**3GPP TSG-RAN WG2 #115bis-e *R2-21xxxxx***

Electronic meeting, 2021-08-16 - 2021-08-27

Agenda Item: 8.15.2

Source: Ericsson

Title: Summary of [AT115-e][702][V2X/SL] SL DRX configuration for UC

Document for: Discussion, Decision

# Introduction

This is to discuss the [702] as follows.

* [AT115-e][702][V2X/SL] SL DRX configuration for UC (Ericsson)

**Scope:** Discuss following FFS/TBD/open issues:

Q1: Any specification impact to set SL DRX inactivity timer value with QoS consideration?

~~Q2: Is pre-configuration needed to determine SL DRX configuration for UC?~~

Q3: Need of SL DRX assistance information REQ from TX UE to RX UE?

Q4: What information is included in the assistance information from RX UE to TX UE?

Q5: When RX UE sends SL DRX assistance information to TX UE?

Q6: Is RX UE’s SL DRX configuration failure/reject to TX UE’s SL DRX configuration needed?

**Intended outcome:** Discussion summary in R2-2108982

**Deadline:** 8/24 10:00am UTC

For rapporteur to have enough time drafting summary report, we would like to have the following two phases:

* Phase 1: collect companies’ views by 2021-08-20 22:00 UTC
* Phase 2: rapporteur will finalize summary report based on inputs of phase 1 by 2021-08-24 10:00am UTC

# Discussion on open issues

We raise questions for the open issues of unicast and summarize views from companies in this section.

## Q1 – QoS impact on the inactivity timer

RAN2 has agreed that the SL inactivity timer value may take into consideration the QoS. Whether any specification impacts are needed is FFS.

This issue has been discussed in the email discussion [POST114-e][706]. The initial discussion outcome is summarized in [1], wherein, companies agree that for RRC\_CONNECTED, NW selects the inactivity timer based on NW implementation (which is aligned with current agreements). For IDLE/INACTIVE and OOC, the following views were expressed on whether configuration in SIB (for IDLE/INACTIVE) and preconfiguration (for OOC) can be used to determine the inactivity timer:

* SL Inactivity timer is determined without the use of (pre)configuration (RX UE assistance information and/or TX UE implementation) – 7 companies (Ericsson, OPPO, Apple, Xiaomi, LG, Nokia, Lenovo)
* SL Inactivity timer can use (pre)configuration information – 6 companies (QC, AsusTek, Vivo, Huawei, ZTE, InterDigital)
* Open to using (pre)configuration – 1 company (CATT)

Based on the initial summary results in [1], all companies agree that there is no spec impact due to consideration of QoS for UE in RRC CONNECTED since NW selects the inactivity timer based on NW implementation (which is aligned with current agreements). Therefore, discussions for this issue only concern UEs in IDLE/INACTIVE and OOC. Companies have diverse views on the issue. The diverse is mainly due to that some companies believe that RX UE may not provide assistance information. In this case, it would be beneficial for the TX UE to base on configuration or preconfiguration to derive the inactivity timer setting. Or in other words, if TX UE has obtained assistance information from the RX UE prior to setup up the radio bearer, TX UE can just rely on the received assistance information to determine the setting of the inactivity timer. It is also pointed out by some companies in [1] that the received assistance information from RX UE shall override the existing configuration or preconfiguration if there is any.

Based on the above reasoning, Rapporteur would like to raise the following questions to double check companies views.

For the first question, Rapporteur would like to check companies’ views on whether assistance information is mandatory or optionally for RX UE to provide. It is worth noting that the procedure for UE to send Sidelink UE information for NR sidelink communication is not mandatory in Rel-16. It is reasonable to follow the same behaviors for RX UE to provide assistance information containing SL DRX related parameters to TX UE. In addition, RX UE may not know when TX UE will trigger configuration/establishment of the SL DRX, therefore, RX UE can not provide assistance information in time to TX UE.

**Q1-1: for unicast in IDLE/INACTIVE or OOC, do companies agree that same as Sidelink UE information for NR sidelink communication in Rel-16, RX UE may provide assistance information containing SL DRX related info to TX UE, i.e., RX UE is not mandatory to provide assistance information containing SL DRX related info to TX UE?**

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| --- | --- | --- |
| Company | Yes/No | Comments |
| Xiaomi | Yes | If RX UE has no preference on SL DRX, RX UE could choose not to provide assistance information containing SL DRX info. |
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If TX UE doesn’t obtain assistance information from RX UE, it would be beneficial for the TX UE to base on configuration or preconfiguration to derive the inactivity timer setting.

It is worth noting that Q1-2 would depend on the answer of Q1-1.

**Q1-2: for unicast in IDLE/INACTIVE or OOC, if TX UE doesn’t obtain assistance information from RX UE, do companies agree that TX UE can base on configuration or preconfiguration to derive the SL inactivity timer value?**

**Note:** *Q1-2 depends on the answer of Q1-1. If companies answer Q1-1 as “No”, meaning that RX UE is mandatory to provide assistance information, Q1-2 can be skipped*.

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| Company | Yes/No | Comments |
| Xiaomi | No | In this case, RX UE can accept any SL DRX configuration. So, we don’t see the benefit to consider preconfiguration. |
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If TX UE has obtained assistance information from RX UE, it is reasonable to let TX UE to only rely on assistance information to derive the inactivity timer setting, since the assistance information can better reflect the preference of power saving for RX UE.

**Q1-3: For unicast in IDLE/INACTIVE or OOC, if TX UE has obtained both assistance information from RX UE and configuration/preconfiguration which are both indicating the value of the inactivity timer for a QoS profile (e.g., PQI), do companies agree that TX UE can only base on the received assistance information to derive the SL inactivity timer value for the QoS profile, i.e., the assistance information overrides configuration/preconfiguration of SL DRX?**

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| Company | Yes/No | Comments |
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**Rapporteur summary**:

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## Q3 - Need of SL DRX assistance information REQ from TX UE to RX UE

In the scope of this email discussion, one issue is raised on whether TX UE can send SL DRX assistance information REQ to RX UE. Rapporteur understands this REQ message can be one way to support mandatory report of SL DRX assistance information by RX UE. In this case, upon reception of a request message from TX UE, RX UE will be aware of that TX UE needs assistance information now in order to initiate configuration/reconfiguration of the SL DRX towards the RX UE. RX UE must provide assistance information as response to TX UE. However, rapporteur thinks that bigger spec changes would be required by allowing such procedure. In addition, same as the procedure of CSI reporting, a time window may be also needed to be introduced to TX UE, which would incur even bigger changes to the spec. Additional latency may be also incurred due to transmission of the request message. All in all, rapporteur tends to suggest to not support introducing REQ message for SL DRX assistance information report.

*Note: discussion for this issue is relevant to unicast in both RRC CONNECTED, RRC\_IDLE/RRC\_INACTIVE and OOC.*

**Q2-1: do companies agree that SL DRX assistance information REQ is not supported in Rel-17 in order to limit the standardization efforts?**

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| --- | --- | --- |
| Company | Yes/No | Comments |
| Xiaomi | Yes | RX UE is aware of TX UE’s capability of SL DRX. So, RX UE could autonomously send the assistance information, if SL DRX is desired. |
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**Rapporteur summary**: According to the comments received by the companies, companies’ comments are summarized in the below.

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Rapporteur would like to try to reach at least a consensus about the above highlighted points and thus would like to suggest:

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## Q4 - what information is included in the assistance information

Regarding assistance information provided by RX UE, RAN2 needs to further discuss the content of the assistance information. A RX UE may include at least one of the following as assistance information

* Desired SL DRX configuration for the concerned link
* RX UE’s Uu DRX configuration if RX UE is in RRC\_CONNECTED
* RX UE’s QoS parameters (e.g., PQI) of other SL links
* RX UE’s SL DRX configuration of other SL links

Therefore, rapporteur would like to raise the following question to collect companies’ views.

*Note: discussion for this issue is relevant to unicast in both RRC CONNECTED, RRC\_IDLE/RRC\_INACTIVE and OOC.*

**Q3-1: do companies agree that A RX UE may include at least one of the following as assistance information**

1. **Desired SL DRX configuration for the concerned link**
2. **RX UE’s QoS parameters (e.g., PQI) of other SL links**
3. **RX UE’s SL DRX configuration of other SL links**
4. **RX UE’s Uu DRX configuration if RX UE is in RRC\_CONNECTED**
5. **activated configured SL/UL grant resource allocation, e.g. period and start offset**
6. **Other if any?**

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| --- | --- | --- |
| Company | Options | Comments |
| Xiaomi | C, d, e | Regarding a, TX UE are not aware how RX UE derives the desired SL DRX configuration. In case TX UE is not able to follow RX UE’s preference, TX UE is not able to do appropriate compromise. So we prefer RX UE to provide the factors related to SL DRX.  Regarding b and c, the SL DRX for unicast can’t be derived from QoS parameters. So, we prefer c.  Regarding d, it’s useful to achieve alignment between SL and Uu DRX.  Regarding e, our understanding is that sidelink operates in half-duplex mode. If sidelink DRX active time overlaps with SL transmission or UL transmission in case of sidelink shares UL resources, RX UE can’t monitor PSCCH reception. But TX UE is not aware of the SL/UL resource scheduling at RX UE. Therefore, the sidelink transmission within the overlapping period would be lost. The dynamic scheduling is up to gNB’s implementation and unpredictable. But the resources for configured UL/SL grant is predictable. To avoid the conflict between sidelink DRX and configured UL/SL grant, RX UE could provide the activated UL/SL grant resource allocation, e.g. period and starting offset, to TX UE. TX UE could determine the SL DRX to avoid the conflict as much as possible. |
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**Rapporteur summary**: According to the comments received by the companies, companies’ comments are summarized in the below.

Rapporteur would like to try to reach at least a consensus about the above highlighted points and thus would like to suggest:

1. .

## Q5 - when RX UE sends SL DRX assistance information to TX UE

In RAN2#114e, RAN2 has made the following agreements regarding how to configure SL DRX.

* *For* ***SL unicast****, TX-UE centric DRX configuration based on the assistance information from RX-UE is agreed as baseline.*
* *In* ***SL unicast****, for DRX configuration of each direction where one UE as Tx-UE and the other as Rx-UE, signaling-1 (Rx->Tx) is carried via a new PC5-RRC message, from Rx-UE to Tx-UE.*
* *In* ***SL unicast****, for DRX configuration of the direction where one UE as Tx-UE and the other as Rx-UE, signaling-2 (Tx->Rx) is carried via RRCReconfigurationSidelink, to deliver DRX configuration from Tx-UE to Rx-UE.*

The RX UE shall be able to send the assistance information to TX UE at least before the TX UE sets up the link/DRBs (i.e., TX UE sends *RRCReconfigurationSidelink* to the RX UE), so that the TX UE is able to take the assistance information into consideration when sending *RRCReconfigurationSidelink* to the RX UE, which may contain DRX configuration to be applied by the RX UE.

From Rapporteur’s perspecitve, for unicast, RX UE sends the assistance information to TX UE at least before TX UE sends DRX configuration to RX UE via *RRCReconfigurationSidelink.* Neverthless it is beneficial to check companies’s views.

*Note: discussion for this issue is relevant to unicast in both RRC CONNECTED, RRC\_IDLE/RRC\_INACTIVE and OOC.*

**Q4-1: do companies agree RX UE sends the assistance information to TX UE at the following time**

1. **before TX UE sends DRX configuration to RX UE via RRCReconfigurationSidelink**
2. **after TX UE has sent DRX configuration to RX UE via RRCReconfigurationSidelink?**

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| Company | Yes/No | Comments |
| Xiaomi | Yes | We support both options. Option b could be useful, in case the assistance information is changed, i.e. information listed in Q3-1 may change. |
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Regardless whether RX UE is mandatory or optional to provide SL DRX assistance information, another related question is whether trigger conditions for RX UE to provide assistance information need to be defined. In rapporteur’s understanding, trigger conditions are needed to be defined. Therefore, rapporteur would like to raise the following question to collect companies’ views. Some exemplary trigger conditions may include the following

* upon change of interest (e.g., whether or not to use SL DRX),
* upon changing QoS profiles,
* upon receiving configuration/reconfiguration on SL DRX from the gNB

**Q4-2: do companies think what trigger conditions/events shall be defined for RX UE to provide SL DRX assistance information to TX UE? E.g.,**

1. **upon change of interest** (**e.g., whether or not to use SL DRX**)**,**
2. **upon changing QoS profiles,**
3. **upon receiving configuration/reconfiguration on SL DRX from the gNB.**
4. Transmitted assistance information has changed
5. **other if any**

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| Company | Trigger conditions | Comments |
| Xiaomi | d | We could further discuss the detail event after content of assistance information is agreed. |
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**Rapporteur summary**: According to the comments received by the companies, companies’ comments are summarized in the below.

Rapporteur would like to try to reach at least a consensus about the above highlighted points and thus would like to suggest:

1. .

## Q6 - Is RX UE’s SL DRX configuration failure/reject to TX UE’s SL DRX configuration needed

In addition, a RX UE is allowed to accept or reject a recommended DRX configuration by a TX UE. In this way, the drawback of TX UE centric option, i.e., RX UE may lose its power saving by compulsorily following instructions from TX UEs can be mitigated.

From Rapporteur’s perspective, RX UE can simply indicate the decision (i.e., acceptance or rejection) after reception of a suggested SL DRX configuration. The process shall be based on RRC reconfiguration procedure as defined in Rel-16. In details, TX UE sends *RRCReconfigurationSidelink* containing DRX configuration to be applied by the RX UE, upon reception of the signaling, RX UE replies with *RRCReconfigurationCompleteSidelink* indicating acceptance of the DRX configuration, or *RRCReconfigurationFailureSidelink* indicating rejection of the DRX configuration.

Therefore, rapporteur would like to check companies’ views.

**Q5-1: do companies agree that** **a two-step process (i.e., RX UE simply accepts or rejects TX UE’s suggestion) should be adopted as the baseline, i.e.,**

**Step 1: TX UE sends RRCReconfigurationSidelink containing DRX configuration to be applied by the RX UE**

**Step 2: RX UE replies with RRCReconfigurationCompleteSidelink if the DRX configuration is accepted or RRCReconfigurationFailureSidelink if the DRX configuration is rejected?**

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| Company | Yes/No | Comments |
| Xiaomi | No for step 2 | RRCReconfigurationFailureSidelink is used to inform reconfiguration failure in R16. RRCReoconfigurationSidelink may contain both SL DRX configuration and other sidelink configuration. TX UE is not able to know whether the RRCReconfigurationFailureSidelink is caused by RX UE reject the DRX configuration or there is configuration failure, if RRCReconfigurationFailureSidelink is reused. So, we prefer RX UE to indicate the SL DRX reject or accept in **RRCReconfigurationCompleteSidelink.** TX UE could tell the different causes by different messages. |
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**Rapporteur summary**: According to the comments received by the companies, companies’ comments are summarized in the below.

Rapporteur would like to suggest

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# Conclusion

We have the following proposal:

[Proposal 1 .](#_Toc80046547)

[Proposal 2 .](#_Toc80046548)

[Proposal 3 .](#_Toc80046549)

[Proposal 4 .](#_Toc80046550)

[Proposal 5 .](#_Toc80046551)

3.1 For chair notes (proposal in priority order)

**Easy Proposals for Block Approval**

**Proposals for Online discussion**

**Proposals of Low priority**

# Reference

[1] R2-2107268 Summary of [POST114-e][706][V2X/SL] Discussion on remaining FFSs/open issues in SL DRX timer maintenance (InterDigital) InterDigital

# Appendix