3GPP TSG-RAN WG1 Meeting #110bis R1-220xxxx

e-Meeting, October 10th – 14th, 2022

**Agenda item:** 7.1

**Source:** Moderator (Qualcomm Incorporated)

**Title:** [110bis-e-NR-R15-08] - Discussion on timeline for group power control command

**Document for:** Discussion and Decision

# Background

This email discussion is to treat the following contribution (CR for Rel-16):

R1-2209934 Draft CR on Clarification on timelines for group power control command Qualcomm Incorporated

The contribution above proposes to define the timelines for group power control as . According to the proponents, based on the current specifications the UE has zero or negative time to decode a DCI and apply the TPC command. For completeness, the “reasons for change”, “summary of change” and actual CR change are shown below:

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| ***Reason for change:*** | Current specification does not clarify what is the required timeline for application of TPC commands carried over group DCIs (DCI format 2\_2 scrambled by TPC-PUCCH-RNTI or TPC-PUSCH-RNTI, or DCI format 2\_3 scrambled by TPC-SRS-RNTI).For instance, if we conside the case of using 2\_2 for power control of CG-PUSCH, where the CG-PUSCH reads as follows (TS 38.213, 7.1.1):- If a PUSCH transmission is configured by *ConfiguredGrantConfig*, is a number of symbols equal to the product of a number of symbols per slot, , and the minimum of the values provided by *k2* in *PUSCH-ConfigCommon* for active UL BWP of carrier of serving cell *k2* is defined in TS 38.331 as follows:PUSCH-TimeDomainResourceAllocation ::=  SEQUENCE {    k2                                      INTEGER(0..32)                                  OPTIONAL,   -- Need S    mappingType                             ENUMERATED {typeA, typeB},    startSymbolAndLength                    INTEGER (0..127)}The minimum value for *k2* is zero, therefore can be zero. This leads to the UE having to apply the TPC command non-causally, which is non-implementable.A similar issue is present in subclause 7.2.1 for PUCCH and 7.3.1 for SRS. |
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| ***Summary of change:*** | Clarify that the timeline between the reception of a TPC command and its application to a PUSCH is . This timeline is the same as the one defined in 11.1.1. |

11.3 Group TPC commands for PUCCH/PUSCH

**<Unchanged parts are omitted>**

The UE does not expect to apply a TPC command on a PUSCH or PUCCH transmission if the first symbol of the PUCCH or the PUSCH occurs within relative to a last symbol of a CORESET where the UE detects the DCI format 2\_2 carrying the TPC command. is the PUSCH preparation time for the corresponding UE processing capability [6, TS 38.214] assuming , and corresponds to the smallest SCS configuration between the SCS configuration of the PDCCH carrying the DCI format 2\_2 and the SCS configuration of the PUCCH or PUSCH.

11.4 SRS switching

**<Unchanged parts are omitted>**

The UE does not expect to apply a TPC command on an SRS transmission if the first symbol of the SRS occurs within relative to a last symbol of a CORESET where the UE detects the DCI format 2\_3 carrying the TPC command. is the PUSCH preparation time for the corresponding UE processing capability [6, TS 38.214] assuming , and corresponds to the smallest SCS configuration between the SCS configuration of the PDCCH carrying the DCI format 2\_3 and the SCS configuration of the SRS.

1. Discussion – Round 1

Please provide input by Tuesday 11th 23:59pm CET

**Q1: Do you agree that the current timelines for power control are not defined (potentially leading to unimplementable UEs) and, therefore, a CR is needed?**

* **If the answer is negative, please provide your understanding on the minimum time between end of the PDCCH carrying a DCI 2\_2 or 2\_3 and the first channel/signal the UE has to apply the power control to (in actual time).**

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| Huawei, HiSilicon | No.Because the concerned timelines were explicitly discussed and the following agreements were achieved in RAN1#93, along with TPs achieved in RAN1#94. It is not true to claim “not defined”.The only issue is that for a special case with minimum configured k2=0, whether the Tproc,2 specified in TS 38.214 should be taken into account for the timeline of applying TPC to a configured PUSCH. Since the k2 is always subject to Tproc,2, zero k2 does not mean that a UE can response with zero symbol gap but a gap larger than Tproc,2. With this common understanding, for the issue above, Tproc,2 should be taken into account. A CR could be OK to clarify it only for the specific case with minimum k2=0. For the other cases, it is unclear for us why new UE behaviours causing NBC issues are needed. **RAN1#93****Agreement:**K value for non-scheduled UL transmission is the minimum of the common configured K2 values of the associated BWP.* Applies for both PUSCH and SRS

**Working Assumption**For PUCCH, K value for non-scheduled UL transmission is the minimum of the common configured K2 values**Working Assumption**For group common TPC* If group TPC commands for PUSCH are received the K symbols before PUSCH transmission period i, the accumulation is updated according to all the group common TPC commands;
* If group TPC commands for PUCCH are received the K symbols before PUCCH transmission period i, the accumulation is updated according to all the group common TPC commands;
* If group TPC commands for SRS not tied with PUSCH are received the K symbols before SRS transmission period i, the accumulation is updated according to all the group common TPC commands;

Notes: How to capture the above is up to editor, especially for the time unit of i and K. **RAN1#94****Agreement**Following working assumption is confirmedFor PUCCH, K value for non-scheduled UL transmission is the minimum of the common configured K2 values**Agreement**The text in the paragraph on the PUSCH power control in {38.213: 7.1.1 UE behaviour}.

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| - If the PUSCH transmission is configured by higher layer parameter *ConfiguredGrantConfig*,  is a number of  symbols equal to the product of a number of symbols per slot, , and the minimum of the values provided by higher layer parameter *k2* in *PUSCH-ConfigCommon* and for UL BWP  of carrier  of serving cell   |

**Agreement** The text in the paragraph on the PUCCH power control in {38.213:7.2.1 UE behaviour}.

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| - If the PUCCH transmission is not in response to a detection by the UE of a DCI format 1\_0 or DCI format 1\_1,  is a number of  symbols equal to the product of a number of symbols per slot, , and the minimum of the values provided by higher layer parameter *k2* in *PUSCH-ConfigCommon* and for UL BWP  of carrier  of serving cell   |

**Agreement** The text in the paragraph on the SRS power control in {38.213: 7.3.1 UE behaviour}.

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| - if the SRS transmission is semi-persistent or periodic,  is a number of  symbols equal to the product of a number of symbols per slot, , and the minimum of the values provided by higher layer parameter *k2* in *PUSCH-ConfigCommon* and for UL BWP  of carrier  of serving cell   |

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**Q2: If the questions to Q1 is “YES”, do you have any comments on the CR? (e.g. value of processing time, how to capture the restriction, etc.)**

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1. Conclusions

TBD