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

**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, Mode2 and Mode 3 from [1]. RAN1 would like to ask RAN4 for feedbacks about the following questions.

For DL operation, the following DL wideband operation cases are discussed:

1. Intra-band CA
2. Wideband carrier operation Modes 2/3 without scheduling intra-cell guard bands
	* Mode 2: Single wideband carrier when LBT is successful in a subset of the LBT sub-bands which are contiguous [1]
	* Mode 3: Single wideband carrier when LBT is successful in a subset of the LBT sub-bands which are non-contiguous [1]
3. Wideband carrier operation Modes 2/3 with scheduling intra-cell guard bands
4. Wideband carrier operation Mode 1
	* Mode 1: single carrier wideband operation when LBT is successful in all LBT sub-bands [1]
* Question 1: Does RAN4 think AGC and/or other aspects may be issues to UE to support Mode 2 and Mode 3? Is there any difference in DL reception between Cases 1) and 2) with respect to AGC and/or other aspects when at least one of the sub-bands of a BW/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?
	+ In RAN1, some companies think AGC at UE side may be an issue in Mode 2 and Mode 3 where a subset of LBT sub-bands may be acquired by devices other than the UE’s serving cell e.g. near-by WiFi APs.
* Question 2: Does UE require additional capability for Case 3) compared to Case 2)?
* Question 3: Does UE require additional capability for Cases 2) and 3) compared to Case 4)?
* Question 4: If the answer is yes to Question 2 or Question 3, does RAN4 plan to define the corresponding UE capabilities in RAN4?

For UL operation, the following UL wideband operation cases are discussed:

1. UL wideband operation Mode 2A (UL-WB Mode 2A): UE transmits if LBT passes for single scheduled LBT sub-band
2. UL wideband operation Mode 2B (UL-WB Mode 2B): UE transmits if LBT passes for scheduled LBT sub-bands
3. UL wideband operation Mode 1 (UL-WB Mode 1): UE transmits only if LBT passes for all LBT sub-bands of BWP/carrier
* Question 5: Is change of transmit filtering required to support any of UL Cases 1)-3)? If yes, will that be an issue for UE to support?
	+ In RAN1, some companies think in UL-WB Modes 2A and 2B, UE may be required to adapt filters. An example for UL-WB Modes 2B is given in Figure 1 where filtering adaptation may be applied in between UL-1 and UL-2 transmissions.
* Question 6: If RAN4 identifies any issues for UE to support any of UL WB Modes 1, 2A, and 2B, does RAN4 plan to define UE capabilities corresponding to UL WB Modes 1/2A/2B in RAN4?



Figure : In UL WB Modes 2A and 2B operation, UE may have to adapt filters according to the bandwidth of uplink transmissions. Above is 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 take the above into consideration in their future work.

**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