

Smarter technology for all

3GPP TSG RAN#93-e

Electronic Meeting, Sep. 13 – 17, 2021

RP-212464

Agenda Item:

9.0.2

Source:

Lenovo, Motorola Mobility

Document for:

Discussion

On scope of DL MIMO Enhancements in Rel-18

Lenovo

CSI Enhancements for high/medium mobility

- **Moderator conclusion:** Enhancement for high/medium mobility, (**Not controversial in framework**), including, e.g.,
 - Time-domain correlation/doppler-domain based CSI feedback or overhead reduction (**Controversial**)
 - Enhancement of CSI acquisition for TDD via SRS enhancement (**Controversial**)
- **On correlation/doppler-domain CSI feedback**
 - Use cases and possible frameworks for solution(s) need to be studied first prior to down-selection
 - e.g., vehicles in highways, high-speed train, drones/UAV
- **On SRS enhancement for CSI acquisition**
 - Companies have different views on SRS enhancements, e.g., for mobility, interference management in UL M-TRP, non-PMI feedback
 - Thus, further clarity is needed on the motivation/use cases
 - Additionally, SRS enhancements should be discussed in the UL Enhancements discussion

CSI Enhancements for M-TRP URLLC

- **Moderator conclusion:** Enhancement for M-TRP URLLC (**Controversial**)
- Rel-17 M-TRP CSI enhancements are being finalized in Rel-17
- Performance gains need be demonstrated relative to Rel-17 M-TRP CSI enhancements
- Need further justification and study on the benefits

Suggested Proposal for Example Area 1

For Example Area 1 - Further enhancements for CSI (e.g., mobility, overhead, etc.), further discussion could focus on following items:

- Enhancement for high/medium mobility, including, e.g.,
 - Time-domain correlation/doppler-domain based CSI feedback or overhead reduction

M-TRP and multi-beam Enhancements – TCI framework

Moderator conclusion:

- Extend Rel-17 Unified TCI framework, e.g.,
 - for indication of multiple DL and UL TCI states (e.g., $M > 1$ and/or $N > 1$, and [inter-band]) (Not controversial in framework)
 - Combined MTRP schemes, more generic (Controversial)
- Asynchronous M-TRP/Multiple TA for M-TRP (Controversial)
- Inter-cell beam management to facilitate L1/L2-centric inter-cell mobility, as well as BFR for both S-TRP and M-TRP with unified TCI framework should be supported
 - Support of more than 2 TRPs operations with inter/intra-cell, dynamic TPR and TRP-pair selection
- On combined MTRP schemes, more discussion is needed on potential enhancements, e.g., which schemes can be combined, as well as the potential gains/tradeoffs of such combining
- “Asynchronous M-TRP” should be discussed based on the unified TCI framework, e.g., when DL signals are received from different TRPs are beyond the CP
- “Multiple TA for M-TRP” should be discussed in UL Enhancements discussion

M-TRP and multi-beam Enhancements – DM-RS, CJT/D-MIMO

- **Moderator conclusion:** Increasing the number of orthogonal DL [and UL] DMRS ports both for S-TRP and M-TRP (**Not controversial in framework**)
 - Need further discussion and motivation to showcase the gains of such enhancements
- **Moderator conclusion:** Enhancement for Coherent-JT/D-MIMO, including e.g., codebook, CSI reporting, spatial domain interference avoidance (**Controversial**)
 - Only supported if significant gains over Rel-17 NCJT CSI framework with realistic assumptions
 - Use case (whether limited to <1 GHz bands?) and assess commercial interest
 - Also, “spatial domain interference avoidance” is too specific scheme, and should be generalized to e.g., “interference management”

M-TRP and multi-beam Enhancements – Beam management

- **Moderator conclusion:** Overhead and/or Latency reduction for beam management procedure/beam acquisition procedures, more generic (**Controversial**)
- “UE-initiated and/or group-based beam reporting” should be included
- Group/sharing-based beam measurements allow common measurements for a group of UEs
- (pseudo) Prediction-based beam indication should be studied to indicate beams and associating timing for deterministic UE movement (path and speed)

Suggested proposal for Example Area 2

For Example Area 2 - Evolved handling of multi-TRP (Transmission Reception Points) and multi-beam, further discussion could focus on following items:

- Extend Rel-17 Unified TCI framework, e.g.,
 - For indication of multiple DL and UL TCI states (e.g., $M > 1$ and/or $N > 1$, and inter-band)
 - Enhancements on BFR for both S-TRP and M-TRP
- Overhead and/or Latency reduction for beam management procedure/beam acquisition procedures, e.g.,
 - UE-initiated and/or group-based beam reporting
- Asynchronous M-TRP, e.g.,
 - DL signals received from different TRPs are beyond CP
- Support of > 2 TRP operation with inter/intra-cell
 - Dynamic TRP and/or TRP-pair selection
- Inter-cell beam management to facilitate L1/L2-centric inter-cell mobility

CPE Enhancements

- **Moderator conclusion:** Priority of CPE - Lower Priority (**Controversial**)
- Supportive of low priority for DL CPE enhancements
- UL CPE-related enhancements should be prioritized (discussed in UL Enh. R18-Prep02)
- CPE use cases for assisting hand-held UEs (e.g., offload some of the UE procedures) to reduce complexity and improve power saving should be studied
- Open to study DL CPE enhancements with lower priority compared to the areas in Example Area 1, 2
 - DMRS enhancements for fixed (and vehicle-mounted)
 - DL Codeword-to-layer mapping enhancements

Suggested proposal for Example Area 3

For Example Area 3 - CPE (customer premises equipment)-specific considerations:

- No consensus on supporting DL-MIMO related CPE enhancements in Rel-18

UL-related areas

- **Moderator conclusion:** Moderator lists all related schemes below for reference, and would like to propose to suspend the discussion at this moment, waiting for the decision on the umbrella for UL part.
 - UL related
 - Supportive of 4096QAM (**Controversial**)
 - > 4 UL Tx antenna
 - UL TPMI
- 4096QAM is intended for DL transmission under CPE enhancements
- “> 4 UL Tx antenna”, and “UL TPMI” are discussed UL Enhancements (R18-Prep02) – agree to stop further discussions under DL MIMO to avoid conflict with UL Enhancement discussion

Suggested proposal for UL-related areas

For "UL Related" area, e.g., "> 4 UL Tx antenna" and "UL TPMI", suspend the discussion, waiting for the decision on the umbrella for UL part.

thanks.

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