**3GPP TSG-RAN WG2 Meeting #121b-e R2-2304223**

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

**Agenda item: 6.10.2**

**Source: ASUSTeK**

**Title: Summary on [AT121bis-e][505][V2X/SL] DRX timer numerology (ASUSTeK)**

**Document for: Discussion & Decision**

Introduction

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

* [AT121bis-e][505][V2X/SL] DRX timer numerology (ASUSTek)

**Scope:** Discuss corrections

1. DRX timer numerology, including 3907, 3925, 3926, 3927, 2908, change-3 of 2683

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

**Intended outcome:**

1. discussion summary in R2-2304223.
2. If needed, 38.331 CR in R2-2304224
3. If needed, 38.321 CR in R2-2304225

**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 an issue where based on current specification, timer length of drx-HARQ-RTT-TimerSL and drx-RetransmissionTimerSL cannot be derived correctly for type-1 CG, and the conclusion was postponed:

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| Proposal 4: Changes in R2-2301530 are not agreed.   * Postponed |

In the current specification, the value of the length of drx-HARQ-RTT-TimerSL and drx-RetransmissionTimerSL is in number of symbols or slots of the BWP where the PDCCH corresponding to the SL grant was transmitted:

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| --- |
| ***DRX-ConfigSL* field descriptions** |
| ***drx-HARQ-RTT-TimerSL***  Value in number of symbols of the BWP where the PDCCH was transmitted. Value 0 is used in case *sl-PUCCH-Config* is not configured and the corresponding resource pool is not configured with PSFCH. |
| ***drx-RetransmissionTimerSL***  Value in number of slot lengths of the BWP where the PDCCH was transmitted. *sl0* corresponds to 0 slots, *sl1* corresponds to 1 slot, *sl2* corresponds to 2 slots, and so on. |

It is unclear which PDCCH is associated with SL configured grant type-1 and the UE cannot derive the numerology of the timers. Therefore, proposing companies suggest that a change is needed in the spec so that the UE can derive symbol length for the timers corresponding to SL configured grant type-1.

Q1: Do you agree that a spec change is needed for SL UE to derive symbol length for drx-HARQ-RTT-TimerSL and the slot length for drx-RetransmissionTimerSL corresponding to SL configured grant type-1?

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Detailed Comments** |
| ASUSTeK | Agree |  |
| Ericsson | Disagree | UE can derive the reference BWP on which the PDCCH was transmitted by the gNB for transmtting RRC signaling to the UE. Although the UE may expereince BWP switch, it is can be up to UE implementation to address it. No need to introuce spec change. |
| Apple | Yes | The current spec does not cover the CG type 1 case which is configured by RRC message. |
| CATT | Agree | For SL CG type 1, there is only RRC and no PDCCH. Hence, the spec is unclear. |
| Samsung | Agree |  |
| Lenovo | Agree |  |
| Xiaomi | Agree |  |
| OPPO | Disagree | Isn’t it NBC change? |
| vivo | Agree |  |
| Intel |  | We are fine to support the change but the NBC change as mentioned by OPPO is a valid concern |
| Sharp | Agree |  |
| LG | Agree |  |
| Nokia | Disagree | We have concern on having NBC change. If companies think, for CG type 2, the BWP where the UE receives the CG type 2 activation command is used as a reference BWP, the same can be applied to the CG type 1, i.e., to use a BWP where the UE receives the CG type 1 configuration is received as a reference BWP since the CG type 1 is considered activated upon receiving the configuration.  If there are multiple CGs and the configurations are received via different BWPs, it would be up to UE implementation which BWP to use as reference BWP. |
| ZTE | Agree |  |
| Huawei, HiSilicon | Agree | The bigger issue than NBC is that there might be misunderstanding on the chose referece BWP between gNB and UE. |
| Qualcomm | Disagree | Without decoding a DCI the UE cannot decode an RRC configuration carried on PDSCH. So both UE and gNB should know **the numerology for a CG type1 configuration**.  It was debated at RAN1 in Rel 16 if the UE was allowed to change SL numerology according to UL’s numerology and was concluded with NO. Giving this, if the SL numerology doesn’t change then the gNB most likely won’t change the numerology for PUCCH on UL with UE’s ACK/NACK and other reports associated with sidelink. If gNB were allowed to change UL numerology used for SL’s feedback on UL, then all the timing alignment would be an issue not just for the ACK/NACK based RTT timer value calculation. |
| MediaTek | Agree |  |

**Summary 1:**

Fine with the change: 13

Disagree: 4

**Rapporteur’s view:**

There seems to be majority supporting the change. Regarding NBC changes raised by some companies, with the current spec not covering/being unclear on the derivation of timer length for SL CG type-1, the function cannot work without correction, and the change should be considered mandatory no matter whether the correction is BC or NBC.

**Proposal 1: Spec change is needed for SL UE to derive symbol length for drx-HARQ-RTT-TimerSL and the slot length for drx-RetransmissionTimerSL corresponding to SL configured grant type-1 (13/17).**

In this meeting, there are several documents continuing the discussion, and some options are provided regarding how to derive symbol length for drx-HARQ-RTT-TimerSL and the slot length for drx-RetransmissionTimerSL:

* **Option 1**: referring to active DL BWP of the PCell ([1], [2], [3], [4], [5]).
* **Option 2**: referring to the BWP on which the PDCCH transmission scheduling the RRC message, carrying the type-1 CG configuration, was transmitted ([2]).
* **Option 3:** adding a NOTE stating that it is up to UE implementation to determine the SL BWP if no dedicated SL BWP exists [6].

Q2: If a spec change is agreed, which option(s) would you prefer?

* Option 1: referring to active DL BWP of the Pcell.
* Option 2: referring to the BWP on which the PDCCH transmission scheduling the RRC message, carrying the type-1 CG configuration, was transmitted.
* Option 3: adding a NOTE stating that it is up to UE implementation to determine the SL BWP if no dedicated SL BWP exists.

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| **Company** | **Preferred option** | **Detailed Comments** |
| ASUSTeK | Option 1 | For Option 2, this would lead to the UE having to store the information of which BWP was used to schedule MAC PDUs and the associations between the MAC PDUs, disassembled RLC PDUs, disassembled PDCP PDUs, and disassembled RRC messages. UE implementation complexity is increased for protocol layers interactions. In addition, different type-1 CG configurations can be provided in different RRC messages, and each RRC message containing the type-1 CG configuration can be segmented into multiple transmissions. If the transmissions encompasses multiple BWP and/or numerologies, it is still unclear for the UE which one to refer to among all the BWPs. While it can be left to UE implementation to select any of the BWPs carrying the RRC messages, it may cause UE DRX active time state to be unsynchronized between the UE and the network, which could cause data loss. While the network implementation may ensure data can be received by the UE for all possible combination/BWP selected, it would be an unnecessary restriction for NW scheduling. |
| Apple | Option 1 |  |
| CATT | Option 1 |  |
| Samsung | Option 1 |  |
| Lenovo | Option 1 |  |
| Xiaomi | Option 1 | Can follow majority |
| vivo | Option 1 |  |
| Intel | Option 1 |  |
| Sharp | Option 1 |  |
| LG | Option 1 |  |
| Nokia | Option 3 | Option 1 is NBC. We would assume that the current UE behaviour would be option 2, but needs to be checked further. To avoid NBC change but clarify what BWP to use, we can have a NOTE as in R2-2302908. |
| ZTE | Option1 |  |
| Huawei, HiSilicon | Option 1 | Option 1 for CG type 1 case, which is not covered by the existing spec. |
| Qualcomm | Comment | Option 1: Don’t support: active Pcell is mostly for DL communication which may be applicable for DG or CG type 2 in Mode 1 but may not be the numerology for configuring the CG type 1 if gNB changes the DL numerology for DL communication. In the case, if gNB changes the numerology, a RRC reconfiguration may be conducted for CG type 1.  Option 3: Don’t support: it was heavily debated in RAN1, at the beginning of Rel 16, if the SL numerology can be changed or not. The conclusion is NOT, because of supporting of broadcast and distance based groupcast. |
| MediaTek | Option 1 |  |

**Summary 2:**

Option 1: 13

Option 3: 1

**Rapporteur’s view:** There seems to be majority supporting Option 1. Proposals to be done with questions below.

If Option 1 is selected, there are two ways to adopt the changes:

* **Option a**: apply the change to all SL grants (corresponding change in R2-2303926 [3] and R2-2302683 [5]).

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| ***DRX-ConfigSL* field descriptions** |
| ***drx-HARQ-RTT-TimerSL***  Value in number of symbols of the active DL BWP of the PCell. Value 0 is used in case *sl-PUCCH-Config* is not configured and the corresponding resource pool is not configured with PSFCH. |
| ***Drx-RetransmissionTimerSL***  Value in number of slot lengths of the active DL BWP of the PCell. *Sl0* corresponds to 0 slots, *sl1* corresponds to 1 slot, *sl2* corresponds to 2 slots, and so on. |

* **Option b**: apply the change to SL configured grant type-1 only (and the UE derives timer length of other SL grants following the current behaviour)

Option b-1 (R2-2303907 [1]):

|  |
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| *DRX-ConfigSL* field descriptions |
| ***drx-HARQ-RTT-TimerSL***  For configured type1, value in number of symbols of PDCCH on the activated BWP of PCell. For other cases,value in number of symbols of the BWP where the PDCCH was transmitted. Value 0 is used in case *sl-PUCCH-Config* is not configured and the corresponding resource pool is not configured with PSFCH. |
| *Drx-RetransmissionTimerSL*  For configured type1, value in number of slot of PDCCH on the activated BWP of Pcell. For other cases,value in number of slot lengths of the BWP where the PDCCH was transmitted. *Sl0* corresponds to 0 slots, *sl1* corresponds to 1 slot, *sl2* corresponds to 2 slots, and so on. |

Option b-2 (R2-2303927 [4]):

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| ***DRX-ConfigSL* field descriptions** |
| ***drx-HARQ-RTT-TimerSL***  Value in number of symbols of the BWP where the PDCCH was transmitted, or the active DL BWP of the Pcell in case of sidelink configured grant Type 1. Value 0 is used in case *sl-PUCCH-Config* is not configured and the corresponding resource pool is not configured with PSFCH. |
| ***Drx-RetransmissionTimerSL***  Value in number of slot lengths of the BWP where the PDCCH was transmitted, or the active DL BWP of the Pcell in case of sidelink configured grant Type 1. *Sl0* corresponds to 0 slots, *sl1* corresponds to 1 slot, *sl2* corresponds to 2 slots, and so on. |

Q3: If Option 1 (referring to active DL BWP of the Pcell) is selected in Q2, which option would you prefer for applying the change?

* Option a: apply the change to all SL grants.
* Option b: apply the change to SL configured grant type-1 only (and the UE derives timer length of other SL grants following the current behaviour)

|  |  |  |
| --- | --- | --- |
| **Company** | **Preferred option** | **Detailed Comments** |
| ASUSTeK | Option b |  |
| Apple | Option b-1 |  |
| CATT | Option b |  |
| Samsung | Option b |  |
| Lenovo | Option b |  |
| Xiaomi | b |  |
| vivo | Option b |  |
| Intel | Option b |  |
| Sharp | Option b |  |
| LG | Option b |  |
| Nokia | Comment | As commented above, we think the issue is not only for the CG type 1 but also for CG type 2. Thus, if we introduce a change, that should be for both of CG type 1 and 2. |
| ZTE | Option b |  |
| Huawei, HiSilicon | Option b | Understand there is NBC issue with option a. |
| Qualcomm | None | Refer to QC’s comment in Q2. |
| MediaTek | Option b |  |

**Summary 3:**

Option a: 0

Option b: 13

**Rapporteur’s view:** There seems to be majority supporting Option b.

**Proposal 2: For SL CG type 1, the UE derives symbol length for drx-HARQ-RTT-TimerSL and the slot length for drx-RetransmissionTimerSL by referring to active DL BWP of the PCell (and no change of behaviour for other SL grants) (13/15).**

Q4: If Option b (apply the change to SL configured grant type-1 only) is selected in Q3, which wording proposed in the CRs would you prefer?

* Option b-1 (R2-2303907 [1])
* Option b-2 (R2-2303927 [4])

|  |  |  |
| --- | --- | --- |
| **Company** | **Preferred option** | **Detailed Comments** |
| ASUSTeK | Option b-2 |  |
| Apple | Option b-1 |  |
| CATT | Option b-1 | But the wording should be revised to keep terminology consistent, e.g., “configured type1” should be modified to “sidelink configured grant Type 1”. |
| Samsung | Option b-2 |  |
| Lenovo | Option b-2 |  |
| Xiaomi | b-1 |  |
| vivo | Option b-2 |  |
| Intel | Ok with either option |  |
| Sharp | Option b-1 |  |
| LG | Option b-2 |  |
| ZTE | Optionb-1 | *Proponent: OK with CATT’s modification. Thanks for the correction.* |
| Huawei, HiSilicon | Option b-1 | Option b-1 is clearer. |
| Qualcomm | None | Refer to QC’s comment in Q2. |
| MediaTek | Ok with either option |  |

**Conclusion 4: TBD**

**Summary 4:**

Option b-1: 6

Option b-2: 5

OK with either option: 2

**Rapporteur’s view:** There is no majority on which version to use. Considering this being more or less a beauty contest and both CR has the same effect, I’d suggest using Option b-1 as baseline with modification suggested by CATT.

**Proposal 3: Agree the change in R2-2303907 with “configured type1” changed to “sidelink configured grant Type 1”. Final in-principle agreeable CR in R2-2304224 (8/13).**

If Option 2 is selected, a text proposal provided in [2] is as follows:

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| --- |
| ***DRX-ConfigSL* field descriptions** |
| ***drx-HARQ-RTT-TimerSL***  Value in number of symbols of the BWP where the PDCCH scheduling the corresponding SL grant or the *RRCReconfiguration* containing the *rrc-ConfiguredSidelinkGrant* for the corresponding SL grant was transmitted. Value 0 is used in case *sl-PUCCH-Config* is not configured and the corresponding resource pool is not configured with PSFCH. |
| ***drx-RetransmissionTimerSL***  Value in number of slot lengths of the BWP where the PDCCH scheduling the corresponding SL grant or the *RRCReconfiguration* containing the *rrc-ConfiguredSidelinkGrant* for the corresponding SL grant was transmitted. *sl0* corresponds to 0 slots, *sl1* corresponds to 1 slot, *sl2* corresponds to 2 slots, and so on. |

Q5: If Option 2 (referring to the BWP on which the PDCCH transmission scheduling the RRC message, carrying the type-1 CG configuration, was transmitted) is selected in Q2, would you agree with the TP proposed in [2]?

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree as is/**  **Agree with changes/**  **Disagree** | **Detailed Comments** |
| ASUSTeK | Agree as is |  |
| Qualcomm | Rewording | Value in number of symbols of the BWP where the PDCCH scheduling or activating the corresponding SL grant or the PDCCH indicating the PDSCH carrying the *RRCReconfiguration* containing the *rrc-ConfiguredSidelinkGrant* for the corresponding SL grant was transmitted. |

**Summary 5: As Option 1 is supported by majority, Q5 is not pursued.**

# Conclusion

We have the following proposals for email discussion [AT121bis-e][505]:

**Proposal 1: Spec change is needed for SL UE to derive symbol length for drx-HARQ-RTT-TimerSL and the slot length for drx-RetransmissionTimerSL corresponding to SL configured grant type-1 (13/17).**

**Proposal 2: For SL CG type 1, the UE derives symbol length for drx-HARQ-RTT-TimerSL and the slot length for drx-RetransmissionTimerSL by referring to active DL BWP of the PCell (and no change of behaviour for other SL grants) (13/15).**

**Proposal 3: Agree the change in R2-2303907 with “configured type1” changed to “sidelink configured grant Type 1”. Final in-principle agreeable CR in R2-2304224 (8/13).**

# Reference

[1] R2-2303907 Correction on field description for DRX timer ZTE

[2] R2-2303925 Discussion on deriving timer length for DRX timers ASUSTeK

[3] R2-2303926 Corrections on deriving timer length for DRX timers - option 1a ASUSTeK

[4] R2-2303927 Corrections on deriving timer length for DRX timers - option 1b ASUSTeK, vivo

[5] R2-2302683 Miscellaneous corrections on 38.331 for SL enhancements Huawei, HiSilicon

[6] R2-2302908 SL DRX timers BWP numerology Nokia