



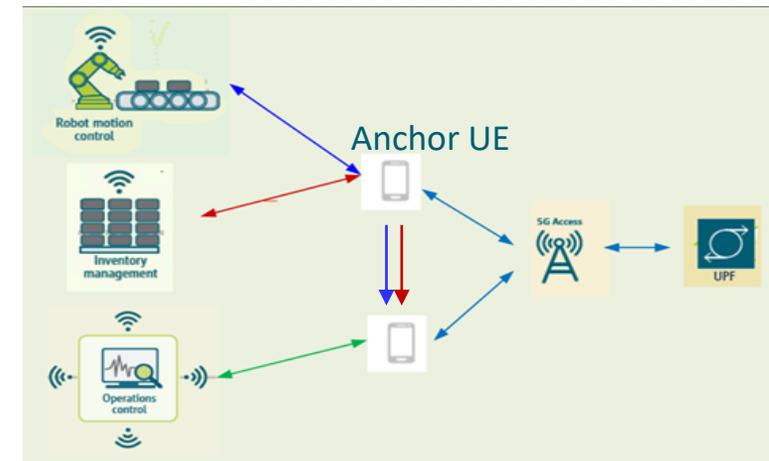
# NR MIMO Enhancement in Rel-19

CMCC

# Multi-UE Joint Transmission and Reception

## Multi-UEs

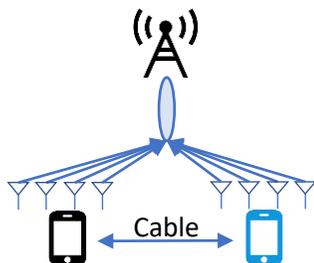
- **Motivation:**
  - Improve the throughput, reliability, and reduce delay of services as well, that is, if the channel condition of a terminal is deteriorating, another terminal can be used to make up for the traffic performance unsteadiness caused by channel condition variation.
  - Provide applications requiring high UL bitrates on 5G terminals, in cases when normal UEs are too limited by UL UE transmission power to achieve required bitrate, especially at the edge of a cell.
  - Enable up to 8 layers UL transmission to satisfy the requirement of high UL data rate.
- **Potential Objectives:**
  - **Multi-UE UL transmission enhancement:**
    - ① CJT scheme to improve throughput
    - ② NCJT SDM scheme to improve throughput
    - ③ NCJT TDM/FDM scheme to improve reliability
    - ④ SFN scheme to improve reliability
  - **Multi-UE DL reception enhancement:**
    - ① CJR scheme to improve throughput
    - ② NCJR SDM scheme to improve throughput
    - ③ NCJR TDM/FDM scheme to improve reliability



## Multi-UE UL PUSCH transmission enhancement

### ① CJT scheme to improve throughput

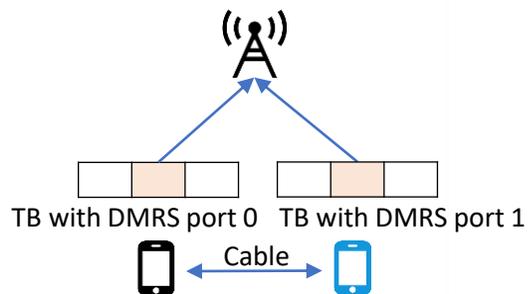
- Anchor UE and assistant UE jointly transmit one TB
- Up to 8 layer transmission could be enabled based on two UEs with 4Tx



(a) CJT scheme

### ② NCJT SDM scheme to improve throughput

- Anchor UE and assistant UE transmit one TB with different layer

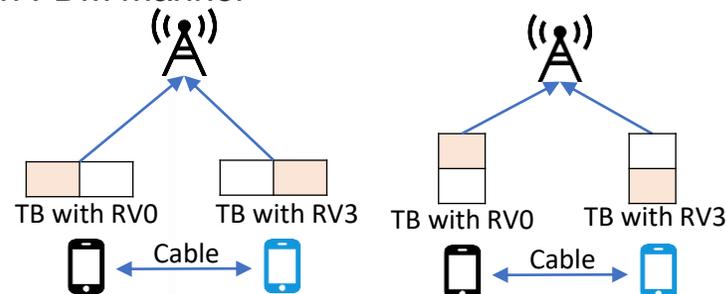


(b) NCJT SDM scheme

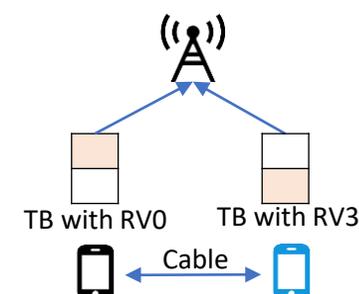
Note: Both S-DCI and M-DCI based scheduling could be considered

### ③ NCJT TDM/FDM scheme to improve reliability

- Anchor UE and assistant UE transmit TB with same/different RV in TDM manner
- Anchor UE and assistant UE transmit TB with same/different RV in FDM manner



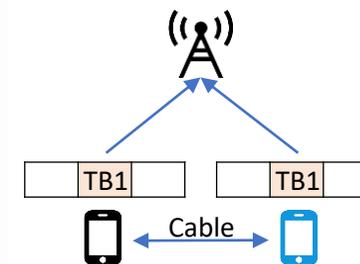
(c) NCJT TDM scheme



(d) NCJT FDM scheme

### ④ SFN scheme to improve reliability

- Anchor UE and assistant UE transmit the same TB in same resources

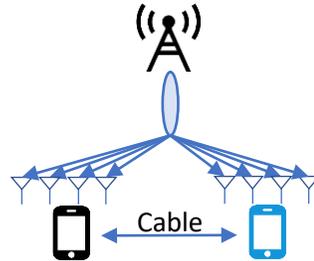


(e) SFN scheme

## Multi-UE DL PDSCH reception enhancement

### ① CJR scheme to improve throughput

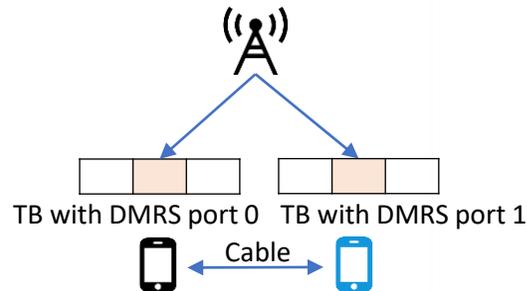
- Anchor UE and assistant UE jointly receive one TB
- Up to 8 layer reception could be enabled based on two UEs with 4Rx



(a) CJR scheme

### ② NCJR SDM scheme to improve throughput

- Anchor UE and assistant UE receive one TB with different layer

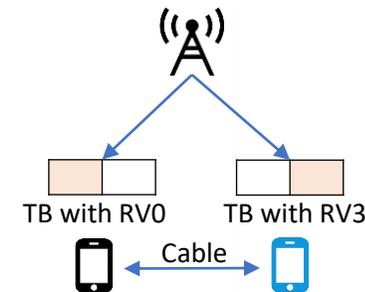


(b) NCJR SDM scheme

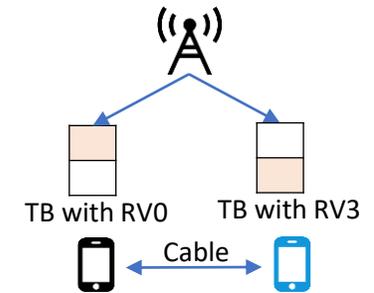
Note: Both S-DCI and M-DCI based scheduling could be considered

### ③ NCJR TDM/FDM scheme to improve reliability

- Anchor UE and assistant UE receive TB with same/different RV in TDM manner
- Anchor UE and assistant UE receive TB with same/different RV in FDM manner



(c) NCJR TDM scheme

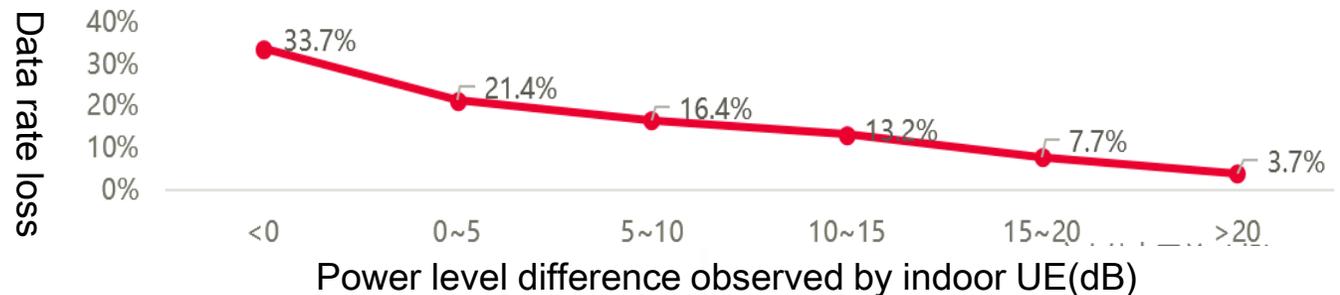
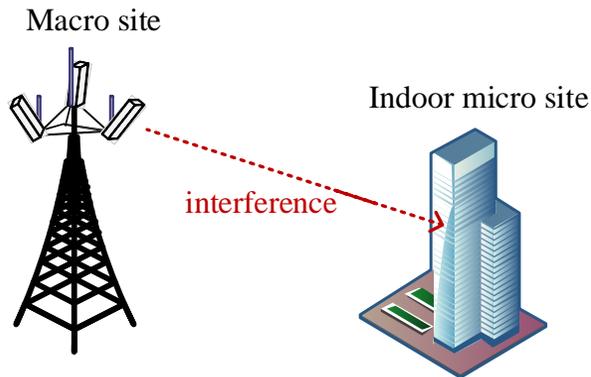


(d) NCJR FDM scheme

# Outdoor-Indoor HetNet Interference Management

## Motivations

- 5G indoor gNBs and outdoor gNBs are deployed at the same frequency, macro site may cause severe interference towards indoor micro site. The data rate decrease of indoor UEs has been observed in current network deployment.
- Similar techniques used in LTE eICIC can be considered in NR to improve indoor UE performance, e.g., reduce the DL transmission power of macro cell in some slots



## Potential Objectives

- Study and specify interference mitigation schemes for Outdoor-Indoor HetNet scenario, e.g.,
  - Exchange of macro gNB's slot pattern (reduced-power/normal-power) between macro gNB and indoor gNB
  - CSI-RS/CSI report enhancement for UEs under macro gNB to support two transmit power levels for a single CSI-RS of macro gNB
  - CSI report enhancement for UEs under indoor gNB to report two kinds of CSI corresponding to different macro gNB transmit power levels
  - Advanced UE receiver

# Enhancement on CJT transmission

## Motivations

- CJT in Rel-18 considers only ideal time/frequency synchronization among TRPs, which is not realizable for deployment. It restricts that the TRPs should be under ideal backhaul and could not enable large area cooperation.
- For CJT transmission, it is difficult to implement calibration across different TRPs with non-ideal backhaul.

## Other objectives

- Enhancements on CJT transmission
  - UE assisted calibration for non-ideal time/frequency synchronization among TRPs
  - Consider air based antenna calibration among TRPs

**THANK YOU !**