3GPP TSG-RAN WG2 #117-e draftTdoc R2-2203561

Electronic meeting, Feb 21st – Mar 3rd, 2022

Agenda Item: 8.12.2.2.1

Source: Ericsson (Rapporteur)

Title: Email discussion report for [AT117-e][105][RedCap] CP open issues - PH2

Document for: Discussion, Decision

# 1 Introduction

In RAN2#117-e, there was an online discussion based on the outcome of a pre-meeting offline which was captured in [R2-2203538](http://ftp.3gpp.org/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2203538.zip). During the online discussion the following agreements were made:

**Agreements**:

1. The following working assumption is confirmed: “System information can provide information on which frequencies accept RedCap UE access (e.g., by considering whether supporting RedCap)”
2. The invalid configuration where INACTIVE eDRX cycle is configured but IDLE eDRX cycle is not configured, is captured in the field description of the parameter ran-ExtendedPagingCycle.
3. The invalid configuration where INACTIVE eDRX cycle is longer than IDLE eDRX cycle, is captured in the field description of the parameter ran-ExtendedPagingCycle.
4. In Rel-17, one spare value is sufficient for the parameter ran-ExtendedPagingCycle-r17.
5. For the handover case, if the target gNB does not configure RRM relaxation for a UE, the UE shall not perform the evaluation of the relaxed measurement criterion for a stationary UE, i.e. the UE shall not perform the procedural text of 5.7.4.X.
6. When network configures both R16/R17 relaxation criteria and the UE fulfills both, RAN2 assumes it is up to UE implementation to perform either Rel-16 or Rel-17 relaxation method based on the “allowed” cases RAN4 specifies, unless we receive different view from RAN4
7. It is up to UE implementation when to start the RRM relaxation in RRC Idle/Inactive if multiple methods are configured
8. RAN2 confirms that it is up to network implementation, but it is expected that the network configures a MO on the NCD-SSB frequency if it wants the UE to use it only for serving cell measurements when some neighbor cells do not send an SSB on UE’s NCD-SSB frequency.
9. For neighbour cell measurements, it is up to network to configure MO on CD-SSB or NCD-SSB or both (same in legacy, no spec impact)
10. servingCellMO is configured to the MO on the CD-SSB when RedCap specific BWP of a UE contains neither CD-SSB nor NCD-SSB.
11. A RedCap UE may be configured with multiple NCD-SSBs, but only one per BWP (FFS on what "only one per BWP" means).
12. The working assumption “The periodicity of NCD-SSB shall be not less than the periodicity of serving cell’s CD-SSB.” is confirmed.
13. NCD-SSB should not be indicated in the handover command, i.e., network sets ServingCellConfigCommon => downlinkConfigCommon => frequencyInfoDL => absoluteFrequencySSB to the frequency of the CD-SSB (not the NCD-SSB)
14. The discussion on whether a non-RedCap UE should be able to use NCD-SSB instead of CD-SSB is deprioritized in Rel-17.
15. The number of most significant bits used for UE\_ID\_H is 13.
16. For RedCap-specific BWP, both common and dedicated configurations are provided using full configuration, i.e., delta configuration is not supported.
17. RAN2 confirms that upon failure of RRC connection setup/resume, UE operates in the initial BWP in which it has been configured to monitor paging (no spec impact)

In this document we continue the discussion for the following proposals:

**Proposals for further discussion**

**Proposal 10** RAN2 confirms that it is up to network implementation, but it is expected that network refers to MO on NCD-SSB explicitly from within the *ServingCell* configuration (similarly to *servingCellMO*) when some neighbor cells do not send an SSB on UE’s NCD-SSB frequency.

**Proposal 11** RAN2 confirms that It is possible for the network to configure a UE with multiple NCD-SSBs.

**Proposal 12** RAN2 confirms that it is sufficient to configure at least one of the MOs configured on CD-SSB or NCD-SSB in the current active BWP, if contained, in servingCellMO.

**Proposal 15** One servingCellMO is configured per UE regardless of whether RedCap specific BWP of a UE contains CD-SSB, NCD-SSB or neither (requires retuning).

**Proposal 16** A RedCap UE may be configured with multiple NCD-SSBs, but only one per BWP (FFS on what "only one per BWP" means)

**Proposal 21** In connected mode if RA occasions are not configured on the active BWP, RedCap UEs should use the RedCap-specific initial UL BWP, if configured.

**Proposal 23** In case RedCap-specific initial DL BWP contains CD-SSB, PDCCH-ConfigCommon includes common search space configurations for paging, RAR, SIB1 and OSI when RedCap-specific initial DL BWP and the legacy initial DL BWP does not overlap sharing the CD-SSB.

**Proposal 24** For a RedCap UE in connected mode, it is up to network implementation to configure a RedCap-specific initial BWP, i.e., no restrictions on existing possible configurations.

**Proposal 25** Discuss whether it should be possible for the network to transmit CD-SSB and NCD-SSB(s) at different times by configuring an offset.

**Proposal 26** In Rel-17, no mechanism is introduced for the network to provide SI or SIB6/SIB7/SIB8 to a UE configured with a DL BWP that does not contain CD-SSB after a notification for system information update or ETWS and/or CMAS is transmitted.

**Proposal 27** Upon submitting the RRCSetupRequest/RRCResumeRequest message to the lower layers, if the RedCap UE is in the separate DL BWP where CD-SSB is not present, it is up to the UE to continue cell re-selection related measurements and cell re-selection evaluation (no spec impact).

**Proposal 29** Discuss whether UE should consider IFRI as “allowed” or follows the IFRI in MIB when i) cell does not indicate support for RedCap UEs or ii) Red Cap UE is unable to acquire SIB1..

**Proposal 30** Discuss whether UE should follow legacy IFRI in MIB or acquire SIB1 and follow the RedCap-specific IFRI provided in SIB1 when cellBarred in MIB is set to barred.

**Proposal 31** Support for Half-Duplex FDD RedCap is indicated in SIB1.

**Proposal 32** UE should consider the RRC\_IDLE eDRX cycle for comparing with the modification period for both RRC\_IDLE and RRC\_INACTIVE to decide if eDRX acquisition period is used.

**Proposal 33** If Proposal 32 is agreed, it is captured with the following change in TS 38.331

1. if the UE is ~~in RRC\_IDLE,~~ configured with an eDRX cycle longer than the modification period and the *systemInfoModification-eDRX* bit of Short Message is set:

Contact information

|  |  |
| --- | --- |
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|  |  |

# 2 Discussion

RAN2 discussed the following proposals during the first phase of this offline discussion:

* RAN2 confirms that it is up to network implementation, but it is expected that network refers to MO on NCD-SSB explicitly from within the ServingCell configuration (similarly to servingCellMO) when some neighbor cells do not send an SSB on UE’s NCD-SSB frequency.
* RAN2 confirms that it is sufficient to configure at least one of the MOs configured on CD-SSB or NCD-SSB in the current active BWP, if contained, in servingCellMO.
* One servingCellMO is configured per UE regardless of whether RedCap specific BWP of a UE contains CD-SSB, NCD-SSB or neither (requires retuning).

The rapporteur thinks it would be better to merge the proposals above as suggested during the online discussion and proposes the following:

“One *servingCellMO* is configured per serving cell and the UE performs serving cell measurements according to the MO indicated in *servingCellMO* (as in legacy). It is up to network implementation to refer to the MO on CD-SSB or NCD-SSB in *servingCellMO*."

**Q 2.1** Do you agree with the proposal above? Please elaborate your reply especially if you replied “No”, and suggest an alternative.

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Qualcomm | No | The servingCellMO should refer the SSB in UE’s active BWP. We do not like the situation where network configures CD-SSB for servingCellMO but UE’s active BWP contains only NCD-SSB. |
| ZTE | Yes | We prefer explicit indication instead of UE-based dynamic switching, so it can avoid mismatch and IoT problems as much as possible.  Regarding the comments from Qualcomm, we think in case the activate BWP contains NCD-SSB, the network will configure NCD-SSB for servingCellMO. But we also see no problem if the network configures CD-SSB for servingCellMO, it means the network wants the UE to perform both serving cell and neighbour cell measurements on CD-SSB (e.g. for triggering handover based on the RSRP/RSRQ/SINR evaluation on the same frequency), and gap will be provided in this case (same as in legacy). |
| Huawei, HiSilicon | No | Similar concern as QC.  We need to first clarify the multiple NCD-SSB configuration and BWP switching case, as also discussed in the case that “A RedCap UE may be configured with multiple NCD-SSBs“ in Q2.2.  When UE perform BWP swithcing from its ative BWP1, configured with NCD-SSB, to another BWP2 configured with CD-SSB. The single servingCellMO in the proposal can only indicate the absoluteFrequencySSB of BWP1 but not BWP2. After BWP switching, servingCellMO is not valid anymore. UE has to wait for the NW to use RRC signaling to reconfigure the servingCellMO. The BWP switching is more dynamic.  Therefore, we propose:  For serving cell measurement based on NCD-SSB, UE’s serving cell measurement object is the ssbFrequency associated with the NCD-SSB of its active BWP (i.e. **UE changes the MO of servicing cell upon BWP switching**).  Then we can discuss whether NW provide MeasObjectNR/ MeasObjectId to each BWP/NCD-SSB.  So there is no such ”mismatch and IoT problems”, since it means UE still follow the NW configuration. |
| Samsung | Yes | We are fine with the proposal from the rapporteur. |
| NEC | Yes |  |
| DENSO | Yes | On the scenario raised by Qualcomm, we agree with ZTE that a measurement gap is provided as in the legacy if some of the BWPs do not contain SSB configured by servingCellMO. |
|  |  |  |

**Summary – Q 2.1**

TBD

Based on the observations above, the rapporteur proposes the following:

1. ???

RAN2 agreed the following proposal during the first phase of the online discussion: “A RedCap UE may be configured with multiple NCD-SSBs, but only one per BWP (FFS on what "only one per BWP" means)”

Based on the comments provided during the online discussion, the rapporteur proposes the following revision to address the FFS. Note that this discussion covers also Proposal 11 in [R2-2203538](http://ftp.3gpp.org/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2203538.zip).

“A RedCap UE may be configured with multiple NCD-SSBs provided that each BWP contains at most one NCD-SSB”

**Q 2.2** Do you agree with the proposal above? Please elaborate your reply especially if you replied “No” and suggest an alternative.

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| **Company** | **Yes/No** | **Comments** |
| Qualcomm | See comment | We’d like to propose the following change:  “A RedCap UE may be configured with multiple NCD-SSBs provided that each BWP is configured with ~~contains~~ at most one ~~NCD-~~SSB.”  The case we want to avoid is the following scenario:     * NCD-SSB is configured in BWP-DownlinkDedicated IE for BWP #2 * NCD-SSB is contained within the bandwidth of BWP #1. But network shall not configure it in BWP-DownlinkDedicated IE for BWP #1 |
| ZTE | Yes | We think this question includes two parts:  1. Whether a BWP can contain two SSBs in frequency domain (e.g. BWP#1 in QC’s example)?  2. From signaling point of view, how NCD-SSBs are configured? In *BWP-DownlinkDedicated* (per-BWP), or in *servingCellConfig* (per-cell)?  For Q1, for RedCap UEs, we think there is no need to consider it, because from network perspective, it is very unlikely to deploy two SSBs within 20MHz. And the motivation of introducing NCD-SSB is because CD-SSB may be outside UE’s CBW.  For Q2, either solution works, but we need to consider a usually case that multiple BWPs may contain the same NCD-SSB. So to avoid duplicate the SSB configuration in overlapped BWPs, we slightly prefer to configure NCD-SSB in *servingCellConfig.*    So we support the rapporteur’s proposal which is aligned with our understanding on Q1. |
| Huawei, HiSiilcon | Yes | It is a common use case that NW configures UE with NCD-SSB for each BWP.  For the figure from ZTE, it still works even if it is configured per BWP, as long as ssbFrequency the indicated NCD-SSB are same between BWP#1 and #2.  For the figure from QC, the proposed update makes sense. The SSB configured is more likely used to configure the servicing cell MO. So, “configured at most one” should be fine. |
| Samsung | Yes | The proposal is aligned with the general understanding during the online discussion. |
| NEC | Yes | We share the view from ZTE on their point 1. Also, referring to QC’s figure, we do not assume both CD-SSB and NCD-SSB are configured in one BWP for a RedCap UE, either. |
| DENSO | Yes | We think that the network may transmit CD-SSB and NCD-SSB with the separation of less than 20 MHz. In that sense, there is a case that a BWP contains both CD-SSB and NCD-SSB. So, we agree with Qualcomm that NCD-SSB is configured only if CD-SSB is not present within a BWP. |
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**Summary – Q 2.2**

TBD

Based on the observations above, the rapporteur proposes the following:

1. ???

During the online session in week 1 there was a discussion on the proposal below:

“In connected mode if RA occasions are not configured on the active BWP, RedCap UEs should use the RedCap-specific initial UL BWP, if configured.”

Based on the comments provided during the online session, the rapporteur suggests revising the proposal as follows:

“In connected mode if RA occasions are not configured on the active BWP, RedCap UEs should use the RedCap-specific initial UL BWP, if configured, or else legacy BWP#0 if it has a bandwidth of <=20 MHz for FR1 or <=100 for FR2.”

**Q 2.3** Do you agree with the proposal above? Please elaborate your reply especially if you replied “No” and suggest an alternative.

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| **Company** | **Yes/No** | **Comments** |
| Qualcomm | Yes |  |
| ZTE | Yes |  |
| Huawei, HiSilicon | Yes |  |
| Samsung | Yes but | The current else part in the proposal seems a misconfiguration case, so we do not have to capture it. Instead the proposal can be updated as follows, as per MAC CR:  "In connected mode if RA occasions are not configured on the active BWP, RedCap UEs should use the RedCap-specific initial UL BWP, if configured, or else default initial UL BWP." |
| NEC | Yes |  |
| DENSO | Yes |  |
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**Summary – Q 2.3**

TBD

Based on the observations above, the rapporteur proposes the following:

1. ???

RAN2 discussed the following proposal during the online session in week 1 following the first phase of this offline discussion:

“In case RedCap-specific initial DL BWP contains CD-SSB, PDCCH-ConfigCommon includes common search space configurations for paging, RAR, SIB1 and OSI when RedCap-specific initial DL BWP and the legacy initial DL BWP does not overlap sharing the CD-SSB.”

Based on the comments provided during the online discussion, the rapporteur proposes the following:

“In case RedCap-specific initial DL BWP contains CD-SSB and CORESET#0, one common search space configuration, i.e., *PDCCH-ConfigCommon*, for paging, RAR, SIB1 and OSI is enough.

**Q 2.4** Do you agree with the proposal above? Please elaborate your reply especially if you replied “No” and suggest an alternative.

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| **Company** | **Yes/No** | **Comments** |
| Qualcomm | Yes |  |
| ZTE | See comments | The wording “one common search space” is a bit confusing, does it mean the pdcch-ConfigCommon signaled for legacy initial DL BWP? Or the pdcch-ConfigCommon signaled for RedCap-specific initial DL BWP?  Our understanding is the latter one, because it does not require the UE to read the configuration of two BWPs, and it does not require spec change on the field descriptions, the UE can continue to monitor Paging, SIB1,OSI when the UE enters RRC\_CONNECTED and when RedCap-specific initial DL BWP is activated.  So our understanding is that:  In case RedCap-specific initial DL BWP contains CD-SSB and CORESET#0, ~~one~~the common search space configuration, i.e., *PDCCH-ConfigCommon*, for paging, RAR, SIB1 and OSI is ~~enough~~ included in the configuration of RedCap-specific initial DL BWP. |
| Huawei, HiSilicon | Yes | We prefer the original wording from rapporteur. |
| Samsung | See comments | The meaning of the proposal is not clear to us, but before understanding the proposal, we are wondering what RAN2 is trying to achieve here. Is it to restrict the network requirement? From UE perspective, UE can follow the signaled information for the BWP that UE is in (e.g. search space ID of the BWP can be different if network wants to do so), so we are not sure whether anything needs to be agreed here. |
| NEC | Yes with clarification | Our understanding is that one common search space configuration is for/under RedCap-specific initial DL BWP, not legacy. |
| DENSO | Yes with comments | Agree with ZTE that “one common search space configuration” is misleading, since a search space needs to be configured for paging, RAR, SIB1 and OSI, individually. On top of ZTE proposal, “the common search space configuration, i.e.,” could be removed and the rest is enough to describe the intended behavior. |
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**Summary – Q 2.4**

TBD

Based on the observations above, the rapporteur proposes the following:

1. ???

The following proposal was discussed during the online session in week 1:

“For a RedCap UE in connected mode, it is up to network implementation to configure a RedCap-specific initial BWP, i.e., no restrictions on existing possible configurations.”

During the first phase of the related offline discussion 19 companies responded in total to this question. All companies but one responded with “No” even though the rapporteur assumes that company has a similar view with the rest. Considering that there was a common understanding on the need not to restrict network configuration and during the online session the discussion was rather on the terminology, rapporteur proposes not to discuss the proposal above further:

**Q 2.5** Do you agree that there is no need to discuss the proposal above further? Please elaborate your reply.

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| **Company** | **Yes/No** | **Comments** |
| Qualcomm | Yes |  |
| ZTE | Yes | But we may need to clarify how many dedicated BWPs can be configured (3 or 4?) if network does not provide BWP dedicated configuration for both legacy initial BWP and RedCap-specific initial BWP (#Option 1 operation).  If 4 additional dedicated BWPs can be configured, we need to discuss how to signal the BWP-Id value (the current value range is {0, 1, 2, 3, 4}). |
| Huawei, HiSilicon | Yes |  |
| Samsung | See comments | We are fine to not discuss the issue further, but want to clarify the meaning of the proposal.  From the existing signaling structure depicted in Annex B.2 in RRC (where BWP#0 is referred as an initial BWP in both options), *BWP-Downlink/UplinkCommon* part is provided in SIB1 for the initial access, and it cannot be reconfigured, as *ServingCellConfig* can only contain provide *BWP-Downlink/UplinkDedicated* (optionally for the BWP configuration option 2).  Note that in the BWP configuration option 1, network may configure a dedicated BWP (#1–#4; maybe the proposal clarifies this one) but none of them are an initial BWP (referred by MAC specification), as said above.  In short, we think that 'Redcap-Specific Initial BWP' refers to:  - *initialDownlink/UplinkBWP-Redcap* (*BWP-Downlink/UplinkCommon*) in *ServingCellConfigCommonSIB* (*SIB1*); and  - *initialDownlink/UplinkBWP* (*BWP-Downlink/UplinkDedicated*) in *RRCReconfiguration*, if configured for the BWP configuration option 2.  This can be clarified in the RRC field description later, once RAN2 has a consensus on it. |
| NEC | Yes |  |
| DENSO | Yes | In case of BWP Option #1, we understand that it is the same as in the legacy that RedCap UE can be configured up to 4 RRC-configured BWPs (i.e. BWP #1 to BWP #4), depending on the UE capability. |
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**Summary – Q 2.5**

TBD

Based on the observations above, the rapporteur proposes the following:

1. ???

During the first phase of this offline discussion RAN2 discussed whether it should be possible for the network to transmit CD-SSB and NCD-SSB(s) at different times by configuring an offset. In total 19 companies responded to this question. 10 companies responded with “Yes”, 7 companies indicated that this should be up to RAN4 to decide, and 2 companies had no strong view. Considering the current status of the discussion, rapporteur proposes to continue this discussion online

1. Discuss whether it should be possible for the network to transmit CD-SSB and NCD-SSB(s) at different times by configuring an offset.

In RAN2117-e, the following proposal was discussed with the intention to improve its formulation:

“In Rel-17, no mechanism is introduced for the network to provide SI or SIB6/SIB7/SIB8 to a UE configured with a DL BWP that does not contain CD-SSB after a notification for system information update or ETWS and/or CMAS is transmitted.”

The rapporteur proposes the following based on the discussion during the online session:

“RAN2 confirms that system information, e.g., SIB6/SIB7/SIB8, can be provided via dedicated signalling to a RedCap UE in an active DL BWP that does not contain CD-SSB after a notification for system information update or ETWS and/or CMAS is transmitted.”

**Q 2.x** Do you agree with the proposal above? Please elaborate your reply especially if you replied “No” and suggest an alternative.

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Qualcomm | Yes | In our contribution R2-2203030, we discussed a related issue on SI acquisition during handover. Our proposal is:  “RAN2 confirm that if *searchSpaceSIB1* is not configured in the first active BWP in a target cell and *dedicatedSIB1-Delivery IE* is not included in handover command, then RedCap UE expects to receive SIB1 of the target cell by dedicated signaling after it completes the first RACH in the target cell.”  During the online discussion, it appeared to be a common understanding among companies that network uses dedicated signaling to deliver SI to UE in a BWP without search spaces for SIBs. Hence we wonder if companies can accept amending our proposal to the one above, e.g.  “RAN2 confirms that system information, e.g., SIB6/SIB7/SIB8, can be provided via dedicated signalling to a RedCap UE in an active DL BWP that does not contain CD-SSB after a notification for system information update or ETWS and/or CMAS is transmitted or after a handover in which dedicatedSIB1-Delivery IE is not included in the handover command.” |
| ZTE | Yes | We think what QC proposed is aligned with legacy NR specification. That network can provide SIB1 via dedicatedSIB1-Delivery when the first active BWP does not provide SIB1 search space.  But the modified proposal may cause confusion, because it seems to say the network needs to provide SIB6/7/8 when SIB1 is not included in ho command (no matter if ETWS/CMAS happens or not). We think that is not the intention.  Maybe it is more clear to say:  “RAN2 confirms that system information~~, e.g., SIB6/SIB7/SIB8,~~ can be provided via dedicated signalling to a RedCap UE in an active DL BWP that does not contain CD-SSB, e.g. SIB6/SIB7/SIB8 after a notification for system information update or ETWS and/or CMAS is transmitted or SIB1 after a handover in which dedicatedSIB1-Delivery IE is not included in the handover command.” |
| Huawei, HiSilicon | Yes | Fine with the suggestion from QC and ZTE, but it seems containing too many “or”. |
| Samsung | Yes | As in the legacy. |
| NEC | Yes |  |
| DENSO | Yes | As in th legacy. |
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**Summary – Q 2.6**

TBD

Based on the observations above, the rapporteur proposes the following:

1. ???

Based on the online discussion in meeting week 1, the rapporteur thinks that there is no need to discuss the proposal below further as it seems to be the common understanding and the intention is not to change the legacy behaviour:

“Upon submitting the *RRCSetupRequest/RRCResumeRequest* message to the lower layers, if the RedCap UE is in the separate DL BWP where CD-SSB is not present, it is up to the UE to continue cell re-selection related measurements and cell re-selection evaluation (no spec impact).”

**Q 2.7** Do you agree that there is no need to discuss the proposal above further? Please elaborate your reply.

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| **Company** | **Yes/No** | **Comments** |
| Qualcomm | Yes |  |
| ZTE | Yes |  |
| Huawei, HiSlicon | No | In the current specification, we have “T*he UE shall continue cell re-selection related measurements as well as cell re-selection evaluation. If the conditions for cell re-selection are fulfilled, the UE shall perform cell re-selection as specified in 5.3.3.6.*” The proposal indeed changes the UE behavior to allow UE to choose not to continue cell re-selection related measurements and cell re-selection evaluation.  We believe this can be clarified in the specifcication, unless the commmon understanding is that legacy UE is not requried to continue either. |
| Samsung | Yes |  |
| NEC | Yes |  |
| DENSO | No | Same view as Huawei. Given that there is the existing behaviour in the specification for legacy UEs (even since LTE Rel-8!), we’re sure that someone will bring up the correction for clarification later after the specification freeze, even though it is not clarified right now. |
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**Summary – Q 2.7**

TBD

Based on the observations above, the rapporteur proposes the following:

1. ???

The session chair has indicated in the meeting minutes that proposals 29 and 30 are to be discussed only online during the second meeting week.

1. Proposals 29 and 30 are to be discussed online during the second meeting week.

In the pre-meeting offline discussion, i.e., [R2-2203502](http://ftp.3gpp.org/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2203502.zip), the rapporteur asked the following question “Do you think that support for Half-Duplex FDD RedCap should be indicated in SIB1?” In total 22 companies responded; 12 companies agree that support for Half-Duplex FDD RedCap should be indicated in SIB1 yet 6 companies prefer not to support. 3 companies do not have any strong opinion and 1 company stated that they do not understand the intention with this indication.

For those companies which responded with “No”, the rapporteur thinks there may be a misunderstanding regarding the need for such support based on the responses provided. For example Oppo and T-Mobile think that HD-FDD operation is a feature for connected mode and therefore can be handled by UE capability signalling. But they might be overlooking at the fact that the network may need to treat all RedCap UEs as HD until UE capability information is received, i.e., during connection establishment. Xiaomi indicated that “in LTE, we have HD-FDD MTC, but we do not see there is such an indication of NW capability” which is correct but both LTE-M and NB-IoT are designed assuming HD from the start, which is why no indication was needed, however this is not the case for RedCap. Samsung indicated “Maybe” and MediaTek stated that there is no need to introduce the indication now before the case is identified. The rapporteur would like to emphasize that this is an indication from the network, there may be an impact on the scheduling during connection establishment, i.e., random access, and it would be too late to introduce the indication in a later release since there may already be a UE implementation that supports only HD-FDD.

So, the rapporteur would like to check once more whether support for Half-Duplex FDD RedCap should be indicated in SIB1 based on the assessment above.

**Q 2.8** Do you think that support for Half-Duplex FDD RedCap should be indicated in SIB1 based on the assessment above? Please reply after reading the text above and elaborate your reply.

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Qualcomm | Yes | Agree with the rapporteur’s analysis |
| ZTE | Yes |  |
| Huawei, HiSlicon | No | It is still not clarified the intended UE behavior if UE find the NW does not support HD-FDD.  HD-FDD is optional for RedCap UE. UE is assumed to support FD-FDD in FDD bands. So, it means UE can still work in a cell, even if both NW and UE do not support this HD-FDD feature.  “*there may be an impact on the scheduling during connection establishment*” is not clear to us. NW cannot know UE capability during connection establishment phase anyway. We are wondering how it works in the case if NW indicates “support” but UE does not support. |
| Samsung | Still maybe no | As indicated in the previous discussion, we are not sure in which case UE requires to perform FD operation before normal capability exchanges. Also, we think that even in legacy LTE (e.g. Rel-8), some UE supports HD-FDD only in a certain band, but network does not indicate whether it only supports HD-FDD. |
| NEC | Yes |  |
| DENSO | Yes | Agree on rapporteur’s analysis. |
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**Summary – Q 2.8**

TBD

Based on the observations above, the rapporteur proposes the following:

1. ???

In the pre-meeting offline discussion, i.e., [R2-2203502](http://ftp.3gpp.org/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2203502.zip), the rapporteur asked which option below companies would prefer:

“The following options have been considered regarding which DRX cycle UE should consider for comparing with the modification period to decide if eDRX acquisition period is used.:

1. CN\_eDRX for both RRC\_IDLE and RRC\_INACTIVE (same as LTE)
2. CN\_eDRX for RRC\_IDLE, and RAN eDRX, if configured, for RRC\_INACTIVE, i.e., use CN\_eDRX if RAN eDRX is not configured.”

In total 19 companies responded; 11 companies prefer option a) and 7 companies prefer option b) or slightly updated version of option b) (provided by Oppo). However, 3 of these companies indicated that option a) is also acceptable. One company prefers none of the options and provided yet another option. Considering that only options a and b are under discussion at the moment and 14 companies may accept option a, yet 4 companies prefer option b, rapporteur would like to check whether option a is acceptable.

**Q 2.9** Do you think option a is acceptable? Please elaborate your reply.

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Qualcomm | See comment | We still prefer Option b. Our view has not changed. |
| ZTE | Yes | We prefer Option a. |
| Huawei, HiSlicon | Yes | We are fine to make compromise for the sake of progress. |
| Samsung | No | It is not reasonable to follow solutions (including option a and option b) which can be problematic in NR. We capture our view on first phase:  We would like to clarify although CN\_eDRX (or RAN\_eDRX) is "configured", UE in RRC\_IDLE (or RRC\_INACTIVE) may "use" different DRX cycle with CN\_eDRX (or RAN\_eDRX). DRX cycle UE uses is defined as 'T' in clause 7.1 in 38.304 CR. We think modification period (MP) should be compared with DRX\_cycle UE "uses", rather than "configured" eDRX cycles (CN\_eDRX or RAN\_eDRX)  Example 1) When CN\_eDRX >10.24s, UE in RRC\_IDLE uses DRX cycle (T) of min (UE specific cycle, default cycle) within PTW. In this case, even if CN\_eDRX > MP, there is no reason for UE to use eDRX acquisition period (which delays SI update much longer) as long as T < MP.  Example 2) When CN\_eDRX >10.24s and RAN\_eDRX ≤10.24s, UE in RRC\_INACTIVE uses DRX cycle (T) of min (default cycle, UE specific cycle, RAN\_eDRX) within PTW. Assume T < RAN\_eDRX. In this case, even if RAN\_eDRX > MP, there is no reason for UE to use eDRX acquisition period (which delays SI update much longer) as long as T < MP.  This solution is not complicated at all, which can be implemented as follows: 5.2.2.2.2 SI change indication and PWS notification (...)  If the UE receives a Short Message, the UE shall:  (...)  1> if DRX cycle (T) UE is using according to TS 38.304 is not longer than the modification period and the *systemInfoModification* bit of Short Message is set:  2> apply the SI acquisition procedure as defined in sub-clause 5.2.2.3 from the start of the next modification period;   1. if DRX cycle (T) UE is using according to TS 38.304 is longer than the modification period and the *systemInfoModification-eDRX* bit of Short Message is set:   2> apply the SI acquisition procedure as defined in sub-clause 5.2.2.3 from the start of the next eDRX acquisition period boundary. |
| NEC | Yes |  |
| DENSO | Yes | Same position as in the previous discussion. |
|  |  |  |

**Summary – Q 2.9**

TBD

Based on the observations above, the rapporteur proposes the following:

1. ???

The rapporteur would also like to check the proposals below after coordination with the session chair:

In [R2-2203352](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203352.zip), Nokia proposed the following in Proposal 1:

**“**Introduce separate indications broadcasted in system information whether the eDRX is allowed for UEs in RRC\_IDLE or for UEs in RRC\_INACTIVE.”

**Q 2.10** Do you agree with the proposal above? Please elaborate your reply.

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Qualcomm | Yes |  |
| ZTE | No | We think one indication is sufficient. Inactive eDRX is configured by the network, in our view, the UE does not need to know whether the network supports inactive eDRX or not.  In addition, if separate indications are supported, do we need to specify new UE and network behavior when IDLE eDRX is set to “not supported”, but Inactive eDRX is set to “supported”? |
| Huawei, HiSlicon | No | It is sufficient use one common indication.  Why would the NW implements only one of them, rather than both? |
| Samsung | No | There was the same eDRX indication for RRC\_IDLE in LTE. The separate indication for RRC\_INACTIVE in NR seems not needed. In NR, RAN itself can configure eDRX configuration for RRC\_INACTIVE. If RAN does not want to allow eDRX in RRC\_INACTIVE, it will not configure eDRX configuration for RRC\_INACTIVE. |
| NEC | No | We think the common (one) indication is sufficient, with option a in previous Q2.9. |
| DENSO | No | Given that eDRX cycle can be configured differently, as well as the conventional DRX cycle, different cycle can be applied anyway. In that sense, one idication would be enough. |
|  |  |  |

**Summary – Q 2.10**

TBD

Based on the observations above, the rapporteur proposes the following:

1. ???

In [R2-2203056](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203056.zip), Huawei proposed the following in Proposal 3:

**“**The Rx branches capability should be included in the *UERadioPagingInformation* inter-node message.”

**Q 2.11** Do you agree with the proposal above? Please elaborate your reply.

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Qualcomm | Yes | We are fine with the intention behind the proposal. |
| ZTE | No | This is indeed optimization.  If necessary, RAN2 should first discuss how to prevent non-RedCap capable cells to broadcast paging for RedCap UEs. |
| Huawei, HiSilicon | Yes | Based on the RX branches capability, gNB can only send paging message to the specific UEs (e.g. if the paging message is for 1RX UE but the cell bars all 1RX RedCap UEs, gNB can choose not to send paging message.).  Since the similar capability based paging is already supported for non-RedCap UE, it is reasonable to also add this for RedCap UE accordingly. |
| Samsung | No? | This seems not essential but an optimization. |
| NEC | No | Our understanding is that support of 1Rx/2Rx will be common within the same network basically. No strong need for this. Rather we see a point in comment from ZTE, if some paging optimization is needed. |
| DENSO | No | It was discussed at the #116bis-e meeting as in R2-2201734 and no conclusion was made on this proposal. |
|  |  |  |

**Summary – Q 2.11**

TBD

Based on the observations above, the rapporteur proposes the following:

1. ???

# 3 Conclusion

Based on the discussion above the following observations have been made:

[Observation 1 Proposals 29 and 30 are to be discussed online during the second meeting week.](#_Toc96968196)

Based on the discussion above the following proposals have been made:

[Proposal 1 ???](#_Toc96968209)

[Proposal 2 ???](#_Toc96968210)

[Proposal 3 ???](#_Toc96968211)

[Proposal 4 ???](#_Toc96968212)

[Proposal 5 ???](#_Toc96968213)

[Proposal 6 Discuss whether it should be possible for the network to transmit CD-SSB and NCD-SSB(s) at different times by configuring an offset.](#_Toc96968214)

[Proposal 7 ???](#_Toc96968215)

[Proposal 8 ???](#_Toc96968216)

[Proposal 9 ???](#_Toc96968217)

[Proposal 10 ???](#_Toc96968218)

[Proposal 11 ???](#_Toc96968219)

[Proposal 12 ???](#_Toc96968220)

# References

1. [R2-2201886](http://ftp.3gpp.org/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201886.zip) Running 331 CR for RedCap Ericsson
2. [R2-2201887](http://ftp.3gpp.org/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201887.zip) Open issue list for 38.331 for RedCap Ericsson
3. [R2-2201888](http://ftp.3gpp.org/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201888.zip) Running 304 CR for RedCap Ericsson
4. [R2-2201889](http://ftp.3gpp.org/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201889.zip) Open issue list for 38.304 for RedCap Ericsson
5. [R4-2201780](http://www.3gpp.org/ftp//tsg_ran/WG4_Radio/TSGR4_101-bis-e/Docs//R4-2201780.zip) Discussion on the use of NCD-SSB MediaTek
6. [R2-2202318](http://ftp.3gpp.org/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202318.zip) Discussion on RAN2 impacts on NCD-SSB and separate initial BWP vivo, Guangdong Genius
7. [R2-2202653](http://ftp.3gpp.org/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202653.zip) Remaining issues on separate initial BWP and NCD-SSB for RedCap UEs ZTE Corporation, Sanechips
8. [R2-2202998](http://ftp.3gpp.org/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202998.zip) Left open issues on NCD-SSB OPPO
9. [R2-2203057](http://ftp.3gpp.org/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203057.zip) Discussion on NCD-SSB aspects for RedCap UE Huawei, HiSilicon
10. [R2-2203078](http://ftp.3gpp.org/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203078.zip) Discussion on the open issues of NCD-SSB CATT
11. [R2-2203505](http://ftp.3gpp.org/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203505.zip) Monitoring POs in connected mode when using NCD-SSB Ericsson
12. [R2-2203508](http://ftp.3gpp.org/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203508.zip) C-plane related open issues on NCD-SSB DENSO CORPORATION
13. [R2-2203352](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203352.zip) eDRX and system information Nokia, Nokia Shanghai Bell
14. [R2-2203056](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203056.zip) Access restriction of RedCap UE Huawei, HiSilicon