**3GPP TSG-RAN WG2 Meeting #121bis-e *R2-230xxxx***

**e-Meeting, 17th – 26th April, 2023**

Title: DRAFT LS on HARQ enhancement for IoT NTN

Response to: -

Release: Release 18

**Work Item:**  IoT\_NTN\_enh-Core

Source: OPPO (to be RAN2)

To: RAN1

Cc: -

**Contact Person:**

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Attachments: -

**1. Overall Description:**

For Rel-18 IoT NTN’s HARQ enhancements, RAN2 has agreed to introduce HARQ mode A and HARQ mode B for UL HARQ operation. For an UL HARQ process configured with HARQ mode A, UE does not expect to receive (N)PDCCH for the given HARQ process before a period of UE-eNB RTT has passed since (N)PUSCH transmission, as supported in Rel-17 IoT NTN. For an UL HARQ process configured with HARQ mode B, UE can expect to receive (N)PDCCH for the given HARQ process within the period of UE-eNB RTT. Relevant RAN2 agreements are given below.

Agreement in RAN2#119e:

1. For UL HARQ operation, introduce two HARQ modes, i.e., HARQ mode A and HARQ mode B in IoT NTN (both NB-IoT and eMTC NTN), similarly to NR NTN.

Agreements in RAN2#119bis-e:

1. HARQ mode A/B for uplink transmission may be configured per UL HARQ process at least via UE specific RRC signalling for eMTC and NB-IOT NTN. We can also revert this decision if requested by RAN1.

Agreements in RAN2#120:

1. RAN2 understands that something needs to be added to consider the processing time also for inactivity timer of HARQ mode B.

To facillate RAN2’s work, RAN2 would like to seek answers from RAN1 for the following questions.

**Question 1**: For an UL HARQ process with HARQ mode B for NB-IoT UEs, what is the minimum time between the end of NPUSCH transmission and NPDCCH reception for the same HARQ process?

**Question 2**: For UL multiple TB scheduling, which of the following HARQ mode combinations does RAN1 intend to support?

* Case 1: all HARQ processes corresponding to the scheduled multiple TBs are configured with HARQ mode A
* Case 2: all HARQ processes corresponding to the scheduled multiple TBs are configured with HARQ mode B
* Case 3: some HARQ processes corresponding to the scheduled multiple TBs are configured with HARQ mode A and the others are configured with HARQ mode B

**2. Actions:**

**To RAN1**

**ACTION:** RAN2 respectfully asks RAN1 to take above information into account and to provide answers to the above questions.

**3. Date of Next TSG-RAN WG2 Meetings:**

TSG-RAN WG2 Meeting #122 22th – 26th May 2023 Incheon, KR

TSG-RAN WG2 Meeting #123 21th - 25th August 2023 Toulouse, FR