**3GPP TSG-RAN2 Meeting #117- e R2-22xxxxx**

**e-Meeting, xxx, 2022**

**Source: email discussion Rapporteur (ZTE Corporation)**

**Title: UP open issues list for common RACH (email: [POST116bis-e][514])**

**Agenda item:** **xxx**

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

# Introduction

This document contains summary of open issues and proposed resolutions for UP aspects of Common RACH partitioning:

* [POST116bis-e][514][RA Part] UP open issues (ZTE)

Scope:

- List of critical open issues to be resolved for WI completion

- Updated CR 38.321 for information and review

NOTE: NO contributions on these critical open issues are expected

Deadline:

- Open issues list Jan. 28th

- Company inputs Feb. 15th

Proposed format for comments is as below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| # | Description | Criticality(Essential / Optional / Enhancement)  | Company comments/PreferenceCompanies can use company ID and enter comment (see example) | Proposed resolution (to be updated by Rapporteur) |
| Zxxx | XXX is missing/wrong/open etc | Essential | ZTE: We think this is not neededXXX: We agree with YYY etc | Rapp: Will be implemented in the next revision |

# Discussion

## Procedural open issues

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| # | Description | Criticality(Essential / Optional / Enhancement)  | Company comments/Preference | Proposed resolution (to be updated by Rapporteur) |
| Z001 | Align the parameter names between MAC and RRC specs | Essential |  | Rapp: To be done before/during next meeting (after the RRC CR is stable) |
|  |  |  |  |  |

## UP/MAC open issues

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| # | Description | Criticality(Essential / Optional / Enhancement)  | Company comments/Preference | Proposed resolution (to be updated by Rapporteur) |
| Z002 | What is the order of carrier selection and RACH partition selectionOptions: 1. Carrier selection happens before RACH partition selection
2. RACH partition selection happens before carrier selection
 | Essential | [Huawei]: **We support Option 2** for several reasons:* it is aligned with legacy RACH procedure where carrier selection threshold is included in RACH configuration
* if carrier selection is happening before RACH partition selection, then it is impossible to have feature (combination) specific carrier selection threshold which was agreed for SDT for example and can be useful for other features as well (e.g. CE)
* Option 1 will become very complex when considering feature combination specific carrier selection thresholds and would diverge from legacy RACH procedure too much

OPPO:The issues for option1 could be:the SDT specific threshold i.e. sdt-RSRP-ThresholdSSB-SUL need be reverted i.e. legacy threshold should be followedThe issues for option2 could be:for CE it is not feasible to judge whether a CE based RACH is triggered or not because the RSRP threshold i.e. rsrp-Threshold-Msg3Rep is different between SUL and NUL assuming RAN2 still take CE as a featureOPPO’s prefer option 1. solution of the potential issue: the threshold for carrier selection for SDT follows legacy RSRP threshold. In addition sdt-RSRP-Threshold can be configured differently between SUL and NUL. Note such change may have impact on CG-SDT also. But we can leave this to SDT WID’s discussion. In current MAC running CR R2-2202041, carrier selection for both RA-SDT and CG-SDT is captured there, which need be updated anyway since the carrier selection for RA-SDT suppose to be covered in common MAC CR. |  |
| Z003 | If RACH partition selection is performed after carrier selection, how to configure separate carrier selection threshold for CE and SDT etc? (e.g. should we undo these agreements or should we design something else?) | Essential | [Huawei]: It would be possible to make carrier selection as part of feature combination selection, but we find it complex and we think we should not do carrier selection before RACH partition selection**.** We are not OK to undo the previous agreements.OPPO:In 116bis meeting , it is agreed that carrier selection for CE follow legacy threshold, so only agreement for SDT need be reverted |  |
| Z004 | How to capture RECAP BWP selection? Options: * In REDCAP CR
* In Common RACH CR
 | Essential | [Huawei]: This should be handled by Redcap CR as the Redcap specific BWP will be specified in Redcap CRs as well.OPPO:It is already captured in R2-2201890 and we think it should be fine. |  |
| Z005 | Can the rsrp-Threshold-Msg3Rep and RSRP threshold for SSB selection for CE be configured differently in different RACH partitions? If so, how to select the correct value (before selecting the RACH partition)?  | Essential | [Huawei]: RAN2 made the following agreement which required further checking:CE will also be considered as part of the feature combination for each RACH partition. The eligibility criteria for CE will be determined before the RACH partition selection is performed. [CB need to confirm that it is compatible with the CE agreementsWe have a preference to have a common framework for all features, but this should not be at the expense of feature performance and by undoing the decisions from WI discussions. We think we should respect the decisions from CE session which were done after long technical discussions and not just undo the agreements, because of arbitrary decisions in RA part AI. Based on this, we think the above agreement is not compatible with CE agreements as it is not possible to have carrier specific CE threshold in case CE is treated as part of feature combination. Furthermore, as clarified in Z009, having CE as part of feature combination can violate another agreement from CE, i.e. that the fallback from CFRA to CE RACH is not supported. We then believe CE should not be part of feature combination, but should be optionally configured within RACH partition for a specific feature combination.Not necessary. UE should know that CE is one the feature to trigger RACH and then to find a RACH partition, but not the another way around. |  |
| Z006 | How to refer to the “legacy RACH partition”? Can we use the name of some RRC IE etc? | Essential | [Huawei]: We think we should refer to RRC parameter name. OPPO:One solution is to introduce a variant to record featureCombination as proposed also in answer to Z009. The RACH partition selection procedure in the running CR will result in two cases:Case 1: if a valid featureCombination is recorded , then a corresponding RACH partition is selected; elseCase 2: legacy RACH partition is selectedNote this variant could aLso help fallback procedure. if partition specific 2-step RACH procedure can fall to 4-step RACH of the same partition or common 4-step RACH, the this variant can be used differentiate between these two procedures | Propose to finalise this after the RRC structure is finalized.  |
| Z007 | Is RACH partitioning applicable in dedicated BWP (i.e. RRC\_CONNECTED)? | Essential | [Huawei]: At least Redcap and CE indication are applicable to RRC Connected state, so we think it should be supported. OPPO:SDT: noRedcap: maybe e.g. due to reception of msg2CE: yesslicing: no |  |
| Z008 | Is RACH partitioning applicable to CFRA? | Essential | [Huawei]: If the question is whether to have separate CFRA preambles/ROs assigned for different feature combinations, then we believe this is not needed. However, interworking of CFRA and CBRA with RACH partitioning has to be considered, please see our reply to Z009 below.OPPO:The question is rather puzzling since RACH partition is selected based on triggered feature/feature combination while dedicated RACH resource is signaled by network for CFRA. Or the intention is to ask whether RACH partition specific parameter e.g. power control parameter is still applicable? Anyway no CFRA for SDT and slicing for sure.Redcap/CE: not clear |  |
| Z009 | Is RACH partitioning applicable when CFRA fallsback to CBRA? How does the overall procedure look like in this case? | Essential | [Huawei] For CFRA, the UE needs to know rsrp-ThresholdSSB which is configured via RACH-ConfigCommon. Hence, for the UE to know which rsrp-ThresholdSSB to use, the UE needs to select RACH partition first, i.e. before doing CFRA. Furthemore, it was agreed in CE session that the fallback from CFRA to CE RACH is not supported, so we need to consider this somehow. Hence, the simplest would be to have the following procedure:1. Not to treat CE as part of feature combination as calrified in Z005.
2. UE performs RACH partition selection at the beginning of RACH procedure, no matter it performs CFRA or CBRA (as captured in the current MAC running CR). The UE uses rsrp-ThresholdSSB from the selected RACH partition.
3. When UE falls back from CFRA to CBRA, UE can directly move to select SSBs according to the corresponding threshold configured in the previously selected RACH partition and proceed to select RO and preamble as in legacy.

This way we minimize the impact on RACH procedure.OPPO: If issue in Z008 is confirmed, then the answer is yes. We think another variant to record featureCombination-r17 is needed. Once CFRA is triggered UE can record what is potential featureCombination:Redcap or CE or Redcap+CEIn case CFRA fallsback to CBRA, RACH partition can be selected again based on recorded featureCombination. |  |
| Z010 | Can we assume that there is default RACH resource without feature combination in REDCAP initial BWP, which is similar as the legacy RACH resource on legacy initial BWP and can be selected if there is no available RACH partition can be selected on the REDCAP initial BWP? (otherwise we may need to specify some BWP switching procedure for this case) | Essential | [Huawei]: We agree with the handling suggested in the issue description, i.e. in RedCap specific BWP there is always RACH partition which is applicable to RedCap (i.e. without combination with other features), similar as “legacy” RACH partition in non-Redcap initial BWP.OPPO: It is captured in R2-2201885 that “If a RedCap-specific initial UL BWP is configured, RedCap UEs in RRC\_IDLE and RRC\_INACTIVE shall use only the RedCap-specific initial UL BWP to perform RACH”If a UE access the network via Redcap-specific initial U BWP, then it must be a Redcap UE i.e. at least RACH partition for Redcap should be there. |  |
| Z011 | Do we need to handle the issue of RNTI collision? I.e. which option is preferred?Option 1: Do nothing (i.e. leave to network implementation)Option 2: the network should be able to (optionally) configure a specific search space for RAR/MSGB monitoring per RACH resource partitionOption 3: A custom offset, signalled through RRC and associated to each PRACH configuration, is added in the formula for RA-RNTI and/or MSGB-RNTI. The legacy PRACH configuration it is assumed to have offset = 0. | Optimisation  | [Huawei] We think this is essential to address this issue. With all the RACH partitions that we may now have, it is impossible for the network to deal with this by implementation and a solution is needed if RACH efficiency is to be kept. We propose not to rediscuss other solution, but focus on Option 2, which is simple and straightforward.[Rapp] Agree with the comment above. But since option 1 seems to be on the table still, it seems it is an optimisation (at least according to some companies). So, marked it as optimisaiton for now. OPPO: up to network’s implementation. The additional search space for SDT has nothing to do with RACH procedure.[Sony] We think it is very important and essesntial to be addressed the issue in this release. Then between Option 2 and 3, we think Option 2 does not solve the issue because it allows as many search spaces as the number of partitions which may be impractical due to limited CORESET0 resource/space. It should be noted that search spaces have monitoring periodicity and offset, so if a lot of search spaces are allowed in the associated CORESET0, the search spaces will overlap, and this overlap may cause RNTI collisions as well as making difficult for the gNB to achieve scheduling flexibility. So before agreeing this solution, RAN1 must be consulted to check if it is visible.Option 3 just provides configurable offset(s) to either *s\_id* or *t\_id* or both, and it can easily be added in the PRACH configuration parameters, hence Option 3 does not need a separate search space for each partition. The specification is also in RAN2 domain and RAN1 does not need to be involved. We prefer a simple solution of Option 3. |  |
| Q001 | What is the rule for UE to select BWP when RACH is triggered in a dedicated BWP? E.g. UE performs RACH in the current BWP as long as it is eligible to use at least one RACH partition configured in that BWP or something else? | Essential | [Rapp] see also Z007[Huawei]: We agree with the suggestion as in the description of the issue, which is a similar rules as for RACH partition selection in RRC IDLE/INACTIVE. I.e. UE stays in the active BWP as long as there is an eligible RACH partition and otherwise it switches to the initial BWP.OPPO: BWP treatment for Redcap is already captured in WID specific running CR. So the issue is only about CE for CBRA. We think network should help to configure proper RACH resource to enable CE in concerned BWP. So no further optimization is necessary. Note initial BWP should be allowed not to configure one particular RACH partition. |  |
|  |  |  |  |  |
| H001 | The RSRP threshold for selecting CE or non-CE can be configured differently on NUL and SUL. If RACH partition is selected before carrier selection, which threshold should UE use to perform CE/ non-CE selection? | Essential | [Huawei]: The current agreement to treat CE as part of feature combination brings issues to CE design. We can either revert this decision or the overall design will actually get more complicated instead of being less complicated (e.g. if we start treating carrier as part of feature combination as well). This is especially true if we would also decide to perform carrier selection before RACH partition selection – in this case it would be impossible to have even feature specific carrier selection threshold.OPPO: please refer to answer to Z005 |  |

# Conclusion and proposals

# References

1. R2-2201664, Report for Rel-17 Small data, URLLC/IIoT and RACH partitioning

# Annex (contact details for email discussions)

|  |  |  |
| --- | --- | --- |
| Company | Contact name | Contact email |
| Huawei | Dawid Koziol | dawid.koziol@huawei.com |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |