**3GPP TSG RAN WG2 Meeting #116-e R2-210xxxx
Electronic Meeting, 1st - 12th, Nov 2021**

**Agenda item: 8.x.x**

**Source: CATT**

**Title: [Draft] [POST115-e][716][V2X/SL] Identified FFS/open issues (CATT)**

**Document for: Discussion and Decision**

# Introduction

This email discussion is for the below offline discussion:

* [POST115-e][716][V2X/SL] Identified FFS/open issues (CATT)

 **Scope:** Discuss identified FFS/open issues including: 1) FFS whether a TX profile identifies a release, or one or more sidelink feature groups, 2) FFS whether a TX profile needs to be provided with service type information or L2 id when upper layer indicates to AS layer, 3) FFS on slot or symbol where the start of SL-specific drx-HARQ-RTT-Timer and SL-specific drx-RetransmissionTimer, 4) FFS on the specific values of HARQ RTT that can be used for HARQ disabled case, 5) How to handle cases when a transmission may cause these timers to be running at the RX UE is FFS. FFS on groupcast. FFS on whether any spec impact (in agreement 14 and 15 in SL DRX timer maintenance, 6) what information is included in the assistance information from RX UE to TX UE? 7) Need of SL DRX assistance information REQ from TX UE to RX UE, 8) If SL DRX assistance information REQ is needed, what information is included? 9) FFS on the interpretation if assistance information is not provided, 10) FFS on the following TX/RX UE behaviours when reject happens, 11) FFS on whether the new rejection cause for SL DRX needs to be defined, 12) FFS on whether RRCReconfigurationFailureSidelink or RRCReconfigurationCompleteSidelink is used in Step 2, 13) Need of down-selection for SL DRX configuration when multiple QoS profiles are associated for same DST L2 ID, 14) Common or separate default SL DRX configuration for GC and BC? 15) FFS on whether default SL BC DRX configuration or which SL BC DRX configuration for DCR message should be used, 16) Whether SL DRX is applied after DCR message and before SL unicast DRX configuration is applied? 17) Whether we can confirm the WA that DRX configuration for V2X group management signaling is out of RAN2 scope.

 **Intended outcome:** Discussion summary

**Deadline:** Long email discussion. 1st phase: check companies’ views for the simple/general question, collect candidate options from the companies for the question including multiple options before checking all companies’ views for each option. 2nd phase: check companies’ views for all questions (no restriction). Checking the rapporteur summary is done from the end of 2nd phase to tdoc submission.

The above email discussion is divided in three phases:

* **Phase I**: Companies are invited to check the questions and provide your option for each question if it is not included in the candidate options by 26th Sep 10:00 UTC. Please pay attention, no feedback on the questions is needed in Phase I. Rapporteur will reshape the questions and options in this email discussion based on companies’ comments.
* **Phase II:** During this phase, a complete questionnaire will be published and companies are invited to provide feedback on the questions by 14th Oct 10:00 UTC.
* **Phase III:** Rapporteur submits a summary based on phase II’s feedback, and companies can comments on the summary by deadline of submission for RAN2#116-e.

# Identified FFS/open issues from [Post114-e][704]

## FFS whether a TX profile identifies a release, or one or more sidelink feature groups?

According to the description in [2], in Rel-15, in order to solve the compatible issue,“TX profile” was introduced to indicate whether a Rel-15 UE shall use Rel-14 compatible format or shall use Rel-15 format to transmit the corresponding V2X packet. In RAN2#115-e meeting, the compatible issue of SL DRX was discussed and RAN2 reached the agreement that for BC/GC, TX profile is introduced in Rel-17 for sidelink enhancement. But it is still FFS whether a TX profile identifies a release, or one or more sidelink feature groups?

During the RAN2#115-e online session, some companies raised that if TX profile is associated with release, there may be forward compatible issue (e.g., sidelink DRX may not be mandatory capability for sidelink UEs in future releases. If TX profile is R18, it may indicate CA or packet duplication operation, while doesn’t mean sidelink DRX is applied for this transmission. It’s unclear whether service associated with R18 should apply DRX or not) and TX Profile associated with a feature is a future proof solution. And some companies raised that sidelink features are not a good approach since increased sidelink feature combinations.

**Question 2.1-1:** **Whether a TX profile identifies a release, or one or more sidelink feature groups? Which option do you prefer and please give your comments.**

* **Option 1: A Tx profile identifies a release.**
* **Option 2: A Tx profile identifies one or more sidelink feature groups (If this option is selected, please give your view on which sidelink feature/feature groups should be considered).**
* **Option 3: Leave the decision to SA2/CT1.**

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| **Companies** | **Option** | **Comments** |
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## FFS whether a TX profile needs to be provided with service type information or L2 id when upper layer indicates to AS layer?

During RAN2#115-e meeting, RAN2 reached the below agreement [1]:

A TX profile is indicated from upper layer to AS layer. FFS whether a TX profile needs to be provided with service type information or L2 id.

For the FFS, the original question during online discussion is whether the service type is visible to AS layer or not. In upper layer, the service type is mapped to Tx profile, and the Tx profile is indicated to AS layer. For AS layer, for a given cast type and destination ID, which Tx profile is used should be considered. One company raised that maybe the L2 ID associated to the service type should accompany with the TX profile. Another company argued that in LTE, service type information is directly provided by the upper layer for each data unit.

**Question 2.2-1: Whether a TX profile needs to be provided with service type information or L2 id? Which option do you prefer? Please give your comments.**

* **Option 1:** **A Tx profile needs to be provided with service type information.**
* **Option 2: A Tx profile needs to be provided with L2 ID.**
* **Option 3: Leave the decision to SA2/CT1.**

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| **Companies** | **Option** | **Comments** |
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# Identified FFS/open issues from [Post114-e][705]

## FFS on slot or symbol where the start of SL-specific drx-HARQ-RTT-Timer and SL-specific drx-RetransmissionTimer?

During RAN2#115-e meeting, RAN2 reached the below agreements [1]:

Agreements on Uu DRX timer impacts:

1: When sl-PUCCH-Config is configured but the PUCCH is not transmitted due to UL/SL prioritization, the TX UE should start the SL-specific drx-HARQ-RTT-Timer in Uu for the corresponding SL HARQ process in the first slot/symbol after the end of the corresponding PUCCH resource. FFS on slot or symbol.

3:SL-specific drx-RetransmissionTimer is started at the first symbol after the end of last PSSCH resource scheduled through one DCI (with the assumption RAN2 agrees not to support SL-specific drx-HARQ-RTT-Timer but to support SL-specific drx-RetransmissionTimer when sl-PUCCH-Config is not configured, when sl-PSFCH-Config is configured). FFS the SL-specific drx-RetransmissionTimer is started at the first slot after the end of last PSSCH resource scheduled through one DCI instead.

4:SL-specific drx-RetransmissionTimer is started at the first symbol after the end of last PSSCH resource scheduled through one DCI (with the assumption RAN2 agrees not to support SL-specific drx-HARQ-RTT-Timer but to support SL-specific drx-RetransmissionTimer when sl-PUCCH-Config is not configured, when sl-PSFCH-Config is not configured). FFS the SL-specific drx-RetransmissionTimer is started at the first slot after the end of last PSSCH resource scheduled through one DCI instead.

During the RAN2#115-e online session, the majority was fine with the intention of the proposal, while not sure about the start point “in/at the first symbol/slot after the end of”. The proponent of slot raised that compared with Uu, the difference of PC5 is that the PHY channels are defined in the granularity of slots instead of symbols, so it is preferred at least for SL-DRX timers to be defined in slots [3]. The opponent of slot raised that for Uu DRX, it is “symbol” used in the MAC spec for Uu DRX, it is better to use the time unit of “symbol” in the proposals, and also in the procedure texts in the spec.

**Question 3.1-1: When sl-PUCCH-Config is configured but the PUCCH is not transmitted due to UL/SL prioritization, which option should be selected as the starting time granularity of the SL-specific drx-HARQ-RTT-Timer for Tx UE? Please give your comments.**

* **Option 1:** **The starting timing of SL-specific drx-HARQ-RTT-Timer is referring to slot.**
* **Option 2: The starting timing of SL-specific drx-HARQ-RTT-Timer is referring to symbol.**

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| **Companies** | **Option** | **Comments** |
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In the phase I discussion, some companies think that when sl-PUCCH-Config is configured, the starting time granularity of SL-specific drx-HARQ-RTT-Timer should be same regardless whether PUCCH is transmitted and not.

In RAN2#114-e meeting, it was agreed that:

7: When sl-PUCCH-Config is configured (and the PUCCH is transmitted), the UE should start the SL-specific drx-HARQ-RTT-Timer in Uu for the corresponding SL HARQ process in the first slot after the end of the corresponding transmission carrying the SL HARQ feedback via the PUCCH.

**Question 3.1-2: Do you agree that the agreement in RAN2#114-e (When sl-PUCCH-Config is configured (and the PUCCH is transmitted), the UE should start the SL-specific drx-HARQ-RTT-Timer in Uu for the corresponding SL HARQ process in the first slot after the end of the corresponding transmission carrying the SL HARQ feedback via the PUCCH.) needs to be reverted to align with the agreement for Question 3.1-1? Please give your comments.**

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| **Companies** | **Yes/No** | **Comments** |
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**Question 3.1-3: In case of SL-specific drx-HARQ-RTT-Timer is not supported but to support SL-specific drx-RetransmissionTimer, which option should be selected as the starting time granularity of the SL-specific drx-RetransmissionTimer for Tx UE? Please give your comments.**

* **Option 1:** **The starting timing of SL-specific drx-RetransmissionTimer is referring to slot.**
* **Option 2: The starting timing of SL-specific drx-RetransmissionTimer is referring to symbol.**

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| **Companies** | **Option** | **Comments** |
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# Identified FFS/open issues from [Post114-e][706]

## FFS on the specific values of HARQ RTT that can be used for HARQ disabled case?

In RAN2#115-e meeting, RAN2 reached the below agreement [1]:

Proposal 10 – HARQ RTT is supported for both HARQ enabled and HARQ disabled cases by allowing HARQ RTT timer to be set to different values. FFS on the specific values that can be used for HARQ disabled case.

Based on the above agreement, it is still FFS when HARQ feedback is disabled, how to determine the value of HARQ RTT timer. In the email discussion [4], four options were given, but only seven companies gave their view on this issue. Hence in the current email discussion, RAN2 will further discuss this issue to gather more companies’ view on this question.

**Question 4.1-1:** **How to determine the value used for the HARQ RTT timer when HARQ feedback is disabled? Which option do you prefer? Please give your comments.**

* **Option 1: The value of zero.**
* **Option 2: The value of non-zero.**

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| **Companies** | **Option** | **Comments** |
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## How to handle cases when a transmission may cause these timers to be running at the RX UE is FFS. FFS on groupcast. FFS on whether any spec impact (in agreement 14 and 15 in SL DRX timer maintenance).

In RAN2#115-e meeting, RAN2 reached the below agreement [1]:

14: For unicast, the TX UE selects the resources for the initial transmission associated with any active time (e.g. on duration timer or inactivity timer, or retransmission timer) at the RX UE. How to handle cases when a transmission may cause these timers to be running at the RX UE is FFS. FFS on groupcast. FFS on whether any spec impact.

15: For unicast, the TX UE can select the resources for the retransmission associated with any active time (e.g. on duration timer or inactivity timer, or retransmission timer) at the RX UE. How to handle cases when a transmission may cause these timers to be running at the RX UE is FFS. FFS on groupcast. FFS on whether any spec impact.

According to the above agreement 14 and agreement 15, for unicast, it is clear that no matter for initial transmission or retransmission, it can be sent when any of the DRX timers (including on-duration timer, inactivity timer or retransmission timer) is running at the Rx UE. In the rapporteur’s understanding, the first FFS (how to handle cases when a transmission may cause these timers to be running at the RX UE is FFS) is to address the case that the active time of Rx UE may be changed upon receiving transmission from Tx UE. In the rapporteur’s understanding, this FFS has some relationship with the “future active time” which was mentioned in the following agreement 13:

13: When data is available for transmission to one or more RX UE in DRX, TX UE selects the resources taking into account the active time (current or future) of the RX UE(s) determined by the timers maintained at the TX UE. Details are FFS. FFS whether RAN1 or RAN2 implement this restriction. Send LS to RAN1.

In mode 2, the TX UE MAC receives a set of available resources from the PHY layer and performs random selection on these available resources to select a transmission and retransmission resource(s) from this set of available resources. If RAN1 considered the current or future active time in RAN1, no further work is needed in RAN2. Since LS has been sent to RAN1, RAN2 had better wait for RAN1 LS reply before we discuss this issue further.

**Question 4.2-1: For sidelink unicast, do companies agree that RAN2 can wait for RAN1 LS reply before RAN2 discuss how to handle the cases when a transmission may cause these timers (inactivity timer or retransmission timer) to be running at the RX UE when mode 2 Tx UE performs resource selection? Please give your comments.**

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| **Companies** | **Yes/No** | **Comments** |
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**Question 4.2-2: If the answer of Question 4.2-1 is No, how to handle the cases when a transmission may cause these timers (inactivity timer or retransmission timer) to be running at the RX UE when mode 2 Tx UE performs resource selection? Which option do you prefer? Please give your comments.**

* **Option 1: Ensure all resources (transmission and retransmission) occur in the active time determined at the time of resource selection.**
* **Option 2: Ensure at least one (transmission, and possibly one or more retransmissions) occur in the active time determined in the active time at the time of resource selection.**

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| **Companies** | **Option** | **Comments** |
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For the second FFS (FFS on groupcast), during the RAN2#115-e online session, some company raised that it is more complicated for groupcast scenario compared to unicast which is one to one mapping. The core concern is that for groupcast, there may be another Tx UE. The misalignment of the active time of Tx UE and Rx UE(s) may be more serious.

During the Phase I discussion, some companies thinks the active time definition for sidelink groupcast has not been discussed, but in the rapporteur’s understanding the agreement on active time definition reached in RAN2#113bis-e can be applied to both unicast and broadcast/groupcast:

27: The SL active time of the RX UE includes the time in which any of its applicable sl-drx-OnDuration(s), sl-DRXInactivityTimer(s), or sl-drx-RetransmissionTimer(s) are running.

Hence, we can directly discuss whether the agreement reached for unicast can be reused for groupcast.

**Question 4.2-3: Do you agree that for groupcast, the same agreement (agreement 14 and agreement 15) reached for unicast can be reused? Please give your comments.**

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| **Companies** | **Yes/No** | **Comments** |
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For the last FFS (FFS on whether any spec impact), one company raised concern that for the agreed proposal, whether the current Agreements 14&15 is separated with Agreement 13. Then the FFS part was added.

Agreements in RAN2#115-e:

13: When data is available for transmission to one or more RX UE in DRX, TX UE selects the resources taking into account the active time (current or future) of the RX UE(s) determined by the timers maintained at the TX UE. Details are FFS. FFS whether RAN1 or RAN2 implement this restriction. Send LS to RAN1.

14: For unicast, the TX UE selects the resources for the initial transmission associated with any active time (e.g. on duration timer or inactivity timer, or retransmission timer) at the RX UE. How to handle cases when a transmission may cause these timers to be running at the RX UE is FFS. FFS on groupcast. FFS on whether any spec impact.

15:For unicast, the TX UE can select the resources for the retransmission associated with any active time (e.g. on duration timer or inactivity timer, or retransmission timer) at the RX UE. How to handle cases when a transmission may cause these timers to be running at the RX UE is FFS. FFS on groupcast. FFS on whether any spec impact.

**Question 4.2-4: Regarding to the Agreements 14&15 for unicast, whether companies think there is specification impacts in RAN2?**

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| **Companies** | **There is/There isn’t** | **Comments** |
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# Identified FFS/open issues from [AT115-e][702]

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

RAN2 reached the below agreement in RAN2#115-e meeting [1]:

2: For SL unicast, RX UE may include its desired SL DRX configuration in the assistance information which is transmitted to TX UE.

But it is FFS what information should be included in the assistance information. Before RAN2 discuss what should be included in the assistance information, it should first make clear how the Rx UE determines its desired SL DRX configuration.

**Question 5.1-1: How does the Rx UE determine its desired SL DRX configuration? Please give your comments.**

* **Option 1: Up to Rx UE’s implementation.**
* **Option 2: It should consider TX UE’s traffic pattern.**
* **Option 3: It should consider the SL DRX configuration of the other PC5-S connections of this Rx UE.**
* **Option 4: It should consider the Uu DRX configuration of this Rx UE.**

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| **Companies** | **Option** | **Comments** |
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And then, it should further discuss whether the desired SL DRX configuration in the assistance information is defined by the conventional SL DRX parameters.

**Question 5.1-2: Do companies agree that the desired SL DRX configuration in the assistance information is defined by the conventional SL DRX parameters (e,g, DRX cycle, onduration timers, RTT timers and etc)? Please give your comments.**

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| **Companies** | **Yes/No** | **Comments** |
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**Question 5.1-3: If the answer of the Question 5.1-2 is No, please give your detailed description on how to define the desired SL DRX configuration in the assistance information?**

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| **Companies** | **Please give your detailed description on how to define the desired SL DRX configuration in the assistance information** |
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**Question 5.1-4: If the answer of the Question 5.1-2 is Yes, whether the onduration timer should be included in the RX UE’s desired SL DRX configuration? Please give your comments.**

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| **Companies** | **Yes/No** | **Comments** |
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**Question 5.1-5: If the answer of the Question 5.1-2 is Yes, whether the DRX start offset should be included in the RX UE’s desired SL DRX configuration? Please give your comments.**

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| **Companies** | **Yes/No** | **Comments** |
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**Question 5.1-6: If the answer of the Question 5.1-2 is Yes, whether the DRX cycle should be included in the RX UE’s desired SL DRX configuration? Please give your comments.**

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| **Companies** | **Yes/No** | **Comments** |
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**Question 5.1-7: If the answer of the Question 5.1-2 is Yes, whether the drx-inactivity timer should be included in the RX UE’s desired SL DRX configuration? Please give your comments.**

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| **Companies** | **Yes/No** | **Comments** |
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**Question 5.1-8: If the answer of the Question 5.1-2 is Yes, whether the HARQ RTT timer should be included in the RX UE’s desired SL DRX configuration? Please give your comments.**

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| **Companies** | **Yes/No** | **Comments** |
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**Question 5.1-9: If the answer of the Question 5.1-2 is Yes, whether the HARQ retransmission timer should be included in the RX UE’s desired SL DRX configuration? Please give your comments.**

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| **Companies** | **Yes/No** | **Comments** |
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## Need of SL DRX assistance information REQ from TX UE to RX UE?

During the email discussion for this issue [5], 16 of 21 companies agreed that the SL DRX assistance information request message is not supported. The proponent of SL DRX assistance information REQ raised that without this procedure, the RX UE can’t set the desired/suggested DRX configuration and the RX UE can’t know if TX UE supports SL DRX or not. But no final conclusion was reached. Hence, this issue should be further discussed in this email discussion.

**Question 5.2-1: Whether it is necessary to introduce the SL DRX assistance information request from Tx UE to Rx UE? Please give your comments.**

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| **Companies** | **Yes/No** | **Comments** |
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## If SL DRX assistance information REQ is needed, what information is included?

If the answer of Question 5.2-1 is Yes, it should further discuss what information should be contained in the SL DRX assistance information request message.

**Question 5.3-1: If the answer of Question 5.2-1 is Yes, what information should be included in the SL DRX assistance information REQ message? Which option do you prefer? Please give your comments.**

* **Option 1: A request for SL DRX assistance information.**
* **Option 2: Traffic pattern information of the TX UE.**
* **Option 3: QoS information of the sidelink service(s) from Tx UE to Rx UE.**

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| **Companies** | **Option** | **Comments** |
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## FFS on the interpretation if assistance information is not provided?

In RAN2#115-e meeting, RAN2 reached the below agreement [1]:

1: For determining SL DRX configuration by TX UE, SL DRX capable RX UE is not mandatory to provide the SL DRX assistance information to TX UE. FFS on the interpretation if assistance information is not provided.

During the RAN2#115-e online session, some company raised concern that if the assistance information is not provided, it is not clear whether TX UE considers that RX UE does not want DRX operation or RX UE is ok with any DRX configuration. Hence, the above FFS part was added as a compromise.

**Question 5.4-1: When TX UE doesn’t receive any assistance information from RX UE, how to interpret it in Tx UE? Which option do you prefer? Please give your comments.**

* **Option 1: TX UE considers that RX UE does not want DRX operation.**
* **Option 2: TX UE considers that RX UE is ok with any DRX configuration.**

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| **Companies** | **Option** | **Comments** |
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## Open issues when Rx UE rejects the SL DRX configured by Tx UE?

This section covers the below three issues:

10) FFS on the following TX/RX UE behaviours when reject happens, 11) FFS on whether the new rejection cause for SL DRX needs to be defined, 12) FFS on whether RRCReconfigurationFailureSidelink or RRCReconfigurationCompleteSidelink is used in Step 2,

In RAN2#115-e meeting, it was agreed that [1]:

4: For unicast, a two-step process (i.e., RX UE accepts or rejects TX UE’s suggestion) is adopted as a baseline, i.e., FFS on the following TX/RX UE behaviours when reject happens.

 • Step 1: TX UE sends RRCReconfigurationSidelink containing a SL DRX configuration to be applied by RX UE to RX UE

 • Step 2: RX UE replies with a PC5-RRC signalling indicating acceptance or rejection for the SL DRX configuration. FFS on whether the new rejection cause for SL DRX needs to be defined. FFS on whether RRCReconfigurationFailureSidelink or RRCReconfigurationCompleteSidelink is used in Step 2.

When the SL DRX configuration is included in the *RRCReconfigurationSidelink* message, but the Rx UE rejects it, what is the Rx UE behaviour should be discussed.

**Question 5.5-1: When the Rx UE rejects the SL DRX configuration included in the RRCReconfigurationSidelink, which PC5-RRC signaling should be sent from Rx UE to Tx UE? Which option do you prefer? Please give your comments.**

* **Option 1: *RRCReconfigurationFailureSidelink*.**
* **Option 2: *RRCReconfigurationCompleteSidelink*.**

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| **Companies** | **Option** | **Comments** |
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If Option 1 is selected for Question 5.5-1, according to TS38.331, the contents of *RRCReconfigurationFailureSidelink* are as below:

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| – *RRCReconfigurationFailureSidelink*The *RRCReconfigurationFailureSidelink* message is used to indicate the failure of a PC5 RRC AS reconfiguration. It is only applied to unicast of NR sidelink communication.Signalling radio bearer: SL-SRB3RLC-SAP: AMLogical channel: SCCHDirection: UE to UE***RRCReconfigurationFailureSidelink* message**-- ASN1START-- TAG-RRCRECONFIGURATIONFAILURESIDELINK-STARTRRCReconfigurationFailureSidelink ::= SEQUENCE { rrc-TransactionIdentifier-r16 RRC-TransactionIdentifier, criticalExtensions CHOICE { rrcReconfigurationFailureSidelink-r16 RRCReconfigurationFailureSidelink-IEs-r16, criticalExtensionsFuture SEQUENCE {} }}RRCReconfigurationFailureSidelink-IEs-r16 ::= SEQUENCE { lateNonCriticalExtension OCTET STRING OPTIONAL, nonCriticalExtension SEQUENCE {} OPTIONAL}-- TAG-RRCRECONFIGURATIONFAILURESIDELINK-STOP-- ASN1STOP |

According to the above message, there is no failure cause indication in the *RRCReconfigurationFailureSidelink*. If Rx UE rejects the SL DRX configuration, whether new rejection cause should be introduced inthe *RRCReconfigurationFailureSidelink* can be further discussed.

**Question 5.5-2: If Option 1 is selected for Question 5.5-1, when the Rx UE rejects the SL DRX configuration included in the *RRCReconfigurationSidelink*, whether new rejection cause for SL DRX should be introduced in the *RRCReconfigurationFailureSidelink* message? Please give your comments.**

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| **Companies** | **Yes/No** | **Comments** |
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**Question 5.5-3: If Option 1 is selected for Question 5.5-1, when the Rx UE rejects the SL DRX configuration included in the *RRCReconfigurationSidelink*, besides the new rejection cause for SL DRX, whether other information can be included in the *RRCReconfigurationFailureSidelink* message?**

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| **Companies** | **Yes/No** | **Comments** |
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If Option 1 is selected for Question 5.5-1, it should further discuss what are the Tx UE behaviors upon receiving the *RRCReconfigurationFailureSidelink*. According to the description in TS38.331, in Rel-16 V2X, the corresponding UE behaviors are as below:

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| 5.8.9.1.8 Reception of an *RRCReconfigurationFailureSidelink* by the UEThe UE shall perform the following actions upon reception of the *RRCReconfigurationFailureSidelink*:1> stop timer T400 for the destination, if running;1> continue using the configuration used prior to corresponding *RRCReconfigurationSidelink* message;1> if UE is in RRC\_CONNECTED:2> perform the sidelink UE information for NR sidelink communication procedure, as specified in 5.8.3.3 or sub-clause 5.10.15 in TS 36.331 [10]; |

**Question 5.5-4: If Option 1 is selected for Question 5.5-1, once the Tx UE received the *RRCReconfigurationFailureSidelink*，what is the Tx UE behavior? Which option do you prefer? Please give your comments.**

* **Option 1: Fully reuse the legacy Tx UE behaviors.**
* **Option 2: Tx UE applies the the parameters other than SL DRX which is included in the RRCReconfigurationSidelink, but continue using the SL DRX configuration used prior to corresponding RRCReconfigurationSidelink message if present.**
* **Option 3: Tx UE restarts the T400 and resends the RRC reconfiguration including a new DRX configuration.**

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| **Companies** | **Option** | **Comments** |
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If Option 2 is selected for Question 5.5-1, it should further clarify how the Tx UE aware the sidelink DRX rejection. As rapporteur thinks, in order to solve this question, some additional indication in the *RRCReconfigurationCompleteSidelink* message can be enhanced, and the Tx UE’s behavior for how to handle this new added indication is also needed.

**Question 5.5-5: If Option 2 is selected for Question 5.5-1, when the Rx UE rejects the SL DRX configuration included in the *RRCReconfigurationSidelink*, whether indication of SL DRX configuration rejection should be introduced in the *RRCReconfigurationCompleteSidelink* message? Please give your comments.**

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| **Companies** | **Yes/No** | **Comments** |
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The current Tx UE behaviors upon receiving the *RRCReconfigurationCompleteSidelink* message are listed as below:

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| 5.8.9.1.9 Reception of an *RRCReconfigurationCompleteSidelink* by the UEThe UE shall perform the following actions upon reception of the *RRCReconfigurationCompleteSidelink*:1> stop timer T400 for the destination, if running;1> consider the configurations in the corresponding *RRCReconfigurationSidelink* message to be applied. |

**Question 5.5-6: If Option 2 is selected for Question 5.5-1 and Yes is answered for Question 5.5-5, once the Tx UE received the *RRCReconfigurationCompleteSidelink* message，what is the Tx UE behavior? Which option do you prefer? Please give your comments.**

* **Option 1: Fully reuse the legacy Tx UE behaviors.**
* **Option 2: Tx UE applies the the parameters other than SL DRX which is included in the RRCReconfigurationSidelink, but continue using the SL DRX configuration used prior to corresponding RRCReconfigurationSidelink message if present.**
* **Option 3: Tx UE restarts the T400 and TX UE resends the RRC reconfiguration including a new DRX configuration.**

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| **Companies** | **Option** | **Comments** |
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# Identified FFS/open issues from [AT115-e][703]

## Need of down-selection for SL DRX configuration when multiple QoS profiles are associated for same DST L2 ID?

Regarding to the SL DRX configuration for BG/CG, the following agreements were reached in the past RAN2 meetings:

**RAN2#114:**

4: For GC/BC, DRX cycle is configured per QoS profile.

5a: For GC/BC, RAN2 understands that sl-drx-startoffset does not take QoS requirement into consideration.

5b: For GC/BC, For GC/BC, sl-drx-startoffset is set based on DST L2 ID.

**RAN2#115:**

2: For BC/GC, the on-duration timer length and inactivity timer length (only for GC) are configured per QoS profile.

3: For GC, do not pursue per-QoS or per-L2-ID configuration for RTT timer length and retransmission timer length.

5b: For GC/BC, For GC/BC, sl-drx-startoffset is set based on DST L2 ID.

Based on the above agreement, for BC/GC, if there are multiple QoS profiles associated for the same L2 DST, there may be multiple DRX cycles, and each DRX cycle is corresponding to one QoS profile. It will be complex for maintain the SL DRX active time. Hence, one question raised whether down-selection for SL DRX configuration is needed when multiple QoS profiles are associated for the same L2 DST.

Regarding to the down-selection, the views from different companies are divergent. The proponent of down-selection raised that since SCI only carries the destination ID related information for the associated TB, even when multiple SDUs of different logical channels associated with different QoS profiles are multiplexed into the same TB, the MAC entity at the RX side simply cannot operate separate DRX configurations respectively towards different QoS profiles of the data within a given TB, considering that DRX is performed for SCI reception which is at a per TB (not per LCH) level. If multiple DRX configurations are applied, considering UE is in active according to some QoS profiles but the data associated with those QoS profiles are not multiplexed in the TB, such design can easily defeat the purpose of power saving from DRX mechanism. Moreover, if multiple DRX configurations are applied for a given destination ID by the MAC, it would cause considerable challenge on UE implementation complexity, as there could be quite a few timers needed to be maintained in parallel. The opponent of down-selection thought that SL QoS have multiple dimensions, and the ordering of one dimension is not necessarily the same as the other dimension. So down-selection based on a single dimension of the QoS is not feasible.

According to the above agreements, there is already agreements that down-selection of inactivity timer is necessary. Hence, in the following, when RAN2 discuss whether down-selection should be performed, RAN2 can discuss the SL DRX parameters one by one:

**Question 6.1-1: For BC/GC, how to perform the down-selection for inactivity timer? Which option do you prefer? Please give your comments.**

* **Option-1: Select the inactivity timer associated with the QoS profile whose priority level is the highest.**
* **Option-2: Select the inactivity timer associated with the QoS profile whose PDB is the smallest.**
* **Option-3: Select the inactivity timer whose inactivity timer length is the largest.**

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| **Companies** | **Option** | **Comments** |
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**Question 6.1-2: For BC/GC, do you think down-selection of the DRX cycle for BG/CG is necessary when multiple QoS profiles are associated with the same DST L2 ID? Please give your comments.**

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| **Companies** | **Yes/No** | **Comments** |
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**Question 6.1-3: If the answer of Q6.1-2 is Yes, how to perform the down-selection for the DRX cycle? Which option do you prefer? Please give your comments.**

* **Option 1: Select greatest common divisor of the DRX cycle of multiple QoS profiles as DRX cycle.**
* **Option 2: Select the DRX cycle associated with the QoS profile whose priority level is the highest.**
* **Option 3: Select the DRX cycle associated with the QoS profile whose PDB is the smallest.**
* **Option 4: Select the DRX cycle whose DRX cycle is the smallest.**
* **Option 5: Select the DRX cycle whose DRX cycle is the longest.**

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| **Companies** | **Option** | **Comments** |
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**Question 6.1-4: For BC/GC, do you think down-selection of the length of the on-duration timer is necessary when multiple QoS profiles are associated with the same DST L2 ID? Please give your comments.**

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| **Companies** | **Yes/No** | **Comments** |
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**Question 6.1-5: If the answer of Q6.1-4 is Yes, for BC/GC, how to perform the down-selection of the length of the on-duration timer, which option do you prefer? Please give your comments.**

* **Option-1: Select the length of the on-duration timer associated with the QoS profile whose priority level is the highest.**
* **Option-2: Select the length of the on-duration timer associated with the QoS profile whose PDB is the smallest.**
* **Option-3: Select the length of the on-duration timer whose on-duration timer length is the smallest.**
* **Option-4: Select the length of the on-duration timer whose on-duration timer length is the longest.**
* **Option-5: Select the length of the on-duration timer associated with the QoS profile, which is associated with the selected DRX cycle.**

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| **Companies** | **Option** | **Comments** |
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**Question 6.1-6: For GC, do you think down-selection of the length of the HARQ RTT timer is necessary when multiple QoS profiles are associated with the same DST L2 ID? Please give your comments.**

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| **Companies** | **Yes/No** | **Comments** |
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**Question 6.1-7: If the answer of Q6.1-6 is Yes, for GC, how to perform the down-selection of the length of the HARQ RTT timer, which option do you prefer? Please give your comments.**

* **Option-1: Select the length of the HARQ RTT timer associated with the QoS profile whose priority level is the highest.**
* **Option-2: Select the length of the HARQ RTT timer associated with the QoS profile whose PDB is the smallest.**
* **Option-3: Select the length of the HARQ RTT timer whose on-duration timer length is the smallest.**
* **Option-4: Select the length of the HARQ RTT timer whose on-duration timer length is the longest.**
* **Option-5: Select the length of the HARQ RTT timer associated with the QoS profile, which is associated with the selected DRX cycle.**

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| **Companies** | **Option** | **Comments** |
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**Question 6.1-8: For GC, do you think down-selection of the length of the HARQ retransmission timer is necessary when multiple QoS profiles are associated with thesame DST L2 ID? Please give your comments.**

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| **Companies** | **Yes/No** | **Comments** |
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**Question 6.1-9: If the answer of Q6.1-8 is Yes, for GC, how to perform the down-selection of the length of the HARQ retransmission timer, which option do you prefer? Please give your comments.**

* **Option-1: Select the length of the HARQ retransmission timer associated with the QoS profile whose priority level is the highest.**
* **Option-2: Select the length of the HARQ retransmission timer associated with the QoS profile whose PDB is the smallest.**
* **Option-3: Select the length of the HARQ retransmission timer whose on-duration timer length is the smallest.**
* **Option-4: Select the length of the HARQ retransmission timer whose on-duration timer length is the longest.**
* **Option-5: Select the length of the HARQ retransmission timer associated with the QoS profile, which is associated with the selected DRX cycle.**

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| **Companies** | **Option** | **Comments** |
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## Common or separate default SL DRX configuration for GC and BC?

In RAN2#115-e meeting, the following agreements were reached [1]:

4: For BC/GC, default DRX configuration(s) can be used for QoS profile(s) which cannot be mapped into DRX configuration configured for the dedicated QoS profile(s).

But it is still FFS whether only one common default SL DRX configuration is applied to both GC and BC or separate default SL DRX configuration should be defined for GC and BC?

**Question 6.2-1: Whether common or separate default SL DRX configuration should be used for GC and BC? Which option do you prefer? Please give your comments.**

* **Option 1: Common.**
* **Option 2: Separate.**

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| **Companies** | **Option** | **Comments** |
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# Identified FFS/open issues from [AT115-e][704]

## FFS on whether default SL BC DRX configuration or Which SL BC DRX configuration for DCR message should be used?

In RAN2#115-e meeting, regarding to the DRX for DCR message, the following agreement was reached [1]:

3: For unicast, SL BC DRX configuration is applied for DCR message [20/22]. FFS on whether default SL BC DRX configuration or which SL BC DRX configuration for DCR message should be used.

Based on the above agreement, RAN2 agreed that SL BC DRX configuration is applied for DCR message, but it is FFS on which SL BC DRX configuration should be used for the DCR message.

**Question 7.1-1: Which SL BC DRX configuration should be used for the DCR message? Which option do you prefer? Please give your comments.**

* **Option 1: Use the default SL BC DRX configuration.**
* **Option 2: Define a DCR message dedicated DRX configuration (common for UEs).**
* **Option 3: Define a QoS profile for DCR message and use the DRX for this QoS profile.**
* **Option 4: Define TX profile for DCR to decide DRX application as additional consideration.**

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| **Companies** | **Option** | **Comments** |
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## Whether SL DRX is applied after DCR message and before SL unicast DRX configuration is applied?

Besides DCR, for the other PC5-S messages (SMC, DCA, etc.) that are transmitted between the two UEs, the L2 destination ID corresponding to these message is unicast L2 ID. For these messages, since PC5-RRC connection has not been established, whether and which SL DRX should be applied needs further discussion.

**Question 7.2-1: Do you agree that SL DRX should be applied for the PC5-S messages which are sent after the DCR message and before SL unicast DRX configuration is applied?**

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| **Companies** | **Yes/No** | **Comments** |
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**Question 7.2-2: If the answer of Question 7.2-1 is Yes, which DRX configuration should be used for PC5-S messages which are sent after the DCR message and before SL unicast DRX configuration is applied? Which option do you prefer? Please give your comments.**

* **Option 1: Use the default SL BC DRX configuration.**
* **Option 2: Define a dedicated DRX configuration.**
* **Option 3: Define a QoS profile for DCR message and use the DRX for this QoS profile.**

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| **Companies** | **Option** | **Comments** |
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## Whether we can confirm the WA that DRX configuration for V2X group management signaling is out of RAN2 scope?

As raised in [9], according to the procedure for groupcast mode of V2X communication over PC5[10], before running the groupcast service(s), the V2X application layer carries out V2X group management, and provides group identifier information (i.e., an application-layer V2X group identifier) as well as V2X application requirements for the groupcast communication.



Figure 6.3.2-1: Procedure for groupcast mode of V2X communication over PC5 reference point

As discussed in TS 38.287 [10], although V2X group formation is initiated by the V2X application layer, which is out of scope of 3GPP specification, the V2X group management is carried out in VAE and SEAL layers, which is within the scope of 3GPP specification.

During the email discussion [7], the majority companies (15/22) agreed that DRX configuration for V2X group management signaling is out of RAN2 scope. But during the RAN2#115-e online session, one company raised concern that SA2 is discussing that discovery message includes some GC related messages. RAN2 may need to check SA2 status further. Hence the above proposal changed to working assumption as below.

4: Working assumption: DRX configuration for V2X group management signaling is out of RAN2 scope.

**Question 7.3-1:** **After checking with SA2, shall RAN2 confirm the working assumption that DRX configuration for V2X group management signaling is out of RAN2 scope? Please give your comments.**

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| **Companies** | **Yes/No** | **Comments** |
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# Conclusion

# References

1. R2-2108838 Report from session on LTE V2X and NR SL Session Chair (Samsung)
2. R2-2107303 Summary of [POST114-e][704][V2X/SL] How to make sure Rel-16 UEs not supporting SL DRX are not involved in SL communication in DRX manner (Sharp) SHARP Corporation

1. R2-2107159 Summary of [POST114-e][705][V2XSL] Discussion on remaining FFSs and open issues in Uu DRX timer Huawei, HiSilicon

1. R2-2107268 Summary of [POST114-e][706][V2X/SL] Discussion on remaining FFSs/open issues in SL DRX timer maintenance (InterDigital) InterDigital
2. R2-2108982 Summary of [AT115-e][702][V2X/SL] SL DRX configuration for UC Ericsson
3. R2-2108983 Summary of [AT115-e][703][V2X/SL] SL DRX configuration for GC/BC (OPPO) OPPO
4. R2-2108984 Summary of email [AT115-e][704][V2X/SL] Others ZTE
5. R2-2002501 Report of 3GPP TSG RAN2#109-e meeting, Online
6. R2-2108222 A Default PC5 DRX Configuration for Broadcast/Groupcast/Unicast vivo
7. 3GPP TS 38.287, Architecture enhancements for 5GS to support V2X services, V17.0.0, June, 2021