**3GPP TSG-RAN WG2 Meeting #117-e R2-220xxxx**

**Electronic Meeting, February 21 – March 3, 2022**

**Agenda item:** 5.4.1 NR RRC

**Source:** Intel Corporation (Rapporteur)

**Title:** [AT117-e][028][NR15] RRC misc II (Intel)

**Document for:**  Report

# Introduction

This document captures the discussion and report on the following offline discussion:

* [AT117-e][028][NR15] RRC misc II (Intel)

Scope: Treat R2-2202637, R2-2202638, R2-2202639, R2-2203327, R2-2203328

Ph1 Determine agreeable parts, Ph2 For agreeable parts, progress CRs

Intended outcome: Report, Agreed CRs.

Deadline: Schedule 1

A **first round** with **Deadline for comments W1 Thur Feb 24th 1200 UTC** to settle scope what is agreeable etc

A Final round with **Final deadline W2 Wed March 2nd 1200 UTC** to settle details / agree CRs etc.

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# Discussion

## NCC handling for re-establishment and Resume

### Scope: Treat R2-2202637, R2-2202638, R2-2202639

R2-2202637 Issues with use of NCC for KgNB derivation during re-establishment and Resume procedure Intel Corporation discussion Rel-15 38.331 NR\_newRAT-Core

R2-2202638 Correction of NCC storage during re-establishment and Resume Intel Corporation CR Rel-15 38.331 15.16.0 2899 - F NR\_newRAT-Core

R2-2202639 Correction of NCC storage during re-establishment and Resume Intel Corporation CR Rel-16 38.331 16.7.0 2900 - A NR\_newRAT-Core

These documents/CRs observe that:

The current procedural text for NCC storage and key derivation in re-establishment procedure is incorrect and result in wrong KgNBs.

The current specification text related to the storage and usage of NCC during Resume procedure is inconsistent and incorrect and can result in wrong KgNB during Handover, Reestablishment or Resume procedure and failure of these procedures.

And proposes:

Proposal #1: Correct 38.331 procedural text for the re-establishment with the TP shown above (i.e. storing the NCC received in the *RRCReestablishment* message after updating the KgNB key with the received NCC).

Proposal #2: Discuss if the above specification corrections regarding handling of NCC for Resume procedure as captured on corresponding CR R2-2202638 are essential and if so for which release.

The CRs proposes to correct the re-establishment and Resume procedures as summarised in the cover page:

1. The storage of NCC is moved to after key generation in the procedural text [for re-establishment]
2. nextHopChainingCount received in RRC Release message is stored in UE Inactive context. The value of nextHopChainingCount used for the current keys is stored on receipt of Resume message and also on receipt of RRC Release in response to a ResumeRequest. It is clarified that the value of nextHopChainingCount received in RRCRelease message and stored in UE Inactive context is used for key derivation during ResumeRequest procedure.

**Q1: Please provide your company views on the proposed corrections – whether the corrections are useful/needed/Not essential and if needed, for which release.**

|  |  |  |  |
| --- | --- | --- | --- |
| Company | Correction to re-establishment useful/needed/Not essential | Corrections to Resume useful/needed/Not essential | Comments (including, if needed, how to capture/which release to capture) |
| QCOM | Not needed | Not needed | Already devices are in the field with no interoperability issue.  besides how UE stores NH and how to derive horizontal and vertical keys in reestablishment and resume are clearly defined in 33.501 |
| Ericsson | Useful | Needed | **For the reestablishment case**, we think that for consistency this change makes things clear in the spec but also for the UE implementation. Also, if all the UEs already have implemented the procedure correctly, this change should not be very critical.  **For the resume case**, if a UE implements the specification line by line, it is evident that is not clear how UE stores NH and how to derive horizontal and vertical keys. In 33.501 it is described how the UE should perform horizontal and vertical key derivation but not how the signalling should be modelled. All in all, we think that there is a hole in the current RRC specification and is better to fix it. |
| Huawei, HiSilicon | Not essential | Not essential | Agree with QCOM. The handle of NCC is a basic operation, and it is unnecessary to clarify since there is no interoperability issues so far. |
| CATT | Not essential | Not essential | Agree with QCOM. We believe a correct UE implementation can store the new NCC correctly, without flushing the old NCC. |
| Intel | Useful | Needed | Apart from the justifications provided in the discussion document, it is also useful to get the basic framework specifications correct to help with future specification work involving Resume and security handling. The gaps and errors in the current specs make evaluation and update of the specs for future features difficult. |
| Nokia | Useful | Needed | We also note that checking from LTE side it really seems that this is an issue but hopefully as UE vendors above mention that they have realized this and implemented correctly.  In the cover page of the CR, we should ideally not have an interoperability issue with R15, R16 as all UE vendors would have implemented this correctly. If this is the case, we would be okay for the change but mentioning that there is no interop issue. |
| ZTE | Not essential | Not essential | Agree with QCOM and CATT. |
| Apple | Not essential. | Not essential. | Same views are CATT and Qualcomm |
| Samsung | Needed | Needed | Ambiguity exists for both cases. It is reasonable to fix it, even though we see no critical problem in real networks, e.g. due to smart UE implementation. |
| vivo | Not essential | Not essential | Agree with QCOM. |
| MediaTek | Useful | Useful | We assume that current UE implementation already aligned with the proposals. But it would be good to make SPEC clear. |
| Docomo | Needed | Needed | The discussion is about the procedure text, and current procedure text seems to potentially create issues, if followed literally. Reasonable to have the clarification.  We are ok to have “no interoperability issue” text as Nokia mentioned, as long as all the UE vendors confirm it. |
| NEC | Useful | Useful | For reestablishment:  Smart UE implementation could already perform as expected, while it seems good/useful clarification.  For resume:  We would like to hear views from UE side. To us, it would be good to clarify these details.  For both, if applied, it should be from Rel-15. |
| Sequans | Needed | Needed | Agree with Intel. Thanks for the thorough analysis. |
| Fujitsu | Not essential | Not essential | Agree with QCOM. |
| LGE | Useful | Useful | Intel’s analysis is technically correct. The issue is whether we need to change the specification for frozen release.  In our view, if implementation already takes care of this, it would be better to correct the specification as early as possible. |
| OPPO | Not needed | Not needed | For the mentioned cases, we think the analysis from Intel is reasonable, but we also don’t see any issues from the field UEs. |

**Summary:**

Almost all companies agreed with the technical analysis provided in the documents. However, most companies mentioned that there are no implementation issues in the field and 33.501 captures the implementation aspects. A small majority (9/8) of companies thought that it was still useful to correct the procedural text in RRC specs as it currently has gaps. Many also commented that if the CR was to be agreed, the cover page should be updated to only indicate justification of correcting the specifications and not about risk of interoperability. While most did not indicate a preference on the release, some companies said that they prefer to correct from Rel-15, others commented that Rel-17 could be sufficient.

Proposal #1: Proceed in phase 2 to see if the contents of the CR R2-2202638 is agreeable after updating the cover page to only provide correction of the specifications as the justification.

Proposal #2: Check in phase 2, which release to target the change – Rel-15/16/17.

**Q2: Please provide comments, if any, on the technical details of the proposed corrections.**

|  |  |
| --- | --- |
| Company | Comments, if any, on the technical details of the corrections |
| MediaTek | Further comment on Resume case (with Reject)  If the NCC received in suspendConfig is different from the current NCC, the UE will perform vertical key derivation when it sends RRCResumeRequest. It means the UE will derive NH.  Also NH is a parameter which UE needs to keep stored for the next key derivation purposes. This means that chapter 5.3.15.2 (Reception of RRCReject) should also mention discard of NH, as it might have been derived due to 5.3.13.3. Otherwise, the spec is still unclear whether the UE should keep the NH or not. |
|  |  |

Proposal #3: Discuss proposed additions to the CR during phase 2

## Correction on Full Configuration regarding reconfigWithSync

### Scope: Treat R2-2203327, R2-2203328

R2-2203327 Correction on Full configuration ZTE Corporation, Sanechips CR Rel-15 38.331 15.16.0 2941 - F NR\_newRAT-Core

R2-2203328 Correction on Full configuration(R16) ZTE Corporation, Sanechips CR Rel-16 38.331 16.7.0 2942 - A NR\_newRAT-Core

These CRs propose that the current text on 5.3.5.11 Full configuration:

is incorrect, because the *fullConfig* is applicable to all cases of reconfiguration with sync

So we suggest to delete the words ‘(i.e., SpCell change)’ above.

And proposes the following correction:

1> if the *spCellConfig* in the *masterCellGroup* includes the *reconfigurationWithSync*:

**Q3: Please provide company views on the proposed correction - whether the correction is useful/needed/Not essential and if needed, for which release.**

|  |  |  |
| --- | --- | --- |
| Company | Correction is useful/needed/Not essential | Comments (including, if needed, how to capture/which release to capture) |
| QCOM | - | The change is correct … will go with majority |
| Ericsson | Not essential | This change is not essential. If majority wants to go for it we can have it in the Rapporteur’s CR. |
| Huawei, HiSilicon | Not needed | According the field description below, fullconfiguration only applied to handover scenario (including resume and re-establishment which is like handover).  ***fullConfig***  Indicates that the full configuration option is applicable for the *RRCReconfiguration* message for intra-system intra-RAT HO. For inter-RAT HO from E-UTRA to NR, *fullConfig* indicates whether or not delta signalling of SDAP/PDCP from source RAT is applicable. This field is absent if any DAPS bearer is configured or when the *RRCReconfiguration* message is transmitted on SRB3, and in an *RRCReconfiguration* message for SCG contained in another *RRCReconfiguration* message (or *RRCConnectionReconfiguration* message, see TS 36.331 [10]) transmitted on SRB1.  In response to ZTE’s comment, similar view as Intel, we also understand in previours RAN2 discussion, PCell change (same as HO) supposes to cover both intra-cell HO and intra-cell HO, then there is nothing wrong about the existing wording.  Furthermore, deleting content in parentheses does not really change anything, thus the CR is not needed. |
| CATT | useful | The change seems OK as indeed there is case that IE “reconfigurationWithSync” is included but not for SpCell change. |
| Intel | Useful | No strong view and OK to go with majority. We had previously considered reconfigWithSync as a HO (intra or inter) and so the current text though could be a bit misleading is not incorrect. |
| Nokia | Useful, see comments | We agree with the case described here and would support this as the i.e., seems to indeed exclude other use cases. Usually anything in parentheses is not requirement thus deleting does not change anything.  Case is purely editorial so we propose rapporteur CR only rather than such individual one. |
| ZTE | Useful | @Huawei: The presence condition of the field *fullConfig*  is “The field is mandatory present in case of inter-system handover from E-UTRA/EPC to NR. It is optionally present, Need N, during reconfiguration with sync and also in first reconfiguration after reestablishment; or for intra-system handover from E-UTRA/5GC to NR. It is absent otherwise”, i.e. the *fullConfig* is applicable to all cases of reconfiguration with sync, so we think the CRs are needed. |
| Apple | Useful, we are not very strong on having this and we can go with majority. |  |
| Samsung | Useful | It’s minor and useful. We agree to have it in the Rapporteur’s CR |
| vivo |  | We prefer to have it in the Rapporteur’s CR. |
| MediaTek | Not essential | We don’t really the CR change anything. But if majority prefer, we can accept it in rapporteur’s CR. |
| Docomo | Useful | Fine to have it in the Rapp’s CR. |
| NEC | Not essential | Prefer to merge in Rapporteur CR (if any) |
| Sequans | Useful | We are fine with the proposed correction. |
| Fujitsu | Not essential | Same view with Ericsson. If majority wants to go for it we can have it in the Rapporteur’s CR. |
| LGE | Not essential | Same view with Ericsson. |
| OPPO | Useful, we are not very strong on having this and can go with majority |  |

**Summary:**

Majority (10/6) of companies felt the change was useful. Many (even among those that didn’t see it needed) considered this almost editorial and preferred to capture the change in a rapporteur CR. A couple of companies felt is was not needed as the current text includes both intra and inter cell change and is not incorrect. Companies did not provide a preference on which release to make this change. Given the majority that considered it acceptable to include it in the rapporteur CR,

Proposal #3: Include the change proposed in R2-2203327 in a rapporteur CR.

Proposal #4: check in phase 2, which release to target the CR - Rel-15/16/17

**Q4: Please provide comments, if any, on the technical details of the proposed correction.**

|  |  |
| --- | --- |
| Company | Comments, if any, on the technical details of the correction |
|  |  |
|  |  |

**Summary:**

# Summary and proposals

## NCC handling for re-establishment and Resume

**Summary:**

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