**3GPP TSG-RAN2#118-e R2-220xxxx**

**Electronic meeting, May 09-20, 2022**

**Source: ZTE Corporation**

**Title: [AT118-e][508][RA Part] UP open issues and CR 38.321 (ZTE) - Report**

**Agenda item:** **6.18.2**

**Document for:** **Discussion and Decision**

# Introduction

This is the report of offline discussion collecting the comments on open issues for SDT control plane as noted below:

* [AT118-e][508][RA Part] UP open issues and CR 38.321 (ZTE)

 UP open issues and CR capturing agreed corrections

Deadline: To be set by rapporteur aiming to have company inputs and proposals by Friday

**Deadline for company comments: Thursday (12th) 23:59 UTC**

# Resource selection for RACH procedure when SDT is applicable

In R2-2205470 and in R2-2205942, the issue about RACH resource selection in case of RA-SDT is discussed. The issues are as follows:

Issue1: In clause 5.27, it is unclear whether MAC should perform RACH resource selection (according to section 5.1.1b) or RACh resource set availability (according to section 5.1.1c).

Issue2: Assuming that in clause 5.27 for Small Data Transmission, MAC performs the Random Access resources selection according to 5.1.1b after checking whether data volume and RSRP threshold are satisfied, the UE would have to repeat the selection according to section 5.1.1 for RA initialization procedure.

The question is whether companies agree with this and if there are any comments to the changes. Looking at R2-2205470 and R2-2205942, it seems the intention is to clarify the same thing, but we could try with one of the options and the options proposed in R2-2205942 seems more rigorous so we could check if this is acceptable.

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| Company | Q 2.1 Do you agree with the above issues (issue 1 and issue 2): Yes/No | Q 2.2 Do agree with the changes proposed in R2-2205942? | Any comments to the actual text proposal? |
| ZTE | Not really. We think there is no real issue here because the UE will check the resource availability according to 5.1.1b, which is the same as the RACH resource selection in RACH procedure, and 5.1.1b will call 5.1.1c in current text. The intention is to ensure the same procedure will be used for the RACH resource verification and RACH resource selection, in which case if the available RACH resource can be identified in 5.27, the same RACH resource will be selected in the following RACH procedure. The only issue here is the UE need to perform the 5.1.1b twice for both RACH resource verification and RACH resource selection, but since same threshold will be used in both cases, there is no ambiguity in our view with current implementation.  | Not essential. We don’t think this clarification is essential. But no strong view | If we agree to change something then the proposal in R2-2205942 seems better.  |
| Nokia | Yes although issue 2 is a bit artificial and could be handled by the UE. | Intention is OK | There cannot be “current RA procedure” in SDT initiation while there is no RA procedure ongoing. So 5.27.1 could say something like:“*select set(s) of Random Access resources according to clause 5.1.1b on the selected UL carrier as if a Random Access procedure was ongoing:*”In 5.1.1, we can just say “*if the RA procedure is not initiated for RA-SDT as specified in 5.27.1*” since we would always select the resources in 5.27.1 if we did it like this. |
| Huawei, HiSilicon | We think it is better to have this clear in the specifications and it is ambiguous at the moment. Potentially issue 2 could be solved by UE implementation, but in case it is not, this may lead to misalignement between the UE and the NW on the used procedure (i.e. SDT vs. non-SDT resume). | Yes (proponent) | The proposal from Nokia would also work, but not sure whether this is clearer than TP from R2-2205942, so we have some preference o stick to R2-2205942. |
| Intel | We also don’t think the change is really essential. In our view, once the MAC decides that the condition for SDT is fulfilled, the UE will use the set of Random Access resources configured with SDT indication   | We prefer to stick to existing text. |  |
| Samsung | Not essential | Current text is fine  |  |
| Qualcomm | The current spec does require UE to perform RA resource selection twice. Although nothing is broken since the RA resources selected in these two steps are unlikely to be different, we still think it is better to fix it, because otherwise we would not be surprised if some company raise this issue again in a few years. | We are fine with the TP. |  |
| CATT | The issues discussed in R2-2205470 and in R2-2205942 are similar but we think they are not same.The issues in R2-2205470 consider the issues that **carrier selection procedure is selected twice in** clause 5.27 and in clause 5.1.1. In clause 5.27.1, the carrier selection is performed before CG-SDT and RA-SDT is determined. However, after RA-SDT is determined, the carrier selection will be performed again according to clause 5.1.1. So we think it is better to clarify the carrier will not be selected twice. For the issues in R2-2205942, we also think it is better to clarify in specification. | YesAnd the modified TP for carrier selection is shown in right column. | TP for carrier selection:1> if the carrier to use for the Random Access procedure is explicitly signalled:2> select the signalled carrier for performing Random Access procedure;2> set the *PCMAX* to PCMAX,f,c of the signalled carrier.1> else if the carrier to use for the Random Access procedure is not explicitly signalled or this carrier is selected for SDT in clause 5.27.1; and1> if the Serving Cell for the Random Access procedure is configured with supplementary uplink as specified in TS 38.331 [5]; and1> if the RSRP of the downlink pathloss reference is less than *rsrp-ThresholdSSB-SUL*:2> select the SUL carrier for performing Random Access procedure;2> set the *PCMAX* to PCMAX,f,c of the SUL carrier. |
| LGE | Issue 1: Maybe, Issue 2: NoFor issue 2, same view with ZTE since the RSRP threshold for UL carrier selection is common in SDT initiation procedure and RA procedure. | No. If the clarification is needed, the only change can be applied in order to clarify that the SDT indication is performed based on the selection of RA-SDT partition | If needed, following modification in clause 5.27 is enough:2> else if a set of Random Access resources to indicate RA-SDT are selected according to clause 5.1.1b on the selected UL carrier:3> consider *cg-SDT-TimeAlignmentTimer* as expired and perform the corresponding actions in clause 5.2;3> indicate to the upper layers that the conditions for initiating SDT procedure are fulfilled. |
| OPPO | We understand the intention, i.e., if ue first check the availability of a RA set for SDT (in section 5.1.1b), it will indicate to RRC while afterwards when performing the RA selection it may select another set of RA which may results in un-proper RRC behaviour due to the previous indication.However, we think the concerned wording “available” in “else if a set of Random Access resources to indicate RA-SDT are available according to clause 5.1.1b on the selected UL carrier:” does not actually mean that it should refer to 5.1.1c section, but instead it clearly says that 5.1.1b should be referred. Thus, from our understanding, the current spec is clear. | Current text is fine |  |

Then, in R2-2205470 it was also proposed to delete the following notes in MAC spec:

**NOTE 4: The network configures the same value for rsrp-ThresholdSSB-SUL in all BWPs. So, the UE can obtain this parameter from any Random Access configuration.
NOTE: On a given BWP, the network configures the same value for rsrp-ThresholdMsg3. So, the UE can obtain this parameter from any Random Access configuration within the BWP selected for the Random Access procedure.**

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| Q 2.3: Do companies agree to delete the above notes?  |
| Company | Agree to delete Y/N  | Any comments?  |
| ZTE | Not yet | We need to make sure this is clear from either RRC or from MAC. If it is clear in RRC then we can delete these notes from MAC spec.  |
| Nokia | Yes | Can be included in RRC field descriptions. |
| Huawei, HiSilicon | Yes | We should make an agreement that this will be removed from MAC and captured in RRC. |
| Intel | Yes | Our understanding is that the note was added because the threshold for UL carrier selection and CE selection are not RACH partition specific. This needs to be added to RRC spec rather than in MAC spec  |
| Samsung | Yes | Can be included in RRC field descriptions. |
| Qualcomm | Yes | Agree with companies above that it is enough to include that clarification in RRC  |
| CATT | Yes | It can be included in RRC. |
| LGE | Yes | If needed, these notes should be clarified in RRC spec, not in MAC spec.  |
| OPPO | No | Nothing wrong with theses note, but if majorities think if it’s already clear in RRC, we are also fine to remove them. |

# Fallback from CFRA to CBRA for REDCAP UE

In R2-2205486, the following proposal is made:

**Proposal 1. For the fallback cases from CFRA to CBRA, RedCap UE should select the RedCap specific RACH resource, if it is configured.**

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| Q 3.1: Do companies agree with the above proposal?  |
| Company | Agree/Disagree | Any comments to the TP in R2-2205486?  |
| ZTE | Disagree | Since NW is not sure about RSRP on UE side when the RACH is initiated, NW has no idea which RACH partition will be selected on UE side (e.g. whether the RACH partition with Msg3 repetition or without Msg3 repetition will be selected). Also considering some parameters for CFRA is derived based on the CBRA RACH partition selected for the fallback operation, the change proposed may lead to some mismatch between NW and UE side on the CFRA parameters.If companies think such optimization is needed, then we prefer to configure the reference CBRA resource directly with either a reference feature combination or some kind of RACH partition index. |
| Nokia | Agree with intention | This should only happen **within a BWP.** Ie., there should not be any BWP switch performed for the CBRA fallback.NW configures the CFRA resource and knows that it configures it for RedCap UE. Hence, if there is no RedCap RACH in the current BWP, the the UE uses the common RACH for CBRA. OTOH, if there is RedCap RACH, the UE can do CBRA there.For Text Proposal: It would end up selecting CE RACH also available for the RA procedure, hence, the TP does not work as is. |
| Huawei, HiSilicon | Agree with intention | We agree with the proposal from R2-2205486, i.e.:**Proposal 1. For the fallback cases from CFRA to CBRA, RedCap UE should select the RedCap specific RACH resource, if it is configured.**It is important to ensure that RedCap UE uses RedCap specific RACH whenever available, and we have already agreed this during the last meeting:**For the REDCAP BWP, network configures a RACH partition which is applicable to REDCAP (i.e. without combination with other features), similar to “legacy” RACH partition in non-Redcap initial BWP****In case of CFRA, in order to initialize the RACH parameters (such as rsrp-ThresholdSSB etc) and for CBRA fallback - UE uses RA parameters of Rel-15 common RACH resource or for RedCap common RACH resource**The current MC specifications did not implement this properly and has to be fixed. However, as pointed out by Nokia, the TP from R2-2205486 does not handle this properly, but we have provided a fix for this in R2-2205941.  |
| Intel | Agree with the intention |  |
| Samsung | Agree with the intention |  |
| Qualcomm | Agree with the proposal but not the TP | We think the proposal itself is fine, as it captures the common understanding. But we are not sure if the TP is needed. The current text already covers it. |
| CATT | Agree with the intention |  |
| LGE | Agree with the intention | If RedCap UE uses common RACH for the fallback case, the network cannot recognize whether the UE is RedCap UE or not. Therefore, the network may mistakenly determine the UE as a normal UE and transmit the Msg2 to (legacy) DL initial BWP, while the RedCap UE monitors Msg2 in RedCap-specific initial DL BWP. It would cause RA failures. We think if the common procedure is applied for the RedCap UE, there would be no mismatch issue between the RedCap UE and the network.We understand that the TP is not correct since the fallback case should only be handled for the RedCap early indication (i.e., not for other features). Therefore, following modification is proposed:

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| 1> if contention-free Random Access Resources have not been provided for this Random Access procedure and one or more of the features including REDCAP and/or a specific slice group(s) and/or SDT and/or MSG3 repetition is applicable for this Random Access procedure:Editor’s Note: FFS if some clarification is needed on how feature applicability is known (e.g. from RRC etc)2> if none of the sets of Random Access resources are available for the current Random Access procedure (as specified in clause 5.1.1c):3> select the set of Random Access resources that are not associated with any feature indication (as specified in clause 5.1.1c) for this Random Access procedure.2> else if there are one or more set(s) of Random Access resources available (as specified in clause 5.1.1c) and one of these set(s) of Random Access resources can be used for indicating all features triggering this Random Access procedure: 3> select the available set of Random Access resources for this Random Access procedure.2> else (i.e. there are one or more sets of Random Access resources available that are configured with indication(s) for a subset of all features triggering the RACH procedure):3> select a set of Random Access resources from the available set of Random Access resources based on the priority order indicated in the system information as specified in clause 5.1.1d for this Random Access Procedure.1> else if contention-free Random Access Resources have been provided for this Random Access procedure; and2> if REDCAP is applicable for the current Random Access procedure and there is one set of Random Access resources available that is only configured with REDCAP indication;3> select this set of Random Access resources for this Random Access procedure.2> else3> select the set of Random Access resources that are not associated with any feature indication (as specified in clause 5.1.1c) for this Random Access procedure.1> else (i.e. CFRA and RedCap is not applicable or none of the REDCAP and/or a specific slice group and/or SDT and or MSG3 repetition is applicable):2> select the set of Random Access resources that are not associated with any feature indication (as specified in clause 5.1.1c) for the current Random Access procedure. |

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| OPPO | Agree, but the TP has issue. | We actually agree the intention that if REDCAP UE falls back to CBRA from CFRA, the REDCAP UE should select the REDCAP specific RACH resources. However, we fail to see why the TP handle this issue.BTW, network does not know whether the RACH partition is with msg3 repetition or not for REDCAP UEs since it does not know the rsrp in the UE side. Thus, the current TP may end up with CE partition. |

# Feature prioritization for RACH partitioning

In R2-2205876, it was first proposed to discuss the current RACH partitioning mechanism in general and the following proposal is made first.

Proposal 2 RAN2 should agree on which of the following approaches is desired:

1. Indicating a non-triggered feature is not allowed

2. All triggered features must be signalled

3. No initial down-selection before applying the configured priorities

Rapporteur understanding is that current approach takin in MAC spec is aligned with option 1 above and if we change this there will be other significant changes in RRC and MAC. For instance, if the UE is allowed to select SDT resource even if SDT is not triggered then there will be a misalignment between network and UE regarding whether the SDT RBs are resumed or not. Similar implications may apply to other features too. So, current understanding is that non-triggered feature should not be indicated to the network (i.e. option 1 above), but we can first check if this is the common understanding.

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| Q 4.1: Do companies agree with the current approach that Indicating a non-triggered feature is not allowed? |
| Company | Agree/Disagree | Please explain your preference |
| ZTE | Agree | We think current text is fine and we agree that “non-triggered feature should not be indicated to the network” – i.e. option 1 above.  |
| Nokia | Agree | This should be rather obvious. |
| Huawei, HiSilicon | Agree | Not sure how this can work otherwise. |
| Intel | Agree | The existing implemented text looks fine to us.  |
| Samsung | Agree |  |
| Qualcomm | Agree |  |
| CATT | Agree |  |
| LGE | Agree | We support Option 1, which is already implemented in current spec. For Option 2, it may cause network restriction.For Option 3, if is agreed, the erroneous RA procedure would be happened. For example, when a UE uses RACH partition with Msg3 repetition even though the UE is not intended to perform Msg3 repetition, the network would transmit Msg2 with different format (in order to indicate Msg3 grant with repetition), which cannot be understood by the UE. Therefore, this mismatch would cause more complexity in RA procedure. |
| OPPO | Agree | At this late stage, we agree the non-triggered feature is not allowed because otherwise lots of places in the spec need to be updated.However, we show the sympathy from the paper R2-2205876 that, if network does not configure a RA set which is able to indicate all the combined features applicable to the current RA procedure, any RA set selected by priority can not fully reflect the features for the current RA procedure. But it seems there is no other good way, unless network ensures a proper configuration to handle all possible combinations? |

Then, in R2-2205876 the following proposal is also made.

Proposal 3 Do not specify UE behaviour for the error case when the network does not provide all needed partitions.

We discussed this in the past and agreed to specify UE behaviour for error cases (because network is allowed to only configure RACH resources for a subset of features). So, we can check again if we stick to this approach.

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| Q 4.2: Do companies agree with the following proposal?Proposal: Do not specify UE behaviour for the error case when the network does not provide all needed partitions |
| Company | Agree/Disagree | Please explain your preference |
| ZTE | Disagree | It is not clear what error case mean since if no suitable RACH partition with feature combination can be selected, the UE will always select the RACH partition without feature combination (i.e. one available RACH resource will be selected anyway after the procedure).However, we agree that network should have flexibility to configure RACH resources only for a subset of feature combinations as already agreed.  |
| Nokia | Disagree | What error case is this? Obviously the NW may not provide all partitions, and for this we specified the prioritization for the selection. |
| Huawei, HiSilicon | Disagree | This is not an error case and as agreed previously, the NW may provide RACH resources only for a subset of feature combinations. |
| Intel | Disagree | Not sure what error cases are missing in the 5.1.1 |
| Samsung | - | RAN2 has agreed previously, the NW may provide RACH resources only for a subset of feature combinations.We are ok to consider the approach where network always provides all combinations of features supported in the cell, if that’s majority view. |
| Qualcomm | Disagree | Agree with all the comments above |
| CATT | Disagree | The NW may provide RACH resources for a subset of the feature combinations. So we are sure the error cases. |
| LGE | Disagree | The option to leave as UE implementation was discussed before. However, it was not pursued because the network needs to control the UE behaviour of selecting RACH partition. We prefer to stick the current approach. |
| OPPO | Disagree | Maybe too late to consider this proposal? If network can provide all the needed partitions, we believe the current text (e.g., 5.1.1b and 5.1.1c) can be simplified a lot. |

# General MAC corrections

In [R2-2205840](file:///C%3A%5Cevutukuri%5Cwork%5C5G%5CRAN2%5Cdocs%5CR2-2205840.zip) and in R2-2205941 a number of general MAC corrections are proposed. Most of these seem straightforward and hence acceptable. However, in R2-2205840, there was issue 7 which proposed to modify the RA partition selection from excluding the unavailable partitions to selection available partitions. Although it seems feasible to go this way, the current proposal in R2-2205840 seems to not work.

For instance, with the approach proposed in R2-2205840, any RACH resource for a feature combination with feature A (e.g: partition with A, A+B, A+C, A+X) will be considered as available for RACH procedure triggered by feature A (even if feature B/C/X is one of the triggers for the same RACH). For example, the RACH resource REDCAP+SDT, REDCAP+CE, REDCAP+Slice A will be considered as available for RACH procedure triggered by REDCAP UE without SDT/CE/Slice indication (i.e. even though the RACH resource is reserved for SDT/CE/Slice A, it will be considered as available for any RACH triggered by REDCAP UE). It seems this is not the intention. So, companies are encouraged first to check the issue 7 in R2-2205840 and explain if they agree with this change or not.

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| Q 5.1: Do companies agree with the following change in R2-2205840?7: Section 5.1.1c: Consider the RA resource sets as available for the RA procedure based on their configured indication and the feature applicability for the RA procedure. |
| Company | Agree/Disagree | Please explain your preference |
| ZTE | Disagree | The change on 5.1.1c seems not correct as explained by the rapporteur above.  |
| Nokia | Agree (proponent) | However, agree with the issue pointed out by the email rapporteur.In any case, certain sets of RA resources would need to be determined available for the RA procedure, ie., we cannot just exclude RA resource sets without considering anything as available. |
| Huawei, HiSilicon | Disagree | We think the current description works properly and there is no need for such drastic changes. Agree also with the issue pointe out by the rapporteur. |
| Intel | Disagree | Agree with the rapporteur analysis.  |
| Samsung | Disagree | Agree with the rapporteur.  |
| Qualcomm | Disagree | This change is against the principle that many agreements are built on. We should not make such a drastic change unless something is really broken. |
| CATT | Disagree  | Agree with the rapporteur. |
| LGE | Disagree | Agree with the rapporteur. |
| OPPO | Disagree | The change for 5.1.1c in R2-2205840 has different results compared with the current text as also pointed out by the rapporteur.This discussion is also related to the Q4.1 when we discuss the proposal 2 in R2-2205876, i.e., whether a non-triggered feature associated RA set can be considered as available for RA resource selection?  |

The other changes in R2-2205840 seem straightforward and perhaps we can generally check whether these are acceptable or not.

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| Q 5.2: Apart from the Issue 7 discussed above, do companies have any comments to the other changes in R2-2205840? |
| Company | Changes areOkay/Comments | Please explain any specific comments |
| ZTE | Changes are okay | We are fine with other changes.  |
| Nokia | Agree |  |
| Huawei, HiSilicon | OK in general, but see comments | Change 2: this will not be needed in case we apply corrections as proposed in rapporteur CR in R2-2205553.Change 5: This seems OK, but perhaps we then need to clarify somewhere (in RRC?) that there may be at maximum one partition for each feature combination per RA type.Change 6: Agree to remove the note, but not without correcting the procedural text, as explained in Q.3.1 |
| Intel | OK | Other than the changes to 5.1.1c, all the other changes look ok |
| Samsung | ok |  |
| Qualcomm | OK |  |
| CATT | OK |  |
| LGE | Partly | For Issue 5, if the title of clause 5.1.1b is changed to ‘Selection of the set of Random Access resources **available** to the Random Access procedure,’ the word “available” would cause confusion with the title of clause 5.1.1c (i.e., **Availability** of Random Access resource partitions). Therefore, we prefer to keep the current wording.For Issue 6, as in our response of Q3.1, the special handling for RedCap UE is needed, in order to prevent the RA failure.We are okay with other issues |
| OPPO | OK |  |

Similarly, for the changes proposed in R2-2205941 we may be able to check the whole CR at one go.

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| Q 5.3: Do companies have any comments to the changes proposed in R2-2205941? |
| Company | Changes areOkay/Comments | Please explain any specific comments |
| ZTE | Okay but… | See comments to Q.2.1 |
| Nokia | Mostly OK | Can check the wordings in CR review. |
| Huawei, HiSilicon | OK (proponent) |  |
| Intel | OK except for the changes related to Q2.1 |  |
| Samsung | ok |  |
| Qualcomm | OK |  |
| CATT | OK |  |
| LGE | Partly | For Issue 2, a common RA procedure is preferred. When a UE is operated in CE-only BWP (i.e., only configured with the set(s) of Random Access resources with MSG3 repetition indication), *rsrp-ThresholdMsg3* may be set to infinity to ensure that UE always select RA partition for Msg3 repetition. If this is clarified in RRC spec, this modification in MAC spec is not needed.We are fine with other issues. |
| OPPO |  | For the issue #5, i.e., CFRA fallback to CBRA for REDCAP UE, we may need further discussion. |

# Editorial issues

Finally, there is one CR submitted capturing a couple of editorial corrections and companies are invited to comment on these specific corrections in R2-2205553.

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| Q 6.1: Do companies have any comments to the changes proposed in R2-2205553? |
| Company | Changes areOkay/Comments | Please explain your choice |
| ZTE | Okay |  |
| Nokia | Mostly OK | Can check the wordings in CR review. |
| Huawei, HiSilicon | OK |  |
| Intel | OK |  |
| Qualcomm | OK |  |
| CATT | OK |  |
| LGE | OK |  |
| OPPO | OK |  |

# Conclusion and proposals

TBD

# References

1. R2-2205470 Consideration on UP Remaining Issues of RACH common CATT discussion Rel-17 NR\_cov\_enh-Core, NR\_slice-Core, NR\_SmallData\_INACTIVE-Core, NR\_redcap-Core

1. R2-2205942 Correction to RACH procedure with SDT applicability Huawei, HiSilicon draftCR Rel-17 38.321 17.0.0 F NR\_SmallData\_INACTIVE-Core, NR\_slice-Core, NR\_redcap-Core, NR\_cov\_enh-Core
2. [R2-2205486](file:///C%3A%5Cevutukuri%5Cwork%5C5G%5CRAN2%5Cdocs%5CR2-2205486.zip) Correction on fallback cases from CFRA to CBRA for RedCap UE LG Electronics Inc. discussion Rel-17 NR\_SmallData\_INACTIVE-Core, NR\_slice-Core, NR\_redcap-Core, NR\_cov\_enh-Core

1. R2-2205876 Feature Prioritization for RACH Partitioning Ericsson discussion Rel-17

1. R2-2205839 Introduction of RACH partitioning Nokia, Nokia Shanghai Bell CR Rel-17 38.300 17.0.0 0466 - F NR\_SmallData\_INACTIVE-Core

1. R2-2205840 RACH partitioning MAC issues Nokia, Nokia Shanghai Bell CR Rel-17 38.321 17.0.0 1288 - F NR\_SmallData\_INACTIVE-Core

1. R2-2205941 Various corrections to MAC spec for RACH partitioning Huawei, HiSilicon draftCR Rel-17 38.321 17.0.0 F NR\_SmallData\_INACTIVE-Core, NR\_slice-Core, NR\_redcap-Core, NR\_cov\_enh-Core

1. R2-2205553 MAC Corrections for RACH partitioning ZTE Corporation (rapporteur) CR Rel-17 38.321 17.0.0 1273 - F NR\_redcap-Core, NR\_SmallData\_INACTIVE-Core, NR\_cov\_enh-Core, NR\_slice-Core