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

e-Meeting, August 17th – 28th, 2020

Source: Moderator (OPPO)

Title: Discussion 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)

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

Based on the inputs from vivo/spreadtrum/sharp, A draft TP to align RRC parameter names in TS 38.211, TS 38.213 and TS 38.214 is provided:

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 if the codeword is scheduled using a CORESET with *CORESETPoolIndex* equal to 1; if the higher-layer parameters *dataScramblingIdentityPDSCH* and dataScramblingIdentityPDSCH2 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*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 channel< 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 >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 *PDSCH-config* that indicates at least one entry in *pdsch-TimeDomainAllocationList-r16* or *pdsch-TimeDomainAllocationListForDCI-Format1-2-r16* containing *repetitionNumber-r16* 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-r16* or *pdsch-TimeDomainAllocationListForDCI-Format1-2-r16* which contain *repetitionNumber-r16* 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-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 in *pdsch-TimeDomainAllocationList-r16* or *pdsch-TimeDomainAllocationListForDCI-Format1-2-r16* which contain *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 in *pdsch-TimeDomainAllocationList-r16* or *pdsch-TimeDomainAllocationListForDCI-Format1-2-r16* which contain *repetitionNumber-r16* in *PDSCH-TimeDomainResourceAllocatio*n, 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 >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 in *pdsch-TimeDomainAllocationList-r16* or *pdsch-TimeDomainAllocationListForDCI-Format1-2-r16* contain *repetitionNumber-r16* 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-r16* or *pdsch-TimeDomainAllocationListForDCI-Format1-2-r16* which contain *repetitionNumber-r16* 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-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 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 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 in *pdsch-TimeDomainAllocationList-r16* or *pdsch-TimeDomainAllocationListForDCI-Format1-2-r16* which contain *repetitionNumber-r16* 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-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 >5.1.6.2 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-r16* or *pdsch-TimeDomainAllocationListForDCI-Format1-2-r16* which contain *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 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 in *pdsch-TimeDomainAllocationList-r16* or *pdsch-TimeDomainAllocationListForDCI-Format1-2-r16* which contain *repetitionNumber-r16* in *PDSCH-TimeDomainResourceAllocatio*n, 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 Draft TP MT.3.1:

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| Company | Views and comments, and if you think it is agreeable in principle |
| QC | Ok in principle. A couple of comments:* For DCI format 1\_2 related additions in 38.214, the conditions for TDRA table / field can be significantly simplified as follows

For RRC configuration condition: “When a UE configured by higher layer parameter *repetitionNumber-r16* in *PDSCH-TimeDomainResourceAllocatio*n” For DCI signaling: “together with the DCI field "Time domain resource assignment' indicating an entry which contains *repetitionNumber-r16*”* The following can be added as part of RRC name alignment: In 38.214 Section 5.1.4.2:

- 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*. |
| Spreadtrum | Support the proposal |
| OPPO | OK |
| ZTE | OK with these TPs. Also support QC’s update. |
| NEC | OK |
| Apple | Some more alignmentdataScramblingIdentityPDSCH2 -> dataScramblingIdentityPDSCH2-r16We are also fine with the TP from QC |
| Ericsson | Ok |

MT.3.2 Default QCL of PDSCH for DCI format 1\_2

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.

Draft TP MT.3.2: adopt the following TP for TS 38.214:

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| ------------------------------------------Start of Text Proposal ----------------------------------**5.1.5 Antenna ports quasi co-location**< Unchanged parts are omitted >If a UE is configured with *enableDefaultTCIStatePerCoresetPoolIndex* and the UE is configured by higher layer parameter *PDCCH-Config* that contains two different values of *CORESETPoolIndex* in different *ControlResourceSets~~,~~*, ~~for both cases,~~when *tci-PresentInDCI* is set to 'enabled' and *tci-PresentInDCI* is not configured in RRC connected mode, or *tci-PresentInDCI-ForFormat1\_2* is configured or not, if the offset between the reception of the DL DCI and the corresponding PDSCH is less than the threshold *timeDurationForQCL,* 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.< Unchanged parts are omitted >--------------------------------------- End of Text Proposal ------------------------------------ |

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

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| --- | --- |
| Company | Views and comments, and if you think it is agreeable in principle |
| QC | It should be aligned with the structure of the paragraph. For example, in the beginning of the paragraph, it is mentioned that “Independent of the configuration of *tci-PresentInDCI* and *tci-PresentInDCI-ForFormat1\_2* in RRC connected mode”. Furthermore, this paragraph is very long, and readability should be enhanced. Here is one suggestion: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*, - 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* and the UE is configured by higher layer parameter *PDCCH-Config* that contains two different values of *CORESETPoolIndex* in *ControlResourceSet,* *,* 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* 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.- 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. |
| Spreadtrum | Share the same view with Qualcomm, it should be aligned in the whole paragraph. We are fine with Qualcomm’s revision, also fine with the following revision marked in yellow:< Unchanged parts are omitted >If a UE is configured with *enableDefaultTCIStatePerCoresetPoolIndex* and the UE is configured by higher layer parameter *PDCCH-Config* that contains two different values of *CORESETPoolIndex* in different *ControlResourceSets~~,~~*, ~~for both cases,~~~~when~~ *~~tci-PresentInDCI~~* ~~is set to 'enabled' and~~ *~~tci-PresentInDCI~~* ~~is not configured in RRC connected mode, or~~ *~~tci-PresentInDCI-ForFormat1\_2~~* ~~is configured or not~~ 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,* 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.< Unchanged parts are omitted > |
| OPPO | We are fine to divide the paragraph into multiple bullets to make it clearer, as suggested by QC. However, I’m not so sure whether the last bullet can be applied to all cases of multi-DCI based M-TRP. For example, in a serving cell, if the activated TCI states associated with *CORESETPoolIndex* = 0 contain QCL-typeD, while the activated TCI states associated with *CORESETPoolIndex* = 1 don’t contain QCL-typeD, will the default TCI state also applied to PDSCHs associated with *CORESETPoolIndex* = 1 regardless the TCI codepoint?  |
| ZTE | We are OK for QC’s update.  |
| NEC | OK with QC’s update. |
| Apple | We are fine with QC proposed restructure, but we miss “-r16” in some RRC parametersBut for the last paragraph added by Qualcomm, we think further discussion is needed. |
| Ericsson | We are fine with QC’s restructured TP. The last paragraph is not new and it exists in the spec (which is moved to the end for better reading). Our understanding is that the last paragraph applies to all cases.Also, what is the use case for configuring/activating TCI states with QCL-TypeD only in one *CORSETPoolIndex* while not the other within the same serving cell? We don’t think we need to consider this corner case. |

MT.3.3 TCI states for inter-slot PDSCH repetition

Motivation for changes:

Vivo [1] explained that besides URLLC scheme 4, Rel-16 also supported Scheme 4-like inter-slot PDSCH transmission with dynamic repetition number indication from the same TRP. As agreed previously, a UE would 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, when it is indicated one TCI state, DM-RS port(s) within one CDM group and one entry in *pdsch-TimeDomainAllocationList* containing *repetitionNumber-r16* (>1) in TDRA by DCI regardless *RepSchemeEnabler* is configured or not. Vivo [1] proposed the text for TCI states application should capture this case as well.

Draft TP MT.3.3: adopt the following TP for TS 38.214:

|  |
| --- |
| ------------------------------------------Start of Text Proposal ----------------------------------**5.1.5 Antenna ports quasi co-location**< Unchanged parts are omitted >When the UE is configured or indicated with a multi-slot PDSCH, the indicated TCI state should be based on the activated TCI states in the first slot with the scheduled PDSCH, and UE shall expect the activated TCI states are the same across the slots with the scheduled PDSCH.< Unchanged parts are omitted >--------------------------------------- End of Text Proposal ------------------------------------ |

Please input your views and comments on Draft TP MT.3.3:

|  |  |
| --- | --- |
| Company | Views and comments, and if you think it is agreeable in principle |
| QC | Ok. |
| Spreadtrum | The current spec is clear. Not understand the intention of the proposal. |
| ZTE | OK |
| NEC | OK |
| Apple | Okay |
| Ericsson | The part with ‘configured or indicated’ is a bit confusing unless we are referring to the specifics. Note that ‘multi-slot PDSCH’ is only referred to in 38.214 in two places. I want to check the understanding of other delegates. If the ‘indicated’ part refers to scheme 4, then what does the ‘configured’ part refer to?We think it is lot simpler if we go with the following TP: ------------------------------------------Start of Text Proposal ----------------------------------**5.1.5 Antenna ports quasi co-location**< Unchanged parts are omitted >~~When the UE is configured with a~~ For multi-slot PDSCH reception, the indicated TCI state should be based on the activated TCI states in the first slot with the scheduled PDSCH, and UE shall expect the activated TCI states are the same across the slots with the scheduled PDSCH.< Unchanged parts are omitted >--------------------------------------- End of Text Proposal ------------------------------------ |

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.

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

|  |
| --- |
| **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:

|  |  |
| --- | --- |
| Company | Views and comments, and if you think it is agreeable in principle |
| QC | Ok. |
| Spreadtrum | In current spec, generally the term ‘overlap’ refers to overlapping in time domain. But we are fine with the proposal. |
| OPPO | OK |
| ZTE | OK |
| NEC | OK |
| Apple | Okay |
| Ericsson | Okay |

MT.3.5 Type 1 HARQ codebook

Motivation for changes:

ZTE [2] explained that, based on the current 38.213 for type-1 HARQ-ACK codebook, the separate serving cell set and set seem only used for joint feedback*.* When a UE separately feeds back a type 1 HARQ-ACK codebook to each TRP, it is unclear that the two HARQ-ACK codebooks corresponding to two TRPs are based on the separate or the same serving cell sets. In our view, it is natural to support the two HARQ-ACK codebooks with different serving cell sets since it can avoid unnecessary HARQ-ACK bits. For example, HARQ-ACK codebook 2 for the second TRP won’t include default HARQ-ACK bits for {cell 3 and cell 4} as shown in Figure 1 where cell 3 and 4 are configured with single TRP transmission.



Figure 1: Different HARQ-ACK codebook associated with different serving cell set

ZTE [2] proposed to clarify that The two type 1 HARQ-ACK codebooks corresponding to two TRPs should be based on different serving cell sets regardless of joint or separate feedback

Draft TP MT.3.5: adopt the following TP for TS 38.213:

|  |
| --- |
| **9.1.2.1 Type-1 HARQ-ACK codebook in physical uplink control channel**<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, andwhere - a serving cell is placed in a first set of serving cells if the serving cell includes a first CORESET, and- a serving cell is placed in a second set of serving cells if the serving cell includes a second CORESET, and- serving cells are placed in a set according to an ascending order of a serving cell indexthe UE generates a Type-1 HARQ-ACK codebook for the set and the set of serving cells separately by setting and in the following pseudo-code. If the UE is provided *ACKNACKFeedbackMode* = *JointFeedback,* the UE concatenates the HARQ-ACK codebook generated for the set followed by the HARQ-ACK codebook generated for the set to obtain a total number of  HARQ-ACK information bits.<Unchanged parts are omitted> |

Please input your views and comments on Draft TP MT.3.5:

|  |  |
| --- | --- |
| Company | Views and comments, and if you think it is agreeable in principle |
| QC | In Section 9 of 38.213, it is mentioned that “the UE shall separately apply the procedures described in Clauses 9.1 and 9.2.3 for reporting HARQ-ACK information” for separate feedback. With the above TP, S0 and S1 are determined two times (overall four sets). |
| ZTE | @QC, I copy the description in section 9 as follows. For type I separate ACK-codebook feedback, it is unclear for a TRP 0 whether UE should feed back NACK or UE should only feed back ACK bits for serving cells without data from TRP1. That’s because in section 9, there is not clear definition for ‘serving cells’. The ‘serving cells’ below for TRP0 and TRP1 seem the same cell set. That’s the ambiguity. It is not clear that -------------------------section 9 in 38.213---------------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* = *SeparateFeedback*the UE shall separately apply the procedures described in Clauses 9.1 and 9.2.3 for reporting HARQ-ACK information associated with the first CORESETs on active DL BWP of the serving cells and for reporting HARQ-ACK information associated with the second CORESETs on active DL BWP of the serving cells. HARQ-ACK information reporting is associated with a CORESET through a reception of a PDCCH with a DCI format triggering the reporting of the HARQ-ACK information by the UE.-----------------------------------------------------------------------If companies do not want change the section 9.1.2.1, we suggest the following text change for section 9.1 :-------------------------section 9 in 38.213---------------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* = *SeparateFeedback*the UE shall separately apply the procedures described in Clauses 9.1 and 9.2.3 for reporting HARQ-ACK information associated with the first CORESETs on active DL BWP of the serving cell set which only include the first CORESETs and for reporting HARQ-ACK information associated with the second CORESETs on active DL BWP of the serving cell set which only includes the second CORESETs. HARQ-ACK information reporting is associated with a CORESET through a reception of a PDCCH with a DCI format triggering the reporting of the HARQ-ACK information by the UE.----------------------------------------------------------------------- |
| NEC | We understand ZTE’s intention and agree with the principle. While in our understanding, the current spec is clear. As in section 9, for *SeparateFeedback*, HARQ-ACK feedback is associated with first or second CORESETs separately. And here, the serving cell is not placed with S0 or S1, which is different from *JointFeedback* mode.-------------------------section 9 in 38.213---------------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* = *SeparateFeedback*the UE shall separately apply the procedures described in Clauses 9.1 and 9.2.3 for reporting HARQ-ACK information associated with the first CORESETs on active DL BWP of the serving cells and for reporting HARQ-ACK information associated with the second CORESETs on active DL BWP of the serving cells. HARQ-ACK information reporting is associated with a CORESET through a reception of a PDCCH with a DCI format triggering the reporting of the HARQ-ACK information by the UE.----------------------------------------------------------------------- |
| Ericsson | Similar view as Qualcomm and NEC. The current spec is clear enough. |

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.

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

|  |
| --- |
| **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:

|  |  |
| --- | --- |
| Company | Views and comments, and if you think it is agreeable in principle |
| QC | Prefer “for the first PDSCH transmission occasion”. This is because the number of DMRS symbols can be different in the two repetitions (e.g. if overlapping with CORESET and DMRS is shifted to the first symbol after the CORESET). |
| Spreadtrum | Fine with the proposal, for the reason that the number of symbols of the PDSCH allocation for the two PDSCH occasions in one slot is same.Regarding Qualcomm’s concern, the following revision may be needed:‘ is the number of REs for DM-RS per PRB in the scheduled duration for the first PDSCH occasion within the slot including the overhead of the DM-RS CDM groups without data’ |
| OPPO | OK |
| ZTE | OK to use ‘for the first PDSCH transmission occasion’ to replace ‘for one PDSCH occasion’ |
| NEC | OK with QC’s update |
| Apple | Okay |
| Ericsson | We understand the intention. Rather than modifying the existing paragraph for TBS determination, we prefer to have a separate paragraph to address the TBS determination issue associated with *TDMSchemeA*. Note that we had a similar situation for *FDMSchemeB,* and we introduced a separate paragraph also for *FDMSchemeB*. Also, it is important to state that the same TBS is applied to both the first and second PDSCH transmission occasion. Our modified TP is to capture this in a separate paragraph as given below:“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.” |

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.

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

|  |
| --- |
| **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 except that the 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)*", for which the UE may assume that the same precoding is applied to the allocated resource corresponding to the same TCI state. |

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

|  |  |
| --- | --- |
| Company | Views and comments, and if you think it is agreeable in principle |
| QC | Ok. |
| Spreadtrum | Fine |
| OPPO | OK |
| ZTE | OK |
| NEC | OK |
| Apple | Okay |
| Ericsson | Understand the intention. But could we simplify the TP a bit? We would like the propose the following TP which would address the issue brought up by ZTE:**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. |

MT.3.8 A missing condition for two default TCI state for Multi-DCI based system in TS 38.214

Motivation for changes:

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.

Draft TP MT.3.8: adopt the following TP for TS 38.214:

|  |
| --- |
| 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*, 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 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. If a UE is configured with *enableDefaultTCIStatePerCoresetPoolIndex* and the UE is configured by higher layer parameter *PDCCH-Config* that contains two different values of *CORESETPoolIndex* in *ControlResourceSet,* for both cases,when *tci-PresentInDCI* is set to 'enabled' and *tci-PresentInDCI* is not configured 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 PDSCH associated with a value of *CORESETPoolIndex* of a serving cell contains the 'QCL-TypeD', the UE may assume that the DM-RS ports of PDSCH associated with the value of *CORESETPoolIndex* of the 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. When a UE is configured with *enableTwoDefaultTCIStates*, if the offset between the reception of the DL DCI and the corresponding PDSCH or the first PDSCH transmission occasion is less than the threshold *timeDurationForQCL* and at least 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. |

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

|  |  |
| --- | --- |
| Company | Views and comments, and if you think it is agreeable in principle |
| QC | Not needed based on the TP provided for MT.3.2 above. |
| Spreadtrum | Support it with one minor revision: one configured TCI state~~s~~ where a letter s is deleted. But if Qualcomm’s proposal on MT.3.2 is adopted, the proposal is not needed. |
| OPPO | As mentioned in MT3.2, in a serving cell, if the activated TCI states associated with *CORESETPoolIndex* = 0 contain QCL-typeD, while the activated TCI states associated with *CORESETPoolIndex* = 1 don’t contain QCL-typeD, will the default TCI state also applied to PDSCHs associated with *CORESETPoolIndex* = 1 regardless of the TCI codepoint? With this TP, the answer is NO, while in QC’s proposed TP, the answer is YES. We can follow the majority on this issue.  |
| ZTE | The same view with QC. |
| NEC | OK. And can be merged with MT3.2. |
| Apple  | We can discuss together with MT3.2 |
| Ericsson | Similar view as Qualcomm and ZTE. The TP is not needed. |

MT.3.9 One part in the agreement made in RAN1#101e was not captured in TP

Motivation for changes:

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 the following agreement on default TCI states for scheme 3 and scheme 4:

*Agreement*

*The default TCI-states for PDSCH transmission of scheme 3 or scheme 4 are determined as follows:*

* *When the time offset between the DCI and the 1st PDSCH transmission occasion is less than the threshold, the two default TCI-states are applied to PDSCH transmission occasions, respectively. The mapping between default TCI states and PDSCH transmission occasions follows the mapping specified for indicated TCI states in Section 5.1.2.1 in TS 38.214.*
* *The default TCI states are based on the activated TCI states in the slot with the first PDSCH transmission occasion*
* *Note: Whether to support this feature or not is subject to UE capability FG 16-2b-0.*

OPPO [3] observed that the wording in red is lost in the corresponding text proposal for 38.214. They proposed a text proposal to capture the lost sentence.

Draft TP MT.3.9: adopt the following TP for TS 38.214:

|  |
| --- |
| 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*, 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 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. If a UE is configured with *enableDefaultTCIStatePerCoresetPoolIndex* and the UE is configured by higher layer parameter *PDCCH-Config* that contains two different values of *CORESETPoolIndex* in *ControlResourceSet,* for both cases,when *tci-PresentInDCI* is set to 'enabled' and *tci-PresentInDCI* is not configured in RRC connected mode, if the offset between the reception of the DL DCI and the corresponding PDSCH is less than the threshold *timeDurationForQCL,* 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. When a UE is configured with *enableTwoDefaultTCIStates*, if the offset between the reception of the DL DCI and the corresponding PDSCH or the first PDSCH transmission occasion is less than the threshold *timeDurationForQCL* and at least 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. |

Please input your views and comments on Draft TP MT.3.9:

|  |  |
| --- | --- |
| Company | Views and comments, and if you think it is agreeable in principle |
| QC | Seems ok. |
| Spreadtrum | Support the proposal |
| ZTE | OK |
| NEC | OK |
| Apple | Okay |
| Ericsson | okay |

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.

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

|  |
| --- |
| **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 single value 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:

|  |  |
| --- | --- |
| Company | Views and comments, and if you think it is agreeable in principle |
| QC | Ok. Prefer to add “,” as below to clarify that condition is (X or Y) and Zwhere 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 |
| Spreadtrum | Fine with Qualcomm’s revision |
| OPPO | OK |
| ZTE | OK  |
| NEC | OK |
| Apple | Okay |
| Ericsson | Ok |

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.

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

|  |
| --- |
| 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:

|  |  |
| --- | --- |
| Company | Views and comments, and if you think it is agreeable in principle |
| QC | Ok |
| Spreadtrum | Fine |
| ZTE | OK |
| NEC | OK |
| Apple | Okay |
| Ericsson | Okay |

MT.3.12 TP for the case “*startingSymbolOffset is not configured*”

Motivation for changes:

LGE [8] explained that in the current specification TS 38.214, the default value for the number of offset symbols between two transmission occasions for TDMSchemeA is defined. However, according to TS 38.331, the parameter for configuration of the number of offset symbols, i.e., *startingSymbolOffsetK*, is always configured to a UE when the UE is configured with TDMSchemeA. So, the default value in TS 38.214 does not need to be defined. Therefore, they proposed TP to delete the corresponding text in TS 38.214

Draft TP MT.3.12: adopt the following TP for TS 38.214:

|  |
| --- |
| 5.1.2.1 Resource allocation in time domain<Unchanged parts are omitted>When a UE is configured by the higher layer parameter *RepSchemeEnabler* 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*.* - If two TCI states are indicated by the DCI field '*Transmission Configuration Indication*', the UE is expected to receive two PDSCH transmission occasions, where 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. The second TCI state is applied to the second PDSCH transmission occasion, and the second PDSCH transmission occasion shall have the same number of symbols as the first PDSCH transmission occasion. If the UE is configured by the higher layers with a value in *StartingSymbolOffsetK*, it shall determine that the first symbol of the second PDSCH transmission occasion starts after symbols from the last symbol of the first PDSCH transmission occasion. ~~If the value is not configured via the higher layer parameter~~ *~~StartingSymbolOffsetK~~*~~, = 0 shall be assumed by the UE.~~ The UE is not expected to receive more than two PDSCH transmission layers for each PDSCH transmission occasion. For two PDSCH transmission occasions, the redundancy version to be applied is derived according to Table 5.1.2.1-2, where applied respectively to the first and second TCI state. The UE expects the PDSCH mapping type indicated by DCI field "*Time domain resource assignment*' to be mapping type B, and the indicated PDSCH mapping type is applied to both PDSCH transmission occasions.- Otherwise, the UE is expected to receive a single PDSCH transmission occasion, and the resource allocation in the time domain follows Clause 5.1.2.1. <Unchanged parts are omitted> |

Please input your views and comments on Draft TP MT.3.12:

|  |  |
| --- | --- |
| Company | Views and comments, and if you think it is agreeable in principle |
| QC | Not needed. Default value is already agreed, and there is no need to change 38.214. Instead, 38.331 should change to correctly capture the agreement.  |
| Spreadtrum | One CR for 38.331 is better. |
| ZTE | Agree to change 331 |
| NEC | OK to change 331. |
| Apple | Either way is fine with us |
| Ericsson | 38.214 is according to RAN1 agreement. It would be more appropriate to change 38.331 to align with 38.214.  |

MT.3.13 determine for PUCCH transmission in M-DCI M-TRP

Motivation for changes:

Huawei [6] explained that there is a misalignment between TS 38.212 and TS 38.213. In last meeting, it was agreed as following and captured in TS 38.212 that when one serving cell is configured with dynamic joint HARQ-ACK codebook for multi-PDCCH based multi-TRP system, total DAI is presented in DCI.

|  |
| --- |
| Agreement*For the number of DAI bits in DCI format 1\_1 when dynamic joint HARQ-ACK codebook is configured in multi-PDCCH based multi-TRP system：** *The number of DAI bits is 4 when one serving cell is configured and dynamic joint HARQ-ACK codebook is configured for multi-PDCCH based multi-TRP system.*
 |

Based on the current spec in TS 38.213, used for obtaining a transmission power for a PUCCH is determined by the value of  , which is further determined by the value of the total DAI in the at least one DCI format that includes a total DAI field, when . Therefore section 9.1.3.1 in TS 38.213 shall be extent to the case of  for multi-PDCCH based multi-TRP configured with dynamic joint HARQ-ACK codebook due to the present of total DAI. Therefore, Huawei [6] proposed a text proposal for section 9.1.3.1 in TS 38.213 g20.

Draft TP MT.3.13: adopt the following TP for TS 38.213:

|  |
| --- |
| < Start of the text proposal >9.1.3.1 Type-2 HARQ-ACK codebook in physical uplink control channelIf a UE is not provided *PDSCH-CodeBlockGroupTransmission* for each of the  serving cells, or for PDSCH receptions scheduled by a DCI format that does not support CBG-based PDSCH receptions, or for SPS PDSCH reception, or for SPS PDSCH release, and if , the UE determines a number of HARQ-ACK information bits  for obtaining a transmission power for a PUCCH, as described in Clause 7.2.1, as  where - if ,  is the value of the counter DAI in the last DCI format scheduling PDSCH reception or indicating SPS PDSCH release for any serving cell  that the UE detects within the  PDCCH monitoring occasions. - if  or if  and the higher layer parameter *pdsch-HARQ-ACK-Codebook=dynamic*, and 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 = JointFeedback*- if the UE does not detect any DCI format that includes a total DAI field in a last PDCCH monitoring occasion within the  PDCCH monitoring occasions where the UE detects at least one DCI format scheduling PDSCH reception or indicating SPS PDSCH release for any serving cell ,  is the value of the counter DAI in a last DCI format the UE detects in the last PDCCH monitoring occasion- if the UE detects at least one DCI format that includes a total DAI field in a last PDCCH monitoring occasion within the  PDCCH monitoring occasions where the UE detects at least one DCI format scheduling PDSCH reception or indicating SPS PDSCH release for any serving cell ,  is the value of the total DAI in the at least one DCI format that includes a total DAI field< End of the text proposal > |

Please input your views and comments on Draft TP MT.3.13:

|  |  |
| --- | --- |
| Company | Views and comments, and if you think it is agreeable in principle |
| QC | Not needed. It is already mentioned above that the serving cell is counted two times. |
| NEC | OK |
| Ericsson | Ok. |
|  |  |

MT.3.14 Type-1 HARQ-ACK codebook determination for Scheme 3

Motivation for changes:

Both NTT DOCOMO [9] and Nokia [10] discussed the issue of Type-1 HARQ-ACK codebook determination for URLLC scheme 3. They both proposed to clarify that for URLLC scheme 3, the HARQ-ACK bit location is determined based on the first PDSCH transmission occasion.

NTT DOCOMO [9] explained that when two TCI states are indicated, it is not clear how to determine the HARQ-ACK bit location for TDM scheme A. An example is given by NTT DOCOMO: For example, the time domain resource allocation of TDM scheme A is indicated as in Fig.1 and the PDSCH time domain resource allocation table is configured as in Fig.2. The time domain resource allocation of PDSCH#1 corresponds to row index #0 in the PDSCH time domain resource allocation table. The time domain resource allocation of PDSCH#2 is overlapped with row index#1 in the PDSCH time domain resource allocation table. According to the type-1 HARQ-ACK codebook generation pseudo-code, two HARQ-ACK bits location may be generated, one corresponds to candidate PDSCH reception occasion of row index#0 and another corresponds to the candidate PDSCH reception occasion of row index#1. Furthermore, based on TS38.213 section 9.1, “*If a UE is not provided PDSCH-CodeBlockGroupTransmission, the UE generates one HARQ-ACK information bit per transport block.*”, the UE generates one HARQ-ACK information bit per TB if CBG transmission is not configured. Therefore, in the above example, one HARQ-ACK bit location needs to be selected for HARQ-ACK bit transmission for two PDSCHs in TDM scheme A. Since the time domain resource allocation is indicated based on the 1st PDSCH reception occasion for TDM scheme A, it is natural to determine the HARQ-ACK bit location based on the 1st PDSCH reception occasion.



Fig.1 Time domain resource allocation for TDM scheme A



Fig.2 PDSCH time domain resource allocation table configuration

Nokia provided the similar observation. When the TDRA table for Scheme 3 has an entry that corresponding to the second PDSCH transmission occasions, the two HARQ-ACK bit locations may be generated, one corresponds to the first PDSCH transmission occasion and another to the second transmission occasion. We also think this is a valid issue and should be corrected.

Both NTT DOCOMO and Nokia provided text proposal for section 9.1.2.1 of TS 38.213 to clarify that. Their TPs are same in essence with only slight difference in wording. The TP draft provided by NTT DOCOMO [9] is adopted for proposal.

Draft TP MT.3.14: adopt the following TP for TS 38.213:

|  |
| --- |
| 9.1.2.1 Type-1 HARQ-ACK codebook in physical uplink control channel<Unchanged parts are omitted>For the set of slot timing values *K*1, the UE determines a set of *M*A,c occasions for candidate PDSCH receptions or SPS PDSCH releases according to the following pseudo-code. A location in the Type-1 HARQ-ACK codebook for HARQ-ACK information corresponding to a single SPS PDSCH release is same as for a corresponding SPS PDSCH reception. A location in the Type-1 HARQ-ACK codebook for HARQ-ACK information corresponding to multiple SPS PDSCH releases by a single DCI format is same as for a corresponding SPS PDSCH reception with the lowest SPS configuration index among the multiple SPS PDSCH releases. When a UE is configured by the higher layer parameter *RepSchemeEnabler* set to *‘TDMSchemeA’* and indicated DM-RS port(s) within one CDM group in the DCI field “*Antenna Port(s)*”*,* and if two TCI states are indicated by the DCI field ‘*Transmission Configuration Indication*’, a location in the Type-1 HARQ-ACK codebook for HARQ-ACK information corresponding to two PDSCH reception occasions by a single DCI format is same as for the first PDSCH reception.<Unchanged parts are omitted> |

Please input your views and comments on Draft TP MT.3.14:

|  |  |
| --- | --- |
| Company | Views and comments, and if you think it is agreeable in principle |
| QC | Ok in principle. It can be a bit simplified:For a PDSCH with two PDSCH transmission occasions in a slot, a location in the Type-1 HARQ-ACK codebook for HARQ-ACK information corresponding to the PDSCH is based on the first PDSCH transmission occasion. |
| Spreadtrum | Fine in principle |
| OPPO | We are fail to see the necessity of this TP. Since only one TDRA is indicated by DCI which corresponds to the 1st PDSCH occasion, according to current spec, only the HARQ-ACK bit for the 1st PDSCH occasion will be reported as meaningful HARQ bit. The description of the TP is redundant from our view. |
| ZTE | The same view with OPPO |
| NEC | OK with QC’s update. |
| Apple | Fine in principle, but it is not necessary  |
| Ericsson | Same view as Oppo and ZTE. |

References

1. [R1-2005354](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_102%5CDocs%5CR1-2005354.zip) Remaining issues on Multi TRP operation vivo
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
3. [R1-2005975](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_102%5CDocs%5CR1-2005975.zip) Text proposals for enhancements on multi-TRP and panel Transmission OPPO
4. [R1-2006117](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_102%5CDocs%5CR1-2006117.zip) On Rel.16 multi-TRP/panel transmission Samsung
5. [R1-2006257](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_102%5CDocs%5CR1-2006257.zip) Discussion on remaining issues for multi-TRP operation Spreadtrum Communications
6. [R1-2006395](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_102%5CDocs%5CR1-2006395.zip) Remaining issues for Multi-TRP in Rel-16 Huawei, HiSilicon
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
9. [R1-2006700](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_102%5CDocs%5CR1-2006700.zip) Remaining issues on multi-TRP/panel transmission NTT DOCOMO, INC.
10. [R1-2006842](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_102%5CDocs%5CR1-2006842.zip) Maintenance of Rel-16 Multi-TRP operation Nokia, Nokia Shanghai Bell
11. [R1-2006551](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_102%5CDocs%5CR1-2006551.zip) Corrections for enhancements on MIMO for NR Sharp
12. R1-2006979 Summary#2 for Rel.16 NR eMIMO maintenance Moderator (Samsung)