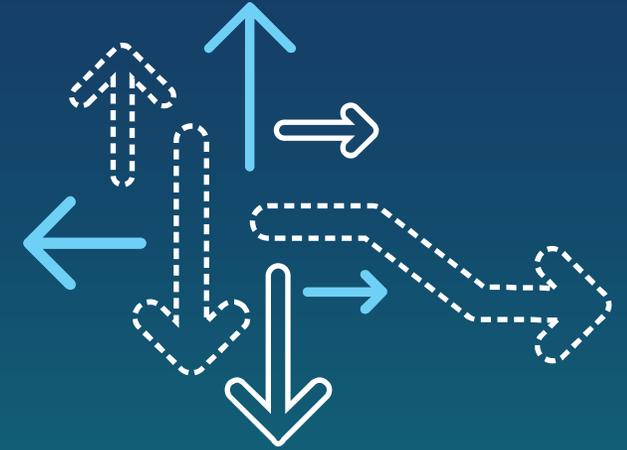


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Agenda Item 9.2.1

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NR UE Categories

Qualcomm Incorporated

Introduction

- An LS was received from RAN2 in RP 171553, “LS on UE categories and capabilities” (R2-1709979; to: RAN1, RAN4; cc: RAN), which included the following:
 - “A non-DC UE supporting a peak data rate that is lower than the data rate achievable according to the above-mentioned parameters indicates this by a per-UE category (data rate). However, a UE supporting dual connectivity (MR-DC, NR-NR DC) shall not advertise a data rate (category) that is lower than the highest data rate achievable according to any of the DC band combinations.”
 - The first condition is necessary only if RAN plenary agrees to introduce a category at all. The second condition avoids the need for inter-node negotiation how to “split” the peak data rate indicated by the UE category.
- We add our views on some remaining questions on category definitions

Background

Options for category definition

- Regarding category options, two approaches were implied in the LS:
 - Option A: In any band combination, the UE supports the data rate that can be derived with using the maximum TBS defined for the given BW, number of MIMO layers, modulation order, etc. on each CC in the band combination
 - Option B: It is allowed that the UE supports a data rate that is less than what can be derived with using the maximum TBS defined for the given BW, number of MIMO layers, modulation order, etc. on each CC in the band combination
- Note that LTE has used Option B

Background

Option A as default

- RAN2 has indicated in their LS that Option A will be the default for NR
- Option B may be used only if both the following are true
 - The RAN Plenary decides to introduce NR UE Categories
 - The signaling and other definitions allow the data rate reduction resulting from Option B to be limited within each CC group
- The Plenary needs to decide whether an NR UE Category should be introduced or not
 - Note that with Option A, the NR UE Category information is not needed to be known to the network in order to operate the air-interface properly, therefore definition of NR UE Categories would not be strictly speaking required

Proposals on NR UE Category Introduction

- We propose that NR UE Categories should be introduced
 - Irrespective of whether Option A or Option B is used
 - (For the remainder of the discussion, we assume Option A)
- A possible definition of NR UE Category
 - The UE Category should be determined as follows:
 - For each CA band combination supported (including all NR+LTE band combinations for NSA UEs and including all NR band combinations for SA UEs)
 - Calculate the total data rate across all CCs
 - The UE Category is the maximum among all such combinations
 - If multiple numerologies are supported, the maximum is taken across all numerology combinations
 - It is TBD whether the data rate should be defined as
 - Sustained data rate in maximum DL or maximum UL configurations
 - Per slot data rate with appropriate slot definition covering multiple numerologies

Remaining questions for NR UE Categories

- Q: Should there be separate NR DL and UL Categories?
 - (Note that LTE has transitioned to using separate DL and UL categories)
- Proposal:
 - Separate DL and UL categories should be defined
- Q: If separate DL and UL Categories are used, is it required that the UE reaches both in the same CA band combination?
- Proposal:
 - It should be allowed that DL and UL Category limits are reached in different CA band combinations

Thank you

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