3GPP TSG-RAN WG1 Meeting #110bis-e Draft R1-2210247

e-Meeting, 10th – 19th October 2022

**Agenda Item: 8.6**

**Title: FL summary #3 on Rel-17 RedCap maintenance**

**Source: Moderator (Ericsson)**

**Document for: Discussion, Decision**

# Introduction

This feature lead (FL) summary (FLS) concerns the Rel-17 work item (WI) for support of reduced capability (RedCap) NR devices [[1](https://www.3gpp.org/ftp/TSG_RAN/TSG_RAN/TSGR_95e/Docs/RP-220966.zip), [2](https://www.3gpp.org/ftp/TSG_RAN/TSG_RAN/TSGR_96/Docs/RP-221163.zip)]. Earlier RAN1 agreements for this WI are summarized in [[3](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_110/Docs/R1-2208274.zip)], the final FLS from the previous RAN1 meeting can be found in [[4](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_110/Docs/R1-2207729.zip)], and the 38.213 CR that was agreed in the previous RAN1 meeting can be found in [[5](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_110/Docs/R1-2208247.zip)].

This document summarizes contributions [6] – [21] submitted to agenda item 8.6 as well as RedCap-related aspects in contribution [[22](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209468.zip)] submitted to another agenda item and the following email discussion:

|  |
| --- |
| [110bis-e-R17-RedCap-01] Email discussion to determine maintenance issues to be handled in RAN1#110bis-e by October 12 – Johan (Ericsson)   * Additional email discussions will be set up once the maintenance issues for RAN1#110bis-e are determined |

The initial FLS is available in [25, 26]. The issues that are in the focus of this round of the discussion are tagged FL3.

Follow the naming convention in this example:

* *RedCapFLS3-v000.docx*
* *RedCapFLS3-v001-CompanyA.docx*
* *RedCapFLS3-v002-CompanyA-CompanyB.docx*
* *RedCapFLS3-v003-CompanyB-CompanyC.docx*

If needed, you may “lock” a discussion document for 30 minutes by creating a checkout file, as in this example:

* Assume CompanyC wants to update *RedCapFLS3-v002-CompanyA-CompanyB.docx*.
* CompanyC uploads an empty file named *RedCapFLS3-v003-CompanyB-CompanyC.checkout*
* CompanyC checks that no one else has created a checkout file simultaneously, and if there is a collision, CompanyC tries to coordinate with the company who made the other checkout (see, e.g., contact list below).
* CompanyC then has 30 minutes to upload *RedCapFLS3-v003-CompanyB-CompanyC.docx*
* If no update is uploaded in 30 minutes, other companies can ignore the checkout file.
* Note that the file timestamps on the server are in UTC time.

In file names, please use the hyphen character (not the underline character) and include ‘v’ in front of the version number, as in the examples above and in line with the general recommendation (see slide 16 in [R1-2208323](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208323.zip)), otherwise the sorting of the files will be messed up (which can only be fixed by the RAN1 secretary).

To avoid excessive email load on the RAN1 email reflector, please note that there is NO need to send an info email to the reflector just to inform that you have uploaded a new version of this document. Companies are invited to enter the contact info in the table below.

**FL3 Question 0-1a: Please consider entering contact info below for the points of contact for this email discussion.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Point(s) of contact** | **Email address(es)** |
| vivo | Lihui Wang | wanglihui@vivo.com |
| CATT | Yongqiang FEI | feiyognqiang@catt.cn |
| MediaTek | Chiou-Wei Tsai | cw.tsai@mediatek.com |
| Ericsson | Sandeep Narayanan Kadan Veedu | sandeep.narayanan.kadan.veedu@ericsson.com |
| FUTUREWEI | Vip Desai | vipul.desai@futurewei.com |
| Qualcomm | Jing Lei | leijing@qti.qualcomm.com |
| Sequans | Efstathios Katranaras | ekatranaras@sequans.com |
| NTT DOCOMO | Mayuko Okano | mayuko.okano.ca@nttdocomo.com |
| Intel | Debdeep Chatterjee | debdeep.chatterjee@intel.com |
| CMCC | Lijie Hu | hulijie@chinamobile.com |
| Sharp | Liqing Liu | liu.liqing@sharp.co.jp |
| NEC | Takahiro Sasaki | takahiro.sasaki@nec.com |
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| ZTE | Youjun Hu | hu.youjun1@zte.com.cn |
| Apple | Hong He | hhe5@apple.com |

# Issue #1: QCL properties for NCD-SSB

RAN1#110 agreed the 38.213 CR in [[5](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_110/Docs/R1-2208247.zip)] which contains an incomplete sentence. The incomplete sentence is a remainder from a longer sentence in Proposal 2.1-1d in the FLS in [[4](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_110/Docs/R1-2207729.zip)]. The longer sentence in the proposal looked like this:

|  |
| --- |
| If the active DL BWP includes the SS/PBCH blocks provided by *NonCellDefiningSSB*, these SS/PBCH blocks and the SS/PBCH blocks that the UE used to obtain SIB1 have the same quasi-colocation properties, if they have the same index. |

An online (GTW) session during RAN1#110 noted that the above sentence may be superfluous since there already is corresponding text in [38.331](https://www.3gpp.org/ftp/Specs/archive/38_series/38.331/38331-h20.zip):

|  |
| --- |
| ***nonCellDefiningSSB***  If configured, the RedCap UE operating in this BWP uses this SSB for the purposes for which it would otherwise have used the cell-defining SSB of the serving cell (e.g. obtaining sync, measurements, RLM). Furthermore, other parts of the BWP configuration that refer to an SSB (e.g. the "SSB" configured in the *QCL-Info* IE; the "ssb-Index" configured in the *RadioLinkMonitoringRS*; *CFRA-SSB-Resource*; *PRACH-ResourceDedicatedBFR*) refer implicitily to this NCD-SSB.  The NCD-SSB has the same values for the properties (e.g., *ssb-PositionsInBurst*, *PCI*, *ssb-periodicity*, *ssb-PBCH-BlockPower*) of the corresponding CD-SSB apart from the values of the properties configured in the *NonCellDefiningSSB-r17* IE. |

To avoid double specification (in 38.213 and 38.331), it was suggested in the online session that the mentioned longer sentence should not be agreed as part of the 38.213 CR and to potentially come back at later RAN1 and RAN2 meetings with CRs toward both 38.213 and 38.331 to move the QCL related specification text from 38.331 to 38.213.

However, in the end, only part of the mentioned longer sentence was included in the RAN1#110 agreement and in the corresponding final 38.213 CR in [[5](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_110/Docs/R1-2208247.zip)], which means that there is now an incomplete sentence in [38.213](https://www.3gpp.org/ftp/Specs/archive/38_series/38.213/38213-h30.zip):

|  |
| --- |
| If the active DL BWP includes the SS/PBCH blocks provided by *NonCellDefiningSSB*~~, these SS/PBCH blocks and the SS/PBCH blocks that the UE used to obtain SIB1 have the same quasi-colocation properties, if they have the same index~~. |

Now, contributions [[7](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208537.zip), [9](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208941.zip), [15](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209222.zip), [16](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209429.zip), [20](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209850.zip)] propose to include the missing part of the sentence, whereas contribution [[6](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208360.zip)] proposes to remove the remainder of the sentence and rely on the 38.331 specification text.

**FL1 Question 1-1a: Should the QCL-related sentence be included in 38.213? If yes, please comment on whether something needs to be done to avoid double specification in 38.213 and 38.331.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Y/N** | **Comments** |
| Nordic | Y | We think that 213 and 331 would be complementary rather than double-specification. |
| vivo | Y | We prefer to include the QCL-related aspect in TS 38.213. Per our understanding, the text in TS 38.331 for NCD-SSB does not define explicitly that if NCD-SSB and CD-SSB have the same index, their quasi-colocation properties are the same. |
| CATT | Y | We think it is justified and proper to explicitly capture QCL relationship in RAN1 spec.  We also feel that currently the QCL relationship between CD-SSB and NCD-SSB is not explicitly included in current 38.331:   * *“If configured, the RedCap UE operating in this BWP uses this SSB for the purposes for which it would otherwise have used the cell-defining SSB of the serving cell (e.g. obtaining sync, measurements, RLM).”* This part only means the usage of NCD-SSB is the same as CD-SSB, but no QCL relationship between NCD-SSB and CD-SSB is specified. * “*Furthermore, other parts of the BWP configuration that refer to an SSB (e.g. the "SSB" configured in the QCL-Info IE; the "ssb-Index" configured in the RadioLinkMonitoringRS; CFRA-SSB-Resource; PRACH-ResourceDedicatedBFR) refer implicitily to this NCD-SSB.*”: This part only means NCD-SSB can be used/referred as for QCL relationship by other RS/channels, but not about QCL between CD-SSB and NCD-SSB itself. * *“The NCD-SSB has the same values for the properties (e.g., ssb-PositionsInBurst, PCI, ssb-periodicity, ssb-PBCH-BlockPower) of the corresponding CD-SSB apart from the values of the properties configured in the NonCellDefiningSSB-r17 IE.”* This part does not mention the QCL between CD-SSB and NCD-SSB with the same index, but more about the property of ‘SSB set’. |
| Spreadtrum | Y | Observations from vivo and CATT is reasonable. |
| Nokia, NSB | Y | Agree with observations made by CATT and Vivo. |
| Lenovo | Y | Agree with observations made by CATT and Vivo. |
| MediaTek | Y | Share similar views with the above companies |
| Ericsson | Y | Agree with observations made by CATT and Vivo |
| FUTUREWEI | Y | Similar observations as vivo and CATT |
| Qualcomm | Y | We think the QCL properties of NCD-SSB should be captured in RAN1 specification(s). |
| Sequans | Y | Agree with CATT and vivo |
| DOCOMO | Y | Agree with vivo and CATT. |
| OPPO |  | We are OK to complete the sentence make it more specific in 213, similar as other QCL behavior. |
| Intel | Y | It is preferred to include the sentence in 38.213, which is aligned with specification in 38.331. |
| Huawei | Y |  |
| CMCC | Y | Agree with CATT that current 38.331 does not clearly mention the QCL relation between NCD-SSB and CD-SSB |
| Sharp | Y | Agree with vivo and CATT that TS38.331 does not explicitly describe the QCL property. |
| Samsung | Y | We understand 331 does not specify something like “NCD-SSB and CD-SSB have the same QCL if they have the same index.” as other companies commented and so, we are fine with capturing it in 213. |
| NEC | Y | Agree with observations by vivo and CATT |
| LGE | Y | Agree with vivo and CATT. |
| FL2 | All received responses agree to include the following missing part of the QCL-related sentence in TS 38.213 clause 17.1.   |  | | --- | | If the active DL BWP includes the SS/PBCH blocks provided by *NonCellDefiningSSB*, these SS/PBCH blocks and the SS/PBCH blocks that the UE used to obtain SIB1 have the same quasi-colocation properties, if they have the same index. | | |
| FL3 | Based on received responses, the following proposal can be considered.  **Proposal 1-1b: Agree the following TP for 38.213 clause 17.1.**   |  | | --- | | If the active DL BWP includes the SS/PBCH blocks provided by *NonCellDefiningSSB*, these SS/PBCH blocks and the SS/PBCH blocks that the UE used to obtain SIB1 have the same quasi-colocation properties, if they have the same index. | | |
| vivo | Y |  |
| Nokia, NSB. | Y |  |
| Nordic | Y |  |
| Qualcomm | Y |  |
| CATT | Y in general | Generally fine.  Additionally, to align the terminology that already used in TS 38.214, it is better to use ‘quasi co-location’ instead of ‘quasi-colocation’. |
| Intel | Y |  |
| ZTE, Sanechips | Y |  |
| Sharp | Y |  |
| Apple | Y |  |
| Samsung | Y |  |
| NEC | Y | Support suggestion by CATT. In 38.213 also, QCL is spelled out “Quasi co-location” in sub-clause 3.3. |
| DOCOMO | Y |  |
| Lenovo | Y |  |
| Sequans | Y |  |

# Issue #2: Collision between DL transmission and NCD-SSB

RAN1#110 agreed the 38.213 CR in [[5](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_110/Docs/R1-2208247.zip)] which clarifies the handling of several NCD-SSB collision cases:

* Collision between PUCCH repetition and NCD-SSB in TDD
* Collision between other UL transmission and NCD-SSB in TDD
* Collision between PDCCH and NCD-SSB

Now, new contributions propose to make a similar clarification in [38.213](https://www.3gpp.org/ftp/Specs/archive/38_series/38.213/38213-h30.zip) clause 17.1 for the handling of collision between other DL transmission and NCD-SSB:

* Contribution [[17](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209431.zip)] proposes to add a new paragraph for DL inspired by the existing paragraph for TDD UL:

|  |
| --- |
| For a RedCap UE indicated presence of SS/PBCH blocks within an active DL BWP by *NonCellDefiningSSB* in unpaired spectrum, collision handling between uplink transmissions and the SS/PBCH blocks are same as described for a UE indicated presence of SS/PBCH blocks by *ssb-PositionsInBurst* in *SIB1* or in *ServingCellConfigCommon* described in all other clauses, unless otherwise stated.  For a RedCap UE indicated presence of SS/PBCH blocks within an active DL BWP by *NonCellDefiningSSB*, the UE assumptions on the SS/PBCH blocks for reception of a downlink signal or channel are same as described for SS/PBCH blocks for a UE indicated presence of SS/PBCH blocks by *ssb-PositionsInBurst* in SIB1 or in *ServingCellConfigCommon* described in all other clauses, unless otherwise stated. |

* Contribution [[6](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208360.zip)] instead proposes to modify the existing paragraph to make it cover DL transmission:

|  |
| --- |
| For a RedCap UE indicated presence of SS/PBCH blocks within an active DL BWP by *NonCellDefiningSSB* ~~in unpaired spectrum~~, collision handling between downlink or uplink transmissions and the SS/PBCH blocks are same as described for a UE indicated presence of SS/PBCH blocks by *ssb-PositionsInBurst* in *SIB1* or in *ServingCellConfigCommon* described in all other clauses, unless otherwise stated. |

**FL1 Question 2-1a: Companies are invited to provide comments and suggested priority (Low/Medium/High).**

|  |  |  |
| --- | --- | --- |
| **Company** | **Priority** | **Comments** |
| Nordic | High | We prefer [6] |
| vivo | Medium | Except the collision between PDCCH and SSB that was corrected in the last meeting, and rate-matching for PDSCH around SSB that was clarified in the last meeting, there seems no additional collision need to be handled for DL and SSB in RAN1 specification. But the correction is also not harmful, and maybe safer. So, we are open to discuss it. |
| CATT | Medium | Since the handling of collision in SSBvsDL and SSBvsUL are in fact a little different in legacy (e.g. spectrum, dropping granularity), we slightly prefer the first one to capture them separately (i.e. [17]). But either is acceptable |
| Spreadtrum | Medium | Prefer [6] if spec change is needed. |
| Nokia, NSB | Medium | Either solution is acceptable to us. |
| Ericsson | Medium | Either solution is acceptable to us, with a slight preference for [6]. |
| Qualcomm | Medium | Either solution is fine |
| Sequans | Medium | Both solutions are fine |
| DOCOMO | High | We are fine to discuss with high priority. The later CR [6] seems simpler and clear enough. |
| OPPO | High | We can discuss the detail. |
| Intel | High | The related behavior should be clarified in the specification |
| Huawei |  | This again tends to be clearer that having more NCD-SSB specific texts just cause more issues.  If a change is pursued, change in [6]. Other removing explicitly NCD-SSB could be simpler. |
| CMCC | Medium | Proposal in [6] is simply, but we wonder whether the unpaired spectrum should be deleted.  For HD-FDD, there are dedicated section to handle the collision between SSB and UL transmission, so the collision handling only applied to unpaired spectrum for uplink.  But for downlink, it seems both FDD and TDD need to handle the collision. |
| Sharp | Medium | Fine with either solution. |
| NEC | Medium | [6] would be preferable. |
| LGE | Medium | [6] is preferred if there is no critical difference b/w the two. |
| FL2 | Most received responses indicate that Issue #2 should have medium priority in this RAN1 meeting, with the remaining responses indicating high priority. | |
| FL3 | Based on received responses, the following proposal can be considered.  **Proposal 2-1b: Agree the following TP for 38.213 clause 17.1.**   |  | | --- | | For a RedCap UE indicated presence of SS/PBCH blocks within an active DL BWP by *NonCellDefiningSSB* ~~in unpaired spectrum~~, collision handling between downlink or uplink transmissions and the SS/PBCH blocks are same as described for a UE indicated presence of SS/PBCH blocks by *ssb-PositionsInBurst* in *SIB1* or in *ServingCellConfigCommon* described in all other clauses, unless otherwise stated. | | |
| Vivo | Y |  |
| Nokia, NSB. | Y |  |
| Nordic | Y |  |
| Qualcomm | Y |  |
| CATT | Y |  |
| Intel |  | We suggest the following modification to the TP as below:   |  |  | | --- | --- | | For a RedCap UE indicated presence of SS/PBCH blocks within an active DL BWP by *NonCellDefiningSSB* ~~in unpaired spectrum~~, collision handling between downlink receptions or uplink transmissions and the SS/PBCH blocks are same as described for a UE indicated presence of SS/PBCH blocks by *ssb-PositionsInBurst* in *SIB1* or in *ServingCellConfigCommon* described in all other clauses, unless otherwise stated. |  | |
| ZTE, Sanechips | Y |  |
| Sharp | Y |  |
| Apple | Y | Prefer Intel’s modification. |
| Samsung | Y |  |
| NEC | Y | Fine with Intel’s suggestion. |
| DOCOMO | Y | The subsequent description in the current specification regarding the handling of NCD-SSB and PDCCH can be covered by this CR, and hence if this CR is approved, it can be removed accordingly. |
| Sequans | Y | Fine with Intel modification. |

# Issue #4: PUSCH repetition type A in HD-FDD

RAN1#110 discussed PUSCH repetition in HD-FDD, which is captured in section 3 in the FLS [[4](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_110/Docs/R1-2207729.zip)].

Now, new contributions propose to make corrections for PUSCH repetition type A (and TBoMS) in HD-FDD:

* Contribution [[19](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209779.zip)] provides a draft CR for [38.214](https://www.3gpp.org/ftp/Specs/archive/38_series/38.214/38214-h30.zip) clauses 6.1.2.1, 6.1.2.3.1 and 6.1.2.3.3.
  + Contribution [[18](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209778.zip)] provides some additional discussion on the above draft CR.
* The last paragraph in contribution [[22](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209468.zip)] proposes a similar correction for [38.214](https://www.3gpp.org/ftp/Specs/archive/38_series/38.214/38214-h30.zip) clause 6.1.2.3.3.

Proposals related to PUSCH repetition type B in HD-FDD are treated under Issue #5.

**FL1 Question 4-1a: Companies are invited to provide comments and suggested priority (Low/Medium/High).**

|  |  |  |
| --- | --- | --- |
| **Company** | **Priority** | **Comments** |
| Nordic | High |  |
| vivo | High | We support corrections in [19]. For corrections in [22], we are fine with the last last paragraph for adding the reference of Clause 17.2, other parts should be discussed in Coverage enhancements. |
| CATT | Medium | Generally OK with the correction. |
| Spreadtrum | High |  |
| Nokia, NSB | High |  |
| Lenovo | High |  |
| Ericsson | High |  |
| Sequans | Medium |  |
| DOCOMO | High | The same handling for PUSCH repetition type-A can be applied to TboMS. |
| OPPO | Medium |  |
| Intel | High |  |
| Huawei |  | Ok to resolve. |
| CMCC | High |  |
| Sharp | High |  |
| Samsung | High |  |
| LGE | High | Okay with the correction. |
| FL2 | Most received responses indicate that Issue #4 should have high priority in this RAN1 meeting, with the remaining responses indicating medium priority. | |
| FL3 | Based on received responses, the following proposal can be considered.  **Proposal 4-1b:**   * **Agree the draft CR in** [**R1-2209779**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209779.zip) **for 38.214 clauses 6.1.2.1, 6.1.2.3.1 and 6.1.2.3.3.** * **Agree the following TP for 38.214 clause 6.1.2.3.3.**  |  | | --- | | For Type 2 PUSCH transmission with a configured grant of TB processing over multiple slots*,* the UE shall transmit the TB across the slots determined for the PUSCH transmission applying the same symbol allocation in each slot. A Type 2 PUSCH transmission with a configured grant of TB processing over multiple slots is omitted in a slot according to the conditions in clause 9, clause 11.1, ~~and~~ clause 11.2A, and clause 17.2 of [6, TS 38.213]. | | |
| vivo | Y |  |
| Nokia, NSB | Y |  |
| Nordic | Y |  |
| Qualcomm | Y |  |
| CATT | Y |  |
| Intel | Y |  |
| ZTE, Sanechips | Y |  |
| Sharp | Y |  |
| Apple | Y |  |
| Samsung | Y in general | We fully agree with having this CR. But, one thing we’d like to clarify is that we noticed that the CR is using “would” in the wording although “does” was used in the relevant agreement. If there is no big reason to use “would”, we prefer to use “does” as in the agreement. |
| DOCOMO | Y |  |
| Lenovo | Y |  |

# Issue #5: PUSCH repetition type B in HD-FDD

As mentioned above, RAN1#110 discussed PUSCH repetition in HD-FDD, which is captured in section 3 in the FLS [[4](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_110/Docs/R1-2207729.zip)].

Now, new contributions propose to make corrections for PUSCH repetition type B in HD-FDD:

* Contribution [[8](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208605.zip)] provides a draft CR for [38.214](https://www.3gpp.org/ftp/Specs/archive/38_series/38.214/38214-h30.zip) clause 6.1.2.1.
* Contribution [[13](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209188.zip)] proposes additional potential corrections for [38.214](https://www.3gpp.org/ftp/Specs/archive/38_series/38.214/38214-h30.zip) clause 6.1.2.1.
  + Contribution [[11](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209186.zip) (section 2.3)] provides some additional discussion on the above draft CR.

Proposals related to PUSCH repetition type A in HD-FDD are treated under Issue #4.

**FL1 Question 5-1a: Companies are invited to provide comments and suggested priority (Low/Medium/High).**

|  |  |  |
| --- | --- | --- |
| **Company** | **Priority** | **Comments** |
| Nordic | High |  |
| vivo | High | We support corrections in [8].  For the corrections in [13], the first correction misses the case of insufficient switching time for back-to-back DL/UL transmission/reception on invalid symbol determination; The second correction is not necessary since RedCap does not support CA or half-duplex CA. |
| CATT | Medium | Generally OK with the correction. |
| Spreadtrum | High |  |
| Nokia, NSB | High |  |
| Lenovo | High |  |
| Ericsson | High |  |
| Qualcomm | Medium |  |
| Sequans | Medium |  |
| DOCOMO | High |  |
| OPPO | Medium |  |
| Intel | High |  |
| Huawei |  | Ok to resolve. |
| CMCC | Medium |  |
| Sharp | High | Agree with vivo. Corrections in [8] can cover the first correction in [[13](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209188.zip)] and insufficient switching gap case. The second correction in [[13](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209188.zip)] is unnecessary given the relevant description is for half-duplex TDD CA where RedCap UEs do not support. |
| Samsung | High |  |
| LGE | High | Okay with the correction. |
| FL2 | Most received responses indicate that Issue #5 should have high priority in this RAN1 meeting, with the remaining responses indicating medium priority. | |
| FL3 | Based on received responses, the following proposal can be considered.  **Proposal 5-1b: Agree the draft CR in** [**R1-2208605**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208605.zip) **for 38.214 clause 6.1.2.1.** | |
| vivo | Y |  |
| Nokia, NSB | Y |  |
| Nordic | Y |  |
| Qualcomm | Y |  |
| CATT | Y |  |
| Intel | Y |  |
| ZTE, Sanechips | Y |  |
| Sharp | Y |  |
| Apple | Y |  |
| Samsung | Y in general | Similar comment as Issue #4. We fully agree with having this CR. But, one thing we’d like to clarify is that we noticed that the CR is using “would” in the wording although “are” without “would” was used in the relevant agreement. If there is no big reason to use “would”, we prefer to use “does”. |
| DOCOMO | Y |  |
| Lenovo | Y |  |

# Issue #7: Maximum UL BWP bandwidth

Contribution [[6](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208360.zip)] proposes to clarify in [38.213](https://www.3gpp.org/ftp/Specs/archive/38_series/38.213/38213-h30.zip) clause 17.1 that the separate initial UL BWP for RedCap UEs (if configured) is smaller than or equal to the maximum UL bandwidth that the UE supports.

**FL1 Question 7-1a: Companies are invited to provide comments and suggested priority (Low/Medium/High).**

|  |  |  |
| --- | --- | --- |
| **Company** | **Priority** | **Comments** |
| Nordic | Medium | It is kind of obvious that UE should not be configured with BWP larger than it supports. |
| Vivo | Medium | We are fine with the correction. |
| CATT | Medium | Currently there is a similar description for separate initial DL BWP. We think it is fine to treat UL in the same way. |
| Spreadtrum | Medium |  |
| Nokia, NSB | Medium | We are fine with the correction. |
| Lenovo | Medium | We are fine with the correction. |
| MediaTek | Medium | We support the correction. |
| Ericsson | Medium | We are fine with the correction (or clarification). |
| FUTUREWEI | Medium | OK but may not be essential |
| Qualcomm | Low |  |
| Sequans | Medium | Support |
| DOCOMO | Low/Medium |  |
| OPPO | Low |  |
| Intel | Low | The spec already implies that the separate initial UL BWP should be no more than BW of RedCap UE. We are fine for the update if majority companies would like to do it. |
| Huawei |  | Ok to resolve – submitted by Huawei last meeting. |
| CMCC | Medium | We are fine with the correction. |
| Sharp | Medium | We support the correction. |
| Samsung | Low | We think this already covered by 331. |
| NEC | Medium | We are fine with the correction. |
| LGE | Low | It is obvious but, fine with the correction. |
| FL2 | Most received responses indicate that Issue #7 should have medium priority in this RAN1 meeting, with the remaining responses indicating low priority. | |
| FL3 | Based on received responses, the following proposal can be considered.  **Proposal 7-1b: Agree the following TP for 38.213 clause 17.1.**   |  | | --- | | A UE expects the initial DL BWP and the active DL BWP after the UE (re)establishes dedicated RRC connection to be smaller than or equal to the maximum DL bandwidth that the UE supports. A UE can be provided a DL BWP by *initialDownlinkBWP-RedCap* in *DownlinkConfigCommonSIB*, and an UL BWP by *initialUplinkBWP-RedCap* in *UplinkConfigCommonSIB*. If *initialUplinkBWP* in *UplinkConfigCommonSIB* indicates an UL BWP that is larger than a maximum UL BWP that a UE supports, the UE expects to be provided an UL BWP by *initialUplinkBWP-RedCap* in *UplinkConfigCommonSIB* that is smaller than or equal to the maximum UL bandwidth that the UE supports. | | |
| Vivo | Y |  |
| Nokia, NSB | Y |  |
| Nordic | Y |  |
| Qualcomm | Y |  |
| CATT | Y |  |
| Intel | Y |  |
| ZTE, Sanechips | Y |  |
| Sharp | Y |  |
| Apple | Y |  |
| NEC | Y |  |
| DOCOMO | Y |  |
| Lenovo | Y |  |
| Sequans | Y |  |

# Issue #8: Msg1/MsgA retransmission timeline

Contribution [[21](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209947.zip) (section 2)] proposes to add text about the Msg1/MsgA retransmission timeline for the case when a RedCap UE performs random access on an active DL BWP with SSB in [38.213](https://www.3gpp.org/ftp/Specs/archive/38_series/38.213/38213-h30.zip) clause 17.1, corresponding to the text in clauses 8.2 and 8.2A for non-RedCap UEs.

**FL1 Question 8-1a: Companies are invited to provide comments and suggested priority (Low/Medium/High).**

|  |  |  |
| --- | --- | --- |
| **Company** | **Priority** | **Comments** |
| Nordic | Low | We had hard time to identify in the CR what suppose to be different from legacy behaviour. |
| CATT | Low |  |
| Spreadtrum | Low | We cannot tell whether it is an optimization or an essential correction. Maybe more time of discussion is needed. |
| Nokia, NSB | Low |  |
| Ericsson | Low |  |
| Qualcomm | High | We think a clarification is needed in TS 38.213 to avoid ambiguity/confusion for PRACH retransmission of 4-step/2-step RA in an SSB-less initial DL BWP.  We think the following sentences can be added in Clause 17.1 of TS 38.213 for clarification:  ***When a RedCap UE performs Type-1 or Type 2 random access procedure on an active DL BWP with SSB, the UE shall be ready to retransmit a PRACH according to the timeline in Clauses 8.2 and 8.2A.*** |
| Sequans | Medium | Need more discussion to understand issue |
| DOCOMO | High | We are fine to discuss this issue further. |
| OPPO | Low |  |
| Intel | Low | First, we do not see a difference from Rel-15 behavior. So, not sure what is being clarified for RedCap UEs.  Moreover, this aspect was discussed during WI phase and it was clarified that the spec refers to a time-line w.r.t. to UE higher layers ("If requested by higher layers"), and thus, for RedCap UEs with any constraints (HD-FDD or lack of SSB in DL BWP) can be addressed by UE implementation. |
| Huawei |  | We do not see issue that needs a resolution. |
| CMCC | Low | This issue has been discussed for several times, but no conclusion. |
| Sharp | Medium | We are open to discuss. |
| Samsung | Medium | Fine to have clarification. |
| LGE | Medium | Okay with the clarification. |
| FL2 | Most received responses indicate that Issue #8 should have low priority in this RAN1 meeting. A few responses indicate that they are open to discuss whether a clarification is needed. The proponent has provided a more concise text proposal above. | |
| FL3 | Based on received responses, the following proposal can be considered.  **Proposal 8-1b: Agree the following TP for 38.213 clause 17.1.**   |  | | --- | | When a RedCap UE performs Type-1 or Type 2 random access procedure on an active DL BWP with SSB, the UE shall be ready to retransmit a PRACH according to the timeline in clauses 8.2 and 8.2A. | | |
| vivo |  | We are not convinced about the necessity of the TP. If the TP is adopted, we would like to clarify what the timeline in case the active BWP without SSB for RedCap UE and for the legacy UE supporting FG6-1a. |
| Nokia, NSB |  | Like Vivo, we question the added value/necessity of the proposed text and would like to query, how this helps with the “without SSB” timeline potential issue outlined in the original discussion paper (R1-2209947). |
| Nordic |  | Was there a typo?  ***When a RedCap UE performs Type-1 or Type 2 random access procedure on an active DL BWP without SSB, the UE shall be ready to retransmit a PRACH according to the timeline in Clauses 8.2 and 8.2A.*** |
| Qualcomm | Y | @Vivo, we have a different view from you. Based on RAN1 agreements for R17 UE features, FG 6-1a does not apply to RedCap UE. Therefore, we are not convinced to couple the discussion for RedCap UE procedure with a feature that applies to non-RedCap UE. Besides, please note in discussing the R16 CR (R1-2205297) for msg1/msgA retransmission timeline of non-RedCap UE, it is your suggestion to discuss the proposal for RedCap UE in R17 maintenance session. FYI, your message/note sent to RAN1 reflector (May 12, 2022) is copied below:    @ Nordic, thanks for your question. We think there is no typo in FL3 Proposal 8-1b. When the active DL BWP of RedCap UE includes SSB, RedCap UE shall be able to maintain the same timeline as legacy (eMBB) UE in msg1/msgA retransmission.  Our intention is to clarify RedCap UE’s behavior for RA and minimize the specification impacts. For the case that RedCap UE is performing RA in an SSB-less active DL BWP, we agree with other companies that it can be left to RedCap UE implementation. |
| CATT |  | Same feeling as Nokia, it seems the original purpose is to explain the UE behavior (likely up to UE implementation) for re-transmitting the PRACH in a SSB-less BWP, but now the newly added paragraph only describes the UE behavior for re-transmitting the PRACH in a BWP with SSB, which is just the same with legacy behavior. Not sure this helps, since what is unclear is still unclear by our reading.  Nevertheless, if Qualcomm’s CR is the best way we can achieve, which can put an end to similar discussion in the future, we can live with it. |
| Intel | N | As responded during the preparation phase discussion, we do not see a need for this TP. It would be good to understand what it addresses and what is currently amiss without the TP. In our understanding, in the absence of the TP, a RedCap UE would anyway be expected to follow Clauses 8.2 and 8.2A, regardless of whether SSB is included in DL BWP or not.  Thus, we do not see a need to distinguish between the cases when SSB may be included in DL BWP as suggested by the proposal. |
| vivo2 |  | Thanks QC for the explanation.  Yes, the suggestion from us is the RedCap related issues should be brought up and can be in Rel-17 RedCap session, since Rel-16 CR is not right place to discuss Rel-17 issue. But whether the RedCap “issue” is essential and need to be discussed should assessed by all companies who join in Rel-17 RedCap session. We do not see anything wrong from this aspect.  Generally, RedCap UE behavior that different from legacy UEs are captured in the specification. But if the RedCap UE behavior is the same as legacy UE, we think it is not need to be captured in the specification. |
| ZTE, Sanechips |  | We are OK with the clarification of keeping the same behavior with legacy UE. However, we do not think it is necessary to have the CR since there is no new UE behavior and it is still based on clauses 8.2 and 8.2A. Therefore, it is better to have the conclusion in the chairman notes and no CR. |
| Sharp |  | On one hand, generally we prefer to have a clarification or conclusion on timeline requirement for RedCap UE considering that we have not concluded it.  On the other hand, the only difference of SSB-based RA between RedCap UEs and non-RedCap UEs lies in the fact that the RedCap UEs can be configured with SSB-based RA for initial DL BWP without SSB. Then the part to be clarified may be the timeline requirement for MSG1/A retransmission for initial DL BWP **without** SSB. We can have either a conclusion or TP to clarify it. Then for DL BWP with SSB, according to the statement “Procedures for a RedCap UE are same as described for a UE in all other clauses of this document unless stated otherwise.” in clause 17.1, the RedCap UEs follow the same behaviors as non-RedCap UEs in clauses 8.2 and 8.2A. |
| Samsung |  | Same view as Nokia and CATT.  If this is for a DL BWP with SSB, we think Redcap is just same as non-Redcap. Without the TP there is no issue. On the other hand, we cared more about that case that if there is no SSB in DL BWP, what shall UE do? We suggest to have some common understanding first, then discuss whether/how to have CR. |
| NEC |  | The same behavior as non-RedCap UE does not need to be captured in sub-clause 17.1. We are fine with capturing it into chairman’s notes as conclusion as suggested by ZTE. |
| DOCOMO |  | We think the clarification of timeline requirement for RedCap UE especially for the SSB-less BWP operation would be helpful since it was not concluded yet. If the majority of companies think it should be up to UE implementation for the case where the DL BWP does not include SSB, we think any TP is not required. However, if the timeline needs to be extended for RedCap UE from that for legacy UE, we need to specify it. |
| Sequans |  | Same view as Sharp. We should clarify in TP or conclusion the RedCap UE msg1/A retransmission timeline requirement in case of initial DL BWP without SSB. |

# References

|  |  |  |  |
| --- | --- | --- | --- |
| [1] | [RP-220966](https://www.3gpp.org/ftp/TSG_RAN/TSG_RAN/TSGR_95e/Docs/RP-220966.zip) | Revised WID on support of reduced capability NR devices | Ericsson |
| [2] | [R1-221163](https://www.3gpp.org/ftp/TSG_RAN/TSG_RAN/TSGR_96/Docs/RP-221163.zip) | Summary of WI on support of reduced capability (RedCap) NR devices | Ericsson |
| [3] | [R1-2208274](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_110/Docs/R1-2208274.zip) | RAN1 agreements for Rel-17 NR RedCap | Rapporteur (Ericsson) |
| [4] | [R1-2207729](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_110/Docs/R1-2207729.zip) | FL summary #3 for Rel-17 RedCap maintenance | Moderator (Ericsson) |
| [5] | [R1-2208247](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_110/Docs/R1-2208247.zip) | 38.213 CR0360 (Rel-17, F) Corrections and clarifications of RedCap UE procedures | Moderator (Ericsson) |
| [6] | [R1-2208360](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208360.zip) | Corrections and clarifications of RedCap UE procedures | Ericsson |
| [7] | [R1-2208537](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208537.zip) | Corrections on Support of Reduced Capability NR Devices | Spreadtrum Communications |
| [8] | [R1-2208605](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208605.zip) | Correction on invalid symbol determination for PUSCH repetition type B for HD-FDD | Vivo, Sharp, Intel, Nokia, Nokia Shanghai Bell |
| [9] | [R1-2208941](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208941.zip) | Correction on QCL relationship between NCD-SSB and CD-SSB | CATT |
| [10] | [R1-2209164](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209164.zip) | Alignment between RAN1 and RAN2 specifications | NEC |
| [11] | [R1-2209186](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209186.zip) | Discussion on RedCap remaining issues | ZTE, Sanechips |
| [12] | [R1-2209187](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209187.zip) | Correction on NCD-SSB related spec for RedCap in TS38213 | ZTE, Sanechips |
| [13] | [R1-2209188](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209188.zip) | Correction on NCD-SSB related spec for RedCap in TS38214 | ZTE, Sanechips |
| [14] | [R1-2209189](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209189.zip) | Correction on TDRA misalignment of PUSCH for RedCap | ZTE, Sanechips |
| [15] | [R1-2209222](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209222.zip) | Draft CR on NCD-SSB in an active BWP | Lenovo |
| [16] | [R1-2209429](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209429.zip) | Editorial corrections for RedCap in TS 38.213 | Nokia, Nokia Shanghai Bell |
| [17] | [R1-2209431](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209431.zip) | Corrections on UE assumptions when configured with NCD-SSB | Nokia, Nokia Shanghai Bell |
| [18] | [R1-2209778](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209778.zip) | Discussion on available slot determination for PUSCH repetition type A and TBoMS for HD-UE | Sharp |
| [19] | [R1-2209779](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209779.zip) | Corrections on available slot determination for PUSCH repetition type A and TBoMS for HD-UE | Sharp, Vivo, Nokia, Nokia Shanghai Bell, Intel |
| [20] | [R1-2209850](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209850.zip) | Correction on NCD-SSB for RedCap UE | Huawei, HiSilicon |
| [21] | [R1-2209947](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209947.zip) | Remaining issues on procedures of RedCap UE | Qualcomm Incorporated |
| [22] | [R1-2209468](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209468.zip) | Correction on cancellation of PUSCH repetitions and TBoMS | ZTE |
| [23] | [R1-2209184](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209184.zip) | Discussion on PUSCH TDRA misalignment issue | ZTE, Sanechips |
| [24] | [R1-2209185](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209185.zip) | Correction on TDRA misalignment of PUSCH | ZTE, Sanechips |
| [25] | [R1-2210245](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2210245.zip) | FL summary #1 on Rel-17 RedCap maintenance | Moderator (Ericsson) |
| [26] | [R1-2210246](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2210246.zip) | FL summary #2 on Rel-17 RedCap maintenance | Moderator (Ericsson) |