**3GPP TSG RAN WG1 #107-e R1-21xxxxx**

**e-Meeting, November 11th – 19th, 2021**

**Title:** [Draft] LS on BFR for CORESET with two activated TCI states

**Response to:**

**Release:** Rel-17

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

**Source:** RAN1

**To:** RAN4

**CC:** RAN2

**Contact Person:**

**Name:**  Chuangxin Jiang

**E-mail Address:** jiang.chuangxin1@zte.com.cn

**1. Overall Description:**

In Rel-17, RAN1 has agreed two SFN transmission modes for PDCCH in which two TCI states can be activated for a CORESET. Two SFN modes support network based (TRP based pre-compensation scheme) and UE based (scheme 1) Doppler shift compensation for DL transmission.

For implicit BFD RS based on a CORESET with two activated TCI states, RAN1 has agreed that how to calculate radio link quality for RLM /BFD is up to RAN4 discussion.

Two options have been discussed in RAN1:

* Option 1: For a CORESET with two activated TCI states, two RS indexes are included in (as two BFD RS resources). UE calculates two hypothetical BLER or two radio link quality for the CORESET and follows the Rel-15/16 specification for BFD
* Option 2: For a CORESET with two activated TCI states, UE calculates single hypothetical BLER or single radio link quality for the CORESET

Some relevant agreements and conclusion from RAN1 are listed as follows

|  |
| --- |
| **Agreement**  If enhanced SFN PDCCH transmission scheme (scheme 1 or TRP-based pre-compensation) is configured and two TCI states are activated for at least one CORESET, support the following configuration of RS for BFD   * For implicit configuration   + Alt 1-2: RS of CORESETs with both single and two TCI states are used   FFS: The maximum number of BFD RS and details on RS determination    **Conclusion**  No RAN1 specification impact on how to calculate hypothetical BLER for BFD    **Agreement**  When CORESET is indicated with two TCI states   * One BFD RS pair for SFN CORESET is counted as two BFD RSs * FFS: Increase the maximum number of monitored BFD RSs to X.   + X is UE capability   + X = 2, 3, 4, FFS other values of X     **Agreement**  When two TCI states are activated for a CORESET, NBI RS can be configured as follows   * Alt 4-1: Using the existing Rel-15 NBI configuration based on single SSB / CSI-RS resource * FFS addition support of Alt 4-2: two new beam identification CSI-RS resource sets / new beam identification CSI-RS resource pairs or SSB pairs     **Agreement**  For a CORESET with two activated TCI states, for implicit BFD RS, how to calculate radio link quality for RLM /BFD is up to RAN4 discussion   * Send LS to let RAN4 to let them know about two possible options of radio link quality estimation for RLM /BFD using each RS or RS pair of CORESET activated with two TCI states. RAN1 has discussed both options, but was not able to reach a consensus. Inform that it is up to RAN4 to specify the most appropriate option. LS is endorsed in R1-211XXXX (Chuangxin , ZTE ). |

**2. Actions:**

**To RAN4**

**ACTION:**

RAN1 would like to respectfully request RAN4 to take the above information into account.

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

TSG-RAN WG1 Meeting #107b-e 17th Jan. – 25th Jan. 2022 emeeting

TSG-RAN WG1 Meeting #108-e 21st Feb. – 3rd Mar. 2022 emeeting