3GPP TSG-RAN WG4 Meeting #95-e R4-2008618

Electronic Meeting, 25th May – 5th June, 2020

**Agenda item: 6.11.2**

**Source: Samsung**

**Title: WF on NR eMIMO RRM Requirement**

**Document for: Approval**

# **1 Background**

Rel-16 NR eMIMO WI (i.e., Enhancements on MIMO for NR) is a RAN1 leading WI with below major enhancement in RAN1 area which has potential RRM requirement impact in RAN4:

* Enhancements on multi-beam operation
  + DL/UL beam indication with reduced latency and overhead
  + Beam failure recovery for SCell
  + L1-SINR measurement

This WF is used to capture further agreements from RAN#95.

# **2 Agreement from RAN4#95 Chairman Notes after 1st Round**

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| **Topic #1: L1-SINR Measurement**  Issue 1-1-1: For SSB/CSI-RS-based CMR+IMR, the sharing factor P  Agreement:  For SSB/CSI-RS-based CMR+IMR L1-SINR measurement:   * + No requirement when CMR or IMR is fully overlapped with MG.   + The variable P used for defining L1-SINR measurement period could can be defined as the maximum value between PCMR and PIMR, where     - PCMR is the scaling factor for CMR according to the principles of defining variable P for L1-RSRP measurement.     - PIMR is the scaling factor for IMR according to the principles of defining variable P for L1-RSRP measurement.   Issue 1-1-2: Extend single carrier requirement to CA  Agreement:  For extending single carrier requirement to CA for L1-SINR measurement:   * + Follow the conclusion from extending single carrier requirement to CA for L1-RSRP measurement in Rel-15 TEI.   Issue 1-2-2: For SSB-based CMR+IMR, “repetition = ON” field of IMR  Agreement: For SSB-based CMR+IMR with NZP IMR configured with “repetition = ON”:   * + No measurement period requirement shall be applied.   **Topic #2: SCell Beam Failure Recovery**  Issue 2-1-1: BFD/CBD Sharing factor for FR1 inter-band CA  Agreement:  BFD/CBD Sharing factor for FR1 inter-band CA:   * + The sharing factor is proportional to the number of bands on which UE is performing BFD/CBD only for SCell.   Issue 2-1-3: Sharing factor for BFD/CBD measurement on PCell/PSCell  Agreement  Sharing factor for BFD/CBD measurement on PCell/PSCell:   * + No scaling factor is introduced for BFD/CBD measurements on PCell/PSCell.   Issue 2-2-1: How the requirement for beam failure recovery request should be defined  Agreement  The requirement for beam failure recovery request is defined as:   * + After detecting beam failure in an SCell, UE is required to transmit scheduling request on PUCCH configured for SR for BFR within a period T, where     - T = T1 x Ceil((T2 + D) / T1),       * T1 is equal to the periodicity of PUCCH configured with *schedulingRequestForBFR*.       * T2 is the time to perform the candidate beam detection T2 = TEvaluate\_CBD.         + TEvaluate\_CBD is the evaluation period for candidate beam detection specified in TS38.133 8.5.5 and 8.5.6.       * D is the UE Processing time.   **Topic #3: DL/UL Beam Indication with Reduced Latency and Overhead**  Issue 3-1-1: The necessity of new RRM requirement for MAC-CE based spatial relation update for aperiodic-SRS  Agreement  The necessity of new RRM requirement for MAC-CE based spatial relation update for aperiodic-SRS:   * + No new RRM requirement is introduced for the feature of MAC-CE based spatial relation update for aperiodic SRS.   **Topic #4: Multi-TRxP Transmission**  Issue 4-2-1: For FR1 Intra-band CA, whether or not the same conclusion as intra-band EN-DC can be applied  Agreement  For FR1 Intra-band CA, RRM MRTD requirement impact due to enabling multi-TRxP transmission in Rel-16:   * + RAN4 apply the same conclusion as intra-band EN-DC. |

# **3 Way Forward**

3.1 L1-SINR Measurement

##### 3.1.1 “Repetition” field of NZP-IMR Not Present:

* **For L1-SINR measurement with dedicated configured NZP-IMR, the expected UE behavior if NZP-IMR is not configured with “repetition” field:**
  + In RAN4 requirement, the FR2 scaling factor N is defined only based on CMR configuration.
  + In RAN4 requirement, there is no need to specify the expected UE behavior/requirement if NZP-IMR is not configured with “repetition” field, because the expected UE behavior is already specified in RAN1 and RAN2 specification.

##### 3.1.2 Scheduling Restriction

* **Scheduling restriction due to L1-SINR measurement**
  + The scheduling restriction due to L1-SINR shall be based on the framework of scheduling restriction due to Rel-15 L1-RSRP measurement.

3.2 SCell Beam failure recovery

##### 3.2.1 BFD and CBD on SCell

* **BFD/CBD Sharing factor for FR2 inter-band CA and FR1-FR2 CA**
  + Define sharing factor as:
    - In FR2 inter-band CA, the sharing factor is proportional to the number of bands on which UE is performing BFD/CBD only for SCell.
      * UE is required to perform BFD/CBD in only one band among a set of bands that it can receive with the common beam.”
    - In FR1+FR2 CA, sharing factor shall be introduced, and the sharing factors is the sum of the sharing factor of FR1 and the sharing factor of FR2.

##### 3.2.2 SCell Beam Failure Recovery Request

* **UE Processing time, D:**
  + D = 2ms
    - In RAN4#96, companies may further discuss the conclusion of D = 2ms, if problem identified.

3.3 DL/UL Beam Indication with Reduced Latency and Overhead

##### 3.3.1 RRM requirement impact to enable multi-TRP transmission

* **The necessity of new RRM requirement for MAC-CE based Pathloss RS activation**
  + Option 1: The agreed UE behavior and requirements for MAC-CE based pathloss RS activation when an activated pathloss RS is not being maintained shall be specified in TS 38.133.
  + Option 2: Follow existing agreement from RAN4 chairman notes, as below:

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| < RAN4#92bis Chairman Notes>   * No RAN4 impact has been identified due to newly introduced   + Mechanism of updating pathloss RS for PUSCH/SRS via MAC-CE.   + Mechanism of simultaneous spatial relation update for multiple PUCCH resources with one MAC-CE.   + Default spatial Relation for PUCCH/SRS in FR2. |

* **How to capture new RRM requirement for MAC-CE based Pathloss RS activation (if any)**
  + If the necessity of new requirement is confirmed (in the discussion on the above listed issue), there are options proposed for how to capture new RRM requirement:
    - Option 1: in Rel-16 TEI.
    - Option 2: in Rel-17 scope.
    - Option 3: in Rel-16 eMIMO WI.
    - Option 4: No new requirement needed at all.

3.4 Multi-TRxP Transmission

##### 3.3.1 RRM requirement impact to enable multi-TRxP transmission

* **“Co-located deployment assumption” and its impact on multi-TRxP transmission**
  + FFS whether or not “co-located deployment” in intra-band EN-DC and intra-band FR1 CA MRTD requirement needs to be revised to enable multi-TRxP transmission on NR cells.
  + FFS the reference timing of each multi-TRxP enabled carrier to find MRTD/MTTD in EN-DC scenarios.

# **4 Reference**

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| R4-2006205 | Discussion on requirements for L1-SINR measurements | Apple | discussion |
| R4-2006370 | Discussion on L1-SINR Measurement Requirement | Samsung | discussion |
| R4-2006371 | CR to TS38.133 on introduction of L1-SINR Measurement Requirement (Section 3.3 and 9) | Samsung | CR |
| R4-2006864 | Discussion on RRM requirements for L1-SINR | MediaTek inc. | discussion |
| R4-2007483 | RRM requirements for L1-SINR estimation | Qualcomm | discussion |
| R4-2007767 | Discussion on L1-SINR measurement requirements for NR eMIMO | Huawei, HiSilicon | discussion |
| R4-2007768 | Discussion on L1-SINR measurement accuracy for NR eMIMO | Huawei, HiSilicon | discussion |
| R4-2007769 | DraftCR on L1-SINR measurement accuracy requirements | Huawei, HiSilicon | draftCR |
| R4-2008091 | Discussions on Rel-16 NR eMIMO L1-SINR measurements | Nokia, Nokia Shanghai Bell | other |
| R4-2006372 | Discussion on SCell Beam Failure Recovery RRM Requirement | Samsung | discussion |
| R4-2006373 | CR to TS38.133 on introduction of SCell BFD and CBD (Section 8.5) | Samsung | CR |
| R4-2006374 | CR to TS38.133 on introduction of SCell BFRQ Procedure (Section 8.5) | Samsung | CR |
| R4-2006865 | Discussion on RRM requirements for BFR on SCell | MediaTek inc. | discussion |
| R4-2007378 | BFRQ on SR-like PUCCH resource | Ericsson | discussion |
| R4-2007379 | Draft CR: Correction of SCell BFRQ Procedure (Section 8.5) | Ericsson | draftCR |
| R4-2007484 | SCell Beam Failure Detection and Recovery | Qualcomm | discussion |
| R4-2007770 | Discussion on SCell BFD and CBD requiremetns for NR eMIMO | Huawei, HiSilicon | discussion |
| R4-2007771 | CR on SCell BFD and CBD requirements | Huawei, HiSilicon | CR |
| R4-2006375 | Discussion on MAC-CE based spatial relation update for aperiodic SRS | Samsung | discussion |
| R4-2006065 | Discussion on applicable timing for the unknown PL RS activated by MAC-CE | ZTE Corporation | discussion |
| R4-2006206 | Discussion on RRM requirements for Multi-TRP | Apple | discussion |
| R4-2006376 | Discussion on MRTD/MTTD requirement to Enable Multi-TRP Transmission | Samsung | discussion |
| R4-2006377 | CR to TS38.133 on introduction of multi-TRP transmission (Section 7.5 and 7.6) | Samsung | CR |
| R4-2006866 | Discussion on MRTD for multiple TRPs scenario | MediaTek inc. | discussion |
| R4-2006867 | Discussion on PL RS activation requirement via MAC CE | MediaTek inc. | discussion |
| R4-2006868 | CR for introduction of pathloss reference signal switching delay | MediaTek inc. | CR |
| R4-2007380 | MRTD/MTTD requirements for Multi-TRP deployment for MIMO+CA and MIMO+DC | Ericsson | discussion |
| R4-2007485 | MRTD/MTTD in CA/DC with multiple TRPs | Qualcomm | discussion |
| R4-2007772 | Discussion on MRTD and MTTD requirements for multi-TRP transmissions | Huawei, HiSilicon | discussion |
| R4-2008092 | Discussions on Rel-16 NR eMIMO multi-TRP transmissions | Nokia, Nokia Shanghai Bell | other |