**3GPP TSG-RAN WG2 Meeting #113-e *R2-210xxxx***

**Online, 25 January–5 February 2021**

**Agenda item: 5.3.1**

**Source: Samsung**

**Title: Report of [AT113-e][002][NR15] User Plane I (Samsung)**

**Document for: Discussion and Agreement**

# 1 Introduction

This is to report the result of the following email discussion in RAN2#113-e Meeting [1].

* [AT113-e][002][NR15] User Plane I (Samsung)

Scope: MAC Treat R2-2100206, R2-2100207, R2-2101510, R2-2101337, R2-2101769, R2-2101351, R2-2101593, R2-2101522, R2-2101523, R2-2101524, R2-2101525

Phase 1, determine agreeable parts, Phase 2, for agreeable parts Work on CRs.

Intended outcome: Report and Agreed CRs.

Deadline: Schedule A

# 2 Contact Information

|  |  |
| --- | --- |
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# 3 Discussion

## 3.1 Miscellaneous corrections

R2-2100206 Miscellaneous corrections Samsung CR Rel-15 38.321 15.11.0 1003 - F NR\_newRAT-Core

R2-2100207 Miscellaneous corrections Samsung CR Rel-16 38.321 16.3.0 1004 - A NR\_newRAT-Core

|  |  |  |
| --- | --- | --- |
| Company | Agree as is; Agree with changes; Disagree | Detailed Comments |
| Samsung | Agree as is (Rel-15) | Editorial corrections as indicated in the coversheet |
| OPPO | Agree with change | The changes in R15 CR is not mirrored in R16, e.g., the first change “MAC header”. |
| Qualcomm | Agree as is |  |
| HW | Agree as is (Rel-15) |  |
| ZTE | Agree as is (Rel-15) |  |
| Xiaomi | Agree as is |  |
| MediaTek | Agree as is (Rel-15) |  |
| Ericsson | Agree as is | Assume some CRs may be merged to this CR during the meeting. |
| Nokia | Agree with change | "MAC header" was previously used to consider the full header since there might be multiple subheaders. So should be "MAC subheader(s)" here:  "4>           if the potential Msg3 size (UL data available for transmission plus MAC **subheader(s)** and" |
| Apple | Agree as is |  |
| LG | Agree, but | I’m wondering whether R16 CR is a mirror CR, because the first change is already implemented in R16. |
| CATT | Agree as is |  |
| Lenovo | Agree as is |  |
| vivo | Agree as is |  |
| Intel | Agree as is (Rel-15) |  |
| Sequans | Agree with change | Agree with Nokia, and Rel-16 would also need to be aligned |

**Conclusion:**

**TBD**

## 3.2 CG and DRX Inactivity Timer

(The following four contributions are discussed together here.)

R2-2101510 Activation of CG and DRX Inactivity Timer LG Electronics Inc. discussion Rel-15 NR\_newRAT-Core

R2-2101337 Activation of CG and DRX Inactivity Timer Ericsson discussion Rel-15 NR\_newRAT-Core R2-2010621

R2-2101769 Further discussions on DRX InactivityTimer operations Huawei, HiSilicon discussion Rel-15 NR\_newRAT-Core

R2-2101351 Activation of CG/SPS and DRX Inactivity Timer Apple discussion Rel-15 NR\_newRAT-Core, TEI15

The issue has been discussed for a long time, and rappoteur thinks that it would be difficult to change Rel-15 behavior anyway as UE vendors have different implementation from the discussion at the last meeting. If so, we can start the discussion for Rel-16 onwards, and the following options can be considered:

- Option 1: Leave it to UE implemenation as in Rel-15  
(which implies that network should not start *drx-InactivityTimer*, and no specification changes would be needed)

- Option 2: UE (re-)starts *drx-InactivityTimer* when it receives PDCCH to activate DL SPS/UL CG type 2  
(which implies that we could add a NOTE to clarify this)

- Option 3: UE does not (re-)start *drx-InactivityTimer* when it receives PDCCH to activate DL SPS/UL CG type 2  
(which implies that we could add a NOTE to clarify this)

- Option 4: …

|  |  |  |
| --- | --- | --- |
| Company | Which option do you prefer? | Detailed Comments |
| Samsung | Option 1 or 2 | For Rel-15, we can leave it to UE implementation to avoid any impact to UEs in the field.  For Rel-16, we still prefer to have the same behaviour as in LTE (i.e. to Option 2), but can go with Option 1.  Regarding *drx-HARQ-RTT-TimerDL*, *drx-HARQ-RTT-TimerUL*, *drx-RetransmissionTimerDL*, and *drx-RetransmissionTimerUL* in R2-2101510, we can rely on the behaviours in the existing text anyway (i.e. under 'if a MAC PDU is received/transmitted…'), and thus no specification changes would be needed. |
| OPPO | Option1 | For R15, we can leave it to UE implementation. For R16, we can go with LTE baseline which is to start the timer. |
| Qualcomm | Option 3, or Option 1 | For Rel-15, we think it is a sensible wayforward by leaving it to network implementation to handle different UE implementations already in the field.  For Rel-16, we prefer NOT to re-/start DRX inactivity timer by activation DCIs, because the LTE behavior is not power efficient. For example, if activation DCI is used for link adaptation for a VoIP connection, UE would unnecessarily extend its DRX inactivity timer constantly, which is not desirable for UE power saving. We prefer to capture this change in the spec, so that we don’t have to revisit this issue down the road. But if majority prefer to leave it to network implementation and RAN2 have that captured in chair’s notes, that is fine with us too. |
| HW | Option 2 | First, we would like to clarify that leaving to UE implementation (option 1) is actually option 3 from network’s point of view.  Actually the relevant text is inherited from LTE, and it is running so well for a long period, so there is no reason to revisit the UE behaviour in NR, that is to say, Option 2 should be adopted without any spec change. In case majority still sees room for ambiguity, we are okay to capture a NOTE in Rel-15/Rel-16 to clarify option 2 ( it can be merged into the rapporteur CR as no functionality is changed or just captured into the Chairman notes).  Regarding the other timers in R2-210510, we share the same view as Samsung. |
| ZTE | Option 2 | No matter in Rel-15 or Rel-16, the RAN1 spec have obviously specified for DCI of activating CG type 2 resources:  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  When PUSCH resource allocation is semi-statically configured by higher layer parameter *configuredGrantConfig* in *BWP-UplinkDedicated* information element, and the PUSCH transmission corresponding to a configured grant, the following higher layer parameters are applied in the transmission:  - For Type 1 PUSCH transmissions with a configured grant, the following parameters are given in *configuredGrantConfig*:  <omit for short>  - For Type 2 PUSCH transmissions with a configured grant: the resource allocation follows the higher layer configuration according to [10, TS 38.321], and **UL grant** received on the DCI.  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  It can be seen that the DCI for activating the CG type 2 transmission is actually a UL grant (PDCCH) and indicating a **NEW** transmission of the first CG occasion. Thus based on the current RAN2 spec, the drx-inactivityTimer shall be started/restarted when receiving the DCI of activating the CG type2 resources. |
| Xiaomi | Option 1 or Option 2 | In both LTE and NR, the SPS/CG activation DCI should be consider as new transmission, as the NDI of the corresponding HARQ process is considered as toggled upon the reception of the SPS/CG activation DCI. If companies conside that the Rel-15 specification is not clear, we would prefer to leave it to the UE implementation in Rel-15 (i.e. Option 1), but to align with LTE in Rel-16 (i.e. Option 2). |
| MediaTek | Option 2 | For R15, we can go for UE implementation. And for R16, we prefer to (re)start the timer as in LTE. |
| Ericsson | Option 1 or 3 | It seems the rapporteur assumes we go with UE behaviour for Rel-15. This is fine to us, but maybe RAN2 should capture that too.  For Rel-16 option 1 and 3 are acceptable to us. And regarding option 1 there is a proposal for a chairman's note in R2-2101337. |
| Nokia | Option 2 | Agree with ZTE and HW. Type 2 activation includes resource allocation for new transmission, so we do not see how it would be interpreted otherwise. Such understanding is there since LTE Rel-8 and it has been confirmed several times. Option1/3 are NBC. |
| Apple | Option 1 or 3 | For R15, we can go for UE implementation.  For R16, if UE behaviour needs to be clearly specified, we prefer not starting the DRX inactivity timer since it is better for the UE power and more aligned with the DRX purpose. |
| LG | Option 3 | We don’t want to debate again what is the correct understanding of the current specifications. The fact is that there are different understandings among different companies. To avoid further discussion, we prefer to specify the UE behavior clearly.  Between Option 2 and Option 3, we think the network should anyway assume that the UE does not restart the drx-InactivityTimer. Otherwise, the network may unnecessarily schedule PDCCH after CG Type 2 activation. Thus, Option 3 is a better way to go.  Regarding Samsung comments on *drx-HARQ-RTT-TimerDL*, *drx-HARQ-RTT-TimerUL*, *drx-RetransmissionTimerDL*, and *drx-RetransmissionTimerUL*, we cannot rely on existing text ‘if a MAC PDU is received/transmitted’, because this text is for CG while the issue is whether the DG received/transmitted together with PDCCH indicating SPS or CG Type 2 activation starts/stops the timers or not. The UE behavior of those timers are unclear similar to drx-InactivityTimer. |
| CATT | Option 2 but | We agree the behaviour descripted in option 2 but we don't think no specification change (option 1) implies that network should not start *drx-InactivityTimer*. Agree with Huawei, we can accept a note if other companies think ambiguity exists.  For other timers, it is late in the release and it is an important functional change. So we agree with Samsung and Huawei that no specification changes would be needed. |
| Lenovo | Option 2 | We have the same understanding as ZTE that CG type activation also allocates resources for new transmission. This should be clear from the beginning. |
| vivo | Option 2 | When DCI validation PDCCH is received, the UE will stop the CG timer and consider the NDI bit to have been toggled, which implies that new transmission is going. In this sense, we think the drx-Inactivity should be (re)started.  In our understanding, the current spec is quite clear. We are quite confused why we need to make something different for Rel-16 NR. |
| Intel | Option 2 | For Rel-15, agree to leave to UE implementation to avoid impacts to UEs in the field.  For Rel-16, we prefer Option 2 since PDCCH activating SPS/CG type 2 indicates new DL/UL transmission, and should be handled in consistent way as PDCCH for dynamic PDSCH/PUSCH. |
| Sequans | Option 2 | We think the activation PDCCH actually indicates a new transmission (even if it is by a different way than for usual PDCCH) – so starting the timer would be the specified behaviour. |

**Conclusion:**

**TBD**

## 3.3 CG Type 1 upon TA expired

(The following five contributions are discussed together here.)

R2-2101593 Discussion on the handling of CG type 1 resources when TA timer is expired ZTE Corporation, Sanechips discussion Rel-15 NR\_newRAT-Core

R2-2101522 CR on CG type 1 resources handling when timeAlignmentTimer is expired-Opt 1 ZTE Corporation, Sanechips CR Rel-15 38.321 15.11.0 1038 - F NR\_newRAT-Core

R2-2101523 CR on CG type 1 resources handling when timeAlignmentTimer is expired-Opt 2 ZTE Corporation, Sanechips CR Rel-15 38.321 15.11.0 1039 - F NR\_newRAT-Core

R2-2101524 CR on CG type 1 resources handling when timeAlignmentTimer is expired-Opt 1 ZTE Corporation, Sanechips CR Rel-16 38.321 16.3.0 1040 - F NR\_newRAT-Core

R2-2101525 CR on CG type 1 resources handling when timeAlignmentTimer is expired-Opt 2 ZTE Corporation, Sanechips CR Rel-16 38.321 16.3.0 1041 - F NR\_newRAT-Core

For your convenience, proposals in R2-2101593 are copied below:

|  |
| --- |
| Proposal 1: RAN2 confirm that the RRC configuration for type 1 configured grant will not be released in case the timeAlignmentTimer expires (i.e. delta configuration is allowed. e.g. for pusch-RepTypeIndicator-r16).  Proposal 2: RAN2 confirm that, after the expiration of timeAlignmentTimer, the type 1 configured grant will not become available unless the type 1 configured grant is initialized again (i.e. will not become available automatically after the start of timeAlignmentTimer ).  Proposal 3:RAN2 confirm that, after the expiration of timeAlignmentTimer, the type 1 configured grant will become unavailable unless a new RRC configuration for type 1 configured grant is received (i.e. although the RRC configuration for type 1 configured grant is not released, RRC configuration for type 1 configured grant should be included in RRC signaling to enable the type 1 configured grant).  Proposal 4: If companies have the same understanding on the proposals 1-3, then the specs are clear. Otherwise, a CR is needed to clarify the expected behaviour on the handling of type1 configured grant in case the timeAlignmentTimer expires. |

|  |  |  |
| --- | --- | --- |
| Company | Do you agree with proposals 1 to 3 in R2-2101593?  Do you support either Option 1 in R2-2101522 or Option 2 in R2-2101523? | Detailed Comments |
| Samsung | No;  Option 1 partially (clear CG type 2 only) | We think that CG type 1 is not released upon expiry of TAT, and UE resumes CG type 1 without (re-)initializing it upon TAT becomes running, as in the current specification.  For the actual changes, RAN2 may consider updating the specification from Rel-15 that UE clears configured uplink grants of CG type 2 upon expiry of TAT. |
| OPPO | Yes | Maybe we need a Note to clarify the behaviour of CG type1 when TAT expiry and the behaviour once TA is obtained. |
| Qualcomm | See comments | Proposal 1: Agree;  Proposal 2 and 3: Disagree. Our understanding is that such re-initialization is not needed. “Clear” for type-1 CG only suspends the use of CG resource; the RRC configuration is not release. Once the blocking condition is cleared (i.e. TA is re-established), UE can use the CG resources again without RRC reconfiguration. If our understanding was not correct (i.e. if Proposal 2 is correct), then there is no essential difference between “release” and “clear” type-1 CG”.  Option 1 or 2: we think the current spec is clear enough. No change is necessary.  [ZTE]: We do not think the current spec is clear enough. We also do not think the term “clear” is equal to the term ‘suspend’ since the “clear” you mentioned have been used in several places in MAC spec.  For example of BWP case:  1> if a BWP is deactivated:  2> not transmit on UL-SCH on the BWP;  2> not transmit on RACH on the BWP;  2> not monitor the PDCCH on the BWP;  2> not transmit PUCCH on the BWP;  2> not report CSI for the BWP;  2> not transmit SRS on the BWP;  2> not receive DL-SCH on the BWP;  2> clear any configured downlink assignment and configured uplink grant of configured grant Type 2 on the BWP;  2> suspend any configured uplink grant of configured grant Type 1 on the inactive BWP.  It can be seen that the wording “clear” and “suspend” is two different matters . In addition, for the term “suspend” we have the following description in order to guarantee the CG type 1 resources are available again when BWP is activated:  1> if a BWP is activated:  2> transmit on UL-SCH on the BWP;  2> transmit on RACH on the BWP, if PRACH occasions are configured;  2> monitor the PDCCH on the BWP;  2> transmit PUCCH on the BWP, if configured;  2> report CSI for the BWP;  2> transmit SRS on the BWP, if configured;  2> receive DL-SCH on the BWP;  2> (re-)initialize any suspended configured uplink grants of configured grant Type 1 on the active BWP according to the stored configuration, if any, and to start in the symbol according to rules in clause 5.8.2.  But We assume you on the same page with Samsung and HW where the CG type 1 can be available for transmission as soon as the TA is obtained, how about we follow rapporteur’s suggestion for simplicity or go for option 2 as we suggested. |
| HW | Okay with the intention of Option 2 (suspend and resume) | We agree the UE behaviour should be discussed and clarified.  P1: Agree, which was discussed in Rel-15 with the conclusion that RRC will not release the RRC configurations for both CG Type 1 and Type 2. The difference between “release” and “clear” from the spec is that “clear” just indicates to disable the transmissions while the RRC configuration is stored.  P2 and P3: We share the similar view as QC. Given that the CG Type 1 resource is still kept in RRC, MAC can naturally resume the relevant transmission when TAT is running again. That is to say, Option 2 is the intended UE behaviour in our understandings. We are fine with either a CR or a NOTE captured in the minutes once a common understanding is achieved. |
| ZTE | The intention Option 2( option 2 can be revised as rapporteur’ suggestion) | Actually, we have no strong point of view to go which way and just would like to clarify the behavior in order to keep alignment between NW and UE.  We think the suggestion from rapporteur is fine to us. I just try to provide the revise according to the suggestion from rapporteur.  Since we have specified that the PUSCH transmission cannot be performed during the TAT expiry, thus it does not matter the CG type 1 resources are cleared or not, thus we can just simply modify the spec as following :  1> when a *timeAlignmentTimer* expires:  2> if the *timeAlignmentTimer* is associated with the PTAG:  3> flush all HARQ buffers for all Serving Cells;  3> notify RRC to release PUCCH for all Serving Cells, if configured;  3> notify RRC to release SRS for all Serving Cells, if configured;  3> clear any configured downlink assignments and configured uplink grants of configured uplink grant type 2 associated with all Serving Cells;  3> clear any PUSCH resource for semi-persistent CSI reporting;  3> consider all running *timeAlignmentTimer*s as expired;  3> maintain NTA (defined in TS 38.211 [8]) of all TAGs.  2> else if the *timeAlignmentTimer* is associated with an STAG, then for all Serving Cells belonging to this TAG:  3> flush all HARQ buffers;  3> notify RRC to release PUCCH, if configured;  3> notify RRC to release SRS, if configured;  3> clear any configured downlink assignments and configured uplink grants of configured uplink grant type 2 associated with all Serving Cells;  3> clear any PUSCH resource for semi-persistent CSI reporting;  3> maintain NTA (defined in TS 38.211 [8]) of this TAG.  **With above change, the configured UL grants of CG type 1 is still saving in MAC entity and can be available as soon as the TA is obtained.** |
| Xiaomi | Only agree with Proposal 1 | For Rel-15, if companies cannot achieve common understandings, we would prefer to leave it to the UE implementation for Rel-15. This means that the gNB would have to send the RRCReconfiguration to re-initialize the CG type-1 in Rel-15. The UE can either activate CG type-1 or not based on implementation.  For Rel-16, we think that the CG type-1 should be avaialbe again when the UE has an valid TA, but the CG type-2 should be reactived by DCI. No need to clarify the UE behaviours for the CG type-1, but we can clarify the CG type-2. |
| MediaTek | Ok with option 2 | In RAN2#100, we have agreement below:   1. The MAC entity shall clear all configured resources for Type1/ (SPS) when the TA timer associated with pTAG expires. Type 1 and SPS resources can be reactivated by RRC configuration and DCI respectively. 2. The MAC entity shall clear all configured resources for Type1/ (SPS) for all Serving Cells belonging to this TAG when TA timer associated with sTAG expires. Type 1 and SPS resources can be reactivated by RRC configuration and DCI respectively   So, we think it is the consensus the CG type 1 resource is unavailable after TA expiration. Besides, the agreement uses “reactivated”, which does not really clearly say whether the CG type 1 configuration, after TA expiration, is released or is just suspended (i.e. can be reactivated later). So some clarification would be useful. |
| Ericsson | P1: Do not agree.  P2-3: Agree to intention.  Can accept clarification along the lines of 1522. | Regarding the proposals (P1 in particular); it depends what is meant with "release".  We think the CG Type 1 is released/cleared upon TAT expiry meaning that the UE seizes UL transmissions according to that grant. The CG type 1 shall not be autonomously resumed by the UE once it has reacquired time alignment as the network may have configured other UEs with these resources. This is similar to PUCCH/SRS which also need to be reconfigured after TAT expiry.  We don't understand why there should be different behaviours for PUCCH/SRS and CGs. All of them are RRC-configured UL transmissions. |
| Nokia | Agree with P1~3. No change needed. | Since there is no re-initialization in MAC when TA is valid again, RRC reconfiguration is needed to reconfigure the CG after TAT expiry. According to current specification, the resource is not released, delta configuration is possible.  Option 1 and 2 are both NBC. |
| Apple | P1: agree | For P1, CG Type 1 resource should be configured or released by RRC. Upon TAT expiry, UE MAC only notifies RRC to release PUCCH and SRS but not CG Type 1 resource, therefore , it’s clear the CG type 1 resource is not released upon TAT expiry.  For P2 and P3, current spec is not clear whether UE can resume the CG Type 1 resource after UE receives the TAC MAC CE. So in R15 it should be up to UE implementation to resume autonomously or upon the NW explicit configuraiton after UE resume the UL synchronization. |
| LG | NO for proposals  OK for Option 1 (R2-2101522) like approach | We share the view with Ericsson that the CG Type 1 is similar to PUCCH/SRS. Thus, same handling for CG Type 1 and PUCCH/SRS is preferred. |
| CATT | P1 agree  P2/3 not agree | We agree with Qualcomm’s analysis and interpret current specification as Option 2, so we don’t think any change is needed. |
| Lenovo | Agree with P1-P3 | We think that RRC reconfiguration is needed to reconfigure the CG after TAT expiry. |
| vivo | Agree with P1/2/3;  Do not support either option for Rel-16 | In Rel-15, it seems there was no achieved agreement that the UE can autonomously re-initialize the type-1 CG after getting a new TA. We understand that the current MAC behavior might be not good in terms of performance. However, no bug is found and everything works smoothly. Thus, we prefer not to make any enhancement for Rel-16 in the maintenance stage. The optimal option can be further discussed in Rel-17 TEI. |
| Intel | Agree with P1, disagree with P2 and P3.  Agree with the intention of option 2 | Our understanding is that upon expiry of *timeAlignmentTimer*, type 1 CG resource is not released. MAC automatically continue the usage of type 1 CG resource once *timeAlignmentTimer* runs again.  For option 2, we’re OK either to go with CR or to capture the intended behavior in Chair notes. |
| Sequans | Agree with P1 and intention of Option 2 | We think CG Type 1 is only “suspended” after TAT expiry (no transmission possible) and “resumed” when TA is valid again.  We would prefer a NOTE or a lighter CR.  E.g. “clear any configured downlink assignments and type-2 configured uplink grants” might be enough. |

**Conclusion:**

**TBD**

# 4 Conclusion

**TBD**

# 5 References

[1] RAN2 113-e Chairman Notes 2021-01-25 0900 UTC