**3GPP TSG RAN WG2 #124 *R2-23xxxxx***

**Chicago, USA, 13 – 17 Nov, 2023**

Source: Ericsson

Title: [Post123bis][307][NR-NTN Enh] 38.331 running CR (Ericsson)

Agenda Item: 7.6.1

Document for: Discussion and decision

# Introduction

This document captures the outcome of the following email discussion:

* [Post123bis][307][NR-NTN Enh] 38.331 running CR (Ericsson)

Scope: running CR update and list of open issues

Intended outcome:

* + - * + Endorsed running CR
        + List of open issues to be addressed by company Tdocs

Deadline: Medium

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| \*\*\* Detailed scope for all e-mail discussions on running CRs and open issues \*\*\*  1.     Update the running CR with agreements from the meeting  2.     Rapporteur to propose resolutions for straightforward open issues which can already be included in the running CR  3.     For Stage 3 running CRs, get input on stage-3 issues that require further input from companies to make a decision:   * Focus on stage-3 issues which are better handled via offline, e.g. signaling details, parameter values/ranges, NOT functionality discussion. For these issues, if any, the CR rapporteur should submit a separate report with proposals to the next meeting by the submission deadline, while input via company Tdocs should be avoided   4.     Identify the remaining open issues that need to be solved for WI completion in the next meeting:   * Company Tdocs for the next meeting should focus on these issues |

# 2 Open Issue List

During RAN2#123, the following agreement was taken for RACH-less handover:

* The mapping between type-1 CG and SSBs in CG-SDT can be the baseline of how to configure pre-allocated grant mapped to SSBs (can rediscuss in case of different input from RAN1).

Consequently, the CG-SDT configuration was taken as a baseline to implement the pre-allocated uplink grant (CG type 1) for RACH-less handover. While some parameters such as ssb-Subset or RSRP-ThesholdSSB have been discussed in RAN2, others such as DMRS-Ports needs further clarification.

Editor’s Note: FFS whether the definition of DMRS port configuration and DMRS sequence configuration for NTN RACH-less handover needs revision.

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| *CG-NTN-RACH-less-Configuration* field descriptions |
| ***ntn-DMRS-Ports***  Indicates the set of DMRS ports for SSB to PUSCH mapping (see TS 38.213 [13]). The first (left-most / most significant) bit corresponds to DMRS port 0, the second most significant bit corresponds to DMRS port 1, and so on. A bit set to 1 indicates that this DMRS port is used for mapping. |
| ***ntn-NrofDMRS-Sequences***  Indicates the number of DMRS sequences for SSB to PUSCH mapping (see TS 38.213 [13]). |
| ***ntn-SSB-Subset***  Indicates SSB subset for SSB to CG PUSCH mapping within one CG configuration. |
| ***ntn-SSB-PerCG-PUSCH***  The number of SSBs per pre-allocated uplink grant PUSCH (see TS 38.213 [13]). Value *one* corresponds to 1 SSBs per pre-allocated uplink grant PUSCH, value *two* corresponds to 2 SSBs per pre-allocated uplink grant PUSCH and so on. |
| ***ntn-RSRP-ThresholdSSB***  An RSRP threshold configured for SSB selection for the pre-allocated uplink grant as specified in TS 38.321 [3]. |

**Q1: Please share your views on whether DMRS port configuration and DMRS sequence configuration for RACH-less handover needs revision:**

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| **Company** | **Yes / No** | **Comments** |
| Ericsson | Yes | These parameters are within RAN1’s scope. |
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In addition, during the RRC review, a company raised the question whether the following parameters, which hold a special configuration/restrictions for CG-SDT are equally applicable for NTN RACH-less handover.

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| *ConfiguredGrantConfig* field descriptions |
| ***antennaPort***  Indicates the antenna port(s) to be used for this configuration, and the maximum bitwidth is 5. See TS 38.214 [19], clause 6.1.2, and TS 38.212 [17], clause 7.3.1. The UE ignores this field in case of CG-SDT. |
| ***cg-RetransmissionTimer***  Indicates the initial value of the configured retransmission timer (see TS 38.321 [3]) in multiples of *periodicity*. The value of *cg-RetransmissionTimer* is always less than or equal to the value of *configuredGrantTimer.* This field is always configured together with *harq-ProcID-Offset*. This field is not configured for operation in licensed spectrum or simultaneously with *harq-ProcID-Offset2.* The network does not configure this field for CG-SDT. |
| ***harq-ProcID-Offset***  For operation with shared spectrum channel access configured with *cg-RetransmissionTimer-r16*, this configures the range of HARQ process IDs which can be used for this configured grant where the UE can select a HARQ process ID within [*harq-procID-offset, ..,* (*harq-procID-offset + nrofHARQ-Processes* – 1)]. *harq-ProcID-Offset-v1730* is only applicable for operation with shared spectrum channel access in FR2-2*.* If the field *harq-ProcID-Offset-v1730* is present, the UE shall ignore the *harq-ProcID-Offset-r16*. The network does not configure this field for CG-SDT. |
| ***pathlossReferenceIndex***  Indicates the reference signal index used as PUSCH pathloss reference (see TS 38.213 [13], clause 7.1.1). In case of CG-SDT, the UE does not use this field. |
| ***phy-PriorityIndex***  Indicates the PHY priority of CG PUSCH at least for PHY-layer collision handling. Value *p0* indicates low priority and value *p1* indicates high priority. The network does not configure this for CG-SDT. |
| ***precodingAndNumberOfLayers***  Indicates the precoding and number of layers (see TS 38.212 [17], clause 7.3.1.1.2, and TS 38.214 [19], clause 6.1.2.3). In case of CG-SDT, network sets this field to 1. |
| ***srs-ResourceIndicator***  Indicates the SRS resource to be used. The network does not configure this for CG-SDT. |
| ***uci-OnPUSCH***  Selection between and configuration of dynamic and semi-static beta-offset. For Type 1 UL data transmission without grant, *uci-OnPUSCH* should be set to *semiStatic.* The network does not configure this for CG-SDT. |

**Q2: Please share your views on whether the following parameters in the *ConfiguredGrantConfig* IE which have a special description for CG-SDT need revision for NTN RACH-less handover:**

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| **Company** | **Yes / No** | **Comments** |
| Ericsson | Yes | These parameters are within RAN1’s scope. |
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**Q3: Do you think anything essential for WI completion is missed? Note that unchanged PCI functionality is discussed in a separate offline (312). Please elaborate on the missing issues if any.**

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| **Company** | **Open issue** | **Comments** |
| Ericsson | In NTN RACH-less handover, how network indicates the beam for the monitoring of PDCCH in dynamic grant case | From the RRC review, rapporteur has proposed to use TCI state Id (which contains SSB indexes) to provide the beam. A few companies are unsure of how this would work. Others prefer SSB index. The issue would be better handled with company contributions next meeting. |
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# 3 Conclusion

The following Stage 3 issues remain open for RACH-less HO and have been captured in the Running CR with editor’s note.

**Issue 1**. Configured grant in RACH-less HO takes CG-SDT as a baseline. There are several RAN1 related parameters in the configured grant settings which may not be applicable or have a different configuration for NTN RACH-less HO. The following have been identified:

* *ntn-NrofDMRS-Sequences*
* *ntn-DMRS-Ports*
* *antennaPort*
* *cg-RetransmissionTimer*
* *harq-ProcID-Offset*
* *pathlossReferenceIndex*
* *phy-PriorityIndex*
* *precodingAndNumberOfLayers*
* *srs-ResourceIndicator*
* *uci-OnPUSCH*

As a solution, the rapporteur suggests sending an LS to RAN1 to check the applicability of these parameters with the exception of *cg-RetransmissionTimer* and *harq-ProcID-Offset.* These are within RAN2’s scope and should not apply to RACH-less handover.

**Issue 2**. Regarding the association of the Configured Grant with an SSB (*ntn-SSB-Subset-r18*), can it be optional? What is the UE’s behaviour if this information is not provided?

* Option 1. The association of Configured Grant and SSB is mandatory for NTN RACH-less HO.
* Option 2. The association is optional. If the field is absent, the UE assumes the SSB set includes all actually transmitted SSBs.

**Issue 3**. Signalling details to indicate in the handover command a single beam associated with the dynamic grant for initial UL transmission.

* Option 1: TCI state ID. Similar mechanism to LTM.
* Option 2: SSB position in burst. Similar mechanism to dynamic grant.

**Issue 4**. MAC level is configured with the Configured Grant by RRC. This configuration has a “Need N” code which means one-shot configuration that is not maintained. Given that the UE shall not continue using the grant once the handover is completed, a few companies have raised attention of whether this configuration should be released and which layer should be responsible.

* Option 1. Release the configuration explicitly in RRC. Similar approach to LTE.
* Option 2: Release in MAC, i.e., the configured grant is no longer valid after HO completion. Similar approach to LTM.