3GPP TSG-RAN WG1 Meeting #110 R1-22xxxxx

Toulouse, France, 22nd – 26th August 2022

**Agenda Item: 8.6**

**Title: FL summary #1 for Rel-17 RedCap maintenance**

**Source: Moderator (Ericsson)**

**Document for: Discussion, Decision**

# 1 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_109-e/Docs/R1-2205427.zip)], and the FLSs from the previous RAN1 meeting can be found in [[4](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2205107.zip), [5](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2205428.zip), [6](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2205429.zip), [7](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2205364.zip), [8](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2205442.zip)].

This document summarizes the contributions [9] – [45] submitted to agenda item 8.6 and captures this email discussion:

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| --- |
| [110-R17-RedCap] To be used for sharing updates on online/offline schedule, details on what is to be discussed in online/offline sessions, Tdoc number of the moderator summary for online session, etc. – Johan (Ericsson) |

The issues that are in the focus of the initial round of the discussion are tagged FL1.

Follow the naming convention in this example:

* *RedCapMaintenanceFLS1-v000.docx*
* *RedCapMaintenanceFLS1-v001-CompanyA.docx*
* *RedCapMaintenanceFLS1-v002-CompanyA-CompanyB.docx*
* *RedCapMaintenanceFLS1-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 *RedCapMaintenanceFLS1-v002-CompanyA-CompanyB.docx*.
* CompanyC uploads an empty file named *RedCapMaintenanceFLS1-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 *RedCapMaintenanceFLS1-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 12 in [R1-2205703](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2205703.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 1-1: Please consider entering contact info below for the points of contact for this email discussion.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Point(s) of contact** | **Email address(es)** |
| Spreadtrum | Huayu Zhou | huayu.zhou@unisoc.com |
| Qualcomm | Jing Lei | leijing@qti.qualcomm.com |
|  |  |  |

# 2 BWP operation

2.1 SSB presence in 38.213

RAN1#109e discussed several text proposals (TPs) for [38.213](https://www.3gpp.org/ftp/Specs/archive/38_series/38.213/38213-h20.zip) clause 17.1 that intended to better capture earlier RAN1 agreements. Contributions [[9](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2205738.zip), [17](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206546.zip), [18](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206547.zip), [24](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206746.zip)] propose to adopt similar changes as TP#10 in the RAN1#109e FLS [[5](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2205428.zip)], which looked like this:

|  |
| --- |
| *[The following paragraph captures presence of SSB in idle and inactive modes.]*  For an initial DL BWP provided by *initialDownlinkBWP-RedCap* in *DownlinkConfigCommon~~RedCap~~SIB*, if a UE in RRC\_IDLE state or in RRC\_INACTIVE state monitors PDCCH according to ~~a~~ Type1-PDCCH CSS set and does not monitor PDCCH according to Type2-PDCCH CSS set, the UE ~~assumes that~~ does not expect the initial DL BWP ~~does not~~ to include SS/PBCH blocks ~~or~~ and the CORESET with index 0. If the UE in RRC\_IDLE state or in RRC\_INACTIVE state monitors PDCCH according to Type2-PDCCH CSS set, the UE assumes that the initial DL BWP includes the SS/PBCH blocks that the UE used to obtain SIB1 and, for SS/PBCH block and CORESET multiplexing pattern 1, the CORESET with index 0. ~~if the UE used the SS/PBCH block to obtain SIB1~~  ~~- includes a SS/PBCH block and does not include the CORESET with index 0 if the initial DL BWP does not include the SS/PBCH block the UE used to obtain SIB1~~  ~~For an active DL BWP provided by~~ *~~BWP-DownlinkDedicated~~*~~, a UE assumes that the active DL BWP includes a SS/PBCH block, unless the UE indicates a capability to operate in the DL BWP without receiving an SS/PBCH block, and does not include the CORESET with index 0.~~  *[The following paragraph captures presence of SSB in connected mode for separate initial DL BWP configured by BWP configuration option 1.]*  For an active DL BWP not provided by *BWP-DownlinkDedicated*, unless a UE indicates a capability to operate in the active DL BWP without receiving an SS/PBCH block, the UE in RRC\_CONNECTED state assumes that the active DL BWP includes the SS/PBCH blocks that the UE used to obtain SIB1 and, for SS/PBCH block and CORESET multiplexing pattern 1, the CORESET with index 0.  *[The following paragraph captures presence of SSB in connected mode for non-initial DL BWP configured by BWP configuration option 1 and initial/non-initial DL BWP configured by BWP configuration option 2.]*  For an active DL BWP provided by *BWP-DownlinkDedicated*, unless a UE indicates a capability to operate in the active DL BWP without receiving an SS/PBCH block, the UE in RRC\_CONNECTED state assumes that the active DL BWP includes the SS/PBCH blocks that the UE used to obtain SIB1 or the SS/PBCH blocks provided by *NonCellDefiningSSB*. If the active DL BWP includes the SS/PBCH blocks that the UE used to obtain SIB1, for SS/PBCH block and CORESET multiplexing pattern 1, the UE expects the active DL BWP to include the CORESET with index 0. 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. |

Contributions [[9](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2205738.zip), [10](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2205788.zip), [11](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2205789.zip), [14](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206369.zip), [17](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206546.zip), [18](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206547.zip), [24](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206746.zip), [30](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206888.zip), [32](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207045.zip) (section 2.2), [35](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207048.zip), [36](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207196.zip) (section 3)] aim to capture some of or all the agreements that TP#10 aimed to capture. Somewhat related, contribution [[11](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2205789.zip)] also proposes to remove the statement that “A UE with reduced capabilities (RedCap UE) supports all Layer-1 UE features that are mandatory without capability signalling” in [38.213](https://www.3gpp.org/ftp/Specs/archive/38_series/38.213/38213-h20.zip) clause 17.

**FL1 Question 2.1-1: Companies are invited to provide comments and suggested priority (1=Low, 2=Med, 3=High).**

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| --- | --- | --- |
| **Company** | **Priority** | **Comments** |
| Spreadtrum | 3 | It is the left issue in the last meeting. The agreements of SSB presence for several meetings are pending to be captured in RAN1 spec. We also provide our TP in [[12](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2205974.zip)]. By the way, we have the following questions coming from checking companies’ TPs, which may reflect the different understandings among companies.   * For paging reception in idle/inactive mode, should SSB presence be captured in RAN1 spec? It has been captured in RAN2 spec, and paging/SIB1/OSI should have the same behavior for SSB/CORESET#0 presence. Moreover, there is no explicit RAN1 agreement for paging reception other than BWP#0 configuration option 1 in connected mode   + Our answer could be no * For paging reception for BWP#0 configuration option 1 in connected mode, should SSB presence be captured separately? It was agreed in RAN1#108e, but seem being overridden by RAN1#109e agreements   + Our answer could be no * For RAR, how to understanding “SSB/CORESET#0” in the corresponding agreements? “SSB and CORESET#0” or “SSB or CORESET#0”?   + Our answer could be “SSB and CORESET#0” * For CORESET#0, should CORESET#0 presence be captured in RAN1 spec? In RAN1 agreements, whether CORESET#0 is present is differentiated by FR1 and FR2, for now, it is differentiated by multiplexing pattern 1 and others in some companies’ view   + Our answer could be yes |
| Nordic | 3 | RAN1 made the above mentioned agreements regarding presence of SSB/CORESET#0 in BWPs in IDLE and CONNECTED state, we believe those should be captured in RAN1 specs. When it comes to paging related, we would prefer to capture in RAN2 though.  Regarding removal of “A UE with reduced capabilities (RedCap UE) supports all Layer-1 UE features that are mandatory without capability signalling”. We could keep the sentence and add an exception for FG 6-1? |
| vivo | 3 | About removing the statement that “A UE with reduced capabilities (RedCap UE) supports all Layer-1 UE features that are mandatory without capability signalling”, we understand there is a note in FG28-1 saying that a UE supporting FG28-1 is not required to support FG6-1. While there are other Rel-15 L1 UE capabilities mandatory without capability signalling that we did not update for RedCap. Given the corrections for SSB presence we will do in section 2.1, We prefer to keep it with following modifications:  “A UE with reduced capabilities (RedCap UE) supports all Layer-1 UE features that are mandatory without capability signalling, unless stated otherwise.” |
| Intel | 3 | Also support the modification suggested by vivo on the handling of FG 6-1 for a UE supporting FG 28-1. |
| Qualcomm | 3 | Support the TP above for Clause 17.1 of TS 38.213.  vivo’s suggestion looks good to us. |

2.2 Center frequency alignment in 38.213

As already mentioned, RAN1#109e discussed several TPs for [38.213](https://www.3gpp.org/ftp/Specs/archive/38_series/38.213/38213-h20.zip) clause 17.1 that intended to capture earlier RAN1 agreements. Contributions [[16](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206442.zip) (issue 1), [17](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206546.zip), [18](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206547.zip)] propose to adopt similar changes as TP#9 in the RAN1#109e FLS [[5](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2205428.zip)], which looked like this:

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| A RedCap UE does not expect to receive a configuration where the center frequency for an initial DL BWP in which the UE is configured to monitor Type1-PDCCH CSS set (separate or shared with non-RedCap UEs) is different than the center frequency for an initial UL BWP (separate or shared with non-RedCap UEs) in which the RedCap UE may transmit Msg1/Msg3 or MsgA. |

**FL1 Question 2.2-1: Companies are invited to provide comments and suggested priority (1=Low, 2=Med, 3=High).**

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| --- | --- | --- |
| **Company** | **Priority** | **Comments** |
| Spreadtrum | 3 | It is the left issue in the last meeting. It is important for UE implementation. We also provide our TP in [[12](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2205974.zip)]. |
| Nordic | 3 | We support the TP |
| vivo | 3 | Center frequency alignment is important for RedCap UE to reduce the complexity. We think it is a high priority issue. |
| Intel | 3 | Agree with the above comments and we also see a need to address this gap. |
| Qualcomm | 3 | Suggest to add “single carrier operation on unpaired spectrum” as a condition for the TP above. |

2.3 Maximum bandwidth in 38.213

Contributions [[16](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206442.zip) (issue 5), [45](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207669.zip)] propose some clarifications related to the maximum bandwidth in [38.213](https://www.3gpp.org/ftp/Specs/archive/38_series/38.213/38213-h20.zip) clause 17.1.

**FL1 Question 2.3-1: Companies are invited to provide comments and suggested priority (1=Low, 2=Med, 3=High).**

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| **Company** | **Priority** | **Comments** |
| Spreadtrum | 1 | It seems complete that the maximum bandwidth of any BWP for RedCap UEs is no wider than the maximum RedCap bandwidth. |
| Nordic | 1/2 | [16] We do not see issue with differentiating DL and UL BW, even if in R17 the limit is the same for both DL and UL.  [45] We OK with clarification, but it is not of highest priority |
| vivo | 2 | The correction is the common understanding, should be quickly converged during the meeting. |
| Intel | 1/2 | Same view as Nordic. |
| Qualcomm | 1 |  |

2.4 Common PUCCH resource set determination in 38.213

Contributions [[31](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207000.zip), [44](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207494.zip)] propose to clarify the common PUCCH resource set index determination in [38.213](https://www.3gpp.org/ftp/Specs/archive/38_series/38.213/38213-h20.zip) clause 17.1 and to send an LS to ask RAN2 to clarify in [38.331](https://www.3gpp.org/ftp/Specs/archive/38_series/38.331/38331-h10.zip) that RedCap-specific common PUCCH resource is always provided for a RedCap-specific initial UL BWP.

Contributions [[36](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207196.zip) (section 4), [41](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207275.zip)] propose a correction of the PUCCH PRB offset parameter name in [38.213](https://www.3gpp.org/ftp/Specs/archive/38_series/38.213/38213-h20.zip) clause 17.1.

**FL1 Question 2.4-1: Companies are invited to provide comments and suggested priority (1=Low, 2=Med, 3=High).**

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| --- | --- | --- |
| **Company** | **Priority** | **Comments** |
| Nordic | 2 | While rather obvious that if configured with RedCap PUCCH UE will not use non-RedCap PUCCH, but could be specified |
| vivo | 2 | We think it is a high priority issue. |
| Intel | 2 | OK to discuss |
| Qualcomm | 3 | Considering the potential impacts on UE implementation, we think it should be treated as high priority at this meeting. |

2.5 Relation between PUSCH and NCD-SSB in 38.213/38.214

Contributions [[21](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206550.zip), [22](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206551.zip), [32](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207045.zip) (section 2.3), [34](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207047.zip), [40](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207275.zip)] propose to clarify the relation between PUSCH and NCD-SSB in various subclauses to [38.214](https://www.3gpp.org/ftp/Specs/archive/38_series/38.214/38214-h20.zip) clause 6.1, whereas contribution [[39](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207274.zip)] proposes to clarify this in [38.213](https://www.3gpp.org/ftp/Specs/archive/38_series/38.213/38213-h20.zip) clause 17.1.

**FL1 Question 2.5-1: Companies are invited to provide comments and suggested priority (1=Low, 2=Med, 3=High).**

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| **Company** | **Priority** | **Comments** |
| Spreadtrum | 1 | The actually transmitted SSB pattern is not provided in IE *NonCellDefiningSSB*. Maybe it should follow *ssb-PositionsInBurst* for CD-SSB or have a separate *ssb-PositionsInBurst*. It needs the further discussion. |
| Nordic |  | Agree with Spreadtrum, the TPs are technically wrong. Moreover, *ssb-PositionsInBurst* should be the same for CD and NCD SSB. So there is no issue with using *ssb-PositionsInBurst in SIB1* for NCD SSB as well |
| vivo | 3 | It is necessary to clarify that the SSB should include NCD-SSB.  About correction proposed in [39], we are not sure the necessity of this statement given all collision handling between SSB and UL transmissions for RedCap HD-FDD are captured in clause 17.2. In addition, we are not sure such correct is accurate, since for TDD, there is no collision between valid PRACH and SSB; but for HD-FDD, the collision can happen, and UE behavior is left to Ue implementation. |
| Intel | 3 | SSB provided by *NonCellDefiningSSB* is already referenced in current 213 specifications and that can be followed. A reference to *NonCellDefiningSSB* is necessary even if ssb-PositionsInBurst may be common between CD- and NCD-SSB due to potential different periodicities and offsets. |
| Qualcomm | 2 | If clarification is needed, we suggest to add a general description in 213 and/or 214 spec, instead of pursuing brute-force changes in various clauses of multiple specs. For example, the following description can be added to 213 spec:   * If an active DL BWP of RedCap UE includes the SS/PBCH blocks configured by *NonCellDefiningSSB* of the serving cell, the UE assumes the SS/PBCH blocks transmitted within a NCD-SSB burst is indicated by *ssb-PositionsInBurst* in *SIB1,* and the SS/PBCH blocks indicated by *ssb-PositionsInBurst* in SIB1 and transmitted within the active DL BWP refer to the SS/PBCH blocks configured by *NonCellDefiningSSB*. |

2.6 PDSCH resource mapping around NCD-SSB in 38.214

Contributions [[16](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206442.zip) (issue 2), [25](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206747.zip), [40](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207275.zip)] propose to clarify PDSCH resource mapping around NCD-SSB in [38.214](https://www.3gpp.org/ftp/Specs/archive/38_series/38.214/38214-h20.zip) clause 5.1.4.

**FL1 Question 2.6-1: Companies are invited to provide comments and suggested priority (1=Low, 2=Med, 3=High).**

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| --- | --- | --- |
| **Company** | **Priority** | **Comments** |
| Spreadtrum | 1 | Similar to **FL1 Question 2.5-1** |
| Nordic | 1 | Agree with SPRD |
| vivo | 3 | We think it is a high priority issue to define RedCap UE behavior for PDSCH resource mapping around NCD-SSB. |
| Intel | 2 | While we are OK to discuss the issue, in our understanding current description in 214 only refers to “*ssb-PositionsInBurst*” without reference to SIB1 or *ServingCellConfigCommon*. So, this depends on how *ssb-PositionsInBurst* is defined for NCD-SSB. |
| Qualcomm | 2 | Same view as our comments on FL1 Question 2.5-1 |

2.7 Relation between control channels and NCD-SSB in 38.213

Contributions [[16](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206442.zip) (issue 4), [20](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206549.zip), [22](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206551.zip), [26](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206748.zip), [32](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207045.zip) (section 2.3), [33](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207046.zip)] propose to clarify the relations between various control channels and NCD-SSB in one or more of clauses 8.1, 8.1A, 9.2.6, 10, 11.1, 11.1.1 and 19.1 in [38.213](https://www.3gpp.org/ftp/Specs/archive/38_series/38.213/38213-h20.zip).

**FL1 Question 2.7-1: Companies are invited to provide comments and suggested priority (1=Low, 2=Med, 3=High).**

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| **Company** | **Priority** | **Comments** |
| Spreadtrum | 1 | Similar to **FL1 Question 2.5-1** |
| Nordic | 1 | Agree with SPRD |
| vivo | 3 | We think it is a high priority issue to define the RedCap UE behavior at least for PDCCH colliding NCD-SSB. |
| Intel | 3 | Share same view with vivo. |
| Qualcomm | 2 | Same view as our comments on FL1 Question 2.5-1 |

2.8 DCI format 0\_0 size determination in 38.212

Contribution [[27](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206749.zip)] proposes to clarify the DCI format 0\_0 size determination in [38.212](https://www.3gpp.org/ftp/Specs/archive/38_series/38.212/38212-h20.zip) clause 7.3.1.0.

**FL1 Question 2.8-1: Companies are invited to provide comments and suggested priority (1=Low, 2=Med, 3=High).**

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| **Company** | **Priority** | **Comments** |
| Spreadtrum | 1 | The initial UL BWP may include the BWP provide by *initialUplinkBWP* or *initialUplinkBWP-RedCap* |
| Nordic | 1 | We believe there is no ambiguity, as it is clear which initial UL BWP is used by the RedCap UE. |
| vivo | 3 | For DCI format 1\_0 size determination in CSS, we made one conclusion in RAN1#108-e that DCI format 1\_0 size in CSS always depends on size of CORESET#0. But there is no discussion about DCI size determination for DCI format 0\_0 in CSS before aligning its size to DCI format 1\_0 monitored in CSS. It should be clarified in 38.212. |
| Intel | 1 | Same view as Spreadtrum and Nordic. |
| Qualcomm | 1 |  |

2.9 Msg1/MsgA retransmission timeline in 38.213

Contributions [[42](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207383.zip), [43](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207384.zip)] propose to make the text about the Msg1/MsgA retransmission timeline in [38.213](https://www.3gpp.org/ftp/Specs/archive/38_series/38.213/38213-h20.zip) clauses 8.2 and 8.2A applicable to non-RedCap UEs only, whereas contribution [[36](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207196.zip) (section 2)] proposes to add corresponding text in [38.213](https://www.3gpp.org/ftp/Specs/archive/38_series/38.213/38213-h20.zip) clause 17.1 for the case when a RedCap UE performs random access on an active DL BWP with SSB.

**FL1 Question 2.9-1: Companies are invited to provide comments and suggested priority (1=Low, 2=Med, 3=High).**

|  |  |  |
| --- | --- | --- |
| **Company** | **Priority** | **Comments** |
| Spreadtrum | 2 | It is important for UE implementation, but companies may have time to check the actual time line. |
| Nordic | 3 | We should discuss whether timeline is extended for RedCap due to RF returning. |
| vivo | 1 | As clarified, “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. Neither correction from [42] or [36] can solve the ‘problem’ in case the active/separate initial BWP without SSB. If it is really issue, the legacy UE supporting FG6-1a also have timeline problem in case the active BWP does not contain SSB? |
| Intel | 1 | Share same view as vivo – this aspect was discussed earlier during the WI and clarified as explained by vivo. |
| Qualcomm | 3 | The R16 CR on msg1/msg3 retransmission was discussed in RAN1#109 meeting. The FL of the R16 CR (Lihui, vivo) has clarified the R16 CR applies to non-RedCap UE only.  Due to the potential impacts on RedCap UE timeline/implementation, we think it is a high priority issue. As proposed in our Tdoc, a minor change to 213 spec (adding “if SSB is present in the initial DL BWP of RedCap UE” to the relevant descriptions in Clause 8.2/8.2A, or in Clause 17.1) should be able to fix the issue. |

# 3 HD-FDD operation

3.1 PUSCH repetition corrections in 38.214

Contributions [[13](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206298.zip) (section 3), [16](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206442.zip) (issue 3), [19](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206548.zip), [28](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206750.zip), [29](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206751.zip), [37](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207272.zip), [38](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207273.zip)] propose various PUSCH repetition related corrections for HD-FDD in subclauses to [38.214](https://www.3gpp.org/ftp/Specs/archive/38_series/38.214/38214-h20.zip) clause 6.1.2.

**FL1 Question 3.1-1: Companies are invited to provide comments and suggested priority (1=Low, 2=Med, 3=High).**

|  |  |  |
| --- | --- | --- |
| **Company** | **Priority** | **Comments** |
| Spreadtrum | 3 | Based on the agreements for Type B repetition in the last meeting, CR is needed. |
| Nordic | 3 |  |
| vivo | 3 | The agreements made for HD-FDD collision handling and/or insufficient switching time for PUSCH repetition Type A with/without enabling valid slot counting and PUSCH repetition Type B should be correctly captured in the spec |
| Intel | 3 |  |
| Qualcomm | 3 |  |

3.2 PUSCH repetition corrections in 38.213

Contribution [[13](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206298.zip) (section 2)] proposes PUSCH repetition related corrections for HD-FDD in [38.213](https://www.3gpp.org/ftp/Specs/archive/38_series/38.213/38213-h20.zip) clause 17.2.

**FL1 Question 3.2-1: Companies are invited to provide comments and suggested priority (1=Low, 2=Med, 3=High).**

|  |  |  |
| --- | --- | --- |
| **Company** | **Priority** | **Comments** |
| Spreadtrum | 1 | In our understanding, 214 describes the available slots for Msg3 repetition, while 213 describes the UE behavior, i.e., whether to drop a transmission in an available slot if collision happens (overlapped with SSB). It seems no conflicts... |
| vivo | 1 | We think the correction is not needed. Aavailable slot determination and whether to perform the transmission on the determined available slot is different thing. There are no conflict behaviours for HD-FDD UE for Msg.3 repetitions. |
| Intel | 1 | No conflicts as explained by Spreadtrum and vivo. |
| Qualcomm | 1 |  |

3.3 UE processing capability clarification in 38.213

Contribution [[23](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206616.zip)] proposes clarifications related to UE processing capability for HD-FDD in [38.213](https://www.3gpp.org/ftp/Specs/archive/38_series/38.213/38213-h20.zip) clause 17.2.

**FL1 Question 3.3-1: Companies are invited to provide comments and suggested priority (1=Low, 2=Med, 3=High).**

|  |  |  |
| --- | --- | --- |
| **Company** | **Priority** | **Comments** |
| Nordic | 1 | It does not make sense to support faster capability 2 for RedCap UE. |
| vivo | 1 | For HD-FDD RedCap UE, it may not be necessary or essential to support UE processing capability 2. |
| Intel | 1 | Not essential. |

# 4 SDT operation

Contribution [[12](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2205974.zip)] contains several proposals related to small data transmission (SDT) operation for RedCap UEs. Contribution [[32](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207045.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. The FL suggestion is to postpone these proposals for the combination of RedCap and SDT until the RedCap specifications on one hand and the SDT specifications on the other hand are a bit more stable.

**FL1 Question 4-1: Companies are invited to provide comments and suggested priority (1=Low, 2=Med, 3=High).**

|  |  |  |
| --- | --- | --- |
| **Company** | **Priority** | **Comments** |
| Spreadtrum | 3 | It is important for clarification since RedCap+SDT is not complete in the spec. Moderator’s suggestion is also reasonable. |
| Nordic | 3 | We fine with proposal |
| vivo | 1 | We are fine with FL suggestion to wait when the specification for RedCap and SDT are more stable. |
| Intel | 1 | Support recommendation from the FL. |
| Qualcomm |  | Agree with FL proposal |

# 5 SSB-less BWP

5.1 Measurements gaps

Contribution [[36](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207196.zip) (section 6)] proposes to update [38.213](https://www.3gpp.org/ftp/Specs/archive/38_series/38.213/38213-h20.zip) and [38.822](https://www.3gpp.org/ftp/Specs/archive/38_series/38.822/38822-g30.zip) to capture a RedCap UE’s need for measurement gaps to use SSB outside its BWP based on a potential LS reply from RAN4.

**FL1 Question 5.1-1: Companies are invited to provide comments and suggested priority (1=Low, 2=Med, 3=High).**

|  |  |  |
| --- | --- | --- |
| **Company** | **Priority** | **Comments** |
| Spreadtrum | 1 | It seems to be resolved in the LS reply for BWP operation without restriction. There are several options, like CSI-RS based measurement and measurement gap. Whether to introduce measurement gap needs to be discussed and concluded by RAN1/RAN2/RAN4, and for now RAN1 only needs to reply the LS. |
| vivo | 1 | We are fine with the proposal. But we think the related spec impact should be in RAN4 given the following conclusion we made:  Conclusion:   * From RAN1 perspective, whether and under what conditions a RedCap UE requires to be configured with existing measurement gaps to support operation without SSB in an RRC-configured active BWP, and **its related UE feature discussion (including measurement gaps) is up to RAN4.** * Send an LS to RAN4 to inform them about the conclusion. |
| Intel | 1 | Same view as vivo. We already agreed to leave this up to RAN4. |
|  |  |  |

5.2 CSI-RS based RLM

Contribution [[15](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206416.zip)] proposes to include capability of CSI-RS based RLM (FG 1-7) into FG 28-1a and to reuse existing specifications for RLM on PCell. The FL suggests treating this topic under UE feature list agenda item 8.16.5 instead.

# 6 NCD-SSB time offset parameter

Contribution [[36](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207196.zip)] section 5 concerns the definition and values of the recently introduced NCD-SSB time offset parameter. It can be discussed together with the incoming LS in [[46](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2205734.zip)] and the related contributions in [47] – [53] which also concern the definition and values of that parameter (after the Monday LS session).

# 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] | [R1-2205427](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2205427.zip) | RAN1 agreements for Rel-17 NR RedCap | Rapporteur (Ericsson) |
| [4] | [R1-2205107](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2205107.zip) | FL summary for preparatory phase for Rel-17 RedCap maintenance | Moderator (Ericsson) |
| [5] | [R1-2205428](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2205428.zip) | FL summary for maintenance on UE bandwidth reduction for RedCap | Moderator (Ericsson) |
| [6] | [R1-2205429](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2205429.zip) | FL summary for incoming LS ([R1-2203046](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2203046.zip)) on introduction of an offset to transmit CD-SSB and NCD-SSB at different times | Moderator (Ericsson) |
| [7] | [R1-2205364](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2205364.zip) | FL summary #1 for maintenance on HD-FDD for RedCap | Moderator (Qualcomm) |
| [8] | [R1-2205442](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2205442.zip) | FL summary #2 for maintenance on HD-FDD for RedCap | Moderator (Qualcomm) |
| [9] | [R1-2205738](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2205738.zip) | Corrections and clarifications of RedCap UE procedures | Ericsson |
| [10] | [R1-2205788](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2205788.zip) | Correction on separate initial DL/UL BWP for RedCap UEs | Huawei, HiSilicon |
| [11] | [R1-2205789](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2205789.zip) | Corrections related to NCD-SSB for RedCap UEs | Huawei, HiSilicon |
| [12] | [R1-2205974](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2205974.zip) | Remaining issues on support of Reduced Capability NR Devices | Spreadtrum Communications |
| [13] | [R1-2206298](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206298.zip) | Other remaining issues for Reduced Capability NR Devices | OPPO |
| [14] | [R1-2206369](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206369.zip) | Correction on Type2-PDCCH CSS configuration in separate initial DL BWP | CATT |
| [15] | [R1-2206416](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206416.zip) | Remaining details on BWP operation for RedCap | NEC |
| [16] | [R1-2206442](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206442.zip) | Maintenance Issues on Complexity Reduction for RedCap | Nokia, Nokia Shanghai Bell |
| [17] | [R1-2206546](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206546.zip) | Draft CR on corrections to BWP operations for RedCap UEs | Intel Corporation |
| [18] | [R1-2206547](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206547.zip) | Remaining details on BWP operations for RedCap UEs | Intel Corporation |
| [19] | [R1-2206548](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206548.zip) | Draft CR on correction to handling of Types A and B PUSCH repetitions for HD-FDD RedCap UEs | Intel Corporation |
| [20] | [R1-2206549](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206549.zip) | Draft CR on corrections for handling of NCD-SSB for RedCap UEs | Intel Corporation |
| [21] | [R1-2206550](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206550.zip) | Draft CR on corrections for PDSCH reception in BWP configured with NCD-SSB for RedCap UEs | Intel Corporation |
| [22] | [R1-2206551](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206551.zip) | Discussion on NCD-SSB handling for RedCap UEs | Intel Corporation |
| [23] | [R1-2206616](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206616.zip) | Corrections on Half-duplex FDD operation in paired spectrum in TS 38.213 | Xiaomi |
| [24] | [R1-2206746](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206746.zip) | Corrections for RedCap UE behavior on BWP operation | vivo |
| [25] | [R1-2206747](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206747.zip) | Correction on PDSCH resource mapping around NCD-SSB for RedCap UE | vivo |
| [26] | [R1-2206748](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206748.zip) | Correction on PDCCH monitoring for RedCap UE | vivo |
| [27] | [R1-2206749](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206749.zip) | Corrections on DCI format 0\_0 size determination for RedCap UE | vivo |
| [28] | [R1-2206750](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206750.zip) | Correction on available slot determination for PUSCH repetition type A for HD-FDD | vivo |
| [29] | [R1-2206751](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206751.zip) | Correction on invalid symbol determination for PUSCH repetition type B for HD-FDD | vivo |
| [30] | [R1-2206888](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206888.zip) | Correction on SSB transmission for initial DL BWP | CMCC |
| [31] | [R1-2207000](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207000.zip) | Correction for PUCCH resource set indication for RedCap | MediaTek Inc. |
| [32] | [R1-2207045](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207045.zip) | Discussion on RedCap remaining issues | ZTE, Sanechips |
| [33] | [R1-2207046](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207046.zip) | Correction on NCD-SSB related spec for RedCap in TS38.213 | ZTE, Sanechips |
| [34] | [R1-2207047](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207047.zip) | Correction on NCD-SSB related spec for RedCap in TS38.214 | ZTE, Sanechips |
| [35] | [R1-2207048](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207048.zip) | Correction on SSB and CORESET#0 presence for RedCap | ZTE, Sanechips |
| [36] | [R1-2207196](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207196.zip) | Maintenance on NR R17 RedCap UE | Qualcomm Incorporated |
| [37] | [R1-2207272](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207272.zip) | Corrections on available slot counting for PUSCH repetition type A for HD-UE | Sharp |
| [38] | [R1-2207273](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207273.zip) | Corrections on inclusion of NCD-SSB and switching gap for determining invalid symbols for PUSCH repetition type B for HD-UE | Sharp |
| [39] | [R1-2207274](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207274.zip) | Corrections on collision handling between NCD-SSB and UL transmission in TS38.213 for RedCap UE in unpaired spectrum | Sharp |
| [40] | [R1-2207275](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207275.zip) | Corrections on inclusion of NCD-SSB in TS38.214 for RedCap UE | Sharp |
| [41] | [R1-2207276](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207276.zip) | Correction on RRC parameter alignment for additional PRB offset in TS38.213 for RedCap UE | Sharp |
| [42] | [R1-2207383](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207383.zip) | Draft CR on timeline requirement for retransmitting MSG1/MSGA for RedCap | NTT DOCOMO, INC. |
| [43] | [R1-2207384](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207384.zip) | Discussion on timeline requirement for retransmitting MSG1/MSGA for RedCap | NTT DOCOMO, INC. |
| [44] | [R1-2207494](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207494.zip) | On PUCCH resource set indication for RedCap | MediaTek Beijing Inc. |
| [45] | [R1-2207669](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207669.zip) | Correction on separate initial UL BWP for RedCap UEs | Huawei, HiSilicon |
| [46] | [R1-2205734](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2205734.zip) | Reply LS on introduction of an offset to transmit CD-SSB and NCD-SSB at different times | RAN2, Ericsson |
| [47] | [R1-2205761](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2205761.zip) | On the offset between CD-SSB and NCD-SSB | Huawei, HiSilicon |
| [48] | [R1-2206415](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206415.zip) | Discussion on LS on introduction of an offset to transmit CD-SSB and NCD-SSB at different times | NEC |
| [49] | [R1-2206441](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206441.zip) | Discussion on reply LS on introduction of an offset to transmit CD-SSB and NCD-SSB | Nokia, Nokia Shanghai Bell |
| [50] | [R1-2206483](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206483.zip) | On the Reply LS on introduction of an offset to transmit CD-SSB and NCD-SSB at different times | Ericsson |
| [51] | [R1-2206704](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206704.zip) | Draft reply LS on introduction of an offset to transmit CD-SSB and NCD-SSB at different times | vivo |
| [52] | [R1-2207044](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207044.zip) | Discussion on LS reply for time offset between CD-SSB and NCD-SSB | ZTE, Sanechips |
| [53] | [R1-2207614](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207614.zip) | Draft Reply LS on introduction of an offset to transmit CD-SSB and NCD-SSB at different times | Ericsson |