**3GPP TSG RAN WG1 #104b-e R1-210xxxx**

**e-Meeting, April 12th - 20th, 2021**

Agenda Item: 8.11.1.1

Source: Moderator(ZTE, Sanechips)

Agenda Item: Moderator summary of Email discussion/approval to reply LS in R1-2100021

Document for: Discussion and Decision

# **Introduction**

During RAN1#104e meeting, reply LS to R1-2100021 was discussed under the email thread [104-e-NR-R17-SL-LS-01]. Even though consensus was not reached regarding a reply LS, many companies agreed that RAN1 should further study and discuss the relationship between sidelink DRX and sensing, and a reply LS would be expected in RAN1#104b-e once there is any related agreement made or any concern found [1].

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| Working assumption:  SL DRX should take PSCCH monitoring also for sensing (in addition to data reception) into account if SL DRX is used.  To RAN WG1: RAN2 kindly asks RAN1 to provide feedback if there is any concern on the working assumption and take the above information into their future works. |

For this meeting, the following contributions are submitted in this regard.

There is also an ongoing discussion under 8.11.1.1 regarding the interaction between SL DRX pattern.

The FFS bullet from the previous RAN1 meeting also has an impact on the data reception part with the SL DRX

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| * FFS any restriction to determine Y candidate slots (including its relationship with SL-DRX) |

For this meeting, contributions [2][3][4][5][6] discussed about the considerations regarding the reply LS. From moderator perspective, the discussion points in the following section are helpful to clarify companies’ position before RAN1 could agree on a reply LS.

# **Discussion**

###### Discussion Point 1

Is sensing operation restricted to be performed under DRX ON duration?

This is related to the ongoing discussion topic #7 under 8.11.1.1. However, according to the majority view (4 out of 5 contributions), some collective concerns are mentioned w.r.t the performance degradation impact from having this restriction. It’s observed that power saving effects may be mitigated if some mismatch between DRX pattern and partial sensing configuration exists.

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###### Discussion point 2

If your position regarding the first discussion point is positive – i.e. sensing should be performed under DRX ON duration, do you think the following two scenarios need to be considered(please share your views on how to handle the issues thereof in the meantime):

* Scenario 1: Under unicast case, if the Tx UE B is configured with DRX1, and the Rx UE A is configured with DRX2, does the sensing need to be restricted to the on duration of DRX1 or DRX 2, in particular if the DRX On durations have are not overlapping.
* Scenario 2: Under groupcast/broadcast case, if the Tx UE B is configured with a given DRX, and the multiple Rx UE within the range of groupcast/broadcast are configured with distinct DRX patterns. Which of the DRX patterns shall be used as a representative one so that the scenario is converted into scenario 1.

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###### Discussion point 3

Does RAN1 need to ask for RAN2 feedback on the feasibility of taking into account the sensing parameters into SL DRX configuration?

In response to the potential mismatch between DRX ON duration and partial sensing setting, DRX configuration could take the sensing parameters into account so as to maintain the power saving effects brought up by DRX configuration. This view was also mentioned in companies’ feedback during the previous meeting.

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###### Discussion point 4

Is DRX configuration supposed to have an impact on the data reception?

FFS any restriction to determine Y candidate slots (including its relationship with SL-DRX)

The FFS bullet from the previous RAN1 meeting also has an impact on the data reception part with the SL DRX. Please share your views on this.

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###### Others

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# **Conclusion**

TBD

# **Reference**

1. R1-2102024 Summary of [104-e-NR-R17-SL-LS-01] regarding potential reply to LS in R1-2100021 Moderator(ZTE)
2. [R1-2102577](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_104b\Docs\R1-2102577.zip) Discussion on LS from RAN2 on SL DRX design CATT, GOHIGH
3. [R1-2102928](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_104b\Docs\R1-2102928.zip) Draft Reply LS on SL DRX design vivo
4. [R1-2103283](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_104b\Docs\R1-2103283.zip) [draft]Reply LS on sidelink DRX ZTE, Sanechips
5. [R1-2103717](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_104b\Docs\R1-2103717.zip) Consideration of SL DRX ZTE, Sanechips
6. [R1-2103752](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_104b\Docs\R1-2103752.zip) Discussion on RAN2 LS on DRX impact Huawei, HiSilicon

# **Appendix**

Views from [2]

***Proposal 1: It is not preferred that sensing operation is only allowed in its own SL DRX active duration.***

***Proposal 2: Sensing operation is allowed in SL DRX inactive duration without the restriction of its own SL DRX configuration***

***Proposal 3: Reply LS to RAN2,***

* ***From RAN1’s perspective, sensing operation is allowed in SL DRX inaction duration without the restriction of its own SL DRX configuration. And RAN1 respectfully asks RAN2 to take the information into account.***

Views from [3]

RAN1 thanks RAN2 for the LS informing the working assumption and agreements on sidelink DRX design. RAN1 would like to confirm RAN2’s understanding, i.e., if SL DRX is used, the impact of DRX on sensing (as well as resource allocation) should be considered in addition to data reception. More specifically, a UE is not required to perform sensing out of the DRX active time. RAN1 will consider the DRX impact in RAN1’s design, and respectfully asks RAN2 to provide any updates of DRX design that may have potential impacts on sensing and resource allocation.

Views from [4]

RAN1 would like to thank RAN2 on the announcement of their agreement and working assumption on sidelink DRX.

Regarding to the below working assumption

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| Working assumption:  SL DRX should take PSCCH monitoring also for sensing (in addition to data reception) into account if SL DRX is used. |

RAN1 understands that sidelink DRX can be configured towards the UE while partial sensing is enabled. In RAN1’s perspective, if the monitoring of PSCCH for sensing only takes place during the active time of SL DRX, the sensing performance shall be degraded under a variety of cases. RAN1 has a concern on these aspects due to the impact on sensing by SL DRX.

On the other hand, if the monitoring of PSCCH for sensing can also take place other than during the active time for SL DRX, the sensing performance shall not be compromised at the cost of potentially increased power consumption. To minimize the impact on sensing mechanism and maintain sensing reliability for transmission, RAN1 is wondering whether the sensing parameter can be taken into SL DRX configuration. If SL DRX has been mostly aligned with partial sensing pattern, RAN1 thinks partial sensing can be performed according to the sensing configuration directly and solely, incurring minimal RAN1 impact.

**Question 1)** Can SL DRX configuration take into account the sensing parameters?

Furthermore, RAN1 has no concern on other agreements.

Views from [5]

[Observation 1: The granularity of SL DRX operation could be per a pair of source/destination, or per cast type, or per L2 destination ID.](#_Toc68685748)

[Observation 2: The SL DRX configurations can be obtained from pre-configuration or SIB or dedicated-RRC or PC5-RRC.](#_Toc68685749)

[Observation 3: For one UE, more than one SL DRX configurations would be configured.](#_Toc68685750)

[Observation 4: For unicast, the SL DRX for both Tx UE and RX UE can be acquired by one UE.](#_Toc68685751)

[Observation 5: If Alt 1(To perform sensing only in on-duration) is adopted, the PPR would degrade.](#_Toc68685752)

Proposal 1: For data reception, all configured SL DRX should be applied .

Proposal 2: The reception that can be known in advance needs to be monitored even if in off-duration, e.g. SPS transmissions.

Proposal 3: Alt 1(To perform sensing only in on-duration) should be suspended till RAN2 reaches more progress.

Proposal 4: For power saving, the partial sensing parameters should be taken into sidelink DRX (pre-)configuration, i.e. in RAN1’s perspective, it is assumed that sidelink DRX (pre-)configuration would be almost aligned with the partial sensing parameter .

Proposal 5: For UE which is configured with SL DRX configuration, partial sensing should be performed even in SL DRX off-duration.

Views from [6]

***Observation 1: For a UE, there is no timing relationship between its data transmissions and receptions, because its communicating peer(s) can be different with different traffic services.***

***Proposal 1: When DRX is configured for a given UE, its communicating TX UE should ensure that the transmitted data is delivered during SL DRX active time of the UE according to the DRX configuration.***

***Observation 2: Sensing and resource selection would be impacted for a UE with SL DRX configuration when there is an overlap between sensing windows/occasions and SL DRX inactive time.***

***Proposal 2:******When SL DRX is configured, sensing is not limited to be within SL DRX active time.***

***Observation 3: PSFCH reception in SL DRX inactive time is beneficial for power saving, as it reduces the need for re-transmissions***.

***Proposal 3: Reply to RAN2 as follows:***

* ***RAN1 confirms that SL DRX should take PSCCH monitoring also for sensing (in addition to data reception) into account, if SL DRX is configured.***
  + ***Support PSCCH reception within the sensing during SL DRX inactive time.***
* ***In addition, SL reception of PSCCH for sensing, and PSFCH, during the SL DRX inactive time should be considered***

Relevant RAN2 agreements on SL DRX

* Agreements on high-level principles for SL DRX
  + For SL unicast (after SL unicast link is established), SL DRX configuration can be configured per a pair of source/destination. FFS whether SL DRX operates per direction or for both directions.
  + For SL groupcast/broadcast, SL DRX configuration can be configured in common. FFS on granularity of SL DRX configuration.
  + Short DRX cycle is not introduced for SL unicast, groupcast and broadcast in Rel-17.
  + For data reception, RAN2 defines the behaviour for monitoring the SCI reception (i.e., PSCCH and 2nd SCI on PSSCH) during the SL active time for SL DRX. For data reception, the UE may skip monitoring of PSCCH and 2nd SCI on PSSCH during inactive time for SL DRX. Sensing aspect is not considered in this agreement.

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* Agreements on SL DRX configurations
  + For broadcast/groupcast, for out-of-coverage case, TX-UE/RX-UE obtain DRX configuration from pre-configuration.
  + For broadcast/groupcast, for in-coverage case, RRC\_IDLE/INACTIVE TX-UE/RX-UE obtain DRX configuration from SIB. It is up to network implementation how to coordinate active time between different cells.
  + For broadcast/groupcast, for in-coverage case, for RRC\_CONNECTED TX-UE/RX-UE can obtain DRX configuration from SIB. FFS on whether dedicated-RRC is also used.
  + For unicast, for OOC scenario, the UE who sends out the DRX configuration decides on the DRX configuration. FFS on whether pre-configuration and/or the assistance information from the peer UE is also taken into account when determining the DRX configuration.
  + For unicast, for OOC scenario, adopt per-direction DRX configuration is as baseline. FFS on whether it is TX-centric or Rx-centric, i.e. TX UE or RX UE decides it.