**3GPP TSG-RAN WG2 Meeting #121b-e R2-2304219**

**Online, 17th April– 26th April, 2023**

**Agenda item: 5.2**

**Source: ASUSTeK**

**Title: Summary on [AT121bis-e][502][V2X/SL] Clear SL CG (ASUSTeK)**

**Document for: Discussion & Decision**

 Introduction

This is to summarize the result of the following email discussion in RAN2#121bis-e:

* [AT121bis-e][502][V2X/SL] Clear SL CG (ASUSTek)

      **Scope:** Discuss corrections for

1) SL CG clearing at MAC reset, including 2574, 3210, 3915, 3928, and

      Identify CRs that can be agreed in principle with or without revision

      **Intended outcome:**

1. discussion summary in R2-2304219.
2. If needed, 38.321 CR in R2-2304220 for R16 and R2-2304221 for R17

**Deadline: Comeback** at 4/25 CB session

2 Contact Information

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# 3 Discussion

In RAN2#121 meeting, there was a discussion regarding whether to clear configured sidelink grants when performing MAC reset and the conclusion was postponed:

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| (4, 11) Proposal 3. Correction (“Added that the UE clears configured sidelink grant when performing MAC reset.”) in R2-2301525 (For Rel-16)/R2-2301526 (For Rel-17) is not agreed.* Postponed.
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In the current specification, when a MAC entity performs MAC reset requested by RRC, the MAC entity considers the *timeAlignmentTimer* to be expired and performs the actions in clause 5.2, where the MAC entity clears any configured DL assignments and configured UL grants:

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| 5.12 MAC ResetIf a reset of the MAC entity is requested by upper layers, the MAC entity shall:1> consider all *timeAlignmentTimer*s as expired and perform the corresponding actions in clause 5.2;…5.2 Maintenance of Uplink Time Alignment…1> when a *timeAlignmentTimer* expires:3> clear any configured downlink assignments and configured uplink grants; |

and the MAC entity does not clear SL CG when performing MAC reset.

In RRC re-establishment (when T311 is running), the UE releases the SL CG type-1 resource but not the type-2 resources. The UE does not use type-2 CG when T310 is running based on the NOTE in 5.8.8:

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| 5.8.8 Sidelink communication transmission[…]3> if the UE is in RRC\_CONNECTED and uses the frequency included in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message:4> if the UE is configured with *sl-ScheduledConfig*:[…]5> if T311 is running, configure the lower layers to release the resources indicated by *rrc-ConfiguredSidelinkGrant* (if any);[…]NOTE 1: The UE continues to use resources configured in *rrc-ConfiguredSidelinkGrant* (while T310 is running) until it is released (i.e. until T310 has expired). The UE does not use sidelink configured grant type 2 resources while T310 is running. |

In this meeting, there are several documents continuing the discussion.

In R2-2303915 [1] and its Rel-17 mirror R2-2303928, it is proposed to clear the sidelink grant when performing MAC reset in order to avoid collision of SL transmissions due to UE occupying SL CG in scenarios requiring MAC reset (e.g., the serving cell changes due to handover/RRC re-establishment), and to align with Uu CG handling where the MAC entity clears any configured DL assignments and configured UL grants:

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| 5.12 MAC ResetIf a reset of the MAC entity is requested by upper layers, the MAC entity shall:…1> cancel, if any, triggered configured sidelink grant confirmation;1> clear, if any, configured sidelink grants;1> cancel, if any, triggered Desired Guard Symbol query; |

On the other hand, R2-2302574 [2] and R2-2303210 [3] propose that clearing SL CG upon MAC-reset is not needed.

In [2], it is observed that the current spec requires UE to switch to mode-2/exceptional during handover, and the current spec requires the UE to stop using type-2 CG upon T310 start and release type-1 CG upon T311 start, there’s not enough motivation to pursue the change:

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| 1. For SL CG, current spec requires UE to switch to mode-2 using exceptional pool upon T304 start without clearing operation, to stop using type-2 CG upon T310 start, and to release type-1 CG upon T311 start.
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In [3], similar observation is provided that the UE is not allowed to use SL CG when T311 is running, and NW implementation can be leveraged when MAC reset is triggered by NW signalling:

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| **Observation 1: When T311 is running, UE is not allowed to use the configured SL grant based on current RRC specification, no need to duplicate in MAC.** **Observation 2: When T310 is running, if MAC reset is triggered by NW signalling, we can rely on NW implementation to release the configured SL grant.**  |

With the above contributions summarized, this email discussion respectfully asks for all companies’ view on whether to clear SL CG when performing MAC reset:

Q1: Do you agree the UE should clear configured sidelink grant when performing MAC reset?

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| **Company** | **Agree/Disagree** | **Detailed Comments** |
| ASUSTeK | Agree | For handover case, if the UE does not release/clear SL CG in MAC reset, the UE will switch to mode-1 and resume using the resources after handover to the target Cell. As the UE should not be allowed to use the resources in the target Cell, it is a burden for the Source Cell to be always required to deactivate/release the CG before handover.For RRC connection re-establishment case, if the UE does not release/clear SL type-2 CG in MAC reset, the UE will switch to mode-1 and resume using the resources after re-establishing to the target Cell. As the UE should not be allowed to use the resources in the target Cell, it is a burden for the target Cell to be always required to deactivate/release the SL type-2 CG after re-establishment. |
| Huawei, HiSilicon | Agree | 1. the current spec text for Uu grant clearing, it is said " consider all timeAlignmentTimers, inactivePosSRS-TimeAlignmentTimer, and cg-SDT-TimeAlignmentTimer, if configured, as expired and perform the corresponding actions in clause 5.2;" and in clause 5.2, UL CG grants are cleared. Please note this "consider all timers as expired" are "artificial" expiry when the MAC reset is requested by upper layers, not necessarily really expired. So the arguent that SL can use GNSS may be true but not really relevant when the timers are considered as expired. Also the syncronization is not about using absolute time from GNSS or from other time source, it is about syncronization on the border of frame/slot which is controlled with TA procedures. 2. NW implementation could have further actions regarding deactivating/deconfiguring "residul" grants however this would be more complicated, compared to "all cleared" reset and re-initilized the needed grants. It seems more natural to specify a "clean slate" "MAC reset" procedure, rather than keep tracking all the grants even after a reset action. 3. just above the proposed clearing action, there is action by UE "1> cancel, if any, triggered configured sidelink grant confirmation;" which clealy demontrates the intended UE behavior is to clear also the sidelink grant, otherwise it is problematic UE clear the triggered SL grant confirmation but still to use the SL grant. This would lead to misalgnment between the NT and the UE. If UE intends to still use the SL grant, it shall keep (not clear) the triggered SL grant confirmation and report it to the NT after MAC reset.  |
| vivo | Agree | As one proponent of the change. |
| Apple | Agree | We tend to agree with Huawei’s understanding that UL CG is also cleared when Uu MAC reset. So, SL MAC reset can result similär behavior to clear all SL CGs. |
| Xiaomi | Disagree but | We check the sepcification and found there are some cases MAC reset will be triggered, e.g., T311 running and upon reception of HO command. Actually if T311 is running, we already restrict the usage of CG via RRC normative text and there is no need to duplicate the “clear” in MAC, i.e., even MAC does not clear CG, UE is not allowed to use it if MAC reset is triggered during T311 running.While for HO case, we think MAC reset is triggered by NW singalling and in this case, we can leave it to NW implementation to relesase the CG during HO. We don’t think this is some burden/complicated behaviour since in Uu we also have many other cases to leave to NW to release instead of requiring the UE to release itself. Regarding UE cancels the CG confirmation upon MAC reset, we think this is to cancel all the reporting to NW upon MAC reset and based on the existing spec, only when confirmation is triggered will the UE store the SL CG and initialise the SL CG. So if the SL CG has not been confirmed upon MAC reset, the confirmation will be cancelled and the SL CG will not be initialized/used. Therefore we think the comment that UE clear the triggered SL grant confirmation but still to use the SL grant is not correct. 2> else if PDCCH contents indicate configured grant Type 2 activation for a configured sidelink grant:3> trigger configured sidelink grant confirmation for the configured sidelink grant;3> store the configured sidelink grant;3> initialise or re-initialise the configured sidelink grant to determine the set of PSCCH durations and the set of PSSCH durations for transmissions of multiple MAC PDUs according to clause 8.1.2 of TS 38.214 [7].So from our point, we don’t see there is any issue if SL CG is not cleared in the MAC, but if there is clear majority to have this, we can also follow the majority’s view since we also agree there is no issue if SL CG is cleared during MAC reset… [Huawei, HiSilicon] Thanks for Xiaomi's comments. On which approach is more complicated, there could be different preferences, e.g. either relying on NT's following clean-up after MAC reset, or relying on "all clearing" actions during MAC rest. We understand there is no much difference from UE implementation perspective as UE would follow NT's de-configuration/deactivation with either approach. However from NT perspective, if NT would trigger MAC reset (for a reason not necessarily by T311 or HO), it would be more preferred to have "all at once" clearing behaviour. On the "cancel of grant confirmation", we could have been more clear that it means using the grant without confirmation (as it is cancelled) is not allowed by spec. As MAC reset can happen any time, it is possible SL CG couldn't be used (even not cleared), as without confirmation.  |
| Samsung | Agree | (One of proponent) It is clearer to apply the same UE behavior for SL CG as for Uu CG upon Uu MAC reset. |
| Ericsson | agree | We share the same understanding as Huawei. It is beneficial to apply an unified solution as Uu to handle the SL CG grant. |
| OPPO | Disagree | 1. Is this NBC change?
2. For HO, since the spec already prevent the usage of mode-1 resource during T304 running period, what is the additional benefit of it? After T304 being stopped and before the first RRCReconfiguration from target cell? Yet that wouldn’t target cell already send reconfigured CG via HO command?
3. For RLF/Reestablishment, RRC spec also restrict the usage of CG, what is the benefit to duplicate it in MAC?

[Huawei, HiSilicon] It might be functional NBC as there might be IOT issue e.g. when NT implemeted with the CR and UE does not, there will be mismatch on the resource usage. However the impact on (existing) UE implementation would be minimum as UE would always prepare for can-use and can-not-use one grant e.g. based on whether the grant is confirmed. When MAC reset happends before the grant is confirmed, the grant is still not to be used. Such judgement behaviour would be always implemented according to the spec. On the NT side, as MAC reset is not always caused by only HO and RLF/Reestablishment, NT implementation can benefit considerably from "all cleared" MAC reset, compared with NT always tracks everthing even after a "reset". [OPPO] To follow-up: this part seems to agree with the point by Xiaomi? (Is NT = network?)And what is the view for the question-2/3 above? Can the proponent clarify the additional benefit/improvement given that current RRC spec already restrict the CG usage during T304 and during RLF? Sorry if any missing point here.[Huawei, HiSilicon] Thanks for the further comments. Regarding the green parts, we were trying to explain the assumed impact on the (existing) UE implementation would be minimum. The NBC issue should be judeged according to the severity of needed implementation change. In this case, as we interprete from the statement of "duplicated behaviour between RRC and MAC specs", the implementation impact would be minimum/negligible. On the other hand from NT/network implementation perspective, the not-cleared SL CG type1 or type 2 in MAC entity would bring ambiguity whether or not they should be used. It is considerably easier (additional benefit) for e.g. target gNB to configure directly SL CG type1/activate SL CG type 2 after handover. [OPPO] thanks for the further clarification, i think now it is clear that the proponent believes ” restricting the usage of CG during HO/RLF/Reestablishment in the control plane doesn't necessarily equal to the clearing of existing SL grants in the user plane. There is ambiguity on the usage of such grants once the conditions for the restriction are not met.” (based on Huawei reply to ZTE), to be crystal clear, can the propent clarify what is the scenario of it? (as we asked above), i.e., the additional scenario that can benefit from this NBC CR on top of the existing restriction from CP/RRC spec. [Huawei, HiSilicon] Thanks for further comments. Sorry we could have been more clear on the additional scenarios: 1. MAC reset is triggered by "upper layers", i.e. MAC reset can be triggered by RRC message e.g. " *RRCReconfiguration* with *reconfigurationWithSync* " without involving T310/311. gNB can use such upper layer message directly to trigger UE to re-access the current cell due to various reasons including but not limited to security key refresh, resource scheduling confliction issues. Especially if this is to solve the resource scheduling confliction issues, it is needed that UE can clear all grants and obtain new resource allocation. In 331, the SL CG restriction/release behaviour are all conditioned on timers. There is descreption between MAC and RRC spec for this case. 2. During HO (T304 is running), the usage of SL grants is resticted however the grants are not cleared. When the target gNB issues e.g. *rrc-ConfiguredSidelinkGrant,* it is preferred all grants are cleared during MAC reset such that there would be no resource confliction issues. Hope this clarifies. [OPPO] thanksf for the clarification, based on the above, may i understand network vendor would like to use this CR to ensure UE would not use the CG after ”T304 stopped” and before ”target gNB issues the type-1 CG”? If that is the delta part (i.e., the additional benefit on top of existing spec), compared to a NBC CR at UE side, why not target gNB directly release the CG in HO command? Which is perfectly BC operation and can achieve all the benefit we are aiming at. Are we on the same page of the issue? Sorry if any misunderstanding.[Huawei, HiSilicon] Thanks for the further comments. This is quite subjective area now. From the begining of this discussion, it is understood that network can do de-configuration of the grants, though it is preferred to do all-clearing with MAC reset instead of to do each de-configuration in the sense of "reset" (especially in the first scenario above for a refresh of everthing). Compared with always adding extra CG release message in HO command by gNB implementation, it seems better to specify this clearing behaviour in the standard. On the NBC issue on the UE side, as majority companies here want the similar behavior regarding clearing Uu/SL CGs, the impression would be that the NBC issue on the UE side regarding implementation seems not to be very critical, right? In any case, thanks for the good discussion.  |
| Intel | See comment | While we share the view that the change is aligned with Uu MAC reset, we share same concern as OPPO that there may be a NBC issue |
| Sharp  | Agree | We share the same view with ASUSTeK. |
| LG | Follow majority view | Both camps' opinions are valid. |
| Nokia | Agree | Nothing seems to be broken but it would be clear to specify explicity how to handle the SL CG resources. |
| Lenovo | See comments | We are fine to align with Uu behavior and explicitly clear the CG grant. But share the concern from OPPO for NBC issue  |
| ZTE | Disagree | We share the view with OPPO and Xiaomi. We do not see too much benefit to adopt this change. UE clear the CG UL and DL grant when the TA timer expiry. It is not triggered by MAC Reset directly. My understanding is when TA timer expiry, the synchronization between UE and gNB is failure. Considering CG UL and DL are used for data transmission between UE and gNB, synchronization failure may cause incorrect data decoding, therefore UE needs to clear the UL and DL CG grant. However, for sidelink, synchronization failure between UE and gNB does not influence the sidelink data transmission. And As illustrated by Xiaomi, OPPO, current specification has restricted the usage of CG during HO/RLF/Reestablishment. So, this change is not necessary.[Huawei, HiSilicon]: Thanks for the comments. Our understanding is that, at least from network implementation perspective, restricting the usage of CG during HO/RLF/Reestablishment in the control plane doesn't necessarily equal to the clearing of existing SL grants in the user plane. There is ambiguity on the usage of such grants once the conditions for the restriction are not met.  |
| CATT | Follow majority view |  |

**Conclusion 1: TBD**

Q2: If the answer to Q1 is yes, do you agree with the change in R2-2303915 (Rel-16 CR) and R2-2303928 (Rel-17 CR)?

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| **Company** | **Agree as is;Agree with changes;Disagree** | **Detailed Comments** |
| ASUSTeK | Agree as is |  |
| vivo | Agree as is |  |
| Samsung | Agree as is |  |
| Ericsson | agree |  |
| OPPO | Disagree | At least there seems NBC concern for R16? |
| Sharp | Agree as is |  |
| Nokia | Agree as is. |  |
| Lenovo | Agree as is. |  |
| Huawei, HiSilicon | Agree as it is | The NBC issue (functional issue) regarding UE implementation is minimum/negligible. |

**Conclusion 2: TBD**

# Conclusion

**TBD**

# Reference

[1] R2-2303915 Corrections on MAC reset regarding configured sidelink grant ASUSTeK, Huawei, HiSilicon, Samsung, vivo

[2] R2-2302574 Left issue on SL CG clear during MAC-reset OPPO

[3] R2-2303210 Discussion on clear of SL CG upon MAC reset Xiaomi