**3GPP TSG-RAN WG2 Meeting #115 Electronic DRAFT R2-210xxxx**

**Elbonia, 16 – 27 August 2021**

**Title: [DRAFT]** LS on inter-cell beam management and multi-TRP in Rel-17

**Response to:** -

**Release:** Release 17

**Work Item:** NR\_feMIMO-Core

**Source:** Nokia [RAN2]

**To:** RAN1

**Cc:** RAN4

**Contact Person:**

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**Attachments:** -

**1. Overall Description:**

RAN2 has continued the discussion on inter-cell beam management (including multi-TRP in the context of the Rel-17 FeMIMO WI, would like to request some clarifications on various areas to better understand the required RAN2 work.

First, RAN2 would like to note that as the term "non-serving cell" has been problematic, the following questions use "**serving cell TRP**" to denote the "legacy" TRP and "**TRP with different PCI**" to denote the "non-serving cell" configured for the UE.

Consequently, RAN2 would request answers to the following questions:

* 1) **Applicability of inter-cell beam management to mTRP:** RAN2 understands that WI states that the inter-cell beam management (BM) objective contains inter-cell mTRP operation (as per WI objective 1 and 2, i.e. " *The same beam measurement/reporting mechanism will be reused for inter-cell mTRP* "). However, RAN2 would like to understand if there are differences between inter-cell BM and inter-cell mTRP operation (in general for any of the following questions) or if the entire inter-cell BM is also applicable to inter-cell mTRP?
* **2) Basic Tx/Rx operation with inter-cell beam management:** The WI states that "*For inter-cell beam management, a UE can transmit to or receive from only a single cell (i.e. serving cell does not change when beam selection is done)*". Then, when the UE is configured to use both *serving cell TRP* and *TRP with different PCI*, RAN2 would like to understand the corresponding behaviour for:
	+ a) **UL and DL:** Are UL and DL always processed at the same TRP or can the UE use e.g. *serving cell TRP* for UL transmissions and *TRP with different PCI* for DL reception or vice-versa?
	+ b) **System information and paging:** If UE is receiving DL data from *TRP with different PCI* on dedicated channels, is the UE still able to receive short message and system information from *serving cell TRP* at the same time?
	+ c) **SSB reception:** is the UE able to always receive CD-SSB from *serving cell TRP* when needed and is there any impact to RRM measurements of serving or neighbour cells?
	+ d) **Number of TRPs:** Is the number of TRPs involved in the operation restricted to two (i.e. *serving cell TRP* and *TRP with different PCI*? Is there different restriction on active TRPs from which UE may send/receive data and TRPs the UE is assumed to be able to make L1 measurements?
	+ e) **PCell/PSCell/SCell:** Is the inter-cell beam management applicable to any serving cell (i.e. PCell/PSCell/SCell)? That is, can intercell beam management or intercell mTRP be configured for SCell and/or PSCell in addition to PCell?
	+ f) **TCI switching signalling:** Which signalling should be used for TCI switching for inter-cell beam management?
	+ h) **Simultaneous Tx/Rx from and to “serving cell TRP” and “TRP with different PCI”:** Is it correct understanding that such simultaneous Tx/Rx is not supported for “inter-cell beam management”, but is supported for “inter-cell mTRP”? If so, what is the difference regarding their configuration that needs to be introduced by RAN2?
* **3) MAC aspects:** RAN2 would like to understand the impacts to MAC operation, in particular:
	+ a) **Timing advance:** Is it assumed that TA is the same for both *serving cell TRP* and *TRP with different PCI*, or does UE maintain different TAs for each?
	+ b) **RACH:** Are there any impacts to RACH operation with inter-cell beam management ? That is, is it necessary to perform RACH toward TRP with different PCI e.g. for TA, BFR, etc?
	+ c) **UL PC/PHR:** When UE is configured for *TRP with different PCI* for a cell with UL, is there an impact to UL power control or PHR?
* **4) HARQ operation:** How does the HARQ operation work with the multi-beam operation? In particular:
	+ a) **HARQ entity:** Is there a single HARQ entity handling both the *serving cell TRP* and *TRP with different PCI*?
	+ b) **HARQ retransmissions:** Can retransmission occur from different TRP than initial transmission for the same HARQ process? E.g. can initial transmission be done from *serving cell TRP* and retransmission from *TRP with different PCI*?
* **5）Physical layer configuration:** Does the *TRP with different PCI* have an independent physical layer configuration, e.g. for PUSCH/PDSCH/PDCCH/PUCCH and PRACH?
	+ a) **Configuration differences:** Does RAN1 assume that only certain parameters can be different from the serving cell and if so, which ones?
	+ b) **Configuration of inter-cell beam management measurements and reporting:** Which RRC configuration(s) need to be provided for inter-cell beam measurement and reporting? ‎
	+ c) Are the RRC parameters/configurations different for inter-cell mTRP and inter-cell beam management?
	+ d) Does RAN1 intend to provide a parameter to distinguish the "mode" of inter-cell beam management to help distinguish what is configured for the UE? The R16 sDCI mTRP and mDCI mTRP did not have those, which made some parts of specifications difficult.

RAN2 would request RAN1 feedback to these questions to ensure RAN2 work completion.

**2. Actions:**

**To RAN4 group.**

**ACTION:** RAN2 respectfully asks RAN1 to provide answers to the above questions and indicate information on any other aspects that may impact RAN2 work**.**

**3. Date of Next TSG-RAN WG2 Meeting:**

3GPP RAN2#116-e from 2021-11-01 to 2021-11-12 Electronic Meeting