3GPP TSG-RAN WG2 Meeting #110e Tdoc R2-200xxxxx

**1-12 June 2020**

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

**Title: [Post109bis-e][933][eMIMO] RRC Open Issues (Ericsson)**

**Agenda Item: 6.16.2**

**Document for: Discussion**

# 1 Introduction

This discussion is to progress RRC issues for eMIMO WI as per below email discussion:

* [Post109bis-e][933][eMIMO] RRC Open Issues (Ericsson)

      Intended outcome: Summary, updated RRC CR, RRC RILs

      Deadline: Next Meeting, ASN.1 review schedule

DL for initial input May 15th (Friday)

Final DL Wednesday May 20th 23.59 PST

# 2 Discussion on open issues to be handled during this meeting

2.1 nrofReportedRS-ForSINR in CSI-ReportConfig

**2.1.1. RIL:N/A**

The parameter nrofReportedRS-ForSINR in CSI-ReportConfig has been extensively discussed in RAN2 in order to get correct understanding of the intended operation. Notes of the discussion from RAN2#109bise chairnotes are as follows:

1. If nrofReportedRSForSINR is used only with quantityConfig-r16, RAN2 to agree as baseline the REVISED TP in Appendix A for the nrofReportedRS-ForSINR in CSI-ReportConfig.

[R2-2003898](file:///C:\Data\3GPP\RAN2\Inbox\R2-2003898.zip) Offline discussion 102: eMIMO RRC aspects - second round Ericsson (Rapporteur) discussion Rel-16 NR\_eMIMO-Core

Proposal 3 RAN2 understand that nrofReportedRSForSINR has dependency also with groupBasedBeamReporting and RAN2 further clarify if default value is enough or any value should be possible to be configured.

Options to resolve

Options 1 if groupBasedBeamReporting is disabled UE assumes nrofReportedRSForSINR is 1

Options 2 if groupBasedBeamReporting is disabled nrofReportedRSForSINR is configured and to enable that add reportQuantity-r16 to be optional

SINRQuantityConfig-r16 ::= SEQUENCE {

nrofReportedRS-ForSINR-r16 ENUMERATED {n1, n2, n3, n4},

reportQuantity-r16 CHOICE {

cri-SINR-r16 NULL,

ssb-Index-SINR-r16 NULL

} OPTIONAL -- Need R

}

* Huawei agrees with Ericsson understanding that we might not need to have this parameter at all
* Continue the discussion via email after the meeting

When looking now into more details into this it looks that the paragraphs in 38.214 that describe how to use these configurations are almost identical. The configuration that the UE needs related to L1-SINR reporting and L1-RSRP reporting is exactly the same: the number of RSs and if groupBasedReporting is used. In more detail:

The possible configs for L1-RSRP are:

groupBasedReporting

nonGroupBasedReporting with 1,2,3 or 4 RSs reported

The possible configs for L1-SINR are:

groupBasedReporting

nonGroupBasedReporting with 1,2,3 or 4 RSs reported

With this understanding the proposal is to delete the parameter nrofReportedRS-ForSINR-r16 and reuse the existing structure:

groupBasedBeamReporting CHOICE {

enabled NULL,

disabled SEQUENCE {

nrofReportedRS ENUMERATED {n1, n2, n3, n4} OPTIONAL -- Need S

}

Appendix A has TP for the proposal which also includes implementation for RIL I626 that has status PropAgree (WI-CR) from RAN2#109bise.

1. Agree with TP in Appendix A and inform RAN2 that parameter nrofReportedRS-ForSINR-r16 is removed

*Q1 Companies are asked to provide their views whether they agree with Proposal 1?*

|  |  |
| --- | --- |
| Company | Answer |
| **CATT** | After checking we think this works.  In 214 we have the following  If the UE is configured with a *CSI-ReportConfig* with the higher layer parameter *reportQuantity* set to 'cri-SINR' or 'ssb-Index-SINR',  - if the UE is configured with the higher layer parameter *groupBasedBeamReporting* set to 'disabled', the UE shall report [in a single report] *nrofReportedRSForSINR* (higher layer configured) different CRI or SSBRI for each report setting.  - if the UE is configured with the higher layer parameter *groupBasedBeamReporting* set to 'enabled', the UE shall report in a single reporting instance two different CRI or SSBRI for each report setting  So it seems safe to reuse nrofReportedRS for the 1st branch above. For the 2nd branch, it can be understood the way that when *groupBasedBeamReporting* set to 'enabled', UE does not use RRC configured value but just apply the procedure ‘a single reporting instance two different CRI or SSBRI for each report setting’ per ran1 spec.  A by product is nrofReportedRS has in its field description ‘When the field is absent the UE applies the value 1’, which solves the related issue that CATT raised during ran2-109bis meeting.  If this is agreeable in RAN2, we need LS to RAN1 asking them to change 214 accordingly, to avoid mi-alignment. |
| Ericsson | *agree* |
| Huawei | We agree that RAN1 needs to be informed that the existing parameter is reused, so they can update the specification. |
| ZTE | Agree. |
| Qualcomm | Agree; And should inform RAN1 our changing. |
| vivo | Agree. We think it is better to inform RAN1. |
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2.2 schedulingRequestID-BFR-SCell

**2.2.1 RIL Z280**

The field schedulingRequestID-BFR-SCell is applicable only when the SCell is configured with BFR which is currently not reflected in the field description.

Current implementation reads as follows:

MAC-CellGroupConfig ::= SEQUENCE {

drx-Config SetupRelease { DRX-Config } OPTIONAL, -- Need M

schedulingRequestConfig SchedulingRequestConfig OPTIONAL, -- Need M

bsr-Config BSR-Config OPTIONAL, -- Need M

tag-Config TAG-Config OPTIONAL, -- Need M

phr-Config SetupRelease { PHR-Config } OPTIONAL, -- Need M

skipUplinkTxDynamic BOOLEAN,

...,

[[

csi-Mask BOOLEAN OPTIONAL, -- Need M

dataInactivityTimer SetupRelease { DataInactivityTimer } OPTIONAL -- Cond MCG-Only

]],

[[

usePreBSR-r16 ENUMERATED {true} OPTIONAL, -- Need M

lbt-FailureRecoveryConfig-r16 LBT-FailureRecoveryConfig-r16 OPTIONAL, -- Need M

schedulingRequestID-LBT-SCell-r16 SchedulingRequestId OPTIONAL, -- Need M

lch-BasedPrioritization-r16 ENUMERATED {enabled} OPTIONAL, -- Need R

schedulingRequestID-BFR-SCell-r16 SchedulingRequestId OPTIONAL -- Need R

]]

}

***schedulingRequestID-BFR-SCell***

If present, it indicates the scheduling request configuration applicable for BFR on SCell, as specified in TS 38.321 [3].

Proposal is to change the field descption as follows

***schedulingRequestID-BFR-SCell***

Indicates the scheduling request configuration applicable for BFR on SCell, as specified in TS 38.321 [3]. The network does not configure this field if BFR on SCell is not configured.

1. Agree with the proposed change above.

*Q2 Companies are asked to provide their views whether they agree with Proposal 2?*

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| --- | --- |
| Company | Answer |
| **CATT** | Agree. |
| Ericsson | *agree* |
| Huawei | This sentence is not ok as it is written now:  - it ignores the fact that this parameter is per cell group while SCell BFR is per SCell per DL BWP  - it is a vague system-level description that does not allow answering key questions for inter-operability, e.g.  - when the network releases the only SCell which has a DL BWP using SCell BFR, is the network requires to explicitly release schedulingRequestID-BFR-SCell-r16?  - if no, when the network configures SCell BFR again, is the UE required to remember the previously configured value?  Any statement that does not unambiguously answers these questions is useless. |
| ZTE | Agree |
| Qualcomm | Agree |
| vivo | Agree |
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2.3 Need codes for CoresetPoolIndex

**2.3.1 Z281**

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| --- | --- |
| The CoresetPoolIndex-r16 is absent, it implies the coresetPollIndex is 0 according to the field description. Thus need R shall be corrected to need S. If The controlResourceSetId-R16 is absent, there is no any other behavior shall be specified in specification. Thus need S shall be corrected to need R [Proposed Change]: coresetPoolIndex-r16 INTEGER (0..1) OPTIONAL, -- Need SR controlResourceSetId-r16 ControlResourceSetId-r16 OPTIONAL -- Need RS | coresetPoolIndex-r16 INTEGER (0..1) OPTIONAL, -- Need SR controlResourceSetId-r16 ControlResourceSetId-r16 OPTIONAL -- Need RS |

ControlResourceSet ::= SEQUENCE {

controlResourceSetId ControlResourceSetId,

frequencyDomainResources BIT STRING (SIZE (45)),

duration INTEGER (1..maxCoReSetDuration),

cce-REG-MappingType CHOICE {

interleaved SEQUENCE {

reg-BundleSize ENUMERATED {n2, n3, n6},

interleaverSize ENUMERATED {n2, n3, n6},

shiftIndex INTEGER(0..maxNrofPhysicalResourceBlocks-1) OPTIONAL -- Need S

},

nonInterleaved NULL

},

precoderGranularity ENUMERATED {sameAsREG-bundle, allContiguousRBs},

tci-StatesPDCCH-ToAddList SEQUENCE(SIZE (1..maxNrofTCI-StatesPDCCH)) OF TCI-StateId OPTIONAL, -- Cond NotSIB1-initialBWP

tci-StatesPDCCH-ToReleaseList SEQUENCE(SIZE (1..maxNrofTCI-StatesPDCCH)) OF TCI-StateId OPTIONAL, -- Cond NotSIB1-initialBWP

tci-PresentInDCI ENUMERATED {enabled} OPTIONAL, -- Need S

pdcch-DMRS-ScramblingID INTEGER (0..65535) OPTIONAL, -- Need S

...,

[[

rb-Offset-r16 INTEGER (0..5) OPTIONAL, -- Need N

tci-PresentInDCI-ForDCI-Format1-2-r16 INTEGER (1..3) OPTIONAL, -- Need S

coresetPoolIndex-r16 INTEGER (0..1) OPTIONAL, -- Need R

controlResourceSetId-r16 ControlResourceSetId-r16 OPTIONAL -- Need S

]]

}

Rapporteur comment: should correct according to comment(looks like typo/mistake in CR implementation in the first place)

coresetPoolIndex-r16 INTEGER (0..1) OPTIONAL, -- Need S

controlResourceSetId-r16 ControlResourceSetId-r16 OPTIONAL -- Need R

1. Agree with the proposed change by ZTE to swap the need codes.

*Q3 Companies are asked to provide their views whether they agree with Proposal 3?*

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| --- | --- |
| Company | Answer |
| **CATT** | Need S for coresetPoolIndex-r16 seems fine.  For controlResourceSetId-r16, we do not have strong view, as it seems Need S is also fine, i.e., if it is present then UE applies the value without suffix. |
| Ericsson | *For controlResourceSetId-r16 is actually seems to depend how the ID space is extended in the end.* |
| Huawei | No strong view for need code of coresetPoolIndex-r16 except that we still fail to see the use of allowing signalling the value 0 in two different ways:  1) by including the parameter with the value 0  2) by not including the parameter  Can someone explain what the use of this is?  About controlResourceSetId-r16: this parameter is the ID, with extended ID range, of ControlResourceSet which is only used as ToAddModList/ToReleaseList in PDCCH-Config:  controlResourceSetToAddModList SEQUENCE(SIZE (1..3)) OF ControlResourceSet OPTIONAL, -- Need N  controlResourceSetToReleaseList SEQUENCE(SIZE (1..3)) OF ControlResourceSetId OPTIONAL, -- Need N  and  controlResourceSetToAddModList-r16 SEQUENCE (SIZE (1..5)) OF ControlResourceSet OPTIONAL, -- Need N  controlResourceSetToReleaseList-r16 SEQUENCE (SIZE (1..5)) OF ControlResourceSetId-r16 OPTIONAL, -- Need N  Normally, such ID is mandatory. No need code was intended for such a case.  R: Used for (configuration) fields that are stored by the UE i.e. not one-shot. Upon receiving a message with the field absent, the UE releases the current value.  -> looks unsuitable  M: Used for (configuration) fields that are stored by the UE i.e. not one-shot. Upon receiving a message with the field absent, the UE maintains the current value. -> looks unsuitable too  N: Used for (configuration) fields that are not stored and whose presence causes a one-time action by the UE. Upon receiving message with the field absent, the UE takes no action. -> looks not really suitable either  S: Used for (configuration) fields, whose field description or procedure specifies the UE behavior performed upon receiving a message with the field absent (and not if field description or procedure specifies the UE behavior when field is not configured). -> not great but maybe acceptable?  **So we prefer not to agree the 2nd proposed change.** |
| ZTE | Regarding the question from @HuaWei, I guess HuaWei is to ask why we need two different forms to indicate the same meaning. In our understanding, for the case that BWP is in single PDCCH mode (no matter for single TRP or multiple TRP), there is no need for NW to configured coresetPoolIndex-R16 for this BWP , which also can save a bit from the absence of coresetPoolIndex-r16.Thus we define this IE as an optional IE. However, we are still not clear how to identify the BWP mode, thus we still need to take into account the case of mPDCCH where the coresetPoolInedx-r16 is absent. Even it is not great but there is no error can be found so far.  For the second change , we can also accept need-s code, maybe we need to specify UE behavior for the case that this field is absent, so that the the following sentence can be added into field description:  “If the field *controlResourceSetId-r16* is absent, the UE shall use the *controlResourceSetId* field (without suffix).” |
| Qualcomm | Agree the change on Need S for coresetPoolIndex-r16 |
| vivo | We agree the change on Need S for coresetPoolIndex-r16. For the second change, we are open. |
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|  |  |

2.4 PUCCH-SpatialRelationInfo

**2.4.1 E131&130**

RIL E131 prposes to add extension markers to IE PUCCH-SpatialRelationInfo-r16 and it has ConCAgree from RAN2#109bise. Related RIL E130 asks what should the correct value space for PUCCH-SpatialRelationInfoID-r16 be.

*Q4 Companies are asked to provide their views on what the correct value space for PUCCH-SpatialRelationInfoID-r16 should be?*

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| Company | Answer |
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2.5 DMRS-DownlinkConfig

**2.5.1 I630 R2-2003325**

Issue: Use of Need R in an extension group will not allow delta signalling of this field and will hence incur the extension group header overhead when reconfonfiguring legacy or future fields. Use Need M to avoid extension grouping overhead. Discussion document provides more details.

Proposed change: Please refer to discussion document. For example, consider changing to ENUMERATED {enabled, disabled} with Need M.

Rapp2: Main session notes: "Avoid Need R in an extension if other means to release the field (such as setupRelease discussed in proposal #2) is possible. There are scenarios where Need R is useful and hence this requires careful evaluation on a case by case basis". When the field is in an extension, each reconfiguration of any of the legacy fields in the IE adds the overhead of the extension group. Hence if other mechanisms for release of a field are possible, Need R should be avoided in an extension.

– *DMRS-DownlinkConfig*

The IE *DMRS-DownlinkConfig* is used to configure downlink demodulation reference signals for PDSCH.

***DMRS-DownlinkConfig* information element**

-- ASN1START

-- TAG-DMRS-DOWNLINKCONFIG-START

DMRS-DownlinkConfig ::= SEQUENCE {

dmrs-Type ENUMERATED {type2} OPTIONAL, -- Need S

dmrs-AdditionalPosition ENUMERATED {pos0, pos1, pos3} OPTIONAL, -- Need S

maxLength ENUMERATED {len2} OPTIONAL, -- Need S

scramblingID0 INTEGER (0..65535) OPTIONAL, -- Need S

scramblingID1 INTEGER (0..65535) OPTIONAL, -- Need S

phaseTrackingRS SetupRelease { PTRS-DownlinkConfig } OPTIONAL, -- Need M

...,

[[

dmrs-Downlink-r16 ENUMERATED {enabled} OPTIONAL -- Need R

]]

}

-- TAG-DMRS-DOWNLINKCONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***DMRS-DownlinkConfig* field descriptions** |
| ***dmrs-AdditionalPosition***  Position for additional DM-RS in DL, see Tables 7.4.1.1.2-3 and 7.4.1.1.2-4 in TS 38.211 [16]. If the field is absent, the UE applies the value pos2. See also clause 7.4.1.1.2 for additional constraints on how the network may set this field depending on the setting of other fields. |
| ***dmrs-Downlink***  This field indicates whether low PAPR DMRS is used, as specified in TS38.211 [16], clause 7.4.1.1.1. |
| ***dmrs-Type***  Selection of the DMRS type to be used for DL (see TS 38.211 [16], clause 7.4.1.1.1). If the field is absent, the UE uses DMRS type 1. |
| ***maxLength***  The maximum number of OFDM symbols for DL front loaded DMRS. *len1* corresponds to value 1. *len2* corresponds to value 2. If the field is absent, the UE applies value *len1*. If set to *len2*, the UE determines the actual number of DM-RS symbols by the associated DCI. (see TS 38.211 [16], clause 7.4.1.1.2). |
| ***phaseTrackingRS***  Configures downlink PTRS. If the field is not configured, the UE assumes that downlink PTRS are absent. See TS 38.214 [19] clause 5.1.6.3. |
| ***scramblingID0***  DL DMRS scrambling initialization (see TS 38.211 [16], clause 7.4.1.1.1). When the field is absent the UE applies the value *physCellId* configured for this serving cell. |
| ***scramblingID1***  DL DMRS scrambling initialization (see TS 38.211 [16], clause 7.4.1.1.1). When the field is absent the UE applies the value *physCellId* configured for this serving cell. |

*Q5 Companies are asked to provide their views on coding dmrs-Downlink-r16 ? Further check if the LS reply on conflicting configurations potentially impacts here.*

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| --- | --- |
| Company | Answer |
| Huawei | Maybe SetupRelease would be good.  Still, this is a general ASN.1 question rather than a MIMO question. |
| ZTE | We can accept to configure it to the enumerated value with optional M. |
| vivo | This is not a MIMO related question. It is general ASN.1 issue. We can keep the current ASN.1. |
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2.6 lte-CRS-PatternList-r16 and lte-CRS-PatternListSecond-r16

Note that the names of these are changed in endorsed R2-2003910 as lte-CRS-PatternList1-r16 and lte-CRS-PatternList2-r16 and it is assumed to stay that way even here these would be referred to with old names.

**2.6.1 RIL: N/A**

During the email discussion [903] an issue was raised related to setup-release structure when the field has cond “For SetupRelease, it is wrong to use a presence condition relying on the configuration of another field that can be established or released.”

Proposal is to remove the setupRelease and have Need R in the description of the condition

1. Agree with the proposed change as in TP in Appendix B.

*Q6 Companies are asked to provide their views whether they agree with Proposal 4?*

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| --- | --- |
| Company | Answer |
| **CATT** | Seems ok. |
| Ericsson | *agree* |
| Huawei | The proposal is ok.  But maybe our comment was misinterpreted: the issue with the condition is that it refers to "presence" of the field, while what matters is whether it is set to setup.  It would also be possible to: - keep SetupRelease, change to Need M - capture in the field description of lte-CRS-PatternList1-r16 that "The network does not configure this field and lte-CRS-ToMatchAround. The network may only configure this field if CORESETPoolIndex configured with 1 in any CORESET of the serving cell." - capture in the field description of lte-CRS-PatternList2-r16 that "The network does not configure this field and lte-CRS-ToMatchAround." |
| ZTE | Agree |
| Qualcomm | Agree |
| vivo | Agree |
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**2.6.2 RIL: V104**

The implementation of the two lists is questioned in this RIL as explained below:

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| --- | --- |
| In RAN1 #98bis, following agreements were made on CRS rate matching. “Optionally” in the agreement implies that a UE under multi-TRP operation can be configured with multiple CRS patterns but are not associated with TRPs. In this case, the UE shall rate match PDSCH around configured CRS patterns from multiple TRPs. It is beneficial for a UE supporting the capability to operate in MTRP scenarios with severe interference among TRPs. Current field description of non-overlapping CRS patterns within a CRS pattern list does not allow such agreed operation. Thus, the non-overlapping description should be removed. Agreement For multi-DCI based multi-TRP/panel transmission, the UE shall rate match around: Configured CRS patterns which optionally associated with a higher layer signaling index per CORESET (if configured) and are applied to the PDSCH scheduled with a DCI detected on a CORESET with the same higher layer index. This is a UE optional feature with separate UE capability signalling If UE does not support this feature, the default UE behaviour is the following: For multi-DCI based multi-TRP/panel transmission, the UE shall rate match PDSCH around configured CRS patterns from multiple TRPs | Remove the restriction: the LTE CRS patterns in this list shall be non-overlapping in frequency. |

The earlier email discussion related to the current implementation is presented in Appendix X. These lists relate to both eMIMO and a TEI 16 which advices for the implementation as follows:

A list of LTE CRS patterns around which the UE shall do rate matching for PDSCH with 15 kHz subcarrier spacing. This list is not expected to be configured for a UE together with lte-CRS-ToMatchAround of ServingCellConfig or ServingCellConfigCommon. There may be up to three groups of CRS patterns where the groups are pair-wise non-overlapping in frequency and each group may consist of up to two CRS patterns that are fully overlapping in frequency.

These pairs are formed by taking first element from lte-CRS-PatternList and lte-CRS-PatternListSecond, then second element from each list and then third.

|  |
| --- |
| ***lte-CRS-PatternList***  A list of LTE CRS patterns around which the UE shall do rate matching for PDSCH. The LTE CRS patterns in this list shall be non-overlapping in frequency. |
| ***lte-CRS-PatternListSecond***  A list of LTE CRS patterns around which the UE shall do rate matching for PDSCH scheduled with a DCI detected on a CORESET with CORESETPoolIndex configured with 1. This list is configured only if CORESETPoolIndex configured with 1. The first LTE CRS pattern in this list shall be fully overlapping in frequency with the first LTE CRS pattern in lte-CRS-PatternList, The second LTE CRS pattern in this list shall be fully overlapping in frequency with the second LTE CRS pattern in lte-CRS-PatternList, and so on. |

*Q7 Companies are asked whether the current implementation is ok or a change as suggested in RIL V104 is needed?*

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| --- | --- |
| Company | Answer |
| **CATT** | We think current wording is OK, so no need to change this part. |
| Ericsson | *No need for changes* |
| Zte | No change is OK to us. |
| Qualcomm | We don’t agree this change.  RAN1 already made an agreement about this issue. RAN2 can follow up based on RAN1 agreement.   * Add a new RRC parameter [*crs-RateMatch-PerCORESETPoolIndex*] that indicates the UE does rate match PDSCH around configured CRS for each TRP |
| vivo | We are OK not to change this if the majority donot like it.  However, RAN1 has made the following new agreements in RAN1#100b-e, which needs to be considered in RRC specification.  **Agreement**   * Add a new RRC parameter [*crs-RateMatch-PerCORESETPoolIndex*] that indicates the UE does rate match PDSCH around configured CRS for each TRP * The TP in R1-2002917 is endorsed for editor’s CR on TS 38.214:      |  | | --- | | < Start of the text proposal >  5.1.4.2 PDSCH resource mapping with RE level granularity  \*\*\* Unchanged text is omitted \*\*\*  If the UE is configured by higher layer parameter *PDCCH-Config* with two different values of *CORESETPoolIndex* in *ControlResourceSet* and is also configured by the higher layer parameter *LTE-CRS-PatternList-r16* and *lte-CRS-PatternListSecond-r16* in *ServingCellConfig*, the following REs are declared as not available for PDSCH:  - If the UE is configured with [crs-RateMatch-PerCORESETPoolIndex], REs indicated by the CRS pattern(s) in *lte-CRS-PatternList-r16* if the PDSCH is associated with *CORESETPoolIndex* = 0, or the CRS pattern(s) in *lte-CRS-PatternListSecond-r16* if the PDSCH is associated with *CORESETPoolIndex* = 1*~~CRSPatternList-CORESETPoolIndex~~* ~~for a UE supporting the capability of [~~*~~separate-lte-CRS-ToMatchAround~~*~~]~~;  - Otherwise, REs indicated by *CRS-PatternList-r16* *and lte-CRS-PatternListSecond-r16,* in *ServingCellConfig* ~~for a UE not supporting the capability of [~~*~~separate-lte-CRS-ToMatchAround~~*~~]~~.  < End of the text proposal > |   Thus, we prefer to have the following change on the field description to reflect the RAN1 agreements.   |  | | --- | | ***lte-CRS-PatternList1***  If the UE is not configured with [crs-RateMatch-PerCORESETPoolIndex], the first ~~A~~ list of LTE CRS patterns around which the UE shall do rate matching for PDSCH. ~~The LTE CRS patterns in this list shall be non-overlapping in frequency.~~ If the UE is configured with [crs-RateMatch-PerCORESETPoolIndex], the list of LTE CRS patterns around which the UE shall do rate matching for PDSCH scheduled with a DCI detected on a CORESET with CORESETPoolIndex-16 with 0 or not provided CORESETPoolIndex-r16. | | ***lte-CRS-PatternList2***  If the UE is not configured with [crs-RateMatch-PerCORESETPoolIndex], the second ~~A~~ list of LTE CRS patterns around which the UE shall do rate matching for PDSCH. If the UE is configured with [crs-RateMatch-PerCORESETPoolIndex], the list of LTE CRS patterns around which the UE shall do rate matching for PDSCH scheduled with a DCI detected on a CORESET with CORESETPoolIndex configured with 1. ~~This list is configured only if CORESETPoolIndex configured with 1.~~ The first LTE CRS pattern in this list shall be fully overlapping in frequency with the first LTE CRS pattern in lte-CRS-PatternList, The second LTE CRS pattern in this list shall be fully overlapping in frequency with the second LTE CRS pattern in lte-CRS-PatternList, and so on. | |
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2.7 Multiple TRP case for MAC CEs regarding multiple CCs/BWPs

There are two related agreements regarding this topic from RAN2#109e and RAN2#109bise, respectively:

1. Multiple TRP case is not considered for MAC CEs regarding multiple CCs/BWPs, i.e. TCI States Activation/Deactivation for UE-specific PDSCH MAC CE and TCI State Indication for UE-specific PDCCH MAC CE.
2. If the serving cell in the TCI States Activation/Deactivation for UE-specific PDSCH MAC CE is configured in one cell list which contains more than one serving cell, UE shall ignore the CORESET Pool ID field when receiving the MAC CE.

In R2-2003911, the following was added to for “TCI States Activation/Deactivation for UE-specific PDSCH MAC CE”:

CORESET Pool ID: This field indicates that mapping between the activated TCI states and the codepoint of the DCI *Transmission Configuration Indication* set by field Ti is specific to the *ControlResourceSetId* configured with CORESET Pool ID as specified in TS 38.331 [5]. This field set to 1 indicates that this MAC CE shall be applied for the DL transmission scheduled by CORESET with the CORESET pool ID equal to 1, otherwise, this MAC CE shall be applied for the DL transmission scheduled by CORESET pool ID equal to 0. If the *coresetPoolIndex* is not configured for any CORESET, MAC entity shall ignore the CORESET Pool ID field in this MAC CE when receiving the MAC CE. If the serving cell in the MAC CE is configured in a cell list that contains more than one serving cell, the CORSET Pool ID field shall be ignored when receiving the MAC CE.

However, the agreement from RAN2#109e “Multiple TRP case is not considered for MAC CEs regarding multiple CCs/BWPs” is not implemented in RRC yet. This was discussed in RAN#109bise but not agreed with a disclaimer it can be added later if seen needed. Here we provide a proposal on how to implement it in RRC as we think that if there is serving cell configured with mPDCCH mTRP and UE simply ignores the CORESETPoolID it is unclear if UE applies the MAC CE regardless for those serving cells or not. As per the agreement UE should not apply it but nor should network configure such serving cells to the list. Currently network is not advised for this in the specifications. Proposed addition is as follows:

***simultaneousTCI-UpdateList1, simultaneousTCI-UpdateList2***

List of serving cells which can be updated simultaneously for TCI relation with a MAC CE. The *simultaneousTCI-UpdateList1* and *simultaneousTCI-UpdateList2* shall not contain same serving cells. Network should not configure serving cells that are configured with CORESETPoolID=1 in these lists.

1. Agree with the proposed change as for the field description of “simultaneousTCI-UpdateList1, simultaneousTCI-UpdateList2”.

*Q7 Companies are asked to provide their views whether they agree with Proposal 5?*

|  |  |
| --- | --- |
| Company | Answer |
| Ericsson | *agree* |
| ZTE | *Have no strong point of view* |
| Qualcomm | Fine |
| vivo | Agree. |
|  |  |
|  |  |
|  |  |
|  |  |

# Summary

There is consensus on the following proposals:

Proposal 1 Agree with TP in Appendix A and inform RAN2 that parameter nrofReportedRS-ForSINR-r16 is removed

Proposal 4 Agree with the proposed change as in TP in Appendix B.

Proposal 5 Agree with the proposed change as for the field description of “simultaneousTCI-UpdateList1, simultaneousTCI-UpdateList2”.

Proposal 6 Conclude CongReject on RIL: V104 (addition of the new parameter is separate discussion)

These issues need further discussion:

2.2 schedulingRequestID-BFR-SCell

Reformulation of the second sentence in the field description to take into account HW concerns

***schedulingRequestID-BFR-SCell***

Indicates the scheduling request configuration applicable for BFR on SCell, as specified in TS 38.321 [3]. The network does not configure this field if BFR on SCell is not configured.

Would it work to leave out the second sentence and leave it to network to configure properly?

2.3 Need codes for CoresetPoolIndex

Update proposal is to have Need S for both coresetPoolIndex-r16 and controlResourceSetId-r16 and add for the latter:

“If the field *controlResourceSetId-r16* is absent, the UE shall use the *controlResourceSetId* field (without suffix).”

Updated proposal agreeable?

2.4 PUCCH-SpatialRelationInfo

No input for this. Probably due to the dependence on general ASN1.

2.5 DMRS-DownlinkConfig

This was moved from general ASN1 to MIMO WI but seems companies have very different views and also view that is should ne general ASN1.

# 3 List of issues not corrected yet as pending ASN1 discussion or RAN1 feedback

|  |  |  |
| --- | --- | --- |
| What is the intention of size(0) of candidateBeamRSListExt-r16 though this field is optional? We assume that it allows the delta configuration by using Need M for this list, but if there are no additional meaning for this zero signalling it would be better to use SetupRelease structure, or size(1) with Need R (i.e. if delta configuration is not needed). | [Huawei, HiSilicon] Introduction of more items to a list not using ToAddModList should be discussed in ASN.1 review session. | RIL S655 and is under ASN1 general discussion |
| candidateBeamRSListExt-r16 in BeamFailureRecoveryConfig | Nokia: The intent here is to extend the maximum number of RS resources from 16 tro 64.  However: Now it’s also not clear what UE does if it’s signalled with both lists – does the R16 list fully replace the previous (as it seems since it’s done as CR) and what does UE do with the R15 version if the R16 is signalled?  Or if this is a size extension to the existing list, we should mark it with Ext.  Also, this list doesn’t seem, to be releasable withoöut releasing the whole upper level IE.  This is a “plain list” without AddModRelease – structure, for which there was some ambiguity earlier wrt. how to change the number of entries in the list. It might be better to change the (new list) structure to use AddModRel instead?  HW: Could make the R16 parameter a list of additional candidateBeamRS with size 0 (release) to 48 which is used together with the R15 list.  ZTE: Since the maximum number of candidate beam has been extended to 64, we think it would be nice to have AddModList/ ReleaseList for the candidateBeamRS | General discussion, outcome should follow RIL E132 and S655 outcome |
| controlResourceSetToAddModList-r16 in PDCCH-Config | Size of this list needs to be discussed as well as extension.  HW: This makes it possible to configure 8 coresets, using the legacy parameter and this one. Isn't it sufficient to have a list of 2?  Nokia: This should be the R16 version.  Also, we might want to clarify that the R16 version of the list can release also the entries configured by R15 field and vice versa (where possible) to avoid similar ambiguities that were observed in LTE Rel-10 vs. Rel-13 CA.  Samsung: Agree with Nokia i.e. release mechanism of SCell in LTE can be re-used.  BTW, can we introduce ListExt for this?  HW: We should avoid ambiguities but would suggest also avoiding multiple options for the same action, e.g. if ControlResourceSetId-r16 is values from 13 to 64 only, this is clear that the R15 ToReleaseList is to release the CORESET with IDs in R15 range and the R16 ToReleaseList is used to release CORESETS with IDs in the R16 range.  (For addition, there is no restriction but we need to clarify that there is a single list maintained by the UE.).  About "ListExt": so far there is no guideline for extension of list using ToAddModList and ToReleaseList. | General discussion, outcome should follow RIL E132 and S655outcome |
| spatialRelationInfoToAddModList-r16 in PUCCHConfig | Need to discuss is Ext is used. Further the size needs to be discussed.  HW: We need clarifications in the field description on how this is expected to be used in combination with the r15 field (depends on what we want to do exactly with the r16 structure as commented in PUCCH-SpatialRelationInfo | General discussion, outcome should follow RIL E132 and S655 outcome |
| PUCCH-SpatialRelationInfoId-r16 in PUCCH-SpatialRelationInfo | HW: If the new structure is fully identical to the old structure except for the ID range, the extended ID range could only start from the first misssing ID value and the r16 ToAddModList in PUCCH-Config would be used only for entries with ID values not in the r15 range.  That said: if we want to add extension markers (might be a good idea?) for the new structure and make it possible to it use also for entries with IDs in the r15 range, we need to keep the full range. Nevertheless, we should try to avoid unnecesary use of two parameters for the same purpose. For instance, upon and after configuration of entries via the r16 ToAddModList, the network does not use the r15 ToAddModList and ToReleaseList until all entries or the parent structure are released. | General discussion, outcome should follow RIL E132 and S655 outcome |
| pathlossReferenceRSToAddModList-r16 in PUSCH-PowerControl | Samsung: Do we need to discuss whether to introduce ListExt for pathlossReferenceRSToAddModList-r16? | General discussion, outcome should follow RIL E132 and S655 outcome |
| ControlResourceSetId-r16 in ControlResourceSetId | ER: Should start from 12 (to be defined as maxNrofControlResourceSets) because there is no need to repeat the existing values. | Relates to V101 although the solution proposed there is PropReject(we are suppose to limit the number in code) |
| It is not clear how SearchSpace-v16xy is configured. It seems this IE is the additional configuration using SearchSpace but there are no other configuration in this IE i.e. no searchSpaceId, etc.  Is it better to define searchSpace-r16? Or we can add more descriptions how it works.  For example, if the ControlResourceSetId-r16 in SearchSpace-v16xy is configured, UE ignore the ControlResourceSetId but use the same configuration in SearchSpace which ControlResourceSetId was configured. However we need at least earchSpaceId in this case. | [Huawei, HiSilicon] Again, the problem here is very generic, i.e. adding a missing parameter to non-extensible list using ToAddModList, this requires a general ASN.1 discussion. | See outcome of I657 and I658 |
| Cond PI2-BPSK  The field is optionally present if tp-pi2BPSK is included in PUSCH-Config. It is absent, Need R otherwise. | HW: Does this(PUSCHConfig) refer the field of the instance of PUSCH-Config in which the DMRS-Uplink is configured or does it also refer tp the PUSCH-Config in UL BPW in which the DRMS-Config is configured within configuredGrantConfig? | LS conflicting configurations under email [Post109bis-e][061][NR16] LS on Conflicting configurations (Huawei) |
| pdsch-TimeDomainAllocationList-v16xy in PDSCHConfig | Nokia: See definitions of the IE – better use NCE for the list.  Nokia: The point here is that the list extends the existing list, so the entries should be appended to the existing one. This then also allows network to retain Rel-15 version while only adding the Rel-16 part when needed.  HW: Have some doubts on the benefits, see below. | LS conflicting configurations under email [Post109bis-e][061][NR16] LS on Conflicting configurations (Huawei) |
| dataScramblingIdentityPDSCH, dataScramblingIdentityPDSCH2 in PDSCH-Config | HW: Is it so likely that the network can just add the r16 parameters without changing the value of any r15 parameter of any entry in the list?  No strong view but have some doubts that NCE is the best choice (supposing we keep NCE because we think this is likely that the network can add r16 parameters only, it is unclear in the field description whether the network can release the r16 parameters for all entries by setting the r16 parameter to release.). | LS conflicting configurations under email [Post109bis-e][061][NR16] LS on Conflicting configurations (Huawei) |

# Appendix A

\_\_\_\_\_\_\_\_\_\_\_\_\_\_start of TP\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

– *CSI-ReportConfig*

The IE *CSI-ReportConfig* is used to configure a periodic or semi-persistent report sent on PUCCH on the cell in which the *CSI-ReportConfig* is included, or to configure a semi-persistent or aperiodic report sent on PUSCH triggered by DCI received on the cell in which the *CSI-ReportConfig* is included (in this case, the cell on which the report is sent is determined by the received DCI). See TS 38.214 [19], clause 5.2.1.

***CSI-ReportConfig* information element**

-- ASN1START

-- TAG-CSI-REPORTCONFIG-START

CSI-ReportConfig ::= SEQUENCE {

reportConfigId CSI-ReportConfigId,

carrier ServCellIndex OPTIONAL, -- Need S

resourcesForChannelMeasurement CSI-ResourceConfigId,

csi-IM-ResourcesForInterference CSI-ResourceConfigId OPTIONAL, -- Need R

nzp-CSI-RS-ResourcesForInterference CSI-ResourceConfigId OPTIONAL, -- Need R

reportConfigType CHOICE {

periodic SEQUENCE {

reportSlotConfig CSI-ReportPeriodicityAndOffset,

pucch-CSI-ResourceList SEQUENCE (SIZE (1..maxNrofBWPs)) OF PUCCH-CSI-Resource

},

semiPersistentOnPUCCH SEQUENCE {

reportSlotConfig CSI-ReportPeriodicityAndOffset,

pucch-CSI-ResourceList SEQUENCE (SIZE (1..maxNrofBWPs)) OF PUCCH-CSI-Resource

},

semiPersistentOnPUSCH SEQUENCE {

reportSlotConfig ENUMERATED {sl5, sl10, sl20, sl40, sl80, sl160, sl320},

reportSlotOffsetList SEQUENCE (SIZE (1.. maxNrofUL-Allocations)) OF INTEGER(0..32),

p0alpha P0-PUSCH-AlphaSetId

},

aperiodic SEQUENCE {

reportSlotOffsetList SEQUENCE (SIZE (1..maxNrofUL-Allocations)) OF INTEGER(0..32)

}

},

reportQuantity CHOICE {

none NULL,

cri-RI-PMI-CQI NULL,

cri-RI-i1 NULL,

cri-RI-i1-CQI SEQUENCE {

pdsch-BundleSizeForCSI ENUMERATED {n2, n4} OPTIONAL -- Need S

},

cri-RI-CQI NULL,

cri-RSRP NULL,

ssb-Index-RSRP NULL,

cri-RI-LI-PMI-CQI NULL

},

reportFreqConfiguration SEQUENCE {

cqi-FormatIndicator ENUMERATED { widebandCQI, subbandCQI } OPTIONAL, -- Need R

pmi-FormatIndicator ENUMERATED { widebandPMI, subbandPMI } OPTIONAL, -- Need R

csi-ReportingBand CHOICE {

subbands3 BIT STRING(SIZE(3)),

subbands4 BIT STRING(SIZE(4)),

subbands5 BIT STRING(SIZE(5)),

subbands6 BIT STRING(SIZE(6)),

subbands7 BIT STRING(SIZE(7)),

subbands8 BIT STRING(SIZE(8)),

subbands9 BIT STRING(SIZE(9)),

subbands10 BIT STRING(SIZE(10)),

subbands11 BIT STRING(SIZE(11)),

subbands12 BIT STRING(SIZE(12)),

subbands13 BIT STRING(SIZE(13)),

subbands14 BIT STRING(SIZE(14)),

subbands15 BIT STRING(SIZE(15)),

subbands16 BIT STRING(SIZE(16)),

subbands17 BIT STRING(SIZE(17)),

subbands18 BIT STRING(SIZE(18)),

...,

subbands19-v1530 BIT STRING(SIZE(19))

} OPTIONAL -- Need S

} OPTIONAL, -- Need R

timeRestrictionForChannelMeasurements ENUMERATED {configured, notConfigured},

timeRestrictionForInterferenceMeasurements ENUMERATED {configured, notConfigured},

codebookConfig CodebookConfig OPTIONAL, -- Need R

dummy ENUMERATED {n1, n2} OPTIONAL, -- Need R

groupBasedBeamReporting CHOICE {

enabled NULL,

disabled SEQUENCE {

nrofReportedRS ENUMERATED {n1, n2, n3, n4} OPTIONAL -- Need S

}

},

cqi-Table ENUMERATED {table1, table2, table3, spare1} OPTIONAL, -- Need R

subbandSize ENUMERATED {value1, value2},

non-PMI-PortIndication SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-ResourcesPerConfig)) OF PortIndexFor8Ranks OPTIONAL, -- Need R

...,

[[

semiPersistentOnPUSCH-v1530 SEQUENCE {

reportSlotConfig-v1530 ENUMERATED {sl4, sl8, sl16}

} OPTIONAL -- Need R

]],

[[

semiPersistentOnPUSCH-v16xy SEQUENCE {

reportSlotOffsetListForDCI-Format0-2-r16 SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..32)

OPTIONAL, -- Need R

reportSlotOffsetListForDCI-Format0-1-r16 SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..32)

OPTIONAL -- Need R

} OPTIONAL, -- Need R

reportQuantity-r16 CHOICE {

cri-SINR-r16 NULL,

ssb-Index-SINR-r16 NULL

} OPTIONAL, -- Need R

codebookConfig-r16 CodebookConfig-r16 OPTIONAL -- Need R

]]

}

CSI-ReportPeriodicityAndOffset ::= CHOICE {

slots4 INTEGER(0..3),

slots5 INTEGER(0..4),

slots8 INTEGER(0..7),

slots10 INTEGER(0..9),

slots16 INTEGER(0..15),

slots20 INTEGER(0..19),

slots40 INTEGER(0..39),

slots80 INTEGER(0..79),

slots160 INTEGER(0..159),

slots320 INTEGER(0..319)

}

PUCCH-CSI-Resource ::= SEQUENCE {

uplinkBandwidthPartId BWP-Id,

pucch-Resource PUCCH-ResourceId

}

PortIndexFor8Ranks ::= CHOICE {

portIndex8 SEQUENCE{

rank1-8 PortIndex8 OPTIONAL, -- Need R

rank2-8 SEQUENCE(SIZE(2)) OF PortIndex8 OPTIONAL, -- Need R

rank3-8 SEQUENCE(SIZE(3)) OF PortIndex8 OPTIONAL, -- Need R

rank4-8 SEQUENCE(SIZE(4)) OF PortIndex8 OPTIONAL, -- Need R

rank5-8 SEQUENCE(SIZE(5)) OF PortIndex8 OPTIONAL, -- Need R

rank6-8 SEQUENCE(SIZE(6)) OF PortIndex8 OPTIONAL, -- Need R

rank7-8 SEQUENCE(SIZE(7)) OF PortIndex8 OPTIONAL, -- Need R

rank8-8 SEQUENCE(SIZE(8)) OF PortIndex8 OPTIONAL -- Need R

},

portIndex4 SEQUENCE{

rank1-4 PortIndex4 OPTIONAL, -- Need R

rank2-4 SEQUENCE(SIZE(2)) OF PortIndex4 OPTIONAL, -- Need R

rank3-4 SEQUENCE(SIZE(3)) OF PortIndex4 OPTIONAL, -- Need R

rank4-4 SEQUENCE(SIZE(4)) OF PortIndex4 OPTIONAL -- Need R

},

portIndex2 SEQUENCE{

rank1-2 PortIndex2 OPTIONAL, -- Need R

rank2-2 SEQUENCE(SIZE(2)) OF PortIndex2 OPTIONAL -- Need R

},

portIndex1 NULL

}

PortIndex8::= INTEGER (0..7)

PortIndex4::= INTEGER (0..3)

PortIndex2::= INTEGER (0..1)

-- TAG-CSI-REPORTCONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***CSI-ReportConfig* field descriptions** |
| ***carrier***  Indicates in which serving cell the *CSI-ResourceConfig* indicated below are to be found. If the field is absent, the resources are on the same serving cell as this report configuration. |
| ***codebookConfig***  Codebook configuration for Type-1 or Type-2 including codebook subset restriction. Network does not configure codebookConfig and codebookConfig-r16 simultaneously to a UE |
| ***cqi-FormatIndicator***  Indicates whether the UE shall report a single (wideband) or multiple (subband) CQI. (see TS 38.214 [19], clause 5.2.1.4). |
| ***cqi-Table***  Which CQI table to use for CQI calculation (see TS 38.214 [19], clause 5.2.2.1). |
| ***csi-IM-ResourcesForInterference***  CSI IM resources for interference measurement. *csi-ResourceConfigId* of a *CSI-ResourceConfig* included in the configuration of the serving cell indicated with the field "carrier" above. The *CSI-ResourceConfig* indicated here contains only CSI-IM resources. The *bwp-Id* in that *CSI-ResourceConfig* is the same value as the *bwp-Id* in the *CSI-ResourceConfig* indicated by *resourcesForChannelMeasurement*. |
| ***csi-ReportingBand***  Indicates a contiguous or non-contiguous subset of subbands in the bandwidth part which CSI shall be reported for. Each bit in the bit-string represents one subband. The right-most bit in the bit string represents the lowest subband in the BWP. The choice determines the number of subbands (subbands3 for 3 subbands, subbands4 for 4 subbands, and so on) (see TS 38.214 [19], clause 5.2.1.4). This field is absent if there are less than 24 PRBs (no sub band) and present otherwise, the number of sub bands can be from 3 (24 PRBs, sub band size 8) to 18 (72 PRBs, sub band size 4). |
| ***dummy***  This field is not used in the specification. If received it shall be ignored by the UE. |
| ***groupBasedBeamReporting***  Turning on/off group beam based reporting (see TS 38.214 [19], clause 5.2.1.4). |
| ***non-PMI-PortIndication***  Port indication for RI/CQI calculation. For each CSI-RS resource in the linked ResourceConfig for channel measurement, a port indication for each rank R, indicating which R ports to use. Applicable only for non-PMI feedback (see TS 38.214 [19], clause 5.2.1.4.2).  The first entry in *non-PMI-PortIndication* corresponds to the NZP-CSI-RS-Resource indicated by the first entry in *nzp-CSI-RS-Resources* in the *NZP-CSI-RS-ResourceSet* indicated in the first entry of *nzp-CSI-RS-ResourceSetList* of the *CSI-ResourceConfig* whose *CSI-ResourceConfigId* is indicated in a CSI-MeasId together with the above *CSI-ReportConfigId*; the second entry in *non-PMI-PortIndication* corresponds to the NZP-CSI-RS-Resource indicated by the second entry in *nzp-CSI-RS-Resources* in the *NZP-CSI-RS-ResourceSet* indicated in the first entry of *nzp-CSI-RS-ResourceSetList* of the same *CSI-ResourceConfig*, and so on until the NZP-CSI-RS-Resource indicated by the last entry in *nzp-CSI-RS-Resources* in the in the *NZP-CSI-RS-ResourceSet* indicated in the first entry of *nzp-CSI-RS-ResourceSetList* of the same *CSI-ResourceConfig*. Then the next entry corresponds to the NZP-CSI-RS-Resource indicated by the first entry in *nzp-CSI-RS-Resources* in the *NZP-CSI-RS-ResourceSet* indicated in the second entry of *nzp-CSI-RS-ResourceSetList* of the same *CSI-ResourceConfig* and so on. |
| ***nrofReportedRS***  The number (N) of measured RS resources to be reported per report setting in a non-group-based report. N <= N\_max, where N\_max is either 2 or 4 depending on UE capability.  (see TS 38.214 [19], clause 5.2.1.4) When the field is absent the UE applies the value 1. |
|  |
| ***nzp-CSI-RS-ResourcesForInterference***  NZP CSI RS resources for interference measurement. *csi-ResourceConfigId* of a *CSI-ResourceConfig* included in the configuration of the serving cell indicated with the field "carrier" above. The *CSI-ResourceConfig* indicated here contains only NZP-CSI-RS resources. The *bwp-Id* in that *CSI-ResourceConfig* is the same value as the *bwp-Id* in the *CSI-ResourceConfig* indicated by *resourcesForChannelMeasurement*. |
| ***p0alpha***  Index of the p0-alpha set determining the power control for this CSI report transmission (see TS 38.214 [19], clause 6.2.1.2). |
| ***pdsch-BundleSizeForCSI***  PRB bundling size to assume for CQI calculation when *reportQuantity* is CRI/RI/i1/CQI. If the field is absent, the UE assumes that no PRB bundling is applied (see TS 38.214 [19], clause 5.2.1.4.2). |
| ***pmi-FormatIndicator***  Indicates whether the UE shall report a single (wideband) or multiple (subband) PMI. (see TS 38.214 [19], clause 5.2.1.4). |
| ***pucch-CSI-ResourceList***  Indicates which PUCCH resource to use for reporting on PUCCH. |
| ***reportConfigType***  Time domain behavior of reporting configuration. |
| ***reportFreqConfiguration***  Reporting configuration in the frequency domain. (see TS 38.214 [19], clause 5.2.1.4). |
| ***reportQuantity***  The CSI related quantities to report. see TS 38.214 [19], clause 5.2.1. If the field *reportQuantity-r16* is present, UE shall ignore *reportQuantity* (without suffix). |
| ***reportSlotConfig***  Periodicity and slot offset (see TS 38.214 [19], clause 5.2.1.4). If the field *reportSlotConfig-v1530* is present, the UE shall ignore the value provided in *reportSlotConfig* (without suffix). |
| ***reportSlotOffsetList, reportSlotOffsetListForDCI-Format0-1***, ***reportSlotOffsetListForDCI-Format0-2***  Timing offset Y for semi persistent reporting using PUSCH. This field lists the allowed offset values. This list must have the same number of entries as the *pusch-TimeDomainAllocationList* in *PUSCH-Config*. A particular value is indicated in DCI. The network indicates in the DCI field of the UL grant, which of the configured report slot offsets the UE shall apply. The DCI value 0 corresponds to the first report slot offset in this list, the DCI value 1 corresponds to the second report slot offset in this list, and so on. The first report is transmitted in slot n+Y, second report in n+Y+P, where P is the configured periodicity.  Timing offset Y for aperiodic reporting using PUSCH. This field lists the allowed offset values. This list must have the same number of entries as the *pusch-TimeDomainAllocationList* in *PUSCH-Config*. A particular value is indicated in DCI. The network indicates in the DCI field of the UL grant, which of the configured report slot offsets the UE shall apply. The DCI value 0 corresponds to the first report slot offset in this list, the DCI value 1 corresponds to the second report slot offset in this list, and so on (see TS 38.214 [19], clause 6.1.2.1). The field *reportSlotOffsetList* refers to DCI format 0\_0, the field *reportSlotOffsetListForDCI-Format0-1* refers to DCI format 0\_1 and the field *reportSlotOffsetListForDCI-Format0-2* refers to DCI format 0\_2, respectively (see TS 38.214 [19], clause 6.1.2.1). |
| ***resourcesForChannelMeasurement***  Resources for channel measurement. *csi-ResourceConfigId* of a *CSI-ResourceConfig* included in the configuration of the serving cell indicated with the field "carrier" above. The *CSI-ResourceConfig* indicated here contains only NZP-CSI-RS resources and/or SSB resources. This *CSI-ReportConfig* is associated with the DL BWP indicated by *bwp-Id* in that *CSI-ResourceConfig*. |
| ***subbandSize***  Indicates one out of two possible BWP-dependent values for the subband size as indicated in TS 38.214 [19], table 5.2.1.4-2 . If *csi-ReportingBand* is absent, the UE shall ignore this field. |
| ***timeRestrictionForChannelMeasurements***  Time domain measurement restriction for the channel (signal) measurements (see TS 38.214 [19], clause 5.2.1.1). |
| ***timeRestrictionForInterferenceMeasurements***  Time domain measurement restriction for interference measurements (see TS 38.214 [19], clause 5.2.1.1). |

\_\_\_\_\_\_\_\_\_\_\_\_\_\_end of TP\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Appendix B

\_\_\_\_\_\_\_\_\_\_\_\_\_\_start of TP\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

– *ServingCellConfig*

The IE *ServingCellConfig* is used to configure (add or modify) the UE with a serving cell, which may be the SpCell or an SCell of an MCG or SCG. The parameters herein are mostly UE specific but partly also cell specific (e.g. in additionally configured bandwidth parts). Reconfiguration between a PUCCH and PUCCHless SCell is only supported using an SCell release and add.

***ServingCellConfig* information element**

-- ASN1START

-- TAG-SERVINGCELLCONFIG-START

ServingCellConfig ::= SEQUENCE {

tdd-UL-DL-ConfigurationDedicated TDD-UL-DL-ConfigDedicated OPTIONAL, -- Cond TDD

initialDownlinkBWP BWP-DownlinkDedicated OPTIONAL, -- Need M

downlinkBWP-ToReleaseList SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Id OPTIONAL, -- Need N

downlinkBWP-ToAddModList SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Downlink OPTIONAL, -- Need N

firstActiveDownlinkBWP-Id BWP-Id OPTIONAL, -- Cond SyncAndCellAdd

bwp-InactivityTimer ENUMERATED {ms2, ms3, ms4, ms5, ms6, ms8, ms10, ms20, ms30,

ms40,ms50, ms60, ms80,ms100, ms200,ms300, ms500,

ms750, ms1280, ms1920, ms2560, spare10, spare9, spare8,

spare7, spare6, spare5, spare4, spare3, spare2, spare1 } OPTIONAL, --Need R

defaultDownlinkBWP-Id BWP-Id OPTIONAL, -- Need S

uplinkConfig UplinkConfig OPTIONAL, -- Need M

supplementaryUplink UplinkConfig OPTIONAL, -- Need M

pdcch-ServingCellConfig SetupRelease { PDCCH-ServingCellConfig } OPTIONAL, -- Need M

pdsch-ServingCellConfig SetupRelease { PDSCH-ServingCellConfig } OPTIONAL, -- Need M

csi-MeasConfig SetupRelease { CSI-MeasConfig } OPTIONAL, -- Need M

sCellDeactivationTimer ENUMERATED {ms20, ms40, ms80, ms160, ms200, ms240,

ms320, ms400, ms480, ms520, ms640, ms720,

ms840, ms1280, spare2,spare1} OPTIONAL, -- Cond ServingCellWithoutPUCCH

crossCarrierSchedulingConfig CrossCarrierSchedulingConfig OPTIONAL, -- Need M

tag-Id TAG-Id,

dummy ENUMERATED {enabled} OPTIONAL, -- Need R

pathlossReferenceLinking ENUMERATED {spCell, sCell} OPTIONAL, -- Cond SCellOnly

servingCellMO MeasObjectId OPTIONAL, -- Cond MeasObject

...,

[[

lte-CRS-ToMatchAround SetupRelease { RateMatchPatternLTE-CRS } OPTIONAL, -- Need M

rateMatchPatternToAddModList SEQUENCE (SIZE (1..maxNrofRateMatchPatterns)) OF RateMatchPattern OPTIONAL, -- Need N

rateMatchPatternToReleaseList SEQUENCE (SIZE (1..maxNrofRateMatchPatterns)) OF RateMatchPatternId OPTIONAL, -- Need N

downlinkChannelBW-PerSCS-List SEQUENCE (SIZE (1..maxSCSs)) OF SCS-SpecificCarrier OPTIONAL -- Need S

]],

[[

supplementaryUplinkRelease ENUMERATED {true} OPTIONAL, -- Need N

tdd-UL-DL-ConfigurationDedicated-iab-mt-v16xy TDD-UL-DL-ConfigDedicated-IAB-MT-v16xy OPTIONAL, -- Need FFS

firstWithinActiveTimeBWP-Id-r16 BWP-Id OPTIONAL, -- Cond MultipleNonDormantBWP

firstOutsideActiveTimeBWP-Id-r16 BWP-Id OPTIONAL, -- Cond MultipleNonDormantBWP-WUS

ca-SlotOffset-r16 CHOICE {

refSCS15kHz INTEGER (-2..2),

refSCS30KHz INTEGER (-5..5),

refSCS60KHz INTEGER (-10..10),

refSCS120KHz INTEGER (-20..20)

} OPTIONAL, -- Cond AsyncCA

channelAccessConfig-r16 ChannelAccessConfig-r16 OPTIONAL -- Need M

lte-CRS-PatternList1-r16 LTE-CRS-PatternList-r16 OPTIONAL, -- Cond LTE-CRS

lte-CRS-PatternList2-r16 LTE-CRS-PatternList-r16 OPTIONAL -- Cond CORESETPool

]]

}

UplinkConfig ::= SEQUENCE {

initialUplinkBWP BWP-UplinkDedicated OPTIONAL, -- Need M

uplinkBWP-ToReleaseList SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Id OPTIONAL, -- Need N

uplinkBWP-ToAddModList SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Uplink OPTIONAL, -- Need N

firstActiveUplinkBWP-Id BWP-Id OPTIONAL, -- Cond SyncAndCellAdd

pusch-ServingCellConfig SetupRelease { PUSCH-ServingCellConfig } OPTIONAL, -- Need M

carrierSwitching SetupRelease { SRS-CarrierSwitching } OPTIONAL, -- Need M

...,

[[

powerBoostPi2BPSK BOOLEAN OPTIONAL, -- Need M

uplinkChannelBW-PerSCS-List SEQUENCE (SIZE (1..maxSCSs)) OF SCS-SpecificCarrier OPTIONAL -- Need S

]],

[[

enablePLRS-UpdateForPUSCH-SRS ENUMERATED {enabled} OPTIONAL, -- Need R

enableDefaultBeamPL-ForPUSCH0 ENUMERATED {enabled} OPTIONAL, -- Need R

enableDefaultBeamPL-ForPUCCH ENUMERATED {enabled} OPTIONAL, -- Need R

enableDefaultBeamPL-ForSRS ENUMERATED {enabled} OPTIONAL -- Need R

]]

}

ChannelAccessConfig-r16 ::= SEQUENCE {

maxEnergyDetectionThreshold-r16 INTEGER(-85..-52),

energyDetectionThresholdOffset-r16 INTEGER (-20..-13),

ul-toDL-COT-SharingED-Threshold-r16 INTEGER (-85..-52) OPTIONAL, -- Need R

absenceOfAnyOtherTechnology-r16 ENUMERATED {true} OPTIONAL -- Need R

}

-- TAG-SERVINGCELLCONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***ServingCellConfig* field descriptions** |
| ***absenceOfAnyOtherTechnology***  Presence of this field indicates absence on a long term basis (e.g. by level of regulation) of any other technology sharing the carrier; absence of this field indicates the potential presence of any other technology sharing the carrier, as specified in TS 37.213 [48} clause Y. |
|  |
| ***bwp-InactivityTimer***  The duration in ms after which the UE falls back to the default Bandwidth Part (see TS 38.321 [3], clause 5.15). When the network releases the timer configuration, the UE stops the timer without switching to the default BWP. |
| ***ca-SlotOffset***  Slot offset between the primary cell (PCell/PSCell) and the SCell in unaligned frame boundary with slot alignment and partial SFN alignment inter-band CA. Based on this field, the UE determines the time offset of the SCell as specified in clause 4.5 of TS 38.211 [16]. The granularity of this field is determined by the reference SCS for the slot offset (i.e. the maximum of PCell/PSCell lowest SCS among all the configured SCSs in DL/UL *SCS-SpecificCarrierList* in *ServingCellConfig* and this serving cell's lowest SCS among all the configured SCSs in DL/UL *SCS-SpecificCarrierList* in *ServingCellConfig*).  The Network configures at most single non-zero offset duration in ms (independent on SCS) among CCs in the unaligned CA configuration. If the field is absent, the UE applies the value of 0. |
| ***channelAccessConfig***  List of parameters used for access procedures of operation with shared spectrum channel access (see TS 37.213 [48). |
| ***crossCarrierSchedulingConfig***  Indicates whether this serving cell is cross-carrier scheduled by another serving cell or whether it cross-carrier schedules another serving cell. |
| ***defaultDownlinkBWP-Id***  The initial bandwidth part is referred to by BWP-Id = 0. ID of the downlink bandwidth part to be used upon expiry of the BWP inactivity timer. This field is UE specific. When the field is absent the UE uses the initial BWP as default BWP. (see TS 38.213 [13], clause 12 and TS 38.321 [3], clause 5.15). |
| ***downlinkBWP-ToAddModList***  List of additional downlink bandwidth parts to be added or modified. (see TS 38.213 [13], clause 12). |
| ***downlinkBWP-ToReleaseList***  List of additional downlink bandwidth parts to be released. (see TS 38.213 [13], clause 12). |
| ***downlinkChannelBW-PerSCS-List***  A set of UE specific channel bandwidth and location configurations for different subcarrier spacings (numerologies). Defined in relation to Point A. The UE uses the configuration provided in this field only for the purpose of channel bandwidth and location determination. If absent, UE uses the configuration indicated in *scs-SpecificCarrierList* in *DownlinkConfigCommon* / *DownlinkConfigCommonSIB*. Network only configures channel bandwidth that corresponds to the channel bandwidth values defined in TS 38.101-1 [15] and TS 38.101-2 [39]. |
| ***energyDetectionThresholdOffset***  Indicates the offset to the default maximum energy detection threshold value. Unit in dB. Value -13 corresponds to -13dB, value -12 corresponds to -12dB, and so on (i.e. in steps of 1dB) as specified in TS 37.213 [48]. |
| ***firstActiveDownlinkBWP-Id***  If configured for an SpCell, this field contains the ID of the DL BWP to be activated upon performing the RRC (re-)configuration. If the field is absent, the RRC (re-)configuration does not impose a BWP switch.  If configured for an SCell, this field contains the ID of the downlink bandwidth part to be used upon MAC-activation of an SCell. The initial bandwidth part is referred to by BWP-Id = 0.  Upon PCell change and PSCell addition/change, the network sets the *firstActiveDownlinkBWP-Id* and *firstActiveUplinkBWP-Id* to the same value. |
| ***initialDownlinkBWP***  The dedicated (UE-specific) configuration for the initial downlink bandwidth-part (i.e. DL BWP#0). If any of the optional IEs are configured within this IE, the UE considers the BWP#0 to be an RRC configured BWP (from UE capability viewpoint). Otherwise, the UE does not consider the BWP#0 as an RRC configured BWP (from UE capability viewpoint). Network always configures the UE with a value for this field if no other BWPs are configured. NOTE1 |
| ***lte-CRS-PatternList1***  A list of LTE CRS patterns around which the UE shall do rate matching for PDSCH. The LTE CRS patterns in this list shall be non-overlapping in frequency. |
| ***lte-CRS-PatternList2***  A list of LTE CRS patterns around which the UE shall do rate matching for PDSCH scheduled with a DCI detected on a CORESET with CORESETPoolIndex configured with 1. This list is configured only if CORESETPoolIndex configured with 1. The first LTE CRS pattern in this list shall be fully overlapping in frequency with the first LTE CRS pattern in lte-CRS-PatternList, The second LTE CRS pattern in this list shall be fully overlapping in frequency with the second LTE CRS pattern in lte-CRS-PatternList, and so on. |
| ***lte-CRS-ToMatchAround***  Parameters to determine an LTE CRS pattern that the UE shall rate match around. |
| ***maxEnergyDetectionThreshold***  Indicates the absolute maximum energy detection threshold value. Unit in dBm. Value -85 corresponds to -85 dBm, value -84 corresponds to -84 dBm, and so on (i.e. in steps of 1dBm) as specified in TS 37.213 [48]. If the field is not configured, the UE shall use a default maximum energy detection threshold value as specified in TS 37.213 [48]. |
| ***pathlossReferenceLinking***  Indicates whether UE shall apply as pathloss reference either the downlink of SpCell (PCell for MCG or PSCell for SCG) or of SCell that corresponds with this uplink (see TS 38.213 [13], clause 7). |
| ***pdsch-ServingCellConfig***  PDSCH related parameters that are not BWP-specific. |
| ***rateMatchPatternToAddModList***  Resources patterns which the UE should rate match PDSCH around. The UE rate matches around the union of all resources indicated in the rate match patterns. Rate match patterns defined here on cell level apply only to PDSCH of the same numerology. See TS 38.214 [19], clause 5.1.2.2.3. |
| ***sCellDeactivationTimer***  SCell deactivation timer in TS 38.321 [3]. If the field is absent, the UE applies the value infinity. |
| ***servingCellMO***  *measObjectId* of the *MeasObjectNR* in *MeasConfig* which is associated to the serving cell. For this *MeasObjectNR*, the following relationship applies between this MeasObjectNR and *frequencyInfoDL* in *ServingCellConfigCommon* of the serving cell: if *ssbFrequency* is configured, its value is the same as the *absoluteFrequencySSB* and if *csi-rs-ResourceConfigMobility* is configured, the value of its *subcarrierSpacing* is present in one entry of the *scs-SpecificCarrierList*, *csi-RS-CellListMobility* includes an entry corresponding to the serving cell (with *cellId* equal to *physCellId* in *ServingCellConfigCommon*) and the frequency range indicated by the *csi-rs-MeasurementBW* of the entry in *csi-RS-CellListMobility* is included in the frequency range indicated by in the entry of the *scs-SpecificCarrierList*. |
| ***supplementaryUplink***  Network may configure this field only when *supplementaryUplinkConfig* is configured in *ServingCellConfigCommon* or *ServingCellConfigCommonSIB*. |
| ***supplementaryUplinkRelease***  If this field is included, the UE shall release the uplink configuration configured by *supplementaryUplink*. The network only includes either *supplementaryUplinkRelease* or *supplementaryUplink* at a time. |
| ***tag-Id***  Timing Advance Group ID, as specified in TS 38.321 [3], which this cell belongs to. |
| ***tdd-UL-DL-ConfigurationDedicated-iab-mt*** ***v16xy***  Resource configuration per IAB-MT D/U/F overrides all symbols (with a limitation that effectively only flexible symbols can be overwritten in Rel-16) per slot over the number of slots as provided by *TDD-UL-DL ConfigurationCommon*. |
| ***ul-toDL-COT-SharingED-Threshold***  Maximum energy detection threshold that the UE should use to share channel occupancy with gNB for DL transmission with length no longer than 2, 4, and 8 OFDM symbols for 15Khz, 30Khz, 60KHz SCS respectively, as specified in TS 37.213 [48]. |
| ***uplinkConfig***  Network may configure this field only when *uplinkConfigCommon* is configured in *ServingCellConfigCommon* or *ServingCellConfigCommonSIB*. |

|  |
| --- |
| ***UplinkConfig* field descriptions** |
| ***carrierSwitching***  Includes parameters for configuration of carrier based SRS switching (see TS 38.214 [19], clause 6.2.1.3. |
| ***enableDefaultBeamPlForPUSCH0\_0, enableDefaultBeamPlForPUCCH, enableDefaultBeamPlForSRS***  When the parameter is present, UE derives the spatial relation and the corresponding pathloss reference Rs as specified in 38.213, clauses 7.1.1, 7.2.1, 7.3.1 and 9.2.2The network only configures these parameters for FR2. |
| ***enablePLRSupdateForPUSCHSRS***  When this parameter is present, the Rel-16 feature of MAC CE based pathloss RS updates for PUSCH/SRS is enabled. Network only configures this parameter , when the UE is configured with *sri-PUSCH-PowerControl*. |
| ***firstActiveUplinkBWP-Id***  If configured for an SpCell, this field contains the ID of the UL BWP to be activated upon performing the RRC (re-)configuration. If the field is absent, the RRC (re-)configuration does not impose a BWP switch.  If configured for an SCell, this field contains the ID of the uplink bandwidth part to be used upon MAC-activation of an SCell. The initial bandwidth part is referred to by BandiwdthPartId = 0. |
| ***initialUplinkBWP***  The dedicated (UE-specific) configuration for the initial uplink bandwidth-part (i.e. UL BWP#0). If any of the optional IEs are configured within this IE as part of the IE *uplinkConfig*, the UE considers the BWP#0 to be an RRC configured BWP (from UE capability viewpoint). Otherwise, the UE does not consider the BWP#0 as an RRC configured BWP (from UE capability viewpoint). Network always configures the UE with a value for this field if no other BWPs are configured. NOTE1 |
| ***powerBoostPi2BPSK***  If this field is set to *true*, the UE determines the maximum output power for PUCCH/PUSCH transmissions that use pi/2 BPSK modulation according to TS 38.101-1 [15], clause 6.2.4. |
| ***pusch-ServingCellConfig***  PUSCH related parameters that are not BWP-specific. |
| ***uplinkBWP-ToAddModList***  The additional bandwidth parts for uplink to be added or modified. In case of TDD uplink- and downlink BWP with the same *bandwidthPartId* are considered as a BWP pair and must have the same center frequency. |
| ***uplinkBWP-ToReleaseList***  The additional bandwidth parts for uplink to be released. |
| ***uplinkChannelBW-PerSCS-List***  A set of UE specific channel bandwidth and location configurations for different subcarrier spacings (numerologies). Defined in relation to Point A. The UE uses the configuration provided in this field only for the purpose of channel bandwidth and location determination. If absent, UE uses the configuration indicated in *scs-SpecificCarrierList* in *UplinkConfigCommon* / *UplinkConfigCommonSIB*. Network only configures channel bandwidth that corresponds to the channel bandwidth values defined in TS 38.101-1 [15] and TS 38.101-2 [39]. |

NOTE 1: If the dedicated part of initial UL/DL BWP configuration is absent, the initial BWP can be used but with some limitations. For example, changing to another BWP requires *RRCReconfiguration* since DCI format 1\_0 doesn't support DCI-based switching.

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *AsyncCA* | This field is mandatory present for SCells whose slot offset between the SpCell is not 0. Otherwise it is absent, Need S. |
| *CORESETPool* | This field is optionally present, Need R, if the field *lte-CRS-ToMatchAround* is not configured and CORESETPoolIndex configured with 1 in any CORESET of the serving cell. It is absent otherwise. |
| *LTE-CRS* | This field is optionally present, Need R, if the field *lte-CRS-ToMatchAround* is not configured. It is absent otherwise. |
| *MeasObject* | This field is mandatory present for the SpCell if the UE has a *measConfig*, and it is optionally present, Need M, for SCells. |
| *MultipleNonDormantBWP* | The field is mandatory present when the SCell is configured with more than one *BWP-DownlinkDedicated* with *pdcch-Config* present, otherwise it is absent. |
| *MultipleNonDormantBWP-WUS* | The field is mandatory present when the SCell is configured with WUS and with more than one *BWP-DownlinkDedicated* with *pdcch-Config* present, otherwise it is absent. |
| *SCellOnly* | This field is optionally present, Need R, for SCells. It is absent otherwise. |
| *ServingCellWithoutPUCCH* | This field is optionally present, Need S, for SCells except PUCCH SCells. It is absent otherwise. |
| *SyncAndCellAdd* | This field is mandatory present for a SpCell upon PCell change and PSCell addition/change and upon *RRCSetup*/*RRCResume*.  The field is mandatory present for an SCell upon addition.  For SpCell, the field is optionally present, Need N, upon reconfiguration without *reconfigurationWithSync*.  In all other cases the field is absent. |
| *TDD* | This field is optionally present, Need R, for TDD cells. It is absent otherwise. |

\_\_\_\_\_\_\_\_\_\_\_\_\_\_end of TP\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Appendix C

# Handling of rate matching signalling

In R1-1913674 a rate matching related parameter is given under RAN1 TEI16:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Sub-feature group | Parameter name in the spec | New or existing? | Parameter name in the text | Description | Value range | Per (UE, cell, TRP, …) |
| Multiple LTE-CRS rate matching patterns | LTE-CRS-PatternList-r16 | New | LTE-CRS-PatternList-r16 | A list of LTE CRS patterns around which the UE shall do rate matching for PDSCH with 15 kHz subcarrier spacing. This list is not expected to be configured for a UE together with lte-CRS-ToMatchAround of ServingCellConfig or ServingCellConfigCommon. There may be up to three groups of CRS patterns where the groups are pair-wise non-overlapping in frequency and each group may consist of up to two CRS patterns that are fully overlapping in frequency. | SEQUENCE (SIZE (1..6)) OF RateMatchPatternLTE-CRS | per serving cell configuration |

Under eMIMO, the following parameter is given in the same excel:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Sub-feature group | Parameter name in the spec | New or existing? | Parameter name in the text | Description | Value range | Per (UE, cell, TRP, …) |
| M-TRP | CRSPatternList- CORESETPoolIndex | New |  | ~~Agreement For multi-DCI based multi-TRP/panel transmission, the UE shall rate match around: Configured CRS patterns which optionally associated with a higher layer signaling index per CORESET (if configured) and are applied to the PDSCH scheduled with a DCI detected on a CORESET with the same higher layer index.~~ For mPDCCH based mPDSCH transmission, the UE shall rate match around configured CRS patterns which are associated with CORESETPoolIndex and are applied to the PDSCH scheduled with a DCI detected on a CORESET with the same value of CORESETPoolIndex. | ~~FFS~~ Up to RAN2 | per DL BWP |

Both [1][2] share the understanding that the total number of CRS patterns will be 6. Difference in the proposals comes in how to handle the association of a CRS pattern to CORESETPoolIndex and restrictions on how to enable the following:

There may be up to three groups of CRS patterns where the groups are pair-wise non-overlapping in frequency and each group may consist of up to two CRS patterns that are fully overlapping in frequency.

In [2], a list of CORESETPoolIndexes is suggested together with a limitation “The maximum of three CRS pattern associates to one CORESETPoolIndex.”

CRSPatternList-CORESETPoolIndex-r16    SEQUENCE (SIZE (1..6)) OF INTEGER (0，1)               OPTIONAL    -- Need N

This proposal does not seem to match with the limitation above. The limitation stated in RAN1 excel is about how CRS patterns are overlapping in frequency and not about exact CRS patterns. Further, by introducing a separate list of CORESETPoolIndexes that is suppose to match with the list of CRS patterns may result in tricky issues on ensuring that the intended matching between these lists is maintained correctly in RRC reconfigurations.

In [1], the association between CRS pattern and CORESETPoolIndex is done in a traditional way by adding the CORESETPoolIndex to each CRS pattern. This would avoid the issue of maintaining the mapping between the two separately configured lists (LTE-CRS-PatternList-r16 and CRSPatternList-CORESETPoolIndex-r16). However, the restrictions of configuring overlapping and non-overlapping CRS patterns in frequency was not implemented.

Our understanding is that as an NR carrier can overlap with maximum 3 LTE carriers, up to 3 CRS non overlapping patterns may be configured in case of single PDCCH. Then, as it could be possible that TRPs have different LTE cells as neighbours, the second PDCCH may be associated with different CRS pattern which is fully overlapping in frequency with the first PDCCH.

A CR for “Support of multiple LTE CRS rate matching patterns” was submitted to RAN2-109e in R2-2000865 with a note:

This CR only considers the non-overlapping case and the multi-TRP agreements in [R2-1912024](http://www.3gpp.org/ftp/tsg_ran/wg2_rl2/tsgr2_107bis/docs/R2-1912024.zip) ([R1-1909895](http://www.3gpp.org/ftp/tsg_ran/WG1_RL1//TSGR1_98/Docs//R1-1909895.zip)) are assumed to be handled in the Rel-16 MIMO WID. The Rel-16 MIMO WID CR XXXX (R2-20xxxxx) also clashes with this CR, with the changes from that CR superseding the changes in this CR.

In there, a CRS pattern list of size 3 is introduced which would correspond to the non-overlapping CRS patterns(although in CR itself this requirement is not stated). Our proposal is to add another length 3 CRS pattern list that correspond to the CORESETPooIndex 1 if that is configured. In more detail, our suggested changes are as follows showing both changes by Nokia as in R2-2000865 and our additions:

*First Modified Subclause*

### 6.3.2 Radio resource control information elements

<UNNECESSARY PARTS OMITTED>

– *RateMatchPatternLTE-CRS*

The IE *RateMatchPatternLTE-CRS* is used to configure a pattern to rate match around LTE CRS. See TS 38.214 [19], clause 5.1.4.2.

***RateMatchPatternLTE-CRS* information element**

-- ASN1START

-- TAG-RATEMATCHPATTERNLTE-CRS-START

RateMatchPatternLTE-CRS ::= SEQUENCE {

carrierFreqDL INTEGER (0..16383),

carrierBandwidthDL ENUMERATED {n6, n15, n25, n50, n75, n100, spare2, spare1},

mbsfn-SubframeConfigList EUTRA-MBSFN-SubframeConfigList OPTIONAL, -- Need M

nrofCRS-Ports ENUMERATED {n1, n2, n4},

v-Shift ENUMERATED {n0, n1, n2, n3, n4, n5}

}

LTE-CRS-PatternList-r16 ::= SEQUENCE (SIZE (1..maxLTE-CRS-Patterns-r16)) OF RateMatchPatternLTE-CRS

-- TAG-RATEMATCHPATTERNLTE-CRS-STOP

-- ASN1STOP

|  |
| --- |
| ***RateMatchPatternLTE-CRS* field descriptions** |
| ***carrierBandwidthDL***  BW of the LTE carrier in number of PRBs (see TS 38.214 [19], clause 5.1.4.2). |
| ***carrierFreqDL***  Center of the LTE carrier (see TS 38.214 [19], clause 5.1.4.2). |
| ***mbsfn-SubframeConfigList***  LTE MBSFN subframe configuration (see TS 38.214 [19], clause 5.1.4.2). |
| ***nrofCRS-Ports***  Number of LTE CRS antenna port to rate-match around (see TS 38.214 [19], clause 5.1.4.2). |
| ***v-Shift***  Shifting value v-shift in LTE to rate match around LTE CRS (see TS 38.214 [19], clause 5.1.4.2). |

<UNNECESSARY PARTS OMITTED>

– *ServingCellConfig*

The IE *ServingCellConfig* is used to configure (add or modify) the UE with a serving cell, which may be the SpCell or an SCell of an MCG or SCG. The parameters herein are mostly UE specific but partly also cell specific (e.g. in additionally configured bandwidth parts). Reconfiguration between a PUCCH and PUCCHless SCell is only supported using an SCell release and add.

***ServingCellConfig* information element**

-- ASN1START

-- TAG-SERVINGCELLCONFIG-START

ServingCellConfig ::= SEQUENCE {

tdd-UL-DL-ConfigurationDedicated TDD-UL-DL-ConfigDedicated OPTIONAL, -- Cond TDD

initialDownlinkBWP BWP-DownlinkDedicated OPTIONAL, -- Need M

downlinkBWP-ToReleaseList SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Id OPTIONAL, -- Need N

downlinkBWP-ToAddModList SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Downlink OPTIONAL, -- Need N

firstActiveDownlinkBWP-Id BWP-Id OPTIONAL, -- Cond SyncAndCellAdd

bwp-InactivityTimer ENUMERATED {ms2, ms3, ms4, ms5, ms6, ms8, ms10, ms20, ms30,

ms40,ms50, ms60, ms80,ms100, ms200,ms300, ms500,

ms750, ms1280, ms1920, ms2560, spare10, spare9, spare8,

spare7, spare6, spare5, spare4, spare3, spare2, spare1 } OPTIONAL, --Need R

defaultDownlinkBWP-Id BWP-Id OPTIONAL, -- Need S

uplinkConfig UplinkConfig OPTIONAL, -- Need M

supplementaryUplink UplinkConfig OPTIONAL, -- Need M

pdcch-ServingCellConfig SetupRelease { PDCCH-ServingCellConfig } OPTIONAL, -- Need M

pdsch-ServingCellConfig SetupRelease { PDSCH-ServingCellConfig } OPTIONAL, -- Need M

csi-MeasConfig SetupRelease { CSI-MeasConfig } OPTIONAL, -- Need M

sCellDeactivationTimer ENUMERATED {ms20, ms40, ms80, ms160, ms200, ms240,

ms320, ms400, ms480, ms520, ms640, ms720,

ms840, ms1280, spare2,spare1} OPTIONAL, -- Cond ServingCellWithoutPUCCH

crossCarrierSchedulingConfig CrossCarrierSchedulingConfig OPTIONAL, -- Need M

tag-Id TAG-Id,

dummy ENUMERATED {enabled} OPTIONAL, -- Need R

pathlossReferenceLinking ENUMERATED {spCell, sCell} OPTIONAL, -- Cond SCellOnly

servingCellMO MeasObjectId OPTIONAL, -- Cond MeasObject

...,

[[

lte-CRS-ToMatchAround SetupRelease { RateMatchPatternLTE-CRS } OPTIONAL, -- Need M

rateMatchPatternToAddModList SEQUENCE (SIZE (1..maxNrofRateMatchPatterns)) OF RateMatchPattern OPTIONAL, -- Need N

rateMatchPatternToReleaseList SEQUENCE (SIZE (1..maxNrofRateMatchPatterns)) OF RateMatchPatternId OPTIONAL, -- Need N

downlinkChannelBW-PerSCS-List SEQUENCE (SIZE (1..maxSCSs)) OF SCS-SpecificCarrier OPTIONAL -- Need S

]],

[[

lte-CRS-PatternList-r16 SetupRelease { LTE-CRS-PatternList-r16 } OPTIONAL -- Cond LTE-CRS

lte-CRS-PatternListSecond-r16 SetupRelease { LTE-CRS-PatternList-r16 } OPTIONAL -- Cond CORESETPool

]]

}

UplinkConfig ::= SEQUENCE {

initialUplinkBWP BWP-UplinkDedicated OPTIONAL, -- Need M

uplinkBWP-ToReleaseList SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Id OPTIONAL, -- Need N

uplinkBWP-ToAddModList SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Uplink OPTIONAL, -- Need N

firstActiveUplinkBWP-Id BWP-Id OPTIONAL, -- Cond SyncAndCellAdd

pusch-ServingCellConfig SetupRelease { PUSCH-ServingCellConfig } OPTIONAL, -- Need M

carrierSwitching SetupRelease { SRS-CarrierSwitching } OPTIONAL, -- Need M

...,

[[

powerBoostPi2BPSK BOOLEAN OPTIONAL, -- Need M

uplinkChannelBW-PerSCS-List SEQUENCE (SIZE (1..maxSCSs)) OF SCS-SpecificCarrier OPTIONAL -- Need S

]]

}

-- TAG-SERVINGCELLCONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***ServingCellConfig* field descriptions** |
| ***bwp-InactivityTimer***  The duration in ms after which the UE falls back to the default Bandwidth Part (see TS 38.321 [3], clause 5.15). When the network releases the timer configuration, the UE stops the timer without switching to the default BWP. |
| ***crossCarrierSchedulingConfig***  Indicates whether this serving cell is cross-carrier scheduled by another serving cell or whether it cross-carrier schedules another serving cell. |
| ***defaultDownlinkBWP-Id***  The initial bandwidth part is referred to by BWP-Id = 0. ID of the downlink bandwidth part to be used upon expiry of the BWP inactivity timer. This field is UE specific. When the field is absent the UE uses the initial BWP as default BWP. (see TS 38.213 [13], clause 12 and TS 38.321 [3], clause 5.15). |
| ***downlinkBWP-ToAddModList***  List of additional downlink bandwidth parts to be added or modified. (see TS 38.213 [13], clause 12). |
| ***downlinkBWP-ToReleaseList***  List of additional downlink bandwidth parts to be released. (see TS 38.213 [13], clause 12). |
| ***downlinkChannelBW-PerSCS-List***  A set of UE specific channel bandwidth and location configurations for different subcarrier spacings (numerologies). Defined in relation to Point A. The UE uses the configuration provided in this field only for the purpose of channel bandwidth and location determination. If absent, UE uses the configuration indicated in *scs-SpecificCarrierList* in *DownlinkConfigCommon* / *DownlinkConfigCommonSIB*. Network only configures channel bandwidth that corresponds to the channel bandwidth values defined in TS 38.101-1 [15] and TS 38.101-2 [39]. |
| ***firstActiveDownlinkBWP-Id***  If configured for an SpCell, this field contains the ID of the DL BWP to be activated upon performing the RRC (re-)configuration. If the field is absent, the RRC (re-)configuration does not impose a BWP switch.  If configured for an SCell, this field contains the ID of the downlink bandwidth part to be used upon MAC-activation of an SCell. The initial bandwidth part is referred to by BWP-Id = 0.  Upon PCell change and PSCell addition/change, the network sets the *firstActiveDownlinkBWP-Id* and *firstActiveUplinkBWP-Id* to the same value. |
| ***initialDownlinkBWP***  The dedicated (UE-specific) configuration for the initial downlink bandwidth-part (i.e. DL BWP#0). If any of the optional IEs are configured within this IE, the UE considers the BWP#0 to be an RRC configured BWP (from UE capability viewpoint). Otherwise, the UE does not consider the BWP#0 as an RRC configured BWP (from UE capability viewpoint). Network always configures the UE with a value for this field if no other BWPs are configured. NOTE1 |
| ***lte-CRS-ToMatchAround***  Parameters to determine an LTE CRS pattern that the UE shall rate match around. |
| ***lte-CRS-PatternList***   1. A list of LTE CRS patterns around which the UE shall do rate matching for PDSCH. The LTE CRS patterns in this list shall be non-overlapping in frequency. |
| ***lte-CRS-PatternListSecond***  A list of LTE CRS patterns around which the UE shall do rate matching for PDSCH scheduled with a DCI detected on a CORESET with CORESETPoolIndex configured. This list is configured only if CORESETPoolIndex configured. The first LTE CRS pattern in this list shall be fully overlapping in frequency with the first LTE CRS pattern in lte-CRS-PatternList, The second LTE CRS pattern in this list shall be fully overlapping in frequency with the second LTE CRS pattern in lte-CRS-PatternList, and so on. |
| ***pathlossReferenceLinking***  Indicates whether UE shall apply as pathloss reference either the downlink of SpCell (PCell for MCG or PSCell for SCG) or of SCell that corresponds with this uplink (see TS 38.213 [13], clause 7). |
| ***pdsch-ServingCellConfig***  PDSCH related parameters that are not BWP-specific. |
| ***rateMatchPatternToAddModList***  Resources patterns which the UE should rate match PDSCH around. The UE rate matches around the union of all resources indicated in the rate match patterns. Rate match patterns defined here on cell level apply only to PDSCH of the same numerology. See TS 38.214 [19], clause 5.1.2.2.3. |
| ***sCellDeactivationTimer***  SCell deactivation timer in TS 38.321 [3]. If the field is absent, the UE applies the value infinity. |
| ***servingCellMO***  *measObjectId* of the *MeasObjectNR* in *MeasConfig* which is associated to the serving cell. For this *MeasObjectNR*, the following relationship applies between this MeasObjectNR and *frequencyInfoDL* in *ServingCellConfigCommon* of the serving cell: if *ssbFrequency* is configured, its value is the same as the *absoluteFrequencySSB* and if *csi-rs-ResourceConfigMobility* is configured, the value of its *subcarrierSpacing* is present in one entry of the *scs-SpecificCarrierList*, *csi-RS-CellListMobility* includes an entry corresponding to the serving cell (with *cellId* equal to *physCellId* in *ServingCellConfigCommon*) and the frequency range indicated by the *csi-rs-MeasurementBW* of the entry in *csi-RS-CellListMobility* is included in the frequency range indicated by in the entry of the *scs-SpecificCarrierList*. |
| ***supplementaryUplink***  Network may configure this field only when *supplementaryUplinkConfig* is configured in *ServingCellConfigCommon* or *ServingCellConfigCommonSIB*. |
| ***tag-Id***  Timing Advance Group ID, as specified in TS 38.321 [3], which this cell belongs to. |
| ***uplinkConfig***  Network may configure this field only when *uplinkConfigCommon* is configured in *ServingCellConfigCommon* or *ServingCellConfigCommonSIB*. |

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| ***UplinkConfig* field descriptions** |
| ***carrierSwitching***  Includes parameters for configuration of carrier based SRS switching (see TS 38.214 [19], clause 6.2.1.3. |
| ***firstActiveUplinkBWP-Id***  If configured for an SpCell, this field contains the ID of the UL BWP to be activated upon performing the RRC (re-)configuration. If the field is absent, the RRC (re-)configuration does not impose a BWP switch.  If configured for an SCell, this field contains the ID of the uplink bandwidth part to be used upon MAC-activation of an SCell. The initial bandwidth part is referred to by BandiwdthPartId = 0. |
| ***initialUplinkBWP***  The dedicated (UE-specific) configuration for the initial uplink bandwidth-part (i.e. UL BWP#0). If any of the optional IEs are configured within this IE as part of the IE *uplinkConfig*, the UE considers the BWP#0 to be an RRC configured BWP (from UE capability viewpoint). Otherwise, the UE does not consider the BWP#0 as an RRC configured BWP (from UE capability viewpoint). Network always configures the UE with a value for this field if no other BWPs are configured. NOTE1 |
| ***powerBoostPi2BPSK***  If this field is set to *true*, the UE determines the maximum output power for PUCCH/PUSCH transmissions that use pi/2 BPSK modulation according to TS 38.101-1 [15], clause 6.2.4. |
| ***pusch-ServingCellConfig***  PUSCH related parameters that are not BWP-specific. |
| ***uplinkBWP-ToAddModList***  The additional bandwidth parts for uplink to be added or modified. In case of TDD uplink- and downlink BWP with the same *bandwidthPartId* are considered as a BWP pair and must have the same center frequency. |
| ***uplinkBWP-ToReleaseList***  The additional bandwidth parts for uplink to be released. |
| ***uplinkChannelBW-PerSCS-List***  A set of UE specific channel bandwidth and location configurations for different subcarrier spacings (numerologies). Defined in relation to Point A. The UE uses the configuration provided in this field only for the purpose of channel bandwidth and location determination. If absent, UE uses the configuration indicated in *scs-SpecificCarrierList* in *UplinkConfigCommon* / *UplinkConfigCommonSIB*. Network only configures channel bandwidth that corresponds to the channel bandwidth values defined in TS 38.101-1 [15] and TS 38.101-2 [39]. |

NOTE 1: If the dedicated part of initial UL/DL BWP configuration is absent, the initial BWP can be used but with some limitations. For example, changing to another BWP requires *RRCReconfiguration* since DCI format 1\_0 doesn't support DCI-based switching.

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| **Conditional Presence** | **Explanation** |
| *LTE-CRS* | This field is optionally present, Need M, if the field *lte-CRS-ToMatchAround* is not configured. It is absent otherwise. |
| *CORESETPool* | This field is optionally present, Need M, if the field *lte-CRS-ToMatchAround* is not configured and CORESETPoolIndex configured. It is absent otherwise. |
| *MeasObject* | This field is mandatory present for the SpCell if the UE has a *measConfig*, and it is optionally present, Need M, for SCells. |
| *SCellOnly* | This field is optionally present, Need R, for SCells. It is absent otherwise. |
| *ServingCellWithoutPUCCH* | This field is optionally present, Need S, for SCells except PUCCH SCells. It is absent otherwise. |
| *SyncAndCellAdd* | This field is mandatory present for a SpCell upon PCell change and PSCell addition/change and upon *RRCSetup*/*RRCResume*.  The field is mandatory present for an SCell upon addition.  For SpCell, the field is optionally present, Need N, upon reconfiguration without *reconfigurationWithSync*.  In all other cases the field is absent. |
| *TDD* | This field is optionally present, Need R, for TDD cells. It is absent otherwise. |