**3GPP TSG-RAN WG2 Meeting #128 R2-24xxxxx**

**Orlando, USA, 18 - 22 November 2024**

**Agenda Item: 8.12.2**

**Source: Huawei, HiSilicon**

**Title: Summary of [AT128][008][CE] Response LS to RAN1 (Huawei)**

**Document for: Discussion and Decision**

# 1 Introduction

This document is to present the summary of [AT128][008][CE] Response LS to RAN1 (Huawei).

# 2 Discussion

During the online discussion, the following consensus were made with respect to answers to Q0, Q1 and Q2.

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| **Agreements**1. For Q0, RAN2 confirms that Case#1 is not precluded, i.e. Repetition number n2 and n4 are configured in one RACH-ConfigCommon, while n8 is configured in another RACH-ConfigCommon.
2. For Q1, RAN2 confirms that Case#2 is not precluded. Repetition number n2 and n4 are associated to one feature combination(i.e. msg1-repetition-r18), n8 is associated to another feature combination(i.e. msg1-repetition-r18+redCap-r17).

3 For Q2, RAN2 confirms that Case#1-Rev is not precluded |

However, regarding the answers to Q3, Q4 and Q5, company’s views are diverging during the online discussion. As the moderator of this offline, I have summarized the company’s views based on contributions and proposed candidate solutions to consolidate views.

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| **Q3:** If the answer to Q1 is “not precluded”, according to the following specification excerpt of TS 38.331, a UE capable of msg1-repetition but incapable of RedCap ignores the RACH resource indicated by the third *FeatureCombinationPreambles* in the case#2. In addition to the ignored RACH resource, does it mean that the corresponding parameter repetition number n8 is also ignored, i.e. considered as “not configured” to the UE?

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| ***featureCombination***Indicates which combination of features that the preambles indicated by this IE are associated with. The UE ignores a RACH resource defined by this *FeatureCombinationPreambles* if any feature within the *featureCombination* is not supported by the UE or if any of the spare fields within the *featureCombination* is set to *true*. |

**Q4:** If the answer to Q1 is “not precluded”, according to the following RAN2 agreement, a UE capable of RedCap must select the RACH resource indicated by the third *FeatureCombinationPreambles* in the case#2. For the RedCap UE, does it mean that the corresponding parameter repetition number n2 and n4 indicated by the first and second *FeatureCombinationPreambles* in the case#2 are considered as “not configured” to the UE?

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| RAN2#116bis*Proposal 1’: [Easy] In MAC perspective, a RedCap UE uses Msg1 early identification whenever transmitting preamble for CBRA, as long as the Msg1 early identification is configured for RedCap by NW.** Agreed
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**Q5:** If the answer to Q1 is “not precluded”, in a case where a UE selects a set of PRACH resources according to *featurePriorities* and S5.1.1d of TS 38.321, whether or not only parameter repetition numbers indicated for the sets of PRACH resources selected by the UE are considered as “configured” to the UE while all parameter repetition numbers indicated for all the other sets of PRACH resources as “not configured”? |

Based on the contributions, company’s views on the answers to Q3, Q4 and Q5 can be classified into the following options:

* **Option 1:** As proposed in [1], RAN2 supports interpretation 1-2: the time period is determined per feature combination. That is, one time period for feature msg1-repetition-r18 is determined based on n2 and n4. Another time period for the feature combination msg1-repetition-r18+redCap-r17 is determined based on only n8.

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| **Option 1** | **Interpretation** | **Answer to Q3** | **Answer to Q4** | **Answer to Q5** |
| 1 | 1-2 | **Y**, repetition number n8 is not configured | **Y**, repetition number n2 and n4 are not configured | Y, only the RACH resource and parameters corresponding to repetition numbers indicated for the sets of PRACH resources selected by the UE are considered as “configured” to the UE |
| NOTE: consider the “feature combination” that indicates supported features | NOTE: consider the “feature combination” that indicates supported features | NOTE: consider the “feature combination” that indicates supported features |

* **Option 2**: As proposed in [2], RAN2 supports interpretation 2-2: the time period is determined considering all feature combinations. That is, only one time period is determined based on n2, n4 and n8.

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| **Option 1** | **Interpretation** | **Answer to Q3** | **Answer to Q4** | **Answer to Q5** |
| 2 | 2-2 | N, UE still need to evaluate the applicability of repetition n8” in MAC spec | N, UE may select the RACH resource set indicated by the reptition number n2 and n4. | N, UE may fallback to other repetition numbers even though the UE selects one repetition number first. |
| NOTE: consider all repetition numbers | NOTE: consider all selected RACH resource set | NOTE: consider all selected RACH resource set |

* **Option 3** – As proposed in [3], not confirm RAN1’s provided interpretations, but focus on answer to questions.

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| **Option** | **Interpretation** | **Answer to Q3** | **Answer to Q4** | **Answer to Q5** |
| 3 | NA | Y, repetition number n8 is not configured | N, UE may select the RACH resource set indicated by the reptition number n2 and n4. | N, UE may fallback to other repetition numbers even though the UE selects one repetition number first. |
| NOTE: consider all selected RACH resource set | NOTE: consider all selected RACH resource set | NOTE: consider all selected RACH resource set |

* **Option 4** – As proposed in [4], not confirm RAN1’s provided interpretations, but focus on answer to questions.

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| **Option**  | **Interpretation** | **Answer to Q3** | **Answer to Q4** | **Answer to Q5** |
| 4 | NA | Y, repetition number n8 is not configured | Y, repetition number n2 and n4 are not configured | Y, only the RACH resource and parameters corresponding to repetition numbers indicated for the sets of PRACH resources selected by the UE are considered as “configured” to the UE |
| NOTE: consider the “feature combination” that indicates supported features | NOTE: consider the “feature combination” that indicates supported features | NOTE: consider the “feature combination” that indicates supported features |

As the moderator, I feel like it is difficult to conclude the answers based on options on the table because company have different understandings on the questions, which seems to be misleading.

* Some companies think RAN1 is asking which feature combination will be considered.
* Some companies think RAN1 is asking which RACH resource set will be considered.

Note that MAC procedures are formulated based on the logic that “**a feature combination indicating msg1 repetition can be configured with multiple repetition number, which is considered as different RACH resource set**” so directly answering to RAN1 from MAC procedures is supposed to be more confusing to RAN1 so that it might not help RAN1 to understand RAN2’s logic. Actually, the ambiguity from RAN1 is how to interpret “all the configured number of multiple PRACH transmissions” when determining time period. Note that based on the below RAN1 agreement, this time period is one common parameter for all the configured number of multiple PRACH transmissions.

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| **Appendix**

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| RAN1#114AgreementFor the number of SSB-to-RO association pattern periods *K* within the time period X,* For multiple PRACH transmissions with different numbers, support

One common*K* is implicitly determined as a minimum integer for all the configured number of multiple PRACH transmissions such that for each of $N\_{Tx}^{SSB}$ SSBs, there is at least one RO group per each configured number of multiple PRACH transmissions consisting of ROs associated with the SSB. |

In the two cases, RAN1 specification ambiguity is identified for the text “all configured number of preamble repetitions” of the concerned time period. For example, the text can be interpreted in the case#2 as**Interpretation 1-2**: the time period is determined per feature combination. That is, one time period for feature *msg1-repetition-r18* is determined based on n2 and n4. Another time period for the feature combination *msg1-repetition-r18+redCap-r17* isdetermined based on only n8.**Interpretation 2-2**: the time period is determined considering all feature combinations. That is, only one time period is determined based on n2, n4 and n8.**Interpretation 3-2**: the time period is determined per UE. That is, one time period for UEs capable of feature *msg1-repetition-r18* but incapable of *redCap-r17* is determined based on n2 and n4. The second time period for UEs capable of both the feature *msg1-repetition-r18* and *redCap-r17* isdetermined based on n2, n4 and n8.**Case#2:** Only single *RACH-ConfigCommon* isconfigured with multiple feature combinations. As shown in Figure 2, repetition number n2 and n4 are associated to one feature combination(i.e. *msg1-repetition-r18*), n8 is associated to another feature combination(i.e. *msg1-repetition-r18*+*redCap-r17*). Figure 2 |

Therefore, the moderator proposes **Option 5** to only provide RAN2 common understanding on how multiple repetition numbers are configured and the relation with the feature combination rather than answering Y or N as requested by RAN1 to the questions directly.

* **Option 5** – Only provide RAN2 common understanding on how multiple repetition numbers are configured, rather than the answers.

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| **Option**  | **Interpretation** | **Answer to Q3** | **Answer to Q4** | **Answer to Q5** |
| 5 | RAN2 understands that multiple repetition numbers can be configured per feature combination, and the UE shall consider all the configured repetition numbers for the feature combination(s) indicating supported features as “all configured repetition numbers”. | NA | NA | NA |

3 Questionnaire

For efficient offline, companies are encouraged to provide your preference among the above options (**Option 1- 5**) before the offline into below questionnaire. But it is also acceptable to indicate your option during the offline if you are not available before offline.

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| **Company** | **Contact Email** | **Option** | **Comment** |
| Qualcomm | linhaihe@qti.qualcomm.com | Option 1 | 1. It is beneficial for RAN1 if RAN2 tells RAN1 directly which interpretation is correct. That helps avoid potential ambiguity and RAN1 do not need to interpret what our reply exactly means.
2. “not configured” is misleading, as network generally considers any parameters included in SIB1 and dedicated signaling as configured to UE. We think a more appropriate term to use in the reply to RAN1 should be “not applicable”
3. It is useful to include in the reply LS that “Fallback between different repetition numbers of different feature combinations is not allowed, e.g. a RedCap UE with 4 repetition cannot fallback to the non-redcap RACH partition for 8 repetitions”. This restriction may not be well known in RAN1. It can be one of the sources of confusion for RAN1 colleagues.
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3 Conclusion

From the offline discussion, we made the following proposals:

5 Reference

1. R2-2410617 Discussion on LS from RAN1 on the time period for R18 preamble repetition Huawei, HiSilicon discussion Rel-18 NR\_cov\_enh2-Core
2. R2-2410447 Discussion on RAN1 LS on time period in Msg1 repetition ZTE Corporation discussion Rel-18 NR\_cov\_enh2-Core
3. R2-2410819 Discussion on RAN1 LS on the time period for R18 preamble repetition LG Electronics Inc. discussion Rel-18 NR\_cov\_enh2-Core
4. R2-2410543 Discussion on RAN1 LS on time period Ericsson discussion Rel-18 NR\_cov\_enh2-CoreTS 3GPP 38.321 V18.3.0