**3GPP TSG-RAN WG2 #109e R2-2002204**

**Elbonia, 24th February – 6th March, 2020**

**Title:** LS to RAN1 on preamble-to-PRU mapping for 2-step CFRA

**Release:** Rel-16

**Work Item:** NR\_2step\_RACH-Core

**Source:** RAN2

**To:** RAN1

**Contact Person:**

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**1. Overall Description:**

During the RAN2#109e meeting, RAN2 took the following agreements on the signaling of CFRA:

**Agreements**

**For 2-step CFRA**

1 Support dedicated msgA PUSCH resources, i.e non-shared msgA PUSCH resources between CFRA and CBRA.

2 For dedicated msgA PUSCH resources, the full msgA PUSCH configuration is signaled in RACH-ConfigDedicated

3 Dedicated msgA PRACH occasions are optionally configured for 2-step CFRA. If not configured, msgA PRACH occasions for 2-step CBRA are used.

The remaining issue for CFRA after these agreements was identified as part of the open issue summary on Control Plane [1]. The remaining issue is regarding the preamble-to-PRU mapping for CFRA and how to map a dedicated preamble to a dedicated CFRA msgA PUSCH resource. Currently RAN2 have discussed two alternatives for mapping:

**Alt 1:** Reusing the preamble-to-PRU mapping rule defined by RAN1 for CBRA and signaling the number of contention free preambles per SSB (field *msgA-TotalNumberOfCFRAPreambles*), and an offset, if needed, to be used for the start of the contention free preamble in each RACH occasion (field *msgA-PreambleStartIndex*)[2]. And it is noted that for CFRA dedicated configuration may include 1-to-1 mapping between a preamble index and a PUSCH resource unit.

**Alt 2:** The PUSCH occasions corresponding to a PRACH slot are indexed, first, in increasing order of frequency resource indexes for frequency multiplexed PUSCH occasions; second, in increasing order of time resource indexes for time multiplexed PUSCH occasions within a PUSCH slot and Third, in increasing order of indexes for PUSCH slots corresponding to a PRACH slot. PUSCH occasion index is signaled in *RACH-ConfigDedicated* in addition to *ra-PreambleIndex* [3]. The indexing order can either be captured in RAN1 spec or in RAN2 specs. The validation rules for PUSCH resource and the DMRS mapping related aspects are assumed to be transparent to RAN2.

 It is clear from the discussions on these two alternatives that both may either require assistance from RAN1 or may have RAN1 specification impact. Alternative 1 has more support in RAN2.

For CFRA, RAN2 respectfully asks RAN1 to take the above alternatives into consideration and to implement one of the above solutions for CFRA preamble-to-PRU mapping and respond to RAN2 on the required signaling in order for the UE to successfully identify a PRU based on a dedicated preamble in respective SSB(s)/CSI-RS(s).

**2. Actions:**

**To RAN1:**

**ACTION:** RAN2 respectfully ask RAN1 to take the above into considerations and choose one alternative for the preamble-to-PRU mapping and reply to RAN2 on the required signaling to identify a PRU in a dedicated PUSCH occasion.

**3. Date of Next TSG-RAN WG2 Meetings:**

RAN-WG2 Meeting #109bis Sapporo, Japan 20-24 April, 2020

RAN-WG2 Meeting #110 Athens, Greece 25-29 May, 2020

RAN-WG2 Meeting #111 Toulouse, France 24-28 Aug, 2020

**4. References**

[1] R2-2001917, Summary of CP open issues, Ericsson, RAN2#109e

[2] R2-2000998, Resource configuration for 2-step CFRA, ZTE, RAN#109e

[3] R2-2000224, PUSCH Resource Configuration for 2 step CFRA, Samsung, RAN2#109e