

R4-1813480
Agenda item: 7.6.4.3

Qualcomm Incorporated

3GPP TSG-RAN WG4 #88bis
Chengdu, CN
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Qualcomm

System level analysis for intra-band EN-DC power control



RAN 4 #88 WF

Overview of RAN 4 #88 WF

- According to WF R4-1811797, companies are supposed to provide analysis/simulation results comparing different A-MPR options for intra-band EN-DC
 - **Option 1:** A-MPR based on 38.101-3 assuming full knowledge of LTE and NR allocation
 - ✓ sub-clause 6.2B.3.1.1 for DC_(n)71B or
 - ✓ sub-clause 6.2B.3.1.2 for DC_(n)41AA or
 - ✓ Sub-clause 6.2B.3.2.1 for DC_41A-n41
 - **Option 2:** Prioritize LTE and drop NR as needed
 - ✓ This option is extensively discussed in [1]

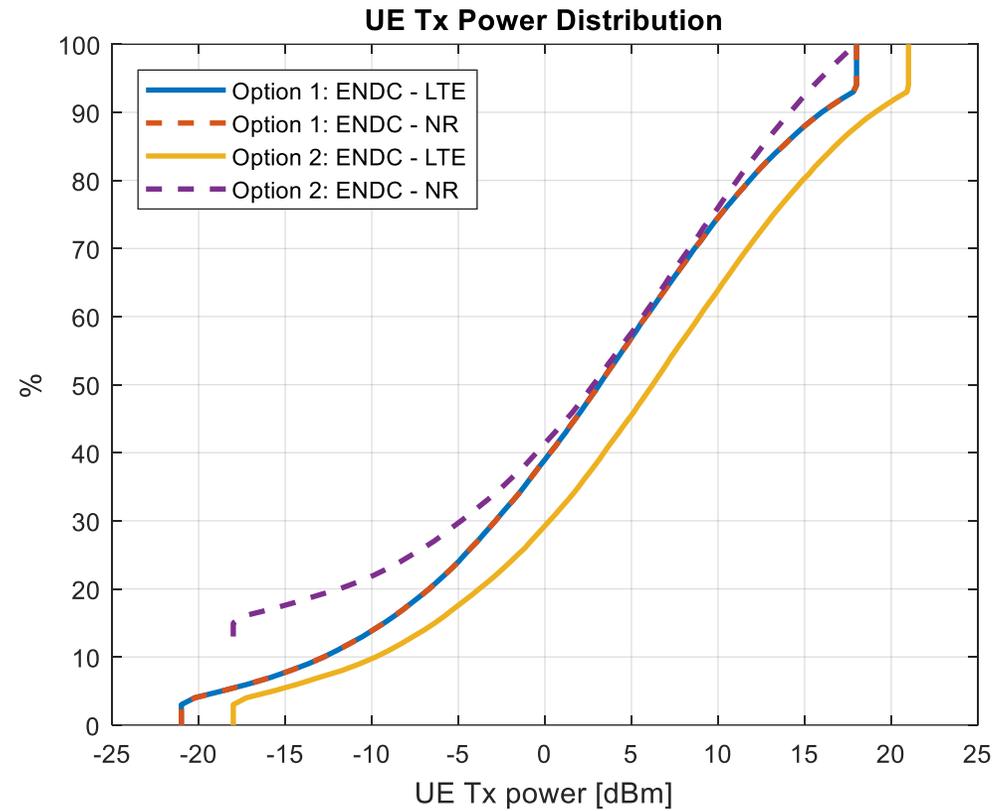
Simulation assumptions

Summary of system level assumptions

- Macro cell base stations deployment
 - BS antenna height: 30m
 - ISD: 750m
- UE parameters
 - Baseline assumptions from TR 36.886
 - Max transmitted power (P_{cmx}): 23dBm
 - #RBs per UE per RAT: 32 RBs (3 UEs per BS \rightarrow 20MHz bandwidth per RAT)
 - ✓ NR and LTE have same allocation
 - LTE MPR+A-MPR: 2dB (from TS 36.101)
 - ✓ 1dB MPR + 1dB A-MPR for allocation under consideration
 - ENDC LTE (NR) A-MPR: 5dB (from TR 38.101-3 with MPR = 0)
 - PC settings: PC set 1 and PC set 2 from TR 36.886

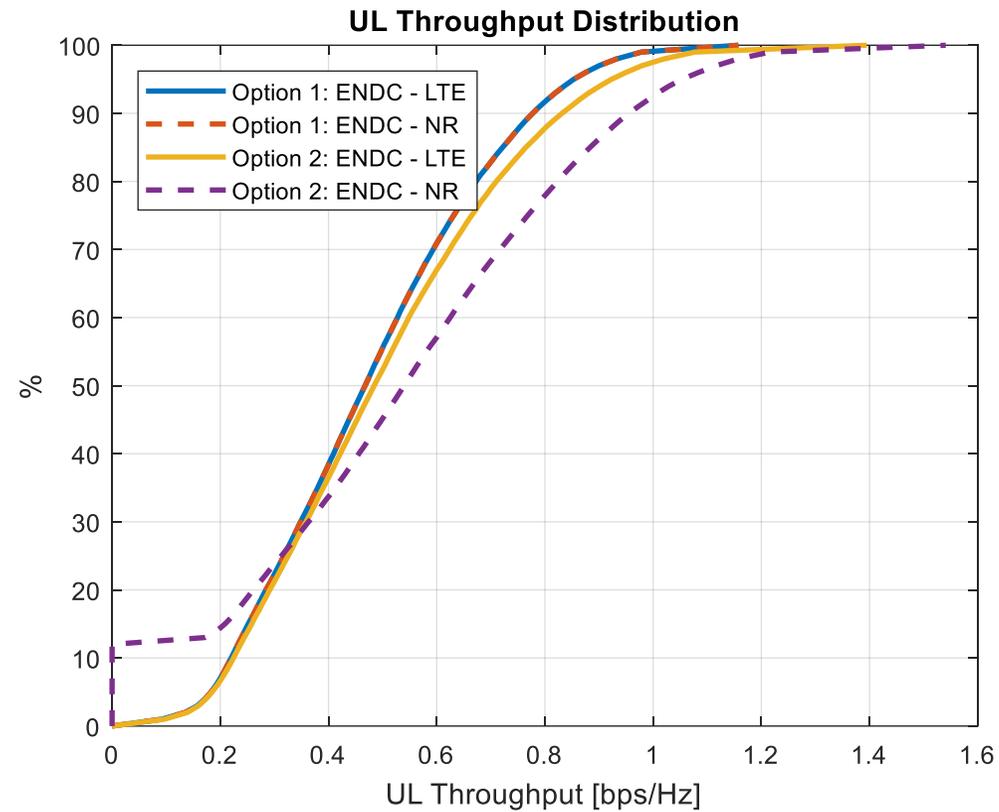
Results – PC set 1

UE Tx power distribution for PC set 1



Results – PC set 1

UL Throughput distribution for PC set 1



Results – PC set 1

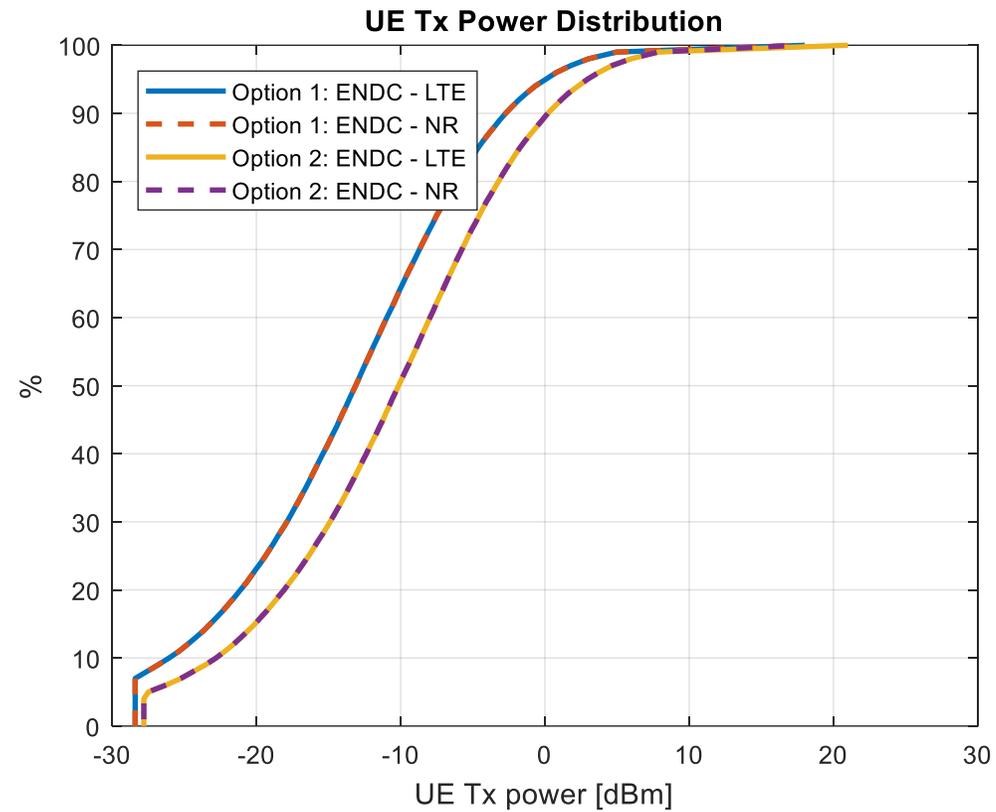
Outage and throughput considerations

	Outage [%]	
	LTE	NR
Option 1	0.49%	0.49%
Option 2	0.47%	12.1%

Average throughput gain of Option 2 over Option 1 for UEs not in outage [%]	
LTE	NR
4.73%	20.57%

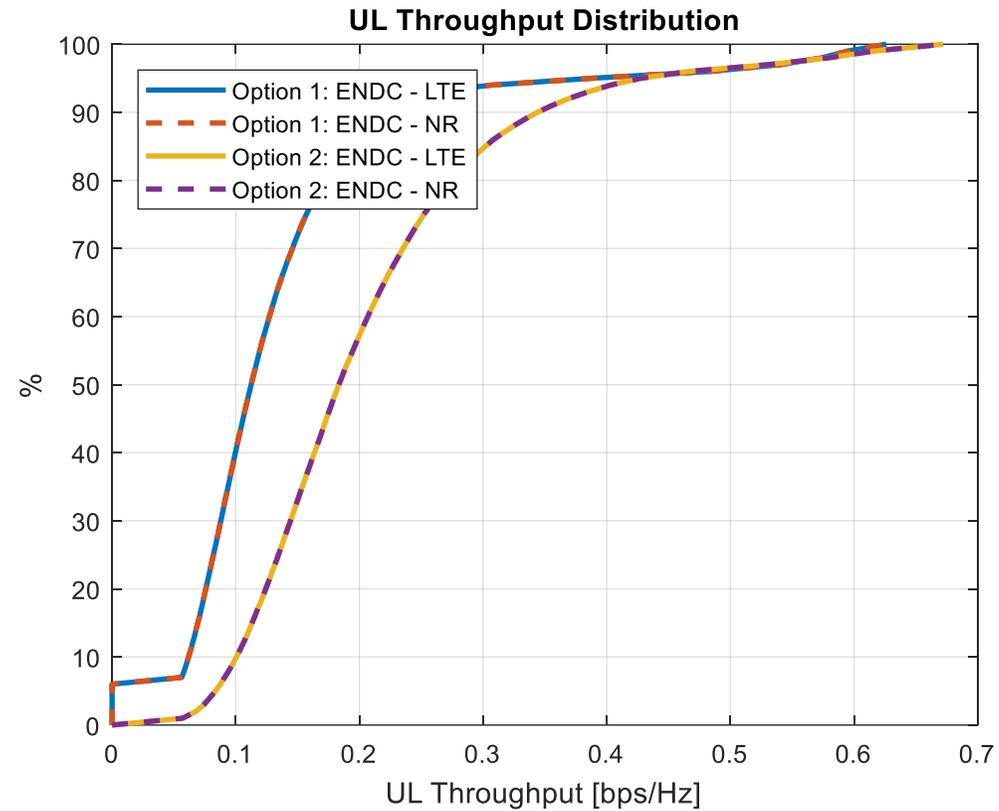
Results – PC set 2

UE Tx power distribution for PC set 2



Results – PC set 2

UL Throughput distribution for PC set 2



Results – PC set 2

Outage and throughput considerations

	Outage [%]	
	LTE	NR
Option 1	6.34%	6.34%
Option 2	0.84%	0.84%

Average throughput gain of Option 2 over Option 1 for UEs not in outage [%]	
LTE	NR
34%	30%

Conclusions

Remarks and conclusions

- With PC set 2, UEs almost never transmit at max power
 - Option 1: Outage will be large due to limited available power
 - Option 2:
 - ✓ LTE and NR power distributions (and throughput) will be roughly the same because few UEs transmit at power above $P_{\text{cmax_NR_ENDC}}$
 - ✓ LTE and NR will have negligible outage
 - ✓ Both LTE and NR will experience an average throughput gain compared to Option 1
- With PC set 1, ~5% UEs transmit at maximum power in LTE
 - Option 1: Almost no outage and same performance for LTE and NR
 - Option 2:
 - ✓ NR will be in outage for 12% of the cases while LTE will experience almost no outage
 - ✓ Both LTE and NR will experience an average throughput gain compared to Option 1



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