**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.** |
| Huawei, HiSlicon | Option1 |  |
| Apple | Option 1 | 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. |
| Fujitsu | Option 1 | The configuration of logicalChannelzSR-DelayTimer can be up to network implementation. |
| ZTE | Yes | We will go with majority view, but we think this is an artificial restriction preventing something that is possible today and such artificial restriction is not nice from network perspective. Considering that SDT data is generally delay tolerant, the UE shall not send too many RACH messages for every UL packet. Thus, we see a benefit to enable the logicalChannelSR-DelayTimer to avoid unnecessary RACH procedures. We also think this comes for free from MAC perspective since all procedure is already there. The only change required is to configure the logicalChannelSR-DelayTimer |
| LGE | Option 2 | The logicalChannelSR-DelayTimer is introduced in LTE to delay the trigger of SR for certain logical channel when there is no available UL resource. However, for SDT, delaying the trigger of SR is of no use because whether to trigger SDT is not determined by BSR but by SDT data. That is, regardless of whether the BSR is triggered or not, once the SDT condition is met, the UE will trigger CG-SDT or RA-SDT. The BSR will be included in the UL resource in any case. We don’t see any use case of delaying the trigger of SR for SDT.  In addition, RAN2 agreed that BSR is configured only by default MAC Cell Group configuration, and the logicalChannelSR-DelayTimer is not included in the default MAC Cell Group configuration. If we want to support logicalChannelSR-DelayTimer, then additional signalling is needed for each logical channel. |
| Sharp | Option 2 |  |
| Xiaomi | No | Agree with Samsung. |
| OPPO | Option 2 | Even for connected state, logicalChannelSR-DelayTimer is optionally configured. Since we have agreed to apply default mac cell group configuration, it seems not necessary to introduce spec impacts in order to configure logicalChannelSR-DelayTimer which is actually not essential for BSR/SR procedure. |
| CMCC | Option 1 with comments | If we want to support logicalChannelSR-DelayTimer (per MAC Cell Group), we should also specify whether to support logicalChannelSR-DelayTimerApplied (per logical channel). If yes, whether to use logicalChannelSR-DelayTimer for a specific logical channel is up to network implementation. |

If it is 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 |
| Huawei, HiSIilicon | Option3 |  |
| Apple | Option 1/ 4 |  |
| Fujitsu | Option 1 | Options 3 and 4 can be also acceptable. |
| ZTE | 1/2/4 | We are fine with either option 1,2 or 4.  For option 3, we think it should be optional configured by NW, thus option 3 is not preferred. |
| LGE | Option 1/2 |  |
| Sharp | Option 4 |  |
| Xiaomi | Option 1 |  |
| OPPO | Option 3 | If Option1/2/4 is agreed, do we need to re-discuss whether other two parameters, i.e., periodicBSR-Timer and retxBRS-Timer, can be also configured as Option1/2/4? |
| CMCC | Option 1/4 | If logicalChannelSR-DelayTimerApplied is supported, option 1/4 is prefered. |

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 |  |
| Huawei, HiSilicon | Option2 | Same as the current spec |
| Apple | Option 1/2 |  |
| Fujitsu | Option 2 | According to the current ASN.1 structure i.e. per MAC according to MAC-CellGroupConfig. |
| ZTE | Option 2 |  |
| LGE | Option 1 | The logicalChannelSR-DelayTimer is per logical channel parameter. |
| Sharp | Option 2 | We tend to reuse the value configured in connected state which is the same value for all logical channels if configured. |
| Xiaomi | Option 2 |  |
| OPPO | Option 2 | In current spec, the logicalChannelSR-DelayTimer is applied for all LCHs. |
| CMCC | Option 2 | logicalChannelSR-DelayTimer is per MAC-CellGroupConfig, while logicalChannelSR-DelayTimerApplied is per logical channel. |

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 |  |
| Huawei, HiSilicon | Yes, But | It should only be applicable for CG-SDT |
| Apple | No |  |
| Fujitsu | Option 1 |  |
| ZTE | Yes |  |
| LGE | Option 2 |  |
| Sharp | Option 2 |  |
| Xiaomi | Option 2 |  |
| OPPO | Option 1 |  |
| CMCC | Option 2 |  |

## 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. |
| Huawei, HiSilicon | Option1 | Option1 has not spec change and We should follow legacy UE procedure |
| Apple | Option 2 | 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. |
| Fujitsu | Option 2 > 1 | Both options are fine, but Option 2 has no spec change but Option 1 seems to have spec change. |
| ZTE | No | It seems CCCH message will only be generated after the SDT/Non-SDT selection. Therefore, since the CCCH message has not been generated in case the SDT data volume calculation, there is no need to consider the CCCH message size in SDT data volume calculation.  In addition, we also agree with Samsung that the CCCH message size is fixed, the NW can take this into account when configuring the threshold. |
| LGE | Option 2 | The size of CCCH message (i.e. RRCResumeRequest message) is constant, and could easily be considered in SDT data volume calculation. However, it should be noted that the CCCH message is not constructed at the time of SDT data volume calculation. Only after the SDT data volume criteria is met, the RRC constructs the CCCH message. Then, it is a bit illogical to consider unconstructed message into data volume calculation. Even if the CCCH message size is not considered in the SDT data volume calculation, the network can set the threshold considering the potential CCCH message size because the CCCH message size is also known to the network. We don’t see any problem not to consider CCCH message for SDT data volume calculation. |
| Sharp | Option 2 | We share the same view with Samsung. |
| Xiaomi | Option 1 | Agree with Huawei, as CCCH message with LCG=0 is already part of the BSR. When to construct the CCCH message is the UE implementation. We should not prohibit the UE implementation of constructing the CCCH message at the early stage of the initial access. |
| OPPO | Option 2 | According to the agreement we made before, it seems that only buffer size across SDT-RBs shall be considered.  - Data volume used for SDT selection criteria is calculated as the total sum of Buffer Size across SDT RBs (i.e. same approach as BSR) |
| CMCC | Option 2 | Same view as LGE |

## 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 |  |
| Huawei, HiSilicon | Option1 | Data should only be considered in the data volume if they are to be transmitted. |
| Apple | Yes/Option 1 |  |
| Fujitsu | Option 1 |  |
| ZTE | Yes |  |
| LGE | Option 1 |  |
| Sharp | Option 1 |  |
| Xiaomi | Option 1 |  |
| OPPO | Option 1 with comments | We are wondering whether ‘buffered packets in PDCP/RLC entities that will not be transmitted during SDT procedure’ also intends to include non-SDT data? |
| CMCC | Option 1 |  |

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 |  |
| Huawei, HiSilicon | Option1 | PDCP SDUs will be transmitted during SDT, hence, they should be considered in the data volume calculation |
| Apple | Yes/Option 1 |  |
| Fujitsu | Option 1 |  |
| ZTE | Yes |  |
| LGE | Option 1 |  |
| Sharp | Option 1 |  |
| Xiaomi | Option 1 |  |
| OPPO | Option 1 |  |
| CMCC | Option 1 | For DRBs, PDCP SDUs shall be discarded when the discardTimer expires. PDCP SUDs that are not discarded should be considered in the data volume calculation |

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 |
| Huawei, HiSilicon | Option1 | This should only be for SRB. For DRB, legacy procedure is kept that PDCP SDUs are not discarded |
| Apple | Yes/Option 1 |  |
| Fujitsu | Option 1 |  |
| ZTE | No | We are not sure why PDCP SDU discard should happen at RRCRelease. Today we only discard PDCP PDUs upon PDCP suspend operation.  Our understanding is that PDCP re-establishment is performed upon RRC resume (as we do currently) for both DRBs and SRBs.  We would like to point out that this is already implemented in the running CR. So, companies can comment directly on this.  1> re-establish PDCP entities for SRB1;  1> resume SRB1;  1> if the resume procedure is initiated for SDT:  2> for each radio bearer that is configured for SDT:  3> re-establish PDCP entity for the radio bearer without triggering PDCP status report;  2> resume all the radio bearers that are configured for SDT;  Legacy behaviour  Added for SDT  So, we think nothing more is needed for this anyway. |
| LGE | Option 1 | The PDCP SDUs for SRBs are not transmitted during SDT procedure because they are discarded by PDCP re-establishment upon initiation of SDT procedure, explained by ZTE. As the PDCP SDUs are not transmitted during SDT procedure, they should be discarded before SDT data volume calculation. |
| Sharp | Option 1 |  |
| Xiaomi | Option 1 |  |
| OPPO | Option 1 |  |
| CMCC | Option 1 |  |

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 |  |
| Huawei, HiSilicon | Option1 | No need for explicit signaling |
| Apple | Option 1 |  |
| Fujitsu | Option 1 |  |
| ZTE | N/A | Question is not clear to us. Please see answer to Issue 8 above. |
| LGE | Option 1 |  |
| Sharp | Option 1 |  |
| Xiaomi | Option 1 |  |
| OPPO | Option 1 |  |
| CMCC | 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 |  |
| Huawei, HiSilicon | Option2 | Follow the legacy spec. there is no re-establish indication in the RRCRelease with suspendConfig |
| Apple | Yes/Option 1 |  |
| Fujitsu | Option 1 |  |
| ZTE | Yes | This is the proposal in the running CR. However, currently we only reestablish the RLC entities for those RBs that are configured for SDT. However, we agree with the rapporteur that all RLC entities should be reestablished (otherwise, the non-sdt RLC entities may still have some old data which will result in actually SDT being not triggered at all). This change can be made in the running CR.  3> for each of the RLC bearers ~~with the~~ *~~servedRadioBearer~~* ~~configured for SDT~~:  4> re-establish the RLC entity as specified in TS 38.322 [4]; |
| LGE | Option 1 |  |
| Sharp | Option 1 |  |
| Xiaomi | Option 1 |  |
| OPPO | Option 1 |  |
| CMCC | Option 1 |  |

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 ignalling (i.e. reestablishRLC).**

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| --- | --- | --- |
| Company | Preferred option | Detailed Comments |
| Samsung | Option 1 |  |
| Huawei, HiSIlicon | Option1 | For SDT, Option1 is the only option because there is no network indication |
| Apple | Option 1 |  |
| Fujitsu | Option 1 |  |
| ZTE | Option 1 |  |
| LGE | Option 1 |  |
| Sharp | Option 1 |  |
| Xiaomi | Option 1 |  |
| OPPO | Option 1 |  |
| CMCC | 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 |  |
| Huawei, HiSIlicon |  | We don’t think LCH restriction is applicable for RA-SDT |
| Apple | Option 1 |  |
| Fujitsu | Option 1 |  |
| ZTE | See comments | It is not clear how to use the existing allowedCG-List in SDT. Considering the allowedCG-List is configured based on “ConfiguredGrantConfigIndexMAC-r16”, and it is very much likely the CG resource configured in RRC Release will have different ConfiguredGrantConfigIndexMAC, the allowedCG-List configured in CONNECTED mode can not be used in INACTIVE SDT. If we want to reuse the allowedCG-List, then we have to configure separate allowedCG-List for each LCH in RRC release for SDT, which increase both the signaling overhead and complexity.  Therefore, we are fine to reuse the existing LCH restriction except the “configuredGrantType1Allowed or allowedCG-List”. For the “configuredGrantType1Allowed or allowedCG-List”, we propose not to have such restrictions in SDT. If majority companies think such restriction is useful, then we simply use CG-SDT DRB list instead of the per LCH allowedCG-List. |
| LGE | Option 1 |  |
| Sharp | Option 1 |  |
| Xiaomi | Option 1 |  |
| OPPO | Option 1 |  |
| CMCC | 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.**

|  |  |  |
| --- | --- | --- |
| Company | Preferred option | Detailed Comments |
| Samsung | Yes |  |
| Huawei, HiSilicon |  | Not clear what is the R2 spec impacts |
| Apple | Yes | No RAN2 impact |
| Fujitsu | Option 1 |  |
| ZTE | Yes |  |
| LGE | Option 1 |  |
| Sharp | Option 1 |  |
| Xiaomi | Option 1 |  |
| OPPO | Option 1 |  |
| CMCC | Option 1 |  |

## 2.6 CG-SDT resource validation based on RSRP change

The related proposals in the submitted documents are captured below.

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| --- |
| [14] Proposal 1. In the case of CG-SDT initial transmission, for TA validation, the RSRP at the time of initiating CG-SDT is compared to the DL pathloss reference RSRP stored at the time when RRCRelease message is received. |

RAN2 agreed to introduce a TA validation mechanism for SDT based on RSRP change. In legacy specification, the UE compares the measured RSRP value with the RSRP value stored at the UE’s last uplink transmission. However, in RRC\_INACTIVE, there may be no UL transmission until the SDT procedure is initiated, and thus there may be no stored DL pathloss reference RSRP at the time of initiating SDT procedure in RRC\_INACTIVE. Then, the UE cannot compare the RSRP change, and the TA validation for SDT procedure may fail. With this reason, [14] propose to compare the RSRP value stored at the time when RRCRelease message is received.

**Issue 14: Do you agree that, for CG-SDT resource validation, the UE compares the RSRP at the time of initiating CG-SDT procedure with the RSRP stored at the time when RRCRelease message is received?**

**- Option 1: Yes.**

**- Option 2: No (Please indicate which RSRP should be compared with).**

|  |  |  |
| --- | --- | --- |
| Company | Preferred option | Detailed Comments |
| Samsung | Option 1 |  |
| Huawei, HiSilicon | Option1 | The UE should be clear on how to compute the RSRP change at the very first transmission |
| Apple | Option 1 |  |
| Fujitsu | Option 1 |  |
| ZTE | Option 1 |  |
| LGE | Option 1 |  |
| Sharp | Option 1 |  |
| Xiaomi | Option 1 |  |
| OPPO | Option 2 | We think the RSRP to compare with shall be the one at the last TA validation, i.e., the last time when the TA is updated/validated. |
| CMCC | Option 2 | Same view as OPPO |

## 2.7 CG-SDT-TAT behavior

In RAN2#116-e meeting, the agreements were made for legacy TAT as follows.

|  |
| --- |
| 1. The legacy TAT (i.e. timeAlignmentTimerCommon in SIB) is used for UL timing maintenance during RA-SDT procedure. (21/23) 2. The legacy TAT (i.e. timeAlignmentTimerCommon in SIB) starts/restarts when RAR TAC or TAC MAC CE is received, regardless of SDT procedure. No spec change is needed. (23/23) 3. CG-SDT resource is not released even if the legacy TAT expires. (23/23) |

And, during the online discussion in RAN2#116bis-e, RAN2 agreed followings for CG-SDT-TAT.

1. RSRP-based TA validation is only applicable for initial CG-SDT and not needed for retransmission of the initial CG-SDT.

2 No additional NTA is defined for CG-SDT procedure

3 Upon expiry of CG-SDT-TAT , UE should (a) clears all SDT configured grant, (b) flushes HARQ buffer and (c) continue to maintain NTA.

And, there were also agreements made for CG-SDT-TAT in RAN2#113-e.

|  |
| --- |
| 1. TAT-SDT is started upon receiving the TAT-SDT configuration from gNB, i.e. RRCrelease message, and can be (re)started upon reception of TA command. |

With the agreements above, the rapporteur think the following behavior is clear for CG-SDT-TAT.

- The UE starts the CG-SDT-TAT upon reception of RRCRelease message.

- The UE restarts the CG-SDT-TAT upon reception of TA command.

- The UE clears CG-SDT resource and flushes HARQ buffer when the CG-SDT-TAT expires.

However, following issues need to be resolved.

- Whether the CG-SDT-TAT can be stopped.

- If the CG-SDT-TAT can be stopped, when does the CG-SDT-TAT stop?

- Does the CG-SDT-TAT stop at initiation of CG-SDT procedure? If so, when does the CG-SDT-TAT stop? At CG-SDT resource validation or at first UL transmission on CG or at reception of acknowledgement?

- Does the CG-SDT-TAT stop at initiation of RA-SDT procedure? If so, when does the CG-SDT-TAT stop? At preamble transmission or at reception of RAR TAC or at successful contention resolution?

- Does the CG-SDT-TAT at initiation of legacy RA procedure? If so, when does the CG-SDT-TAT stop? At preamble transmission or at reception of RAR TAC or at successful contention resolution?

- If the CG-SDT-TAT does not stop while running, when does the CG-SDT-TAT restart?

- In RA-SDT procedure, when does the CG-SDT-TAT restart? At reception of RAR TAC or at successful contention resolution? Or the UE does not restart the CG-SDT-TAT?

- In legacy RA procedure, when does the CG-SDT-TAT restart? At reception of RAR TAC or at successful contention resolution? Or the UE does not restart the CG-SDT-TAT?

- The NTA value is updated when the RAR TAC is received (due to legacy TAT). How to handle the NTA value if contention resolution fails?

Companies are asked to provide their views on the above issues.

**Issue 15: Do you think the CG-SDT-TAT can be stopped at some events?**

**- Option 1: Yes.**

**- Option 2: No.**

|  |  |  |
| --- | --- | --- |
| Company | Preferred option | Detailed Comments |
| Samsung | Yes | It is stopped when  a) UE enters RRC connected  b) UE receives RRC Release at the end of SDT procedure and RRC Release does not include/configure CG resources |
| Huawei, HiSIlicon | Yes | It should be stopped when CG-SDT procedure is triggered and started when RRCRelease message is received. |
| Apple | Yes | Same view as Samsung.  CG-SDT-TAT can be stopped when the current SDT procedure is terminated/ended by RRC message. |
| Fujitsu | Option 1 | Our understanding has been that CG-SDT-TAT is used for UL timing advance during CG-SDT procedure. |
| ZTE | Yes |  |
| LGE | Option 2 | We don’t see the need to stop the CG-SDT-TAT. There is no problem to keep this timer running until expires. The UE uses the CG-SDT resource only while the timer is running in RRC\_INACTIVE. Introducing “stop” behavior just complicates the specification. |
| Sharp | Option 1 | We think CG-SDT-TAT could be stopped when UE enters RRC connected and when UE receives RRC release without CG-SDT configured. |
| Xiaomi | Option 1 | Agree with Samsung |
| OPPO | Option 1 | In our understanding, CG-SDT-TAT can be stopped and CG-SDT resources can be released at least when:   1. UE receives RRCResume and goes into RRC\_Connected. 2. UE triggers RA-SDT/RRC resume when CG-SDT resources are available. 3. Based on explicit signalling in RRCRelease, e.g., Indication to release CG-SDT resources is included.    1. UE |
| CMCC | Option 1 | Same view as Samsung. |

**Issue 16.1: If the CG-SDT-TAT can be stopped at some events, does the CG-SDT-TAT stop at initiation of CG-SDT procedure?**

**- Option 1: Yes.**

**- Option 2: No.**

|  |  |  |
| --- | --- | --- |
| Company | Preferred option | Detailed Comments |
| Samsung | No | UE needs to ensure that TA remains valid while the initial UL transmission is successful. If the CG-SDT-TAT expires before the acknowledgment to initial UL transmission is received, UE cannot use CG resources for retransmitting the initial UL message. |
| Huawei, Hisilicon | Yes | When CG resource is being, there is no need to release the CG-SDT resources. |
| Apple | No | The validation of the UL TA during the initial SDT transmission is maintained by the CG-SDT-TAT. |
| Fujitsu | Option 2 | According to our understanding stated in Issue16. |
| ZTE | Yes |  |
| LGE | Option 2 | We don’t see any problem to keep the timer running. Introducing “stop” behavior just complicates the specification. |
| Sharp | Option 2 |  |
| Xiaomi | Option 2 | We should ensure that the UE has a valid TA during the CG-SDT procedure, to avoid the uplink interference to other slot. |
| OPPO | Option 2 |  |
| CMCC | Option 2 |  |

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**Issue 16.1.1: If the CG-SDT-TAT can be stopped at initiation of CG-SDT procedure, when does the CG-SDT-TAT stop?**

**- Option 1: At CG-SDT resource validation.**

**- Option 2: At first UL transmission on CG.**

**- Option 3: At reception of acknowledgement.**

**- Option 4: Other option (please indicate).**

|  |  |  |
| --- | --- | --- |
| Company | Preferred option | Detailed Comments |
| Samsung | See comments | We do not agree to stop CG-SDT-TAT. However if there is consensus to stop, it should be done as per option 3 |
| Huawei, HiSilicon | Option3 | The network side should also keep an instance of the timer. So the timer should be started when response is received |
| Fujitsu | Option 4 | According to our understanding stated in Issue16. |
| ZTE | Option 1/3 | We are fine with either option 1/3.  For option 1, considering the CG-SDT-TAT expiration after CG-SDT resource validation is a corner case, we don’t see clear need to optimize this.  However, if majority companies want to take this short period into account, then option 3 is also acceptable to us. With option 3, if CG-SDT-TAT expired after first UL CG transmission, then UE autonomous retransmission is not allowed (i.e. UE will release the CG resource as usual when CG-SDT-TAT expired), but NW scheduled retransmission should still be allowed, which is similar to PUR. |
| LGE | Option 4 | We don’t see any problem to keep the timer running. Introducing “stop” behavior just complicates the specification. |
| Sharp | Option 4 | CG-SDT-TAT could keep running. |
| Xiaomi | Option 4 | See our answers to Issue 15. |
| OPPO | Option 4 | In our understanding, if CG-SDT-TAT is stopped, we should have another timer to maintain the UL synchronization, i.e., legacy TAT. According to current spec, one case to start/re-start TAT is as follows:  1> when a Timing Advance Command MAC CE is received, and if an NTA (as defined in TS 38.211 [8]) has been maintained with the indicated TAG:  2> apply the Timing Advance Command for the indicated TAG;  2> start or restart the *timeAlignmentTimer* associated with the indicated TAG.  Therefore, the timing might be when the TAC is received after which CG-SDT-TAT can be stopped and TAT is started.  But as our answer of Q16.1, we CG-SDT-TAT shall maintain the TA during the whole CG-SDT procedure. |

**Issue 16.2: If the CG-SDT-TAT can be stopped at some events, does the CG-SDT-TAT stop at initiation of RA-SDT procedure?**

**- Option 1: Yes.**

**- Option 2: No.**

|  |  |  |
| --- | --- | --- |
| Company | Preferred option | Detailed Comments |
| Samsung | Option 2 | We do not see any need to stop. |
| Huawei, HiSIlicon | Option2 | RA procedure is not related to the CG-SDT resource |
| Apple | Option 2 |  |
| Fujitsu | Option 2 | According to our understanding stated in Issue16. |
| ZTE | Option 1 | We don’t see the need to maintain the CG-SDT-TAT during RA-SDT. |
| LGE | Option 2 | We don’t see any problem to keep the timer running. Introducing “stop” behavior just complicates the specification. |
| Sharp | Option 2 |  |
| Xiaomi | Option 2 |  |
| OPPO | Option 1 |  |
| CMCC | Option 2 |  |

**Issue 16.2.1: If the CG-SDT-TAT can be stopped at initiation of RA-SDT procedure, when does the CG-SDT-TAT stop?**

**- Option 1: At preamble transmission.**

**- Option 2: At reception of RAR TAC.**

**- Option 3: At successful contention resolution.**

**- Option 4: Other option (please indicate).**

|  |  |  |
| --- | --- | --- |
| Company | Preferred option | Detailed Comments |
| Samsung | See comments | We do not agree to stop CG-SDT-TAT. However if there is consensus to stop, it should be done as per option 3 |
| Huawei, HiSIlicon | See comments above |  |
| Fujitsu | Option 4 | Keep running according to our understanding stated in Issue16. |
| ZTE | Option 1 | The CG resource will not be used during SDT in case RA-SDT is initiated. If NW want to enable CG resource in the next SDT operation, CG resource can be enabled/configured in case RRC release is received. |
| LGE | Option 4 | We don’t see any problem to keep the timer running. Introducing “stop” behavior just complicates the specification. |
| Sharp | Option 4 | CG-SDT-TAT could keep running. |
| Xiaomi | Option 4 | See our answers to Issue 15. |
| OPPO | Option 4 | When RA-SDT is initiated. |

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**Issue 16.3: If the CG-SDT-TAT can be stopped at some events, does the CG-SDT-TAT stop at initiation of legacy RA procedure?**

**- Option 1: Yes.**

**- Option 2: No.**

|  |  |  |
| --- | --- | --- |
| Company | Preferred option | Detailed Comments |
| Samsung | Option 2 | We do not see any need to stop. |
| Huawei, HiSIlicon | Option2 | No need to relate RA procedure with this. TA can be handled witht eh legacy TAT |
| Apple | Option 2 |  |
| Fujitsu | Option 2 | Keep running according to our understanding stated in Issue16. |
| ZTE | Option 1 | We don’t see the need to maintain two TAT simultaneously. |
| LGE | Option 2 | We don’t see any problem to keep the timer running. Introducing “stop” behavior just complicates the specification. |
| Sharp | Option 2 |  |
| Xiaomi | Option 2 |  |
| OPPO | Option 2 |  |

**Issue 16.3.1: If the CG-SDT-TAT can be stopped at initiation of legacy RA procedure, when does the CG-SDT-TAT stop?**

**- Option 1: At preamble transmission.**

**- Option 2: At reception of RAR TAC.**

**- Option 3: At successful contention resolution.**

**- Option 4: Other option (please indicate).**

|  |  |  |
| --- | --- | --- |
| Company | Preferred option | Detailed Comments |
| Samsung | See comments | We do not agree to stop CG-SDT-TAT. However if there is consensus to stop, it should be done as per option 3 |
| Huawei, HiSIlicon | NO |  |
| Fujitsu | Option 4 | Keep running according to our understanding stated in Issue16. |
| ZTE | Option 1 |  |
| LGE | Option 4 | We don’t see any problem to keep the timer running. Introducing “stop” ehaviour just complicates the specification. |
| Xiaomi | Option 4 | See our answers to Issue 15. |
| OPPO | Option 4 | Not stop. |

**Issue 17.1: If the CG-SDT-TAT does not stop while running, and if RAR TAC is received, when does the CG-SDT-TAT restart during RA-SDT procedure?**

**- Option 1: At reception of RAR TAC.**

**- Option 2: At successful contention resolution.**

**- Option 3: The UE does not restart the CG-SDT-TAT.**

**- Option 4: Other option (please indicate).**

|  |  |  |
| --- | --- | --- |
| Company | Preferred option | Detailed Comments |
| Samsung | Option 2 |  |
| Huawei, HiSIlicon |  | RA-SDT procedure cannot be performed during CG-SDT per this meeting’s agreement.  16 UE does not use RA-SDT resources during ongoing CG-SDT session |
| Apple | Option 2 |  |
| Fujitsu | Option 1 | This is our understanding as agreed in RAN2#113-e above. |
| Samsung | Option 2 |  |
| LGE | Option 2 |  |
| Sharp | Option 2 |  |
| Xiaomi | Option 2 |  |
| OPPO | Option 2 |  |

**Issue 17.2: If the CG-SDT-TAT does not stop while running, and if RAR TAC is received, when does the CG-SDT-TAT restart during legacy RA procedure?**

**- Option 1: At reception of RAR TAC.**

**- Option 2: At successful contention resolution.**

**- Option 3: The UE does not restart the CG-SDT-TAT.**

**- Option 4: Other option (please indicate).**

|  |  |  |
| --- | --- | --- |
| Company | Preferred option | Detailed Comments |
| Samsung | Option 2 |  |
| Huawei, HiSilicon |  | The timer does not start/restart during RA procedure triggered during CG-sDT procedure |
| Apple | Option 2 |  |
| Fujitsu | Option 1 | This is our understanding as agreed in RAN2#113-e above. |
| Samsung | Option 2 |  |
| LGE | Option 2 |  |
| Sharp | Option 2 |  |
| Xiaomi | Option 2 |  |

**Issue 18: The NTA value is updated when the RAR TAC is received (due to legacy TAT). How to handle the NTA value if contention resolution fails?**

**- Option 1: Keep the NTA value updated when the RAR TAC is received.**

**- Option 2: Restore the NTA value used before RAR TAC is received.**

**- Option 3: Other option (please indicate).**

|  |  |  |
| --- | --- | --- |
| Company | Preferred option | Detailed Comments |
| Samsung | Option 2 |  |
| Huawei, HiSilicon | Clarification needed | We would like to understand wheter Option2 contradicts with our agreement that there is only a single NTA. In legacy PUR, a temporary NTA is introduced to temporary hold the value of NTA before successful contention resolution. We think Option2 is essentially the same as the PUR solution for introducing a new NTA/temporary NTA |
| Apple | Option 2 |  |
| Fujitsu | Option 1 | This is our understanding as legacy (i.e. the current TS38.321). |
| ZTE | Option 2 |  |
| LGE | Option 2 |  |
| Sharp | Option 2 |  |
| Xiaomi | Option 2 |  |
| OPPO | Option 2 | Follow the behaviour defined for PUR. |

# 3. Conclusions

To be filled later..

# 4 Contact Information

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| --- | --- |
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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