3GPP TSG-RAN WG1 Meeting #109-e R1-22xxxxx

e-Meeting, 9th – 20th May 2022

**Agenda Item: 8.6**

**Title: FL summary for preparatory phase for Rel-17 RedCap maintenance**

**Source: Moderator (Ericsson)**

**Document for: Discussion, Decision**

# Introduction

This feature lead (FL) summary (FLS) concerns the Rel-17 work item (WI) for support of reduced capability (RedCap) NR devices [1]. Earlier RAN1 agreements for this WI are summarized in [2], which also includes links to earlier FLSs.

This document summarizes contributions [3] – [32] submitted to agenda item 8.6 and captures the preparatory email discussion for Rel-17 RedCap maintenance:

|  |
| --- |
| [109-e-Prep-AI8.6 Rel-17 RedCap] Preparation phase for Rel-17 RedCap maintenance – Johan (Ericsson)   * Final check point: Friday 29th April 23:59 UTC |

The issues in this document are tagged and color coded with High Priority or Medium Priority. The issues that are in the focus of this round of the discussion are furthermore tagged FL1.

Follow the naming convention in this example:

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

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

* Assume CompanyC wants to update *RedCapPrepFLS-v002-CompanyA-CompanyB.docx*.
* CompanyC uploads an empty file named *RedCapPrepFLS-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 *RedCapPrepFLS-v003-CompanyB-CompanyC.docx*
* If no update is uploaded in 30 minutes, other companies can ignore the checkout file.
* Note that the file timestamps on the server are in UTC time.

In file names, please use the hyphen character (not the underline character) and include ‘v’ in front of the version number, as in the examples above and in line with the general recommendation (see slide 16 in [R1-2203012](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2203012.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 1-1a: Please consider entering contact info below for the points of contact for this email discussion.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Point of contact** | **Email address** |
| vivo | Xueming Pan | panxueming@vivo.com |
| Qualcomm | Jing Lei | leijing@qti.qualcomm.com |
| Nordic | Karol Schober | karol.schober@nordicsemi.no |
| Xiaomi | Qin MU | muqin@xiaomi.com |
| Spreadtrum | Huayu Zhou | huayu.zhou@unisoc.com |
| NTT DOCOMO | Mayuko Okano | mayuko.okano.ca@nttdocomo.com |
| Sharp | Liqing Liu | liu.liqing@sharp.co.jp |
| ZTE | Youjun Hu | hu.youjun1@zte.com.cn |
| Lenovo | Yuantao Zhang | zhangyt18@lenovo.com |

# UE bandwidth reduction

The following UE bandwidth reduction related issues are brought up in the contributions submitted to agenda item 8.6:

1. Clarification of case when initial DL BWP is wider than maximum UE bandwidth [3, 4, 5, 7, 8, 9, 14, 16, 18, 20, 22, 23, 24, 25, 27, 28, 29, 32]
2. SSB presence in separate initial DL BWP in connected mode for BWP configuration option 1 [5, 7, 8, 9, 11, 14, 16, 18, 20, 22, 23, 24, 25, 27, 28, 29, 32]
3. Corrections for BWP operation description in 38.213 clause 17.1 [5, 7, 9, 18, 22, 26, 28]
4. Center frequency alignment for TDD [4, 11, 22, 25, 29]
5. RIV for Msg3 frequency resource allocation [4]
6. Collision handling between SSB and Msg2/Msg4/Type1-CCS [11]
7. Paging/Msg2/Msg4 configuration in shared initial DL BWP [12]
8. Collision handling between SIB and other PDSCH [13]
9. Maximum number of separate initial DL BWPs and determination of default DL BWP [15]
10. Ask RAN2 to capture paging monitoring in idle/inactive/connected mode [28]
11. Clarifications of interaction between RedCap and SDT features [31]
12. Collision handling between NCD-SSB and PDSCH/PDCCH [9]

**FL1 High Priority Question 2-1a: Which ones of the issues listed above should be treated in this meeting?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Issues to treat in this meeting** | **Comments** |
| vivo | 1, 2, 3, 12 | In addition, we have raised the issue about PDSCH and PDCCH impact due to overlapping with NCD-SSB in [9] |
| FL | To address Vivo’s comment above, I have added issue #12 in the list above. I missed including it originally because I thought Proposals 5 and 6 were related to Proposal 4 (in [9]), sorry about that. | |
| Qualcomm | 1, 2, 3, 9, 12 |  |
| Intel | 1, 2, 3, [4] (see comments), 12 | We suggest moving [29] to under issue #3 from issue #4 as the proposal on center frequency alignment is essentially a correction to Subclause 7.1 of 38.213 (to capture existing RAN1 agreement) and not a new discussion topic. |
| Nordic | 2,3,5, 10  1+4 could be discussed together | Regarding 1 + 4  Option 1: RAN1 agrees that “valid” initial DL BWP is always configured for RedCap UE in SIB1  Option 2: Follow RAN2 that CORESET#0 can be used until MSG4, at the same time CORESET#0 shall be within BW of initial UL BWP.  Regarding 6 + 12: Current RAN1 specification does not make difference between SSBs in our opiniom, in fact ssb-PositionInBurst from CD SSB applies to NCD SSB. However, if some alignment with RAN2 RRC is deemed needed, we are open. At the same time if SSB is outside of active BWP, it cannot collide with anything.   |  |  | | --- | --- | | NonCellDefiningSSB-r17 ::= | SEQUENCE { | | absoluteFrequencySSB-r17 ARFCN-ValueNR, |  | | ssb-Periodicity | ENUMERATED { ms5, ms10, ms20, ms40, ms80, ms160, spare2, spare1 } | OPTIONAL, | -- Need S |   -- FFS whether additional properties may differ from the CD-SSB, e.g. time offset. If so, add them here. ... }  For other issues we do not see them being essential |
| Xiaomi | 1,2,3,4,9 |  |
| Spreadtrum | 1,2,3,[4] | It seems companies have differnet understandings on center frequency alignment b/w DL/UL for issue 1, although issue 1 is originated from signaling overhead reduction. Some companies also mentioned in the contributions that we can keep the spec as it is without any optimization of signaling overhed reduction (seems marginal), but we should clarify the center frequency alignment b/w DL/UL.  Or, only issue 3 needs the clarification of center frequency alignment b/w DL/UL.  Anyway, issue 4 can be discussed in issue 1. |
| DOCOMO | 1,2,3,4 |  |
| CATT | 1,2,3 |  |
| Sharp | 1,2,3,12 | For issues 6 and 7, they have been discussed in previous meetings and no consensus was reached. In addition, issue 7 would get involved in a new parameter, which should be avoided in the maintenance phase.  For issue 8, it seems an optimization for complexity reduction.  For issue 9, in our understanding, there is one separate initial DL BWP to be configured. A same separate initial DL BWP is used for RACH and paging if CSS for paging is configured in the separate initial DL BWP configuration. |
| ZTE, Sanechips | 1, 2 | Issue 1 and issue 2 should be treated with high priority. And issue4 is related to issue 1 discussion.  Issue 6 and 12 are similar, and they can be treated together with med priority.  Issue 3, 5, 7, 8 can be treated with med priority. |
| Lenovo | 1,2,3,4 | Issue 1/2/3/4 are “inherited” issues and need to be treated with high priority. |

# Half-duplex FDD operation

The following HD-FDD related issues are brought up in the contributions submitted to agenda item 8.6:

1. Collision handling between SSB and RACH related transmissions [5, 8, 10, 12, 16, 18, 21, 22, 25, 28, 30, 32]
2. Available slot/symbol determination for PUCCH and PUSCH [10, 16, 18, 26, 30]
3. PRACH occasion determination [4]
4. Available slot determination for Msg3 repetition [17]
5. Collision handling between SSB and PUSCH repetition [17]
6. Collision handling between NCD-SSB and UL transmission [30]

**FL1 High Priority Question 3-1a: Which ones of the issues listed above should be treated in this meeting?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Issues to treat in this meeting** | **Comments** |
| vivo | 1, 2, 6 |  |
| Qualcomm | 1, 6 |  |
| Intel | 1, 2, 6 | We would like to clarify both PUSCH repetition Type A and B are covered by issue #2. Particularly, our understanding is that #2 is to clarify the invalid symbol determination for PUSCH repetition Type B |
| Nordic | 1,2 | not needed as in sub-clause 8.1 says “For paired spectrum or supplementary uplink band all PRACH occasions are valid.”and 5 should be handled by CovEnh AI? Regarding 6: We do not see need for different handling of NCD compared to CD SSB. There is no differentiation in spec between CD and NCD SSB, thus by default both are treated the same way regarding all potential collisions, rate-matching ….. |
| Xiaomi | 1,2 |  |
| Spreadtrum | 1, 2, [6] | It seems that issue 4/5 can be included in issue 2? |
| DOCOMO | 1,2 |  |
| CATT | 1,6 |  |
| Sharp | 1,2,6 | For Issue 4, in our view, there is no consistence between 213 and 214. 214 describes the available slots determination for Msg3 PUSCH repetition, while 213 describes whether to drop a transmission in an available slot if collision happens.  For Issue 5, the relevant issue had been captured as issue 7 in Moderator summary of AI 8.8. AI 8.8.1 is a better place to discuss the issue related to *AvailableSlotCounting*. |
| ZTE, Sanechips | 1, 2 | Issue 1 and 2 are remaining issues which can be treated with high priority.  Issue 3,4,5,6 can be treated with med priority. |
| Lenovo | 1,2 |  |

# Other issues

The following other issues are brought up in the contributions submitted to agenda item 8.6.:

1. LS on introduction of an offset to transmit CD-SSB and NCD-SSB at different times [3, 4, 9, 27, 29]
   * The LS and contributions related to the LS are submitted under agenda item 5.
   * Draft recommendation: Await the outcome of the preparatory email discussion for agenda item 5.
2. Draft WI summary [6]
   * A draft WI summary has been submitted by the WI rapporteur for information/discussion.
   * Draft recommendation: No email discussion. Comments can be emailed directly to the WI rapporteur.
3. PRACH transmission timeline [9, 19]
   * The contributions argue that there is no need for a RAN1 specification update due to the RAN2 agreement regarding RSRP measurement before Msg1/MsgA retransmission.
   * Draft recommendation: No email discussion. There is no specification update to discuss.
4. Cell barring for 1-Rx and 2-Rx UEs [31]
   * The contribution proposes that it should be an invalid case for gNB to bar 2-Rx UEs but not 1-Rx UEs.
   * Draft recommendation: No email discussion. This seems like something that RAN2 can decide.

**FL1 High Priority Question 4-1a: Do you agree with the draft recommendations listed above?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Y/N** | **Comments** |
| vivo | Y |  |
| Qualcomm | No for 1 at this meeting  Yes for 2, 3 and 4 | We don’t think it is necessary for RAN1 to discuss the RAN2 LS on introducing a time offset between CD-SS and NCD-SSB for the following reasons:   1. The intention of the RAN2 LS is unclear to RAN1  * If the RAN2 LS is a late reply to the RAN1 LS on NCD-SSB configurations (R1-210600), RAN2 should state it clearly in their LS. * Otherwise, RAN2 should explain their motivations to introduce such an offset, and why it is necessary to trigger the RAN1 discussion.  1. Given the limited RAN1 Tus assigned to R17 maintenance and the very limited responses to the RAN2 LS, we believe RAN1 should focus on solving remaining issues with higher priority, such as UE complexity reduction and UE features for R17 RedCap. 2. Since the RAN2 LS was sent to RAN4 as well, RAN1 can wait for the discussion/decision of RAN4, as well as RAN2’s clarification for their intention. |
| Intel | Y |  |
| Nordic | Y, but | Share view with QC that having additional offset for SSB is not essential for the feature to operate. LS reply should have low priority in RAN1. |
| Xiaomi | Y for 2,3,4 | Similar view with QC. In our view, the issues in 1 is not essential in RAN1. |
| DOCOMO | Y for 2,4 | For the 1st point, we share the same view with QC.  For the 3rd point, the discussion can be deferred until the discussion related to the Rel-15/16 CR (R1-2203498, Timeline requirement for re-transmission of MSG1 and MSGA) is concluded. |
| CATT | Y |  |
| Sharp | Y | Agree with Moderator’s recommendation. |
| ZTE, Sanechips | Y |  |
| Lenovo | Y |  |

# 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] | [R1-2202535](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_108-e/Docs/R1-2202535.zip) | RAN1 agreements for Rel-17 NR RedCap | Rapporteur (Ericsson) |
| [3] | [R1-2203053](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2203053.zip) | Remaining aspects of Bandwidth Reduction for RedCap UEs | FUTUREWEI |
| [4] | [R1-2203109](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2203109.zip) | Remaining issues on UE complexity reduction | Huawei, HiSilicon |
| [5] | [R1-2203114](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2203114.zip) | Maintenance issues for UE complexity reduction for RedCap | Ericsson |
| [6] | [R1-2203115](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2203115.zip) | Draft summary of WI on support of reduced capability (RedCap) NR devices | Ericsson |
| [7] | [R1-2203307](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2203307.zip) | Remaining issues on aspects related to reduced maximum UE bandwidth | Spreadtrum Communications |
| [8] | [R1-2203438](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2203438.zip) | Remaining issues on RedCap UE complexity reduction in Rel-17 | CATT |
| [9] | [R1-2203517](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2203517.zip) | Remaining issues on reduced maximum UE bandwidth | vivo, Guangdong Genius |
| [10] | [R1-2203518](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2203518.zip) | Remaining issues on RedCap half-duplex operation | vivo, Guangdong Genius |
| [11] | [R1-2203593](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2203593.zip) | Discussion on UE complexity reduction for Rel-17 Redcap UE | ZTE, Sanechips |
| [12] | [R1-2203594](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2203594.zip) | Remaining aspects for Rel-17 RedCap UE | ZTE, Sanechips |
| [13] | [R1-2203762](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2203762.zip) | SIB reception for RedCap UE | Panasonic |
| [14] | [R1-2203787](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2203787.zip) | Discussion on the remaining issues of complexity reduction | xiaomi |
| [15] | [R1-2203788](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2203788.zip) | Discussion on the other aspects for R17 RedCap | xiaomi |
| [16] | [R1-2203866](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2203866.zip) | Remaining issues on UE complexity reduction | Samsung |
| [17] | [R1-2203992](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2203992.zip) | Other remaining issues for Reduced Capability NR Devices | OPPO |
| [18] | [R1-2204036](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2204036.zip) | Remaining Issues in UE Complexity Reduction | Nokia, Nokia Shanghai Bell |
| [19] | [R1-2204037](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2204037.zip) | Other Remaining Issues in RedCap Support | Nokia, Nokia Shanghai Bell |
| [20] | [R1-2204208](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2204208.zip) | Reduced maximum UE bandwidth for Redcap | Apple |
| [21] | [R1-2204209](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2204209.zip) | On other UE complexity reduction aspects of RedCap | Apple |
| [22] | [R1-2204277](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2204277.zip) | Remaining issues on UE complexity reduction | CMCC |
| [23] | [R1-2204347](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2204347.zip) | Maintenance on complexity reduction for RedCap | NTT DOCOMO, INC. |
| [24] | [R1-2204435](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2204435.zip) | Remaining details on BWP operation for RedCap | NEC |
| [25] | [R1-2204619](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2204619.zip) | Remaining aspects of UE complexity reduction for RedCap | LG Electronics |
| [26] | [R1-2204663](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2204663.zip) | Remaining issues on UE complexity reduction for RedCap NR devices | Sharp |
| [27] | [R1-2204711](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2204711.zip) | On RedCap UE complexity reduction | MediaTek Inc. |
| [28] | [R1-2204744](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2204744.zip) | On remaining aspects related to reduced maximum UE BW | Nordic Semiconductor ASA |
| [29] | [R1-2204771](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2204771.zip) | Remaining details on UE complexity reduction for Rel-17 RedCap | Intel Corporation |
| [30] | [R1-2204772](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2204772.zip) | Remaining details on support of HD-FDD for Rel-17 RedCap | Intel Corporation |
| [31] | [R1-2204906](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2204906.zip) | Remaining issues on RAN2 related issues | Huawei, HiSilicon |
| [32] | [R1-2204987](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2204987.zip) | Remaining Issues on UE Complexity Reduction | Qualcomm Incorporated |