3GPP TSG-RAN WG1 Meeting #110 Draft R1-2207728

Toulouse, France, 22nd – 26th August 2022

**Agenda Item: 8.6**

**Title: FL summary #2 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 FL3. The FLS for the previous round can be found in [54].

Follow the naming convention in this example:

* *RedCapMaintenanceFLS2-v000.docx*
* *RedCapMaintenanceFLS2-v001-CompanyA.docx*
* *RedCapMaintenanceFLS2-v002-CompanyA-CompanyB.docx*
* *RedCapMaintenanceFLS2-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 *RedCapMaintenanceFLS2-v002-CompanyA-CompanyB.docx*.
* CompanyC uploads an empty file named *RedCapMaintenanceFLS2-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 *RedCapMaintenanceFLS2-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.  
  
**FL3 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)** |
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# 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. |
| CATT | 3 | Also fine with vivo’s update. |
| ZTE, Sanechips | 3 | Paging in FR1 and FR2 should be differentiated if spec correction is needed for paging in RAN1. |
| Sharp | 3 | The above TP can be used as a baseline for discussion and some modifications need to be refined. For example, if a UE configured to monitor paging, the initial DL BWP should include CD-SSB regardless of the RRC state the UE is in. |
| Samsung | 3 | Fine with vivo’s update. |
| FUTUREWEI | 3 | Ok with vivo’s update |
| CMCC | 3 | This issue is about how to correctly capture the agreements about the SSB presence, and we think it is high priority.  For the TP given above, it does not reflect the agreement as following, which means for an active DL BWP not provided by *BWP-DownlinkDedicated* in connected mode*,* if it is configured to monitor PDCCH according to Type2-PDCCH CSS set on this BWP, it will expect CD-SSB.  Agreement:(RAN1#108e)   * […] * For BWP#0 configuration option 1,   + For FR1,     - For a separate initial DL BWP, for a RedCap UE in connected mode, paging can only be configured if it contains CD-SSB and the entire CORESET#0.   + For FR2,     - For a separate initial DL BWP, for a RedCap UE in connected mode, paging can only be configured if it contains CD-SSB ~~and the entire CORESET#0~~. * […]   So we propose the following the TP,  For an initial DL BWP provided by *initialDownlinkBWP-RedCap-r17* in *DownlinkConfigCommonSIB*, the UE assumes that the initial DL BWP does not include SS/PBCH blocks or the CORESET with index 0 for the following cases,  - if a UE in RRC\_IDLE state or in RRC\_INACTIVE state monitors PDCCH according to Type1-PDCCH CSS set and does not monitor PDCCH according to Type2-PDCCH CSS set, or  - if the BWP is not provided by *BWP-DownlinkDedicated*, the UE in RRC\_CONNECTED state indicates a capability to operate in the active DL BWP without receiving an SS/PBCH block and it is not configured to monitor PDCCH according to Type2-PDCCH CSS set on this BWP.  Otherwise, the UE assumes that the initial DL BWP includes 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.  For the Layer-1 UE features part, fine with vivo’s update. |
| Nokia, NSB | 3 | Fine with Vivo’s update. |
| Ericsson | 3 | Fine with Vivo’s update. |
| NEC | 3 | Fine with vivo’s update. |
| OPPO | 3 | Ok with vivo’s update |
| Huawei, HiSilicon | 3 | Regarding vivo’s suggestion, we understand the intention and consider it is doable. However, we have a preference to remove the whole because what UE capability RedCap shall be able to support is already clear by 38306, thus this sentence in RAN1 is unnecessary/duplicate and is not RAN1 usual experience, now even conflict with RAN1 agreements. |
| FL2 | Based on received responses, the following proposal can be considered.  **High Priority Proposal 2.1-1a:**   * **Agree the following TP for 38.213 clause 17 in principle:**  |  | | --- | | A UE with reduced capabilities (RedCap UE) supports all Layer-1 UE features that are mandatory without capability signalling, unless stated otherwise. |  * **Agree the following TP for 38.213 clause 17.1 in principle:**  |  | | --- | | *[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 or if a UE monitors PDCCH according to Type2-PDCCH CSS set, 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. | | |
| FL3 | RAN1 made the following agreement on Tuesday 23rd August:  Agreement:   * The following TP for 38.213 clause 17 is endorsed in principle:  |  | | --- | | A UE with reduced capabilities (RedCap UE) supports all Layer-1 UE features that are mandatory without capability signalling, unless stated otherwise. |     The second part of the proposal can be considered again, i.e.:  **High Priority Proposal 2.1-1b:**   * **Agree the following TP for 38.213 clause 17.1 in principle:**  |  | | --- | | *[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 or if a UE monitors PDCCH according to Type2-PDCCH CSS set, 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. | | |
| **Company** | **Y/N** | **Comments** |
| Qualcomm | Y |  |
| Spreadtrum | N for paging part | We are fine for the most parts of CR except for paging part. Paging for idle/inactive state should be removed.  ~~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.~~  1) WA on paging reception made in RAN1#107e was NOT confirmed in RAN1#108e. And we changed to agree that paging reception can be specified in RAN1 spec only for BWP#0 configuration option 1 in connected state. Thus, in my memory there is no explicit agreement for paging reception in idle/inactive state in RAN1.  2) Current wording may not be aligned to RAN2 agreement.   |  | | --- | | RAN2 confirms that if RedCap-specific initial DL BWP does not contain CD-SSB and CORESET#0, then this BWP will not be configured with a paging search space in any RRC state. In this case, the RedCap UE in RRC\_CONNECTED state is not required to read paging. |   Indeed RAN2 spec 38.331 has included the paging is monitored in the initial DL BWP containing CD-SSB in any RRC state.   |  | | --- | | ***pagingSearchSpace***  ID of the Search space for paging (see TS 38.213 [13], clause 10.1). If the field is absent, the UE does not receive paging in this BWP (see TS 38.213 [13], clause 10). This field is absent for the RedCap specific initial DL BWP, if it does not include CD-SSB and the entire CORESET#0. |   Correct me if I’m wrong. Thanks. |

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. |
| CATT | 3 | And clarify that this is for operation in unpaired spectrum. |
| ZTE, Sanechips |  | We are OK to discuss this issue. However, if the initial DL/UL BWP has the same enter frequency, RF retuning between initial DL/UL BWP can be avoided and there is no need to further mandate the same center frequency for Type1-PDCCH CSS set and initial UL BWP.  Moreover, if Type1-PDCCH CSS set and initial UL BWP has the same center frequency, what about the Type2-PDCCH CSS set? Shall we also need to mandate the center frequency with initial UL BWP? This kind of further restriction for Type1-PDCCH and/or Type2-PDCCH would cause scheduling complexity for gNB and UE receiving performance due to restricted position. |
| Sharp | 3 | Also agree with Qualcomm and CATT’s suggestion. |
| Samsung | 3 | Need to clarify this for TDD only (unpaired spectrum.). |
| FUTUREWEI | 3 | Need to clarify that this is for TDD |
| CMCC | 3 | Share similar view with CATT, Sharp, Samsung, and FUTUREWEI that this should be for TDD. |
| Nokia, NSB | 3 | Need to clarify that this is for TDD |
| Ericsson | 3 |  |
| NEC | 3 | Support the TP and agree with Qualcomm and CATT. |
| OPPO | 3 |  |
| Huawei, HiSilicon | 3 | We generally agree with the intention but unclear whether it is a good wording to write “shared with non-RedCap UEs” since a UE does not care about whether a BWP is shared with others or not, who just follow the configured BWP index. The description of “type 1 CSS” is also complicated. It would be simpler to just say the BWP provided in IE xxx. |
| FL2 | Based on received responses, the following proposal can be considered.  **High Priority Proposal 2.2-1a: Agree following TP for 38.213 clause 17.1 in principle.**   |  | | --- | | For unpaired spectrum operation, 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 is different than the center frequency for an initial UL BWP in which the RedCap UE may transmit Msg1/Msg3 or MsgA. | | |
| FL3 | RAN1 made the following agreement on Tuesday 23rd August:  Agreement:  The following TP for 38.213 clause 17.1 is endorsed in principle.   |  | | --- | | For unpaired spectrum operation, 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 is different than the center frequency for an initial UL BWP in which the RedCap UE may transmit Msg1/Msg3 or MsgA. | | |

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).**

|  |  |  |
| --- | --- | --- |
| **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 |  |
| CATT | 1 |  |
| ZTE, Sanechips | 2 | Not a necessary correction but can make it clearer. We are OK to discuss with a relatively lower priority. |
| Sharp | 2 | Agree with the proposed clarifications. |
| Samsung | 1 |  |
| FUTUREWEI | 1 | For [45], ok with clarification. A reason to differentiate DL and UL BW is based on clause 5.3.6 “Asymmetric channel bandwidths” in 38.101-1 where a FDD band can have different sized UL and DL BWs. |
| CMCC | 1 | Both DL and UL share the same maximum RedCap bandwidth, so this issue seems not critical. We are also ok to correct this. |
| Nokia, NSB | 1 |  |
| Ericsson | 1 |  |
| NEC | 1 |  |
| OPPO | 1 |  |
| Huawei, HiSilicon | 3 | The corrections are straightforward. |

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/R1-2207276.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).**

|  |  |  |
| --- | --- | --- |
| **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. |
| CATT | 2 | Fine to have a clear conclusion. |
| ZTE, Sanechips | 2 | We are OK to discuss, and also OK to wait for RAN2 further discussion. |
| Sharp | 3 | We support to figure out the common PUCCH resource set index determination in the initial UL BWP shared with non-RedCap UEs. |
| FUTUREWEI | 2 | Ok to discuss |
| CMCC | 2 | Ok to discuss. |
| Nokia, NSB | 2 |  |
| Ericsson | 2 |  |
| NEC | 2 |  |
| OPPO | 2 |  |
| Huawei, HiSilicon | 3 | It is natural to be clarified. |
| FL2 | Based on received responses, the following proposal can be considered.  **Medium Priority Proposal 2.4-1a:**   * **Agree the draft CR for 38.213 clause 17.1 in** [**R1-2207000**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207000.zip) **in principle.**   + **Also update the the RRC parameter name *pucch-ResourceConfig-RedCap* to *additionalPRBOffset* in 38.213.** * **Discuss whether to send an LS to RAN2 to clarify that *pucch-ResourceCommon-RedCap-r17* is always provided in a RedCap-specific initial UL BWP and to ask RAN2 to clarify this in 38.331 as proposed in** [**R1-2207494**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207494.zip)**.** | |
| FL3 | The proposal was discussed in an online session on Tuesday 23rd August.  **Medium Priority Question 2.4-1b: Companies are invited to comment further on the following proposal and propose potential resolutions in the Comments field.**   * **Agree the draft CR for 38.213 clause 17.1 in** [**R1-2207000**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207000.zip) **in principle.**   + **Also update the the RRC parameter name *pucch-ResourceConfig-RedCap* to *additionalPRBOffset* in 38.213.** * **Discuss whether to send an LS to RAN2 to clarify that *pucch-ResourceCommon-RedCap-r17* is always provided in a RedCap-specific initial UL BWP and to ask RAN2 to clarify this in 38.331 as proposed in** [**R1-2207494**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207494.zip)**.** | |
| Qualcomm | Y | |

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).**

|  |  |  |
| --- | --- | --- |
| **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*. |
| CATT | 2 | Agree with Spreadtrum and vivo. We are open to make it more clear, but just to remind that, RAN2 already made the following definition for *nonCellDefiningSSB-r17* in 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,…). 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. | |
| ZTE, Sanechips | 3 | NCD-SSB related issues need to be addressed together.  If only *ssb-PositionsInBurst* is used in the spec, there is no need to differentiate the CD-SSB and NCD-SSB, since RRC specific SSB and cell specific SSB can all refer to the *ssb-PositionsInBurst*. However, if we need to differentiate the SSB types or symbols from different SSB type, the SIB indication or cell specific indication or RRC indication needs to be differentiated. |
| Sharp | 3 | Agree with Intel. The *ssb-PositionsInBurst* in SIB1 cannot cover the NCD-SSB considering different time offsets. |
| Samsung | 2 | Might need some clarification. It seems companies have different understanding. |
| CMCC | 2 | This issue can be clarified, and how to capture this can be discussed, e.g.by separate clarification in the TS or modify each related section. |
| Nokia, NSB | 2 | Agree with ZTE, all related NCD-SSB issues should be discussed together. |
| Ericsson | 2 |  |
| NEC | 2 | Agree with Spreadtrum. We prefer a TP into 17.1, if needed. Qualcomm’s TP seems OK. |
| OPPO | 2 | We also think NCD-SSB issue to be treated together. |
| Huawei, HiSilicon | 3 | The issue is straightforward but the change can be simpler if made in RAN2 RRC. |
| FL2 | Based on received responses, the following proposal can be considered.  **Medium Priority Proposal 2.5-1a: For the relation between PUSCH and NCD-SSB for RedCap UEs, agree the TP for 38.213 clause 17.1 in** [**R1-2207274**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207274.zip)**.** | |
| FL3 | The proposal was discussed in an online session on Tuesday 23rd August.  **Medium Priority Question 2.5-1b: Companies are invited to comment further on the following proposal and propose potential resolutions in the Comments field.**   * **For the relation between PUSCH and NCD-SSB for RedCap UEs, agree the TP for 38.213 clause 17.1 in** [**R1-2207274**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207274.zip)**.** | |
| Qualcomm | We support this TP in principle, but UL transmission include not only PUSCH, but also PRACH, PUCCH and SRS. Therefore, DL/UL collision handling in TDD should cover UL slots/symbols indicated by *tdd-UL-DL-ConfigurationCommon* and *tdd-UL-DL-ConfigurationDedicated*.  Another non-trivial issue related to collision handling procedure of RedCap UE is the RO validation in RRC connected state, when a RedCap UE is configured with NCD-SSB and PRACH resources in RRC-configured UL and DL BWP, respectively. It is important to clarify which SSB is to be used for RO validation. Basically, a RedCap UE should not consider both CD-SSB and NCD-SSB for RO validation, if a non-zero time offset exists.  Therefore, we propose to revise the TP for Clause 17.1 of 38.213 as follows:   * Procedures for a RedCap UE are same as described for a UE in all other clauses of this document unless stated otherwise. 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. * For unpaired spectrum, a RedCap UE does not expect the set of symbols indicated as uplink by *tdd-UL-DL-ConfigurationCommon* and *tdd-UL-DL-ConfigurationDedicated* to overlap with the set of symbols indicated presence of SS/PBCH blocks by *NonCellDefiningSSB* within an active DL BWP*.* * For unpaired spectrum, if a RedCap UE is configured with PRACH resources in an active UL BWP, which are associated with SS/PBCH blocks indicated by *NonCellDefiningSSB* in an active DL BWP, a valid PRACH occasion for RedCap UE does not precede a SS/PBCH block indicated by *NonCellDefiningSSB* in the PRACH slot and starts at least *Ngap* symbols after a last SS/PBCH block symbol indicated by *NonCellDefiningSSB*, where *Ngap* is provided in Clause 8.1 of TS 38.213. | |

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).**

|  |  |  |
| --- | --- | --- |
| **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 |
| CATT | 1 | Same as 2.5-1, is the following definition in 331 already enough?   |  | | --- | | 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. | |
| ZTE, Sanechips |  | It can be discussed together with Question 2.5-1. |
| Sharp | 3 | Share same view with vivo. |
| Samsung | 1 | Agree with CATT |
| CMCC | 2 | This issue can be discussed. |
| Nokia, NSB | 2 |  |
| Ericsson | 2 |  |
| NEC | 2 | Prefer to handle this together with FL1 question 2.5-1. |
| OPPO | 1 |  |
| Huawei, HiSilicon | 3 | The statement is natural while we think there may be no need to further clarify since we do not expect different UE behavior. |
| FL2 | Based on received responses, the following proposal can be considered, where the TP is from [[16](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206442.zip) (issue 2)].  **Medium Priority Proposal 2.6-1a: For the PDSCH resource mapping around NCD-SSB for RedCap UEs, consider adopting the following TP either for 38.213 clause 17.1 (‘RedCap UE procedures’) or 38.214 clause 5.1.4 (‘PDSCH resource mapping’).**   |  | | --- | | For the case of reduced capability UE configured with *NonCellDefiningSSB*, when receiving the PDSCH, the UE assumes SS/PBCH block transmission according to *NonCellDefiningSSB*, and if the PDSCH resource allocation overlaps with PRBs containing SS/PBCH block transmission resources the UE shall assume that the PRBs containing SS/PBCH block transmission resources are not available for PDSCH in the OFDM symbols where SS/PBCH block is transmitted. | | |
| FL3 | The proposal was discussed in an online session on Tuesday 23rd August.  **Medium Priority Question 2.6-1b: Companies are invited to comment further on the following proposal and propose potential resolutions in the Comments field.**   * **For the PDSCH resource mapping around NCD-SSB for RedCap UEs, consider adopting the following TP either for 38.213 clause 17.1 (‘RedCap UE procedures’) or 38.214 clause 5.1.4 (‘PDSCH resource mapping’).**  |  | | --- | | For the case of reduced capability UE configured with *NonCellDefiningSSB*, when receiving the PDSCH, the UE assumes SS/PBCH block transmission according to *NonCellDefiningSSB*, and if the PDSCH resource allocation overlaps with PRBs containing SS/PBCH block transmission resources the UE shall assume that the PRBs containing SS/PBCH block transmission resources are not available for PDSCH in the OFDM symbols where SS/PBCH block is transmitted. | | |
| Qualcomm | Y | |

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).

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.

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

|  |  |  |
| --- | --- | --- |
| **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 |
| CATT | 1 | Same as 2.5-1. Let’s see whether the definition of *nonCellDefiningSSB-r17* in 331 is already enough. |
| ZTE, Sanechips | 3 | NCD-SSB related correction for adding *NonCellDefiningSSB* can be discussed together. |
| Sharp | 3 | Share same view with vivo. |
| Samsung | 1 |  |
| CMCC | 2 | This issue needs to be discussed. |
| Nokia, NSB | 2 |  |
| Ericsson | 2 |  |
| NEC | 2 | Prefer to handle this together with FL1 question 2.5-1. |
| OPPO | 2 |  |
| FL2 | Based on received responses, the following proposal can be considered, where the TP is from [[16](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206442.zip) (issue 4)].  **Medium Priority Proposal 2.7-1a: For the relation between PDCCH and NCD-SSB for RedCap UEs, consider adopting the following TP either for 38.213 clause 17.1 (‘RedCap UE procedures’) or 38.214 clause 10 (‘UE procedure for receiving control information’).**   |  | | --- | | For monitoring of a PDCCH candidate by a reduced capability UE configured with *NonCellDefiningSSB*, if the UE  - does not monitor PDCCH candidates in a Type0-PDCCH CSS set, and  - at least one RE for a PDCCH candidate overlaps with at least one RE of a candidate SS/PBCH block corresponding to a SS/PBCH block index provided by *NonCellDefiningSSB*,  the UE is not required to monitor the PDCCH candidate. | | |
| FL3 | The proposal was discussed in an online session on Tuesday 23rd August.  **Medium Priority Question 2.7-1b: Companies are invited to comment further on the following proposal and propose potential resolutions in the Comments field.**   * **For the relation between PDCCH and NCD-SSB for RedCap UEs, consider adopting the following TP either for 38.213 clause 17.1 (‘RedCap UE procedures’) or 38.214 clause 10 (‘UE procedure for receiving control information’).**  |  | | --- | | For monitoring of a PDCCH candidate by a reduced capability UE configured with *NonCellDefiningSSB*, if the UE  - does not monitor PDCCH candidates in a Type0-PDCCH CSS set, and  - at least one RE for a PDCCH candidate overlaps with at least one RE of a candidate SS/PBCH block corresponding to a SS/PBCH block index provided by *NonCellDefiningSSB*,  the UE is not required to monitor the PDCCH candidate. | | |
| Qualcomm | We are fine with the TP for PDCCH validation.  Besides, it is necessary to clarify that a RedCap UE will NOT perform extra validation for NCD-SSB and PRACH occasion (configured by RRC) in TDD operation. To this end, we suggest the following TPs for Clause 17.1 of TS 38.213:   * For unpaired spectrum, a RedCap UE does not expect the set of symbols indicated as uplink by *tdd-UL-DL-ConfigurationCommon* and *tdd-UL-DL-ConfigurationDedicated* to overlap with the set of symbols indicated presence of SS/PBCH blocks by *NonCellDefiningSSB* within an active DL BWP*.* * For unpaired spectrum, if a RedCap UE is configured with PRACH resources in an active UL BWP, which are associated with SS/PBCH blocks indicated by *NonCellDefiningSSB* in an active DL BWP, a valid PRACH occasion for RedCap UE does not precede a SS/PBCH block indicated by *NonCellDefiningSSB* in the PRACH slot and starts at least *Ngap* symbols after a last SS/PBCH block symbol indicated by *NonCellDefiningSSB*, where *Ngap* is provided in Clause 8.1 of TS 38.213. | |

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).**

|  |  |  |
| --- | --- | --- |
| **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 |  |
| CATT | 1 |  |
| ZTE, Sanechips | 1 | No need to be discussed. Initial UL BWP can refer to both *initialUplinkBWP* or *initialUplinkBWP-RedCap* |
| Sharp | 1 | Agree with Nordic. There should be no ambiguity on the initial UL BWP definition for RedCap Ues. As clarified in 38.331, if *initialUplinkBWP-RedCap* is present, RedCap Ues use the UL BWP instead of *initialUplinkBWP*. |
| Samsung | 1 |  |
| CMCC | 1 |  |
| Nokia, NSB | 1 |  |
| Ericsson | 1 |  |
| NEC | 1 |  |
| OPPO | 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. |
| CATT | 1 |  |
| ZTE, Sanechips | 1 | It is up to UE implementation in different cases, no need to discuss it again. |
| Samsung | 2 | Open to have some clarification. |
| FUTUREWEI | 1 | This aspect was discussed earlier in the WI |
| CMCC | 1 | Share similar view as vivo. |
| Nokia, NSB | 1 | Share similar view as vivo. |
| Ericsson | 2 |  |
| OPPO | 1 |  |
| Huawei. HiSilicon |  | We think the current specification is even less requiring any timeline for UE. |

# 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 |  |
| CATT | 3 |  |
| ZTE | 3 |  |
| Sharp | 3 |  |
| Samsung | 3 |  |
| CMCC | 3 |  |
| Nokia, NSB | 3 |  |
| Ericsson | 3 |  |
| OPPO | 3 |  |
| FL2 | Based on received responses, the following proposal can be considered.  **High Priority Proposal 3.1-1a:**   * **Agree the draft 38.214 CR on PUSCH repetition type A for HD-UE in** [**R1-2207272**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207272.zip) **in principle.** * **Agree the draft 38.214 CR on PUSCH repetition type B for HD-UE in** [**R1-2207273**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207273.zip) **in principle.** | |
| FL3 | The proposal was discussed in an online session on Tuesday 23rd August.  **High Priority Question 3.1-1b: Companies are invited to comment further on the following proposal and propose potential resolutions in the Comments field.**   * **Agree the draft 38.214 CR on PUSCH repetition type A for HD-UE in** [**R1-2207272**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207272.zip) **in principle.** * **Agree the draft 38.214 CR on PUSCH repetition type B for HD-UE in** [**R1-2207273**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207273.zip) **in principle.** | |
| Qualcomm | Y | |

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 |  |
| CATT | 1 | In R17 CE topic, it is agreed that for Msg3 repetition in HD-FDD, the available slot *determination* is the same as FD-FDD. Msg3 repetition in available slots will be *dropped* due to SSB collision (decision made in RedCap topic). This makes Msg3 repetition different from other PUSCH repetition. Current spec should be correct. |
| ZTE | 1 |  |
| Sharp | 1 | We do not see the inconsistence given that 38.214 just describes the consecutive slots are applied to for slot determination, not about the actual transmission. |
| Samsung | 1 | Share a view from other companies that available slot determination and transmission itself are separately specified. |
| CMCC | 1 | Share similar view with CATT. |
| Nokia, NSB | 1 |  |
| Ericsson | 1 |  |
| OPPO | 3 | That is not only inconsistent issue as CATT mention. We would like to let companies consider the situation that gNB have to unnecessarily try to blind detect HD-FDD UE as this will not be earlier identified through PRACH.  FD-FDD UE: Transmit all N\*K slots for msg3 PUSCH.  HD-FDD UE: Drop some of SSB overlapped slot among N\*K.  gNB supporting HD-FDD should at least try to decoded based on 2 different assumptions of actually transmitted slot.  This dropping is unnecessarily applied to RAR msg3 PUSCH of HD-FDD UE. When it msg3 transmission, it doesn’t need to measure SSB. We don’t think the earlier agreement intended for msg3. |

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. |
| CATT | 1 | This seems technically right since we did not agree to always use UE capability 1 to determine the available/invalid slot or symbols. Having said this, we also feel that RedCap UE is unlikely to support capability 2, especially for a HD-FDD UE. |
| ZTE | 2 | If UE processing capability 2 is supported for RedCap UE, the CR is necessary. If UE processing capability 2 is not supported, then as mentioned by other companies, there is no need to have this kind of correction. Therefore, we may need to determine whether UE processing capability 2 is supported for RedCap firstly. |
| Samsung | 1 | Seems not essential. |
| CMCC | 1 | Share the same view as above companies. If the common understanding is no support of UE processing capability 2, a clarification can be made, then no need for such modification. |
| Nokia, NSB | 1 | Similar view as ZTE. |
| Ericsson | 1 |  |
| OPPO | 1 |  |

# 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 |
| CATT | 1 | Agree with FL. |
| ZTE, Sanechips | 3 | Based on current agreement for SDT and RedCap, further clarification is needed in this meeting, since SDT is supported for RedCap UE and SDT also already supports separate initial BWP for BWP, and our discussion can fascinate the discussion for SDT also. |
| Samsung | 1 | Agree with FL. |
| FUTUREWEI | 1 | Ok with FL proposal |
| CMCC | 1 | Fine with FL suggestion. |
| Nokia, NSB | 1 | Agree with FL. |
| Ericsson | 1 | Agree with FL. |
| NEC | 1 | Agree with FL. |
| OPPO | 1 |  |
| Huawei, HiSilicon | 3 | The issue is also raised in SDT from our side. We are fine to discuss it either side but prefer not to delay further. |

# 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. |
| CATT | 1 | Agree with vivo and Intel. |
| ZTE, Sanechips | 1 | Better to wait for the current discussion of BWP operation without restriction, and then consider whether we need to modify the corresponding conclusion or just reuse it. |
| CMCC | 1 | Better to leave it to RAN4. |
| Nokia, NSB | 1 | Agree with Vivo. |
| Ericsson | 1 |  |
| OPPO | 1 |  |
| Huawei, HiSilicon | 1 | Better to wait for real RAN4 LS not potential LS. |

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 LS response on NCD-SSB time offset parameter

RAN1 and RAN4 have received an LS from RAN2 in [[46](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2205734.zip)] with the following overall description and actions:

|  |  |
| --- | --- |
| **1. Overall Description:**  RAN2 would like to thank RAN1 and RAN4 for their reply LS on introduction of an offset to transmit CD-SSB and NCD-SSB at different times. RAN2 agreed to specify the offset with the following value range {sf5, sf10, sf15, spare5, spare4, spare3, spare2, spare1} and the definition below:   |  | | --- | | ***ssb-TimeOffset***  The time offset between CD-SSB of the serving cell and this Non-Cell Defining SSB. Value sf5 means the first burst of Non-Cell Defining SSB is transmitted 5ms later than the first burst of CD-SSB transmitted after the first symbol of SFN=0 of the serving cell, value sf10 means the first burst of Non-Cell Defining SSB is transmitted 10ms later than the first burst of CD-SSB transmitted after the first symbol in SFN=0 of the serving cell, and so on. If the field is absent, RedCap UE considers that the time offset between the first burst of CD-SSB transmitted in the serving cell and the first burst of this Non-Cell Defining SSB transmitted is zero. |   RAN2 would like to ask RAN1 and RAN4 to take the above into consideration and provide feedback on the values, i.e., confirm and/or indicate whether additional values are needed.  **2. Actions:**  **To RAN1 and RAN4**  **ACTION:** RAN2 kindly asks RAN1 and RAN4 to take the above into consideration and provide feedback on the values, i.e., confirm and/or indicate whether additional values are needed. |

Contribution [[47](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2205761.zip)] proposes to add values {sf20, sf40, sf60}, whereas contribution [[51](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206704.zip)] questions the necessity of value sf15, and contributions [[48](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206415.zip), [49](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206441.zip), [50](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206483.zip), [52](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207044.zip), [53](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207614.zip)] express that the current values {sf5, sf10, sf15} are sufficient from RAN1 perspective.

The ongoing RAN4 meeting has already made the following agreement:

* For NCD-SSB time offset, add the additional MGRP values of 20ms and 40ms, and further discuss whether and what other values are needed.

**FL2 High Priority Proposal 6-1: Reply to RAN2 that the current NCD-SSB time offset values {sf5, sf10, sf15} are sufficient from RAN1 perspective.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Y/N** | **Comments** |
| FL3 | RAN1 made the following agreement on Tuesday 23rd August:  Agreement:  RAN1 understands RAN4 has defined 20 and 40 ms periodicity, and RAN1 think that the NCD-SSB time offset values {sf5, sf10, sf15} are sufficient from RAN1 perspective, and {sf20, sf40} are also feasible.  **High Priority Proposal 6-1a: Agree the draft LS in** [**RedCapDraftLs-v000.docx**](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_110/Inbox/drafts/8.6(NR_redcap)/LS/RedCapDraftLs-v000.docx)**.** | |
| Qualcomm |  | In the LS to RAN2, it is important to include *zero time offset* between CD-SSB and NCD-SSB as a feasible option. |
|  |  |  |

# 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 |
| [54] | [R1-2207727](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2207727.zip) | FL summary #1 for Rel-17 RedCap maintenance | Moderator (Ericsson) |