3GPP TSG-RAN WG1 Meeting #106bis-e R1-21xxxxx

e-Meeting, 11th – 19th October 2021

Agenda Item: 8.6

Title: FL summary on RAN1 RRC parameter list for Rel-17 NR RedCap

Source: Moderator (Ericsson)

Document for: Discussion, Decision

# 1 Introduction

This feature lead (FL) summary (FLS) concerns the following email discussion for the Rel-17 work item (WI) for support of reduced capability (RedCap) NR devices [1].

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| --- |
| [106bis-e-R17-RRC-REDCAP] Email discussion on Rel-17 RRC parameters for REDCAP – Johan (Ericsson)   * 1st check point: October 14 * Final check point: October 19 |

RAN1 agreements for this WI are summarized in [2]. The FLS for the initial discussion on the RRC parameter list can be found in [3] and the resulting initial draft RRC parameter list is available in [4]. For recommendations on RRC parameter list preparation, see [5]. The issues that are in the focus of this round of the discussion in this meeting are tagged FL2.

Follow the naming convention in this example:

* *RedCapParamFLS-v000.docx*
* *RedCapParamFLS-v001-CompanyA.docx*
* *RedCapParamFLS-v002-CompanyA-CompanyB.docx*
* *RedCapParamFLS-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 *RedCapParamFLS-v002-CompanyA-CompanyB.docx*.
* CompanyC uploads an empty file named *RedCapParamFLS-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 *RedCapParamFLS-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 10 in [R1-2108693](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_106b-e/Docs/R1-2108693.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.

**FL2 Question 1-1: Please consider entering contact info below for the points of contact for this email discussion.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Point of contact** | **Email address** |
| Huawei, HiSilicon | Wang Yi | wangyi6@huawei.com |
| vivo | Xueming Pan | panxueming@vivo.com |
| Intel Corporation | Debdeep Chatterjee | debdeep.chatterjee@intel.com |
| Futurewei | Vip Desai | vipul.desai@futurewei.com |
| ZTE, Sanechips | Youjun Hu | hu.youjun1@zte.com.cn |
| CATT | Yongqiang FEI | feiyongqiang@catt.cn |
| Sharp | Liqing Liu | liu.liqing@sharp.co.jp |
| Qualcomm | Jing Lei | leijing@qti.qualcomm.com |
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# References

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. [R1-2108271](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106-e/Docs/R1-2108271.zip), “RAN1 agreements for Rel-17 NR RedCap”, Rapporteur (Ericsson)
3. [R1-2108669](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106-e/Docs/R1-2108669.zip), “FL summary on RAN1 RRC parameter list for RedCap”, Moderator (Ericsson)
4. [R1-2108670](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106-e/Docs/R1-2108670.zip), “Initial draft RAN1 RRC parameter list for RedCap”, Moderator (Ericsson)
5. [R1-2110415](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106b-e/Docs/R1-2110415.zip), “Recommendations for RAN1 RRC Parameter Preparation”, Moderator (Ericsson)

# 2 PRACH configuration

From the initial draft RRC parameter list [4]:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **WI code** | **Sub-feature group** | **RAN1 specification** | **Section** | **RAN2 Parent IE** | **RAN2 ASN.1 name** | **Parameter name in the spec** | **New or existing?** | **Parameter name in the text** | **Description** | **Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **UE-specific or Cell-specific** | **Specification** | **Comment** |
| NR\_redcap | RedCap UE | 38.213 |  |  |  |  | New | [RedCap-specific PRACH configuration] | When this configuration is present, it configures a RedCap-specific PRACH configuration [using a separate PRACH resource and/or PRACH preamble partitioning at least for 4-step RACH, FFS for 2-step RACH], where usage of the RedCap-specific PRACH configuration serves as an early RedCap UE indication. If the parameter is not present, RedCap UEs use the same PRACH configuration as non-RedCap UEs. | FFS |  | Per cell | Cell-specific | 38.331 | See agreements listed in R1-2108271 section 6.  Note: The relation between [RedCap-specific PRACH configuration] and [RedCap-specific initial UL BWP configuration] may need further discussion. Furthermore, the relation between PRACH configurations for different features is under discussion in RAN2. |

**FL1 Question 2-1: Companies are invited to comment on the above parameter for PRACH configuration.**

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| --- | --- |
| **Company** | **Comments** |
| Huawei, HiSilicon | Per the guidance in [5], add in column M of “In BWP-UplinkCommon”. |
| vivo | Fine in general. |
| Intel | Fine with the proposed version. |
| FUTUREWEI | The description column should include the possibility of RedCap and non-RedCap UEs of sharing RACH resources.  A clarification of early indication should be added: “usage of the RedCap-specific PRACH configuration implicitly serves as an early RedCap UE indication if no other UEs are also configured to use the resources”  A clarification of different features should be added: “The WID note allows RedCap UEs to consider CE and that may need discussion in RAN1. Furthermore, the relation between PRACH configurations for different features is under discussion in RAN2” |
| ZTE, Sanechips | Whether RedCap-specific PRACH configuration is applied for RedCap UE with CE and RedCap UE without CE, or just applied for RedCap UE without CE, need to be clarified in the description column. |
| CATT | Fine with the proposal.  It is expected RACH of RedCap may be crossed with many other features (not only to CE, but also SDT, RAN slicing…). If we only focus on RedCap RACH itself, current description seems OK. |
| FL | The corresponding row has been updated in ***[RedCapParamList-v001](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106b-e/Inbox/drafts/8.6/ParamList/RedCapParamList-v001.xlsx)***. |

**FL2 Question 2-2: Companies are invited to comment on the updated parameter for PRACH configuration in *[RedCapParamList-v001](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106b-e/Inbox/drafts/8.6/ParamList/RedCapParamList-v001.xlsx)*.**

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| **Company** | **Comments** |
| Qualcomm | The updated RRC parameters for PRACH configuration look good to us. |
| ZTE, Sanechips | The following clarification can be considered in the last column: If the separate initial DL BWP is used in initial access or separate initial UL BWP is configured, the RedCap specific PRACH resource also should be configured. |
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# 3 Initial DL BWP configuration

From the initial draft RRC parameter list [4]:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **WI code** | **Sub-feature group** | **RAN1 specification** | **Section** | **RAN2 Parent IE** | **RAN2 ASN.1 name** | **Parameter name in the spec** | **New or existing?** | **Parameter name in the text** | **Description** | **Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **UE-specific or Cell-specific** | **Specification** | **Comment** |
| NR\_redcap | RedCap UE | 38.213 |  |  |  |  | New | [RedCap-specific initial DL BWP configuration] | When this configuration is present, it configures a separate initial DL BWP for RedCap UEs including bandwidth and location [CORESET, search space, and other details FFS]. If the parameter is not present, RedCap UEs use the same SIB-configured initial DL BWP as non-RedCap UEs if it is not larger than the RedCap UE bandwidth, otherwise the RedCap UEs will continue using the MIB-configured initial DL BWP. | FFS |  | Per cell | Cell-specific | 38.331 | See agreements and working assumptions listed in R1-2108271 section 1. |

**FL1 Question 3-1: Companies are invited to comment on the above parameter for initial DL BWP configuration.**

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| --- | --- |
| **Company** | **Comments** |
| Huawei, HiSilicon | Per the guidance in [5], add in column M of “In downlinkConfigCommon”. |
| vivo | The consequence when the parameter is not configured should be discussed and decided first, especially when the SIB-configured initial DL BWP for non-RedCap UEs is larger than the RedCap UE BW.  The behavior mentioned in the description is one possibility, i.e. “If the parameter is not present, RedCap UEs use the same SIB-configured initial DL BWP as non-RedCap UEs if it is not larger than the RedCap UE bandwidth, otherwise the RedCap UEs will continue using the MIB-configured initial DL BWP.”  However, there could be another possibilit, i.e. RedCap UEs are not supported in the cell if the parameter is not present and the SIB-configured initial DL BWP for non-RedCap UEs is larger than the RedCap UE BW |
| Intel | We support the current version from the FL.  To Vivo’s proposal, while technically feasible, we think it would be more important/useful to enable RedCap UEs to operate on the MIB-indicated CORESET #0 (i.e., ignore the locationAndBandwidth parameter for initial DL BWP via SIB1 if it exceeds max RedCap UE BW) when separate initial DL BWP for RedCap UEs may not be explicitly configured while still allow for larger BW for BWP #0 for non-RedCap UEs. Mechanisms for cell barring for RedCap UEs are anyway going to be in place, and further implicit indication mechanisms would be redundant. |
| FUTUREWEI | Ok. Minor edit “RedCap UE maximum bandwidth” |
| ZTE, Sanechips | Agree with the comment from Intel. Additionally, two ‘if’ in the description would be a little vague for the ‘otherwise’. The following is suggested ‘~~If~~ when the parameter is not present,’ |
| CATT | Generally fine with this proposal. If RedCap is not supported by a gNB, the gNB shall broadcast the ‘barred’ information in SIB1. |
| Sharp | We would like to ask whether last ‘otherwise’ sentence in the column of description is intended to reflect UE behavior as Intel commented above, i.e. RedCap UE ignores the locationAndBandwidth parameter and reuse the other RRC parameters (e.g., PDCCH-configcommon, PDSCH-configcommon). If so, when commonControlResourceSet is configured for legacy initial DL BWP and then legacy UE uses locationAndBandwidth to determine common CORESET location for CSS, does Redcap UE also use locationAndBandwidth to determine common CORESET location? For confirmation, are these above understanding aligned with the intention of last ‘otherwise’ sentence in the column of description. |
| FL | The corresponding row has been updated in ***[RedCapParamList-v001](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106b-e/Inbox/drafts/8.6/ParamList/RedCapParamList-v001.xlsx)***. For the Vivo/Intel/Sharp comments, it is suggested to bring up these aspects in the [106bis-e-NR-R17-RedCap-01] email discussion regarding aspects related to reduced maximum UE bandwidth. |

**FL2 Question 3-2: Companies are invited to comment on the updated parameter for initial DL BWP configuration in *[RedCapParamList-v001](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106b-e/Inbox/drafts/8.6/ParamList/RedCapParamList-v001.xlsx)*.**

|  |  |
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| **Company** | **Comments** |
| Qualcomm | * If the configuration is present, there should be an extra flag indicating when the SIB-configured RedCap-specific initial DL BWP will take effect, which include the following cases:  1. it is used during and after initial access 2. it is used after initial access only  * If the center frequency of the initial DL BWP is not aligned with the center frequency of the initial UL BWP in TDD (if supported), early indication based on msg1 should always be enabled. Otherwise, the DL/UL switching gap of RedCap UE cannot be accommodated by NW, and RedCap UE may fail to receive on DL or transmit on UL. |
| ZTE, Sanechips | Fine with it. From our understanding, whether it can be used during initial access depends on whether the CORESET corresponding to RAR is configured in the separate initial DL BWP. We do not see the necessity to configure extra flag to indicate the use case for separate initial DL BWP. |
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# 4 Initial UL BWP configuration

From the initial draft RRC parameter list [4]:

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| **WI code** | **Sub-feature group** | **RAN1 specification** | **Section** | **RAN2 Parent IE** | **RAN2 ASN.1 name** | **Parameter name in the spec** | **New or existing?** | **Parameter name in the text** | **Description** | **Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **UE-specific or Cell-specific** | **Specification** | **Comment** |
| NR\_redcap | RedCap UE | 38.213 |  |  |  |  | New | [RedCap-specific initial UL BWP configuration] | When this configuration is present, it configures a separate initial UL BWP for RedCap UEs including bandwidth and location [details FFS]. If the parameter is not present, RedCap UEs use the same initial UL BWP as non-RedCap UEs. | FFS |  | Per cell | Cell-specific | 38.331 | See agreements and working assumptions listed in R1-2108271 section 1.  Note: The relation between [RedCap-specific PRACH configuration] and [RedCap-specific initial UL BWP configuration] may need further discussion. |

**FL1 Question 4-1: Companies are invited to comment on the above parameter for initial UL BWP configuration.**

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| --- | --- |
| **Company** | **Comments** |
| Huawei, HiSilicon | Per the guidance in [5], add in column M of “In UplinkConfigCommon”. |
| vivo | Revise the description part as the following  If the parameter is not present, RedCap UEs use the same initial UL BWP as non-RedCap UEs.if the initial UL BWP does not exceed the RedCap UE BW, otherwise, RedCap UEs are not supported in the cell. |
| Intel | Similar to the case of initial DL BWP, we do not think that an implicit mechanism for cell barring via SIB1 is necessary – it would be redundant to cell barring mechanisms that are likely to be broadcasted via SIB1 as well. Hence, we support the original version from the FL. |
| FUTUREWEI | Editorial (remove the newline in the third column between the “3” and “8”  “If the parameter is not present, RedCap UEs use the same initial UL BWP as non-RedCap UEs if the initial UL BWP does not exceed the RedCap UE maximum BW.” |
| ZTE, Sanechips | Similar understanding with Intel regarding the cell barring. Additionally, the case that when the parameter is not present and legacy initial UL BWP is larger than the RedCap UE bandwidth, need to be addressed. Therefore, it is suggested to add the following wording in the description column:  “If the parameter is not present, RedCap UEs use the same initial UL BWP as non-RedCap UEs. If the initial UL BWP exceed the RedCap UE maximum BW, the parameter should be present.” |
| CATT | A workable initial UL BWP is needed in any case. Suggest the following modification:  “If the parameter is not present, RedCap UEs use the same initial UL BWP as non-RedCap UEs. When the RedCap UEs use the same initial UL BWP as non-RedCap UEs, the bandwidth of the shared initial UL BWP shall not exceed the maximum RedCap UE bandwidth.” |
| Sharp | We suggest the following modification: “If the parameter is not present, RedCap UEs use the same initial UL BWP as non-RedCap UEs. Network ensures that this parameter is present if the initial UL BWP exceeds the RedCap UE maximum BW.” |
| FL | The corresponding row has been updated in ***[RedCapParamList-v001](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106b-e/Inbox/drafts/8.6/ParamList/RedCapParamList-v001.xlsx)***. |
|  |  |

**FL2 Question 4-2: Companies are invited to comment on the updated parameter for initial UL BWP configuration in *[RedCapParamList-v001](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106b-e/Inbox/drafts/8.6/ParamList/RedCapParamList-v001.xlsx)*.**

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| --- | --- |
| **Company** | **Comments** |
| Qualcomm | 1. If the initial UL BWP for non-RedCap UEs exceeds the RedCap UE maximum bandwidth, early indication based on msg1 should always be enabled. Otherwise, RedCap UE may receive an invalid UL grant in msg2, which schedules RedCap UE to transmit msg3 outside its initial UL BWP. 2. If the center frequency of the initial UL BWP is not aligned with the center frequency of the initial DL BWP in TDD (if supported), early indication based on msg1 should always be enabled. Otherwise, the DL/UL switching gap of RedCap UE cannot be accommodated by NW, and RedCap UE may fail to receive on DL or transmit on UL.   If early indication based on msg1 is not enabled in SI for the two cases above, the initial UL BWP configuration is invalid for RedCap UE. |
| ZTE, Sanechips | Fine with it. Regarding the concern from Qualcomm, see comment in FL2 Question 2-2. |
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# 5 PUCCH configuration

From the initial draft RRC parameter list [4]:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **WI code** | **Sub-feature group** | **RAN1 specification** | **Section** | **RAN2 Parent IE** | **RAN2 ASN.1 name** | **Parameter name in the spec** | **New or existing?** | **Parameter name in the text** | **Description** | **Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **UE-specific or Cell-specific** | **Specification** | **Comment** |
| NR\_redcap | RedCap UE | 38.211, 38.213 |  |  |  |  | New | [Intra-slot PUCCH frequency hopping within RedCap-specific initial UL BWP enabled/disabled] | In case a separate initial UL BWP is configured for RedCap UEs, this parameter indicates whether intra-slot PUCCH frequency hopping within the separate initial UL BWP in the PUCCH resource for HARQ feedback for Msg4/MsgB is enabled or disabled for RedCap UEs. | {Enabled, Disabled} |  | [Per cell] | [Cell-specific] | 38.331 | See the last agreement and working assumption listed in R1-2108271 section 1.  Note: This parameter may be provided as part of the [pucch-ConfigCommon] configuration for the separate initial UL BWP. |

**FL1 Question 5-1: Companies are invited to comment on the above parameter for PUCCH configuration.**

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| **Company** | **Comments** |
| Huawei, HiSilicon | Needs further agreements in RAN1 prior to be sent to RAN2 to resolve the WA. |
| vivo | Fine in general. |
| Intel | Fine with the above; and also fine to wait for further progress in RAN1 on this, as suggested by Huawei. |
| FUTUREWEI | There may be an existing parameter “*intraSlotFrequencyHopping*” that captures the behavior |
| ZTE, Sanechips | OK with this parameter. |
| CATT | Fine with this part. |
| Sharp | Fine with the parameter for PUCCH configuration.  Regarding FUTUREWEI’s comment, we think a new parameter seems much more desirable to indicate whether intra-slot FH for the whole cell specific PUCCH resource set is enabled or disabled considering existing parameter “*intraSlotFrequencyHopping*” is used to indicate whether intra-slot FH for one dedicated PUCCH resource is enabled. |
| FL | See also comment from ZTE under Question 7-1 further down in this document. The corresponding row has been updated in ***[RedCapParamList-v001](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106b-e/Inbox/drafts/8.6/ParamList/RedCapParamList-v001.xlsx)***. |

**FL2 Question 5-2: Companies are invited to comment on the parameter for PUCCH configuration in *[RedCapParamList-v001](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106b-e/Inbox/drafts/8.6/ParamList/RedCapParamList-v001.xlsx)*.**

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| **Company** | **Comments** |
| Qualcomm | OK with FL2 proposal |
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# 6 CQI/MCS table configuration

From the initial draft RRC parameter list [4]:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **WI code** | **Sub-feature group** | **RAN1 specification** | **Section** | **RAN2 Parent IE** | **RAN2 ASN.1 name** | **Parameter name in the spec** | **New or existing?** | **Parameter name in the text** | **Description** | **Value range** | **Default value aspect** | **Per (UE, cell, TRP, …)** | **UE-specific or Cell-specific** | **Specification** | **Comment** |
| NR\_redcap | RedCap UE | 38.214 |  | CSI-ReportConfig | cqi-Table |  | Existing |  | For a RedCap UE, CQI table 2 is only supported if the UE indicates support of 256QAM for PDSCH. |  |  |  |  | 38.331 |  |
| NR\_redcap | RedCap UE | 38.214 |  | [Several, TBD] | mcs-Table |  | Existing |  | For a RedCap UE, the 256QAM MCS table for PDSCH is only supported if the UE indicates support of 256QAM for PDSCH. |  |  |  |  | 38.331 |  |

**FL1 Question 6-1: Companies are invited to comment on the above parameters for CQI/MCS table configuration.**

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| **Company** | **Comments** |
| Huawei, HiSilicon | No need for a new RRC parameter. The exiting parameters can be reused. |
| vivo | Existing parameters are sufficient, no need to include them in the table. |
| FUTUREWEI | Similar comment as vivo. This is also applicable for PUSCH. |
| ZTE, Sanechips | Suggest to reuse the existing parameters. |
| CATT | Prefer to reuse the existing parameters as much as possible. |
| FL | Note that these rows are not intended to introduce new parameters, only modify descriptions of existing parameters. |

**FL2 Question 6-2: Companies are invited to comment on the (unchanged) parameters for CQI/MCS table configuration in *[RedCapParamList-v001](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106b-e/Inbox/drafts/8.6/ParamList/RedCapParamList-v001.xlsx)*.**

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| **Company** | **Comments** |
| Qualcomm | OK with FL2 proposal |
| ZTE, Sanechips | Fine with the update. Additionally, when the separate initial UL BWP is configured, pucch-ResourceCommon in PUCCH-ConfigCommon need to be newly defined for RedCap UE, if the PUCCH resource allocation is different with the legacy. |
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# 7 Other comments

**FL1 Question 7-1: Companies are invited to provide any other comments they might have on RRC parameters for RedCap.**

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| **Company** | **Comments** |
| ZTE, Sanechips | PUCCH-ConfigCommon is related to the initial UL BWP. If the initial UL BWP is separately configured for RedCap, whether RedCap specific PUCCH-ConfigCommon should be introduced can be discussed. |
| FL | The ZTE comment has been taken into account under Question 5-1 above. |

**FL2 Question 7-2: Companies are invited to provide any other comments they might have on the updated RRC parameters for RedCap in *[RedCapParamList-v001](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106b-e/Inbox/drafts/8.6/ParamList/RedCapParamList-v001.xlsx)*.**

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| --- | --- |
| **Company** | **Comments** |
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