM measurements in RRC\_CONNECTED as specified in TS 38.331 [9]. | UE | No | No | No |

Phase 2:**Phase 1-Proposal 3.1.3-1: [For agreements] [14/16] Rel-17 RRM relaxation for RRC\_CONNECTED Ues is captured in TS38.306 as optional feature with capability ignaling, i.e. introduce a capability bit on this;**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Definitions for parameters | Per | M | FDD-TDD DIFF | FR1-FR2 DIFF |
| ***rrm-RelaxationRRC-ConnectedRedCap-r17***Indicates whether UE supports Rel-17 relaxed RRM measurements in RRC\_CONNECTED as specified in TS 38.331 [9]. | UE | No | No | No |

Note: T-Mobile USA and MediaTek commented that we should not make the capability generic since the capability only “indicates whether UE supports UE assistance reporting of change of fulfilment status for RRM measurement relaxation criterion in RRC\_CONNECTED as specified in TS 38.331 [9]..””,  |

**Discussion point 3.2.3-1: which option is prefer?**

**Option 1:**

**Rel-17 RRM relaxation for RRC\_CONNECTED Ues is captured in TS38.306 as optional feature with capability ignaling, i.e. introduce a capability bit on this;**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Definitions for parameters | Per | M | FDD-TDD DIFF | FR1-FR2 DIFF |
| ***rrm-RelaxationRRC-ConnectedRedCap-r17***Indicates whether UE supports Rel-17 relaxed RRM measurements in RRC\_CONNECTED as specified in TS 38.331 [9]. | UE | No | No | No |

**Option 2:**

**Rel-17 RRM relaxation for RRC\_CONNECTED Ues is captured in TS38.306 as optional feature with capability ignaling, i.e. introduce a capability bit on this;**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Definitions for parameters | Per | M | FDD-TDD DIFF | FR1-FR2 DIFF |
| ***rrm-RelaxationRRC-ConnectedRedCap-r17***Indicates whether UE supports UE assistance reporting of change of fulfilment status for RRM measurement relaxation criterion in RRC\_CONNECTED as specified in TS 38.331 [9]. | UE | No | No | No |

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Option 1 or****Option 2**  | **Comments, if any** |
| Qualcomm | Option 1 | We think it is fine to keep it generic at least for now.  |
| Samsung | Option 1, and | This capability includes not only stationarity status reporting, but also RRM relaxation methods to be defined by RAN4. Besides, we may need to specify RAN4 spec as well, according to RAN4’s decision. |
| Huawei, HiSilicon | Option 2 | This is the last meeting for stage3 freeze. If there is no conclusion on the new relaxation behavior in RAN4, it seems not likely to support this. |
| MediaTek | Option 2 | We cannot accept introducing a capability for a function that does not exist. The capability must be clear, and therefore Option 1 is not acceptable. |
| Vivo | Option 1 | I am not sure about the intention for option 2, as there may be some discussion on RRM relaxation method in RAN4 (but anyway, this part is up to RAN4 discussion). It is very clear in WID this feature should be relaxed RRM measurement. |
| OPPO | Option 2 | Option 2 as baseline and we can polish later. |
| Nokia | Option 1 |  |
| Sequans | Option 1 | We think actually both work, as they each focus on another aspect of intrinsically interconnected procedures, but we prefer option 1as it is more general and thus obviously includes the related reporting. |
| LGE | Option 1 |  |
| ZTE | Option 2 | We think Option 2 is aligned with the current status in RAN2. |
| Apple | Option 1 is ok. |  |
| Ericsson | Option 1 | Agree with Qualcomm, Samsung. |
| BT | Option 1 |  |

# Summary report and proposals

**For agreement:**

**Online discussion:**

# Open issues list for RedCap UE capabilities (R2-2201893)

|  |  |  |  |
| --- | --- | --- | --- |
| **Topic** | **Open issues****Note:** Open Issues should be defined for aspects that need to be closed, important to make already agreed functionality work in a reasonable way. Not yet agreed optimizations that may not be needed shall not be listed as Open Issues. | **Remark**  | **To be handled by pre-117 discussion or company’s contribution**  |
| RAN1 led feature | To capture “introduce capability bit on Half-duplex FDD operation type A for RedCap UEs; ” | To be captured in Mega CR. (need to check latest RAN1 feature list after Jan meeting) | Mega CR directly. |
| To capture “introduce explicit bit to indicate the support of RedCap; ;” | RAN2 WA is per UE capability. (need to check latest RAN1 feature list after Jan meeting) | Has been captured in capability running CRs. May update if RAN1 has different agreements. No change for now.  |
| Support of NCD-SSB, it is unclear what capabilities are needed, e.g.[R2-2201753] *Proposal 15 Discuss whether a RedCap UE, which does not support CSI-RS, should be able to report “Not need NCD-SSB” as an optional UE capability.**Proposal 17 Discuss whether a non-RedCap UE should be able to use NCD-SSB instead of CD-SSB with an optional capability in this meeting.* | Wait for RAN1 and RAN4. P15/P17 may still be discussed in RAN2 | **Company’s contribution or to be considered in Pre-117 for RRC** |
| Handover UE to non-RedCap cell | 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 | Need to be resolved in RAN2;Note: Companies’ view and potential solutions can be found in R2-2201750. | **Company’s contribution or to be considered in Pre-117 for RRC** |
| RRM relaxation  | Is it applied for non-RedCap UE or not? | Need to be resolved in RAN2;Note: Companies’ view can be found in R2-2201752.*Proposal 5. [Discussion] (16/20) Rel-17 RRM relaxation can apply to any Rel-17 UE.* | **To be handled in Pre-117 for UE capability****Discussion point 3.1.1-1** |
| For IDLE/INACTIVE:* whether to capture it as optional without capability feature?
* To add additional descriptions in section 5.6 *Relaxed measurement or new section?*
 | Need to be resolved in RAN2; | **To be handled in Pre-117 for UE capability****Discussion point 3.1.2-1** |
| For RRC\_CONNECTED, * Is single bit sufficient?
* Granularity of RRM capability, e.g. per UE?
* FDD/TDD diff?
* FR1/FR2 diff?
* Any others?
 | Need to be resolved in RAN2; | **To be handled in Pre-117 for UE capability****Discussion point 3.1.3-1-Discussion point 3.1.3-4** |
| eDRX | For RRC\_INACTIVE, * What additional eDRX capability for RRC\_INACTIVE? E.g. long DRX cycle?
* Granularity of eDRX capability, .e.g.per UE? (legacy is per UE)
* FDD/TDD diff? (legacy yes)
* FR1/FR2 diff? (Legacy no)
* Any others?
 | Need to be resolved in RAN2;Note: RAN2 agreements:1. eDRX feature can be supported by non RedCap UEs.2. 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.3. eDRX support is optional for the RedCap UE. | **To be handled in Pre-117 for UE capability****Discussion point 3.2.2-1-Discussion point 3.2.2-6** |
| For RRC\_IDLE:* 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.
 | Need to be resolved in RAN2;Whether to capture it as optional features without UE capability under section 5 or capability signalling in RAN or nothing? | **To be handled in Pre-117 for UE capability****Discussion point 3.2.1-1** |
| CR implementation | channelBWs-DL/channelBWs-UL | Ericsson commented “The two sentences started with “For FR1…” are difficult to digest and don’t add anything to what the first sentence about RedCap already states.” And suggest to change it asRemove “For FR1 RedCap UE, the bit which indicates 20MHz shall be set to 1 unless the 20Mhz channel bandwidth is not supported for the operating band as specified in TS38.101 [2 ]. For FR2 RedCap UE, the bit which indicates 100MHz shall be set to 1.”Consider adding to the first sentence: “and set the corresponding bits in channelBWs-DL”Regarding how to handle EN Editor's Note: FFS on how to handle the case that the UE cannot support 20MHz BW as specified in TS38.101. Rapp added “1 unless the 20Mhz channel bandwidth is not supported for the operating band as specified in TS38.101 [2”, Huawei think it is not needed since Even if there is one band not supporting 20Mhz, RedCap UE will not consider that band as supported band. Then, RedCap UE will not report the filed at all, e.g. channelBWs-DL and others. Rapp: Would be good to check companies’ view.[Huawei]: In this version of CR, we change nothing compared to the last endorsed version. Add the open issue as “**FFS on how to handle the case that the UE cannot support 20MHz BW as specified in TS38.101. FFS if anything to be added in the field description**”.[Rapp1] This is the open issue table. [Ericsson] Our point is that with the new additions the overall sentence becomes a bit cumbersome – with new additions we should be able to update the overall text even if it was endorsed before. But if there is no consensus now, then we can discuss next time as it seems clear we need to discuss the addition anyways. | **To be handled in Pre-117 for UE capability****Discussion point 3.3.1-1** |
|  | channelBW-90MHz | Ericsson commented We don’t think this kind of additions do ourselves any favour. It should be clear that RedCap UE shall not indicate such capability, as stated in the definition. And suggest Remove the statement about RedCap.Rapp: This has been discussed before and no conclusion to remove it. Would be good to check companies’ view. | **To be handled in Pre-117 for UE capability****Discussion point 3.3.1-2** |
|  | ***supportedBandwidthDL/supportedBandwidthUL*** | Ericsson commented “The two sentences starting at “For FR1…” are not needed (since covered by the first sentence about RedCap UEs) and are actually wrong since this field is not a bitmap. “And suggestRemove “For FR1 RedCap UE, the bit which indicates 20MHz shall be set to 1 unless the 20Mhz channel bandwidth is not supported for the operating band as specified in TS38.101 [2]. For FR2 RedCap UE, the bit which indicates 100MHz shall be set to 1”Rapp: Tend to agree with Ericsson. But the sentence was introduced before. Let’s check companies view on this. [Huawei]: Not agree to remove the sentence. This one has been endorsed after long discussion. See our comment/suggestion to above channelBWs-DL/channelBWs-UL[Ericsson] Same comment as before, with the addition it becomes unnecessary long. Also, we should not keep in text which is wrong.  | **To be handled in Pre-117 for UE capability****Discussion point 3.3.1-1** |
|  | ~~4.2.xx~~~~Location of RedCap general statements and the field descriptions~~ | ~~Ericsson commented~~ ~~Now looking at the structure, we think it would be better to capture all the field descriptions in the correct locations (e.g. PDPC parameters, RLC parameters, etc) instead of in a new section to keep the existing structure intact and not to spread out the descriptions. If all RedCap-specific parameters can be identified through the name (i.e. by including “RedCap” in the name) it woul be easy to find such RedCap-specific parameters.~~ ~~With such update, it could actually be reasonable to have the description of RedCap then as a subsection of 4.1. instead of 4.2 as well~~~~And suggest~~~~Move the field descriptions to their usual places in the existing structure. (Also consider moving RedCap description under 4.1 in such case).~~~~[Rapp] We discussed this in previous meeting and finally agreed current structure. Would be good to hear companies’ view.~~ ~~[Huawei]: Not OK to add this as open issue. But we are fine to discuss this in the next round of running CR discussion.~~ | **To be handled in Pre-117 for UE capability****Discussion point 3.3.4-1** |
|  | ***shortSN***Indicates whether the UE supports 12 bit length of PDCP sequence number. RedCap UE should always report "1".***am-WithShortSN***Indicates whether the UE supports AM DRB with 12 bit length of RLC sequence number. RedCap UE should always report "1". | Ericsson and Rapporteur commentsThe feature is Mandatory for all UEs, therefore all UEs shall support this. ‘Should’ seems to make it somewhat optional. Absence of this bit would make the UE unususable in any case. SuggestWe prefer to remove the addition completely as it is unnecessary. Agree with rapporteur comment. [Rapp] Agree with Ericsson. But Would be good to hear companies’ view. [FW] The signaling of these capabilities is mandatory, but the actually support of them is optional for non-RedCap UEs today. For RedCap UEs, we make the support of short SNs mandatory. Therefore, adding these text is necessary to highlight the difference for RedCap UEs.[Huawei]: Normally we use “This field shall be set to *supported*.” In 306 for mandatory feature. The debating on “shall” and “should” does not count as open issue. We prefer not to include this as open issue.[Rapp1] the debate is not “shall” or “should”. The discussion is whether we need to change anything since so far shortSN is mandatory feature. It is strange to say “it shall be set to 1” again for RedCap UE. [Ericsson]  There should be no debate between “shall” and “should”: “Shall” indicates requirement and “should” indicates recommendation. This case is about a rewuirement. HW suggestion would be also fine to us, if any addition is needed.  | **To be handled in Pre-117 for UE capability****Discussion point 3.3.2-1** |
|  | ***supportOf16DRB-r17***For legacy devices support of 16 DRBs is mandatory without capability signaling – the current wording does not explain this. Amend the description by: “ since support fo 16 DRBs is mandatory without capability signalling for other UEs”The field name could include “RedCap” for easy searching through capability names. [Rapp] updated in RRC v01, 306 v02. [Huawei]: There is no need to add “since xxx” to explain the reason in specification. It is clear this is only for RedCap UE. | [Rapp] discuss whether need to add “since xxx” for ***supportOf16DRB-r17, longSN-RedCap-r17 and am-WithLongSN-RedCap-r17******.*** ***,***  | **To be handled in Pre-117 for UE capability****Discussion point 3.3.3-1** |

# Open issue list on MAC (From R2-2201891)

|  |  |  |  |
| --- | --- | --- | --- |
| **1-2** | Confirm Working assumption or not on:**Working assumption:**1. **Msg3 early identification is mandatorily supported by RedCap UE**
 | This OI will be handled in RAN2 also considering MsgA early identification. | Type 1**Discussion point 3.4-1** |

# Reference

1. R2-2201737 [offline-105] RedCap capabilities Intel
2. R2-2201750 [offline-105] RedCap capabilities - second round Intel
3. R2-2201732 [Pre116bis-e][103][RedCap] Summary of NCD-SSB / Initial BWP aspects Ericsson
4. R2-2201738 [offline-106] NCD-SSB and Initial BWP aspects Ericsson
5. R2-2201753 [offline-106] NCD-SSB and Initial BWP aspects - second round Ericsson
6. R2-2201734 [offline-103] identification and access restriction aspects Huawei
7. R2-2201751 [offline-103] identification and access restriction aspects - second round Huawei
8. R2-2201735 [offline-104] RRM relaxations Samsung
9. R2-2201752 [offline-104] RRM relaxations - second round Samsung
10. R2-2201892 Running 38.331 CR on Capabilities
11. R2-2201968 Running 38.306 CR on Capabilities
12. R2-2201893\_Report of email discussion [Post116bis-e][105][RedCap] 38.306 running CR and list of open issues (Intel)
13. R2-2111586 Correction on PO determination for UE in inactive state ZTE corporation, Ericsson , vivo , CMCC , China Telecom , China Unicom ,Samsung, Sanechip s CR Rel-17 38.306 16.6.0 0665 1 F TEI17