3GPP TSG RAN WG1 #101 R1-200xxxx

e-Meeting, May 20th – June 5th, 2020

Source: Moderator (OPPO)

Title: Text Proposal for TS 38.214 in [101-e-NR-eMIMO-multiTRP-02]

Agenda Item: 7.2.6.2

Document for: Discussion and Decision

1. Introduction

Rel-16 enhancement on MIMO WID includes objectives of enhancing multi-TRP/Panel transmission with ideal and non-ideal backhaul. During the work of rel-16, designs for multiple-PDCCH based and single-PDCCH based multi-TRP/Panel transmission were discussed and specified. This document provides the Text Proposal for the agreement made for Issue #b-2 in multi-TRP email thread 2:

* The issue# b-2 to Clarify the relationship between *RepetitionNumber-r16*/*RepSchemeEnabler* and *pdsch-AggregationFactor*, and also clarify the repetitions are in *RepNum16* consecutive slots in Scheme 4.
1. Text Proposal

*Reason for changes:*

In current specification, the relationship between higher layer parameter *repetitionNumber-r16* and higher layer parameter *AggregationFactor* is not clear. And the relationship between configuring Scheme 2a/2b/3 and configuring higher layer parameter *AggregationFactor* is not clear too. Furthermore, in scheme 4, it is clearly specified that the *repetitionNumber*-r16 PDSCH repetitions in Scheme 4 shall be transmitted in consecutive slots.

In RAN1#101 e-Meeting, we made the following agreement:

**Agreement**

* **When a UE is configured with*repetitionNumber-r16*, the UE does not expect to be configured with *AggregationFactor***
* **When a UE is configured by *repetitionSchemeConfig-r16* set to one of '*FDMSchemeA*', '*FDMSchemeB*' and '*TDMSchemeA*', the UE does not expect to be configured with AggregationFactor.**
* **Clarify that in scheme 4, PDSCH is repeated in *RepNumR16* consecutive slots**

Therefore, TS 38.214 shall be updated accordingly.

Summary of changes:

In TS 38.214, capture the above agreement made in RAN1 #101 e-Meeting.

**Specs/Sections impacted:**

TS 38.214 V16.1.0 /5.1 and 5.1.2.1

Consequences if not approved:

The UE behavior on receiving PDSCH of Scheme 2a/2b/3 and Scheme 4 is ambiguous.

The text proposal for TS 38.214 is:

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| 5.1 UE procedure for receiving the physical downlink shared channel\*\*\* Unchanged text is omitted \*\*\*When a UE is configured by the higher layer parameter *PDSCH-config* that indicates at least one entry in *pdsch-TimeDomainAllocationList* containing *repetitionNumber-16* in *PDSCH-TimeDomainResourceAllocatio*n, the UE may expect to be indicated with one or two TCI states in a codepoint of the DCI field *'Transmission Configuration Indication'* together with the DCI field "*Time domain resource assignment*' indicating an entry in *pdsch-TimeDomainAllocationList* which contain *repetitionNumber-16* in *PDSCH-TimeDomainResourceAllocatio*n and DM-RS port(s) within one CDM group in the DCI field "*Antenna Port(s)"*. - When two TCI states are indicated in a DCI with '*Transmission Configuration Indication*' field, the UE may expect to receive multiple slot level PDSCH transmission occasions of the same TB with two TCI states used across multiple PDSCH transmission occasions in the *repetitionNumber-16* consecutive slots as defined in Clause 5.1.2.1. - When one TCI state is indicated in a DCI with '*Transmission Configuration Indication*' field, the UE may expect to receive multiple slot level PDSCH transmission occasions of the same TB with one TCI state used across multiple PDSCH transmission occasions in the *repetitionNumber-16* consecutive slots as defined in Clause 5.1.2.1. \*\*\* Unchanged text is omitted \*\*\*5.1.2.1 Resource allocation in time domain\*\*\* Unchanged text is omitted \*\*\*When receiving PDSCH scheduled by DCI format 1\_1 or 1\_2 in PDCCH with CRC scrambled by C-RNTI, MCS-C-RNTI, or CS-RNTI with NDI=1, if the UE is configured with *pdsch-AggregationFactor* in *pdsch-config*, the same symbol allocation is applied across the *pdsch-AggregationFactor* consecutive slots. When receiving PDSCH scheduled by DCI format 1\_1 or 1\_2 in PDCCH with CRC scrambled by CS-RNTI with NDI=0, or PDSCH scheduled without corresponding PDCCH transmission using *sps-Config* and activated by DCI format 1\_1 or 1\_2, the same symbol allocation is applied across the *pdsch-AggregationFactor*, in *sps-Config* if configured or in *pdsch-config* otherwise, consecutive slots. The UE may expect that the TB is repeated within each symbol allocation among each of the *pdsch-AggregationFactor* consecutive slots and the PDSCH is limited to a single transmission layer. For PDSCH scheduled by DCI format 1\_1 or 1\_2 in PDCCH with CRC scrambled by CS-RNTI with NDI=0, or PDSCH scheduled without corresponding PDCCH transmission using *sps-Config* and activated by DCI format 1\_1 or 1\_2, the UE is not expected to be configured with the time duration for the reception of *pdsch-AggregationFactor* repetitions, in *sps-Config* if configured or in *pdsch-config* otherwise, larger than the time duration derived by the periodicity P obtained from the corresponding *sps-Config*. The redundancy version to be applied on the *n*th transmission occasion of the TB, where n = 0, 1, …*pdsch-AggregationFactor* -1, is determined according to table 5.1.2.1-2 and "*rvid* indicated by the DCI scheduling the PDSCH" in table 5.1.2.1-2 is assumed to be 0 for PDSCH scheduled without corresponding PDCCH transmission using *sps-Config* and activated by DCI format 1\_1 or 1\_2. If a UE is configured with higher layer parameter *repetitionNumber-16* or if the UE is configured by *repetitionSchemeConfig-r16* set to one of '*FDMSchemeA*', '*FDMSchemeB*' and '*TDMSchemeA*', the UE does not expect to be configured with *pdsch-AggregationFactor* in *pdsch-config.*\*\*\* Unchanged text is omitted \*\*\*When a UE configured by the higher layer parameter *PDSCH-config* that indicates at least one entry in *pdsch-TimeDomainAllocationList* contain*repetitionNumber-16* in *PDSCH-TimeDomainResourceAllocatio*n, - If two TCI states are indicated by the DCI field 'Transmission Configuration Indication' together with the DCI field "Time domain resource assignment' indicating an entry in pdsch-TimeDomainAllocationList which contain *repetitionNumber-16* in PDSCH-TimeDomainResourceAllocation and DM-RS port(s) within one CDM group in the DCI field "Antenna Port(s)", the same SLIV is applied for all PDSCH transmission occasions across the *repetitionNumber-16*  consecutive slots, the first TCI state is applied to the first PDSCH transmission occasion and resource allocation in time domain for the first PDSCH transmission occasion follows Clause 5.1.2.1. \*\*\* Unchanged text is omitted \*\*\*- If one TCI state is indicated by the DCI field 'Transmission Configuration Indication' together with the DCI field "Time domain resource assignment' indicating an entry in pdsch-TimeDomainAllocationList which contain *repetitionNumber-16* in PDSCH-TimeDomainResourceAllocation and DM-RS port(s) within one CDM group in the DCI field "Antenna Port(s)", the same SLIV is applied for all PDSCH transmission occasions across the *repetitionNumber-16*  consecutive slots, the first PDSCH transmission occasion follows Clause 5.1.2.1, the same TCI state is applied to all PDSCH transmission occasions. The UE may expect that each PDSCH transmission occasion is limited to two transmission layers. For all PDSCH transmission occasions, the redundancy version to be applied is derived according to Table 5.1.2.1-2, where $n$ is counted considering PDSCH transmission occasions. \*\*\* Unchanged text is omitted \*\*\* |

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| Company | Views and comments |
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1. Reference
2. R1-2003397 On remaining issues on M-TRP vivo
3. R1-2003469 Maintenance of multi-TRP enhancements ZTE
4. R1-2003531 Remaining issues on multi-TRP in R16 Huawei, HiSilicon
5. R1-2003627 Discussion on remaining issues of multi-TRP/panel transmission CATT
6. R1-2003660 Remaining issues on multi-TRP transmission MediaTek Inc.
7. R1-2003742 Corrections to multi-TRP Intel Corporation
8. R1-2003819 Remaining issues on multi-TRP/panel transmission Lenovo, Motorola Mobility
9. R1-2003881 On Rel.16 multi-TRP/panel transmission Samsung
10. R1-2003928 Text proposals on enhancements on multi-TRP/panel transmission LG Electronics
11. R1-2003954 Remaining issues on multi-TRP/panel transmission CMCC
12. R1-2003987 Discussion on remaining issues of multi-TRP operation Spreadtrum Communications
13. R1-2004047 Text proposals for enhancements on multi-TRP and panel Transmission OPPO
14. R1-2004229 Remaining issues for Multi-TRP enhancement Apple
15. R1-2004265 Maintenance of Rel-16 Multi-TRP operation Nokia, Nokia Shanghai Bell
16. R1-2004311 Remaining issues on multi-TRP transmission NEC
17. R1-2004395 Remaining issues on multi-TRP/panel transmission NTT DOCOMO, INC
18. R1-2004432 Remaining issues on Multi-TRP/Panel Transmission Ericsson
19. R1-2004463 Multi-TRP Enhancements Qualcomm Incorporated
20. R1-2004592 Clarification on Multi-TRP URLLC Scheme 4 Convida Wireless
21. R1-2004719 FL summary #2 for Multi-TRP/Panel Transmission Moderator (OPPO)