3GPP TSG-RAN WG2 Meeting #121bis-e R2-230xxxx

Online, April 17 – 26, 2023

Source: CATT

Title: Report of [AT121bis-e][006][NR17] CP PowSav and DCCA Corrections

Agenda Item: 7.5.2

Document for: Discussion and Decision

# Introduction

The contribution provides the report of the below email discussion:

* [AT121bis-e][006][NR17] CP PowSav and DCCA Corrections (CATT)

 Scope: Treat R2-2302541, R2-2302800, R2-2303617, R2-2303467, R2-2302553, R2-2302554, R2-2302658, R2-2303662, R2-2303616 (3rd change)
Ph1: Determine agreeable parts. Ph2: For agreeable parts, if any, reflect these in agreeable CRs.

 Intended outcome: Report, If applicable: In-Principle-Agreed CRs

 Deadline: Schedule 1

# Contact information

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# Discussion

# Power Saving documents

# RLM and BFD relaxation when SCG is deactivated [5][6]

Following the RAN4 LS [1] informing that RAN4 don’t assume any RLM/BFD relaxation when SCG is deactivated, the UE behavior when RLM and BFD relaxation are configured for the SCG and the SCG is deactivated was discussed and clarified in RAN2#121 as follows [2]:

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| * Go option 2: Keep the current situation for RLM/BFD relaxation for SCG deactivation, i.e. no change in RAN2, no change in RAN4.
* RAN2 clarify that in the case of SCG deactivation and *bfd-and-RLM* is set to true, UE will perform the RLM/BFD according to the requirements for SCG deactivation of *measCyclePSCell* as specified in TS 38.133 no matter whether *goodServingCellEvaluationBFD-r17* and *goodServingCellEvaluationRLM-r17* is configured for SCG.
 |

Essentially, RAN2 chose the solution along the lines of [3], i.e. based on *measCyclePSCell*: since the minimum value of this parameter is larger than the maximum allowed measurement cycle value for enabling RLM/BFD relaxation, then, whenever this parameter is configured, no RLM/BFD relaxation can take place (per RAN4 spec) when SCG is deactivated. Then if *measCyclePSCell* is made mandatory when SCG is deactivated, there is no problem. However companies requested more time to agree the associated CR in [4].

At this e-meeting, two contributions aim at closing the issue in different ways [5][6]:

[R2-2302658](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2302658.zip) Correction on measCyclePSCell used during SCG deactivation vivo, Ericsson, Guangdong Genius draftCR Rel-17 38.331 17.4.0 F NR\_UE\_pow\_sav\_enh-Core, LTE\_NR\_DC\_enh2-Core

This RRC CR is the follow-up of [4], capturing that *measCyclePSCell* is made mandatory when SCG is deactivated:

<TEXT OMITTED>

 measCyclePSCell-r17 ENUMERATED {ms160, ms256, ms320, ms512, ms640, ms1024, ms1280, spare1}

 OPTIONAL, -- Cond SCG

<TEXT OMITTED>

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| ***MeasObjectNR* field descriptions** |
| <TEXT OMITTED> |
| ***measCyclePSCell***The parameter is used only when the PSCell is configured on the frequency indicated by the *measObjectNR* and the SCG is deactivated, see TS 38.133 [14]. The field may also be configured when the PSCell is not configured on that frequency. Value ms*160* corresponds to 160 ms, value *ms256* corresponds to 256 ms and so on. |
| <TEXT OMITTED> |

<TEXT OMITTED>

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| **Conditional Presence** | **Explanation** |
| <TEXT OMITTED> |
| *SCG* | This field is optionally present, Need R, in the *measConfig* associated with the SCG. This field is mandatory present in the *measConfig* for the deactivated SCG when *bfd-and-RLM* is set. It is absent in the *measConfig* associated with the MCG.  |
| <TEXT OMITTED> |

[R2-2302541](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2302541.zip) RRC correction on BFD/RLM relaxation OPPO CR Rel-17 38.331 17.4.0 3947 - F NR\_UE\_pow\_sav\_enh-Core

This CR captures explicitly the RAN2 agreement in RRC:

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| 5.7.13 RLM/BFD relaxationIn case both low mobility criterion and good serving cell criterion are configured for RLM/BFD relaxation, the UE is allowed to perform RLM and/or BFD relaxation according to requirements specified in TS 38.133 [14] when both relaxed measurement criterion for low mobility and relaxed measurement criterion for good serving cell quality are met.In case only the good serving cell quality criterion is configured for RLM/BFD relaxation, the UE is allowed to perform RLM and/or BFD relaxation according to requirements specified in TS 38.133 [14] when the relaxed measurement criterion for good serving cell quality is met.In case SCG is deactived and bfd-and-RLM is set to true, UE shall perform the RLM/BFD according to the requirements for SCG deactivation of *measCyclePSCell* as specified in TS 38.133 [14] no matter whether relaxed measurement criterion for good serving cell quality is configured for SCG. |

Companies are invited to provide their views on which option is most appropriate for capturing the UE behavior agreed in RAN2#121 when RLM and BFD relaxation are configured for the SCG and the SCG is deactivated (both options altogether is also a possibility):

- Option 1: Capture in RRC that *measCyclePSCell* is made mandatory when SCG is deactivated [5]

- Option 2: Capture explicitly the RAN2 agreement in RRC [6]

**Q1. Which of option 1 or 2 (or both) do you prefer?**

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| --- | --- | --- |
| **Company** | **Option** | **Comment (incl. suggested CR adjustments)** |
| OPPO | Option 2 |  |
| Xiaomi | Both | Both CRs are acceptable.A question for option2:“no matter whether relaxed measurement criterion for good serving cell quality is configured for SCG.”Why only good serving cell criterion, not include low mobility criterion? |
| Ericsson | Both | The CRs address different issues:1. Requirement for NW to configure *measCyclePSCell* when SCG is deactivated
2. Clarification of the UE measurement requirements RLM/BFD measurements are configured and SCG is deactivated

@Xiaomi: the good cell criterion is always configured when relaxed RLM/BFD measurements are configured.  |
| Huawei, HiSilicon | Option 1 | Agree with the intention of the CR, but some updates are suggested due to:1. We don't want to mandate configuring measCyclePSCell for every SCG MO, only for the MO associated with the PSCell when the SCG is deactivated
2. There is no need to configure measCyclePSCell for the PSCell before the SCG is deactivated (the network can do it before or at the time of deactivation, up to network implementation)
3. A presence condition only applies when the parent field is included, otherwise it does not apply. So it is suggested to move the clarification from presence condition to field description

So we prefer a sentence like "the network always configures measCyclePSCell for the measObject associated with the PSCell if bfd-and-RLM is configured and the SCG is deactivated" in the field description. |
| Nokia | Option 2 |  |
| Samsung | Option 2 |  |
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Summary:

TBD

# Relaxation state switch for other purpose but the relaxation criteria [7][8]

[R2-2303617](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2303617.zip) RLM and BFD relaxation when SCG is deactivated Ericsson discussion Rel-17 NR\_UE\_pow\_sav\_enh-Core Late

This contribution aims at clarifying the UE behavior regarding the UAI RLM/BFD relaxation state report triggered by a state switch due to SCG deactivation, with the following observations:

**Observation 1**: When the SCG is deactivated and *bfd-and-RLM* is set true, the UE does not perform relaxed RLM/BFD measurements, even when the criterion is fulfilled.

**Observation 2**: When the RLM/BFD measurement state is relaxed and the SCG is deactivated the UE triggers UAI message to report that the RLM/BFD relaxation state is not relaxed.

From Rapporteur’s perspective, observation 1 is straightforward and directly derived from RAN4 LS and RAN2 agreement from RAN2#121. The main clarification in our view comes from observation 2 which we understand captures the following scenario: a UE is in RLM/BFD relaxation state on the (active) SCG and then the SCG is deactivated with *bfd-and-RLM* set to true. Per RAN4 LS and RAN2#121 agreement, the UE is no longer allowed to perform relaxed RLM/BFD measurements on the SCG, which triggers a UE’s RLM/BFD relaxation state switch from “relaxed” to “not relaxed”. And this triggers a UAI for updating the network of the state change.

**Q2. Do you agree with above observations 1 and 2?**

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| **Company** | **Obs 1 (Y/N)** | **Obs2 (Y/N)** | **Comment** |
| OPPO | Y | Y | Observation 2 has been discussed in RAN2#120.[R2-2211342](file:///C%3A%5CUsers%5Cjohan%5COneDrive%5CDokument%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CRAN2%5CDocs%5CR2-2211342.zip) RRC correction on BFD relaxation OPPO CR Rel-17 38.331 17.2.0 3585 - F NR\_UE\_pow\_sav\_enh-Core- CATT think this change has no consequence for the actual reporting. OPPO think this limits some reporting. - ZTE has same understanding as CATT. - vivo think there is an non-necessary report, but just one-shot, has been discussed before. - HW also think this is not needed. Apple also agree with CATT. * Not sufficient support, not pursued.
 |
| Xiaomi | Yes | Yes |  |
| Ericsson | Yes (proponent) | Yes (proponent) | If everybody says yes, then we were probably right that no clarification is needed. |
| Huawei, HiSilicon | Y | Y |  |
| Nokia | Yes | Yes |  |
| Samsung | Yes | Yes |  |
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Summary:

TBD

We understand another point of the contribution is to agree that observation 2 requires no specification change.

**Q3. If you agree with observation 2, do you also agree it requires no specification change?**

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| **Company** |  **Y/N** | **Comment** |
| OPPO | Y | This has been discussed in RAN2#120 and agreed not to pursue spec change.[R2-2211342](file:///C%3A%5CUsers%5Cjohan%5COneDrive%5CDokument%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CRAN2%5CDocs%5CR2-2211342.zip) RRC correction on BFD relaxation OPPO CR Rel-17 38.331 17.2.0 3585 - F NR\_UE\_pow\_sav\_enh-Core- CATT think this change has no consequence for the actual reporting. OPPO think this limits some reporting. - ZTE has same understanding as CATT. - vivo think there is an non-necessary report, but just one-shot, has been discussed before. - HW also think this is not needed. Apple also agree with CATT. * Not sufficient support, not pursued.
 |
| Xiaomi | Yes | No spec change. |
| Ericsson | Yes (proponent) |  |
| Huawei, HiSilicon | Y |  |
| Nokia | Yes |  |
| Samsung | Yes |  |
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Summary:

TBD

[R2-2302800](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2302800.zip) Correction on RLM/BFD relaxation state reporting Nokia, Nokia Shanghai Bell CR Rel-17 38.331 17.4.0 3966 - F NR\_UE\_pow\_sav\_enh-Core

This CR observes that RAN4 specification TS38.133 disallows the UE to perform RLM/BFD relaxation while DRX timers are running (UE is in Active Time), and this result in the RLM/BFD relaxation state to toggle frequently. In such cases proponents suggest such state switches do not trigger a UAI report. The associated CR is as follows:

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| A UE capable of relaxing its RLM measurements of a cell group in RRC\_CONNECTED state shall initiate the procedure for providing an indication of its relaxation state for RLM measurements upon being configured to do so, and upon change of its relaxation state for RLM measurements in RRC\_CONNECTED state. The UE shall not initiate the procedure for providing an indication of its relaxation state for RLM measurements due to DRX state change according to TS 38.133 [14].A UE capable of relaxing its BFD measurements in serving cells of a cell group in RRC\_CONNECTED shall initiate the procedure for providing an indication of its relaxation state for BFD measurements upon being configured to do so, and upon change of its relaxation state for BFD measurements in RRC\_CONNECTED state. The UE shall not initiate the procedure for providing an indication of its relaxation state for BFD measurements due to DRX state change according to TS 38.133 [14]. |

**Q4. Do you agree with the intention of the CR?**

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| **Company** |  **Y/N** | **Comment (incl. CR suggested adjustments)** |
| OPPO | Y |  |
| Xiaomi | No  | RAN4 only says for such case, UE is not allowed to perform RLM/BFD relaxation. But UE can still report the relaxation state.The CR seems like a signalling optimization. Not needed. |
| Ericsson | No | Thanks to Nokia for pointing out this issue. But the NW always configures a prohibit timer, to prevent reporting of too frequent state changes:RLM-RelaxationReportingConfig-r17 ::= SEQUENCE { rlm-RelaxtionReportingProhibitTimer ENUMERATED {s0, s0dot5, s1, s2, s5, s10, s20, s30, s60, s90, s120, s300, s600, infinity, spare2, spare1}BFD-RelaxationReportingConfig-r17 ::= SEQUENCE { bfd-RelaxtionReportingProhibitTimer ENUMERATED {s0, s0dot5, s1, s2, s5, s10, s20, s30, s60, s90, s120, s300, s600, infinity, spare2, spare1}We think that the prohibit timer can and should be used for that. |
| Huawei, HiSilicon | No | We understand the “no DRX” in RAN4 is about “no DRX is configured”, but not the DRX state change, so the RLM/BFD relaxation state won’t change frequently. |
| Nokia | Yes (proponent) | Thanks to Ericsson for the comments about using prohibit timer. Unfortunately, it seems that prohibit timer does not work in this case, because RLM/BFD relaxation state can toggle multiple times due to DRX state change when prohibit timer is running. When prohibit timer expires RLM/BFD relaxation state report can be then triggered due to DRX state change which is not the intention. NW would not know if the report is due to DRX state change or actually based on relaxing condition(s).Thanks to Huawei for the comments on “no DRX” in RAN4 specifications. According to RAN4 specification definition for “no DRX” is that DRX timers are running. This is specified in TS 38.133 clause 3.6.1 as explained in the cover sheet. This is causing RLM/BFD relaxation state to change frequently. |
| Samsung | See comments | Agree that UAI can be triggered due to DRX state changes. However, prohibit timer can minimise the reports. |
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Summary:

TBD

# ePowSav + RedCap [9][11]

Both CRs [9] and 3rd change of [11] address the same issue.

[R2-2303467](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2303467.zip) Clarification on SubgroupID for UE\_ID based subgrouping in RRC\_INACTIVE state Huawei, HiSilicon CR Rel-17 38.304 17.4.0 0332 - F NR\_UE\_pow\_sav\_enh-Core

[R2-2303616](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_121bis-e%5CDocs%5CR2-2303616.zip) Corrections for eDRX in RRC\_INACTIVE Ericsson CR Rel-17 38.304 17.4.0 0334 - F NR\_UE\_pow\_sav\_enh-Core, NR\_redcap-Core Late

The CRs are an update of [10] which discussed similar issue without conclusion in RAN2#121 [2]:

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| R2-2300792 Clarification on the DRX cycle for the misalignment issue in RRC\_INACTIVE state Huawei, HiSilicon CR Rel-17 38.304 17.3.0 0320 - F NR\_UE\_pow\_sav\_enh-Core, NR\_redcap-CoreDISCUSSION- QC agress with the issue but poit out to be careful about the difference between Operating in eDRX and configured for eDRX. - Ericsson are not sure of the issue.- Apple think we need to resolve the other issues on operating in vs configured for first. Think this is not urgent- vivo think that the note is correct, and we need this correction. The other part is related to other discussions.- Chair: can give companies more time * Postponed
 |

They address the issue that RRC\_INACTIVE eDRX UEs need to monitor paging outside the CN PTW, and when using the DRX cycle of RRC\_IDLE state to calculate the corresponding UE\_ID based subgroup ID, it is not clear what DRX cycle T should be. The CRs [9] and 3rd change of [11] have slightly different wording as follows:

R2-2303467 CR [9]:

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| If the UE is not configured with a CN assigned subgroup ID, or if the UE configured with a CN assigned subgroup ID is in a cell supporting only UE\_ID based subgrouping, the subgroup ID of the UE is determined by the formula below:SubgroupID = (floor(UE\_ID/(N\*Ns)) mod subgroupsNumForUEID) + (subgroupsNumPerPO - subgroupsNumForUEID),where:N: number of total paging frames in T, which is the DRX cycle of RRC\_IDLE state as specified in clause 7.1. For RRC\_INACTIVE UEs operating in eDRX configured by upper layers which is longer than 1024 radio frames, the T used outside CN configured PTW is the same as the T specified during the CN configured PTW |

R2-2303616 CR [11]:

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| If the UE is not configured with a CN assigned subgroup ID, or if the UE configured with a CN assigned subgroup ID is in a cell supporting only UE\_ID based subgrouping, the subgroup ID of the UE is determined by the formula below:SubgroupID = (floor(UE\_ID/(N\*Ns)) mod subgroupsNumForUEID) + (subgroupsNumPerPO - subgroupsNumForUEID),where:N: number of total paging frames in T, which is the DRX cycle of RRC\_IDLE state as specified in clause 7.1. In RRC\_INACTIVE state with CN configured PTW the SubgroupID used outside CN PTW is the same as the SubgroupID used inside CN PTW. |

**Q5a. Do you agree with the intention of the CRs?**

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| **Company** |  **Y/N** | **Comment** |
| OPPO | Y |  |
| Xiaomi | No | In RRC\_INACTIVE state with CN configured PTW, during CN configured PTW, T is determined by the shortest of the UE specific DRX value (s), if configured by RRC and/or upper layers, and a default DRX value broadcast in system information. Outside the CN configured PTW, T is determined by the UE specific DRX value configured by RRC.Since the T within PTW or outside of PTW, it would be different from the T in idle mode. So we use the T from idle mode for calculation the UE\_ID based subgroupID. That do not need to differentiate within PTW or outside PTW. And we also do not need to differentiate none eDRX case and eDRX case.I think that also applies to R18 eRedcap when a RAN PTW is introduced.So the original text is OK. |
| Ericsson | Yes (proponent) |  |
| Huawei, HiSilicon | Yes (proponent) | @xiaomi, I agree “**In RRC\_INACTIVE state**”, there is T during CN PTW and outside CN PTW, but in current spec, it says “…which is the DRX cycle **of RRC\_IDLE state** as specified in clause 7.1”. T outside CN PTW **of RRC\_IDLE state** is undefined, that’s why the correction is needed. |
| Samsung | Y |  |
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**Q5b. If you answered yes to Q5a, which CR do you prefer (3467/3616)?**

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| **Company** |  **3467/3616** | **Comment (incl. suggested adjustments)** |
| OPPO | 3616 | Slightly preferred. |
| Ericsson | 3616 (proponent) | Obviously, but we also think it is better to avoid talking about the “T used” and say “T used outside CN configured PTW is the same as the T specified during the CN configured PTW”. Because the UE does not use the same T outside and inside PTW, i.e. the UE uses the same SubgroupID outside and inside PTW. |
| Huawei, HiSilicon | 3467(proponent) | The reason for explain which T to use, is that in previous sentence, it says “N: number of total paging frames in T, which is…”, so we explain what “T” is, then N is derived from T. |
| Samsung | 3616 |  |
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Summary:

TBD

# DCCA documents

# MN handover when SCG is deactivated [11][12][13]

[R2-2302553](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302553.zip) Discussion on MN Handover While the SCG is Deactivated CATT discussion Rel-17 LTE\_NR\_DC\_enh2-Core R2-2300859

[R2-2303662](file:///C%3A%5C%5CUsers%5C%5Cmtk65284%5C%5CDocuments%5C%5C3GPP%5C%5Ctsg_ran%5C%5CWG2_RL2%5C%5CTSGR2_121bis-e%5C%5CDocs%5C%5CR2-2303662.zip%22%20%5Co%20%22C%3AUsersmtk65284Documents3GPPtsg_ranWG2_RL2TSGR2_121bis-eDocsR2-2303662.zip) MN Handover with deactivated SCG Ericsson discussion

These two contributions intend to discuss on whether to support the MN handover without SCG reconfiguration with sync for (NG)EN-DC case while SCG is deactivated. This is an leftover issue which was originaly proposed in offline discussion [AT120][202][DCCA], and also discussed in RAN2#121, but it is postponed.

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| Huawei, HiSilicon | Change 1: prefer noChange 2: prefer no | Change 1: The text from 38.331 saying " the network always includes this field upon MN handover to initiate an NR SCG reconfiguration with sync and key change." is because reconfiguration with sync is needed to flush SCG RLC bearers and change the SN key if configured.However:- when the SCG is deactivated, there is nothing to flush in SCG RLC bearers- there may not be any SN terminated bearer, i.e. no SN keyTherefore, we wonder whether the text from 38.331 is accurate for the case where the SCG was deactivated when the MN handover is received and remains deactivated.Change 2: It would give the impression that the UE continues RLF and BFD if the SCG is not deactivated, which is not the case. |

According to the contributions [11][13], supporting the MN handover without SCG reconfiguration with sync for (NG)EN-DC while SCG is deactivated is a small optimization, with limited benefits. And introducing such optimization at this stage will cause some NBC issue, i.e., for a legacy UE not supporting the optimization, and the NW supporting it, the legacy UE will consider the received handover command is invalid, and lead to handover failure. Further, the contribution [11] also points out that some additional spec impact in the 36.331 and 38.331. i.e., to change the presence condition of *reconfigWithSync* in *nr-SecondaryCellGroupConfig* upon MN handover in (NG) EN-DC from mandatory present to be optionally present for SCG deactivation case.

From rapporteur’s perspective, supporting the MN handover without SCG reconfiguration with sync for (NG)EN-DC while SCG is deactivated at this stage will lead to NBC issues, and this is just small optimization. So to be safer and minimize the spec impacts, it is proposed to keep the legacy principle “The field *nr-SecondaryCellGroupConfig* is mandatory present in case of MN handover in (NG)EN-DC regardless whether the SCG is deactivated”.

**Q6. Do you agree that “the reconfiguration with sync for SCG will always be configured upon MN handover occurs in (NG) EN-DC, regardless whether SCG is deactivated or not.”?**

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| **Company** |  **Y/N** | **Comment**  |
| Huawei, HiSilicon | Y |  |
| Nokia, Nokia Shanghai Bell | N | This reverts the original WI intent that SCG can be deactivated in HO, since doing RACH would also activate the SCG. Therefore we would rather fix the condition accordingly and not require UE to perform RACH towards deactivated PSCell at HO. |
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If answer to Q6 is yes, 36.331 specifications should be updated based on the input of the contributions [11][13]. And the corresponding CR is proposed in [12] with the following change.

[R2-2302554](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302554.zip) Correction on scg-State in RRCConnectionReconfiguration including the mobilityControlInfo CATT CR Rel-17 36.331 17.4.0 4920 - F LTE\_NR\_DC\_enh2-Core

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| 5.3.5.4 Reception of an *RRCConnectionReconfiguration* including the *mobilityControlInfo* by the UE (handover)If the *RRCConnectionReconfiguration* message includes the *mobilityControlInfo* and theUE is able to comply with the configuration included in this message, the UE shall:1> if the *RRCConnectionReconfiguration* is applied due to a conditional reconfiguration execution upon cell selection performed while timer T311 was running, as defined in 5.3.7.3:2> remove all the entries within *VarConditionalReconfiguration*, if any; |

**Q7. Do you agree with the above change from the CR R2-2302554?**

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| **Company** |  **Y/N** | **Comment**  |
| Huawei, HiSilicon | Y |  |
| Nokia, Nokia Shanghai Bell | N | As the CR shows, this is removing a functionality, which is against the earlier agreements.  |
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Summary:

TBD

# Conclusion

The outcome of this email discussion can be summarized with the below proposals:

# References

1. R2-2300055 Reply LS to RAN2 on RLM/BFD relaxation for ePowSav, RAN4
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