3GPP TSG-RAN WG1 Meeting #110bis-e Draft R1-2210246

e-Meeting, 10th – 19th October 2022

**Agenda Item: 8.6**

**Title: FL summary #2 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 issues that were in the focus of the first round of the email discussion are tagged FL1 and they are the same as in the initial FLS provided in [25]. The FL summaries of the initial received responses are tagged FL2.

Follow the naming convention in this example:

* *RedCapFLS2-v000.docx*
* *RedCapFLS2-v001-CompanyA.docx*
* *RedCapFLS2-v002-CompanyA-CompanyB.docx*
* *RedCapFLS2-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 *RedCapFLS2-v002-CompanyA-CompanyB.docx*.
* CompanyC uploads an empty file named *RedCapFLS2-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 *RedCapFLS2-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.

**FL1 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 |
| LGE | Jay KIM | jaehyung.kim@lge.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. |

  |

# 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. |

# Issue #3: Collision between UL transmission and NCD-SSB

As mentioned above, 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 these 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 similar clarifications in [38.213](https://www.3gpp.org/ftp/Specs/archive/38_series/38.213/38213-h30.zip) for the handling of collision between other UL transmission and NCD-SSB:

* Contribution [[12](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209187.zip)] proposes to clarify in [38.213](https://www.3gpp.org/ftp/Specs/archive/38_series/38.213/38213-h30.zip) clauses 8.1 and 8.1A that the specification text for RO validation concerns not only CD-SSB but also NCD-SSB.
	+ 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.
* Contribution [[21](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209947.zip) (section 3)] makes the following proposals related to RO validation in TDD:
	+ For operation on a single carrier in unpaired spectrum, a RedCap UE does not expect to transmit PRACH, or PUSCH, or PUCCH, or SRS in a set of symbols of a slot indicated presence of SS/PBCH blocks within the active DL BWP by *ssb-PositionsInBurst* in SIB1 or by *ServingCellConfigCommon*, or by *NonCellDefiningSSB*. The UE does not expect the set of symbols of the slot to be indicated as uplink by *tdd-UL-DL-ConfigurationCommon*, or *tdd-UL-DL-ConfigurationDedicated*, when provided to the UE.
	+ For operation on a single carrier in unpaired spectrum, if a RedCap UE operates on an active DL BWP configured with NCD-SSB and on an active UL BWP configured with PRACH resources:
		- the valid PRACH occasion(s) will not overlap with SSB symbols of NCD-SSB and CD-SSB
		- the UE does not expect to be configured with a SS/PBCH block by *NonCellDefiningSSB*, which ends within *Ngap* symbols of starting symbol of a valid PRACH occasion configured for RedCap UE or succeeds a valid PRACH occasion, configured for RedCap UE, in a slot
		- the valid PRACH occasion(s) and the definition of *Ngap* for RedCap UE are determined by the rules in Clause 8.1 of TS 38.213

Proposals related to PUSCH repetition in HD-FDD are treated separately under Issues #4 and #5.

**FL1 Question 3-1a: Companies are invited to provide comments and suggested priority (Low/Medium/High).**

|  |  |  |
| --- | --- | --- |
| **Company** | **Priority** | **Comments** |
| Nordic  | Low | resolved already in Issue#2 |
| vivo | High | The clarification on the valid RO especially related to the “*Ngap* symbols” for **unpaired spectrum** may be needed, we are fine to discuss it.  |
| CATT | Low |  |
| Spreadtrum | Low |  |
| Nokia, NSB | Low | Our initial view/question, is why the resolution/text discussed in Issue#2, does not already resolve these scenarios? |
| MediaTek | High | Due to the introduction of non-zero offsets between CD-SSB and NCD-SSB, whether/how to take NCD-SSB into consideration when determining valid ROs in TDD should be discussed.  |
| Ericsson | Low | Similarly view as others above that the resolution in Issue #2 could resolve Issue #3.  |
| Qualcomm | High | Agree with the comments of Vivo and MediaTek. It is non-trivial from UE side to handle the collision between UL transmission(s) and NCD-SSB, given the non-zero time offset between CD-SSB and NCD-SSB. |
| Sequans | High |  |
| DOCOMO | High | Agree with vivo and MediaTek and we are fine to discuss it. |
| OPPO | High |  |
| Intel | Low  | A general rule to extend CD-SSB handling to NCD-SSB is already included in section 17.1 in 38.213, so this CR seems not necessary.  |
| Huawei |  | If we just consider NCD-SSB as an SSB, the current SSB vs RO collisions works we think. |
| CMCC | Low | We also think the collision handling of RO including the Ngap related symbols is covered by the TP in issue 2, since the handle principle is same as CD-SSB. |
| Sharp | Low | Agree with companies that Issue#2 covers the UL transmission of Issue#3. |
| NEC | Low | Consider this as part of issue#2. |
| LGE | Low | Further clarification is needed if there is something not covered by existing spec and the Issue#2. Can be part of Issue#2 if there is any. |
| FL2 | Most received responses indicate that Issue #3 should have low priority in this RAN1 meeting, with the remaining responses indicating high priority. Some responses express that Issue #3 might be resolved if Issue #2 is resolved. Based on these considerations, Issue #2 can be treated first (in this meeting) and then Issue #3 can be revisited later if needed (perhaps in the next meeting). |

# 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. |

# 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. |

# Issue #6: PUSCH TDRA misalignment

Contributions [[11](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209186.zip) (section 2.2), [14](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209189.zip)] propose to clarify in [38.214](https://www.3gpp.org/ftp/Specs/archive/38_series/38.214/38214-h30.zip) clause 6.1.2.1.1 which common search space is used when the UE is addressed with TC-RNTI. Note that similar Rel-15 contributions have been submitted in [[23](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209184.zip), [24](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209185.zip)].

**FL1 Question 6-1a: Companies are invited to provide comments and suggested priority (Low/Medium/High).**

|  |  |  |
| --- | --- | --- |
| **Company** | **Priority** | **Comments** |
| Nordic  | High | FFS on how to update the default scheduling Table |
| vivo | Low | In current Table 6.1.2.1.1-1, the entry of “**Any common search space not associated with CORESET 0**, DCI format 0\_0 in UE specific search space” covers the case for RedCap UEs configured with the separate initial DL BWP without CORESET#0. We also noticed for non-RedCap UEs, the similar “issue” was discussed in R1-2209184, maybe we can also wait for the decision made in AI 7.1.  |
| CATT | Low | Prefer to wait until the discussion for Rel-15 CR is clear. |
| Spreadtrum | Low | If the R15 CR has the similar issue, we can wait for the decision of the R15 CR |
| Nokia, NSB | Low | Pending outcome of similar R15 CR, which we believe is applicable to all UEs, not just RedCap devices. |
| Ericsson | Low | Prefer to wait until the discussion for Rel-15 CR is clear. |
| Qualcomm | Low |  |
| Sequans | Low | Wait R15 CR discussion |
| DOCOMO | Low | It can be deferred until the operation for legacy UE is clarified. |
| OPPO | Low |  |
| Intel | Low | We suggest to wait for resolution of this for R15 instead of having parallel discussion. |
| Huawei |  | Ok to resolve in RedCap specific session. R15 CR is not likely to have any progress as NBC. |
| CMCC | Low  | Ok to wait for resolution of R15 CR. |
| Sharp | Low | The issue lies more in a Rel-15 issue where *ra-searchspace* is associated with a CORESET other than CORESET#0 in initial DL BWP. We can wait for the outcome of Rel-15 email discussion. |
| Samsung | Low | Wait until the discussion for R15 CR |
| NEC | Low | Wait for conclusion of Rel-15 CR |
| LGE | Low | Wait for the conclusion on Rel-15 CR. |
| FL2 | Almost all received responses indicate that Issue #6 should have low priority in this RAN1 meeting, at least until a conclusion has been reached for the corresponding Rel-15 CR. |

# 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. |

# 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. |

# Issue #9: SDT operation

Contribution [[11](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209186.zip) (section 2.1)] proposes that it should be up to the UE implementation whether and how a UE monitors SI change indication during an SDT procedure in a separate initial DL BWP not containing CD-SSB.

**FL1 Question 9-1a: Companies are invited to provide comments and suggested priority (Low/Medium/High).**

|  |  |  |
| --- | --- | --- |
| **Company** | **Priority** | **Comments** |
| Nordic  | Low | I suppose this is current status.  |
| vivo | Low | Same CR was proposed in the last RAN1 meeting. Same comments that “the UE shall be ready to transmit a PRACH” does not mandate the UE must transmit. There are other cases that after the timeline, the UE cannot transmit the PRACH e.g., no valid/available RO or collision happens between RO and DL receptions. The correction from [21] cannot solve the ‘problem’ in case the active/separate initial BWP without SSB. If there is issue, it should be firstly clarified for the legacy UE supporting FG6-1a.  |
| CATT | Low |  |
| Spreadtrum | Low | Fine for leaving for UE implementation |
| Nokia, NSB | Low | Agree with Vivo’s comments. Ultimately, this is left to UE implementation. |
| Ericsson | Low |  |
| Qualcomm |  | UE procedure for SI acquisition can be discussed in RAN2. |
| DOCOMO | Medium |  |
| OPPO | Low |  |
| Intel | Low | We share same view as ZTE that SI update can be handled by implementation. A clarification is not necessary if this is the common understanding.  |
| Huawei |  | Support to conclude something. This was proposed in SDT as well and alternatively, can be: *If separate initial BWP does not include CD-SSB and CORESET#0, but is configured for SDT, a UE does not expect to be scheduled on the BWP during paging/SI update indication monitoring procedure and during CG-SDT resource verifying procedure.** + *The BWP paging/SI update indication monitoring procedure may include every paging monitoring occasions, SSB acquisition time, the possible retuning time, the time between the paging and the updated SI.*
	+ *The CG-SDT resource verifying procedure may include SSB transmission time before every CG resources and the possible retuning time.*
 |
| CMCC | Low |  |
| Samsung | Low |  |
| NEC | Low |  |
| LGE | Low | Leave it for UE implementation. |
| FL2 | Almost all received responses indicate that Issue #9 should have low priority in this RAN1 meeting. |

# Issue #10: Specification alignment

Contribution [[10](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209164.zip)] proposes to correct *pucch-ResourceCommon-RedCap* to *pucch-ResourceCommonRedCap* in [38.213](https://www.3gpp.org/ftp/Specs/archive/38_series/38.213/38213-h30.zip) clause 17.1. This and any other RRC parameter name correction can be done as part of the next (ordinary or alignment) 38.213 CR.

**FL1 Question 10-1a: Companies are invited to provide comments on any potential needs for RRC parameter name correction or specification alignment.**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Nordic  | Spec alignments shall be left up to spec editor  |
| Spreadtrum | Both CR and Editor revision are fine for us |
| FUTUREWEI | Spec editor can handle this |
| Qualcomm | Alignment with TS 38.331 should be addressed.  |
| OPPO | OK for either treat the alignment in this CR or put into editors aligment. |
| CMC | Both CR and editor revision are OK. |
| NEC | Intended to be included in editor’s CR. |
| LGE | Both CR and editor’s revision are okay. |
| FL2 | No other needed RRC parameter name correction has been identified so far in this discussion. Considering that the parameter in question (*pucch-ResourceCommon-RedCap*) only occurs in one clause in 38.213 (clause 17.1), it can be fixed together with other changes if this email discussion results in a CR on 38.213 clause 17.1, otherwise it can be fixed in the editor’s alignment CR. |

# 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) |