3GPP TSG-RAN WG1 Meeting #108-e R1-22xxxxx

e-Meeting, February 21st – March 3rd 2022

**Agenda Item: 8.6.1.2**

**Title: FL summary #1 on other aspects of UE complexity reduction for RedCap**

**Source: Moderator (Qualcomm Inc.)**

**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].

This document summarizes contributions [3] – [19] submitted to agenda item 8.6.1.2 and relevant parts of contribution [20] submitted to other agenda items and captures this email discussion on other aspects of UE complexity reduction for RedCap:

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| [108-e-R17-RedCap-02] Email discussion for maintenance on other aspects of UE complexity reduction – Chao (Qualcomm)   * 1st check point: February 25 * Final check point: March 3 |

# HD-FDD

## Issue #1: SSB overlapping with semi-statically configured UL

For collision handling between SSB and semi-statically configured UL transmission, it is noted in contributions [13, 14] that the current specification in clause 17.2 of TS 38.213 only covers the non-overlapping case of “back-to-back” without sufficient gap, and the collision handling for the overlapping case is missing. The following TP is proposed in [13, 14] to implement the agreement for the overlapping case.

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| ===================== Unchanged parts are omitted=====================  If a HD-UE would transmit a PUSCH, or PUCCH, or PRACH, or SRS ~~based on a detected DCI format~~ and the HD-UE is indicated presence of SS/PBCH blocks by *ssb-PositionsInBurst* in *SIB1* or in *ServingCellConfigCommon* in a set of symbols, the HD-UE does not transmit PUSCH or PUCCH or PRACH if a transmission would overlap with any symbol from the set of symbols and the HD-UE does not transmit SRS in the set of symbols.  ===================== Unchanged parts are omitted ===================== |

**FL1 High Priority Proposal 2.1-1**

* Endorse the above text proposal to TS 38.213, clause 17.2

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| **Company** | **Y/N** | **Comments** |
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## Issue #2: Collision handling between SSB and Msg3 (re)transmission and PUCCH for Msg4/MsgB

For Case 5 of SSB overlapping with UL transmission, the remaining issue is how to handle the collision between SSB and Msg3 (re)transmission and PUCCH for Msg4/MsgB. The following FL proposal was discussed in the last RAN1 meeting but no consensus was achieved.

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| **Updated FL3 High Priority Proposal 5.1-1:**   * For Case 5 of SSB overlapping with Msg3 (re)transmission ~~and~~ or PUCCH for Msg4, reuse the existing collision handling principles of Rel-15/16 for NR TDD that SSB is prioritized over Msg3 and PUCCH for Msg4 |

Based on the received response, companies’ positions have not changed as compared to last RAN1 meeting.

* 12 companies [03, 06, 07, 08, 09, 10, 12, 13, 15, 16, 18, 19] prefer to reuse the same handling as for other dynamically scheduled UL transmission and prioritize the SSB.
* 3 companies [04, 11, 14] have a preference to prioritize Msg3 or PUCCH for Msg4/MsgB over SSB
* Contribution [06, 11, 20] propose other approach, e.g., leaving it to UE implementation for a compromise

The potential impacts on random access procedure and coexistence with legacy FDD UEs are further analysed and discussed in contributions [04, 06, 07, 09, 12, 13, 15, 16]. Companies’ views are quite divergent. It is viewed in contributions [07, 09, 12, 15, 16] that no critical issues are observed for prioritizing SSB over Msg3 or PUCCH for Msg4/MsgB. However, contribution [04] indicates that the RACH performance will be seriously degraded if Msg3 or PUCCH for Msg4/MsgB is dropped in the overlapped resources.

Since majority does not view any critical issue for prioritizing SSB over Msg3 or PUCCH for Msg4/MsgB, unified solution is desirable considering specification impact [03, 12, 16]. No optimization would be necessary in the maintenance phase while the other option (i.e., drop SSB) may have better scheduling flexibility [08]. Therefore, the moderator suggestion is to reuse the same handling as for other dynamically scheduled UL transmission. If it is not acceptable, then leaving it to UE implementation could be considered for a compromise.

**FL1 High Priority Proposal 2.2-1:**

* For Case 5 of SSB overlapping with Msg3 (re)transmission or PUCCH for Msg4/MsgB, reuse the same handling as for other dynamically scheduled UL transmission and prioritize the SSB

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| **Company** | **Y/N** | **Comments** |
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## Issue #3: Whether to support other cases of the “back-to-back” non-overlapping UL/DL without sufficient gap

In the RAN1#106b-e and 107-e meeting, the following were agreed for the “back-to-back” non-overlapping UL/DL without sufficient gap. The remaining issues is whether to allow other cases of the “back-to-back non-overlapping UL/DL without sufficient gap, e.g., between dedicated configured DL and dedicated configured UL, between dynamically scheduled DL and RRC configured UL, or between RRC configured DL and dynamically scheduled UL.

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| Agreements:   * (Working Assumption) The “back-to-back” non-overlapping UL/DL without sufficient gap between RRC configured UL and DL may happen, i.e., are allowed for HD-FDD UEs.   + RRC configured DL/UL includes at least cell specific higher layer parameters configured DL/UL   + Discuss further whether to specify a clear UE behavior, or leave it to UE implementation to ensure that the switching time is satisfied   + Note: This does not mean a HD-FDD UE is required to support the back-to-back UL/DL switching without sufficient gap   Agreement:   * For the case of the “back-to-back” non-overlapping UL/DL without sufficient gap between cell specific configured DL and cell-specific configured UL, e.g., SSB or PDCCH in CSS vs. valid RO, it is up to UE implementation to ensure that the switching time is satisfied   Agreement:   * The “back-to-back” non-overlapping UL/DL without sufficient gap between cell-specific configured DL and dedicated configured UL may happen, i.e., allowed for HD-FDD UEs   + E.g., SSB vs. CG PUSCH, PUCCH or SRS   + Configured UL transmission is cancelled (as in the overlapping case) * The “back-to-back” non-overlapping UL/DL without sufficient gap between dedicated configured DL and cell-specific configured UL may happen, i.e., allowed for HD-FDD UEs   + E.g., PDCCH in USS, SPS PDSCH, CSI-RS or DL PRS vs. valid RO   + Leave it to UE implementation to cancel either DL reception or UL transmission to ensure sufficient switching time |

In contribution [16], it is proposed that all the other cases of the “back-to-back” non-overlapping UL/DL without sufficient gap are not allowed since it is easier for gNB to avoid collision when performing dedicated configuration or dynamic scheduling. Contributions [04, 19] have a different view that the scenarios involved with dynamic DL/UL should be allowed and the corresponding collision handling principles as in the overlapping cases can be applied.

According to [21], the motivation for supporting the “back-to-back” non-overlapping UL/DL without sufficient gap is to efficiently support coexistence with FD-FDD UEs and relax network configuration restriction, there is no strong need to extend to other subcases which would be managed by proper gNB implementation. Considering no optimization would be necessary in the maintenance phase, the following FL proposal can be considered to conclude the discussion.

**FL1 Medium Priority Proposed Conclusion 2.3-1**

* All the other cases of the “back-to-back” non-overlapping UL/DL without sufficient gap are not allowed

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| **Company** | **Y/N** | **Comments** |
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## Issue #4: PRACH overlapping with dynamically scheduled PDSCH or CSI-RS

Contribution [06] indicates that the text related to PRACH for collision handling between semi-statically configured UL and dynamically scheduled PDSCH or CSI-RS should be deleted since RAN1 has agreed that whether to transmit PRACH is up to UE implementation, which is already captured in another paragraph in TS 38.213, clause 17.2.

The corresponding TP proposed by [06] is as follows.

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| ===================== Unchanged parts are omitted=====================  If a HD-UE is configured by higher layers to transmit SRS, or PUCCH, or PUSCH in a set of symbols and the UE detects a DCI format indicating to the HD-UE to receive CSI-RS or PDSCH in a subset of symbols from the set of symbols, then  - the HD-UE does not expect to cancel the transmission of the PUCCH or PUSCH in the set of symbols if the first symbol in the set occurs within relative to a last symbol of a CORESET where the HD-UE detects the DCI format; otherwise, the HD-UE cancels the PUCCH, or the PUSCH, or an actual repetition of the PUSCH [6, TS38.214], determined from clauses 9 and 9.2.5 or clause 6.1 of [6, TS38.214]~~, or the PRACH transmission in the set of symbols~~.  - the HD-UE does not expect to cancel the transmission of SRS in symbols from the subset of symbols that occur within relative to a last symbol of a CORESET where the HD-UE detects the DCI format. The HD-UE cancels the SRS transmission in remaining symbols from the subset of symbols.  is the PUSCH preparation time for UE processing capability 1 [6, TS 38.214] assuming and corresponds to the smallest SCS configuration between the SCS configuration of the PDCCH carrying the DCI format and the SCS configuration of the SRS, PUCCH, PUSCH or , where corresponds to the SCS configuration of the PRACH if it is 15 kHz or larger; otherwise .  ===================== Unchanged parts are omitted ===================== |

**FL1 High Priority Proposal 2.4-1**

* Endorse the above text proposal to TS 38.213, clause 17.2

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| **Company** | **Y/N** | **Comments** |
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## Issue #5: Partial UL cancelation

It is noted in contributions [04, 06] that the current specification in the clause 17.2 of TS 38.213 does not consider whether HD-FDD UE supports partial cancellation or not. Considering partial cancellation is an optional capability introduced in Rel-16, it can be supported by HD-FDD RedCap UE as an optional capability too. Therefore, contributions [04, 06] suggest RAN1 to reach consensus on whether HD-FDD RedCap UE can optionally support partial cancellation. The corresponding TP proposed by [06] is as follows.

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| ===================== Unchanged parts are omitted=====================  If a HD-UE is configured by higher layers to transmit SRS, or PUCCH, or PUSCH in a set of symbols and the UE detects a DCI format indicating to the HD-UE to receive CSI-RS or PDSCH in a subset of symbols from the set of symbols, then  - If the HD-UE does not indicate the capability of [partialCancellation], the HD-UE does not expect to cancel the transmission of the PUCCH or PUSCH in the set of symbols if the first symbol in the set occurs within relative to a last symbol of a CORESET where the HD-UE detects the DCI format; otherwise, the HD-UE cancels the PUCCH, or the PUSCH, or an actual repetition of the PUSCH [6, TS38.214], determined from clauses 9 and 9.2.5 or clause 6.1 of [6, TS38.214], or the PRACH transmission in the set of symbols.  - If the HD-UE indicates the capability of [partialCancellation], the HD-UE does not expect to cancel the transmission of the PUCCH or PUSCH in symbols from the set of symbols that occur within relative to a last symbol of a CORESET where the HD-UE detects the DCI format. The HD-UE cancels the PUCCH, or the PUSCH, or an actual repetition of the PUSCH [6, TS 38.214], determined from clauses 9 and 9.2.5 or clause 6.1 of [6, TS 38.214].  - the HD-UE does not expect to cancel the transmission of SRS in symbols from the subset of symbols that occur within relative to a last symbol of a CORESET where the HD-UE detects the DCI format. The HD-UE cancels the SRS transmission in remaining symbols from the subset of symbols.  is the PUSCH preparation time for UE processing capability 1 [6, TS 38.214] assuming and corresponds to the smallest SCS configuration between the SCS configuration of the PDCCH carrying the DCI format and the SCS configuration of the SRS, PUCCH, PUSCH or , where corresponds to the SCS configuration of the PRACH if it is 15 kHz or larger; otherwise .  ===================== Unchanged parts are omitted ===================== |

**FL1 High Priority Proposal 2.5-1**

* Endorse the above text proposal to TS 38.213, clause 17.2

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| **Company** | **Y/N** | **Comments** |
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## Issue #6: Available slots for PUCCH repetition

In contributions [13, 17], it is indicated that the HD-FDD UE behaviour on determining the available slots for PUCCH repetition is unclear, thereby proposing that HD-FDD UE determines a slot as an available slot for PUCCH repetitions when a PUCCH repetition does not overlap with a symbol with synchronization signal block (SSB) transmission indicated by *ssb-PositionsInBurst.* The corresponding TP proposed for TS 38.213 by [13] is as follows.

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| 9.2.6 PUCCH repetition procedure \*\*\* Unchanged text is omitted \*\*\*  For paired spectrum or supplementary uplink band, the UE, except when it is a half-duplex UE, determines the slots for a PUCCH transmission as the consecutive slots starting from a slot indicated to the UE as described in clause 9.2.3 for HARQ-ACK reporting, or a slot determined as described in clause 9.2.4 for SR reporting or in clause 5.2.1.4 of [6, TS 38.214] for CSI reporting  \*\*\* Unchanged text is omitted \*\*\* 17.2 Half-Duplex UE in paired spectrum \*\*\* Unchanged text is omitted \*\*\*  A HD-UE determines the slots for a PUCCH transmission starting from a slot indicated to the UE as described in clause 9.2.3 for HARQ-ACK reporting, or a slot determined as described in clause 9.2.4 for SR reporting or in clause 5.2.1.4 of [6, TS 38.214] for CSI reporting, where a repetition of the PUCCH transmission does not include a symbol indicated as a symbol of an SS/PBCH block with index provided by *ssb-PositionsInBurst*.  \*\*\* Unchanged text is omitted \*\*\* |

Contribution [08] expresses a similar view that the following conclusion at RAN1#106-e meeting can be also applied to HD-FDD case to have a unified solution with TDD.

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| **Conclusion**  It is clarified that a PUCCH repetition in case  (including the first PUCCH repetition) is postponed to the next available slot if the PUCCH repetition collides with SSB symbols or symbols indicated as DL by*tdd-UL-DL-ConfigurationCommon*or*tdd-UL-DL-ConfigurationDedicated***.**   * There is no consensus in RAN1 for whether or not the above case issupported in Rel-15 for the first PUCCH repetition when the PUCCH is triggered by DCI. |

**FL1 High Priority Proposal 2.6-1**

* HD-FDD UE determines a slot as an available slot for PUCCH repetitions when a PUCCH repetition does not overlap with a symbol with synchronization signal block (SSB) transmission indicated by *ssb-PositionsInBurst*

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| **Company** | **Y/N** | **Comments** |
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## Issue #7: Omitting condition of DL/UL collision for HD-FDD

Contribution [17] indicates the omitting condition of DL/UL collision handling for HD-FDD, which is specified in Clause 17.2 in TS 38.213, has not yet been reflected in the TS 38.214. The corresponding TP proposed by [17] is as below.

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| ======TP to TS 38.214 V17.0.0 ======  5.1.2.1 Resource allocation in time domain  < unchanged text omitted>  A PDSCH reception in a slot of a multi-slot PDSCH reception is omitted according to the conditions in Clause 11.1 and Clause 17.2 of [6, TS38.213].  < unchanged text omitted>  6.1.2.1 Resource allocation in time domain  < unchanged text omitted>  For PUSCH repetition Type A and TB processing over multiple slots, a PUSCH transmission in a slot of a multi-slot PUSCH transmission is omitted according to the conditions in Clause 9, Clause 11.1, ~~and~~ Clause 11.2A and Clause 17.2 of [6, TS 38.213].  < unchanged text omitted>  For PUSCH repetition Type B, after determining the invalid symbol(s) for PUSCH repetition type B transmission for each of the *K* nominal repetitions, the remaining symbols are considered as potentially valid symbols for PUSCH repetition Type B transmission. If the number of potentially valid symbols for PUSCH repetition type B transmission is greater than zero for a nominal repetition, the nominal repetition consists of one or more actual repetitions, where each actual repetition consists of a consecutive set of all potentially valid symbols that can be used for PUSCH repetition Type B transmission within a slot. An actual repetition with a single symbol is omitted except for the case of *L*=1. An actual repetition is omitted according to the conditions in Clause 9, Clause 11.1, ~~and~~ Clause 11.2A and Clause 17.2 of [6, TS 38.213]. The UE shall repeat the TB across actual repetitions. The redundancy version to be applied on the *n*th actual repetition (with the counting including the actual repetitions that are omitted) is determined according to table 6.1.2.1-2, where *N*=1.  For PUSCH repetition Type B, when a UE receives a DCI that schedules aperiodic CSI report(s) or activates semi-persistent CSI report(s) on PUSCH with no transport block by a '*CSI request'* field on a DCI, the number of nominal repetitions is always assumed to be 1, regardless of the value of *numberOfRepetitions*. When the UE is scheduled to transmit a PUSCH repetition Type B with no transport block and with aperiodic or semi-persistent CSI report(s) by a '*CSI request'* field on a DCI, the first nominal repetition is expected to be the same as the first actual repetition. For PUSCH repetition Type B carrying semi-persistent CSI report(s) without a corresponding PDCCH after being activated on PUSCH by a '*CSI request'* field on a DCI, if the first nominal repetition is not the same as the first actual repetition, the first nominal repetition is omitted; otherwise, the first nominal repetition is omitted according to the conditions in Clause 9, Clause 11.1, ~~and~~ Clause 11.2A and Clause 17.2 of [6, TS 38.213].  < unchanged text omitted>  6.1.2.3.1 Transport Block repetition for uplink transmissions of PUSCH repetition Type A with a configured grant  < unchanged text omitted>  A Type 1 or Type 2 PUSCH transmission with a configured grant in a slot is omitted according to the conditions in Clause 9, Clause 11.1, ~~and~~ Clause 11.2A and Clause 17.2 of [6, TS 38.213].  < unchanged text omitted> |

**FL1 High Priority Proposal 2.7-1**

* Endorse the above text proposal to TS 38.214

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| **Company** | **Y/N** | **Comments** |
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## Issue #8: Collision with switching gap

Contributions [05, 13] raise concern on the following text in the clause 17.2 of TS 38.213.

In [13], it is commented that since the logic between the first condition (red) and the second condition (yellow) is essentially ‘OR’, UE will always drop any PUSCH or PUCCH if the PUSCH or PUCCH is not overlapped with the SSB. It is proposed to fix the problem by adding a logic ‘AND’ to the two conditions.

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| If a HD-UE would transmit a PUSCH, or PUCCH, or SRS based on a configuration by higher layers and the HD-UE is indicated presence of SS/PBCH blocks by *ssb-PositionsInBurst* in *SIB1* or in *ServingCellConfigCommon*, the HD-UE does not transmit  - PUSCH or PUCCH if a last symbol of the PUSCH or PUCCH transmission would not be at least [4, TS 38.211] prior to a first symbol of the next earliest SS/PBCH block  - PUSCH or PUCCH if a first symbol of the PUSCH or PUCCH transmission would not be at least [4, TS 38.211] after a last symbol of the previous latest SS/PBCH block  - SRS in symbols that would not be at least prior to a first symbol of the next earliest SS/PBCH block  - SRS in symbols that would not be at least after a last symbol of the previous latest SS/PBCH block |

Contribution [05] points out that *NRX-TX Tc* and *NTX-RX Tc* are not the sufficient gap intended for HD-FDD UEs since there is no agreement on how the gap is defined. It is proposed in [05] to remove the gap of *NRX-TX Tc and NTX-RX Tc*restriction in section 17.2 of TS 38.213 or RAN1 to discuss and conclude the Ngap values for HD-FDD UL/DL processing.

**FL1 High Priority Question 2.8-1**

* Companies are invited to provide views on the above quoted text and any changes needed for correction

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| **Company** | **Y/N** | **Comments** |
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## Issue #9: Processing order for collision handling and intra-UE multiplexing/prioritization

For TDD, it is specified in TS 38.213 that DL-UL collision handling is applied after intra-UE multiplexing/prioritization. It is proposed in [08] that the same principle can be applied to HD-FDD case to have a unified solution with TDD.

**FL1 High Priority Proposal 2.9-1**

* DL-UL collision handling for HD-FDD operation is applied after intra-UE multiplexing/prioritization

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| **Company** | **Y/N** | **Comments** |
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# On PDCCH blocking rate reduction

Contribution [09] proposes to consider configuration of separate PDCCH SS set for RedCap UEs to reduce PDCCH blocking if separated initial DL BWP for RedCap UEs is not configured. The potential spec impact is very limited, as the legacy SS set configuration can be reused for the dedicated search space set. The configuration of a dedicated search space set can be provided to UE in the same way as dedicated initial DL BWP.

Contribution [07] expresses a different view that PDCCH blocking is not expected to be an issue for RedCap UE and existing solutions can be used to mitigate PDCCH blocking if needed and therefore no new solution is needed specifically for PDCCH blocking.

Considering this has been discussed many times in the previous RAN1 meetings and companies’ position has not changed, the following moderator proposal can be considered to conclude the discussion.

**FL1 Medium Priority Proposed Conclusion 3-1:**

* There is no consensus in RAN1 for whether or not a dedicated search space set configuration is supported in Rel-17 for RedCap UEs in case of shared initial DL BWP

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| **Company** | **Y/N** | **Comments** |
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# References

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| [1] | [RP-211574](https://www.3gpp.org/ftp/TSG_RAN/TSG_RAN/TSGR_92e/Docs/RP-211574.zip) | Revised WID on support of reduced capability NR devices | Ericsson |
| [2] | [R1-2112506](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_107-e/Docs/R1-2112506.zip) | RAN1 agreements for Rel-17 NR RedCap | Rapporteur (Ericsson) |
| [3] | [R1-2201100](file:///D:\Documents\3GPP%20documents\RAN1\TSGR1_108-e\Docs\R1-2201100.zip) | Remaining issues on RedCap half-duplex operation | vivo, Guangdong Genius |
| [4] | [R1-2201137](file:///D:\Documents\3GPP%20documents\RAN1\TSGR1_108-e\Docs\R1-2201137.zip) | HD-FDD for reduced capability NR devices | ZTE, Sanechips |
| [5] | [R1-2201278](file:///D:\Documents\3GPP%20documents\RAN1\TSGR1_108-e\Docs\R1-2201278.zip) | Other remaining issues for Reduced Capability NR Devices | OPPO |
| [6] | [R1-2201368](file:///D:\Documents\3GPP%20documents\RAN1\TSGR1_108-e\Docs\R1-2201368.zip) | Remaining issues on other aspects related to complexity reduction | CATT |
| [7] | [R1-2201405](file:///D:\Documents\3GPP%20documents\RAN1\TSGR1_108-e\Docs\R1-2201405.zip) | Other Aspects | Nokia, Nokia Shanghai Bell |
| [8] | [R1-2201483](file:///D:\Documents\3GPP%20documents\RAN1\TSGR1_108-e\Docs\R1-2201483.zip) | Remaining issues on other aspects for RedCap | NTT DOCOMO, INC. |
| [9] | [R1-2201525](file:///D:\Documents\3GPP%20documents\RAN1\TSGR1_108-e\Docs\R1-2201525.zip) | Other aspects for complexity reduction for RedCap Ues | Samsung |
| [10] | [R1-2201550](file:///D:\Documents\3GPP%20documents\RAN1\TSGR1_108-e\Docs\R1-2201550.zip) | Discussion on other aspects for RedCap | Spreadtrum Communications |
| [11] | [R1-2201591](file:///D:\Documents\3GPP%20documents\RAN1\TSGR1_108-e\Docs\R1-2201591.zip) | Other aspects for RedCap UE complexity reduction | Panasonic Corporation |
| [12] | [R1-2201669](file:///D:\Documents\3GPP%20documents\RAN1\TSGR1_108-e\Docs\R1-2201669.zip) | Other UE complexity reduction aspects for RedCap | Ericsson |
| [13] | [R1-2201703](file:///D:\Documents\3GPP%20documents\RAN1\TSGR1_108-e\Docs\R1-2201703.zip) | On other aspects of complexity reduction for RedCap Ues | Intel Corporation |
| [14] | [R1-2201776](file:///D:\Documents\3GPP%20documents\RAN1\TSGR1_108-e\Docs\R1-2201776.zip) | Other UE complexity reduction aspects for RedCap | Apple |
| [15] | [R1-2201862](file:///D:\Documents\3GPP%20documents\RAN1\TSGR1_108-e\Docs\R1-2201862.zip) | Remaining issues of collision handling of HD-FDD operation | CMCC |
| [16] | [R1-2201956](file:///D:\Documents\3GPP%20documents\RAN1\TSGR1_108-e\Docs\R1-2201956.zip) | Discussion on the remaining issues of HD-FDD | Xiaomi |
| [17] | [R1-2202193](file:///D:\Documents\3GPP%20documents\RAN1\TSGR1_108-e\Docs\R1-2202193.zip) | Discussion on duplex operation for RedCap UEs | Sharp |
| [18] | [R1-2202345](file:///D:\Documents\3GPP%20documents\RAN1\TSGR1_108-e\Docs\R1-2202345.zip) | Other aspects related to the UE complexity reduction for RedCap | LG Electronics |
| [19] | [R1-2202418](file:///D:\Documents\3GPP%20documents\RAN1\TSGR1_108-e\Docs\R1-2202418.zip) | Remaining issues on HD-FDD for RedCap UEs | Huawei, HiSilicon |
| [20] | [R1-2202146](file:///D:\Documents\3GPP%20documents\RAN1\TSGR1_108-e\Docs\R1-2202146.zip) | Remaining Issues on UE Complexity Reduction | Qualcomm Incorporated |
| [21] | [R1-2112601](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_107-e/Docs/R1-2112601.zip) | FL summary #3 on other aspects for RedCap | Qualcomm Incorporated |