3GPP TSG-RAN WG2 Meeting #115 Electronic R2-210xxxx

Online, Aug 16th – Aug 27th, 2021

**Agenda item: 5.4.1.1**

**Source: Apple**

**Title: Draft-Summary of [AT115-e][039][NR15] Connection Control III (Apple)**

**Document for: Discussion and Decision**

# 1 Introduction

This document is a report on the following email discussion:

* [AT115-e][039][NR15] Connection Control III (Apple)

 Scope: Determine agreeable parts in a first phase, for agreeable parts agree on CRs. Treat R2-2107617, R2-2107618, R2-2107619, R2-2107770, R2-2107771, R2-2107772, R2-2107838, R2-2107839, R2-2108616, R2-2108617, R2-2108373, R2-2108374

 Intended outcome: Report, agreed CRs if applicable

 Deadline: Schedule 1

The deadline Schedule 1 for this email discussion is copied from Chair notes:

* A first round with Deadline for comments Thursday Aug 19 1200 UTC to settle scope what is agreeable etc
* A Final round with Final deadline Thursday Aug 26 1200 UTC. to settle details / agree CRs etc. Additional check points etc if needed are defined by the Rapporteur.
* In case some parts of an email discussion need more time, doesn’t converge, need on-line treatment etc Rapporteur please contact chair.

This document summarizes the following contributions from Agenda Item 5.1.4.1 Connection control:

RRC Release

R2-2107617 Discussion on RRC handling of NAS triggers not subject to UAC Apple discussion Rel-15 NR\_newRAT-Core

R2-2107618 T302 check when NAS triggers RRC connection resume Apple CR Rel-15 38.331 15.14.0 2734 - F NR\_newRAT-Core

R2-2107619 T302 check when NAS triggers RRC connection resume Apple CR Rel-16 38.331 16.5.0 2735 - A NR\_newRAT-Core

R2-2107770 Discussion on timer expiry after RRCRelease reception NEC discussion Rel-15 NR\_newRAT-Core

R2-2107771 Clarification on timer expiry after RRCRelease reception NEC CR Rel-15 38.331 15.14.0 2737 - F NR\_newRAT-Core

R2-2107772 Clarification on timer expiry after RRCRelease reception NEC CR Rel-16 38.331 16.5.0 2738 - F NR\_newRAT-Core, LTE\_NR\_DC\_CA\_enh-Core

R2-2107838 Correction on the Release Cause for RRC\_INACTVE UE vivo CR Rel-15 36.331 15.14.0 4700 - F NR\_newRAT-Core

R2-2107839 Correction on the Release Cause for RRC\_INACTVE UE vivo CR Rel-16 36.331 16.5.0 4701 - A NR\_newRAT-Core

Other

R2-2108616 Adding RRC processing delay for HO from E-UTRA to NR Huawei, HiSilicon CR Rel-15 38.331 15.14.0 2784 - F NR\_newRAT-Core

R2-2108617 Adding RRC processing delay for HO from E-UTRA to NR Huawei, HiSilicon CR Rel-16 38.331 16.5.0 2785 - A NR\_newRAT-Core

R2-2108373 Correction on plmn-IdentityList ZTE Corporation, Sanechips CR Rel-15 38.331 15.14.0 2772 - F NR\_newRAT-Core

R2-2108374 Correction on plmn-IdentityList(R16) ZTE Corporation, Sanechips CR Rel-16 38.331 16.5.0 2773 - A NR\_newRAT-Core

# 2 Contact Points

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

|  |  |  |
| --- | --- | --- |
| Company | Name | Email Address |
| Apple(rapporteur) | Zhibin Wu | zhibin\_wu@apple.com |
| Qualcomm | Mouaffac Ambriss | mambriss@qti.qualcomm.com  |
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| CATT | Jing Liang | liangjing@catt.cn |
| ZTE | Huang He | Huang.he4@zte.com.cn |
| NEC | Hisashi Futaki/ Da Wang | hisashi.futaki[at]nec.com/ wang\_da[at]nec.cn |
| Nokia |  | amaanat.ali@nokia.com |
| Lenovo | Hyung-Nam Choi | hchoi5@lenovo.com |
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| Intel | Sudeep K Palat | sudeep.k.palat@intel.com |
| vivo | Annie Zhong | tingting.zhong@vivo.com |

# 3 Discussion

It has been noticed that [1-3] are not about RRC Release, so the rapporteur makes a separate section for those documents.

## 3.1 RRC Resume by NAS triggers

This topic is from the following contributions[1][2][3] which discuss the issue on whether AS layer need check T302 timer running when upper layer trigger RRC resume w/o providing access category and access identity.

[1] R2-2107617 Discussion on RRC handling of NAS triggers not subject to UAC Apple discussion Rel-15 NR\_newRAT-Core

[2] R2-2107618 T302 check when NAS triggers RRC connection resume Apple CR Rel-15 38.331 15.14.0 2734 - F NR\_newRAT-Core

[3] R2-2107619 T302 check when NAS triggers RRC connection resume Apple CR Rel-16 38.331 16.5.0 2735 - A NR\_newRAT-Core

**Question 1: Do companies agree with the observation in R2-2107617 [1] that “NAS layer may trigger RRC resume without providing Access Category/Access Identity or requesting access barring check”?**

|  |  |  |
| --- | --- | --- |
| Company | Yes or No | Comments |
| Qcom | No | current spec seems to already cover the suggested behaviour by the CR and the changes proposed by the CRs seem unnecessary |
| Ericsson | No | Along Qualcomm’s comment, our understanding is that the current wording in the spec is already clear. On top of this, a smart UE implementation will never trigger multiple RRCResumeRequest. Further, even if the problem raised by the CR existing (we believe it doesn’t), this can be easily solved by UE implementation without the need to introduce any NBC change at this point. |
| MediaTek | Maybe | We prefer to check with CT1 first to confirm whether the observations are TRUE. |
| CATT | Maybe | We share the same view as MediaTek, maybe we can first check with CT1 |
| Huawei, HiSilicon | No | We also prefer to leave it to UE implementation. |
| ZTE | No | We also think the proposed behaviour can be covered by current specs (i.e. Access Category is neither '2' nor '0') |
| NEC | maybe no | Observations 1&2 seem correct. On the other hand, we understood these are intentional as per SA1/CT1 clarifications. If this is seen as problematic, then spec needs to fix it. however, the cause listing in the tdoc (mobility registration update, deregistration and PDU session release) can help the gNB by releasing resources stored in the gNB to some extent.. |
| Nokia | Maybe not | Our CT1 understanding is aligned to Option 1: RAN2 confirm that T302 check is not needed for NAS layer triggers which are not subject to UAC check.Reasons:- Timely registration update is essential in keeping a UE reachable. So it should be allowed.- Successful deregistration actually alleviates congestion in the network from e2e perspective.However, we are not convinced the CR is really needed. RRC Inactive got slightly different rules to trigger UAC - but it is still required to do the check for barring configuration, as guarded by RRC procedures. Also the section: 5.3.13.4, does capture probably corresponding action in case the timer was running: 1> if T302 is running:2> stop timer T302;2> perform the actions as specified in 5.3.14.4; |
| Samsung | Maybe | The behavior after reject/release is another issue. Hence, we can ask the intention to CT1. |
| LGE | No | Whether UAC is applied or not is specified in TS24.501, and how to implement this UAC exception is up to UE. I.e., NAS layer may provide AC/AI with the indication of “no UAC”. We do not see any issue on this.  |
| Apple (Proponent) | Yes | We believe the observation is correct and the current NAS layer specification does not prevent upper layers of UE to initiate an access request which may not subject to UAC barring.Regarding whether T302 running prevents the UE form accessing in those cases, according to the earlier RAN2 agreements during NR Rel-15 work that T302 running means only AC “0” or “2” could be allowed, those NAS procedures (even it may help alleviates the overall E2E congestion) shall not be triggered in AS layer by RRC\_INACTIVE UE. |
| Intel | May be | This is more of a CT1 question. In any case, we don’t think the consequences are serious enough issue to require a specified Rel-15 solution. It can be left to good UE implementations.  |
| vivo | No | We think it can be left to UE implementation. |

**Question 2: If Answer to Q1 is yes, which option do you prefer for RAN2 to handle the T302 timer checking issue for this access trigger?**

***Option 1: RAN2 confirm that T302 check is not needed for NAS layer triggers which are not subject to UAC check.***

***Option 2: RAN2 informs CT1 that NAS procedures which are not subject to UAC shall not be triggered when AS layer informs upper layer “access barring is applicable for all access categories except categories ‘0’ and ‘2’ and then CT1 can consider update its specification correspondingly.***

***Option 3: RAN2 agrees to add T302 check in RRC resume procedure for the case when UAC is not invoked.***

***Option 4: Other (please specify)***

|  |  |  |
| --- | --- | --- |
| Company | Choice | Comments |
| MediaTek |  | Suggest to confirm the issue first the discuss the solution. One alternative is just to leave it to UE implementation. |
| Nokia |  | See response to Q1 |
| Apple (Proponent) | Option 2 or Option 3 | To make clear in UE implementation that such an access is not feasible when T302 is running, this can be either fixed in NAS spec or RRC spec. |
|  |  |  |
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**Question 3: If the answers to Q2 is Option 3, do companies agree with fixing the issue as suggested by CR R2-2107618/R2-2107619?**

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| --- | --- | --- |
| Company | Yes or No | Comments |
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|  |  |  |

## 3.2 RRC Release

This topic is from the following contributions[4-8].

[4] R2-2107770 Discussion on timer expiry after RRCRelease reception NEC discussion Rel-15 NR\_newRAT-Core

[5] R2-2107771 Clarification on timer expiry after RRCRelease reception NEC CR Rel-15 38.331 15.14.0 2737 - F NR\_newRAT-Core

[6] R2-2107772 Clarification on timer expiry after RRCRelease reception NEC CR Rel-16 38.331 16.5.0 2738 - F NR\_newRAT-Core, LTE\_NR\_DC\_CA\_enh-Core

[7] R2-2107838 Correction on the Release Cause for RRC\_INACTVE UE vivo CR Rel-15 36.331 15.14.0 4700 - F NR\_newRAT-Core

[8] R2-2107839 Correction on the Release Cause for RRC\_INACTVE UE vivo CR Rel-16 36.331 16.5.0 4701 - A NR\_newRAT-Core

In [4-6], the timer expiry problem has been raised during the period between *RRCRelease* message reception and the actual RRC Release procedure.

**Question 4: Do companies agree with the proposal in [4] R2-2107770, as below?**

***Proposal 1: RAN2 confirm that:***

1. ***If T380 expires after RRCRelease reception, the UE should not initiate RRC Resume procedure.***
2. ***If T319 expires after RRCRelease reception, the UE should not perform the procedure upon going to RRC \_IDLE.***
3. ***If T316 expires after RRCRelease reception, UE should not initiate RRC re-establishment procedure.***

|  |  |  |
| --- | --- | --- |
| Company | Yes or No | Comments |
| QCOM | No | Should be left to UE implementation  |
| Ericsson | No | In this paper the argument is that several timers are stopped upon reception of RRCRlease message. However, in the procedure part, these timers are actually not immediately stopped upon the reception of RRCRelease message, but 60 ms needs to be waited from the moment the RRCRelease message was received or optionally when lower layers indicate that the receipt of the RRCRelease message has been successfully acknowledged, whichever is earlier. Nevertheless, the values for the timers are not really in the order to 60ms or lower, but rather in the scale of minutes, as shown below for T380.SuspendConfig ::= SEQUENCE {[…] t380 PeriodicRNAU-TimerValue OPTIONAL, -- Need R[…]}PeriodicRNAU-TimerValue ::= ENUMERATED { min5, min10, min20, min30, min60, min120, min360, min720}Hence, T380 would never expiry while these 60ms is ongoing. Further, in theory, the timer would not even be started before these 60ms, as the UE does not really apply the message until this time is elapsed. |
| MediaTek | See comment | There is indeed small time period between receiving *RRCRelease* and go into connected mode, so we are fine to confirm P1. However, it seems not necessary to specify this transition in SPEC, it could just leave to UE implementation. |
| CATT | See comment | Left to UE implementation is one solution. If majority think the correction is needed, we can follow the majority. |
| Huawei, HiSilicon | No | Also prefer to leave it to UE implementation |
| ZTE | Yes with comments | For T380, we don’t see the issue since 2-step Resume can only be used for RNAU, and T380 will not be running when the RRC release is received.For T319 and T316, we agree the proposed behaviour. We are open to either clarify this in specs or leave it to UE implementation. |
| NEC | Yes as proponent | Firstly we would like to clarify whether companies consider/expect the corresponding cases happen or not? Regarding the configurable timer value/range pointed out by Ericsson, yes, the case will be rare for T380 but we assume it still happen. Besides, since T319 can be as short as 100ms, and T316 can be as short as 50ms, we don’t think it is rare case for these two timers.  t319 ENUMERATED {ms100, ms200, ms300, ms400, ms600, ms1000, ms1500, ms2000},T316-r16 ::= ENUMERATED {ms50, ms100, ms200, ms300, ms400, ms500, ms600, ms1000, ms1500, ms2000}Regarding the T380 pointed out by ZTE, we agree for periodic RNAU, while we assume the case that the UE moves out the current RNA. UE triggers RNAU and maybe 2step release could happen, then T380 of old RNAU may still be running.Secondly, assume that companies confirm that the cases can happen, If we leave it up to UE implementation on whether to perform the behaviour upon timer expiry, it will results in state mismatch between UE and network, which should be avoided. So we need a clear UE behaviour instead of UE implementation based. |
| Nokia | Was there any IODT issue? | Issue makes sense though this should have been normal way in which UEs are supposed to be implemented even in earlier standards. So this should be technically UE implementation dependent and not specification to cover such details of race conditions?Is anything wrong today in the field given the behavior is clarified from Rel-15? |
| Samsung | No | As UE delays the actions upon reception of RRCRelease, UE will perform it first so nothing is broken. If the observation is really valid, it is anyway a corner case so it seems fine to leave it to UE implementation. |
| LGE | No | The change is for clarification. It should be left to UE implementation. |
| Apple  | Yes | We agree that timers like T380 could expire during the 60ms period, and OK to let those UE behaviours to be clarified in the RRC spec. |
| Intel | No | Specifications do not go into every different “collision” combinations. These can be left to good UE implementations.  |
| vivo | No | We think the possibility of the problem is very low, so it can be up to UE implementation. |

**Question 5: Do companies agree with the CR R2-2107771/R2-2107712?**

|  |  |  |
| --- | --- | --- |
| Company | Yes or No | Comments |
| MediaTek | No |  |
| ZTE | No | T380 related clarification seems not needed.If majority want to clarify this in specs, we prefer to capture it in normative text that the concerned timer shall be stopped whenever the RRC release message is received, and the rest action will be delayed by 60ms. |
| NEC | Yes  | our main intention is to confirm these cases may happen and clarify what the UE should do. We are also fine with ZTE’ suggestion to stop the timer immediately after RRCRelease reception. If companies think CRs are not needed, then we are fine to confirm the consensus in RAN2. |
| Nokia | Not really | See Q5 response we are fine to capture in Chair notes the understanding from this discussion |
| Samsung | No |  |
| LGE | No |  |
| Apple | No | If the majority view think the P1 R2-2107770 is correct, then we would prefer to capture it in normative text. |
| Intel | No | See comments to Q4. |
| vivo | No |  |

In[7][8], it has been proposed to fix the problem that the release causes for RRC\_INACTIVE UE resuming the RRC connection procedure are inconsistent in TS 36.331.

**Question 6: Do companies agree with the CR R2-2107838/R2-2107839?**

|  |  |  |
| --- | --- | --- |
| Company | Yes or No | Comments |
| QCOM | Yes |  |
| Ericsson | Yes | It would not harm to agree on it.  |
| MediaTek | Maybe | It does not really change any UE (external) behavior in our understanding |
| CATT | Yes |  |
| Huawei, HiSilicon | Yes | Acceptable to us. |
| ZTE |  Yes |  |
| NEC | Yes but  | does this CR impact on network side (i.e. need to tick “RAN box” in cover page)?[vivo]: this CR does not impact the network side as we analyze in the Inter-operability part of the CR coversheet. We will revise the RAN box in the cover page. |
| Nokia | Yes | At least in NR specifications release cause 'RRC Resume failure' is used in these cases like it is being proposed here. |
| Samsung | Yes |  |
| LGE | Yes |  |
| Apple | Yes |  |
| Intel | May be | It would have been good if the cover page provided the consequences if not accepted at the system level – that is, in terms of UE external behaviour, considering also NAS behaviour if AS provided this different cause to NAS.It is also not clear why the RAN box is ticked in the cover page – is there an external visible behaviour change that impacts RAN?These should be clarified in the cover page.[vivo]: we think the main intention of this CR is to keep the wording release cause of RRC\_INACTIVE UE resuming the RRC connection procedure consistent in TS36.331( as Nokia said, at least in NR specifications release cause 'RRC Resume failure' is used in these cases like it is being proposed here.). As for the UE external behaviour, both the RRC layer and NAS layer are not impacted. Because, according to TS24.501, “ ‘RRC resume failure’ can be considered as an indication that the resumption of the RRC connection has failed” does not preclude other indication methods. |
| vivo | Yes |  |

## 3.3 RRC Processing Delay

This topic is from the following contributions [9-10]

[9] R2-2108616 Adding RRC processing delay for HO from E-UTRA to NR Huawei, HiSilicon CR Rel-15 38.331 15.14.0 2784 - F NR\_newRAT-Core

[10] R2-2108617 Adding RRC processing delay for HO from E-UTRA to NR Huawei, HiSilicon CR Rel-16 38.331 16.5.0 2785 - A NR\_newRAT-Core

The CR from [9][10] proposes to add the RRC processing delay for the cases of HO from E-UTRA/(NG)EN-DC to NR in TS 38.331.

**Question 7: Do companies agree with R2-2108616/R2-2108617?**

|  |  |  |
| --- | --- | --- |
| Company | Yes or No | Comments |
| Qcom | Yes |  |
| Ericsson | Maybe | There is no functional change, and this is purely editorial. Can be merged in the Rapporteur’s CR. |
| MediaTek | Yes | And suggest to put it in Rapporteur’s CR. |
| CATT | Yes |  |
| Huawei, HiSilicon | Yes | Proponent |
| ZTE | Yes |  |
| NEC | Maybe | similar view as Ericsson  |
| Nokia | Yes | Okay with the intent of the proposal. Will go with majority if they think rapporteur CR merge is sufficient. |
| Lenovo | Yes but | On the reference to clause 5.3.4A.2 in 36.133: This clause refers to the requirements for E-UTRAN - NR FR1 Handover to target cell using CCA (Clear Channel Assessment). But those requirements are specified in R16.So, the reference to clause 5.3.4A.2 needs to be removed from the R15 CR. |
| Samsung | Yes |  |
| LGE | Yes | Can be included in Rapporteur’s CR |
| Apple | Yes |  |
| vivo | Yes |  |

## 3.4 PLMN-IdentityList

This topic is from the following contributions [11][12]

[11 R2-2108373 Correction on plmn-IdentityList ZTE Corporation, Sanechips CR Rel-15 38.331 15.14.0 2772 - F NR\_newRAT-Core

[12] R2-2108374 Correction on plmn-IdentityList(R16) ZTE Corporation, Sanechips CR Rel-16 38.331 16.5.0 2773 - A NR\_newRAT-Core

The CR from [11][12] propose Modify the field name *plmn-IdentityList* of IE *PLMN-IdentityInfoList* to *plmn-IdentityInfoList* in NR RRC spec.

**Question 8: Do companies agree with the CR R2-2108373/R2-2108374?**

|  |  |  |
| --- | --- | --- |
| Company | Yes or No | Comments |
| Ericsson | No | The change is not needed as the procedural text to which the CR is pointing is clearly referring to the PLMN-ID of SIB1. However, if companies are eager to pursue this change, I believe that can be included in the Rapporteur’s CR. |
| MediaTek | Yes | We think it is indeed good to avoid duplicated field name although not a must. We also suggest to put it in Rapporteur’s CR. |
| CATT | Yes | It can be more clear |
| Huawei, HiSilicon | Yes | Editorial. Can be merged to rapporteur CR. |
| ZTE | Yes | Proponent. The IE plmn-IdentityList has been mentioned in many place in both the procedural text and ASN.1 description, but the plmn-IdentityList can be referred to two different IEs in ASN.1, which may lead to ambiguity. For example, for definition of selectedPLMN-Identity included in RRCSetupComplete/RRCResumeComplete is “Index of the PLMN or SNPN selected by the UE from the plmn-IdentityList or npn-IdentityInfoList fields included in SIB1.”, it is not clear how to understand the “ from the plmn-IdentityLis” (e.g. the overall index from the red one or the index from the yellow one). Since different understanding may lead to different consequence, we prefer to clarify this in specs clearly.CellAccessRelatedInfo ::= SEQUENCE { plmn-IdentityList PLMN-IdentityInfoList, /\*\*omitted\*\*/}PLMN-IdentityInfoList ::= SEQUENCE (SIZE (1..maxPLMN)) OF PLMN-IdentityInfoPLMN-IdentityInfo ::= SEQUENCE { plmn-IdentityList SEQUENCE (SIZE (1..maxPLMN)) OF PLMN-Identity,/..omitted.../} |
| NEC | Yes | slightly prefer to fix this and think this can be merged to Rapporteur CR.  |
| Nokia | Yes | Fix this as part of rapporteur CR since this is purely editorial change. |
| Lenovo | Yes | We share the views from others that the changes are editorial and can be merged into the rapporteur CR. |
| Samsung | Yes | Editorial.  |
| LGE | No but, | We do not see any issue on UE implementation without this change. But if majority support this change, we are fine to have this.  |
| Apple | Yes with comment | We agree with the intention, and think this can be merged in a rapporteur CR. |
| Intel | May be | There is no functional change though it may impact implementations. If majority are OK with it, it is acceptable to us. It can be included in rapporteur CR.  |
| vivo | Yes |  It can be merged in rapporteur CR. |

# 4 Conclusion

TBD.

# 5 References

[1] R2-2107617 Discussion on RRC handling of NAS triggers not subject to UAC Apple discussion Rel-15 NR\_newRAT-Core

[2] R2-2107618 T302 check when NAS triggers RRC connection resume Apple CR Rel-15 38.331 15.14.0 2734 - F NR\_newRAT-Core

[3] R2-2107619 T302 check when NAS triggers RRC connection resume Apple CR Rel-16 38.331 16.5.0 2735 - A NR\_newRAT-Core

[4] R2-2107770 Discussion on timer expiry after RRCRelease reception NEC discussion Rel-15 NR\_newRAT-Core

[5] R2-2107771 Clarification on timer expiry after RRCRelease reception NEC CR Rel-15 38.331 15.14.0 2737 - F NR\_newRAT-Core

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[7] R2-2107838 Correction on the Release Cause for RRC\_INACTVE UE vivo CR Rel-15 36.331 15.14.0 4700 - F NR\_newRAT-Core

[8] R2-2107839 Correction on the Release Cause for RRC\_INACTVE UE vivo CR Rel-16 36.331 16.5.0 4701 - A NR\_newRAT-Core

[9] R2-2108616 Adding RRC processing delay for HO from E-UTRA to NR Huawei, HiSilicon CR Rel-15 38.331 15.14.0 2784 - F NR\_newRAT-Core

[10] R2-2108617 Adding RRC processing delay for HO from E-UTRA to NR Huawei, HiSilicon CR Rel-16 38.331 16.5.0 2785 - A NR\_newRAT-Core

[11 R2-2108373 Correction on plmn-IdentityList ZTE Corporation, Sanechips CR Rel-15 38.331 15.14.0 2772 - F NR\_newRAT-Core

[12] R2-2108374 Correction on plmn-IdentityList(R16) ZTE Corporation, Sanechips CR Rel-16 38.331 16.5.0 2773 - A NR\_newRAT-Core