**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 notes that WI objective 1 states " *The same beam measurement/reporting mechanism will be reused for inter-cell mTRP* ").RAN2 would like to understand if the entire inter-cell BM is also applicable to inter-cell mTRP? If not, which part is not applicable to mTRP and how does that work?
* **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 short message (e.g. paging):** If UE is receiving DL data from *TRP with different PCI* on dedicated channels, is the UE still able to receive short message (e.g. paging) 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*? Are there any restrictions on TRPs from which UE may send/receive data, or TRPs from which 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) **Feature differences:** Are the RRC parameters/configurations different for inter-cell mTRP and inter-cell beam management?

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