**3GPP TSG-RAN2 #116bis-e R2-220xxxx**

**Electronic meeting, January 17 – January 25, 2022**

**Agenda item:**8.6.2 (NR\_SmallData\_INACTIVE-Core)

**Source:** LG Electronics (Rapporteur)

**Title:** [AT116-e][501][SData] UP SDT open issues (LG)

**Document for:** Discussion and Decision

# 1. Introduction

This document summarizes issues identified in the documents submitted to A.I. 8.6.2 User plane common aspects.

Note that not all the issues submitted to A.I. 8.6.2 are summarized in this document. Issues overlapped with other e-mail discussions and issues not related to user plane are not covered.

Deadline for providing comments:

* + - Companies inputs – January 20, 23:59 UTC
    - Rapporteur summary – January 21
    - Final comments on Rapporteur summary – January 24, 23:59 UTC

# 2. Discussion

## 2.1 logicalChannelSR-DelayTimer

The related proposals in the submitted documents are captured below.

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| [1] Proposal 1: The logicalChannelSR-DelayTimer is not applied for logical channels configured with SDT.  [2] Proposal 3: logicalChannelSR-DelayTimer for SDT can be provided by the network within SDT common configuration in SIB1.  [3] Proposal 3: logicalChannelSR-DelayTimer is not applied during SDT, i.e. confirm that BSR is configured only by default MAC Cell Group configuration  [4] Proposal 1 Delaying the trigger of SR is not supported in SDT, i.e., logicalChannelSR-DelayTimer is not configured for SDT.  [5] Proposal 10: The logicalChannelSR-DelayTimer is not applied to the logical channel configured with SDT.  [7] Proposal 3 The logicalChannelSR-DelayTimer and logicalChannelSR-Mask can be optionally configured in the RRCRelease message.  [8] Proposal 1: logicalChannelSR-DelayTimer can be configured and applied for logical channels configured with SDT.  [8] Proposal 2: RRC release message can provide a dedicated BSR MAC configuration for determining the BSR parameters in INACTIVE state.  [9] Proposal 1: The logicalChannelSR-DelayTimer should be applicable for SDT, and the UE specific logicalChannelSR-DelayTimerApplied stored for each logical channel will be used in SDT.  [9] Proposal 2: Support the configuration of logicalChannelSR-DelayTimer for SDT in SIB1.  [10] Proposal 4: The dedicated BSR and PHR configuration can be configured for SDT.  [10] Proposal 5: logicalChannelSR-DelayTimer can be applied during the SDT procedure.  [11] Proposal 5: Do not support logicalChannelSR-DelayTimer for SDT.  [13] Proposal 3: To prevent frequent RA triggers due to BSR triggers, it should be possible for the NW to control how long time the UE shall wait before triggering RA procedure upon SR trigger.  [13] Proposal 4: Single timer can be configured by the NW to prevent unnecessary RA triggers due to BSR triggers, it applies to all LCHs/DRBs configured for SDT similarly to logicalChannelSR-DelayTimer applies for a single LCH. |

In RAN2#116e, it is left FFS whether the logicalChannelSR-DelayTimer is applied for logical channels configured with SDT. At RAN2#1116e meeting, majority companies think that it is not essential, and it would increase signalling overhead if supported because it is not included in the default MAC Cell Group configuration (Note that it is agreed BSR is configured only by default MAC Cell Group configuration.). However, some companies argue that there is no reason to restrict the use of existing function. Moreover, they think *logicalChannelSR-DelayTimer* is very useful for power saving and efficiency improvement of resource usage by preventing frequent SR triggering.

**Issue 1: Can the logicalChannelSR-DelayTimer be applied for logical channels configured with SDT?**

**- Option 1: Yes.**

**- Option 2: No.**

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| --- | --- | --- |
| Company | Preferred option | Detailed Comments |
| Samsung | No | **According to the proponents, logicalChannelSR-DelayTimer is needed to prevent frequent SR triggering. On the other hand, application of this timer will delay SR and would require either BSR configuration for SDT or configuration of logicalChannelSR-DelayTimer for SDT in SI or RRC Release message. In our view SDT duration is small and frequent SR triggers are unlikely.** |
| Apple | Yes | It can avoid the frequent RA-SR triggering during the SDT duration if the CG-SDT resource is configured. And the dedicated MAC configuration can provide this configuration. |

If it agreed that the logicalChannelSR-DelayTimer can be applied for SDT, next question is how to configure this timer, considering that this timer is not included in the default MAC Cell Group configuration.

**Issue 2: If the logicalChannelSR-DelayTimer can be applied for logical channels configured with SDT, how the timer value is configured?**

**- Option 1: Signalled by RRCRelease message.**

**- Option 2: Signalled by SIB.**

**- Option 3: Include in the default MAC Cell Group configuration.**

**- Option 4: Reuse the value configured in RRC\_CONNECTED.**

**- Option 5: Defined in specification.**

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| Company | Preferred option | Detailed Comments |
| Apple | Option 1/ 4 |  |
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If it is agreed that the logicalChannelSR-DelayTimer can be applied for SDT, one more issue to decide is whether each logical channel is configured with its own timer value, or a same timer value is used for all logical channels configured with SDT.

**Issue 3: If the logicalChannelSR-DelayTimer can be applied for logical channels configured with SDT, which timer value is applied for logical channels configured with SDT?**

**- Option 1: Each logical channel is configured with its own timer value.**

**- Option 2: All logical channels are configured with a same timer value.**

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| Company | Preferred option | Detailed Comments |
| Samsung | Option 2 |  |
| Apple | Option 1/2 |  |

Though not discussed before, it is good to know companies views on whether the logicalChannelSR-Mask is applied to logical channels configured with SDT.

**Issue 4: Can the logicalChannelSR-Mask be applied for logical channels configured with SDT?**

**- Option 1: Yes.**

**- Option 2: No.**

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| Company | Preferred option | Detailed Comments |
| Samsung | No |  |
| Apple | No |  |

## 2.2 CCCH message for SDT data volume calculation

The related proposals in the submitted documents are captured below.

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| [1] Proposal 2: Size of CCCH message is not considered in SDT data volume calculation.  [2] Proposal 4: The size of CCCH message is considered in SDT data volume calculation.  [5] Proposal 11: The size of CCCH message is not considered in SDT data volume calculation.  [7] Proposal 5 CCCH message is included in SDT DVT calculation.  [8] Proposal 5: CCCH bits are not included in the data volume computation for SDT resource selection.  [11] Proposal 6: Do not consider CCCH message for SDT data volume calculation.  [12] Proposal 7: The size of CCCH message is not considered for SDT data volume calculation.  [13] Proposal 5: CCCH SDU size is not accounted in the SDT data volume calculation by the UE. |

This issue has been left FFS for several meetings. However, there is no technical problem either way. The size of CCCH message (i.e. RRCResumeRequest message) is constant, and could easily be considered in SDT data volume calculation. We can go with simple majority.

**Issue 5: Do you think the size of CCCH message should be considered in SDT data volume calculation?**

**- Option 1: Yes.**

**- Option 2: No.**

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| Company | Preferred option | Detailed Comments |
| Samsung | No | CCCH message i.e. RRC Resume Request is always transmitted upon initiation of SDT procedure. The size of CCCH message is known to network. Network can configure the SDT data volume threshold excluding the size of CCCH message. So in our view it is not necessary to include the size of CCCH message in SDT data volume calculation. |
| Apple | No | The CCCH message is delivered in the initial SDT transmission, and the message size is fixed. So it’s unnecessary to include the CCCH message size in the SDT data volume calculation. |

## 2.3 Buffered packet handling upon reception of RRCRelease message

The related proposals in the submitted documents are captured below.

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| [1] Proposal 3: RLC entities of SDT RBs are re-established upon receiving RRC Release with suspend configuration.  [1] Proposal 4: PDCP entity of SRB 2 is re-established upon receiving RRC Release with suspend configuration, if SRB 2 is configured as SDT RB.  [2] Proposal 2: UE should re-establish the SDT RLC entities upon receiving the RRCRelease message instead of when the UE initiates SDT procedure.  [3] Proposal 1: To discard buffered packets for more accurate SDT data volume calculation, upon reception of RRCRelease message providing SDT configuration, the UE shall:  - Perform RLC re-establishment for the SDT DRBs and SDT SRBs  - Perform PDCP SDU discard for the SDT SRBs  [6] Proposal 1: For DRB, Old buffered data in PDCP/RLC entities should not be counted in SDT data volume calculation.  [6] Proposal 2: For SRB1 & SRB2, Old buffered data in PDCP/RLC entities should not be counted in SDT data volume calculation.  [6] Proposal3: for each SDT DRB and SRB1/SRB2, an indication in RRCRelease message shall be introduced to indicate PDCP/RLC entities to be reestablished.  [7] Proposal 6 Old buffered PDCP/RLC packets are not considered for DVT calculation and are discarded at RRCRelease.  [9] Proposal 7: For each of the RLC bearers with the servedRadioBearer configured for SDT, re-establish the RLC entity when UE is released to INACTIVE state.  [11] Proposal 1: At the time of SDT data volume calculation, there should be no buffered packets in PDCP/RLC entities that will not be transmitted during SDT procedure.  [11] Proposal 2: PDCP PDUs are discarded (by PDCP suspend) upon reception of RRCRelease message including suspendConfig. PDCP SDUs already stored are considered in SDT data volume calculation. No change to current specification is needed.  [11] Proposal 3: RLC PDUs and SDUs that will not be transmitted during SDT procedure shall be discarded before performing SDT data volume calculation. RAN2 choose one of the options below.  - Option 1: Up to implementation. The network should not move the UE to RRC\_INACTIVE if some packets a1re stored in the UE’s L2 buffer. The UE should not process PDCP SDUs if they arrive at PDCP entity after sending BSR=0.  - Option 2: The UE re-establishes RLC entities when the UE receives RRCRelease message including suspendConfig.  - Option 2.1: The UE autonomously re-establishes RLC entities  - Option 2.2: The UE re-establishes RLC entities based on explicit signalling (i.e. reestablishRLC)  [12] Proposal 8: Enhancement on handling the PDCP buffered packets for SDT data volume calculation is not needed. |

This issue was discussed in RAN2#116e, and it was agreed that buffered packets in PDCP/RLC entities shall be considered in SDT data volume calculation, same as legacy. However, whether and how to avoid any buffered packets in PDCP/RLC entities at the time of SDT data volume calculation still remains FFS.

First, RAN2 has to decide whether the buffered packets in PDCP/RLC entities should be avoided at the time of SDT data volume calculation. If they are included in the SDT data volume calculation, the calculated SDT data volume may be over-calculated, and SDT procedure may not be triggered. Even if they are considered in SDT data volume calculation, they will not be transmitted in SDT procedure, because they will be discarded when initiating SDT procedure (due to PDCP/RLC re-establishment).

**Issue 6: Do you agree that at the time of SDT data volume calculation, there should be no buffered packets in PDCP/RLC entities that will not be transmitted during SDT procedure.**

**- Option 1: Yes.**

**- Option 2: No.**

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| Company | Preferred option | Detailed Comments |
| Samsung | Yes |  |
| Apple | Yes |  |

For PDCP for DRBs, there is no issue, because the PDCP suspend is performed when the RRCRelease message including suspendConfig is received. As a result, all the stored PDCP PDUs are discarded before performing SDT data volume calculation. If there are PDCP SDUs stored in the PDCP buffer, they shall be considered in SDT data volume calculation because they are unacknowledged (for AM DRB) or not-transmitted (for UM DRB) PDCP SDUs, and they should be transmitted using SDT procedure. Note that PDCP SDUs are not discarded in any case, e.g. by PDCP suspend or PDCP re-establishment.

**Issue 7: For DRBs, do you agree that no change to PDCP is needed, i.e. PDCP suspend is performed upon reception of RRCRelease message including suspendConfig so that PDCP PDUs are discarded, and PDCP SDUs already stored are considered in SDT data volume calculation?**

**- Option 1: Yes.**

**- Option 2: No.**

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| Company | Preferred option | Detailed Comments |
| Samsung | Yes |  |
| Apple | Yes |  |

However, for PDCP for SRBs, PDCP suspend is not performed when the RRCRelease message including suspendConfig is received. As a result, there may be stored PDCP SDUs and PDUs at the time of SDT data volume calculation. In order to avoid old PDCP SDUs and PDUs at the time of SDT data volume calculation, the “PDCP SDU discard” may need to be performed for SRBs upon reception of RRCRelease message including suspendConfig. Note that the “PDCP SDU discard” is requested by RRC to PDCP to discard both PDCP SDUs and PDUs for SRBs.

**Issue 8: For SRBs, do you agree that “PDCP SDU discard” should be performed upon reception of RRCRelease message including suspendConfig in order to discard stored PDCP SDUs and PDUs?**

**- Option 1: Yes.**

**- Option 2: No.**

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| Company | Preferred option | Detailed Comments |
| Samsung | Yes | The issue is only for SRB2. PDCP entity of SRB 2 can be re-established upon receiving RRC Release with suspend configuration |
| Apple | Yes |  |

If it is agreed that the “PDCP SDU discard” should be performed for SRBs, next question is how to trigger “PDCP SDU discard” upon reception of RRCRelease message including suspendConfig.

**Issue 9: For SRBs, if “PDCP SDU discard” should be performed upon reception of RRCRelease message including suspendConfig, how the “PDCP SDU discard” is triggered?**

**- Option 1: The UE autonomously triggers “PDCP SDU discard” for SRBs.**

**- Option 2: The UE performs “PDCP SDU discard” for SRBs based on explicit signaling (i.e. discardOnPDCP).**

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| Company | Preferred option | Detailed Comments |
| Samsung | Option 1 |  |
| Apple | Option 1 |  |

For RLC, there may be stored RLC SDUs and RLC PDUs, because there is no UE action when RRCRelease message including suspendConfig is received. Then, to discard stored RLC SDUs and RLC PDUs, RLC re-establishment may need to be performed upon reception of RRCRelease message including suspendConfig. Note that in current specification, only RLC entity for SRB1 is re-established upon reception of RRCRelease message.

**Issue 10: For both DRBs and SRBs, do you agree that RLC entity should be re-established upon reception of RRCRelease message including suspendConfig in order to discard stored RLC SDUs and PDUs?**

**- Option 1: Yes.**

**- Option 2: No.**

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| Company | Preferred option | Detailed Comments |
| Samsung | Yes |  |
| Apple | Yes |  |

If it is agreed that RLC entity should be re-established, next question is how to trigger RLC re-establishment upon reception of RRCRelease message including suspendConfig.

**Issue 11: For both DRBs and SRBs, if RLC entity should be re-established upon reception of RRCRelease message including suspendConfig, how the RLC re-establishment is triggered?**

**- Option 1: The UE autonomously re-establishes RLC entities for both DRBs and SRBs.**

**- Option 2: The UE re-establishes RLC entities for both DRBs and SRBs based on explicit signaling (i.e. reestablishRLC).**

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| Company | Preferred option | Detailed Comments |
| Samsung | Option 1 |  |
| Apple | Option 1 |  |

## 2.4 LCH restrictions

The related proposals in the submitted documents are captured below.

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| [7] Proposal 2 As in legacy, the LCH restrictions configuredGrantType1Allowed and allowedCG-List are valid only for CG.  [10] Proposal 3: RA-SDT can be used for the transmission of all SDT-RBs, i.e. no further LCH restriction is needed.  [11] Proposal 4: Clarify how the LCH restriction is applied for RA-SDT.  - Option 1: RB level restriction (e.g. sdt-DRB-List) is applied for both CG-SDT and RA-SDT. For CG-SDT, existing LCH restriction (i.e. configuredGrantType1Allowed or allowedCG-List) can be further applied.  - Option 2: Introduce a new LCH restriction parameter (e.g. SDTAllowed) for each logical channel. The new parameter is applied for both CG-SDT and RA-SDT. |

It is agreed in RAN2#116e that if LCH restriction is applied for SDT, it is applied both for CG-SDT and RA-SDT.

For CG-SDT, configuredGrantType1Allowed or allowedCG-List can be used for LCH restriction. However, no such parameter is defined for RA-SDT. Then, it is not clear how the LCH restriction is applied for RA-SDT.

The rapporteur think the previous agreement is RB level restriction rather than LCH level restriction. That is, if a RB is configured for SDT (e.g. sdt-DRB-List in RRC running CR), it can use any of CG-SDT and RA-SDT. For CG-SDT, the use of certain CG can be further restricted by LCH restriction (i.e. configuredGrantType1Allowed or allowedCG-List). For RA-SDT, there is no further restriction unless we introduce a new parameter. Companies are asked to provide their views on the previous agreement.

**Issue 12: What is the meaning of “LCH restriction for RA-SDT”?**

**- Option 1: RB level restriction (e.g. sdt-DRB-List) is applied for both CG-SDT and RA-SDT. For CG-SDT, existing LCH restriction (i.e. configuredGrantType1Allowed or allowedCG-List) can be further applied.**

**- Option 2: Introduce a new LCH restriction parameter (e.g. SDTAllowed) for each logical channel. The new parameter is applied for both CG-SDT and RA-SDT.**

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| Company | Preferred option | Detailed Comments |
| Samsung | Option 1 |  |
| Apple | Option 1 |  |

## 2.5 ROHC continuity in RNA

The related proposals in the submitted documents are captured below.

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| [9] Proposal 3: RAN2 confirms that, for the per RNA ROHC continuity configuration, only the scenario that all the cells within the RNA are controlled by the same gNB will be supported (i.e. the ROHC continuity will not be supported in inter-node SDT, no matter the anchor relocation will be performed or not). |

It was agreed in RAN2#116e that ROHC continuity functionality can be configurable between the cell and RNA. However, if the cells within the RNA are controlled by different gNBs, the ROHC continuity between different gNBs is not supported, same as in RRC\_CONNECTED. It is good to confirm this understanding to have everyone on the same page.

**Issue 13: Do you agree that ROHC continuity in RNA is supported only when all the cells within the RNA are controlled by the same gNB?**

**- Option 1: Yes.**

**- Option 2: No.**

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| Company | Preferred option | Detailed Comments |
| Samsung | Yes |  |
| Apple | Yes |  |

# 3. Conclusions

To be filled later..

# 4 Contact Information

|  |  |
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# References

[1] R2-2200203 User Plane Aspects of RACH and CG based SDT Samsung

[2] R2-2200435 Remaining issues of user plane common aspects Huawei

[3] R2-2200573 Remaining user plane aspects of SDT NEC

[4] R2-2200643 Discussion on user plane issues of SDT OPPO

[5] R2-2200726 Remaining issues on UP aspects of SDT Qualcomm

[6] R2-2200863 Data volume calculation for SDT CMCC

[7] R2-2200985 Common aspects for SDT Ericsson

[8] R2-2201024 Remaining UP issues for SDT InterDigital

[9] R2-2201028 User plane common aspects of SDT ZTE

[10] R2-2201124 User plane aspects of SDT Apple

[11] R2-2201321 Remaining UP issues in SDT LG Electronics

[12] R2-2201570 Consideration on UP remaining issues CATT

[13] R2-2201586 UP aspects for SDT Nokia