3GPP TSG-RAN WG1 Meeting #101 R1-200xxxx

e-Meeting, May 25th – June 5th, 2020

**Title:** [DRAFT] LS on UE capability on wideband carrier operation for NR-U

**Release:** Rel-16

**Work Item:** NR\_unlic-core

**Source:** RAN WG 1

**To:** RAN WG 4, RAN WG2

**Cc:**

**Contact Person:**

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**1. Overall Description:**

RAN1 is discussing NR-U UE feature on wideband carrier operations about whether to add UE capabilities for Mode 1, Mode 2 and Mode 3 from [1].

The following DL wideband operation cases are discussed.

* **DL Case 1**: Intra-band CA
* **DL Case 2**: Wideband carrier operation Modes 2/3 without scheduling intra-cell guard bands
  + DL Case 2a: Mode 2 where single wideband carrier when LBT is successful in a subset of the LBT sub-bands which are contiguous [1]
  + DL Case 2b: Mode 3 where single wideband carrier when LBT is successful in a subset of the LBT sub-bands which are non-contiguous [1]
* **DL Case 3**: Wideband carrier operation Modes 2/3 with scheduling intra-cell guard bands between transmitted contiguous LBT sub-bands
* **DL Case 4**: Wideband carrier operation Mode 1 where single carrier wideband operation when LBT is successful in all LBT sub-bands [1]

For DL operation, RAN1 would like to ask RAN4 for feedbacks about the following questions.

* **Question 1:** Is there any difference in DL reception among DL Cases 1, 2a, 2b, 2, and 3 with respect to AGC when at least one of the sub-bands of a [BW or carrier] is not part of gNB’s acquired channel occupancy and contains interference from devices other than the UE’s serving gNB e.g. near-by WiFi AP? Does RAN4 think AGC issues may prevent UE to meet RAN4 requirements for Mode 2 and Mode 3?
* **Question 2a:** Is there a difference in UE capability between any of DL Cases 2a/2b and DL Case 3?
* **Question 2b:** Is there a difference in UE capability between any of DL Cases 2a/2b/3 and DL Case 4?
* **Question 2c:** Is there a difference in UE capability between any of DL Cases 2a/2b/3/4 and DL Case 1?
* **Question 3:** From RAN4 point of view, does “all LBT sub-bands” for Mode 1 refer to LBT sub-bands of configured carrier or BWP?

The following UL wideband operation cases are discussed.

* **UL Case 1**: UL wideband operation Mode 2A (UL-WB Mode 2A) where UE transmits if LBT passes for single scheduled LBT sub-band
* **UL Case 2**: UL wideband operation Mode 2B (UL-WB Mode 2B) where UE transmits if LBT passes for scheduled multiple contiguous LBT sub-bands
* **UL Case 3**: UL wideband operation Mode 1 (UL-WB Mode 1) where UE transmits only if LBT passes for all LBT sub-bands of BWP

For UL operation, RAN1 would like to ask RAN4 for feedbacks about the following questions.

* **Question 4:** Is change of transmit filtering required (as shown in Figure 1 for WB Mode 2B) to meet RAN4 requirements for any of UL Cases 1-3?
* **Question 5:** Is there any difference if intra-cell GBs between scheduled contiguous sub-bands are scheduled or not?

Finally, if the answer to any of Questions 2a/2b/2c/4/5 is yes and capabilities for any of the cases are deemed needed, RAN1 would like to request RAN4 to define the corresponding UE capabilities.



Figure 1: An example for Mode 2B

**2. Actions:**

**To RAN WG 4 group**

**ACTION:** RAN WG1 respectfully asks RAN WG4 for a response to the above questions and requests RAN4 to define the corresponding UE capabilities if the answer to any of Questions 2a/2b/2c/4/5 is yes and capabilities for any of the cases are deemed needed.

**To RAN WG 2 group**

**ACTION:** RAN WG1 respectfully requests RAN WG2 to reserve capability signalling bits for indication of Mode 1/2/3 for DL and Mode 1/2A/2B for UL as a precaution in case the capability discussion in RAN4 cannot be concluded by the end of RAN4#95-e. It is RAN WG1's understanding that the bits can be kept or reused as needed after the June deadline.

**3. Date of Next TSG-RAN WG1 Meetings:**

TSG-RAN WG1 Meeting #102 17 – 28 August 2020 e-Meeting

**4. Reference**

[1] R4-1905209, “LS reply on wideband carrier operation for NR-U,” RAN4 #90bis, April 2019