

The vivo logo is positioned in the top left corner of the slide. The background of the entire slide is a vibrant blue and green abstract pattern that resembles a microscopic view of a flower or a complex biological structure, with a central dark point from which various lines and shapes radiate outwards.

3GPP TSG RAN Rel-18 workshop
Electronic Meeting, June 28 - July 2, 2021

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AI: 4.1

Further MIMO enhancements in Rel-18



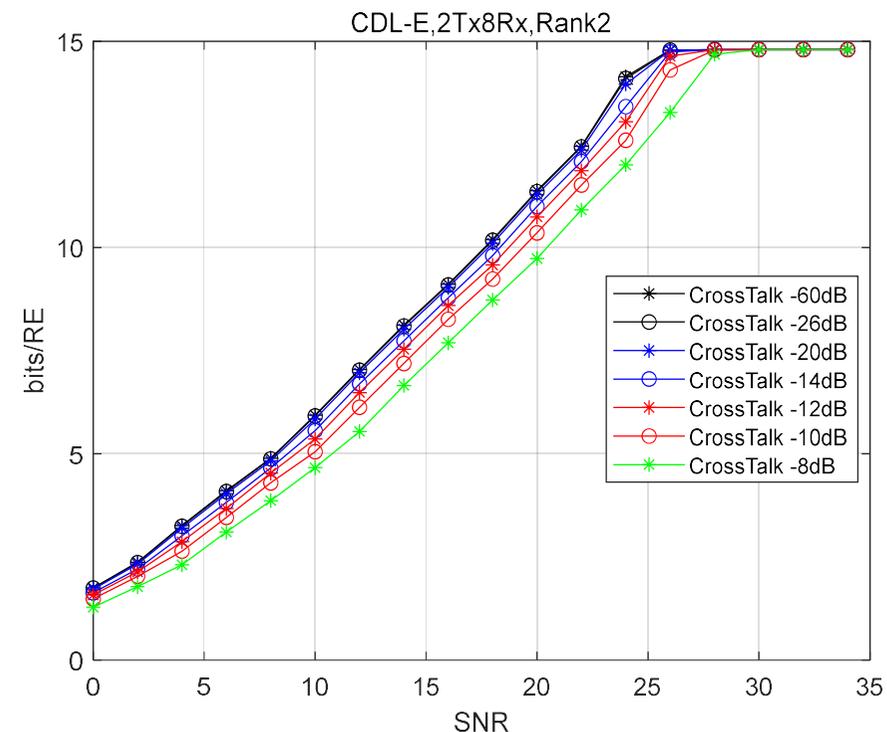
Enhancement UL MIMO

- Motivation
 - DFT-s-OFDM not fully exploited, e.g., restricted to single layer transmission, RRC configured waveform, rarely used DFT-s-OFDM waveform in current deployment, etc.
 - UL throughput impacted by hardware impairment
 - Different types of devices/nodes in market, e.g. IAB, FWA
- Potential enhancement for DFT-s-OFDM
 - Support rank >1 (up to rank 4) for DFT-s-OFDM without PAPR increase
 - Potential DMRS, PTRS enhancement
 - More flexible switching between DFT-s-OFDM and CP-OFDM waveforms
- Support of sub-band precoding
- Potential standard support to resolve implementation issues, e.g. crosstalk between RF chains, power imbalance



Evaluation on cross-talk in UL MIMO

parameters	Assumption
Wireless channel	CDL-E(LOS), Delay spread=50ns and 3km/h
Antenna configuration	2Tx 8Rx with [M=4,N=1,P=2]
waveform	CP-OFDM
PUSCH	24PRB, 8symbols
DMRS	Single symbol, without additional DMRS
SRS period	80 slots
MCS	Maximum 256QAM
Adaptive selection	AMC enabled RI disabled



Observation: Cross-talk between RF chains depends on implementation at the UE due to form factor, larger than -14dB has detrimental impact on UL MIMO performance, .

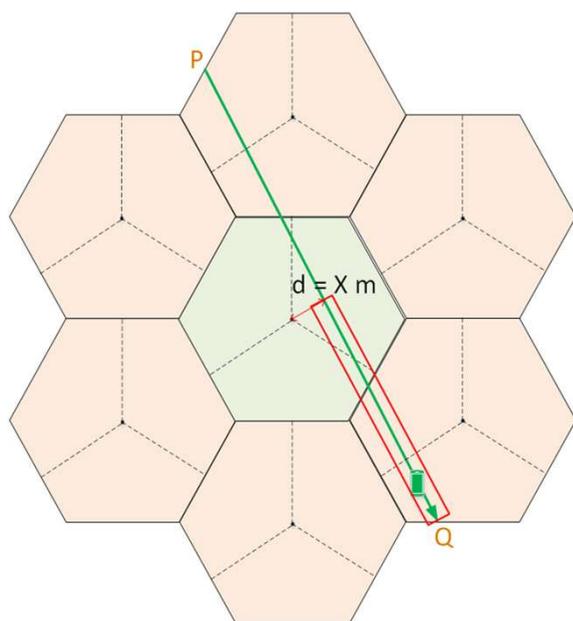


Further enhancement on L1/L2-centric inter-cell operation

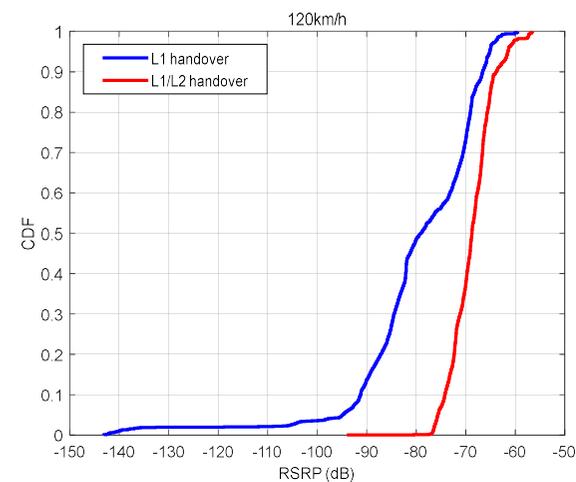
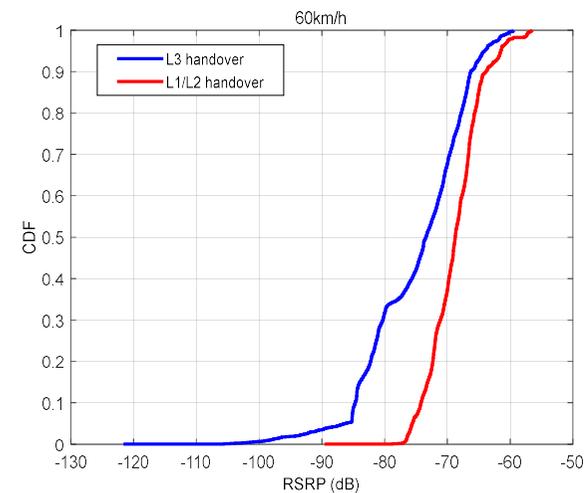
- Motivation
 - Highly possible to focus on L1 inter-cell measurement for L1/L2-centric mobility in Rel-17
 - Limited to DL for inter-cell MTRP operation with Rel-16 MTRP framework
 - Signal from multiple TRPs assumed to be within CP
 - Increased power consumption and latency due to DL-centric measurement
- Potential enhancement
 - Mobility based on UL-centric measurement
 - Measurement and report for both synchronized and non-synchronized scenarios
 - Timing offset configuration/reporting
 - Inter-cell measurement latency/overhead/power consumption reduction
 - Interference measurement due to non-synchronized reception
 - Further enhancement on inter-cell MTRP including beam management and DL/UL transmission
 - L1/L2 based handover (RAN2 intensively involved)
 - Consider both DL-centric and UL-centric
 - Consider both synchronized and non-synchronized



Evaluation on L1/L2 mobility

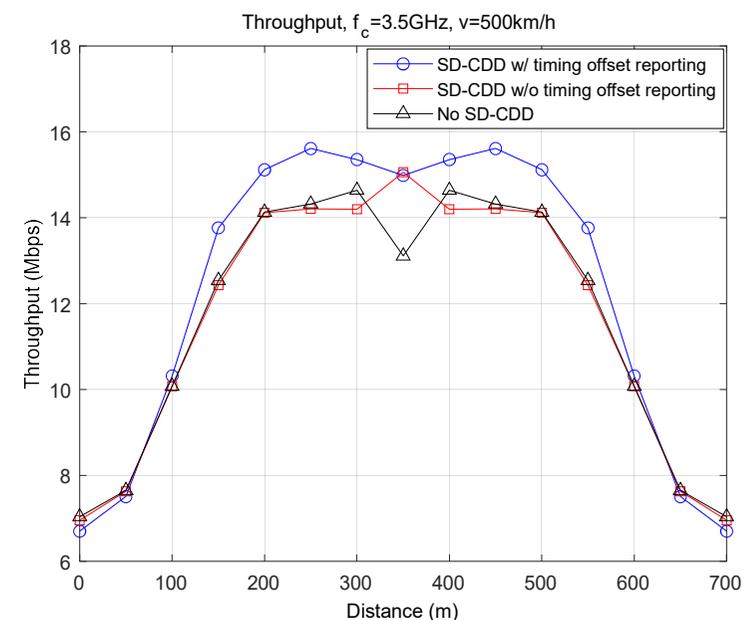


Observation: L1/L2-based handover provides obvious throughput gain compared to L3-based handover due to its prompt beam update.



Further enhancement for high-speed scenario

- Motivation
 - MIMO performance degrades significantly in moderate to high speed scenario due to mismatch in CSI feedback
- Potential enhancement
 - Consider further CSI enhancement to improve system performance in high speed scenario
 - HST-SFN CSI enhancement, e.g., phase/timing offset reporting for MTRP CDD transmission
 - Other potential enhancement, e.g., Doppler information feedback, etc.
 - SRS based enhancement for high speed scenario

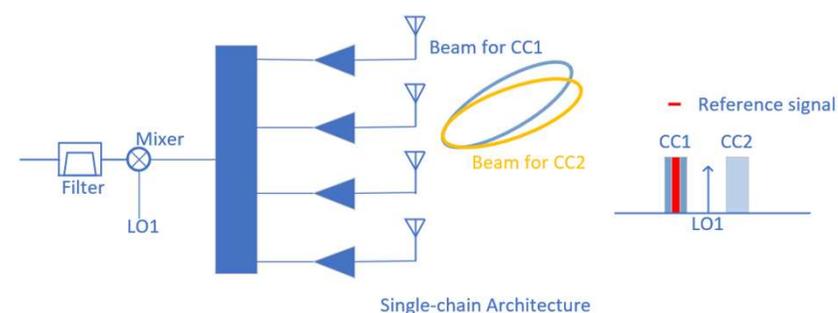
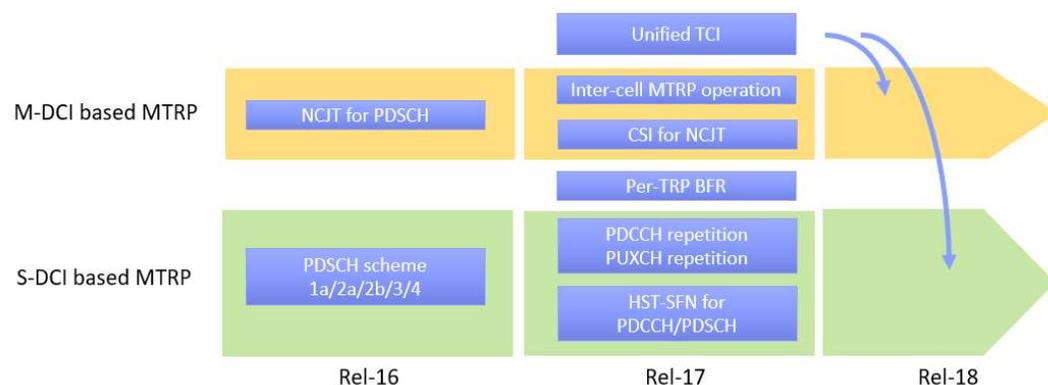


Observation: Small delay CDD can improve the UE demodulation performance, but is sensitive to the timing offset added between the two TRPs.



Further enhancement on multi-beam operation

- Motivation
 - Only basic unified TCI framework design in Rel-17
 - Non-optimized performance for UE-friendly inter-band CBM operation
- Potential enhancement
 - MTRP operation under Rel-17 unified TCI framework
 - Beam management enhancement for inter-band CBM operation under Rel-17 unified TCI framework



Observation: CBM performance in some cases is not optimal.



Distributed DL MIMO (coherent JT)

- Motivation
 - Potential performance gain with coherent joint transmission
- Potential enhancement for FR1
 - CSI enhancement for distributed MIMO scenario, e.g., CMR/IMR configuration/activation/comboination, codebook design
 - Potential enhancement of RS design
 - CSI-RS, DMRS, TRS, SRS, etc.
 - Considering UE complexity in such deployment



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THANK YOU.
谢谢。

