3GPP TSG-RAN WG2 Meeting #111e Tdoc draft R2-2008199

**1-12 June 2020**

**Source: Ericsson (Email discussion rapporteur)**

**Title: [AT110e][102][EMIMO] RRC CR (Ericsson)**

**Agenda Item: 6.16.2**

**Document for: Discussion**

# 1 Introduction

This discussion is for RRC corrections for eMIMO WI:

* [AT111e][112][eMIMO] RRC Corrections (Ericsson)

Scope: Continue the discussion on [R2-2007161](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2007161%2038331CR%20Correction%20on%20number%20of%20CORESET%20per%20BWP.docx) and [R2-2007577](file:///C%3A%5C%5CData%5C%5C3GPP%5C%5CExtracts%5C%5CR2-2007577%2038.331%20NReMIMO.docx%22%20%5Co%20%22C%3AData3GPPExtractsR2-2007577%2038.331%20NReMIMO.docx)

Intended outcome: Agreeable CRs in R2-2008198 and R2-2008199

Initial deadline (for companies' feedback): Wednesday 2020-08-26 07:00 UTC

Initial deadline (for final CRs): Wednesday 2020-08-26 09:00 UTC

The discussion is organized as follows. In Section 2 we discuss content of [R2-2007161](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2007161%2038331CR%20Correction%20on%20number%20of%20CORESET%20per%20BWP.docx). In Section 3 discuss content of [R2-2007577](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2007577%2038.331%20NReMIMO.docx).

# 2 Discuss content of R2-2007161 - number of coresets per UE

The CR R2-2007161 suggests two changes related to the number of coresets to be configured for the UE. There changes are extracted here:

-------------------------------------------------start change I------------------------------------------------------------------------------------------------------------

***controlResourceSetToAddModList, controlResourceSetToAddModList2***

List of UE specifically configured Control Resource Sets (CORESETs) to be used by the UE. The network configures at most 5 CORESETs per BWP per cell (including UE-specific and common CORESETs). The UE shall consider entries in *controlResourceSetToAddModList* and in *controlResourceSetToAddModList2* as a single list, i.e. an entry created using *controlResourceSetToAddModList* can be modifed using *controlResourceSetToAddModList2* and vice-versa. In case network reconfigures control resource set with the same *ControlResourceSetId* as used for *commonControlResourceSet* configured via *PDCCH-ConfigCommon*, the configuration from *PDCCH-Config* always takes precedence and should not be updated by the UE based on *servingCellConfigCommon*.

-------------------------------------------------end change I------------------------------------------------------------------------------------------------------------

-------------------------------------------------start change II------------------------------------------------------------------------------------------------------------

#### ControlResourceSetId

The *ControlResourceSetId* IE concerns a short identity, used to identify a control resource set within a serving cell. The *ControlResourceSetId* = 0 identifies the ControlResourceSet#0 configured via PBCH (*MIB*) and in *controlResourceSetZero* (*ServingCellConfigCommon*). The ID space is used across the BWPs of a Serving Cell.

-------------------------------------------------end change II------------------------------------------------------------------------------------------------------------

The first change was part of the agreed TP in R2-2006344 Summary of [AT110-e][065][NR16] NR ASN1 1 (Huawei). However, there may be a need to revisit the change if RAN1 has further discussed the details for Rel-16 capabilities.

In 38.331 there is parameter multipleCORESET with below description in 38.306

 multipleCORESET ENUMERATED {supported} OPTIONAL,

| Definitions for parameters | Per | M | FDD-TDD DIFF | **FR1-FR2**DIFF |
| --- | --- | --- | --- | --- |
| multipleCORESETIndicates whether the UE supports configuration of more than one PDCCH CORESET per BWP in addition to the CORESET with CORESET-ID 0 in the BWP. It is mandatory with capability signaling for FR2 and optional for FR1. | UE | CY | No | **Yes** |

In the table of UE capability parameter in subsequent clauses, "Yes" in the column by "M" indicates the associated feature is mandatory and "No" indicates the associated feature is optional. "CY" in the column indicates the associated feature is conditional mandatory and the condition is described in the field description and the associated feature is considered mandatory with capability parameter, when the described condition is satisfied. "FD" in the column indicates to refer the associated field description. Some parameters in subsequent clauses are not related to UE features and in the case, "N/A" is indicated in the column.

In Release-15, the exact limitation per BWP has been captured in both in field description of controlResourceSetToAddModList as well as in ControlResourceSetId. In offline discussions for Rel-15 capabilities 010 and 011 there was no reference to number of coresets. Thus it looks like the only place where this restriction is stated in 38.331. If this is the case, we should keep the limitation present in 38.331 at least in one of the places.

1. Agree keep the limitation of maximum 3 coresets per BWP in Release-15 as text in 38.331

*Q1 Do companies agree we need to keep the limitation of maximum 3 coresets per BWP in Release-15 as text in 38.331 i.e. Proposal 1? Further please state if one place is enough and which one is preferred?*

|  |  |
| --- | --- |
| Company | Answer |
| Ericsson | yes |
| OPPO | Based on current TS38.306 and the latest feature list form RAN1.The maximal number of coresets per BWP for both R15 and R16 relies on UE capability, i.e. “multipleCORESET” in R15 and “Multi-DCI based multi-TRP” in R16. We are OK to keep the Release-15 limitation for coreset number, while it would be clear to add also the limitation of maximum 5 coresets per BWP for Release-16 since this is R16 specification. |
| Qualcomm | yes |
| Samsung | yes  |
| Intel(Youn Heo) | We would like to see overall change across Rel-15/16. In our understanding, maximum 3 coreset remains the same for REl-16 for single TRP and single PDCCH multi-TRP cases. So, it could be misleading if the limitation of maximum 3 is removed in Rel-16, while it is kept in Rel-15. In TS38.213, the following is described. For each DL BWP configured to a UE in a serving cell, the UE can be provided by higher layer signalling with -    $P\leq 3$ CORESETs if *CORESETPoolIndex* is not provided, or if a value of *CORESETPoolIndex* is same for all CORESETs if *CORESETPoolIndex* is provided-    $P\leq 5$ CORESETs if *CORESETPoolIndex* is not provided for a first CORESET, or is provided and has a value 0 for a first CORESET, and is provided and has a value 1 for a second CORESETFurthermore, it is somewhat obvious that NW should configure up to UE capability. Therefore, given that RAN1 spec is already clear, we prefer to remove the sentence on the limitation in TS38.331 in both Rel-15/16 and rely on RAN1 spec. If it is not acceptable, we should describe separately for single TRP/single DCI multi-TRPs and multi-DCP multi-TRPs.  |

In Release 16, UE can be configured up to 5 coresets per BWP but the total limit per UE is 16. However, exact amount depends on UE capability depending on the total UE configuration as can be seen in R2-2006511. One option could be to state the number of coresets to be configured for the UE depends on UE capability except for Release 15. Another option is to only state the limitation for Rel-15 and assume other releases follow capability as default.

1. Agree to state the number of coresets to be configured for the UE depends on UE capability except for Release 15?

*Q2 Do companies agree to state the number of coresets to be configured for the UE depends on UE capability except for Release 15 i.e. Prop2? Further, indicate if there is support to either change Ib or IIb.*

|  |  |
| --- | --- |
| Company | Answer |
| Ericsson | yes |
| OPPO | As commented in Q1, the number of coresets to be configured for UE for both R15 and R16 relies on UE capability. We see no reason to capture the coresets number only for R15. |
| Qualcomm | yes |
| Samsung | Yes |
| Intel | See our comment on proposal 1 |

***For companies that agree to Proposal 2***

Example to do it would be agree on change Ib and possibly change IIb

-------------------------------------------------start change Ib------------------------------------------------------------------------------------------------------------

***controlResourceSetToAddModList, controlResourceSetToAddModList2***

List of UE specifically configured Control Resource Sets (CORESETs) to be used by the UE. The UE shall consider entries in *controlResourceSetToAddModList* and in *controlResourceSetToAddModList2* as a single list, i.e. an entry created using *controlResourceSetToAddModList* can be modifed using *controlResourceSetToAddModList2* and vice-versa. In case network reconfigures control resource set with the same *ControlResourceSetId* as used for *commonControlResourceSet* configured via *PDCCH-ConfigCommon*, the configuration from *PDCCH-Config* always takes precedence and should not be updated by the UE based on *servingCellConfigCommon*.

-------------------------------------------------end change Ib------------------------------------------------------------------------------------------------------------

-------------------------------------------------start change IIb------------------------------------------------------------------------------------------------------------

#### ControlResourceSetId

The *ControlResourceSetId* IE concerns a short identity, used to identify a control resource set within a serving cell. The *ControlResourceSetId* = 0 identifies the ControlResourceSet#0 configured via PBCH (*MIB*) and in *controlResourceSetZero* (*ServingCellConfigCommon*). The ID space is used across the BWPs of a Serving Cell. The number of CORESETs per BWP is limited to 3 (including common and UE-specific CORESETs) in Release 15. Otherwise, the number of CORESETs per BWP depends on UE capability.

-------------------------------------------------end change IIb------------------------------------------------------------------------------------------------------------

1. Agree the change Ib
2. Agree the change IIb

*Q2 Please indicate if you support either Prop 3 or 4 as is or with change.*

|  |  |
| --- | --- |
| Company | Answer |
| Ericsson | Agree both Prop 3 and 4 |
| OPPO | Regarding to the first change, we think it is fine to remove the description on how many coresets UE may be configured by network since it is clear defined by the IE of *controlResourceSetToAddModList, controlResourceSetToAddModList2*.And for change IIb, it implicit indicates that the number of CORESETs per BWP for R15 UE is not depending on UE capability which is not align with the current spec. As commented above, we prefer to fix the change as following:ControlResourceSetIdThe *ControlResourceSetId* IE concerns a short identity, used to identify a control resource set within a serving cell. The *ControlResourceSetId* = 0 identifies the ControlResourceSet#0 configured via PBCH (*MIB*) and in *controlResourceSetZero* (*ServingCellConfigCommon*). The ID space is used across the BWPs of a Serving Cell. The number of CORESETs per BWP (including common and UE-specific CORESETs) is limited to 3 in Release 15 or 5 in Release 16 depending on UE capability.  |
| Qualcomm | Agree proposal 3 and 4. |
| Samsung | Agree proposal 3 and 4. |
| Intel | See our comment on proposal 1 |

***For companies that do not agree to Proposal 2***

*Q3 Any other suggestions to handle the issue of number of CORESETs per BWP?*

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| --- | --- |
| Company | Answer |
|  |  |
|  |  |
| Intel | See our comment on proposal 1 |

# 3 Discuss content of R2-2007177 – mTRP sPDCCH

The content that caused discussion for R2-2007177 related to replacing the term mTRP sPDCCH in the below field description to something that captures what ever has been specified for this term. Companies were supportive of the intention however we need to discuss the exact wording.

Section 5.1 of 38.214 specifies multiple modes among which the following corresponds to what was known as “sPDCCH mTRP mode”:

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-TimeDomainResourceAllocation, 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.

First attempt to capture the above in a relatively short form in R2-2007577 was as follows:

-------------------------------------------------start change I------------------------------------------------------------------------------------------------------------

***maxNrofPorts***

The maximum number of DL PTRS ports specified in TS 38.214 [19] (clause 5.1.6.3). 2 PT-RS ports can only be configured for a DL BWP that is configured, as specified in TS 38.214 Clause 5.1, with a mode where 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.

-------------------------------------------------end change I------------------------------------------------------------------------------------------------------------

*Q2 Companies are asked to provide their wording proposals below?*

|  |  |
| --- | --- |
| Company | Answer |
| **Ericsson** | ***maxNrofPorts***The maximum number of DL PTRS ports specified in TS 38.214 [19] (clause 5.1.6.3). 2 PT-RS ports can only be configured for a DL BWP that is configured according to the paragraph “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-TimeDomainResourceAllocation, 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.”, specified in TS 38.214 Clause 5.1 |
| OPPO | We are fine with Ericsson’s proposal. |
| Qualcomm | PTRS part is only relevant for SDM scheme (single-DCI mTRP consists of 5 different schemes, and one of is SDM). The relevant paragraph in 38.214 is in section 5.1.6.2When 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 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.We agree the Ericsson’s intention. The proposed change in R2-2007177 seems OK. |
| Samsung | We are also fine with the original version in R2-2007577. |
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|  |  |

# Summary

**There is consensus on the following proposals:**