

15th – 16th June 2023

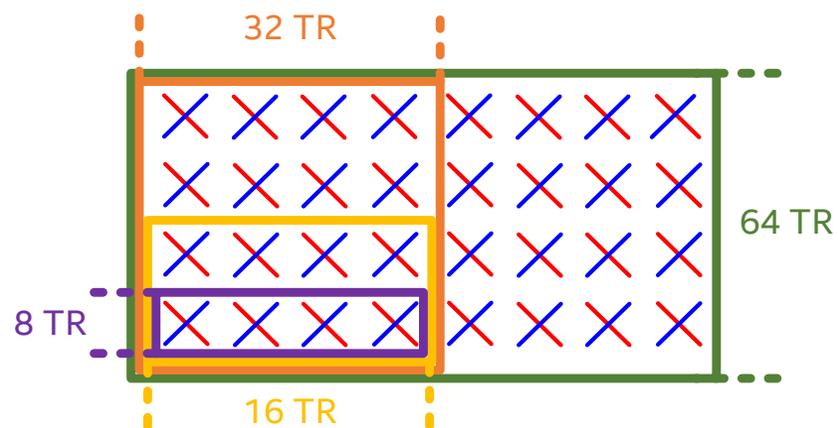
# MIMO enhancements in Rel-19

Agenda Item:	5
Source:	Intel Corporation
Document for:	Discussion

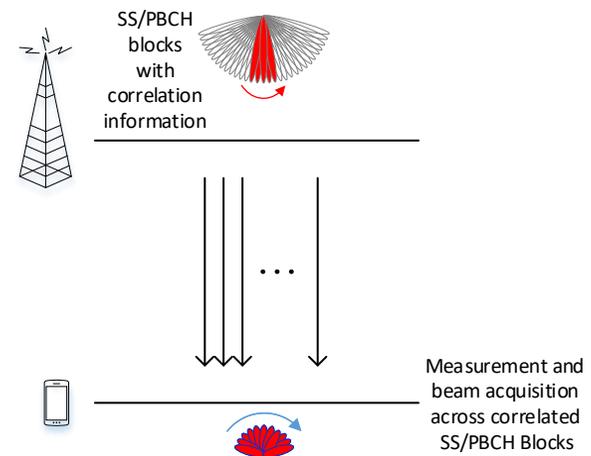


# Introduction

- Massive MIMO is in deployment (FR1) including 64TR radios
  - Useful for capacity - dense traffic hotspots (not large cells)
  - NR Rel-18 supports up to 32 port CSI-RS/CSI
  - TDD bands could rely on SRS (without CSI-RS) but SRS capacity is limited and link adaption is a challenge



- Unified TCI Framework for beam management in Rel-17 and 18
  - Common beam for DL/UL channels RSs and improved beam indication latency
  - However, major impact to latency is due to measurement/reporting which needs to be addressed for faster and practical beam management



# CSI/CSI-RS enhancements

- Support larger number of CSI-RS ports and CSI feedback
  - 64 ports and up to 128 ports
- Support for large size sub-array targeting FR1 deployments (for coverage)
  - Beam sweeping to account for sub-array analog beams
  - UE CSI feedback on multiple sub-array analog beams for MU-MIMO and frequency-selective scheduling

## Spectral efficiency gain from increased MU-MIMO dimensions (ports/layers/UEs)

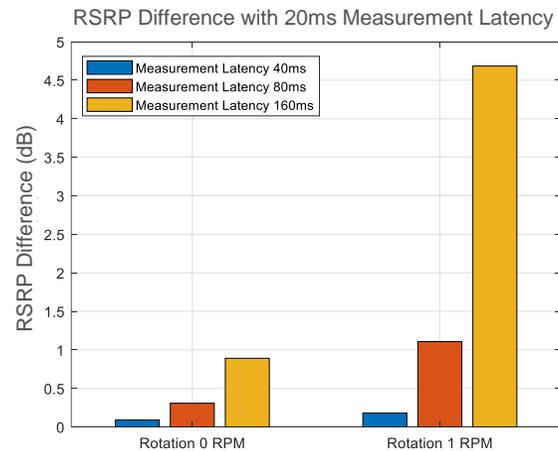
<b>UMa (500m ISD): DL Average BS SE (b/s/Hz)</b>	
32Tx, 12 BS layers, 10 UE/cell	15.9 (0%)
64Tx, 24 BS layers, 20 UE/cell	22.6 (42%)

<b>UMi (200m ISD): DL Average BS SE (b/s/Hz)</b>	
32Tx, 12 BS layers, 10 UE/cell	12.4 (0%)
64Tx, 24 BS layers, 20 UE/cell	17.0 (37%)

# FR2 enhancements

- Beam management
  - Faster beam acquisition: SSB correlation information can be used for faster beam acquisition



- Reporting overhead reduction by UE triggered reporting
- Study UE initiated beam management

- Enhanced asynchronous multi-TRP operation
  - Inter-TRP time difference  $>$  CP
  - Support single DCI operation (DL and UL with 2 TA)
- Uplink
  - Uplink only TRP support (coverage use-case for FR2)
- Residual for evolution of STx2P (e.g. PUCCH + PUCCH/PUSCH)

# LOS channel model - study

- Current channel model uses far-field assumption (point source model)
- Certain deployments do not satisfy this
  - Indoor FR1 deployments with large Tx arrays and large spacings at UE side (lap-top, TVs)
  - Predominantly LOS (very little to no scattering/reflection)
- Capacity/rank of LOS channel is higher in practice than currently modeled
- In near field 3 effects not captured in current model
  - Tx-Rx distance vary over the array (main effect)
  - Effective antenna area vary over the array
  - Polarization mismatch vary over the array
- Propose a study for MIMO channel model in near-field (LOS) and CSI evaluation

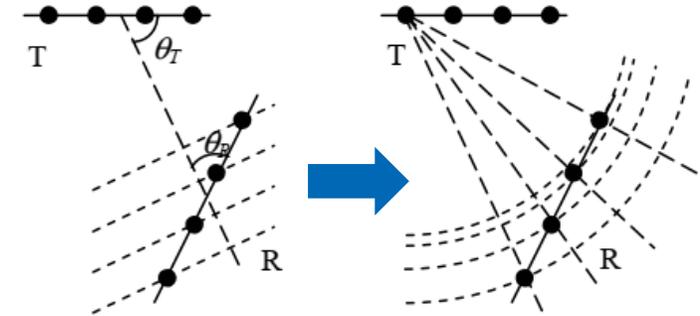
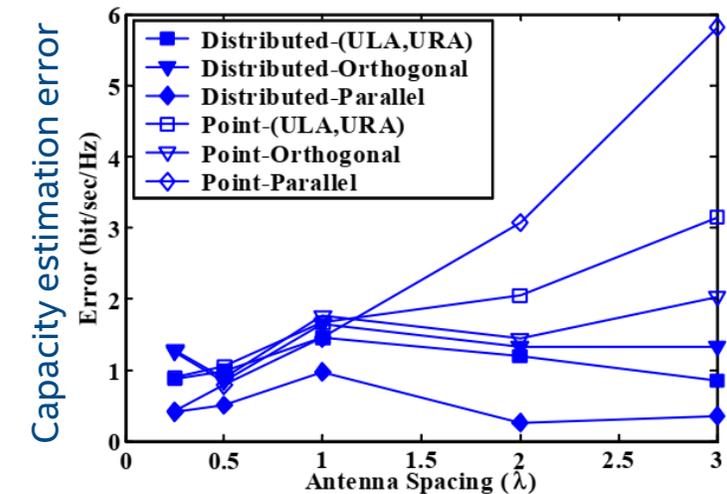


Figure 1: (a) Point-source model. (b) Distributed-source model.



Ref: J. Jiang and M. A. Ingram, "Distributed Source Model for Short-Range MIMO"

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