**3GPP TSG RAN WG1 Meeting #118bis R1-24xxxxx**

**Hefei, China, October 14– 18, 2024**

**Agenda Item: 7**

**Source: Moderator (Huawei)**

**Title: Summary of Discussion on open-loop power control parameters for SCell**

**Document for: Discussion and Decision**

# Introduction

An issue of open-loop power control parameters of SCell is identified in [1] and a CR is proposed in [2].

This document is a summary of discussions for this issue.

According subclause 7.1.1 of TS 38.213, is used for open-loop power control of PUSCH in the following two cases.

Case 1: If *P0-PUSCH-AlphaSet* is not provided

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| - is a parameter composed of the sum of a component and a component where . - If a UE established dedicated RRC connection using a Type-1 random access procedure, as described in clause 8, and is not provided *P0-PUSCH-AlphaSet* or for a PUSCH (re)transmission corresponding to a RAR UL grant as described in clause 8.3,  , , and , where is provided by *preambleReceivedTargetPower* [11, TS 38.321] and is provided by *msg3-DeltaPreamble* or *deltaPreamble*, or dB if *msg3-DeltaPreamble* and *deltaPreamble* are not provided, for carrier of serving cell  |

Case 2: If *p0-NominalWithGrant* is not provided

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| - 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  |

In this subclause, and is provided by *preambleReceivedTargetPower* which is configured for random access procedure.

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| - is a parameter composed of the sum of a component and a component where . - If a UE established dedicated RRC connection using a Type-1 random access procedure, as described in clause 8, and is not provided *P0-PUSCH-AlphaSet* or for a PUSCH (re)transmission corresponding to a RAR UL grant as described in clause 8.3,  , , and , where is provided by *preambleReceivedTargetPower* [11, TS 38.321] and is provided by *msg3-DeltaPreamble* or *deltaPreamble*, or dB if *msg3-DeltaPreamble* and *deltaPreamble* are not provided, for carrier of serving cell  |

However, *preambleReceivedTargetPower* is optional according to TS 38.331 and is not configured for SCell when random access procedure is not needed.

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| ***BWP-UplinkCommon* information element**-- ASN1START-- TAG-BWP-UPLINKCOMMON-STARTBWP-UplinkCommon ::= SEQUENCE { genericParameters BWP, rach-ConfigCommon SetupRelease { RACH-ConfigCommon } OPTIONAL, -- Need M pusch-ConfigCommon SetupRelease { PUSCH-ConfigCommon } OPTIONAL, -- Need M pucch-ConfigCommon SetupRelease { PUCCH-ConfigCommon } OPTIONAL, -- Need M ..., [[<other part omitted> |

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| ***RACH-ConfigCommon* information element**-- ASN1START-- TAG-RACH-CONFIGCOMMON-STARTRACH-ConfigCommon ::= SEQUENCE { rach-ConfigGeneric RACH-ConfigGeneric, totalNumberOfRA-Preambles INTEGER (1..63) OPTIONAL, -- Need S ssb-perRACH-OccasionAndCB-PreamblesPerSSB CHOICE { oneEighth ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64}, oneFourth ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64}, oneHalf ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64}, one ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64}, two ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32}, four INTEGER (1..16), eight INTEGER (1..8), sixteen INTEGER (1..4)<other part omitted> |

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| ***RACH-ConfigGeneric* information element**-- ASN1START-- TAG-RACH-CONFIGGENERIC-STARTRACH-ConfigGeneric ::= SEQUENCE { prach-ConfigurationIndex INTEGER (0..255), msg1-FDM ENUMERATED {one, two, four, eight}, msg1-FrequencyStart INTEGER (0..maxNrofPhysicalResourceBlocks-1), zeroCorrelationZoneConfig INTEGER(0..15), preambleReceivedTargetPower INTEGER (-202..-60), preambleTransMax ENUMERATED {n3, n4, n5, n6, n7, n8, n10, n20, n50, n100, n200}, powerRampingStep ENUMERATED {dB0, dB2, dB4, dB6}, ra-ResponseWindow ENUMERATED {sl1, sl2, sl4, sl8, sl10, sl20, sl40, sl80}, ..., [[ prach-ConfigurationPeriodScaling-IAB-r16 ENUMERATED {scf1,scf2,scf4,scf8,scf16,scf32,scf64} OPTIONAL, -- Need R prach-ConfigurationFrameOffset-IAB-r16 INTEGER (0..63) OPTIONAL, -- Need R prach-ConfigurationSOffset-IAB-r16 INTEGER (0..39) OPTIONAL, -- Need R ra-ResponseWindow-v1610 ENUMERATED { sl60, sl160} OPTIONAL, -- Need R prach-ConfigurationIndex-v1610 INTEGER (256..262) OPTIONAL -- Need R ]], [[ ra-ResponseWindow-v1700 ENUMERATED {sl240, sl320, sl640, sl960, sl1280, sl1920, sl2560} OPTIONAL -- Need R ]]}-- TAG-RACH-CONFIGGENERIC-STOP-- ASN1STOP |

Therefore, an observation is the following,

***Observation*:** *If either P0-PUSCH-AlphaSet or p0-NominalWithGrant is not configured, is applied for open-loop power control of PUSCH, which is determined with RRC parameter preambleReceivedTargetPower. In case of SCell, the parameter preambleReceivedTargetPower may not be configured. Therefore, the current determination of for open-loop power control of PUSCH in an SCell is infeasible for a UE if preambleReceivedTargetPower is not configured and either P0-PUSCH-AlphaSet or p0-NominalWithGrant is not configured.*

To address this issue, a proposal is,

***Proposal: For SCell, if preambleReceivedTargetPower is not configured, then both p0‑NominalWithGrant and P0-PUSCH-AlphaSet are expected to be configured.***

# Discussions

**Question 0: Please consider entering contact info below for the convenience of email contact and F2F discussions.**

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| **Company** | **Point(s) of contact** | **Email address(es)** |
| Huawei, HiSilicon | Frank Yi LONG | frank.longyi@huawei.com |
| MTK | James Hsieh | CH.Hsieh@mediatek.com |
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| Nokia | Diana Zhussip | Diana.zhussip@nokia.com |
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### Question 1-1: Does the issue in the observation in section 1 exists? If not, please elaborate a bit your views.

Companies’ views are welcome.

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| *Company* | *View* |
| Huawei, HiSilicon | As discussed before, *preambleReceivedTargetPower* is optional RRC parameter and it is confirmed in previous RAN1 CR discussion that a gNB may not configure it to a UE for SCell because it is a parameter for PRACH and may not be needed by SCell. However, the RRC parameter is used for open-loop power control of SCell in some cases. Therefore, if either *P0-PUSCH-AlphaSet* or *p0-NominalWithGrant* is not configured, the RRC parameter *preambleReceivedTargetPower* shall be configured. |
| MTK | Yes.Our view: Agree to Huawei’s proposal:* “*For SCell, if* ***preambleReceivedTargetPower*** *is not configured, then both* ***p0‑NominalWithGrant and P0-PUSCH-AlphaSet*** *are expected to be configured.*”

To us, there exists two cases which may cause problem:* + Case 1. SCell tries to access ***preambleReceivedTargetPower*** when ***p0‑NominalWithGrant*** is **not** configured. UE may fail for this case.
	+ Case 2. SCell tries to access ***preambleReceivedTargetPower*** when ***P0-PUSCH-AlphaSet*** is **not** configured. UE may fail for this case.
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| Samsung | Yes, the issue can be happened, and the issue already has been discussed in RAN1 CR (R1-2401683) for PHR. |
| Nokia | The issue exists, however the fallback has already been agreed in [R1-2401838](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_116/Docs/R1-2401838.zip): when *preambleReceivedTargetPower* is not configured for the cell, then the parameter *preambleReceivedTargetPower* configured for the primary cell is applied. We prefer to generalize this approach instead of the current proposal as we have the following concerns:1. It is unclear how mandating *PUSCH-AlphaSet* configuration would help to avoid using *preambleReceivedTargetPower* for . So far, the specification defines derivation only the case when *PUSCH-AlphaSet* is not provided(case 1 in the discussion Tdoc).
2. Configuration of *p0-NominalWithGrant* will help to avoid fallback to that depends on *preambleReceivedTargetPower.* If it is clarified how we can avoid relying on *preambleReceivedTargetPower* for using *PUSCH-AlphaSet*, then mandatory provision of *p0-NominalWithGrant* is not needed.
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| Moderator | **@Samsung**, thank you for your feedback. The CR you mentioned was R17 CR R1-2401838 and its R18 mirror CR R1-2401839, but the CRs address clearly only virtual PHR. Therefore, the issue was not discussed yet. On the contrary, during that discussions, companies believed no such issue existed for real PHR and the actual PUSCH transmission, which is incorrect but is shown by the discussion history in the CR summary R1-2310481, as copied below.

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| **Question 2:** When deriving a vPHR report for an SCell, is the *p0-PUSCH-AlphaSet* from PCell configuration where the random access procedure took place, or from the SCell configuration (if present)?… <omitted>Huawei, HiSilicon: … For Q2, please clarify why the issue is only applicable to virtual PHR, but not to real PHR. In our understanding, the equation “” can be applied for some cases of real PHR. ….Nokia, NSB (Moderator): … @Huawei, do you mean that an SCell must be provided with a RACH configuration to resolve the PHR reporting question? We have experienced the issue specifically with vPHR, and believe this is because for actual PHR there is a reference transmission on the SCell that is used as basis for the SCell PHR derivation, but when there is no transmission then the vPHR equation parameterization is lacking. |

If your proposal is to take the same solution as that of vPHR, i.e. reusing the parameter from PCell configuration, then could you please clarify why the gNB cannot configure parameters p0\_NominalWithGrant and PUSCH-AlphaSet directly to the SCell? In our understanding, they are far different from the justification of *preambleReceivedTargetPower* for vPHR and their absence does not benefit either gNB nor UE implementation.  **@Nokia**, thank you for your feedback. As our reply above, the R17 CR R1-2401838 is clearly not applied to real PHR and the actual PUSCH transmission. For your first question, according to the definition of and the text “where is provided by *preambleReceivedTargetPower*”, *preambleReceivedTargetPower* is used for open-loop power control whenever PUSCH-AlphaSet is not provided, as shown in the excerpt quoted by case 1. If your question is why not to use or for open-loop power control, then replies on *PUSCH-AlphaSet* configuration according to the following excerpt and thus does not exist if PUSCH-AlphaSet is not configured. is only applicable to configured PUSCH instead of dynamic PUSCH here. In shorts, is the only available value in the case with the absence of PUSCH-AlphaSet but requires the presence of *preambleReceivedTargetPower*.

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| 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  |

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### Question 1-2: If yes for Q1-1, do you agree the proposal in section 1? If not, please elaborate a bit your concerns or alternative proposal.

Companies’ views are welcome.

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| *Company* | *View* |
| MTK | Yes. |
| Samsung | As mentioned above, the issue raised in this CR has been discussed, and the issue has been addressed as below using the parameter *preambleReceivedTargetPower* configured for the primary cell.From our perspective, same as previous RAN1 discussion, for SCell, if *preambleReceivedTargetPower* is not configured, then the parameter *preambleReceivedTargetPower* configured for the primary cell can be applied. Therefore, we suggest updated proposal as below:***Updated Proposal: If the activated serving cell is an SCell and parameter preambleReceivedTargetPower is not configured, the parameter preambleReceivedTargetPower configured for the primary cell can be applied.***[TS 38.213]7.7.1 Type 1 PH report< omitted part >If the activated serving cell is an SCell and parameter *preambleReceivedTargetPower* is not configured for the cell, then the parameter *preambleReceivedTargetPower* configured for the primary cell is applied, where the parameter refers to the one configured for the non-supplementary uplink carrier if the primary cell is configured with two uplink carriers.<omitted part> |
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### Question 1-3: If yes for Q1-1, is the CR in [2], as copied in Appendix, agreeable?

Companies’ views are welcome.

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| *Company* | *View* |
| Huawei, HiSilicon | It is necessary to capture clearly what configuration a UE is incapable of, which is essential for UE implementation. |
| MTK | Yes |
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####  [2nd round: ]

# Conclusions

# References

1. R1-2408178, “Corrections on open-loop power control parameters for SCell”, Huawei, HiSilicon, October 14 – 18, 2024.
2. R1-2408179, “Discusson on open-loop power control parameters for SCell”, Huawei, HiSilicon, October 14 – 18, 2024.

# Appendix

The CR in [2]

< Unchanged parts are omitted >

7.1.1 UE behaviour

If a UE transmits a PUSCH on active UL BWP of carrier of serving cell using parameter set configuration with index and PUSCH power control adjustment state with index , the UE determines the PUSCH transmission power in PUSCH transmission occasion as

 [dBm]

where,

- is the UE configured maximum output power defined in [8-1, TS 38.101-1], [8-2, TS 38.101-2], [8-3, TS 38.101-3] and [8-5, TS 38.101-5] for carrier of serving cell in PUSCH transmission occasion .

- is a parameter composed of the sum of a component and a component where .

- If the serving cell is an SCell and *preambleReceivedTargetPower* is not configured, then both *P0-PUSCH-AlphaSet* and *p0-NominalWithGrant* are expected to be configured.

- If a UE established dedicated RRC connection using a Type-1 random access procedure, as described in clause 8, and is not provided *P0-PUSCH-AlphaSet* or for a PUSCH (re)transmission corresponding to a RAR UL grant as described in clause 8.3,

 , , and ,

where is provided by *preambleReceivedTargetPower* [11, TS 38.321] and is provided by *msg3-DeltaPreamble* or *deltaPreamble*, or dB if *msg3-DeltaPreamble* and *deltaPreamble* are not provided, for carrier of serving cell

< Unchanged parts are omitted >