

China Academy of Telecommunication Technology

3GPP TSG RAN Rel-18 workshop

ELECTRONIC MEETING, JUNE 28 - JULY 2, 2021

DOCUMENT FOR: DISCUSSION

Agenda Item: 4.1

RWS-210403

On UL MIMO enhancements in Rel-18

China Academy of Telecommunications Technology (CATT)

UL MIMO – Current Status

- ❑ UL MIMO has been lagging behind DL in feature richness
 - Core features inherited from LTE

- ❑ Moderate enhancement in Rel.15 - 17
 - more focused on FR2.
 - Less enhancement in FR1

Motivation for UL MIMO innovation

❑ New business scenarios

- Mid/short range applications, medium to (very) low mobility
- Home entertainment, office/stadium, business
- Data-heavy UL: video surveillance/uploading, wireless drone, coal mine monitoring, police/military/public safety, vehicle-to-vehicle
- Ultra-high-density uplink:

❑ New device:

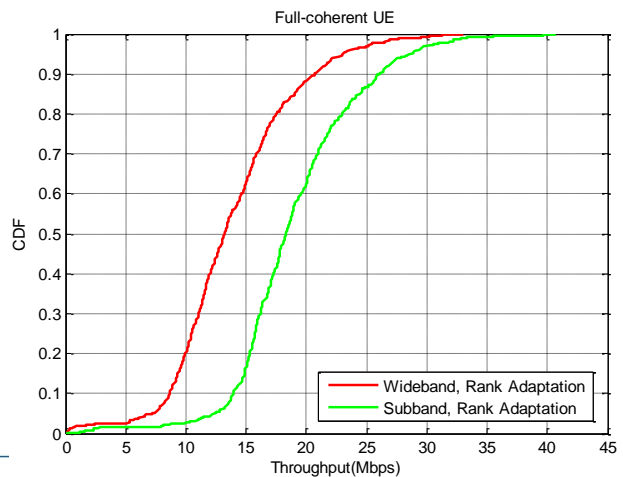
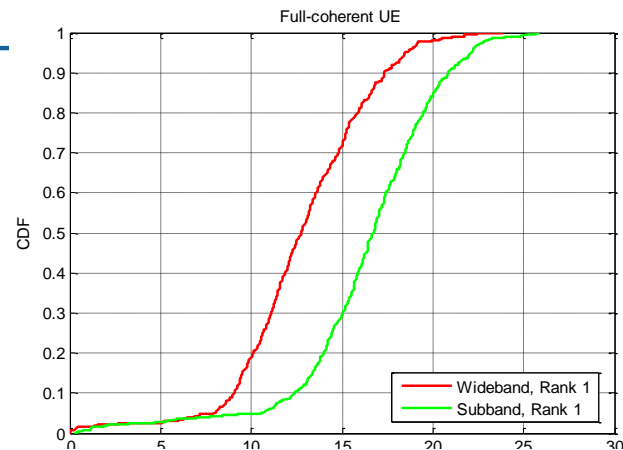
- Less power/computation constraints than traditional MBB devices
- XR terminal
- IAB node
- Indoor/outdoor access point, relay node
- Medical, robot, drone
- V2X road site units
- Commercial/industrial surveillance devices

Motivation for UL MIMO innovation (cont.)

- ❑ New carrier frequency
 - Further higher carrier frequency up to 71GHz
 - Even more challenging propagation calls for advanced multi-antenna innovation
- ❑ New system bandwidth
 - BW up to 400MHz (compared to 20MHz@ LTE)
- ❑ New operation paradigm
 - AI/ML: where a good system model is lacking, or too complicated to be tractable

UL MIMO - Potential Enhancement Areas

- ❑ UL frequency selective precoding
 - Wideband precoding leading to low precoding granularity and multiuser scheduling gain
 - Up to 30% cell-average and 60% cell-edge throughput gain is achievable by frequency-selective precoding
- ❑ Beam management enhancements with multi-panel TX and multi-panel/TRP RX deployment
 - Pre-Rel-18 NR device can only choose one panel for UL transmission, unable to fully utilize UL device investment (e.g. multiple PA and panels)
 - Joint transmission enabling multiple panels simultaneously is promising, considering multi-panel, multi-site and multi-RSU scenario
- ❑ Higher-order UL-MIMO
 - Extension to 8 layer UL MIMO can bridge the gap with DL performance, especially for advanced wireless nodes
 - Enhancement areas include SRS, UL codebook, control channel extension
- ❑ Ultra-high-density UL-MIMO
 - DMRS overhead reduction



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