3GPP TSG-RAN WG1 Meeting #116 Draft R1-2401518

Athens, Greece, 26th February – 1st March 2024

**Agenda Item: 8.11**

**Title: FL summary #1 for Rel-18 NR eRedCap maintenance**

**Source: Moderator (Ericsson)**

**Document for: Discussion, Decision**

# Introduction

This feature lead (FL) summary (FLS) concerns the Rel-18 work item (WI) on enhanced support of reduced capability (RedCap) NR devices [1]. The final FLS from the previous RAN1 meeting can be found in [2]. The RAN1 agreement summary from the previous RAN1 meeting is available in [3].

This document summarizes contributions [4] – [12] submitted to agenda item 8.11 and the following email discussion:

|  |
| --- |
| [116-R18-Other\_WIs] Email discussion on other Rel-18 WIs – Xiaodong (Vice Chair)   * 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.   **RedCap**  R1-2400041 Draft CR for timing relaxation related spec for eRedCap in TS38213 Spreadtrum Communications  R1-2400043 Clarification on remaining issues for eRedCap Spreadtrum Communications  R1-2400225 Maintenance on enhanced reduced capability NR devices Vivo  R1-2400533 Discussion on remaining issues for eRedCap UEs Xiaomi  R1-2400870 Alignment for Rel-18 RedCap NEC  R1-2401097 Maintenance on further UE complexity reduction for eRedCap NTT DOCOMO, INC.  R1-2401199 Correction for SPS PDSCH regarding eRedCap ASUSTeK  R1-2401385 Maintenance on Rel-18 RedCap Huawei, HiSilicon  To be moderated by Johan (Ericsson) |

Issues in this document are tagged and color coded with High Priority, Medium Priority, and Low Priority, and the issues that are in the focus of the initial discussion round are furthermore tagged FL1.

Follow the naming convention in this example:

* *eRedCapFLS1-v000.docx*
* *eRedCapFLS1-v001-CompanyA.docx*
* *eRedCapFLS1-v002-CompanyA-CompanyB.docx*
* *eRedCapFLS1-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 *eRedCapFLS1-v002-CompanyA-CompanyB.docx*.
* CompanyC uploads an empty file named *eRedCapFLS1-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 *eRedCapFLS1-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 [R1-2400003](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_116/Docs/R1-2400003.zip)), otherwise the sorting of the files will be messed up (which can only be fixed by the RAN1 secretary).

To avoid excessive email load on the RAN1 email reflector, please note that there is NO need to send an info email to the reflector just to inform that you have uploaded a new version of this document. Companies are invited to enter the contact info in the table below.

**FL1 Question 0-1a: Please consider entering contact info below for the points of contact for this email discussion.**

|  |  |  |
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| **Company** | **Point(s) of contact** | **Email address(es)** |
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# 1 Random access timeline relaxation

The following contributions discuss random access timeline relaxation:

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| [4] | [R1-2400041](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2400041.zip) (38.213 CR) | Draft CR for timing relaxation related spec for eRedCap in TS38213 | Spreadtrum Communications |
| [7] | [R1-2400533](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2400533.zip) (Proposal 1) | Discussion on remaining issues for eRedCap UEs | Xiaomi |

Contribution [4] expresses that when the UE needs to transmit PRACH after RAR PDSCH reception, the timing of the PRACH transmission should be based on the last RAR PDSCH symbol rather than the end of the RAR window and proposes the following change in 38.213 clause 17.1A:

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| --- |
| When  - a UE receives a PDSCH scheduled by a DCI format with CRC scrambled by a RA-RNTI or a MsgB-RNTI over a number of PRBs that is larger than 25 PRBs for 15 kHz SCS or larger than 12 PRBs for 30 kHz SCS, and  - the UE does not correctly receive the transport block provided by the PDSCH, or if the higher layers at the UE do not identify a RAPID associated with a corresponding PRACH transmission from the UE  if requested by higher layers, the UE shall be ready to transmit a PRACH no later than msec for 15 kHz SCS, or no later than msec for 30 kHz SCS, after the last symbol of the PDSCH reception~~, or after the last symbol of the window as described in Clauses 8.2 and 8.2A~~. |

**FL1 High Priority Question 1-1a: Do you agree with the above proposed change in 38.213 clause 17.1A? Please elaborate in the comment field.**

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| **Company** | **Y/N** | **Comments** |
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Contribution [7] proposes the following change in 38.213 clause 17.1A to capture the RAN1#114bis agreement that the RAR PDSCH timeline relaxation does not apply to CFRA for FG 48-2 UEs [3]:

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| --- |
| For a UE not supporting FG 48-2 performing random access procedure, and for a UE supporting FG 48-2 performing contention-based random access procedure, w~~W~~hen  - a UE receives a PDSCH scheduled by a DCI format with CRC scrambled by a RA-RNTI or a MsgB-RNTI over a number of PRBs that is larger than 25 PRBs for 15 kHz SCS or larger than 12 PRBs for 30 kHz SCS, and  - the UE does not correctly receive the transport block provided by the PDSCH, or if the higher layers at the UE do not identify a RAPID associated with a corresponding PRACH transmission from the UE  if requested by higher layers, the UE shall be ready to transmit a PRACH no later than msec for 15 kHz SCS, or no later than msec for 30 kHz SCS, after the last symbol of the PDSCH reception, or after the last symbol of the window as described in Clauses 8.2 and 8.2A. |

**FL1 High Priority Question 1-2a: Do you agree with the above proposed change in 38.213 clause 17.1A? Please elaborate in the comment field.**

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| **Company** | **Y/N** | **Comments** |
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# 2 SPS PDSCH bandwidth

The following contribution discusses SPS PDSCH bandwidth:

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| [10] | [R1-2401199](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2401199.zip) (38.213 CR) | Correction for SPS PDSCH regarding eRedCap | ASUSTeK |

The above contribution proposes the following change in 38.213 clause 17.1A:

|  |
| --- |
| A UE that has not indicated FG 48-2 does not expect to process a PDSCH reception that is scheduled by a DCI format with CRC scrambled by a C-RNTI, CS-RNTI, MCS-C-RNTI, G-RNTI~~,~~ for multicast or G-CS-RNTI, or is associated with a SPS PDSCH configuration activated by a DCI format with CRC scrambled by CS-RNTI or G-CS-RNTI over a number of PRBs that is larger than 25 PRBs for 15 kHz SCS, or larger than 12 PRBs for 30 kHz SCS, in a slot. |

**FL1 High Priority Question 2-1a: Do you agree with the above proposed change in 38.213 clause 17.1A? Please elaborate in the comment field.**

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| **Company** | **Y/N** | **Comments** |
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# 3 MBS PDSCH bandwidth

The following contributions discuss broadcast/multicast MBS PDSCH bandwidth:

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| [5] | [R1-2400043](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2400043.zip) | Clarification on remaining issues for eRedCap | Spreadtrum Communications |
| [7] | [R1-2400533](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2400533.zip) (Proposal 2&3) | Discussion on remaining issues for eRedCap UEs | Xiaomi |
| [11] | [R1-2401385](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2401385.zip) (38.213 CR) | Maintenance on Rel-18 RedCap | Huawei, HiSilicon |
| [12] | [R1-2401423](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2401423.zip) (Section 2.1) | Maintenance on other Rel-18 work items | Qualcomm Incorporated |

Contribution [5] proposes to discuss TDM of unicast PDSCH and broadcast/multicast PDSCH reception and consider potential clarification of the UE behavior.

**FL1 High Priority Question 3-1a: Given the background information provided in contribution [0043], is some clarification of the UE behavior for TDM of unicast PDSCH and broadcast/multicast MBS PDSCH needed? Please elaborate in the comment field.**

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| **Company** | **Y/N** | **Comments** |
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Contribution [7] proposes that for broadcast MBS PDSCH repetitions, or for consecutive scheduling between broadcast MBS PDSCH and any PDSCH, it is up to UE implementation to prioritize the reception in the first slot or the reception in the second slot, when the number of PRBs for broadcast MBS PDSCH is larger than 25/12 PRBs for 15/30 kHz SCS and proposes the following change in 38.213 clause 17.1A:

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| --- |
| A UE that has not indicated FG 48-2 does not expect to process a PDSCH reception that is scheduled by a DCI format with CRC scrambled by a C-RNTI, CS-RNTI, MCS-C-RNTI, G-RNTI for multicast, or G-CS-RNTI over a number of PRBs that is larger than 25 PRBs for 15 kHz SCS, or larger than 12 PRBs for 30 kHz SCS, in a slot.  ~~A UE that has not indicated FG 48-2 is not required to process a PDSCH reception in slot that is scheduled by a DCI format with CRC scrambled by a G-RNTI for broadcast or a MCCH-RNTI over a number of PRBs that is larger than 25 PRBs for 15 kHz SCS, or larger than 12 PRBs for 30 kHz SCS, when the PDSCH reception is with repetitions or when the UE receives another PDSCH in slot .~~  A UE is not required to process a PDSCH reception that is scheduled by a DCI format with CRC scrambled by a TC-RNTI over a number of PRBs that is larger than 25 PRBs for 15 kHz SCS, or larger than 12 PRBs for 30 kHz SCS, in a slot. |

**FL1 High Priority Question 3-2a: Do you agree with the above proposed change in 38.213 clause 17.1A? Please elaborate in the comment field.**

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| **Company** | **Y/N** | **Comments** |
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Contribution [11] expresses that the currently specified UE behavior implies that the UE must check the scheduling information for the next slot before it determines to skip the PDSCH in current slot and proposes the following change to 38.213 clause 17.1A to specify that the UE checks the previous slot instead:

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| --- |
| A UE that has not indicated FG 48-2 is not required to process a PDSCH reception in slot when the UE received a PDSCH in slot that is scheduled by a DCI format with CRC scrambled by a G-RNTI for broadcast or a MCCH-RNTI over a number of PRBs that is larger than 25 PRBs for 15 kHz SCS, or larger than 12 PRBs for 30 kHz SCS~~, when the PDSCH reception is with repetitions or when the UE receives another PDSCH in slot~~ . The UE is not required to process PDSCH reception with repetitions that is scheduled by a DCI format with CRC scrambled by a G-RNTI for broadcast or MCCH-RNTI over a number of PRBs that is larger than 25 PRBs for 15 kHz SCS, or larger than 12 PRBs for 30 kHz SCS. |

**FL1 High Priority Question 3-3a: Do you agree with the above proposed change in 38.213 clause 17.1A? Please elaborate in the comment field.**

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| **Company** | **Y/N** | **Comments** |
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Contribution [12] has the following proposal:

* For UE BB bandwidth reduction, the number of PRBs scheduled in DCI can be larger than 25 PRBs for 15 kHz SCS and 12 PRBs for 30 kHz SCS if both following conditions are satisfied:
  + Multicast MCCH/MTCH in RRC\_INACTIVE without any PDSCH in next slot.
  + Multicast MCCH/MTCH in RRC\_INACTIVE without MBS PDSCH repetition.

**FL1 High Priority Question 3-4a: Do you agree with the above proposal? Please elaborate in the comment field.**

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| **Company** | **Y/N** | **Comments** |
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# 4 Multicast MBS in RRC\_INACTIVE

The following contributions discuss eRedCap UE support for the Rel-18 feature for Multicast MBS in RRC\_INACTIVE:

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| --- | --- | --- | --- |
| [7] | [R1-2400533](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2400533.zip) (Proposal 4) | Discussion on remaining issues for eRedCap UEs | Xiaomi |
| [9] | [R1-2401097](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2401097.zip) (Proposal 1) | Maintenance on further UE complexity reduction for eRedCap | NTT DOCOMO, INC. |

RAN1#115 discussed this topic and considered the following proposal [2]:

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| RAN1#115 Medium Priority Proposal 4-2b: Down-select between the following options:   * Option 1: For UE BB bandwidth reduction, the number of PRBs scheduled in DCI is not larger than 25/12 PRBs for 15/30 kHz SCS for Rel-18 multicast MBS feature for inactive state. * Option 2: For UE BB bandwidth reduction, the number of PRBs scheduled in DCI can be larger than 25/12 PRBs for 15/30 kHz SCS for Rel-18 multicast MBS feature for inactive state. |

Contribution [9] supports Option 1, whereas contribution [7] supports Option 2.

**FL1 High Priority Question 4-1a: Companies are invited to express their preference among Options 1 and 2. Please elaborate in the comment field.**

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| **Company** | **Option (1/2)** | **Comments** |
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# 5 Clarification of “UE that has not indicated FG 48-2”

RAN1#115 discussed potential clarification of “A UE that has not indicated FG 48-2” and “A UE that indicated FG 48-2” in the following paragraphs in 38.213 clause 17.1A. The discussion is captured in Section 8 in the FLS in [2].

|  |
| --- |
| A UE that has not indicated FG 48-2 does not expect to transmit a PUSCH over a bandwidth that is larger than 25 PRBs for 15 kHz SCS, or larger than 12 PRBs for 30 kHz SCS, per hop in a slot.  A UE that has not indicated FG 48-2 does not expect to process a PDSCH reception that is scheduled by a DCI format with CRC scrambled by a C-RNTI, CS-RNTI, MCS-C-RNTI, G-RNTI for multicast, or G-CS-RNTI over a number of PRBs that is larger than 25 PRBs for 15 kHz SCS, or larger than 12 PRBs for 30 kHz SCS, in a slot.  A UE that has not indicated FG 48-2 is not required to process a PDSCH reception in slot that is scheduled by a DCI format with CRC scrambled by a G-RNTI for broadcast or a MCCH-RNTI over a number of PRBs that is larger than 25 PRBs for 15 kHz SCS, or larger than 12 PRBs for 30 kHz SCS, when the PDSCH reception is with repetitions or when the UE receives another PDSCH in slot .  A UE is not required to process a PDSCH reception that is scheduled by a DCI format with CRC scrambled by a TC-RNTI over a number of PRBs that is larger than 25 PRBs for 15 kHz SCS, or larger than 12 PRBs for 30 kHz SCS, in a slot.  A UE that indicated FG 48-2 does not expect to transmit a PUSCH over a bandwidth that is larger than 25 PRBs for 15 kHz SCS, or larger than 12 PRBs for 30 kHz SCS, per hop in a slot, where the PUSCH is scheduled by RAR UL grant or by a DCI scrambled by a TC-RNTI, or is configured for a Type-2 random access procedure. |

Following the discussion, RAN1#115 made the following agreement regarding “A UE that indicated FG 48-2” [3]:

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| --- | --- | --- | --- | --- |
| Agreement:  Adopt the following TP for TS 38.213 clause 17.1A:   |  | | --- | | A UE ~~that indicated FG 48-2~~ does not expect to transmit a PUSCH over a bandwidth that is larger than 25 PRBs for 15 kHz SCS, or larger than 12 PRBs for 30 kHz SCS, per hop in a slot, where the PUSCH is scheduled by RAR UL grant or by a DCI scrambled by a TC-RNTI, or is configured for a Type-2 random access procedure. | | **Reason for change:** The formulation “A UE that indicated FG 48-2” may have ambiguous interpretation since the UE may not yet have indicated FG 48-2 when it transmits Msg3. | | **Summary of change:** Replace “A UE that indicated FG 48-2” with “A UE”. | | **Consequences if not approved:** Different interpretations of the current text may result in different implementations of the Msg3 PUSCH transmission for FG 48-2 UEs. | |

The potential clarification of “A UE that has not indicated FG 48-2” is discussed in the following contributions:

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| --- | --- | --- | --- |
| [6] | [R1-2400225](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2400225.zip) (38.213 CR) | Maintenance on enhanced reduced capability NR devices | Vivo |

The above contribution proposes to replace “A UE that has not indicated FG 48-2” with “A UE not supporting FG 48-2”.

**FL1 High Priority Question 5-1a: Is there a need to modify one or more of the occurrences of the formulation “A UE that has not indicated FG 48-2” 38.213 clause 17.1A? Please elaborate in the comment field.**

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| **Company** | **Y/N** | **Comments** |
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# 6 Parameter name alignment

The following contribution discusses parameter name alignment:

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| [8] | [R1-2400870](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2400870.zip) (38.213 CR) | Alignment for Rel-18 RedCap | NEC |

The above contribution proposes to replace *supportOfRedCap-r18* with *supportOfERedCap* and to replace FG 48-2 with *eRedCapNotReducedBB-BW* in 38.213 clauses 17.1 and 17.1A.

**FL1 Medium Priority Question 6-1a: Do you agree with the above proposed change in 38.213 clauses 17.1 and 17.1A? Please elaborate in the comment field.**

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| **Company** | **Y/N** | **Comments** |
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# 7 Related issues

The following contribution concerns the maximum receive bandwidth of an eRedCap UE during MBS CFR reception:

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| [13] | [R1-2400042](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2400042.zip) (38.213 CR) | Draft CR for MBS reception related spec for eRedCap in TS38213 | Spreadtrum Communications |

The following contributions concern RedCap/eRedCap UE support for the Rel-18 TEI on RedCap-specific MBS CFR:

|  |  |  |  |
| --- | --- | --- | --- |
| [9] | [R1-2401097](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2401097.zip) (Observation 1) | Maintenance on further UE complexity reduction for eRedCap | NTT DOCOMO, INC. |
| [14] | [R1-2400483](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2400483.zip) | Discussion on RedCap MBS TEI issues | ZTE, Sanechips |
| [15] | [R1-2400484](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2400484.zip) (38.213 CR) | Corrections on MBS for Redcap | ZTE, Sanechips |
| [16] | [R1-2401100](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2401100.zip) | Maintenance on MBS for RedCap | NTT DOCOMO, INC. |

The following contributions concern potential new eRedCap UE feature groups for MBS reception:

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| [7] | [R1-2400533](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2400533.zip) (Section 2.3) | Discussion on remaining issues for eRedCap UEs | Xiaomi |
| [12] | [R1-2401423](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2401423.zip) (Section 2.2 & Section 2.3) | Maintenance on other Rel-18 work items | Qualcomm Incorporated |

The above topics are expected to be handled in other feature lead summaries.

# References

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| --- | --- | --- | --- |
| [1] | [RP-232671](https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_101/Docs/RP-232671.zip) | Revised WID on Enhanced support of reduced capability NR devices | Ericsson |
| [2] | [R1-2312282](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_115/Docs/R1-2312282.zip) | FL summary #3 on Rel-18 RedCap UE complexity reduction | Moderator (Ericsson) |
| [3] | [R1-2312283](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_115/Docs/R1-2312283.zip) | RAN1 agreements for Rel-18 NR RedCap | Rapporteur (Ericsson) |
| [4] | [R1-2400041](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2400041.zip) | Draft CR for timing relaxation related spec for eRedCap in TS38213 | Spreadtrum Communications |
| [5] | [R1-2400043](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2400043.zip) | Clarification on remaining issues for eRedCap | Spreadtrum Communications |
| [6] | [R1-2400225](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2400225.zip) | Maintenance on enhanced reduced capability NR devices | Vivo |
| [7] | [R1-2400533](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2400533.zip) | Discussion on remaining issues for eRedCap UEs | Xiaomi |
| [8] | [R1-2400870](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2400870.zip) | Alignment for Rel-18 RedCap | NEC |
| [9] | [R1-2401097](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2401097.zip) | Maintenance on further UE complexity reduction for eRedCap | NTT DOCOMO, INC. |
| [10] | [R1-2401199](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2401199.zip) | Correction for SPS PDSCH regarding eRedCap | ASUSTeK |
| [11] | [R1-2401385](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2401385.zip) | Maintenance on Rel-18 RedCap | Huawei, HiSilicon |
| [12] | [R1-2401423](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2401423.zip) | Maintenance on other Rel-18 work items | Qualcomm Incorporated |
| [13] | [R1-2400042](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2400042.zip) | Draft CR for MBS reception related spec for eRedCap in TS38213 | Spreadtrum Communications |
| [14] | [R1-2400483](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2400483.zip) | Discussion on RedCap MBS TEI issues | ZTE, Sanechips |
| [15] | [R1-2400484](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2400484.zip) | Corrections on MBS for Redcap | ZTE, Sanechips |
| [16] | [R1-2401100](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2401100.zip) | Maintenance on MBS for RedCap | NTT DOCOMO, INC. |