**3GPP TSG RAN1#117 Meeting R1-240xxxx**

**Fukuoka City, Fukuoka, Japan, May 20th – 24th, 2024**

**Agenda item:** 8.1

**Source:** Moderator (Samsung)

**Title:** Summary of discussion on RAN2 LS on RRC parameters used for CG RACH-less Handover

**Document for:** Discussion

# Introduction

This document contains the overall discussion for RAN2 LS on RRC parameters used for CG RACH-less Handover [1], and considers the following Tdocs submitted in RAN1#117.

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| # | **Tdoc** | **Title** | **Company** |
| 1 | R1-2404062 | Draft Reply LS on parameters used for CG RACH-less Handover | Samsung |
| 2 | R1-2404207 | Discussion on parameters used for CG RACH-less Handover | ZTE |
| 3 | R1-2404208 | Draft reply LS on parameters used for CG RACH-less Handover | ZTE |
| 4 | R1-2404143 | Discussion on LS on parameters used for CG RACH-less Handover | vivo |
| 5 | R1-2404933 | Draft Reply LS on parameters used for CG RACH-less Handover | InterDigital, Inc. |
| 6 | R1-2405326 | Discussion on the reply of LS on parameters used for CG RACH-less Handover | Huawei, HiSilicon |

Main discussion point is “if there is any parameter within the agreed CG-RRC-RACH-LessConfiguration IE and rrc-ConfiguredUplinkGrant in TS 38.331 which may not be applicable for CG-based RACH-less handover” as RAN2 asks. It is noted that, for CG-RRC-RACH-LessConfiguration IE in RAN2 LS, it has been changed to CG-RRC-Configuration in TS 38.331 v18.1.0.

# Companies’ inputs

Based on companies inputs, following RRC parameters have been suggested as not be applicable for CG-based RACH-less handover.

**Table 1. Companies’ input for RRC parameters not applicable for CG-based RACH-less handover**

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| --- | --- | --- |
| **#** | **RRC parameters** | **Company** |
| 1 | *pathlossReferenceIndex* | SS, vivo, ZTE, IDC, HW |
| 2 | *pathlossReferenceIndex2-r17* | HW |
| 3 | *antennaPort* (i.e., UE ignores *antennaPort*) | vivo, ZTE, IDC |
| 4 | *PrecodingAndNumberOfLayers* (i.e., *precodingAndNumberOfLayers* is always set to 1) | vivo, ZTE, IDC, HW |
| 5 | *precodingAndNumberOfLayers2-r17* | HW |
| 6 | *srs-ResourceIndicator* | ZTE, IDC, HW |
| 7 | *srs-ResourceIndicator2-r17* | HW |
| 8 | *srs-ResourceSetId-r18* | HW |
| 9 | *phy-PriorityIndex* | IDC |
| 10 | *applyIndicatedTCI-State-r18* | HW |

Moderator would like to check companies’ views for the above 10 RRC parameters in Table 1 that have been suggested as not being applicable for CG based RACH-less handover. For efficient discussion, moderator made indexing for each RRC parameter in Table 1, and will check if companies are willing to accept or not. Then, moderator will make draft reply LS after collecting companies’ views.

## **1st round discussion (open):**

**Please provide your views if RRC parameters (in Table 1) can be applicable for CG based RACH-less handover.**

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| --- | --- | --- |
| **Company** | **Applicable for CG RACH-less HO (#)** | **Reason(s) of the corresponding RRC parameter can be applicable**  **for CG based RACH-less handover** |
| **IDCC** | None applicable | In our understanding, none of the parameters above is applicable.  The better would be to respond to RAN2 that the parameters 1, 3, 4, 6 and 9 should be handled same as for CG-SDT where some of the parameters are not configured and some are configured with a specific value.  For parameters 2, 5, 7, 8 and 10, in our understanding they are not applicable but we are not certain whether we need to include them in the response to RAN2 LS. |
| **vivo** | none | For 1,3,4, they are mandatory fields that are not applicable for RACH-less handover, thus RAN2 spec change is needed to clarify how to understand these parameters in RACH-loss handover case.  But for others optional fields, NW can make sure that they are absent for RACH-loss handover. |
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# Summary of 1st round discussion

Though there were not many responses, it is quite clear that the following RRC parameters are not applicable to CG based RACH-less handover from moderator’s understanding. For *phy-PriorityIndex*¸ it is not included within *rrc-ConfiguredUplinkGrant* IE that RAN2 asked for clarification. This RRC parameter will not be included in the reply LS.

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| **#** | **RRC parameters** |
| 1 | *pathlossReferenceIndex* |
| 2 | *pathlossReferenceIndex2-r17* |
| 3 | *antennaPort* (i.e., UE ignores *antennaPort*) |
| 4 | *PrecodingAndNumberOfLayers* (i.e., *precodingAndNumberOfLayers* is always set to 1) |
| 5 | *precodingAndNumberOfLayers2-r17* |
| 6 | *srs-ResourceIndicator* |
| 7 | *srs-ResourceIndicator2-r17* |
| 8 | *srs-ResourceSetId-r18* |
| ~~9~~ | *~~phy-PriorityIndex~~* |
| 10 | *applyIndicatedTCI-State-r18* |

# Reference

[1] R1-2403829, LS on parameters used for CG RACH-less Handover RAN2, InterDigital

# Appendix

## rrc-ConfiguredUplinkGrant

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| rrc-ConfiguredUplinkGrant SEQUENCE {  timeDomainOffset INTEGER (0..5119),  timeDomainAllocation INTEGER (0..15),  frequencyDomainAllocation BIT STRING (SIZE(18)),  antennaPort INTEGER (0..31),  dmrs-SeqInitialization INTEGER (0..1) OPTIONAL, -- Need R  precodingAndNumberOfLayers INTEGER (0..63),  srs-ResourceIndicator INTEGER (0..15) OPTIONAL, -- Need R  mcsAndTBS INTEGER (0..31),  frequencyHoppingOffset INTEGER (1.. maxNrofPhysicalResourceBlocks-1) OPTIONAL, -- Need R  pathlossReferenceIndex INTEGER (0..maxNrofPUSCH-PathlossReferenceRSs-1),  ...,  [[  pusch-RepTypeIndicator-r16 ENUMERATED {pusch-RepTypeA,pusch-RepTypeB} OPTIONAL, -- Need M  frequencyHoppingPUSCH-RepTypeB-r16 ENUMERATED {interRepetition, interSlot} OPTIONAL, -- Cond RepTypeB  timeReferenceSFN-r16 ENUMERATED {sfn512} OPTIONAL -- Need S  ]],  [[  pathlossReferenceIndex2-r17 INTEGER (0..maxNrofPUSCH-PathlossReferenceRSs-1) OPTIONAL, -- Need R  srs-ResourceIndicator2-r17 INTEGER (0..15) OPTIONAL, -- Need R  precodingAndNumberOfLayers2-r17 INTEGER (0..63) OPTIONAL, -- Need R  timeDomainAllocation-v1710 INTEGER (16..63) OPTIONAL, -- Need M  timeDomainOffset-r17 INTEGER (0..40959) OPTIONAL, -- Need R  cg-SDT-Configuration-r17 CG-SDT-Configuration-r17 OPTIONAL -- Need M  ]],  [[  srs-ResourceSetId-r18 SRS-ResourceSetId OPTIONAL, -- Need R  cg-LTM-Configuration-r18 CG-RRC-Configuration-r18 OPTIONAL, -- Cond LTM  cg-SDT-PeriodicityExt-r18 ENUMERATED {  sym1x14x1280, sym2x14x1280, sym4x14x1280 , sym8x14x1280, sym16x14x1280,  sym32x14x1280, sym48x14x1280, sym64x14x1280, sym96x14x1280, sym128x14x1280,  sym192x14x1280, sym240x14x1280, sym256x14x1280, sym384x14x1280, sym472x14x1280,  sym480x14x1280, sym512x14x1280, sym768x14x1280, sym944x14x1280, sym960x14x1280,  sym1408x14x1280, sym1536x14x1280, sym1888x14x1280, sym1920x14x1280,  sym2816x14x1280, sym3072x14x1280, sym3776x14x1280, sym5632x14x1280,  sym6144x14x1280, sym7552x14x1280, sym7680x14x1280, sym11264x14x1280,  sym15104x14x1280, sym15360x14x1280, sym22528x14x1280, sym30208x14x1280,  sym45056x14x1280, sym60416x14x1280, sym90112x14x1280, sym180224x14x1280,  sym4x12x1280, sym8x12x1280, sym16x12x1280, sym32x12x1280, sym192x12x1280,  sym384x12x1280, sym960x12x1280, sym1888x12x1280, sym3776x12x1280,  sym5632x12x1280, sym11264x12x1280, spare13, spare12, spare11, spare10, spare9,  spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1  } OPTIONAL, -- Need R  timeReferenceHyperSFN-r18 INTEGER (0..1023) OPTIONAL, -- Need R  cg-RRC-Configuration-r18 CG-RRC-Configuration-r18 OPTIONAL, -- Cond RACH-LessHO  applyIndicatedTCI-State-r18 ENUMERATED {first, second, both} OPTIONAL -- Need R  ]]  } |

## CG-RRC-Configuration-r18

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| CG-RRC-Configuration-r18 ::= SEQUENCE {  cg-RRC-RetransmissionTimer-r18 INTEGER (1..64) OPTIONAL, -- Need R  cg-RRC-RSRP-ThresholdSSB-r18 RSRP-Range OPTIONAL, -- Need R  rrc-SSB-Subset-r18 CHOICE {  shortBitmap-r18 BIT STRING (SIZE (4)),  mediumBitmap-r18 BIT STRING (SIZE (8)),  longBitmap-r18 BIT STRING (SIZE (64))  } OPTIONAL, -- Need S  rrc-SSB-PerCG-PUSCH-r18 ENUMERATED {oneEighth, oneFourth, half, one, two, four, eight, sixteen} OPTIONAL, -- Need M  rrc-P0-PUSCH-r18 INTEGER (-16..15) OPTIONAL, -- Need M  rrc-Alpha-r18 ENUMERATED {alpha0, alpha04, alpha05, alpha06, alpha07, alpha08, alpha09, alpha1} OPTIONAL, -- Need M  rrc-DMRS-Ports-r18 CHOICE {  dmrsType1-r18 BIT STRING (SIZE (8)),  dmrsType2-r18 BIT STRING (SIZE (12))  } OPTIONAL, -- Need M  rrc-NrofDMRS-Sequences-r18 INTEGER (1..2) OPTIONAL, -- Need M  ...  } |

## RAN2 LS(R1-2403829)

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| 1. Overall Description:  RAN2 has agreed to support CG-based RACH-less handover in Rel-18. CG-based RACH-less handover reuses the CG-SDT's RRC parameters as baseline for the configuration.  RAN2 would like to ask RAN1 if there is any parameter within the agreed *CG-RRC-RACH-LessConfiguration* IE and *rrc-ConfiguredUplinkGrant* in TS 38.331 which may not be applicable for CG-based RACH-less handover.  2. Actions:  To RAN WG1  ACTION: RAN2 respectfully asks RAN1 to take such information into account and provide feedback on the parameters used for the CG-based RACH-less handover. |