**3GPP TSG-RAN2 Meeting#131R2-250xxxx**

**Bengaluru, India, 25 – 29 August, 2025**

**Agenda Item: 8.11.1**

**Source: Samsung**

**Title: List of open issues in MAC**

**Document for: Discussion and Decision**

# 1 Introduction

This document is to collect views on remaining open issue related to the MAC running CR, as well as to identify other outstanding issues yet discussed but worth considering. Please provide your input no later than the **end of August 5 UTC**.

Also, please fill in the contact information in the table below when responding.

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2. Open issues for MAC

**Open Issue MAC-1:** **RO type fallback to higher Msg1 repetition number when the same is not available.**

**Issue description:** During last meeting, there was an FFS point related to RO type fallback left for further discussion as captured below. Specifically, we have agreed that RO type fallback is allowed for the resource set with same feature combination and same Msg1 repetition number, while whether it is allowed for that with same feature combination and *higher* Msg1 repetition number, when the same Msg1 repetition number is not available, is still FFS.

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| R2-2504743 Summary of [AT130][209][SBFD] Proposals to address MAC-2 and MAC-3 Samsung discussion Rel-19 NR\_duplex\_evo-Core   * Noted   *Proposal 1. For RACH fallback from one RO type to another, the UE shall only be allowed to switch to an RO type that is configured with the same feature combinations. (13/13 supported)*  *Proposal 2. The UE is allowed to switch to an RO type that is configured with the same Msg1 repetition number. FFS on higher Msg1 repetition number, if the same is not available.*  Discussion  - Ericsson ok with P1, but for P2, think UE shall also check rsrp threshold.  - LG E, CMCC, ZTE ok with P1 and P2.  - Samsung think the P1 and P2 are compromise and think we can agree.  - Nokia think for P2 we can discuss further including ‘higher’ and ‘same’.   * For RACH fallback from one RO type to another, the UE shall only be allowed to switch to an RO type that is configured with the same feature combinations. * The UE is allowed to switch to an RO type that is configured with the same Msg1 repetition number. FFS on higher Msg1 repetition number, if the same is not available. |

To streamline the discussion for Open Issue MAC-1, please kindly indicate your preferred option along with the rationale behind your choice for the Question 1.

***Question 1: When RO type fallback condition is met, do companies think we should allow RO type fallback to the resource set with higher Msg1 repetition number than the current one, when the resource set with the same number is not available?***

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| **Company** | **Yes (Allow)/No (Disallow)** | **Comments** |
| ZTE | Yes | If not allow, that means only when the set with same repetition number are provided in both type of ROs, UE can perform fallback. This is a restriction to NW’s configuration and it reduces the successful rate of RA since the fallback chance is further reduced from UE perspective. |
| CATT | Yes | Agree with ZTE |
| Nokia | Comment | In scenarios where a resource set with the same Msg1 repetition number is not available in the target RO type, the UE may select a resource set with either a higher or lower Msg1 repetition number based on the measured RSRP.  For example, when performing fallback from an SBFD RO to a legacy RO, the CLI may differ such that a lower Msg1 repetition number is sufficient, thereby improving radio resource efficiency.  However, there is a concern that the UE may initially select a lower Msg1 repetition number in the new RO type, which could lead to sub-optimal performance or unnecessary Msg1 transmissions. To mitigate this, it is proposed that the UE consider both:   * the RSRP threshold(s) applicable to the new RO type, and * the Msg1 repetition number used in the previous RO type. |
| OPPO | Yes | We understand the concern raised by Nokia that this may not be optimal. However, we would also like to see the complexity in the specification, if we consider both RSRP threshold and Msg1 repetition number for the RO type fallback. |
| CMCC | Yes | We agree with ZTE. As for the scheme proposed by Nokia, we think that it is an optimization solution with additional complexity. From our point of view, we prefer a simple solution, that is, allowing RO type fallback to the resource set with a higher Msg1 repetition number than the current one. |
| Charter | Yes, with Comment | We agreed, but will like to consider Nokia’s viewpoint, which provides more flexibility for the UE to fallback to RO type with a better RA success rate – UE can fallback to a new RO type with higher Msg1 repetition number but better RSRP, and at the same time UE will have the flexibility to fallback to RO type with lower Msg1 repetition, if the one with higher Msg1 repetition is not feasible due to increased CLI. |
| Qualcomm | Yes |  |
| Huawei, HiSilicon | Yes | The RO type fallback happens during an ongoing RACH procedure, and it would be after some transmission failures (that is why the RO type fallback happens). At this situation, the priority would be to guarantee the (quick) success of the overall RACH procedure by using higher msg1 repetition number. The consideration for higher resource utilization would be secondary and shall be down-prioritized.  On the other aspect of specification effort, choosing higher or lower msg1 repetition number based on a criterion e.g. RSRP measurement would require further discussion for MAC spec or even RRC spec (e.g. gNB needs to allow or not such UE behavior) and such discussion would be not desired at this stage of Rel-19. |
| Apple | See comments | We would like to have a simpler solution.  In last meeting, our proposal is simple enough to support Nokia’s point, where UE performs independent resource set selection in two RO types. Our logic was network configuration should be flexible enough thus the RO resource configuration for two types could be independent.  However, companies were saying they are fine to restrict the same repetition numbers are configured for both RO types, so that UE can perform fallback. And during the fallback procedure, no RSRP threshold checking is performed.  To sum up, since it is already implemented in MAC spec, we would like to keep it this way: Do not introduce the RSRP checking for fallback at this time point if to support fallback to higher repetition (when the same repetition is not available). We don’t have strong view whether to support fallback to a higher repetition number or not. |
| LGE | Okay | From the UE operation point of view, it would be simpler to select only the same repetition number. Additional step to select the different repetition number increases the UE complexity, and may cause some additional issue when the new configuration for the other RO type is applied in various scenarios. Also note that in RACH configuration Option 1, same Msg1 repetition number would be configured in both RO types.  But we also understand the network vendors’ views to have more flexibility on the network configuration, in RACH configuration Option 2. So we are fine to select the next higher repetition number when the RO type is switched and there is no set of RA resources with the same repetition number.  For Nokia’s comment, understand the intention that the appropriate repetition number may be lower in the other RO type, but it would cause additional UE complexity due to re-evaluation of applicable Msg1 repetition number. Given that current RACH partitioning framework is already complicated, additional operation on the existing RACH partitioning framework is not desirable. |

3. Other open issues for MAC

Please list any other outstanding open issues that are critical for the MAC running CR to be fully functional. It is recommended to preclude the issues that have been discussed during the past meetings, to ensure efficient use of the remaining time budget.

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| **Company** | **Other identified open issues? (please describe)** |
| ZTE001 | Both of the RO types (SBFD RO and non-SBFD RO) can further derive 4-step RA. So here if non-SBFD RO choose 2-step RA and falls back to 4-step RA, it should say which RO type it can falls back to. Otherwise, UE does not know which RO type of the 4-step RA to use in the following 5.1.2, resource selection.  Suggest to add open issue here:  When non-SBFD RO 2-step RA falls back to 4-step RA, which RO type can the 4-step RA be?  [Rapp] My previous understanding is, UE will not change RO type when performing 2-step to 4-step fallback, i.e., will fallback to 4-step RA with non-SBFD RO, while I am open to check whether it is common understanding by adding it to the open issue list for the discussion in the next meeting.  [Nokia]: We share the same view as Rapp  [Huawei, HiSilicon]: Agree with Rapp  [Apple]: Agree with Rapp. |
| ZTE002 | *ra-OccasionList* is ordered according to legacy RO time/frequency location. We should discuss whether *ra-OccasionList* should be a separate parameter configured for SBFD RO, or SBFD RO reuse the legacy *ra-OccasionList* (if in this way, RRC field description may need some change).  Suggest to add open issue:  When SBFD RO is indicated in CFRA, whether/how the *ra-OccasionList* in CSI-RS based CFRA needs reinterpretation?  [Rapp] Seemingly, it should be of RRC open issue?  [RRC spec Rapp]: I see no point to treat *ra-OccasionList* differently for legacy RO and SBFD RO. Also I feel this is not critical for the function-freezing in August meeting? What is needed to add in RRC spec for this or what would be the issue if nothing is added?  [Apple]: Wondering is there any request from RAN1 to introduce different *ra-OccasionList*? |
| ZTE003 | This case makes sense: even if CBRA does not provide any SBFD RO (neither option 1 or option 2), gNB can still schedule SBFD RO to UE in CFRA.  [Rapp] Not fully understand why NW has to schedule SBFD RO for CFRA providing neither sbfd-RACH-SingleConfig nor sbfd-RACH-DualConfig.  Even if option 1 and option 2 provides exactly the same RACH-ConfigGeneric, they will derive different actual SBFD RO location. E.g., option 1 allows a SBFD RO to have at least one legacy DL symbols, option 2 allows a SBFD RO to have no legacy DL symbols. So if a RO is totally on legacy flexible symbols, this RO in option 1 will be called legacy RO, this RO in option 2 will be called SBFD RO.  So when RACH resource selection, UE should figure out either option1 or option 2 should be adopted in both CBRA and CFRA.  Since CFRA currently only contains RO type (SBFD RO or legacy RO), does not contain SBFD RO configuration (option 1 or option 2), we suggest to add an open issue:  If SBFD RO is indicated in CFRA, whether/how UE should know the SBFD RACH configuration type (option 1 or option 2) in CFRA?  [Rapp] It is reasonable to assume either sbfd-RACH-SingleConfig or sbfd-RACH-DualConfig will be provided, by which UE knows the config type, in order to use SBFD RO in CFRA. Otherwise, it doesn’t make sense for NW to let UE use SBFD RO when there is no such ROs configured. Also, RAN1 running CR (R1-2504970) assumes the same condition:  *“If a random access procedure is initiated by a PDCCH order* ***and the UE is provided either sbfd-RACHSingleConfig or sbfd-RACHDualConfig****, the PDCCH order indicates [5, TS 38.212] whether the UE uses a PRACH occasion associated with either the first PRACH occasions or the second PRACH occasions, for the PRACH transmission that is initiated by the PDCCH order.”*  [Huawei, HiSilicon] We assume SBFD configuration for CBRA in a cell would be a quite static configuration and UE would be able to read the SBFD configuration in case it is configured to do CFRA. It would be a strange implementation gNB chooses not to configure SBFD for CBRA meanwhile configuraing a UE to do CFRA with SBFD resource. |
| IDC01 | RAN2 agreed that *Random access procedure in SBFD symbols is supported for all the existing RACH trigger events except for SI request. FFS for LTM*. In the last meeting, RAN2 discussed whether to support SBFD with RACH based LTM cell switch using MAC CE. However, RAN2 has not been reached a conclusion and remaining FFS for LTM.  Hence, RAN2 needs to discuss as an open issue whether to support SBFD with RACH-based LTM cell switch and how to modify the legacy LTM cell switch command MAC CE (if needed).  [Rapp] Indeed, this issue should be covered for further discussion. I just assumed RRC open issue will handle it as have done so far. Let’s see whether this is the case.  [RRC spec Rapp] I will add this open issue in RRC discussion. Companies are welcome to participate the discussion and we will see whether or not a majority can be reached. |
| Nokia01 | In the previous RAN2 meeting, the RA-RNTI collision was briefly discussed; however, no agreement was reached. It is therefore proposed to include RA-RNTI collision as a discussion point in the next meeting, with the objective of reaching agreement on whether, and if so how, RA-RNTI collision should be addressed in the SBFD RA.  [Apple]: We also feel RA-RNTI collision can be discussed further. |
| OPPO01 | Due to the configuration of different power ramping step in SBFD RACH configuration Option 2, same as the “*POWER\_OFFSET\_2STEP\_RA*”, we think that a power ramping offset for the fallback between legacy RO and additional RO needs to be added to **“***PREAMBLE\_RECEIVED\_TARGET\_POWER*”. This is to avoid the unexpected uplink power change at the RO fallback due to the use of different power ramping steps for different ROs, which impacts the UE implementation of the uplink power adjustment and uplink interference management.  The specification text/functions related to this issue are quoted as follows:  TS 38.321: 5.1.1a    Initialization of variables specific to Random Access type …  2> if *RA\_TYPE* is switched from *2-stepRA* to *4-stepRA* during this Random Access procedure:  3> set *POWER\_OFFSET\_2STEP\_RA* to (*PREAMBLE\_POWER\_RAMPING\_COUNTER* – 1) × (*MSGA\_PREAMBLE\_POWER\_RAMPING\_STEP* – *PREAMBLE\_POWER\_RAMPING\_STEP*). 5.1.3       Random Access Preamble transmission …  1> set *PREAMBLE\_RECEIVED\_TARGET\_POWER* to *preambleReceivedTargetPower* + *DELTA\_PREAMBLE* + (*PREAMBLE\_POWER\_RAMPING\_COUNTER* – 1) × *PREAMBLE\_POWER\_RAMPING\_STEP* *+* *POWER\_OFFSET\_2STEP\_RA*;  **[Apple]:** We also support to discuss this issue. Note that current running CR captured that when UE performs fallback from RO type 1 to RO type 2, Power\_OFFSET\_2STEP\_RA is maintained (inherited from RO type 1). Since it is not agreed in RAN1, we think RAN2 discussion and conclusion is required.  1> if the selected PRACH occasion is of the second PRACH occasions (as defined in TS 38.213 [6]) and *sbfd-RACH-SingleConfig-preambleReceivedTargetPower* is configured for the Random Access Procedure:  2> set *PREAMBLE\_RECEIVED\_TARGET\_POWER* to *sbfd-RACH-SingleConfig-preambleReceivedTargetPower* + *DELTA\_PREAMBLE* + (*PREAMBLE\_POWER\_RAMPING\_COUNTER* – 1) × *PREAMBLE\_POWER\_RAMPING\_STEP* + *POWER\_OFFSET\_2STEP\_RA*.  1> else if the selected PRACH occasion is of the second PRACH occasions (as defined in TS 38.213 [6]) and *sbfd-RACH-DualConfig* is configured for the Random Access Procedure:  2> set *PREAMBLE\_RECEIVED\_TARGET\_POWER* to *preambleReceivedTargetPower* (included in the *sbfd-RACH-DualConfig*) + *DELTA\_PREAMBLE* + (*PREAMBLE\_POWER\_RAMPING\_COUNTER* – 1) × *PREAMBLE\_POWER\_RAMPING\_STEP* + *POWER\_OFFSET\_2STEP\_RA*. |
| Apple001 | From MAC running CR discussion, it seems whenever the feature combination specific RACH resource is configured for RO type 2, legacy RA resource on SBFD RO should be always configured. Even if it is not needed to be explicitly captured in spec, we hope a RAN2 agreement is captured. |

**[Summary]**

4. Conclusions

The following proposals have been provided based on feedback to the above document:

[Proposals for easy agreement without contributions]

[Issues for further discussion via contributions]