3GPP TSG-RAN WG2 Meeting #123bis R2-10xxxxx

Xiamen, China, October 2023

Agenda Item: 7.20.1

Source: Ericsson

Title: Post 123bis MIMOevo RRC

Document for: Discussion, Decision

# Introduction

* [Post123bis][203][MIMOevo] RRC Running CR and further discussions (Ericsson)

**Scope**:

1. Update and review the RRC running CR
2. Identify all remaining open issues
3. Get inputs for subset of open issues (focus on detailed stage 3 open issues, signaling, parameter ranges, etc to help with CR finalisation).

**Intended outcome**: RRC running CR for endorsement, and discussion report with proposals **Deadline**: Long (2 weeks for running CR, November 3rd for open issues if needed)

# Contact Information

Respondents to the email discussion are kindly asked to fill in the following table.

|  |  |  |
| --- | --- | --- |
| Company | Name | Email Address |
| Ericsson | Helka-Liina Määttänen | Helka-liina.maattanen@ericsson.com |
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| NTT Docomo | Riki Okawa | riki.ookawa.rp@nttdocomo.com |
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| OPPO | Zonda | Duzhongda@oppo.com |

# Background

RAN2 has received the L1 parameters in R1-2308672. The running CR captures most of the parameters in R2-2310611 and in R2-2311167 the RAN1 excel with rapporteur comments together with the field name used in the running CR can be found.

The running CR for this email discussion is updated to below agreements:

R2-2311290 Report for Post 123 MIMOevo RRC

*Proposal 1 In IE ControlResourceset, add value “None” to applyIndicatedTCI-State (first, second, both, none) and do not configure with followUnifiedTCI-State-r17. FFS if the same can be achieved if this field is not included at all.*

*Proposal 2 Configure the parameter applyIndicatedTCIState-r18 per PUCCH resource and not additionally to PUCCH groups*

 *Proposal 4 In IE SRS-Config applyIndicatedTCIState-r18 and followUnifiedTCI-StateSRS are configured separately for r18 mTRP and r17 sTRP. -Cond is added:*

*FollowUTCI The field is absent if the field followUnifiedTCI-State is present. Otherwise, it is optionally present, Need R.*

*Proposal 5 Do not use numberOfSDCombinations and numberOfSDCombinations-PS*

*Proposal 6 IN IE TDCP(new) in IE CSI-ReportConfig The value of Y can be deferred from the list length of delayDSetofLenghtY-r18*

*Proposal 7 Move parameter m (aperiodicResourceOffset-r18) from IE NZP-CSI-RS-ResourceSet to IE CodebookConfig-r18 under typeII-Doppler-r1 and specify relation in field description.*

*Proposal 9 For codebook config:*

*As baseline assumption CodebookConfig is critically extended.*

*Field description for n1-n2-codebookSubsetRestrictionList includes configuration restriction for same n1-n2 for each element.*

*Optionality of n1-n2-codebookSubsetRestrictionList is removed to ensure at least one element is included.*

*Optionality and field description need further review and it can be considered to send LS from next meeting for RAN1 to review the optionality of the parameters, FFS other things.*

*Proposal 10 Wait for Ran1 input for ”applyIndicatedTCIState should be added within the PDCCH-ConfigCommon to indicate whether/which TCI state to be applied for corset 0”*

* In IE ControlResourceset, add value “None” to applyIndicatedTCI-State (first, second, both, none) and do not configure with followUnifiedTCI-State-r17. FFS if the same can be achieved if this field is not included at all.
* P2, P4-7, P9-P10 are taken as baseline for further stage 3 specification development.
* The filed description for CSI-AssociatedReportConfigInfo will be updated, using P3 in R2-2311290 as baseline. Details to be further checked.
* RRC configuration restriction that ‘The network does not configure the field in a serving cell that is configured with more than one value for the *coresetPoolIndex*’ for unifiedTCI-StateType need to be removed. FFS how, and FFS if this also impact other conditions and configurations.

The Proposal 9 inlcudes FFS on LS to RAN1 on codebookconfig parameters. It is suggested, if Ran2 agrees to send this in LS it is send from RAN2#124

**Question 1 Please indicate whether you agree that Ran2 sends** **CodebookConfig-r18 to RAN1 for review from RAN2#124?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/no** | **comment** |
| Ericsson | yes |  |
| Xiaomi | yes |  |
| Docomo | yes |  |
| CATT | Yes |  |
| Samsung | Prefer no | Not sure what needs RAN1 to review unless we have specific questions to ask RAN1. Also, RAN1 can always review our CR and raise issues if any by sending LS.Signaling details should be decided by RAN2, other than functionality issues there is no much need to send LS. If this is about the issue whether certain parameter is optional or mandatory, not sure RAN1 understands the meaning of optional or mandatory for a RRC parameter. This may be resolved by companies internal review, and if any issue is identified by any companies, it can be raised and discussed in RAN2 scope. |
| ZTE | Yes |  |
| Qualcomm | Yes |  |
| OPPO | Comment | Since the suggestion is to do it in next meeting, we are general fine. But I also intend to agree with Samsung that RAN2 need identify detail issues first. |
| Lenovo | Yes |  |

Conclusion

Proposal 1 Discuss on RAN2#124 on LS need and content

# PRACH for two TAs

[RRC spec issue]

* Whether and how the original definition of *tag-Id* is affected by introduction of second TAG ID
* Details on *additionalCFRA-ToAddModList-r18* (i.e., additional PRACH configuration used for CFRA in inter-cell case) which RAN1 left up to RAN2

RAN2 has received updated L1 parameters in R1-2308672. The parameters related to “PRACH” are as follows:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| RAN2 Parent IE | Parameter name in the spec |  New or existing? | Description | Value range | Comment |
| Up to RAN2 | additionalCFRA-ToAddModList-r18 (or up to RAN2) | New | List of additional CFRA configurations where each of the CFRA configurations in the list correspond to one of the Additional PCIs. [At least the following are needed:- RACH-ConfigGeneric- ssb-perRACH-Occasion- rootSequenceIndex] |  | The contents of the paramaters inside each of the CFRA configurations in the list is up to RAN2. This is for PDCCH order CFRA only.This is just an example design. The exact design is up to RAN2. |

RAN1 is asking to extend the PRACH configuration for each additionalPCIs, and there are 7 of those:

maxNrofAdditionalPCI-r17 INTEGER ::= 7 -- Maximum number of additional PCI

Since there are so many additional PRACH configurations, it is suggested to check which parameters need to be extended.

In R2-2311169, the below proposal is presented for the additional PRACh configuration and it is taken as baseline here.

1. RAN2 to adopt as content for RACH configuration per additionaPCI(7 of these) IE *RACH-ConfigGeneric,* ssb-perRACH-OccasionAndCB-PreamblesPerSSB and prach-RootSequenceIndex

**Question 2 Please state if you agree Porposal1 or if you have another suggestion?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/no** | **Comments** |
| Ericsson | Yes |  |
| Xiaomi | Yes |  |
| Docomo | Yes |  |
| CATT | Agree except the association of preambles and SSB (ssb-perRACH-Occasion~~AndCB-PreamblesPerSSB~~) | The RACH configuration is only used for PDCCH order RACH, and for this case, the SSB and preambles will be indicated in the PDCCH order, so there is no need to configure the association of the preambles and SSBs in the RACH configuration for additional PCI. |
| Samsung | See comment | Agree with catt, ssb-perRACH-Occasion should be included, not ssb-perRACH-OccasionAndCB-PreamblesPerSSB |
| LGE | See comment | Agree with CATT and Samsung |
| ZTE | See comments | Agree with CATT on the *ssb-perRACH-Occasion*In addition to parameters in proposal 1, we would like to ask whether msg1-SubcarrierSpacing is needed? Otherwise, how to determine the msg1-SubcarrierSpacing for PDCCH ordered CFRA toward the additional cell. |
| Qualcomm |  | Similar view with CATT |
| OPPO | Comments | Same view as CATT. As for the msg1-subcarrierSpacing, our understanding is that it is covered by preamble format, which is in the table defining prach-ConfigurationIndex. |
| Lenovo | See comment | Agree with CATT and Samsung |

Proposal 2 RAN2 to adopt as content for RACH configuration per additionaPCI(7 of these) IE RACH-ConfigGeneric, ssb-perRACH-Occasion and prach-RootSequenceIndex

In R2-2311169, the below proposal is presented for the additional PRACH configuration and it is taken as baseline here.

1. RAN2 extend the PRACH configuration in the BWP-UplinkCommon.

**Question 3 Please state if you agree Proposal2 or if you have another suggestion?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/no** | **Comments** |
| Ericsson | Yes |  |
| Xiaomi | Yes |  |
| Docomo | Yes |  |
| CATT | No | It is specified as following in 38.331 for BWP-UplinkCommon:“The IE *BWP-UplinkCommon* is used to configure the common parameters of an uplink BWP. They are “cell specific” and the network ensures the necessary alignment with corresponding parameters of other UEs. The common parameters of the initial bandwidth part of the Pcell are also provided via system information. For all other serving cells, the network provides the common parameters via dedicated signaling”Based on the highlight part, it is obvious the BWP-UplinkCommon should be common for all Ues, if we provide the PRACH configuration for inter-cell under the BWP-UplinkCommon, this means it should be provided to each UE served by this cell, including the UE which doesn’t support 2TA. Especially if it is configured for initial BWP for Pcell, it means the extend RACH configuration for inter-cell should be broadcast in system information, which is not we expect. Due to it is un-useless for idle/inactive UE.So we suggest to provide the extend RACH configuration in the BWP- UplinkDedicated.Besides, we may also need to clarify whether only one RACH resources within one BWP should be configured, or per BWP configured (up to four RACH configurations per additional PCI)? We slightly prefer the former understanding.  |
| Samsung | No | Echo catt’s comment. This should be provided by dedicated signaling. BWP-UplinkDedicated can be considered |
| Ericsson | yes | *BWP-UplinkCommon is used to configure initialULBWP in both* UplinkConfigCommon and UplinkConfigCommonSIB. The additional RACH configuration can be specified to present only in UplinkConfigCommon. Hence there should be no issue with system information.Also hard ti see reason why the configuration should be different for each BWP for these additional PCIs when for the original it is common. |
| LGE | No | Additional PRACH configuration should be dedicated signaling, so it should be included in BWP-UplinkDedicated. |
| ZTE | No strong view |  |
| OPPO | Yes and comment | We think we should check whether the additional PRACH configuration should be common across BWPs in the same serving cell or not. We intend to think it is not necessary to be different among BWPs. Maybe we can go even further i.e. to only have one common additional PRACH configuration considering now RAN1 change their agreement that it need only 1 bit in the PDCCH order.Even it is put into BWP-UplinkCommon, still it is dedicated signaling in the sense legacy UE and Rel18 UE not supporthing this feature will not receive in the RRCReconfiguration message. So not sure why do people argue on this point. |
| Lenovo | No  | This is a dedicated configuration. |

*BWP-UplinkCommon is used to configure initialULBWP in both* UplinkConfigCommon and UplinkConfigCommonSIB. The additional RACH configuration can be specified to present only in UplinkConfigCommon. Hence there should be no issue with system information. When this is the only complaint it is still proposed to use the BWP-UplinkCommon.

Proposal 3 RAN2 extend the PRACH configuration in the BWP-UplinkCommon allowed in IE UplinkConfigCommon and not in IE UplinkConfigCommonSIB

# 2TA RRC parameters

The parameters related to “mTRP-2TA” are as follows:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| RAN2 Parent IE | Parameter name in the spec |  New or existing? | Description | Value range | Comment |  |
| ServingCellConfig | tag-Id2 | New | This parameter provides the second TAG ID configured for the servingcell. | (0..maxNrofTAGs-1) |  | Exact design is up to RAN2 |
| TCI-State | tag-Id-ptr | New | This parameter is used to associate a TAG ID with a joint TCI state. This covers the case when joint TCI state is used for UL transmission. | 0, 1 | Note that this parameter either points to either tag-ID or tag-ID2 configured per serving cell depending on the value it indicates. This is only a suggestion/example and the final RRC signaling detail is up to RAN2 to decide. | pointer to original or second TAG ID.  |
| TCI-UL-State | tag-Id-ptr | New | "This parameter is used to associate a TAG ID with an UL TCI state. This  | 0, 1 | Note that this parameter either points to either tag-ID or tag-ID2 configured per serving cell depending on the value it indicates. This is only a suggestion/example and the final RRC signaling detail is up to RAN2 to decide. |  |
| ServingCellConfig | n-TimingAdvanceOffset2-r18 | New | covers the case when UL TCI state is used for UL transmission." | { n0, n25600, n39936 }  | Note that the first n-TimingAdvanceOffset is the legacy parameter given in ServingCellConfigCommon/ServingCellConfigCommonSIB.This parameter is needed only for inter-cell multi-DCI operation |  |

In R2-2311169 it is suggested that two TAG values(and offsetvalues) are configured with definition of which is per UL/DL channels of a TRP. In this case the original TAG(or offset) would be ignored by the UE. This way, also TS 38.321 and TS 38300 specifications can define per TRP TAG and offset behaviours using these parameter names and there is no need to refer to two different procedures/definitions with same parameter name.

1. RAN2 to define tag-Id1 and tag-Id2 to refer to two TA operation as well as n-TimingAdvanceOffset1-r18 and n-TimingAdvanceOffset2-r18

In R2-2310103 It is suggested to follow the excel and use the original tag-id with the newly defined tag-Id2 and same for n-TimingAdvanceOffset2-r18. The TP provided is shown in appendix for convenience. The proposals can be summarized as below:

1. RAN2 to introduce the parameters tag-Id2-r18 n-TimingAdvanceOffset2-r18 in ServingCellConfig

**Question 4 Please state whether support proposal 3 or proposal 4?**

|  |  |  |
| --- | --- | --- |
| **Company** | **P3 or P4** | **Comments** |
| Ericsson | P3 |  |
| Xiaomi | P3 |  |
| Docomo | P3 |  |
| CATT | P4 | Anyway there need at least one TAG, so the legacy TAG configuration can be reused.  |
| Samsung | P4 |  |
| LGE | P4 | The legacy configuration for TAG can be reused. |
| ZTE | P4 | Proponent |
| Qualcomm | P4 |  |
| OPPO | P4 |  |
| Lenovo | P4 |  |

Proposal 4 RAN2 to introduce the parameters tag-Id2-r18 n-TimingAdvanceOffset2-r18 in ServingCellConfig

# Other

**Question 5 Please indicate any other comments for running CR review?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Topic/parameter** | **Comments** |
| Lenovo | 2TA in handover case | In handover case, the configuration for handover is generated by candidate cell. If multi-TRPs with two TAs can be configured for candidate cell e.g PCell or PSCell, UE is expected to synchronize to candidate cell via two TAs. That means UE need to get two TAs via two RACH procedures when T304 is running. Another way is that only one TA for candidate Pcell or PSCell is configured by candidate cell. The second TRP associated with a second TA can be configured after successful handover. Suggest to discuss whether multi-TRPs with two Tas can be supported in handover case. |
|  |  |  |

Proposal 5 RAN2 to discuss whether multi-TRPs with two Tas can be supported in handover case.

# Appendix

*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,

 dummy1 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

]],

…

/\*omit for short\*/

 [[

 tag-Id2-r18 TAG-ID, OPTIONAL -- Need R

 ]],

}

-- TAG-SERVINGCELLCONFIG-STOP

-- ASN1STOP

|  |
| --- |
| *ServingCellConfig* field descriptions |
| ***tag-Id, tag-Id-r18***Timing Advance Group ID, as specified in TS 38.321 [3], which this cell or one TRP of this cell belongs to. The *tag-Id-r18 is optionally configured in a serving cell if and only if the serving cell is configured with more than one value for the coresetPoolIndex* |

*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,

 dummy1 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

]],

…

/\*omit for short\*/

 [[

tag-Id2-r18 TAG-ID, OPTIONAL -- Need R

n-TimingAdvanceOffset2-r18 ENUMERATED { n0, n25600, n39936 } OPTIONAL, -- Cond 2tag

 ]],

}

-- TAG-SERVINGCELLCONFIG-STOP

-- ASN1STOP

|  |
| --- |
| *ServingCellConfig* field descriptions |
| *n-TimingAdvanceOffset2-r18*The N\_TA-offset to be applied for random access on the TRP associated with the *tag-Id2* of the serving cell. The value of this field shall be equal to the value of the *n-TimingAdvanceOffset* in one serving cell that is not configured with *additionalPCI-ToAddModList-r17* |

|  |  |
| --- | --- |
| Conditional Presence | Explanation |
| *2tag* | This field is optionally present, need S, if tag-Id 2 is present for the serving cell. Otherwise, it shall be absent. |