**3GPP TSG-RAN WG2 Meeting #113-e *R2-210xxxx***

**Online, 25 January–5 February 2021**

**Agenda item: 6.1.3**

**Source: Qualcomm**

**Title: Report of [AT113-e][020][NR16] MAC PH type (Qualcomm)**

**Document for: Discussion and Agreement**

# 1 Introduction

This is to report the result of the following email discussion in RAN2#113-e Meeting [1].

* [AT113-e][020][NR16] MAC PH type (Qualcomm)

Scope: Treat R2-2100734, R2-2100314, R2-2100733, R2-2101777

Phase 1, determine agreeable parts, Phase 2, for agreeable parts Work on CRs.

Intended outcome: Report and Agreed CRs.

Deadline: Schedule A

# 2 Contact Information

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| Company | Contact: Name (E-mail) |
| Qualcomm | Linhai He (linhaihe@qti.qualcomm.com) |
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# 3 Discussion

## 3.1 Timeline for PH type determination

[R2-2100314](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_113-e\Docs\R2-2100314.zip) Correction to timeline for determining PH type Qualcomm Incorporated, Nokia, Nokia Shanghai Bell, Apple, Ericsson CR Rel-16 38.321 16.3.0 1012 - F TEI16

In legacy, transmission time of PHR MAC CE and type of PH (real or virtual) are determined when the first PDCCH for UL grant is recevied after the PHR is triggered. At time of that determinition, if a serving cell has a PUSCH Tx scheduled in that slot, UE reports real PH value for that cell. Once that decision (i.e. whether to report real or virtual PH) is made, PH type for a cell does not change even if later UE is scheduled with a new UL grant or no longer performs PUSCH Tx on a serving cell (e.g. due to UL cancelation). From system’s perspective, this UE behavior is not desirable because UE reports false PH information to network. The proposed change is that UE determines PH type at the moment right before (e.g. Tproc,2 prior) the PUSCH Tx in which PHR MAC CE is sent, because after that point all new UL grants scheduled in that slot will be ignored. This enhancement would enable network to obtain more accurate PH values than legacy for its power control. On the UE side, it would align UE’s timeline for PH type determination between dynamic grant and configured grant, which can help simplify UE’s implementation of PHR procedure.

**Q1: Please provide your view on whether this enhancement should be adopted.**

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| --- | --- | --- |
| Company | Agree as is; Agree with changes; Disagree | Detailed Comments |
| Qualcomm | Agree as is |  |
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**Conclusion:**

**TBD**

If the change to PH type determination proposed in [R2-2100314](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_113-e\Docs\R2-2100314.zip) is adopted in Rel-16, there may be interoperability issue for networks in the following two cases:

1. Initially both PUSCH and SRS are scheduled in the same slot but later a PUSCH is canceled;
2. Initially only SRS is scheduled on a carrier but later a PUSCH is scheduled in the same slot on that carrier.

If network implements the change but UE does not, in Case #1 a legacy UE would report type-1 PH but an enhanced network would think it is type-3. In Case #2 a legacy UE would report type-3 PH but an enhanced network would think it is type-1.

If UE implements the change but network does not, in Case #1 an enhanced UE would report type-3 PH but a legacy network would think it is type-1 PH. In Case #2 an enhanced UE would report type-1 PH but a legacy network would think it is type-3.

To handle the potential interoperability issues describe above, the following two CRs propose to have UE report via UE capability signaling whether it implements the enhancement and network advertise in system information whether it supports the enhancement:

[R2-2100733](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_113-e\Docs\R2-2100733.zip) UE capability for enhanced PHR timeline Qualcomm Incorporated, Nokia, Nokia Shanghai Bell, Apple, Ericsson CR Rel-16 38.306 16.3.0 0494 - F TEI16

[R2-2100734](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_113-e\Docs\R2-2100734.zip) Configuration and capability signaling for enhanced PHR timeline Qualcomm Incorporated, Nokia, Nokia Shanghai Bell, Apple, Ericsson CR Rel-16 38.331 16.3.0 2350 - F TEI16

**Q2: If you agree to support the change in Q1, do you agree to introduce a UE capability and a network configuration to support the change?**

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| Company | Agree as is; Agree with changes; Disagree | Detailed Comments |
| Qualcomm | Agree as is |  |
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**Conclusion:**

**TBD**

## 3.3 PHR reporting in case of PUSCH skipping

[R2-2101777](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_113-e\Docs\R2-2101777.zip) Discussion on PHR reporting for PUSCH skipping Huawei, HiSilicon discussion Rel-16 TEI16

The issue is whether UE should change the type of PH value it reports when a PUSCH is skipped. It was first discussed in At RAN2#103bis during Rel-15 discussion and the following agreement was made:

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| --- |
| At the time of determination of PH value for a serving cell, the UE MAC assumes real transmissions for all cells with grants even if any grant is skipped |

At the last RAN2 meeting (RAN2#112-e), this issue was discussed again in email discussion [Offline-003] based on R2-2009482. As most companies did not support the change during the discussion, the following agreement was made:

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| R2-2009482 Clarification on PHR reporting for PUSCH skipping Apple CR Rel-16 38.321 16.2.1 0929 - F NR\_newRAT-Core, TEI16   * [003] Postponed * [003] The issues can be discussed only for Rel-16 |

It might be worth noting that in the last RAN1 meeting, the issue was also discussed for Rel-16 in the context of URLLC inter-UE prioritization, but without any conclusion. According to the summary of the offline discussion in [2], majority of companies think that RAN1 could follow the RAN2 previous agreements and no additional RAN1 discussion is necessary.

**Agreement**

The TP for TS 38.214 Clause 6.1.4 is endorsed in R1-2009478 (TS38.214, Rel-16, CR#0137, Cat. F)

[103-e-NR-L1enh-URLLC-06] Email discussion/approval on remaining issues on inter-UE multiplexing enhancements – Xueming (vivo)

* Issue 1: Impact to PHR calculation due to UL CI in UL CA and/or UL skipping
* Issue 2: Impact to UE power scaling due to UL CI in UL CA and/or UL skipping
* Discussion and decision by 10/29, TPs by 11/5

The email discussion was closed without any agreements or conclusions.

Based on the above information, it is proposed in R2-2101777 that:

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| Proposal: RAN2 confirms that the Rel-15 PHR reporting for UL skipping is applicable to Rel-16 without any RAN2 spec change. |

**Q3: Do you agree to keep the current Rel-16 PHR reporting behavior in the case of PUSCH skipping without any spec change?**

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| Company | Yes/No/Comment | Detailed Comments |
| Qualcomm | Yes | We prefer to keep the legacy behavior.  On the other hand, we can also support the change to have UE report virtual instead of real PH when a PUSCH is skipped, if this change is supported by **all infra vendors**. |
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**Conclusion:**

**TBD**

# 4 Conclusion

**TBD**

# 5 References

[1] RAN2 113-e Chairman Notes 2021-01-25 0900 UTC