

与场景亲密接触  
做方案创新专家

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**RP-233043**

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Agenda Item: 9.1.1.2

## **Considerations on Rel-19 MIMO evolution**

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# Potential objectives for Rel-19 MIMO evolution WI

According to 3GPP RAN chair's summary in RP-232745, several topics have been proposed as potential objectives for Rel-19 MIMO evolution WI:

## NR-MIMO Evolution WI

References: [RWS-230488](#), [RP-231540](#), [RP-232612](#)

Potential objectives:

**[To discuss in RAN#102 according to the TU budget, particularly the necessary down-scoping of the yellow part]**

- **Topic 1: Beam management enhancements to reduce overhead/latency through UE-initiated/event-driven beam management**
  - Objective 1. Signalling/mechanism to facilitate UE-initiated beam management procedure including UE-initiated beam reporting/[switch]
- **Topic 2: Enhancements to CSI framework to support > 32 (64/128) CSI-RS ports**
  - Objective 1: Type I codebook enhancements to support > 32 CSI-RS ports
  - Objective 2: Type II codebook enhancements to support > 32 CSI-RS ports
  - Objective 3: Hybrid beamforming enhancements (CRI based reporting enhancements)
  - Note 1: Extension of legacy codebooks and legacy CSI-RS resources
  - Note 2: Objective 3 may require further study or clarification.
- **Topic 3: CJT/DL multi-TRP enhancements**
  - Objective 1: UE-assisted calibration reporting of delay and frequency/phase offsets for CJT with non-ideal synchronization and backhaul
  - Note: Assume legacy CSI-RS design and standalone aperiodic reporting on PUSCH.

### Topic 4: UL enhancements

Objective 1: STxMP enhancements (e.g. Simultaneous TX of PUCCH and PUSCH, Asymmetric panel implementations, mDCI PUCCH + PUCCH, STxMP with up to rank 8, Coherent SFN STxMP)

Objective 2: Enhancements for UL 3Tx including 3Tx for UL codebook and non-codebook based transmission

### Topic 5: Enhancement for asymmetric downlink S-TRP/UL M-TRP scenario assuming intra-band intra-cell non-co-located M-TRP scenarios without changing existing cell definition or defining a new cell

Objective 1: Extension of Rel-18 2TA mDCI to sDCI assuming legacy PRACH resources

Objective 2: Separate UL power control for SRS only to downlink S-TRP from SRS to UL M-TRP and introduce path loss measurement to uplink M-TRP

### Topic 6: 6Rx/8Rx UE enhancements with lower complexity utilizing two segments of 3/4 Rx antenna units up to 8-layer DL Tx based on legacy codebook and legacy codeword to layer mapping

Objective 1: SRS antenna port grouping, CSI and codeword association to the segments of receive antenna.

Slide 19

Our view is that the scope for Rel-19 MIMO should focus on improvements that may lead to further commercial success for 5G-Advanced, where real and urgent commercial needs should have high priority. In Rel-19, the following objectives should be considered **in descending order of level of priority**:

- **Topic 3: CJT/DL multi-TRP enhancements (*1<sup>st</sup> priority*)**
  - Support objective 1: UE-assisted calibration reporting of delay and frequency/phase offsets for CJT with non-ideal synchronization and backhaul. This objective will facilitate application of CJT with non-ideal synchronization and backhaul in current networks (e.g., inter-site CJT and a base station equipped with distributed remote radio heads require calibration of additional delay and phase/frequency offsets).
- **Topic 1: Beam management enhancements to reduce overhead/latency through UE-initiated/event-driven beam management (*1<sup>st</sup> priority*)**
  - Support objective 1: Signalling/mechanism to facilitate UE-initiated beam management procedure including UE-initiated beam reporting/switch.
  - Topic 1 is actually a paradigm shift from current NW-initiated beam management since Rel-15 and therefore may need more time to study, however the potential benefits in overhead and delay reduction well justify the work.
- **Topic 2: Enhancements to CSI framework to support > 32 (64/128) CSI-RS ports (*2<sup>nd</sup> priority*)**
  - Support objective 1: Type I codebook enhancements to support > 32 CSI-RS ports (up to 128 CSI-RS ports) for commercially important enhancement for e.g., *n104* band.
  - Objectives 2 and 3 are suggested to be down-prioritized due to less foreseeable commercial use cases in 5G-Advanced.

Our view is that the scope for Rel-19 MIMO should focus on improvements that may lead to further commercial success for 5G-Advanced, where real and urgent commercial needs should have high priority. In Rel-19, the following objectives should be considered **in descending order of level of priority**:

- **Topic 4: UL enhancements (2<sup>nd</sup> priority)**
  - Support objective 1: STxMP enhancements (e.g. simultaneous TX of PUCCH and PUSCH, asymmetric panel implementations, mDCI PUCCH + PUCCH, STxMP with up to rank 8, coherent SFN STxMP) to further reduce UL latency and improve system performance/flexibility.
  - Objective 2 is suggested to be down-prioritized since UL 3Tx needs UE hardware update which may not likely to happen in large scale in 5G-Advanced due to lack of wide commercial support and use cases.
- **Topic 6: 6Rx/8Rx UE enhancements with lower complexity utilizing two segments of 3/4 Rx antenna units up to 8-layer DL Tx based on legacy codebook and legacy codeword to layer mapping (3<sup>rd</sup> priority)**
  - Support objective 1 considering 6Rx/8Rx UE enhancements have foreseeable commercial usage in CPE/FWA/vehicles, etc.
- **Topic 5: Enhancement for asymmetric downlink S-TRP/UL M-TRP scenario assuming intra-band intra-cell non-co-located M-TRP scenarios without changing existing cell definition or defining a new cell (3<sup>rd</sup> priority)**
  - Support both objective 1 and objective 2 considering that they are essential for asymmetric enhancements. For example, UL power control (PC) enhancement may be needed when a UE may receive DL transmission from the macro gNB, but transmit UL to either the macro gNB or non-co-located micro nodes in order to maximize UL throughput.

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# Thanks

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