

3GPP TSG RAN Meeting #102

Edinburgh, GB, December 11 – 15, 2023

Agenda Item: 9.1.1.2

RP-233122

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On Rel-19 MIMO evolution

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- The following topics have been listed as proposed objectives for Rel-19 MIMO evolution [1]
 - Topic 1: Beam management enhancements to reduce overhead/latency through UE-initiated/event event-driven beam management
 - Topic 2: Enhancements to CSI framework to support > 32 (64/128) CSI-RS ports
 - Topic 3: CJT/DL multi-TRP enhancements
 - Topic 4: UL enhancements
 - Topic 5: Enhancement for UL-TRP only scenario
 - Topic 6: 6Rx/8Rx UE enhancements with lower complexity up to 8-layer DL Tx

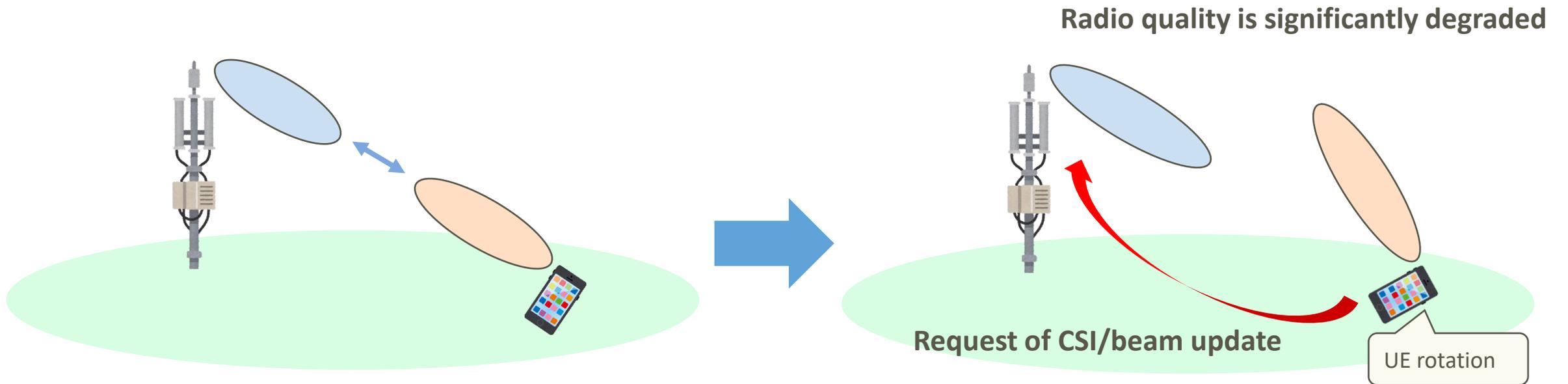
[1] RP-232612, RAN vice-chair (AT&T), “Moderator's summary for REL-19 RAN1 topic MIMO Evolution”, RAN#101, September, 2023

- **Motivation**

- Up to Rel-18 CSI framework, beam report is fully managed by a gNB. However, the gNB may not know the proper CSI/beam if the radio channel condition is significantly changed due to UE rotation, etc.

- **Proposal for objectives**

- UE-initiated/event-driven beam management to reduce overhead and latency



- **Motivation**

- Up to Rel-18 CSI framework, 32 CSI-RS ports is applicable to CSI framework. However, the more than 32 TRx for massive MIMO can be deployed in upper FR1 band (e.g. 3.5 GHz).

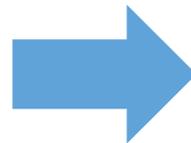
- **Proposal for objectives**

- Up to 128 CSI-RS ports targeting FR1 is specified for Type I and Type II codebook refinement

TS38.214 v18.0.0

Table 5.2.2.1-2: Supported configurations of (N_1, N_2) and (O_1, O_2)

Number of CSI-RS antenna ports, $P_{\text{CSI-RS}}$	(N_1, N_2)	(O_1, O_2)
4	(2,1)	(4,1)
8	(2,2)	(4,4)
	(4,1)	(4,1)
12	(3,2)	(4,4)
	(6,1)	(4,1)
16	(4,2)	(4,4)
	(8,1)	(4,1)
24	(4,3)	(4,4)
	(6,2)	(4,4)
	(12,1)	(4,1)
32	(4,4)	(4,4)
	(8,2)	(4,4)
	(16,1)	(4,1)



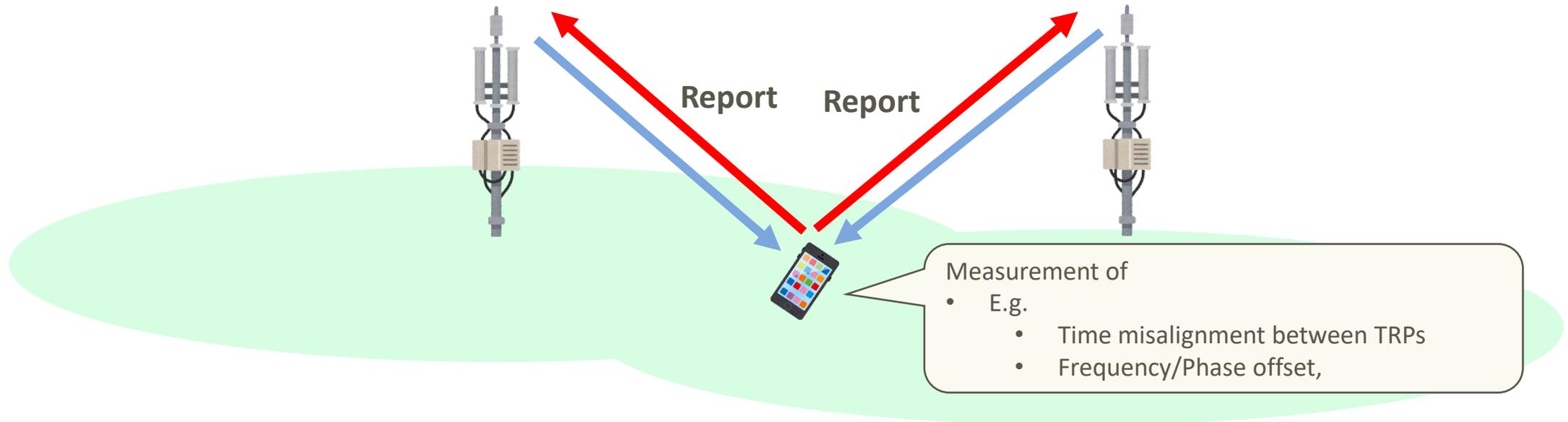
- The candidate number of supported CSI-RS ports can be 48, 64, 72, 96, and 128 to support flexible gNB implementation
- Parameters (N1, N2) are modified.

- Motivation

- Up to Rel-18, CJT with up to 4 TRPs is supported considering ideal-backhaul assumption.

- Proposal for objectives

- To support realistic condition, CJT deployment with non-idea backhaul is supported by inter-TRP time misalignment and frequency/phase offset measurement and reporting

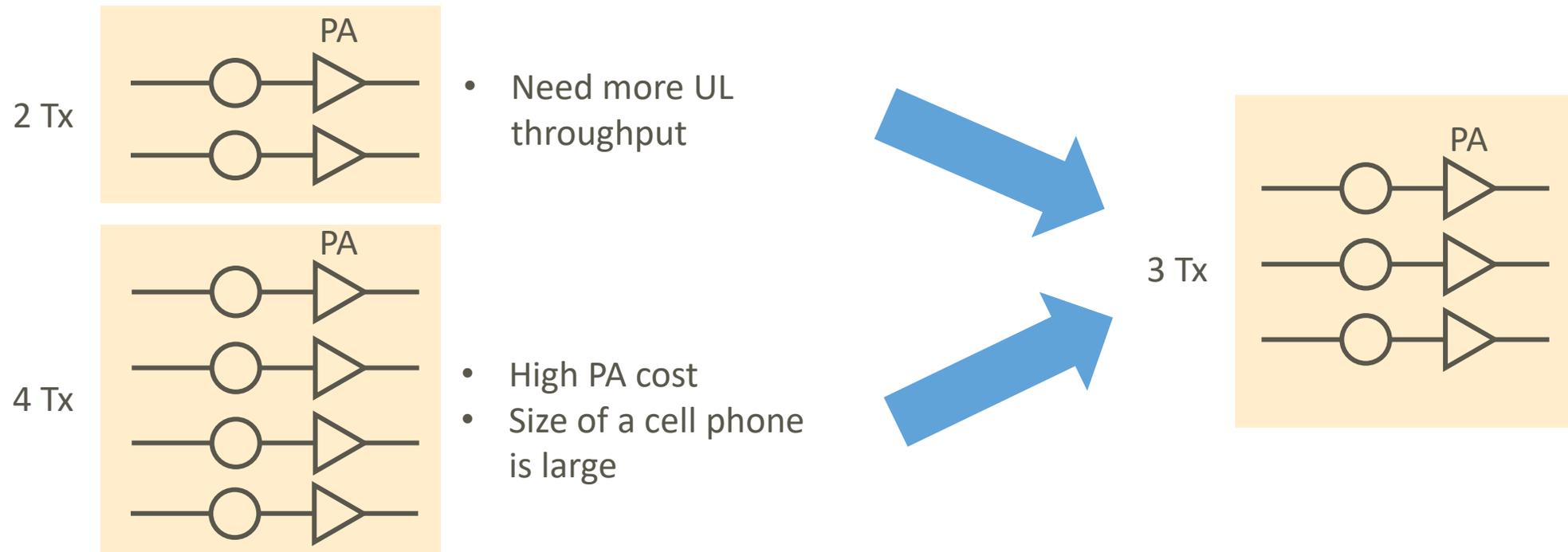


- **Motivation**

- UL enhancements are required for heavy UL transmission. Up to Rel-18 UL MIMO, 1, 2, 4, and 8 Tx transmission are specified. However, to boost UL throughput, 3 Tx antenna ports (Tx chains) maybe considered as an ideal compromise between the cost and size of a 4 Tx antenna port device and the lower performance of a 2 Tx antenna port device.

- **Proposal for objectives**

- 3 UL Tx antenna ports for UL codebook based transmission is specified

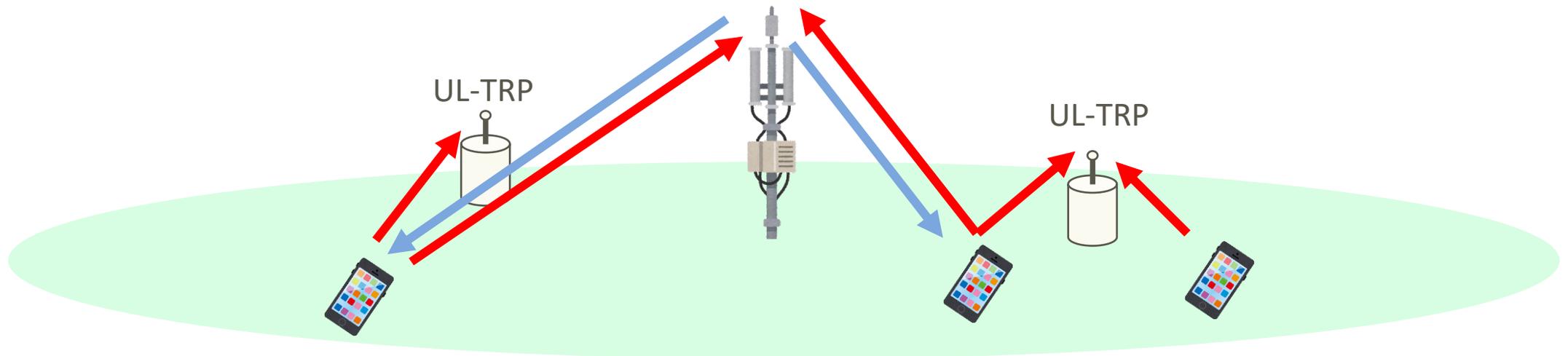


- Motivation

- UL mTRP (e.g. UL-TRP only) can improve UL throughput in small-cell deployment scenario

- Proposal for objectives

- Asymmetric DL sTRP/UL mTRP deployment scenarios, assuming intra-band intra-cell non-co-located mTRP scenarios is supported
 - Enhancements of UL power control is specified (e.g. two closed loop PC)



- Proposals of objectives for Rel-19 MIMO evolution
 - UE-initiated/event-driven beam management to reduce overhead and latency
 - Up to 128 CSI-RS ports targeting FR1 is specified for Type I and Type II codebook refinement
 - CJT deployment with non-ideal backhaul is specified by inter-TRP time misalignment and frequency/phase offset measurement and reporting
 - 3 Tx antenna ports for UL codebook based transmission is specified
 - Asymmetric DL sTRP/UL mTRP deployment scenarios, assuming intra-band intra-cell non-co-located mTRP scenarios is supported
 - Enhancements of UL power control is specified (e.g. two closed loop PC)

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