**3GPP TSG RAN WG1 #118 R1-240xxxx**

**Maastricht, NL, August 19th - 23rd, 2024**

**Source: Moderator (vivo)**

**Title:** **Summary#1 of discussions on time offset for PRACH repetition in CFRA**

**Agenda Item: 8.1**

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

# Introduction

This document is a summary of discussions on the Rel-18 CR on time offset between RO groups for PRACH repetition in CFRA, as provided in [1]. Changes proposed in the CR are copied to Appendix directly for easy discussions.

Discussions and views on this CR will be collected and summarized in section 2 and section 3, and a conclusion will be made in section 4 based on the discussions.

# Discussion

In existing RAN1 specification, *msg1-RepetitionTimeOffsetROGroup* is only used to describe how a gap between 2 RO groups is determined, assuming there’s no ambiguity to determine the value of *msg1-RepetitionTimeOffsetROGroup* in CBRA as there’s only one time offset associated to corresponding PRACH transmission in CBRA. And PRACH repetition in CFRA was not agreed to be supported yet when the concerned specification was written.

Later, RAN2 agreed to support PRACH repetition in CFRA for handover ordered by high layer and SI request, but it was still an open issue on whether and how *msg1-RepetitionTimeOffsetROGroup* should be supported for CFRA.

Then, in RAN2 #126 meeting, it has been agreed to also support time offset between RO groups in case of PRACH repetition in CFRA, wherein the *msg1-RepetitionTimeOffsetROGroup* is provided by *FeatureCombinationPreambles* that provides a *msg1-RepetitionNum* equal to the *msg1-RepetitionNum* provided in *RACH-ConfigDedicated*. This means one of the time offset configurations from CBRA will be determined (based on repetition numbers configured for CBRA and CFRA) for RO gap determination for PRACH repetition in CFRA.

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| RAN2 #126 agreement:* For both RedCap and non-RedCap UEs, msg1-RepetitionTimeOffsetROGroup associated with the same repetition number in FeatureCombinationPreambles is applied (for both CFRA and SI request)
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More specifically, there could be multiple *FeatureCombinationPreambles* providing different values of *msg1-RepetitionTimeOffsetROGroup* in a serving cell for PRACH repetition in CBRA, and it is necessary to specify how one of the *msg1-RepetitionTimeOffsetROGroup* values is determined for PRACH repetition in CFRA.

According to above, the change request seems natural and moderator proposal 1 is prepared for collecting views from companies.

**Moderator proposal 1:**

* Adopt the CR provided in R1-2406160 to capture how one of the *msg1-RepetitionTimeOffsetROGroup* values configured for CBRA is determined for PRACH repetition in CFRA.

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| For a PRACH transmission with preamble repetitions in CFRA procedure, *msg1-RepetitionTimeOffsetROGroup* is determined by the *FeatureCombinationPreambles* indicating *msg1-Repetitions* with same value as *msg1-RepetitionNum* provided by *RACH-ConfigDedicated*. |

Table 1. Company views on Moderator proposal 1

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| **Company Name** | **Support (Yes/No)** | **Comments if answer is No or if any update of the CR is needed.** |
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# Proposal for online discussion

TBD.

# Conclusion

TBD.

# Reference

1. [R1-2406160](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_118/Docs/R1-2406160.zip), Draft CR on time offset for PRACH repetition in CFRA, 3GPP TS RAN1 #118, vivo, August. 2024.

# Appendix

CR in [R1-2406160](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_118/Docs/R1-2406160.zip).

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8.1 Random access preamble\*\*\* Unchanged text omitted \*\*\*Within a time period, for set(s) of $N\_{preamble}^{rep}$ valid PRACH occasions for a PRACH transmission with $N\_{preamble}^{rep}$ preamble repetitions - the first valid PRACH occasion of the first set is the first valid PRACH occasion - the first valid PRACH occasion of subsequent sets, if any, is determined according to an ordering of valid PRACH occasions - first, in increasing order of frequency resource indexes for frequency multiplexed PRACH occasions- second, in increasing order of time resource indexes for time multiplexed PRACH occasions where, for each frequency resource index for frequency multiplexed PRACH occasions- the first valid PRACH occasion of the first set is the first valid PRACH occasion - the first valid PRACH occasion of subsequent sets, if any, - is after *msg1-RepetitionTimeOffsetROGroup* consecutive valid PRACH occasions in time from the first valid PRACH occasion of the previous set, where each PRACH occasion is associated with same SS/PBCH block index(es) and each SS/PBCH block index is associated with same preambles, if *msg1-RepetitionTimeOffsetROGroup* is provided - is after the PRACH occasions for the previous set, if *msg1-RepetitionTimeOffsetROGroup* is not providedFor a PRACH transmission with preamble repetitions in CFRA procedure, *msg1-RepetitionTimeOffsetROGroup* is determined by the *FeatureCombinationPreambles* indicating *msg1-Repetitions* with same value as *msg1-RepetitionNum* provided by *RACH-ConfigDedicated*.For a PRACH transmission triggered upon request by higher layers, a value of *ra-OccasionList* [12, TS 38.331], if *csirs-ResourceList* is provided, indicates a list of PRACH occasions for the PRACH transmission where the PRACH occasions are associated with the selected CSI-RS index indicated by *csi-RS*. The indexing of the PRACH occasions indicated by *ra-OccasionList* is reset per association pattern period.Table 8.1-1: Mapping between PRACH configuration period and SS/PBCH block to PRACH occasion association period

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| PRACH configuration period (msec) | Association period (number of PRACH configuration periods) |
| 10 | {1, 2, 4, 8, 16} |
| 20 | {1, 2, 4, 8} |
| 40 | {1, 2, 4} |
| 80 | {1, 2} |
| 160 | {1} |

\*\*\* Unchanged text omitted \*\*\* |