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A.I. 8A.1

RP-213051

Views on Rel-18 UL Coverage

Qualcomm



Introduction

- In this contribution, we give our views regarding the proposed WI objectives proposed in RP-212662
- In general, we think that we should be selective regarding any addition relative to the NWM output
- Our detailed comments are included in the following slides

Status After Last (October) Email Discussion

6 Topics under discussion

1. RACH enhancements
2. PUCCH/UCI enhancements
 - DMRS-less PUCCH
 - DFT-S-OFDM for short PUCCH
 - CSI repetition on PUCCH/PUSCH
3. Power-domain enhancements
 - Dynamic power aggregation
 - MPR optimization
4. DFT-S-OFDM enhancements
 - Multi-layer DFT-S-OFDM
 - Dynamic waveform switching
5. CA/DC enhancements
 - Uplink Tx switching across more than 2 bands
6. Uplink-only TRPs

Prioritization of Topics

- To ensure a reasonable workload for the WI, it is recommended to focus on the following topics:
 1. RACH enhancements
 - Multiple RACH transmission with same or different beam
 2. Power-domain enhancements
 - Dynamic power aggregation
 - MPR optimization using waveform shaping
 3. DFT-S-OFDM enhancements
 4. PUCCH/UCI enhancements
 - Dynamic indication of resources for PUCCH carrying CSI

RACH repetition

- Having a level of consensus achieved on multiple PRACH transmissions with the same beam for 4-step RACH, the remaining question is whether it should be also applicable for 2-step RACH and whether multiple PRACH transmission using separate beams should be also supported
- We think that both potential additions (different beams and 2-step RACH) are beneficial for improving coverage; However, in order to keep the overall scope in check, it would be acceptable to down-select to a single candidate, therefore we propose the following single addition:
 - → Multiple PRACH transmissions with the same beam should be also applicable to 2-step RACH

Dynamic power aggregation

- There seems to be good consensus building around this topic, the only remaining issue seems to be the clarification of relations to the existing RAN4 WI. We give our views regarding this below
 - → The dynamic power aggregation objective should take into account the output of the RAN4 WI fully
 - → The RAN1 dynamic power aggregation objective should focus on providing the necessary information to the gNB scheduler regarding the UE power management state, in order to enable efficient UL scheduling
 - → Avoid spending time on defining UE SAR management algorithms, this has multiple RAN4 precedents of being left up to UE implementation
 - → Focus on FR1, although any specified solution can be specified to FR2 as well, if applicable

MPR/PAPR reduction

- This topic received wide support across companies in the last round of discussions. What remains is a further refinement of the scope. We have the following views on the scope of this topic
 1. Suggest exclusive focus on improving MPR values via spectrum/waveform shaping
 - Equal emphasis on lower and higher order modulations
 - Equal emphasis on FR1 and FR2
 - Consider both NS and non-NS value cases
 - No new waveforms besides CP-OFDM and DFT-S-OFDM to be considered
 2. Aspects related to RAN4 test tolerances need not be included in the scope
 3. Aspects related to channel filtering are vague and open-ended. No need to include it explicitly.
 - Also note that the current MPR tables are already sensitive to the size and location of RB allocation

DFT-S-OFDM enhancements

- For any UL enhancements, not limited to coverage, it is essential to exploit the full benefits of what DFT-S-OFDM offers. Therefore, we support adding more emphasis to this topic.
 - → Support at least one, or preferably both, of the following
 - → Dynamic switching between CP-OFDM and DFT-S-OFDM UL
 - → Spatial multiplexing for DFT-S-OFDM
 - Reuse the LTE scheme to a large extent
 - Reuse the non-coherent codebook subset for both coherent and non-coherent UL MIMO
 - No new CW-to-layer mapping

Dynamic PUCCH repetition

- Coverage of PUCCH with larger payload sizes (including what is needed for transmission of L1 report) should have similar level of protection as available for PUCCH carrying HARQ-ACK (which had dynamic repetition indication already specified in Rel-17)
- Having sufficient coverage for the L1 report is important for ensuring reliability of beam management which is very important for the reliability of FR2 operation as a whole
 - → Support dynamic indication of repetition factor for P/SP CSI report on PUCCH (at least for L1 report in FR2)



Thank you

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