**3GPP TSG-RAN WG1 Meeting #106bis-eR1-21xxxxx**

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

**Title: [Draft] Reply LS on the physical layer aspects of small data transmission**

**Response to:**

**Release:** Rel-17

**Work Item:** NR\_SmallData\_INACTIVE-Core

**Source:** ZTE [RAN1]

**To:** RAN2

**Contact Person:**

#### Name: Ziyang Li

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**Attachments:** None

**1. Overall Description:**

RAN1 has further discussed the remaining physical layer issues for CG-SDT and RA-SDT, and the following agreements have been achieved.

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| Mapping ratio and association period* Mapping ratio of SSB to CG PUSCH is configured per CG configurations.
	+ FFS whether to restrict the same value for all CG configurations
* For the candidate value set of SSB to CG PUSCH mapping ratio, support at least {1, 2, 4, 8, 16}
	+ FFS {1/8,1/4,1/2}

Multi-layer PUSCH transmission* Multi-layer PUSCH transmission is not supported for CG-SDT.

Repetitions* The repetitions are considered as a bundle of transmission occasions that are mapped to the same SSB(s), no additional specification rule is needed.

Validation of PUSCH occasion* No need to define UL/DL pattern type of validation rule specific for paired spectrum at least for non-RedCap UEs.
	+ FFS the case for RedCap UEs
* A CG PUSCH occasion is not valid if it overlaps with any valid PRACH occasion or valid MsgA PUSCH occasion.

Default SSB set* When SSB set indication is absent, UE assumes the SSB set includes all actually transmitted SSBs configured by SIB1.

Search space and CORESET* RAN1 confirms the working assumption in RAN2 that UE-specific search space is configured for UEs performing CG-SDT.
* CORESET for UE performing RA-SDT should be a common CORESET.

L1 feedback* From RAN1’s perspective, it’s feasible to reuse CG-DFI mechanism for CG-SDT, but no consensus on whether CG-DFI is needed.

Pathloss determination* The pathloss for CG-SDT PUSCH power control can be determined by the measurement of selected SSB associated with the CG PUSCH.

QCL assumption* For CG-SDT, the UE can assume the PDCCH carrying the DCI has the same DM-RS antenna port quasi co-location properties as for a SSB associated to the CG PUSCH transmission e.g. for detection of retransmission DCI in response to a CG PUSCH transmission.
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Regarding the five questions from RAN2 in LS R1-2108715, the responses from RAN1 are provided as follows:

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| Q1: For both RA-SDT and CG-SDT, RAN2 assumes that common PUCCH resources (i.e. those that are shared with non-SDT UEs) can also be used for HARQ-ACK feedback for Msg4 /MsgB and subsequent SDT transmissions. Can RAN1 confirm this?A1:* RAN1 confirms that common PUCCH resources (i.e. those that are shared with non-SDT UEs) can also be used for HARQ-ACK feedback for Msg4 /MsgB and subsequent SDT transmissions.

Q2: For RA-SDT and CG-SDT, for Msg4 /MsgB and subsequent SDT transmissions, does RAN1 think there is a need for any other PUCCH resources than the above and if needed, can RAN1 define these? A2: * RAN1 thinks there is no need for any other PUCCH resources than common PUCCH resources shared with non-SDT UEs.

Q3: Is there any other L1 configuration needed for both RA-SDT and CG-SDT to support the subsequent data transmissions from RAN1 perspective? A3:* From RAN1’s perspective, there is no other L1 configuration for RA-SDT and CG-SDT to support subsequent data transmission.

Q4: Do RAN1 have any concerns to support RA-SDT on the non-initial BWP? NOTE: It has already been agreed in RAN2 that *CG-SDT resource can be configured on either initial BWP or separate SDT BWP*, if confirmed by RAN1.A4:* It’s RAN1’s common understanding that RA-SDT resource cannot be configured on non-initial BWP.
* RAN1 cannot reach a consensus on whether to confirm RAN2 agreement that CG-SDT resource can be configured on separate SDT BWP with the concern on [necessity].

Q5: Does RAN1 think that BFD/BFR procedure is required for SDT and if needed, can RAN1 define the necessary procedure to support this? A5: * It’s RAN1’s common understanding that BFD/BFR procedure is not required for SDT in Rel-17.
	+ FFS: whether or not to support reporting the beam change to gNB.
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**2. Actions:**

**To RAN2:**

**ACTION:** RAN1 respectfully asks RAN2 to take the above information into account.

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

TSG-RAN WG1 Meeting #107-e 11th Nov – 19th Nov 2021 e-meeting