3GPP TSG-RAN WG2 Meeting #116 electronic ***R2-211xxxx***

Online, November 1-12, 2021

**Agenda item:** 8.24.1

**Source:** China Telecom

**Title:** Draft-Summary of [AT116-e][021][NR17] Power Class (Qualcomm, China Telecom)

**WID/SID:** HPUE\_PC1\_5\_n77\_n78-Core, NR\_SAR\_PC2\_interB\_SUL\_2BUL

**Document for:** Discussion and Decision

# Introduction

This document is the report of the following email discussion:

* [AT116-e][021][NR17] Power Class (Qualcomm, China Telecom)

 Scope: Treat R2-2109355, R2-2109796, R2-2109797, R2-2109356, R2-2109799, R2-2110425, R2-2110426, Determine agreeable parts, including CRs, and reply LS if applicable.

 Intended outcome: Report, Agreed or agreed in principle CRs, approved Reply LSes if applicable

 Deadline: Wed W2, Offline approval.

Rapporteur suggests companies provide comments **before Tuesday W2 10:00 UTC (November 9**), so that the agreeable parts can be summarized before the deadline of this offline discussion.

**Contact from companies**

|  |  |
| --- | --- |
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# Discussion

## Signaling for power class 1.5

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| [R2-2109355](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109355.zip) LS on signalling for power class 1.5 (R4-2114929; contact: Qualcomm) RAN4 LS in Rel-17 HPUE\_PC1\_5\_n77\_n78 To:RAN2[R2-2109796](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109796.zip) Duty cycle signalling for power class 1.5 Nokia, Nokia Shanghai Bell CR Rel-16 38.331 16.6.0 2817 - C HPUE\_PC1\_5\_n77\_n78-Core[R2-2109797](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109797.zip) Duty cycle signalling for power class 1.5 Nokia, Nokia Shanghai Bell CR Rel-16 38.306 16.6.0 0646 - C HPUE\_PC1\_5\_n77\_n78-Core |

[R2-2109355](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109355.zip) is an LS from RAN4 on signalling for power class 1.5. In RAN4#100-e meeting, RAN4 agreed that there is a benefit to introduce a new maximum duty cycle capability to facilitate the FWA device to meet Maximum Permissible Exposure (MPE) requirements. RAN4 respectfully requests RAN2 to define a new UE capability ignalling element allowing the PC 1.5 UE to report its maximum uplink duty cycle capability for compliance with MPE.

[R2-2109796](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109796.zip) is a CR to TS 38.331 based on LS [R2-2109355](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109355.zip) for allowing the PC 1.5 UE to report its maximum uplink duty cycle capability for compliance with MPE. The proposed changes in the CR includes: adding capability *maxUplinkDutyCycle-PC1dot5-MPE-FR1* to *BandNR*.

[R2-2109797](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109797.zip) is a CR to TS 38.306 based on LS [R2-2109355](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109355.zip) for allowing the PC 1.5 UE to report its maximum uplink duty cycle capability for compliance with MPE. The proposed changes in the CR includes: adding capability *maxUplinkDutyCycle-PC1dot5-MPE-FR1* to *BandNR*.

**Q1: Do companies agree with the proposed changes in** [**R2-2109796**](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109796.zip) **and** [**R2-2109797**](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109797.zip)**?**

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| **Company** | **Yes/No** | **Comments** |
| China Telecom | Yes |  |
| Qualcomm Incorporated | Yes | We thank Nokia for providing the CRs.Unfortunately, RAN4 LS is not clear about the UE capability definition. But our understanding is in line with Nokia’s CRs. |
| Apple | Yes |  |
| MediaTek | Yes |  |
| Nokia | Yes |  |
| Intel | Yes |  |
| OPPO | Yes |  |
| Samsung  | Yes  |  |
| LG | Yes |  |
| Ericsson | Yes |  |
| ZTE | Yes |  |
| Huawei, HiSilicon | Yes |  |
| CATT | Yes |  |
| vivo | Yes |  |

**Rapporteur summary of Q1:**

All of 14 companies support the proposed changes in R2-2109796 and R2-2109797, so the rapporteur proposes that these two CRs can be agreed.

**Proposal 1: R2-2109796 and R2-2109797 can be agreed.**

## UE capability for UE power class 2 NR inter-band CA and SUL configurations

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| [R2-2109356](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109356.zip) LS on UE capability for UE power class 2 NR inter-band CA and SUL configurations (R4-2114933; contact: China Telecom) RAN4 LS in Rel-17 NR\_SAR\_PC2\_interB\_SUL\_2BUL To:RAN2[R2-2109799](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109799.zip) UE capability for UE power class 2 NR inter-band CA and SUL configurations Nokia, Nokia Shanghai Bell discussion Rel-17 NR\_SAR\_PC2\_interB\_SUL\_2BUL-Core[R2-2110425](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110425.zip) CR to TS 38.306 on UE capability for UE power class 2 NR inter-band CA and SUL configurations China Telecom, Huawei, HiSilicon CR Rel-17 38.306 16.6.0 0651 - B NR\_SAR\_PC2\_interB\_SUL\_2BUL[R2-2110426](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110426.zip) CR to TS 38.331 on UE capability for UE power class 2 NR inter-band CA and SUL configurations China Telecom, Huawei, HiSilicon CR Rel-17 38.331 16.6.0 2829 - B NR\_SAR\_PC2\_interB\_SUL\_2BUL |

[R2-2109356](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109356.zip) is an LS from RAN4 on UE capability for UE power class 2 NR inter-band CA and SUL configurations. In RAN4#100-e meeting, RAN4 has discussed the SAR solutions for UE power class 2 NR inter-band CA and SUL configurations, and achieved the agreements on duty cycle based SAR solution. It is agreed to report one total dutycycle capability of *maxUplinkDutyCycle-interBandCA-PC2* independent of power class cases for power class 2 NR inter-band CA, and report one total dutycycle capability of *maxUplinkDutyCycle- SULcombination-PC2* for power class 2 NR SUL configurations. RAN4 kindly asks RAN2 to take the RAN4 agreements into consideration and design the capability signalling.

[R2-2109799](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109799.zip) is a discussion paper based on LS [R2-2109356](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109356.zip). The proposals in this discussion paper are listed below:

**Proposal 1:** Introduce the new duty cycle capabilities within *CA-ParametersNR* in Rel-17 RRC.

**Proposal 2**: Agree to the above capability descriptions for the new PC2 duty cycle capabilities and introduce them to Rel-17 specifications in March 2022.

[R2-2110425](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110425.zip) is a Rel-17 CR to TS 38.306 based on LS [R2-2109356](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109356.zip) on UE capability for UE power class 2 NR inter-band CA and SUL configurations. The proposed changes in the CR includes: adding UE capabilities of *maxUplinkDutyCycle-interBandCA-PC2* and *maxUplinkDutyCycle-SULcombination-PC2* to *CA-ParametersNR*.

[R2-2110426](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110426.zip) is a Rel-17 CR to TS 38.331 based on LS [R2-2109356](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109356.zip) on UE capability for UE power class 2 NR inter-band CA and SUL configurations. The proposed changes in the CR includes: adding UE capabilities of *maxUplinkDutyCycle-interBandCA-PC2* and *maxUplinkDutyCycle-SULcombination-PC2* to *CA-ParametersNR*.

Since the capability descriptions proposed in [R2-2109799](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109799.zip) are quite similar to the proposed changes in CRs [R2-2110425](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110425.zip) and [R2-2110426](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110426.zip). To make it clearer and easier, the rapporteur suggests companies take the CRs [R2-2110425](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110425.zip) and [R2-2110426](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110426.zip) as the baseline for further discussion.

**Q2: Do companies agree with the proposed changes in** [**R2-2110425**](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110425.zip) **and** [**R2-2110426**](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110426.zip)**?**

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| **Company** | **Yes/No** | **Comments** |
| China Telecom | Yes | RAN4 LS is quite clear. New duty cycle capabilities shall be introduced. We think the proposed changes in R2-2110425 and R2-2110426 are aligned with RAN4 LS and can be agreed in principle. |
| Qualcomm Incorporated | Yes |  |
| Apple | Yes |  |
| MediaTek | Yes |  |
| Nokia | Yes | Yes we could agree for some baseline but formally introduce these in Rel-17 specifications in March 2022. |
| Intel | Yes | One small editorial comment on the 306 CR, the font size in some of the column is not aligned with the other text.[CTC]: Thanks for the careful review. I’ll revise it accordingly. |
| OPPO | Yes |  |
| Samsung  | Yes  |  |
| LGE | Yes |  |
| Ericsson | Yes | A q-n: We noted the 30306 CR has a NOTE that does not exist for the other similar capabilities for UL duty cycles. Is there a reason for the NOTE in particular cases of this CR? Field description already catches what UE supports in case field is absent or?NOTE: Specific targeted UL duty cycle percentage is not assumed if the field is absent.[CTC]: The NOTE is actually copied from RAN4 LS. “The *maxUplinkDutyCycle-interBandCA-PC2* capability is reported by UE as per band combination capability. The values and range is listed as below, if the field is absent, UE shall work on power class 2 regardless of UL duty cycle and may use P-MPRc as defined in 6.2.4 in 38101-1 if necessary (Note that specific targeted UL duty cycle percentage is not assumed  if the field is absent).”I also check it with our RAN4 colleague. The intention of RAN4 is to clarify that the absence of the field does not limit other solutions. To keep aligned with RAN4 LS, the NOTE is added. |
| ZTE | Yes |  |
| Huawei, HiSilicon | Yes |  |
| CATT | Yes |  |
| vivo | Yes |  |

**Rapporteur summary of Q2:**

All of 14 companies agree with the proposed changes in R2-2110425 and R2-2110426. Nokia suggests that we could agree for some baseline but formally introduce these in Rel-17 specifications in March 2022. Intel points out that some editorial revise on the font size is needed in R2-2110425. Ericsson wonders the reasons for adding the NOTEs in R2-2110425. The rapporteur clarifies that the NOTEs are actually copied from RAN4 LS and the intention of RAN4 is to clarify that the absence of the field does not limit other solutions.

Since RAN4 LS is quite clear and all the companies agree with the proposed changes in R2-2110425 and R2-2110426, the rapporteur suggests that RAN2 in-principle agrees the changes in R2-2110425 and R2-2110426 with some editorial revise on the font size.

**Proposal 2: R2-2110425 is revised in R2-2111499 with some editorial modifications on the font size. R2-2111499 can be in-principle agreed.**

**Proposal 3: R2-2110426 can be in-principle agreed.**

# Conclusion

A total of 14 companies provide views on 2 power class related RAN4 LSs and 5 corresponding CRs and discussion paper. All the companies agree with the proposed changes in these CRs based on the RAN4 LS.

Based on the above discussion, the rapporteur proposes that

**Proposal 1: R2-2109796 and R2-2109797 can be agreed.**

**Proposal 2: R2-2110425 is revised in R2-2111499 with some editorial modifications on the font size. R2-2111499 can be in-principle agreed.**

**Proposal 3: R2-2110426 can be in-principle agreed.**

# Reference

1. [R2-2109355](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109355.zip) LS on signaling for power class 1.5 (R4-2114929; contact: Qualcomm) RAN4 LS in Rel-17 HPUE\_PC1\_5\_n77\_n78 To:RAN2
2. [R2-2109796](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109796.zip) Duty cycle signalling for power class 1.5 Nokia, Nokia Shanghai Bell CR Rel-16 38.331 16.6.0 2817 - C HPUE\_PC1\_5\_n77\_n78-Core
3. [R2-2109797](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109797.zip) Duty cycle signalling for power class 1.5 Nokia, Nokia Shanghai Bell CR Rel-16 38.306 16.6.0 0646 - C HPUE\_PC1\_5\_n77\_n78-Core
4. [R2-2109356](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109356.zip) LS on UE capability for UE power class 2 NR inter-band CA and SUL configurations (R4-2114933; contact: China Telecom) RAN4 LS in Rel-17 NR\_SAR\_PC2\_interB\_SUL\_2BUL To:RAN2
5. [R2-2109799](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109799.zip) UE capability for UE power class 2 NR inter-band CA and SUL configurations Nokia, Nokia Shanghai Bell discussion Rel-17 NR\_SAR\_PC2\_interB\_SUL\_2BUL-Core
6. [R2-2110425](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110425.zip) CR to TS 38.306 on UE capability for UE power class 2 NR inter-band CA and SUL configurations China Telecom, Huawei, HiSilicon CR Rel-17 38.306 16.6.0 0651 - B NR\_SAR\_PC2\_interB\_SUL\_2BUL
7. [R2-2110426](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110426.zip) CR to TS 38.331 on UE capability for UE power class 2 NR inter-band CA and SUL configurations China Telecom, Huawei, HiSilicon CR Rel-17 38.331 16.6.0 2829 - B NR\_SAR\_PC2\_interB\_SUL\_2BUL