3GPP TSG-RAN WG4 Meeting #109 R4-2321825

**Chicago, USA, November 13 – 17, 2023**

**Title:** [Draft] LS reply on further clarifications on enhancements to realize increasing UE power high limit for CA and DC

**Response to:** R4-2318078 (R2-2311611)

**Release:** Rel-18

**Work Item:** NR\_cov\_enh2

**Source:** TSG RAN WG4

**To:** TSG RAN WG2

**Cc:** TSG RAN WG1

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**Attachments: None**

# 1 Overall description

RAN4 thanks RAN2 for the LS on further clarifications on enhancements to realize increasing UE power high limit for CA and DC in R2-2311611.

Regarding the questions from RAN2, RAN4 would like to share the following answers.

* **Q1**: What exact information is required to be reported by the UE (i.e., how many bits are required to support the reporting of this information)?

**Answer from RAN4**:

* For ΔPPowerClass reporting
* Both ΔPPowerClass for a serving cell (the reduction of the maximum output power per serving cell) and ΔPPowerClass, CA/ΔPPowerClass, EN-DC/ΔPPowerClass, NR-DC for a band combination (reduction of the maximum total output power per band combination) should be considered.
	+ For a serving cell, 2 bits are needed to cover 0, 3 and 6 dB for ΔPPowerClass.
	+ For a band combination a granularity of 1 bit for ΔPPowerClass, ΔPPowerClass, CA/ΔPPowerClass, EN-DC/ΔPPowerClass, NR-DC: then 0 dB and ≥[3] dB.
* ΔPPowerClass for a serving cells of a band combination should also be reported with a 2 bit granularity.
* For full power transmission mode capability reporting,RAN4 has no consensus on that in Rel-18.
* **Q2**: What is the granularity of the information to be reported (e.g., per UE / per cell / other option)?

**Answer from RAN4**:

* The capability of ΔPPowerClass reporting is per UE
* ΔPPowerClass reported per serving cell.
	+ ΔPPowerClass, CA/ΔPPowerClass, EN-DC/ΔPPowerClass, NR-DC per band combination
* For a band combination, UE can choose the two options below:
	+ Reporting of ΔPPowerClass, CA/ΔPPowerClass, EN-DC/ΔPPowerClass, NR-DC only
	+ Reporting of ΔPPowerClass, CA/ΔPPowerClass, EN-DC/ΔPPowerClass, NR-DC per band combination and ΔPPowerClass per serving cell of band combination configured
* Network configures the reporting of ΔPPowerClass and/or ΔPPowerClass, CA/ΔPPowerClass, EN-DC/ΔPPowerClass, NR-DC forthe overhead reduction purpose.

Alternative from Samsung (which is more friendly for UE implementation):

* The capability of ΔPPowerClass reporting is per UE
* ΔPPowerClass reported per serving cell.
	+ ΔPPowerClass, CA/ΔPPowerClass, EN-DC/ΔPPowerClass, NR-DC reported per band combination
* For a band combination, UE can choose the two options below:
	+ Dot not support any reporting for ΔPPowerClass/ΔPPowerClass, CA/ΔPPowerClass, EN-DC/ΔPPowerClass, NR-DCReporting of ΔPPowerClass, CA/ΔPPowerClass, EN-DC/ΔPPowerClass, NR-DC per band combination and ΔPPowerClass per serving cell of band combination configured
* Network configures the reporting of ΔPPowerClass and/or ΔPPowerClass, CA/ΔPPowerClass, EN-DC/ΔPPowerClass, NR-DC forthe overhead reduction purpose.
* **Q3**: Will RAN4 specification(s) specify the triggering condition(s) when this reporting should be performed by the UE, to which RAN2 specification(s) could then refer to when writing the reporting procedure?

**Answer from RAN4**:

Option 1:

The conditions to allow UE to set a different ∆PPowerClass, ∆PPowerClass,CA, ∆PPowerClass, EN-DC and∆PPowerClass,NR-DC value are already specified in RAN4 specifications except that this reporting scheme shall be associated with duty-cycle management and the reporting must be configured with a UE by a network. Hence RAN4 will specify the side-condition information on ∆PPowerClass and∆PPowerClass,CA reporting in TS 38.101-1, and those for UE report on ∆PPowerClass, EN-DC and∆PPowerClass,NR-DC in TS 38.101-3, respectively.

Further, the ΔPPowerClass reduces the configured maximum power (Pcmax,f,c) of the UL power control and the corresponding for the BC the maximum power at which the UE prioritizes transmissions. RAN4 therefore assumes that the triggering is detailed in RAN2 specification, e.g., these changes of the maximum output power can be triggered by an aperiodic report similarly to DL PL changes for the existing PHR (the DL PL also part of the UL power control), it is not specified in RAN4 specifications.

# 2 Actions

**To RAN2**

**ACTION:** RAN4 respectfully asks RAN2 to consider above information for their future work on the implementation of ΔPPowerClass reporting.

# 3 Dates of next TSG RAN WG4 meetings

TSG RAN WG4 Meeting #110 February 26 – March 1, 2024 Athens, Greek