**3GPP TSG-RAN WG4 Meeting #104-eR4-2214352**

Electronic Meeting, August 15 – 26, 2022

**Title:** **WF on RTD for MIMO with two TAs**

**Source:** **Huawei, HiSilicon**

**Agenda item: 13.4**

**Document for: Approval**

# Introduction

This contribution is to capture the agreements for the email discussion for Time difference for MIMO with two TAs (R1-2205593) in RAN4 #104-e meeting.

# Way-forward

**Sub-topic 1-1: Align views on whether MRTD/MTTD requirements in 38.133 cover intra-cell case.**

*NOTE: the following terminology is used in Option 1/2/3*

* *MRTD/MTTD for CA, DC*
* *MRTD/MTTD for intra-cell MIMO (single CC and different TRP having same physical cell ID)*
* *MRTD/MTTD for inter-cell MIMO (single CC and different TRP having different cell ID).*
* Proposals
	+ Option 1: The current MRTD/MTTD requirements in RAN4 only defines the time difference limitation for different CC case, e.g. CA and DC, but not MIMO.
	+ Option 1a: The current MRTD/MTTD requirements in RAN4 only defines the time difference limitation for different CC case (i.e., CA or DC). However, the requirements shall also be applicable to the case in which “UE is configured to receive multiple PDSCH transmission occasions from one or more QCL sources on any one of the aggregated NR carriers.”
	+ Option 2: The current MRTD/MTTD requirement in RAN4 cover CA, DC and intra-cell and inter-cell MIMO.

**Sub-topic 1-2: MTTD for multiple TRPs for intra-cell case**

*NOTE: the* *intra-cell multi-TRP operation refers to TRPs on the same CC rather than on cross CCs, where both TRPs are associated to the serving PCI.*

* Proposals:
	+ Option 1: the maximum uplink transmit timing difference between multiple TRPs can be assumed within a CP length (single FFT)
	+ Option 2: the maximum transmit timing difference depends on UE capability on number of panels
		- For single UE panel, the MTTD between UL signals should be within CP.
		- For multiple UE panels, the MTTD between UL signals may be larger than CP, e.g. MTTD for CA case.
	+ Option 3: the maximum uplink transmission timing difference refer to the Rel-18 RAN4 intra-band non-collocated WID defined MTTD requirement.
	+ Option 4: RAN4 to reuse MRTD and MTTD values of inter-band CA scenario for multi-DCI and multi-TA feature of Rel-18 MIMO.
	+ Option 5: The maximum uplink timing difference can be assumed as:
		- For FR1, not larger than CP+1.6µs
		- For FR2, not larger than CP+0.5µs
	+ Option 6:
		- For FR1 UE, or for FR2 UE which is only able to Tx from one panel at a time, the maximum Tx timing difference between different carriers in CA/DC scenario that UE is required to assumed, is specified in clause 7.5.4 of TS 38.133, and it is up to RAN 1 to define the Tx timing difference within the single carrier.
		- For FR2 UE that is capable of simultaneous Tx from 2 different panels, RAN4 postpone the discussion until the RTD assumption is concluded in R18 multi-Rx chain WI.

**Sub-topic 1-3: MTTD for multiple TRPs for inter-cell case**

*NOTE: the* *inter-cell multi-TRP operation refers to TRPs on the same CC rather than on cross CCs, where one TRP is associated to the serving PCI and the other TRP is associated to a PCI different from serving PCI.*

* Proposals:
	+ Option 1: the maximum uplink transmit timing difference between multiple TRPs can be assumed within a CP length (single FFT)
	+ Option 2: the maximum transmit timing difference depends on UE capability on number of panels
		- For single UE panel, the MTTD between UL signals should be within CP.
		- For multiple UE panels, the MTTD between UL signals may be larger than CP, e.g. MTTD for CA case.
	+ Option 3: the current inter-band CA MTTD requirement can be reused.
	+ Option 4: RAN4 to reuse MRTD and MTTD values of inter-band CA scenario for multi-DCI and multi-TA feature of Rel-18 MIMO.
	+ Option 5: The maximum uplink timing difference can be assumed as:
		- For FR1, not larger than CP+1.6µs
		- For FR2, not larger than CP+0.5µs
	+ Option 6:
		- For FR1 UE, or for FR2 UE which is only able to Tx from one panel at a time, the maximum Tx timing difference between different carriers in CA/DC scenario that UE is required to assumed, is specified in clause 7.5.4 of TS 38.133, and it is up to RAN 1 to define the Tx timing difference within the single carrier.
		- For FR2 UE that is capable of simultaneous Tx from 2 different panels, RAN4 postpone the discussion until the RTD assumption is concluded in R18 multi-Rx chain WI.