3GPP TSG RAN WG1 #102-e R1-200xxxx

e-Meeting, August 17th – 28th, 2020

Source: Moderator (OPPO)

Title: Discussion #2 in Email Thread #5

Agenda Item: 7.2.6

Document for: Discussion and Decision

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 discussion eMIMO email thread#5:

* [102-e-NR-eMIMO-05] Email thread#5 Editorial TPs for mTRP and MU-CSI (including TP for MU.1)

Updated Draft Text Proposals

MT.3.1 Align the RRC parameter names

Motivation for changes:

Vivo[1], spreadtrum [5] and Sharp [11] suggested or provided text proposals to align the RRC parameter names in TS 38.211, TS 38.213 and TS 38.214.

1. Vivo proposed:
	* Change all “RepNumR16” to “repetitionNumber-r16” in TS 38.214.
	* Change all “RepSchemeEnabler” to “repetitionScheme-r16” in TS 38.214.
	* Change “AdditionaldataScramblingIdentityPDSCH” to “dataScramblingIdentityPDSCH2” in TS 38.213.
2. Spreadtrum proposed:
	* In Rel-16, for single-DCI based multi-TRP transmission, inter-slot repetition for PDSCH with introducing dynamic indication for the number of repetition has been supported. In detail, if this scheme would be enabled, gNB should configure at least one entry containing repetitionNumber-r16 in pdsch-TimeDomainAllocationList-r16 or pdsch-TimeDomainAllocationListForDCI-Format1-2-r16. On the contrary, according to current TS38.331, repetitionNumber-r16 definitely would not be configured in pdsch-TimeDomainAllocationList.
	* There are some high layer parameters in TS 38.214 such as *RepTCIMapping*, *CycMapping* and *SeqMapping*, which should be replaced with *tciMapping-r16*, *cyclicMapping* and *sequenticalMapping* respectively to better align with TS 38.331.
3. Sharp provided text proposal to align RRC parameter for section 9 in TS 38.213

Updated Draft TP MT.3.1: adopt the following TPs:

* TP for TS 38.211

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| 7.3.1 Physical downlink shared channel7.3.1.1 ScramblingUp to two codewords  can be transmitted. In case of single-codeword transmission, .For each codeword , the UE shall assume the block of bits , where is the number of bits in codeword  transmitted on the physical channel, are scrambled prior to modulation, resulting in a block of scrambled bits according to where the scrambling sequence is given by clause 5.2.1. The scrambling sequence generator shall be initialized withwhere-  equals the higher-layer parameter *dataScramblingIdentityPDSCH* if configured and the RNTI equals the C-RNTI, MCS-C-RNTI, or CS-RNTI, and the transmission is not scheduled using DCI format 1\_0 in a common search space; - equals- the higher-layer parameter *dataScramblingIdentityPDSCH* if the codeword is scheduled using a CORESET with *CORESETPoolIndex* equal to 0;- the higher-layer parameter *dataScramblingIdentityPDSCH2-r16* if the codeword is scheduled using a CORESET with *CORESETPoolIndex* equal to 1; if the higher-layer parameters *dataScramblingIdentityPDSCH* and *dataScramblingIdentityPDSCH2-r16* are configured together with the higher-layer parameter *CORESETPoolIndex* containing two different values, and the RNTI equals the C-RNTI, MCS-C-RNTI, or CS-RNTI, and the transmission is not scheduled using DCI format 1\_0 in a common search space;- otherwiseand where  corresponds to the RNTI associated with the PDSCH transmission as described in clause 5.1 of [6, TS 38.214].< Unchanged parts are omitted > |

* TP for TS 38.213

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| 9 UE procedure for reporting control information< Unchanged parts are omitted >If a UE- is not provided *CORESETPoolIndex* or is provided *CORESETPoolIndex* with a value of 0 for first CORESETs on active DL BWPs of serving cells, and- is provided *CORESETPoolIndex* with a value of 1 for second CORESETs on active DL BWPs of the serving cells, and- is provided *ackNackFeedbackMode-r16* = *separate*< Unchanged parts are omitted >If a UE- is not provided *CORESETPoolIndex* or is provided *CORESETPoolIndex* with a value of 0 for first CORESETs on active DL BWPs of serving cells, and- is provided *CORESETPoolIndex* with a value of 1 for second CORESETs on active DL BWPs of the serving cells, and- is provided *ackNackFeedbackMode-r16* = *joint*< Unchanged parts are omitted >9.1.2 Type-1 HARQ-ACK codebook determination< Unchanged parts are omitted >If the UE is provided *pdsch-AggregationFactor* in *SPS-Config* or *PDSCH-Config* and no entry in *pdsch-TimeDomainAllocationList-r16 and pdsch-TimeDomainAllocationListForDCI-Format1-2-r16* includes *repetitionNumber-r16* in *PDSCH-TimeDomainResourceAllocation-r16*, is a maximum value of *pdsch-AggregationFactor* in *SPS-Config* or *PDSCH-Config*; otherwise . The UE reports HARQ-ACK information for a PDSCH reception- from slot to slot , if is provided by *pdsch-AggregationFactor* [6, TS 38.214], or - from slot to slot , if the Time domain resource assignment field in the DCI format scheduling the PDSCH reception indicates an entry containing *repetitionNumber-r16,* or - in slot , otherwise < Unchanged parts are omitted >9.1.2.1 Type-1 HARQ-ACK codebook in physical uplink control channel< Unchanged parts are omitted >9.1.3.1 Type-2 HARQ-ACK codebook in physical uplink control channelA UE determines monitoring occasions for PDCCH with DCI format scheduling PDSCH receptions or SPS PDSCH release on an active DL BWP of a serving cell , as described in Clause 10.1, and for which the UE transmits HARQ-ACK information in a same PUCCH in slot based on- PDSCH-to-HARQ\_feedback timing indicator field values for PUCCH transmission with HARQ-ACK information in slot in response to PDSCH receptions or SPS PDSCH release- slot offsets [6, TS 38.214] provided by time domain resource assignment field in a DCI format scheduling PDSCH receptions or SPS PDSCH release and by *pdsch-AggregationFactor* or *repetitionNumber-r16*, when provided.< Unchanged parts are omitted >A value of the counter downlink assignment indicator (DAI) field in DCI formats denotes the accumulative number of {serving cell, PDCCH monitoring occasion}-pair(s) in which PDSCH reception(s) or SPS PDSCH release associated with the DCI formats is present up to the current serving cell and current PDCCH monitoring occasion, first if the UE indicates support for *PDSCH-Number-perMOperCell* in increasing order of the PDSCH reception starting time for the same {serving cell, PDCCH monitoring occasion} pair, second in ascending order of serving cell index, and then in ascending order of PDCCH monitoring occasion index , where . If, for an active DL BWP of a serving cell, the UE is not provided *CORESETPoolIndex* or is provided *CORESETPoolIndex* with value 0 for one or more first CORESETs and is provided *CORESETPoolIndex* with value 1 for one or more second CORESETs, and is provided *ackNackFeedbackMode-r16 = joint*, the value of the counter DAI is in the order of the first CORESETs and then the second CORESETs for a same serving cell index and a same PDCCH monitoring occasion index. The value of the total DAI, when present [5, TS 38.212], in a DCI format denotes the total number of {serving cell, PDCCH monitoring occasion}-pair(s) in which PDSCH reception(s) or SPS PDSCH release associated with DCI formats is present, up to the current PDCCH monitoring occasion and is updated from PDCCH monitoring occasion to PDCCH monitoring occasion. If, for an active DL BWP of a serving cell, the UE is not provided *CORESETPoolIndex* or is provided *CORESETPoolIndex* with value 0 for one or more first CORESETs and is provided *CORESETPoolIndex* with value 1 for one or more second CORESETs, and is provided *ackNackFeedbackMode-r16 = joint*, the total DAI value counts the {serving cell, PDCCH monitoring occasion}-pair(s) for both the first CORESETs and the second CORESETs.< Unchanged parts are omitted >- if, for an active DL BWP of a serving cell, the UE is not provided *CORESETPoolIndex* or is provided *CORESETPoolIndex* with value 0 for one or more first CORESETs and is provided *CORESETPoolIndex* with value 1 for one or more second CORESETs, and is provided *ackNackFeedbackMode-r16 = joint,* the serving cell is counted two times where the first time corresponds to the first CORESETs and the second time corresponds to the second CORESETs< Unchanged parts are omitted >9.2 UCI reporting in physical uplink control channelUCI types reported in a PUCCH include HARQ-ACK information, SR, LRR, and CSI. UCI bits include HARQ-ACK information bits, if any, SR information bits, if any, LRR information bit, if any, and CSI bits, if any. The HARQ-ACK information bits correspond to a HARQ-ACK codebook as described in Clause 9.1. For the remaining of this clause, any reference to SR is applicable for SR and/or for LRR.A UE may transmit one or two PUCCHs on a serving cell in different symbols within a slot. When the UE transmits two PUCCHs in a slot and the UE is not provided *ackNackFeedbackMode-r16* = *separate*, at least one of the two PUCCHs uses PUCCH format 0 or PUCCH format 2.If a UE is provided *ackNackFeedbackMode-r16* = *separate*, the UE may transmit up to two PUCCHs with HARQ-ACK information in different symbols within a slot.< Unchanged parts are omitted >9.2.3 UE procedure for reporting HARQ-ACK\*\*\* Unchanged text is omitted \*\*\*For a PUCCH transmission with HARQ-ACK information, a UE determines a PUCCH resource after determining a set of PUCCH resources for  HARQ-ACK information bits, as described in Clause 9.2.1. The PUCCH resource determination is based on a PUCCH resource indicator field [5, TS 38.212], if present, in a last DCI format, among the DCI formats that have a value of a PDSCH-to-HARQ\_feedback timing indicator field, if present, or a value of *dl-DataToUL-ACK*, or a value of *dl-DataToUL-ACKForDCIFormat1\_2* for DCI format 1\_2, indicating a same slot for the PUCCH transmission, that the UE detects and for which the UE transmits corresponding HARQ-ACK information in the PUCCH where, for PUCCH resource determination, detected DCI formats are first indexed in an ascending order across serving cells indexes for a same PDCCH monitoring occasion and are then indexed in an ascending order across PDCCH monitoring occasion indexes. For indexing DCI formats within a serving cell for a same PDCCH monitoring occasion, if the UE is not provided *CORESETPoolIndex* or is provided *CORESETPoolIndex* with value 0 for one or more first CORESETs and is provided *CORESETPoolIndex* with value 1 for one or more second CORESETs on an active DL BWP of a serving cell, and with *ackNackFeedbackMode-r16* = *joint* for the active UL BWP, detected DCI formats from PDCCH receptions in the first CORESETs are indexed prior to detected DCI formats from PDCCH receptions in the second CORESETs.< Unchanged parts are omitted >9.2.4 UE procedure for reporting SRA UE can be configured by *SchedulingRequestResourceConfig* a set of configurations for SR in a PUCCH transmission using either PUCCH format 0 or PUCCH format 1. A UE can be configured by *schedulingRequestID-BFR-SCell-r16* a configuration for LRR in a PUCCH transmission using either PUCCH format 0 or PUCCH format 1. The UE can be provided, by *phy-PriorityIndex-r16* in *SchedulingRequestResourceConfig*, a priority index 0 or a priority index 1 for the SR. If the UE is not provided a priority index for SR, the priority index is 0.The UE is configured a PUCCH resource by *SchedulingRequestResourceId*, or by *schedulingRequestID-BFR-SCell-r16* , providing a PUCCH format 0 resource or a PUCCH format 1 resource as described in Clause 9.2.1. The UE is also configured a periodicity  in symbols or slots and an offset  in slots by *periodicityAndOffset* for a PUCCH transmission conveying SR. If  is larger than one slot, the UE determines a SR transmission occasion in a PUCCH to be in a slot with number  [4, TS 38.211] in a frame with number  if .< Unchanged parts are omitted >9.2.5 UE procedure for reporting multiple UCI types< Unchanged parts are omitted >A UE that- is not provided *CORESETPoolIndex* or is provided *CORESETPoolIndex* with a value of 0 for first CORESETs on active DL BWPs of serving cells, and- is provided *CORESETPoolIndex* with a value of 1 for second CORESETs on active DL BWPs of the serving cells, and- is provided *ackNackFeedbackMode-r16* = *separate* |

* TP for TS 38.214

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| **5.1 UE procedure for receiving the physical downlink shared channel**< Unchanged parts are omitted >A UE does not expect to be configured with *repetitionScheme-r16* if the UE is configured with higher layer parameter *repetitionNumber-r16.* When a UE is configured by higher layer parameter *RepetitionScheme-r16* set to one of '*FDMSchemeA'*, '*FDMSchemeB'*, '*TDMSchemeA'*, if the UE is indicated with two TCI states in a codepoint of the DCI field *'Transmission Configuration Indication'* 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 and the UE is set to '*FDMSchemeA',* the UE shall receive a single PDSCH transmission occasion of the TB with each TCI state associated to a non-overlapping frequency domain resource allocation as described in Clause 5.1.2.3. < Unchanged parts are omitted >When a UE is configured by the higher layer parameter *repetitionNumber-r16* in *PDSCH-TimeDomainResourceAllocatio*n*-r16*, 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 which contains *repetitionNumber-r16* in *PDSCH-TimeDomainResourceAllocatio*n*-r16* 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-r16* 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-r16* consecutive slots as defined in Clause 5.1.2.1. When a UE is not indicated with a DCI that DCI field '*Time domain resource assignment*' indicating an entry which contains *repetitionNumber-r16* in *PDSCH-TimeDomainResourceAllocatio*n, and it is indicated with two TCI states in a codepoint of the DCI field *'Transmission Configuration Indication'* and DM-RS port(s) within two CDM group in the DCI field "*Antenna Port(s)"*, the UE may expect to receive a single PDSCH where the association between the DM-RS ports and the TCI states are as defined in Clause 5.1.6.2. When a UE is not indicated with a DCI that DCI field '*Time domain resource assignment*' indicating an entry which contains *repetitionNumber-r16* in *PDSCH-TimeDomainResourceAllocatio*n*-r16*, and it is indicated with one TCI states in a codepoint of the DCI field *'Transmission Configuration Indication',* the UE procedure for receiving the PDSCH upon detection of a PDCCH follows Clause 5.1. < Unchanged parts are omitted >**5.1.2.1 Resource allocation in time domain**< Unchanged parts are omitted >If a UE is configured with higher layer parameter *repetitionNumber-r16* or if the UE is configured by *repetitionScheme-r16* set to one of '*FDMSchemeA*', '*FDMSchemeB*' and '*TDMSchemeA*', the UE does not expect to be configured with *pdsch-AggregationFactor* *or pdsch-AggregationFactor-r16.*< Unchanged parts are omitted >When a UE is configured by the higher layer parameter *RepetitionScheme-r16* set to '*TDMSchemeA'* and indicated DM-RS port(s) within one CDM group in the DCI field "*Antenna Port(s)"*, the number of PDSCH transmission occasions is derived by the number of TCI states indicated by the DCI field *'Transmission Configuration Indication'* of the scheduling DCI*.* < Unchanged parts are omitted >When a UE configured by the higher layer parameter *PDSCH-config* that indicates at least one entry contain *repetitionNumber-r16* in *PDSCH-TimeDomainResourceAllocatio*n*-r16*, - 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 which contains *repetitionNumber-r16* in PDSCH-TimeDomainResourceAllocation-r16 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-r16*  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.  When the value indicated by *repetitionNumber-r16* in PDSCH-TimeDomainResourceAllocation-r16 equals to two, the second TCI state is applied to the second PDSCH transmission occasion. When the value indicated by *repetitionNumber-r16* in PDSCH-TimeDomainResourceAllocation-r16 is larger than two, the UE may be further configured to enable *cyclicMapping* or *sequenticalMapping* in *tciMapping-r16*.- When *cyclicMapping* is enabled, the first and second TCI states are applied to the first and second PDSCH transmission occasions, respectively, and the same TCI mapping pattern continues to the remaining PDSCH transmission occasions. - When *sequenticalMapping* is enabled, first TCI state is applied to the first and second PDSCH transmissions, and the second TCI state is applied to the third and fourth PDSCH transmissions, and the same TCI mapping pattern continues to the remaining PDSCH transmission occasions. The UE may expect that each PDSCH transmission occasion is limited to two transmission layers. For all PDSCH transmission occasions associated with the first TCI state, the redundancy version to be applied is derived according to Table 5.1.2.1-2, where is counted only considering PDSCH transmission occasions associated with the first TCI state. The redundancy version for PDSCH transmission occasions associated with the second TCI state is derived according to Table 5.1.2.1-3, where additional shifting operation for each redundancy version is configured by higher layer parameter *sequenceOffsetforRV-r16*and is counted only considering PDSCH transmission occasions associated with the second TCI state. Table 5.1.2.1-3: Applied redundancy version for the second TCI state when *sequenceOffsetforRV-r16* is present

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| *rvid* indicated by the DCI scheduling the PDSCH | *rvid* to be applied to *n*th transmission occasion with second TCI state |
| *n* mod 4 = 0 | *n* mod 4 = 1 | *n* mod 4 = 2 | *n* mod 4 = 3 |
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- 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 which contain *repetitionNumber-r16* in PDSCH-TimeDomainResourceAllocation-r16 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-r16*  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 is counted considering PDSCH transmission occasions. < Unchanged parts are omitted >5.1.2.3 Physical resource block (PRB) bundling< Unchanged parts are omitted >For a UE configured by the higher layer parameter *RepetitionScheme-r16* set to '*FDMSchemeA' or* '*FDMSchemeB', and* when the UE is indicated with two TCI states in a codepoint of the DCI field *'Transmission Configuration Indication* and DM-RS port(s) within one CDM group in the DCI field "*Antenna Port(s)*", - If  is determined as "wideband", the first PRBs are assigned to the first TCI state and the remaining PRBs are assigned to the second TCI state, where is the total number of allocated PRBs for the UE. - If  is determined as one of the values among {2, 4}, even PRGs within the allocated frequency domain resources are assigned to the first TCI state and odd PRGs within the allocated frequency domain resources are assigned to the second TCI state. - The UE is not expected to receive more than two PDSCH transmission layers for each PDSCH transmission occasion.For a UE configured by the higher layer parameter *RepetitionScheme-r16* set to '*FDMSchemeB',* andwhen the UE is indicated with two TCI states in a codepoint of the DCI field *'Transmission Configuration Indication* and DM-RS port(s) within one CDM group in the DCI field "*Antenna Port(s)",* each PDSCH transmission occasion shall follow the Clause 7.3.1 of [4, TS 38.211] with themapping to resource elements determined by the assigned PRBs for corresponding TCI state of the PDSCH transmission occasion, and the UE shall only expect at most two code blocks per PDSCH transmission occasion when a single transmission layer is scheduled and a single code block per PDSCH transmission occasion when two transmission layers are scheduled. For two PDSCH transmission occasions, the redundancy version to be applied is derived according to Table 5.1.2.1-2, where are applied to the first and second TCI state, respectively.< Unchanged parts are omitted >5.1.4.2 PDSCH resource mapping with RE level granularity< Unchanged parts are omitted >- If the UE is configured by higher layer parameter *PDCCH-Config* with two different values of *CORESETPoolIndex* in *ControlResourceSet* and is also configured by the higher layer parameter *lte-CRS-PatternList1-r16* and *lte-CRS-PatternList2-r16* in *ServingCellConfig*, the following REs are declared as not available for PDSCH:- if the UE is configured with crs-RateMatch-PerCORESETPoolIndex-r16, REs indicated by the CRS pattern(s) in *lte-CRS-PatternList1-r16* if the PDSCH is associated with CORESETPoolIndex = 0, or the CRS pattern(s) in *lte-CRS-PatternList2-r16* if PDSCH is associated with CORESETPoolIndex = 1;- otherwise, REs indicated by *lte-CRS-PatternList1-r16* and *lte-CRS-PatternList2-r16,* in *ServingCellConfig*.< Unchanged parts are omitted >5.1.6.2 DM-RS reception procedure< Unchanged parts are omitted >When a UE is not indicated with a DCI that DCI field "*Time domain resource assignment*' indicating an entry which contains *repetitionNumber-r16* in *PDSCH-TimeDomainResourceAllocatio*n*-r16* and it is indicated with two TCI states in a codepoint of the DCI field *'Transmission Configuration Indication'* and DM-RS port(s) within two CDM group in the DCI field "*Antenna Port(s)",* - the first TCI state corresponds to the CDM group of the first antenna port indicated by the antenna port indication table, and the second TCI state corresponds to the other CDM group.< Unchanged parts are omitted >5.1.6.2 DM-RS reception procedure< Unchanged parts are omitted >When a UE is not indicated with a DCI that DCI field "*Time domain resource assignment*' indicating an entry which contains *repetitionNumber-r16* in *PDSCH-TimeDomainResourceAllocatio*n*-r16*, and if the UE is configured with the higher layer parameter *maxNrofPorts* equal to *n2*, and if the UE is indicated with two TCI states by the codepoints of the DCI field *'Transmission Configuration Indication'* and DM-RS port(s) within two CDM group in the DCI field "*Antenna Port(s)"*, the UE shall receive two PT-RS ports which are associated to the lowest indexed DM-RS port among the DM-RS ports corresponding to the first/second indicated TCI state, respectively.When a UE configured by the higher layer parameter *RepetitionScheme-r16* set to '*FDMSchemeA'* or '*FDMSchemeB',* and the UE is indicated with two TCI states in a codepoint of the DCI field *'Transmission Configuration Indication* and DM-RS port(s) within one CDM group in the DCI field "*Antenna Port(s)*", the UE shall receive a single PT-RS port which is associated with the lowest indexed DM-RS antenna port among the DM-RS antenna ports assigned for the PDSCH, a PT-RS frequency density is determined by the number of PRBs associated to each TCI state, and a PT-RS resource element mapping is associated to the allocated PRBs for each TCI state. < Unchanged parts are omitted > |

Please input your views and comments on updated Draft TP MT.3.1:

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| Company | Views and comments, and if you think it is agreeable in principle |
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MT.3.2 Default QCL of PDSCH for DCI format 1\_2 + MT.3.8 missing condition for two default TCI state for Multi-DCI based system in TS 38.214 + MT3.9

Motivation for changes:

Vivo [1] proposed that DCI format 1-2 introduced in Rel-16 would not affect any DCI indication functions so that the default QCL assumption for MTRP should also be applied to DCI format 1-2.

OPPO [3] observed that in current 38.214, for single TRP transmission and single DCI based M-TRP transmission, the default TCI state is applied only when at least one configured TCI states for the serving cell of scheduled PDSCH contains the'QCL-TypeD'. If none of configured TCI states contains 'QCL-TypeD', the UE shall obtain the other QCL assumptions from the indicated TCI states in DCI irrespective of the time offset between the DCI and PDSCH. However, for multi-DCI based M-TRP, there is no such restriction and the default TCI state will be applied even when no TCI state with QCL-TypeD is configured for PDSCH associated with a *CORESETPoolIndex*. It may lead to performance loss in some case due to an inaccurate TCI state. They proposed text proposal to clarify that.

OPPO [3] explained that one item is the agreement on PDSCH default TCI state made in RAN1#101e is not captured in TS 38.214. In RAN1#101 e-meeting, we have one agreement on default TCI states for scheme 3 and scheme 4 and one item in the agreement was not captured in the spec.

FL note: All of the TPs of MT.3.2, MT.3.8 and MT.3.9 are about changes to the same paragraph in section 5.1.5 of TS 38.214. So merge them into one TP here.

Updated Draft TP MT.3.2, MT.3.8 and MT.3.9: adopt the following TP for TS 38.214:

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| 5.1.5 Antenna ports quasi co-location< Unchanged parts are omitted >Independent of the configuration of *tci-PresentInDCI* and *tci-PresentInDCI-ForFormat1\_2* in RRC connected mode, if the offset between the reception of the DL DCI and the corresponding PDSCH is less than the threshold *timeDurationForQCL* and at least one configured TCI states for the serving cell of scheduled PDSCH contains the 'QCL-TypeD', * the UE may assume that the DM-RS ports of PDSCH of a serving cell are quasi co-located with the RS(s) with respect to the QCL parameter(s) used for PDCCH quasi co-location indication of the CORESET associated with a monitored search space with the lowest *controlResourceSetId* in the latest slot in which one or more CORESETs within the active BWP of the serving cell are monitored by the UE. In this case, if the 'QCL-TypeD' of the PDSCH DM-RS is different from that of the PDCCH DM-RS with which they overlap in at least one symbol, the UE is expected to prioritize the reception of PDCCH associated with that CORESET. This also applies to the intra-band CA case (when PDSCH and the CORESET are in different component carriers).
* If a UE is configured with *enableDefaultTCIStatePerCoresetPoolIndex-r16* and the UE is configured by higher layer parameter *PDCCH-Config* that contains two different values of *CORESETPoolIndex* in different *ControlResourceSets,* the UE may assume that the DM-RS ports of PDSCH associated with a value of *CORESETPoolIndex* of a serving cell are quasi co-located with the RS(s) with respect to the QCL parameter(s) used for PDCCH quasi co-location indication of the CORESET associated with a monitored search space with the lowest *controlResourceSetId* among CORESETs, which are configured with the same value of *CORESETPoolIndex* as the PDCCH scheduling that PDSCH, in the latest slot in which one or more CORESETs associated with the same value of *CORESETPoolIndex* as the PDCCH scheduling that PDSCH within the active BWP of the serving cell are monitored by the UE.
* If a UE is configured with *enableTwoDefaultTCIStates-r16*, and atleast one configured TCI states for the serving cell of scheduled PDSCH contains the'QCL-TypeD', and at least one TCI codepoint indicates two TCI states, the UE may assume that the DM-RS ports of PDSCH or PDSCH transmission occasions of a serving cell are quasi co-located with the RS(s) with respect to the QCL parameter(s) associated with the TCI states corresponding to the lowest codepoint among the TCI codepoints containing two different TCI states. When the UE is configured by higher layer parameter *repetitionScheme-r16* set to '*TDMSchemeA*' or is configured with higher layer parameter *repetitionNumber-r16*, the mapping of the TCI states to PDSCH transmission occasions is determined according to clause 5.1.2.1 by replacing the indicated TCI states with the TCI states corresponding to the lowest codepoint among the TCI codepoints containing two different TCI states based on the activated TCI states in the slot with the first PDSCH transmission occasion.
* In all cases above, if none of configured TCI states for the serving cell of scheduled PDSCH contains 'QCL-TypeD', the UE shall obtain the other QCL assumptions from the indicated TCI states for its scheduled PDSCH irrespective of the time offset between the reception of the DL DCI and the corresponding PDSCH.

< Unchanged parts are omitted > |

Please input your views and comments on updated Draft TP for MT.3.2 and MT.3.8:

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| Company | Views and comments, and if you think it is agreeable in principle |
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MT.3.4 Clarify UL transmission for different TRP shall be TDMed

Motivation for changes:

ZTE [2] proposed to clarify that For Multi-DCI based MTRP, if separate ACK/NACK feedback is configured, UL transmissions towards different TRPs should be TDMed. However, as pointed out by ZTE [2], the current spec description is not clear enough since ‘overlap’ may be only in time domain, or frequency domain or both. Thus, we provide the following TP to make spec clearer.

Updated Draft TP MT.3.4: adopt the following TP for TS 38.213:

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| **9.2.5 UE procedure for reporting multiple UCI types**<Unchanged parts are omitted>A UE that- is not provided *CORESETPoolIndex* or is provided *CORESETPoolIndex* with a value of 0 for first CORESETs on active DL BWPs of serving cells, and- is provided *CORESETPoolIndex* with a value of 1 for second CORESETs on active DL BWPs of the serving cells, and- is provided *ACKNACKFeedbackMode* = *SeparateFeedback*does not expect a PUCCH or a PUSCH transmission triggered by a detection of a DCI format in a PDCCH received in a CORESET from the first CORESETs to overlap in time domain with a PUCCH or a PUSCH transmission triggered by a detection of a DCI format in a PDCCH received in a CORESET from the second CORESETs. If there is one or more aperiodic CSI reports multiplexed on PUSCHs in the group of overlapping PUCCHs and PUSCHs and if symbol  is before symbol  that is a next uplink symbol with CP starting after  after the end of the last symbol of - the last symbol of aperiodic CSI-RS resource for channel measurements, and - the last symbol of aperiodic CSI-IM used for interference measurements, and - the last symbol of aperiodic NZP CSI-RS for interference measurements, when aperiodic CSI-RS is used for channel measurement for triggered CSI report the UE is not required to update the CSI report for the triggered CSI report *.* is defined in [6, TS 38.214] and corresponds to the smallest SCS configuration among the SCS configurations of the PDCCHs scheduling the PUSCHs, the smallest SCS configuration of aperiodic CSI-RSs associated with DCI formats provided by the PDCCHs triggering the aperiodic CSI reports, and the smallest SCS configuration of the overlapping PUCCHs and PUSCHs and  for ,  for  and  for . If a UE would transmit multiple PUCCHs in a slot that include HARQ-ACK information, and/or SR, and/or CSI reports and any PUCCH with HARQ-ACK information in the slot satisfies the above timing conditions and does not overlap with any other PUCCH or PUSCH in the slot that does not satisfy the above timing conditions, the UE multiplexes the HARQ-ACK information, and/or SR, and/or CSI reports and determines corresponding PUCCH(s) for transmission in the slot according to the following pseudo-code. If the multiple PUCCHs do not include HARQ-ACK information and do not overlap with any PUSCH transmission by the UE in response to a DCI format detection by the UE, the timing conditions do not apply. <Unchanged parts are omitted> |

Please input your views and comments on Draft TP MT.3.4:

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| Company | Views and comments, and if you think it is agreeable in principle |
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MT3.6 TBS determination for Scheme 3

Motivation for changes:

ZTE [2] explained that in current specification, TBS of PDSCH is based on the number of OFDM of PDSCH in one slot. It isn’t suitable for ‘TDMSchemeA’, for which two TBs are transmitted in the PDSCH symbols in one slot via repetitions with two TCI states.

Updated Draft TP MT.3.6: adopt the following TP for TS 38.214:

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| **5.1.3.2 Transport block size determination**<Unchanged parts are omitted>For a UE configured with *FDMSchemeB* and indicated with two TCI states in a codepoint of the DCI field *'Transmission Configuration Indication* and DM-RS port(s) within one CDM group in the DCI field "*Antenna Port(s)*", the TBS determination follows the steps 1-4 with the following modification in step 1: a UE determines the total number of REs allocated for PDSCH () by , where *nPRB* is the total number of allocated PRBs corresponding to the first TCI state. and the determined TBS of PDSCH transmission occasion associated with the first TCI state is also applied to the PDSCH transmission occasion associated with the second TCI state.For a UE configured with *TDMSchemeA* and indicated with two TCI states in a codepoint of the DCI field *'Transmission Configuration Indication* and DM-RS port(s) within one CDM group in the DCI field "*Antenna Port(s)*", the TBS determination follows the steps 1-4 with the following modification in step 1: a UE determines the number of REs allocated for PDSCH within a PRB () by , where  is the number of symbols of the PDSCH allocation within the slot corresponding to the first TCI state, and the determined TBS of PDSCH transmission occasion associated with the first TCI state is also applied to the PDSCH transmission occasion associated with the second TCI state.<Unchanged parts are omitted> |

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| **5.1.3.2 Transport block size determination**<Unchanged parts are omitted>1) The UE shall first determine the number of REs (*NRE*) within the slot. - A UE first determines the number of REs allocated for PDSCH within a PRB () by , where is the number of subcarriers in a physical resource block,  is the number of symbols of the PDSCH allocation for one PDSCH occasion within the slot ,  is the number of REs for DM-RS per PRB in the scheduled duration including the overhead of the DM-RS CDM groups without data, as indicated by DCI format 1\_1 or format 1\_2 or as described for format 1\_0 in Clause 5.1.6.2, and  is the overhead configured by higher layer parameter *xOverhead* in *PDSCH-ServingCellConfig*. If the *xOverhead* in *PDSCH-ServingCellconfig* is not configured (a value from 0, 6, 12, or 18), the  is set to 0. If the PDSCH is scheduled by PDCCH with a CRC scrambled by SI-RNTI, RA-RNTI, MsgB-RNTI or P-RNTI,  is assumed to be 0.  |

Please input your views and comments on Draft TP MT.3.6:

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MT.3.7 Wideband PRG for Scheme 2a/2b/3

Motivation for changes:

In Rel-15, when PRG is "wideband", UE is not expected to be scheduled with non-contiguous PRBs and the UE may assume that the same precoding is applied to the allocated resource. ZTE [2] observed that, however, it does not work for ‘FDMSchemeA’ and ‘FDMSchemeB’ for Rel-16 MTRP, in which two TCI states are applied on different frequency resource parts of the scheduling PDSCH. ZTE [1] also made the observation that, when PRG is "wideband", UE assumes the same precoding applying to the allocated resource corresponding to each TCI state for Scheme 2a and 2b. Therefore, they provide text proposal to clarify that

Updated Draft TP MT.3.7: adopt the following TP for TS 38.214:

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| **5.1.2.3 Physical resource block (PRB) bundling**<Unchanged parts are omitted>If  is determined as "wideband", the UE is not expected to be scheduled with non-contiguous PRBs and the UE may assume that the same precoding is applied to the allocated resource associated with a same TCI state. |

Please input your views and comments on Draft TP MT.3.7:

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MT.3.10 TP to capture the case “is not provided with CORESETPoolIndex” in TS 38.213

Motivation for changes:

Spreadtrum [5] suggested that for multi-DCI based multi-TRP transmission, current specification TS38.213 has specified that the first CORESET refers to the CORESETs without provided with *CORESETPoolIndex* or provided *CORESETPoolIndex* with a value of 0. But, in section 10 of TS 38.213, the CORESETs without *CORESETPoolIndex* are not included in the description of a second set of serving cells. They proposed TP to fix that.

Updated Draft TP MT.3.10: adopt the following TP for TS 38.213:

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| **10 UE procedure for receiving control information**<Unchanged parts are omitted>If a UE can support- a first set of serving cells where the UE is either not provided *CORESETPoolIndex* or is provided *CORESETPoolIndex* with a value 0 for all CORESETs on all DL BWPs of each serving cell from the first set of serving cells, and - a second set of serving cells where the UE is not provided *CORESETPoolIndex* or is provided *CORESETPoolIndex* with a value 0 for a first CORESET, and with a value 1 for a second CORESET on any DL BWP of each serving cell from the second set of serving cells<Unchanged parts are omitted> |

Please input your views and comments on Draft TP MT.3.10:

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MT.3.11 One Typo correction

Motivation for changes:

CATT [7] suggested that in subsection 5.1.6.2 of TS38.214, a letter ***s*** is missing. Therefore, they provided a TP on editorial change in TS38.214.

Updated Draft TP MT.3.11: adopt the following TP for TS 38.214:

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| 5.1.6.2 DM-RS reception procedure<Unchanged parts are omitted>When a UE is not indicated with a DCI that DCI field "*Time domain resource assignment*' indicating an entry in *pdsch-TimeDomainAllocationList* which contain *RepNumR16* in *PDSCH-TimeDomainResourceAllocatio*n and it is indicated with two TCI states in a codepoint of the DCI field *'Transmission Configuration Indication'* and DM-RS port(s) within two CDM groups in the DCI field "*Antenna Port(s)",* - the first TCI state corresponds to the CDM group of the first antenna port indicated by the antenna port indication table, and the second TCI state corresponds to the other CDM group. |

Please input your views and comments on Draft TP MT.3.11:

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2. [R1-2005451](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_102%5CDocs%5CR1-2005451.zip) Maintenance of Multi-TRP enhancements ZTE
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7. [R1-2006588](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_102%5CDocs%5CR1-2006588.zip) Discussion on remaining issues of multi-TRP/panel transmission CATT
8. [R1-2006593](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_102%5CDocs%5CR1-2006593.zip) Text proposals on enhancements on multi-TRP/panel transmission LG Electronics
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