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Data rate capabilities and feature support for NR

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Background

- Proposals to mandate 4Rx support in certain NR bands and large channel bandwidths (e.g. 100MHz) were discussed in RAN4 in previous meetings
- The proposals mentioned “eMBB” UEs, however there is no definition of what eMBB UE is
- No agreements were reached
- Such decisions could have a large impact on the ecosystem, also for a more distant future(~2025), and should be discussed at a higher level

UE Categories and Data Rate Capabilities in NR

- RAN1/2 agreed that for NR there will not be UE categories as defined in LTE
- UEs will have to support the maximum data rate implied based on Number of layers x Bandwidth x Modulation
  - There will be a scaling factor
  - E.g. a UE that supports 4Rx, 100MHz channel bandwidth and 256QAM will have to support a data rate >2Gbps with scaling factor 1 and >1.5Gbps with scaling factor 0.75
- Mandating support of certain number of layers and channel bandwidth will implicitly mandate the lowest data rate capabilities for a NR UE
  - Based on the example above, any NR UE that wants to support B41 or B77 would have to support at least >2Gbps -> very high bar to support on NR any device
- NR framework supports UEs with any channel bandwidth in a wider channel bandwidth
  - E.g. a 20MHz UE should work in any channel with >20MHz bandwidth
  - UEs with lower data rate capabilities can support narrower channel bandwidths and do not have to carry the additional of supporting wider bandwidths not required for the data rate
  - Networks should support UEs with different channel bandwidth capabilities, this is similar to bandwidth parts

UE “types” and capabilities for NR

- Framework to differentiate between UEs with different capabilities is needed for NR
  - Different UE “types” (e.g. eMBB UE, URLCC UE, etc) or categories could be used
  - Categorization/differentiation should be clearly defined
- Framework should enable the introduction of different mandatory features based on such UE types
  - E.g. Some UEs could be mandated to support 4Rx/100MHz BW but not all Rel.15 UEs would have to support this in the future
- Framework should be flexible enough to allow support of different features in the future
  - E.g. introduction of NR UEs that support only 500Mbps in the future should be allowed
- Framework should allow tradeoffs of MIMO layers vs. number of CCs vs. channel BW
  - E.g. a UE should be allowed to do 4Rx with 100MHz and 2Rx with 200MHz in the same band
- Baseline capability that all UEs support should be agreed
  - Network coverage(range) planning should take this into account such that certain level of coverage is maintained
  - Introduction of lower UE capabilities (e.g. 1Rx vs. 2Rx) should be possible in the future
  - 1Tx should be the baseline, 2Tx should be optional

Thank you

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