3GPP TSG-RAN WG1 Meeting #118 R1-2xxxxxx

Maastricht, The Netherlands, August 19 – 23, 2024

Agenda Item: 8.1

Source: Moderator (Ericsson)

Title: Moderator Summary for maintenance on Two TAs for multi-DCI

Document for: Discussion & Decision

*During RAN#94e, a new WID for Rel-18 MIMO evolution for DL and UL was agreed. The highlighted Part of objective 7 is relevant for this AI:*

1. Study, and if justified, specify the following
   * Two TAs for UL multi-DCI for multi-TRP operation
   * *Power control for UL single DCI for multi-TRP operation where unified TCI framework extension in objective 2 is assumed.*

For the case of simultaneous UL transmission from multiple panels, the operation will only be limited to the objective 6 scenarios.

*The proposals submitted by Tdocs submitted to RAN1#118 are summarized in this document.*

# **1. Draft CRs**

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| # | Text Proposal | Company Position |
| 1.1 | **Proposal:** Adopt draft CR for 38.213 Clause 8.1 [1]  **Reason for change:** For two TA operation, the UE can be configured with multiple RACH configurations, where different RACH configurations correspond to different cells. However, currently, the SSB-RO mapping rule including the RO validation rule is defined for serving cell only, and the SSB-RO mapping rule for neighbor cell is missing. Then how to identify the RO to transmit the PRACH ordered by PDCCH for TA measurement for neighbor cell is unclear.    **Summary of change:**  Clarify that the SSB-RO mapping for neighbor cell is based on the neighbor cell SSB, which is based on the same principle as serving cell.  **Consequence if not approved:** SSB-RO mapping is unclear when multiple RACH configurations are configured.  **-----------------------------------------------------Start of draft CR--------------------------------------------------** 8.1 Random access preamble <unrelated text omitted>  SS/PBCH block indexes provided by *ssb-PositionsInBurst* in *SIB1* or in *ServingCellConfigCommon* or in *SSB-MTC-AdditionalPCI* are mapped to valid PRACH occasions in the following order where the parameters are described in [4, TS 38.211].  - First, in increasing order of preamble indexes within a single PRACH occasion  - Second, in increasing order of frequency resource indexes for frequency multiplexed PRACH occasions  - Third, in increasing order of time resource indexes for time multiplexed PRACH occasions within a PRACH slot  - Fourth, in increasing order of indexes for PRACH slots  An association period, starting from frame 0, for mapping SS/PBCH block indexes to PRACH occasions is the smallest integer number in the set determined by the PRACH configuration period according Table 8.1-1 such that SS/PBCH block indexes are mapped at least once to the PRACH occasions within the association period, where a UE obtains from the value of *ssb-PositionsInBurst* in *SIB1* or in *ServingCellConfigCommon* or in *SSB-MTC-AdditionalPCI*. If after an integer number of SS/PBCH block indexes to PRACH occasions mapping cycles within the association period there is a set of PRACH occasions or PRACH preambles that are not mapped to SS/PBCH block indexes, no SS/PBCH block indexes are mapped to the set of PRACH occasions or PRACH preambles. An association pattern period includes one or more association periods and is determined so that a pattern between PRACH occasions and SS/PBCH block indexes repeats at most every 160 msec. PRACH occasions not associated with SS/PBCH block indexes after an integer number of association periods, if any, are not used for PRACH transmissions.  **-----------------------------------------------------unchanged part omitted--------------------------------------------------**  For paired spectrum or supplementary uplink band all PRACH occasions are valid.  For unpaired spectrum,  - if a UE is not provided *tdd-UL-DL-ConfigurationCommon*, a PRACH occasion for a cell in a PRACH slot is valid if it does not precede a SS/PBCH block in the PRACH slot and starts at least symbols after a last SS/PBCH block reception symbol, where is provided in Table 8.1-2 and, if *channelAccessMode* = "*semiStatic*" is provided, does not overlap with a set of consecutive symbols before the start of a next channel occupancy time where the UE does not transmit [15, TS 37.213].  - the candidate SS/PBCH block index of the SS/PBCH block corresponds to the SS/PBCH block index provided by *ssb-PositionsInBurst* in *SIB1* or in *ServingCellConfigCommon* or in *SSB-MTC-AdditionalPCI* corresponding to the cell, as described in clause 4.1  - If a UE is provided *tdd-UL-DL-ConfigurationCommon*, a PRACH occasion for a cell in a PRACH slot is valid if  - it is within UL symbols, or  - it does not precede a SS/PBCH block in the PRACH slot and starts at least symbols after a last downlink symbol and at least symbols after a last SS/PBCH block symbol, where is provided in Table 8.1-2, and if *channelAccessMode* = "*semiStatic*" is provided, does not overlap with a set of consecutive symbols before the start of a next channel occupancy time where there shall not be any transmissions, as described in [15, TS 37.213]  - the candidate SS/PBCH block index of the SS/PBCH block corresponds to the SS/PBCH block index provided by *ssb-PositionsInBurst* in *SIB1* or in *ServingCellConfigCommon* or in *SSB-MTC-AdditionalPCI* corresponding to the cell, as described in clause 4.1.  For preamble format B4 [4, TS 38.211], .  Table 8.1-2: values for different preamble SCS   |  |  | | --- | --- | | Preamble SCS |  | | 1.25 kHz or 5 kHz | 0 | | 15 kHz or 30 kHz or 60 kHz or 120 kHz | 2 | | 480 kHz | 8 | | 960 kHz | 16 |   If a random access procedure is initiated by a PDCCH order, the UE, if requested by higher layers, transmits a PRACH in the selected PRACH occasion, as described in [11, TS 38.321], for which a time between the last symbol of the PDCCH order reception and the first symbol of the PRACH transmission is larger than or equal to msec, where  - is a time duration of symbols corresponding to a PUSCH preparation time for UE processing capability 1 [6, TS 38.214] assuming corresponds to the smallest SCS configuration between the SCS configuration of the PDCCH order and the SCS configuration of the corresponding PRACH transmission  - if the active UL BWP does not change, or if a cell indicator field in the PDCCH order indicates a non-serving cell [5, TS 38.212], and is a time duration of defined in [10, TS 38.133] otherwise  - msec for FR1 and msec for FR2  - is a switching gap duration as defined in [6, TS 38.214]  - if a cell indicator field in the PDCCH order indicates a serving cell or if cell indicator field is not present, and is defined in [10, TS 38.133] otherwise  - if a cell indicator field in the PDCCH order indicates a serving cell or if cell indicator field is not present, and is defined in [10, TS 38.133] otherwise  For a PRACH transmission using 1.25 kHz or 5 kHz SCS, the UE determines assuming SCS configuration .  **-----------------------------------------------------End of draft CR--------------------------------------------------** | **Support**: Google, Huawei, Samsung  **Not support**: |
| 1.2 | **Proposal:** Discuss either TP 1 or TP 2 for adoption in TS 38.213 Section 7.1.1 [2]  **Reason for change:** Unnecessary resetting of first closed loop (l=0) configured for the first TRP instead of the resetting the second closed loop (l=1), when CFRA based PDCCH order triggers PRACH towards the second TRP.  **Summary of change:**  Clarify the spec on whether to reset the first closed loop power control adjustment state (l=0) or reset the second closed loop power control adjustment state (l=1) based on whether the PRACH is toward the first TRP or the second TRP.  **Consequence if not approved:** Current code results in unnecessary resetting of the wrong closed loop when PRACH is triggered towards the second TRP.  ============TP1 (Option 1) for 38.213 Section 7.1.1 ==============================  --Unchanged part omitted------------------------  - If the UE transmits a PUSCH associated with the first RS resource index , the UE applies the first value, the first value, and for determining . If the UE transmits a PUSCH associated with the second RS resource index , the UE applies the second value, the second value, and or if *twoPUSCH-PC-AdjustmentStates* is provided or not provided, respectively, for determining .  - If the UE receives a random access response message in response to a PRACH transmission or a MsgA transmission on active UL BWP of carrier of serving cell as described in clause 8  - ,  - where if the UE is not provided with *tag-Id2* or if the UE is not provided with *twoPUSCH-PC-AdjustmentStates*; otherwise,  if the first TAG is indicated by the random access response message and if the second TAG is indicated by the random access response message, and  - is a TPC command value indicated in a random access response grant of the random access response message corresponding to a PRACH transmission according to Type-1 random access procedure, or in a random access response grant of the random access response message corresponding to a MsgA transmission according to Type-2 random access procedure with RAR message(s) for fallbackRAR, on active UL BWP of carrier of serving cell , and  -  and is provided by higher layers and corresponds to the total power ramp-up requested by higher layers from the first to the last random access preamble for carrier in the serving cell , is the bandwidth of the PUSCH resource assignment expressed in number of resource blocks for the first PUSCH transmission on active UL BWP of carrier of serving cell , and is the power adjustment of first PUSCH transmission on active UL BWP of carrier of serving cell .  ===============================================================  ============TP2 (Option 2) for 38.213 Section 7.1.1 ==============================  --Unchanged part omitted------------------------  - If the UE transmits a PUSCH associated with the first RS resource index , the UE applies the first value, the first value, and for determining . If the UE transmits a PUSCH associated with the second RS resource index , the UE applies the second value, the second value, and or if *twoPUSCH-PC-AdjustmentStates* is provided or not provided, respectively, for determining .  - If the UE receives a random access response message in response to a PRACH transmission or a MsgA transmission on active UL BWP of carrier of serving cell as described in clause 8  - ,  - where if the UE is not provided with *tag-Id2* or if the UE is not provided with *twoPUSCH-PC-AdjustmentStates*; otherwise, if the PRACH transmission is in response to a detection of PDCCH order,  - is the closed loop index of the active TCI states associated with the PCI indicated by the PRACH association indicator as described in [5, TS38.212] if the UE is provided *SSB-MTC-AdditionalPCI*,  - otherwise, *l* is the closed loop index of the active TCI states associated with a same *coresetPoolIndex* as PDCCH order if the PRACH association indicator is 0, and *l* is the closed loop index of the active TCI states associated with a different *coresetPoolIndex* from the PDCCH order if the PRACH association indicator is 1, and  - is a TPC command value indicated in a random access response grant of the random access response message corresponding to a PRACH transmission according to Type-1 random access procedure, or in a random access response grant of the random access response message corresponding to a MsgA transmission according to Type-2 random access procedure with RAR message(s) for fallbackRAR, on active UL BWP of carrier of serving cell , and  -  and is provided by higher layers and corresponds to the total power ramp-up requested by higher layers from the first to the last random access preamble for carrier in the serving cell , is the bandwidth of the PUSCH resource assignment expressed in number of resource blocks for the first PUSCH transmission on active UL BWP of carrier of serving cell , and is the power adjustment of first PUSCH transmission on active UL BWP of carrier of serving cell .  =============================================================== | **Support TP1**: Qualcomm, Huawei  **Support TP2:** Qualcomm,  **Not support**: Samsung |

Companies are asked to provide their views on the above draft CR/TPs. For companies supportive of issue 1.2, please indicate if you prefer TP1 or TP2.

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| **Company** | **Comments** |
| Huawei, Hisilicon | For issue 1.1, support the proposal.  For issue 1.2, support TP2 for simplicity. |
| **Lenovo** | For issue 1.1, support the proposal.  For issue 1.2, support TP2. |
| **Samsung** | Issue 1.1: Support proposal  Issue 1.2: Don’t support. Not essential during maintenance.  For Issue 1.2. TP1 forces a certain network mapping for TAGs and PC adjustment states.  TP2 is a significant change for maintenance. This issue is not just related to 2TA, it can happen when there are two TRPs in a cell, and RACH can be sent from either TRP. This includes sDCI and mDCI scenarios, as well as scenarios when a single PC adjustment state is configured. The proposed change, just addresses one corner case. |
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# References

1. R1-2405949, Draft CR on SSB-RO mapping for two TA, Google
2. R1-2407014, Maintenance on NR MIMO Evolution for Downlink and Uplink, Qualcomm Incorporated