**3GPP TSG-RAN WG1 Meeting #105-e R1-210xxxx**

**e-Meeting, May 10th – 27th, 2021**

**Agenda Item: 7.2.1**

**Source: Moderator (ZTE)**

**Title: Summary of email discussion for [105-e-NR-2step-RACH-01]**

**Document for: Discussion**

# Introduction

This document is intended to address the following corrections for 2-step RACH by email discussion.

[105-e-NR-2step-RACH-01] Discuss the potential LS to RAN2 on the description of RRC parameter p0-AlphaSets and whether 4-step RACH can be absent for any of the BWPs, till 5/24 – Li (ZTE)

# On the description of RRC parameter *p0-AlphaSets*

In R1-2103403, it is pointed out that the descriptions of *p0-AlphaSets* in RRC spec. are not aligned with what are described in 38.213 in following aspects:

* *p0-AlphaSets* is only for normal PUSCH according to 38.213, not for msgA PUSCH, while RRC spec. only says “except msg3”

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| ***p0-AlphaSets***  configuration {p0-pusch, alpha} sets for PUSCH (except msg3), i.e., {{p0,alpha,index1}, {p0,alpha,index2},...} (see TS 38.213 [13], clause 7.1). When no set is configured, the UE uses the P0-nominal for msg3 PUSCH, P0-UE is set to 0 and alpha is set according to msg3-Alpha configured for msg3 PUSCH. |

***Proposal 1:***

* Inform RAN2 about the following change on the description of *p0-AlphaSets* parameter in RRC specification for Rel-16.

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| ***p0-AlphaSets***  configuration {p0-pusch, alpha} sets for PUSCH (except msg3 and msgA), i.e., {{p0,alpha,index1}, {p0,alpha,index2},...} (see TS 38.213 [13], clause 7.1). When no set is configured, the UE uses the P0-nominal for msg3 PUSCH, P0-UE is set to 0 and alpha is set according to msg3-Alpha configured for msg3 PUSCH. |

## Comments to proposal 1

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| Company | Comments |
| Ericsson | On top of the red text in the FL proposal, “When no set is configured, the UE uses the P0-nominal for msg3 PUSCH” is not aligned with RAN1 spec. either since in RAN1 spec. p0-nominal can be either msg3 PUSCH or msgA PUSCH according the following text:  “*P0-nominal* will be ”.  So we need to decide whether we should follow RAN1 spec. or RAN2 spec. on the p0-nominal determination too.  And furthermore, actually, following same logic, the alpha should be either msg3-alpha or msgA-alpha too in our understanding which was also missed during the 2-step RACH WI stage, though this is now associated to proposal 2 discussions which does not have to in our understanding since p0-nominal can already be either msg3 p0-nominal or msgA p0-nominal. |
| CATT | We are fine with FL proposal because the parameter ***p0-AlphaSets*** isn’t related to msgA PUSCH. |
| Samsung | We are fine with FL proposal.  Regarding E/// comments, we may have different understanding. In 213, it defines Po\_nonimal for both msg3 and msgA; but 213 did not specify when the set is not configured, which one to use. This issue is solved by 331, then in this case, msg3 based Po\_nominal and msg3 based alpha value will be used. It completes each other rather than conflicts. |
| Huawei | Agree with FL and SS comments. |
| Ericsson2 | Regarding Samsung’s response to our comments:  Note that p0 in *p0-PUSCH-AlphaSetId* has nothing to do with the p0-nominal mentioned in 38.331 and 38.213, it’s for p0-UE, which is why we have concerns on the related text of p0-nominal as well.  - For a PUSCH (re)transmission configured by *ConfiguredGrantConfig*, ,  is provided by *p0-NominalWithoutGrant*, or  if *p0-NominalWithoutGrant* is not provided, and  is provided by *p0* obtained from *p0-PUSCH-Alpha* in *ConfiguredGrantConfig* that provides an index *P0-PUSCH-AlphaSetId* to a set of *P0-PUSCH-AlphaSet* for active UL BWP  of carrier  of serving cell  - For , a  value, applicable for all , is provided by *p0-NominalWithGrant,* or  if *p0-NominalWithGrant* is not provided, for each carrier  of serving cell  and a set of values are provided by a set of *p0* in *P0-PUSCH-AlphaSet* indicated by a respective set of *p0-PUSCH-AlphaSetId* for active UL BWP  of carrier  of serving cell |
| Nokia, Nokia Shanghai Bell | Agree with FL and Samsung comments. |
| Intel | We are fine with FL’s proposal. |
| Qualcomm | Fine with the FL proposal. |
| vivo | Agree with FL’s proposal |
| Apple | We are general ok with FL’s proposal. the wording could be updated a bit if we send the LS to RAN2. Such as RAN1 found the potential issues if ***p0-AlphaSets*** is not configured, and suggest updating the IE description.   * ~~Inform~~ Suggest RAN2 about the following change on the description of *p0-AlphaSets* parameter in RRC specification for Rel-16. |
| Moderator (ZTE) | Thanks for the comments. It seems the majority is ok with the intention of the LS. Regarding Ericsson’s comment on P0-nominal, the moderator’s view is that it would be similar to msg3-Alpha as we are discussing in section 3. The draft LS is provided in the ftp draft folder. |
| Ericsson2 | It seems companies misunderstood/missed our concern, the issue is that p0-nominal has nothing to do with ***p0-AlphaSets***, and in 38.331 it is not aligned with p0-nominal determination in 38.213. The p0 signalled in ***p0-AlphaSets*** is the p0-ue. P0-nominal is signalled by *p0-NominalWithoutGrant* or *p0-NominalWithGrant*. The issue is different from the alpha parameter issue. So this should be included in the LS as well so that 38.213 is aligned with 38.331. |

# On the clarification of 2-step RACH only operation

In R1-2103403, it was further mentioned that in NR release 16, it is possible that msg3 is not configured in all BWPs. Therefore there could be some problem on the determination of P0-nominal, alpha, and waveform for the PUSCH.

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| ***p0-AlphaSets***  configuration {p0-pusch, alpha} sets for PUSCH (except msg3), i.e., {{p0,alpha,index1}, {p0,alpha,index2},...} (see TS 38.213 [13], clause 7.1). When no set is configured, the UE uses the P0-nominal for msg3 PUSCH, P0-UE is set to 0 and alpha is set according to msg3-Alpha configured for msg3 PUSCH. |

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| ***transformPrecoder***  The UE specific selection of transformer precoder for PUSCH (see TS 38.214 [19], clause 6.1.3). When the field is absent the UE applies the value of the field *msg3-transformPrecoder*. |

However, based on the discussion in the last meeting as well as the preparation phase of this meeting, companies have different views on whether the issue exists or not. Some companies though it would be a misconfiguration if 4-step RACH is not configured on any of the BWPs.

***Proposal 2:***

To achieve common understanding on one of the following alternatives. Ask RAN2 if this is not achievable in RAN1.

* Alt 1: 4-step RACH can be absent on all BWPs in Rel-16
* Alt 2: 4-step RACH should be configured at least on the initial BWP in Rel-16

## Comments to proposal 2

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| Company | Comment |
| Ericsson | Alt2 may require new agreement among companies in order to add new conditions for the *RACH-ConfigCommon* field in system information. Alt1 seems aligned with current spec. and is a bit preferred. We’re also fine with alt2 if all companies would like to do so or let RAN2 to discuss and down-select as long as the spec. is clear. |
| CATT | We prefer to Alt.2 because there is NBC issue for REL-15 UE if 4-step RACH isn’t configured on the initial BWP. |
| Samsung | We don’t think the alt.1 is a possible understanding.  On top of NBC issue raised by CATT, even for 2step RACH, there will be switching back to 4step RACH, how is that possible if RAN2 is intentionally or aware this configuration of only 2step RACH is realistic. We think even it is allowed by signaling (still subjective to RAN2), it is a mis-configuration by gNB.  So we think alt.2 should be the understanding. |
| Huawei | We don’t think this needs any conclusion and does not expect any spec impact.  This issue can also be decoupled from the issue raised for 2step RACH - without any change does the system has problem to operate 2step RACH especially for typical gNB configurations. |
| Nokia, Nokia Shanghai Bell | Agree with Huawei that this does not need any conclusion and we do not expect to see any specification impact. Configuring the system without 4-step RACH on the initial BWP would exclude both all Rel-15 UE as well as any Rel-16 UE not supporting 2-step RACH. Hence, this would not be a sensible configuration of the network in the first place. |
| Intel | We prefer Alt. 2. We also think this could be NBC issue as Rel-15 UE cannot access to the network. |
| Qualcomm | We don’t think it is necessary to down select between Alt 1 and Alt 2. It is up to NW configuration and does not need a conclusion in RAN1. |
| vivo | We don’t see the need to conclude the these alternative, as it is up to NW configuration. |
| Apple | For the question “Ask RAN2 if this is not achievable in RAN1”, then Alt 1 is not achievable in RAN1. Alt 2 is ok for RAN1. Two alternatives are talking the same thing, like  RAN1 assume that 4-step RACH can NOT be absent on all BWPs in Rel-16, and 4-step RACH should be configured at least on the initial BWP in Rel-16. |
| Moderator (ZTE) | Thanks for the good discussions.  It seems only alt.2 might be acceptable among RAN1. But there are also multiple companies mentioned that it could be left to gNB implementation to avoid the corner case that 4-step RACH is absent on the initial BWP (even if possible from the spec) and at the same time ***p0-AlphaSets*** is also not configured.  So with either direction the TPs seem to be not needed in the end. So I am wondering if this clarification is still necessary even if we send the LS to RAN2. |
| Ericsson2 | if alternative 2 is agreed, RAN2 need to add the condition for the *RACH-configCommon* parameter in RRC spec;  Alternative 1 requires RAN2’s confirmation on whether it’s already the legacy behavior.  So RAN conclusion on proposal 2 to RAN2 as well. |

Based on the continued offline email discussion, it is proposed to have the following conclusion without spec change.

***Proposed conclusion:***

* It is RAN1 common understanding that 4-step RACH should be configured at least on the initial BWP in Rel-16
  + No spec impact is expected

# Summary

The draft LS is provided in the draft folder, [R1-210xxxx [Draft] LS on the description of RRC parameter p0-AlphaSets\_v1.docx](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_105-e/Inbox/drafts/7.2.1/Draft%20LS/R1-210xxxx%20%5BDraft%5D%20LS%20on%20the%20description%20of%20RRC%20parameter%20p0-AlphaSets_v1.docx)…

Updated in **R1-2106128**.

## Comments to the draft LS?

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| Company | Comment |
| Ericsson | For the proposal 1, it seems companies misunderstood/missed our concern, the issue is that p0-nominal has nothing to do with ***p0-AlphaSets***, and in 38.331 it is not aligned with p0-nominal determination in 38.213. The p0 signalled in ***p0-AlphaSets*** is the p0-ue. P0-nominal is signalled by *p0-NominalWithoutGrant* or *p0-NominalWithGrant*. The issue is different from the alpha parameter issue. So this should be included in the LS as well so that 38.213 is aligned with 38.331.  For proposal 2, if alternative 2 is agreed, RAN2 need to add the condition for the *RACH-configCommon* parameter in RRC spec;  Alternative 1 requires RAN2’s confirmation on whether it’s already the legacy behavior.  2-step RACH only case is not a mis-configuration, it is a correct configuration supported based on current spec.. But we’re also open to discuss whether we should not allow 2-step RACH only operation in initial BWP and this may needs RAN2 discussions as well.  Anyway, RAN1 alternatives discussed on proposal 2 should be sent to RAN2 as well. We can also request Ran2 to decide or give RAN1 guidance on this. |
| CATT | We are fine with original draft LS from FL proposal on the description of RRC parameter p0-AlphaSets and draft LS needn’t address proposal 2 because there is no any consensus on this in RAN1. |
| Apple | W/O Proposal 2 in LS seems not the issue. Basically, if we agree with the Proposal 1, then we agree 4-step RACH absent on all BWPs is valid case, otherwise the msg3 is always there.  This issue is discussed two meetings, anyway we need some conclusion here to avoid endless discussion. |

# References

1. [R1-2105507](http://www.3gpp.org/ftp/tsg_ran/WG1_RL1//TSGR1_105-e/Docs/R1-2105507.zip) Discussion on corrections for 2-step RACH Ericsson