**3GPP TSG RAN WG1 #109-e R1-2205600**

**e-Meeting, May 9th – 20th, 2022**

**Title: [DRAFT] LS reply on questions concerning the implementation of RAN1 agreements in NRPPa**

**Response to: R1-2203040 (R3-222721)**

**Work Item: NR\_pos\_enh-Core**

**Source:** **Moderator (Ericsson) [to be RAN1]**

**To:** **RAN3**

**Cc:**

**Contact Person:**

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**Attachments:**

**1. Overall Description:**

RAN1 discussed the following questions from R3-222721:

Issue 1:

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| **UL-SRS-RSRPP** | RAN1 has defined a new measurement for UL SRS-RSRPP:   |  | | --- | | **Agreement#6:**  Definition  UL SRS reference signal received path power (UL SRS-RSRPP) is defined as the power of the received UL SRS signal configured for the measurement at the i-th path delay of the channel response, where UL SRS-RSRPP for 1st path delay is the power corresponding to the first detected path.  For frequency range 1, the reference point for the UL SRS-RSRPP shall be the antenna connector of the gNB. For frequency range 2, UL SRS-RSRPP shall be measured based on the combined signal from antenna elements corresponding to a given receiver branch.  Note: The following two options are supported by gNB to LMF:  **Option 1 (RX diversity for the first path UL SRS-RSRPP)**   * The same RX branch(es) as applied for the first path UL SRS-RSRPP measurements are used for the additional paths UL SRS-RSRPP measurements if those are provided together * For frequency range 1 and 2, if receiver diversity is in use by the gNB for UL SRS-RSRPP measurements, then reported UL SRS-RSRPP value for the first path shall not be lower than the corresponding UL SRS-RSRPP for the first path of any of the individual receiver branches   **Option 2 (RX diversity for UL SRS-RSRP)**  The same RX branch(es) as applied for UL SRS-RSRP measurements are used for UL SRS-RSRPP measurements (i.e., the first and additional paths UL SRS-RSRPP if those are provided) |   RAN3 will define the value range of the UL-SRS-RSRPP measurement for the i-th path as an INTEGER (0..126).  Some companies question whether the information on the RX Diversity options, captured as a note in the RAN1 agreement, need to be signalled to LMF along with the UL-SRS-RSRPP measurement. |

Issue 2:

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| **TEG** | Some companies in RAN3 believe it is beneficial to signal the SRS port index to the LMF, so that LMF can group measurements based on Port index. RAN3 would like to know if SRS Port Index needs to be signalled to the LMF when SRS resource for MIMO is used? |

Issue 3:

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| **On demand PRS** | RAN3 has observed the following RAN1 agreement on On-demand PRS ON/OFF indicator (for LMF initiated request only):   |  | | --- | | “In "On-demand PRS information for LMF-initiated on-demand DL PRS requests"; either per resource, or per resource set, or per UE” |   RAN3 would like to inform RAN1 that the procedures defined by RAN3 for on-demand PRS transmission are non-UE-associated (i.e., cell specific) and thus an ON/OFF indication per UE does not make sense. Instead, it is considered to have an OFF indication per TRP to minimize the transmission power. |

Issue 4

RAN3 had the following comment on the overhead consideration when using TRP beam information for DL AOD:

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| Based on the assistance information for DL-AoD specified by RAN1/RAN2, the corresponding NRPPa signaling could require, in the case where maximum granularity is used uniformly in azimuth and elevation, an excess of 6 million relative powers per TRP / resource to be signaled over NRPPa and, as consequence, via F1-AP and per NG-RAN design, over NG transport. RAN3 assumes (and would like to confirm) that realistic implementations would not require this high level of data volume traffic and would also use this function sparingly.  RAN3 has agreed to include some mitigations over NRPPa/F1AP, e.g. allowing for the indication of “no change” if a previous TRP beam antenna configuration is still valid.  Note that, as with other TRP configuration items, RAN3 has agreed that OAM is also a possible option for providing such information to LMF. |

The RAN1 response to the issues as follow:

Issue 1:

RAN1 made the following agreement:

**Agreement**

In response to RAN3’s question in the LS R1-2203040: information on the Rx Diversity options does not needs to be signalled to LMF.

·           Note: when UL SRS-RSRP is reported, whether to use Option1 or Option 2 for UL SRS-RSRPP is up to gNB implementation.

Issue 2:

RAN1 discussed the issue and agreed on the following: SRS port index can be optionally signaled to the LMF when SRS resource for MIMO is used. It is RAN1 understanding use of MIMO SRS in such a case is transparent to the UE and brings no specification impact in RAN1.

Issue 3:

The issue was discussed and the following correction was made to the RAN1 agreement:

**Agreement**

The agreement from RAN1#108e on LMF initiated request of on-demand PRS is amended as follow:

* Note: no RAN1 specification impact is expected
* send the agreement as part of the reply LS to RAN3

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| **Agreement**  ●     From RAN1 perspective, for LMF-initiated request of on-demand DL PRS, the following group of on-demand DL PRS parameters is defined and signaled  ○    per resource set per positioning frequency layer per FR  1.    DL PRS Periodicity  2.    DL PRS Resource Bandwidth  3.    DL PRS Resource Repetition Factor  4.    Number of DL PRS Resource Symbols per DL PRS Resource  5.    DL-PRS CombSizeN  ●     Two options for indication of DL PRS QCL-Info, either  ○    Option 1: per resource set per positioning frequency layer per FR  ·      LMF recommends a list of QCL sources  ○    Option 2: per resource set per positioning frequency layer per FR   * LMF requests to provide the QCL information in the assistance data in NRPPa   ○    per FR   * Number of DL PRS frequency layers   ○    either per resource set per positioning frequency layer or per ~~UE~~TRP   * Start/end time of DL PRS transmission   ○    either per resource, or per resource set, or per ~~UE~~TRP   * ON/OFF indicator (for LMF initiated request only) |

Issue 4:

RAN1 did not reach consensus on the response to the issue.

**2. Actions:**

**To RAN WG1, WG2**

**ACTION:**

* RAN1 respectfully asks RAN3 to take RAN1’s response into account.

**3. Date of Next RAN WG1 Meetings:**

RAN1#110e 22 – 26 August 2022 Toulouse

RAN1#110e-bis 10 –18 October 2022 Electronic Meeting