**3GPP TSG RAN WG1 #102-e R1-200XXXX**

**e-Meeting, August 17th – 28th, 2020**

**Agenda item:** 7.1

**Source:** Moderator (Samsung)

**Title:** Summary for [102-e-NR-7.1CRs-13] Correction on PRACH power ramping suspension

**Document for:** Discussion and Decision

# Introduction

This document is a summary for email discussion “[102-e-NR-7.1CRs-13] Correction on PRACH power ramping suspension”, focusing on whether a specification change is needed for Rel-16 TS 38.213 to complete the cases that triggering UE to send power ramping suspension due to possible cancel of PRACH transmission.

The draft CR R1-2006084 [1] triggering the email discussion was originated for Rel-15, but there was no consensus in RAN1 that the identified issues are essential for Rel-15. Hence, the email discussion is for Rel-16 maintenance consideration only.

# Summary of the Preparation Phase Email Discussion

In the preparation phase email discussion, 11 companies provided their initial views on this issue, and 10 companies were supportive to trigger the official email discussion and 1 company commented this is non-essential with all cases have already been captured and there is nothing wrong with the current spec (please refer to Appendix A for the detailed views from companies on this issue).

# Collection of Companies’ View

The draft TP from R1-2006084 [1] is pasted below for the convenience. Note that only changes to the concerned sentence are listed, and the formal draft CR will be prepared, if needed, after a consensus of the group.

=========================== Start of TP for TS 38.213 ==================================

7.4 Physical random access channel

=========================== Unchanged Texts Omitted =================================

If due to power allocation to PUSCH/PUCCH/PRACH/SRS transmissions as described in Clause 7.5, or due to power allocation in EN-DC or NE-DC or NR-DC operation, or due to slot format determination as described in Clause 11.1, or due to the PUSCH/PUCCH/PRACH/SRS transmission occasions are in the same slot or the gap is small as describled in Clause 8.1, the UE does not transmit a PRACH in a transmission occasion, Layer 1 notifies higher layers to suspend the corresponding power ramping counter. If due to power allocation to PUSCH/PUCCH/PRACH/SRS transmissions as described in Clause 7.5, or due to power allocation in EN-DC or NE-DC or NR-DC operation, the UE transmits a PRACH with reduced power in a transmission occasion, Layer 1 may notify higher layers to suspend the corresponding power ramping counter.

=========================== End of TP for TS 38.213 ==================================

 Please provide company’s view in the table: e.g. comments to the TP if you agree with the issues reported in [1], or alternative TP, or any further comments.

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| **Company** | **View** |
| Samsung | In general, we think the proposed the TP is needed to keep the fairness in RACH procedure and sufficient enough to cover the cases that trigger power ramping suspension. Regarding HW’s comments that “all cases have already been captured”, we think as discussed in the draft CR [1], clearly at least there are two more cases not captured so far, as illustrated below:In section 7.4 of TS 38.213, two cases are listed as the trigger events for UE doesn’t transmit PRACH then UE notifies the power ramping suspension to higher layer, the two cases are:Case 1. “If due to power allocation to PUSCH/PUCCH/PRACH/SRS transmissions as described in Clause 7.5,” Case 2. “due to power allocation in EN-DC or NE-DC or NR-DC operation”However, based on the other part of the spec, there is some other case that UE doesn’t transmit PRACH then UE should also notify the power ramping suspension to higher layer, which are:Case 3. In section 11.1, UE may need to determine the slot format based on DCI format 2\_0, in the case that UE finds “a set of symbols” of the RO is indicated as flexible, or being scheduled by DCI to receive DL, or not provided EnableConfiguredUL-r16, UE may not transmit the PRACH or other UL in the set of symbols;Case 4. In section 8.1, it describes for single cell operation or for operation with carrier aggregation in a same frequency band, a UE does not transmit PRACH and PUSCH/PUCCH/SRS in a same slot or when a gap is less than a value; the intention is that UE doesn’t transmit them at the same time, so there is also a chance that UE chooses to not transmit PRACH;Thus, according the same rules, these case 3 and case 4 are rel-15 existing cases these may cause UE not transmitting PRACH, which also requires sending the power ramping suspension to higher layer. |
| vivo | Generally fine with TP. We slightly prefer to clarify that the gap in the TP is the gap between PRACH and PUSCH/PUCCH/SRS to make the text clearer in case there would a problem of unclear referencing if RAN1 defines a new gap in clause 8.1 in later releases. And there is one typo (describled) in the draft TP.We suggest some changes as below:‘the gap is small as describled in Clause 8.1’-> ‘the gap between a PRACH transmission and PUSCH/PUCCH/SRS transmission is small as described in Clause 8.1’ |
| Huawei | The reason why we think “all four cases have been captured” is that the other two cases (Case 3 and Case 4) have been captured in the other part of the same spec as pointed out by Samsung. So the UE behavior w.r.t. when PRACH will not be transmitted is clear. The question is whether for Case 3 and Case 4, there is a need to additionally specify that Layer 1 should notify higher layers to suspend the corresponding power ramping counter. In our understanding, this may not be necessary. Without the CR, the UE behaviour w.r.t. the suspension of power ramping timer can be regarded as unspecified.  |
| ZTE | Thanks for Samsung raising the questions. For case 3, the non-transmission is due to the slot format. I hesitate that in initial access stage, the PRACH occasion could occupy the flexible symbols, but UE doesn’t know the slot format will change the direction of flexible symbols, right? Also even in connected mode, when gNB consider how to indicate the slot format, it should include the PRACH factor into consideration. For case 4, the non-transmission is due to the requirement of gap between PRACH and PUSCH/SRS/PUCCH is not satisfied, but from my memory when we discussed the gap issue, we assume the gNB could schedule or indicate the resource of PUSCH/SRS/PUCCH safely to avoid breaking the gap rule, then the case 4 is rare and we don’t need to specify it. In conclusion, these should not be specified. |
| Samsung2 | To vivo, we are fine with the proposed change.To HW, what you understand is right, we are not proposing to add new cases to cancel PRACH transmission, which these cases have been captured in the spec elsewhere. Here just about if a UE cancels its PRACH transmission, it shall send the power ramping suspension. (Note that there is a minor difference compare the second half of the paragraph in the TP, which is “Layer 1 may notify”). In pervious design, if the PRACH gets cancelled, the power ramping counter shall be suspended. Of course, we cannot say it’s deadly system broken. But it is correction to the error (or a miss) in previous spec. That’s why we it’s more suitable for rel-16 to change instead of rel-15, per Chairman’s guidance. Hope that’s ok for you.To ZTE, the slot format is only applied to a certain of UEs as specified in 11.1. I agree when you say “when gNB consider how to indicate the slot format, it should include the PRACH factor into consideration.” But that’s for resource configuration, that the valid RO shall not be configured with DL (this has been clearly specified), but the valid RO could still be configured with Flexible, then UE shall cancel the PRACH transmission if the valid RO is still indicated as flexible. And here we just say, if UE cancelled the PRACH, it shall suspend the power ramping, just as other cases that PRACH get cancelled. For case 4, I was referring to the last paragraph of section 8.1, that if the PRACH as other UL channels are too close or in the same slot, UE did not transmit both of them, thus UE might cancel PRACH. Again, in this case, UE shall also suspend the power ramping counter. We discussed last meeting that for the gap between msgA PUSCH and msgA PRACH, that should be avoided by gNB scheduling. Not the same issue. Hope the above clarifies.  |
| DOCOMO | We are fine with the TP updated by vivo. The intention on the notification of power ramping suspension was to not increase the transmission power of PRACH unnecessary if the UE does not transmit PRACH, not limited only for the first two cases. If it is not allowed for the UE to notify power ramping suspension, it is undesirable UE behavior and may cause unnecessary interference. |
| Nokia/NSB | We are fine with this CR and prefer vivo’s version. Since UE oriented UL power management can cause unexpected interference issue at the network, we need to specify exact UE operation for UL power control. |
| Ericsson | Thanks for the discussion. We are not sure if the TP is somehow repeating what is described already at the beginning of this paragraph. “If due to power allocation to PUSCH/PUCCH/PRACH/SRS transmissions as described in Clause 7.5, or due to power allocation in EN-DC or NE-DC or NR-DC operation” vs the new update “, or due to the PUSCH/PUCCH/PRACH/SRS transmission occasions are in the same slot or the gap is small as describled in Clause 8.1,” Maybe only the SFI part is needed. |

# Conclusion

To be added after the discussion.

# Reference

[1] R1-2006084, “38.213 DRAFT CR (Rel-16, F) on PRACH power ramping suspension”, Samsung.

# Appendix A Views in the preparation phase email discussion.

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| **Moderator / Session Chair's initial view** | **Discuss over email in RAN1#102-e**Proposal is to clarify in which case UE reports power ramping suspension. Current specifications has discrepancy on which case the report is made and which case it is not. |
| **vivo** | Agree with Chairman's assessment |
| **Nokia** | Agree with Chairman's assessment |
| **CATT** | Agree to discuss in RAN1#102-e |
| **Samsung** | Agree with chairman's view. Need to clarify additional cases for power ramping suspension. |
| **Huawei** | Not essential since all cases have already been captured and there is nothing wrong with the current spec |
| **Apple** | OK to discuss in this meeting. |
| **MediaTek** | Agree with chairman's view |
| **Intel** | Ok to discuss |
| **Ericsson** | OK to discuss over email. |
| **NTT DOCOMO** | OK to discuss in this meeting. |
| **QC** | OK to discuss over email in this meeting |