**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. |
| NEC | Option 2 | **The SDT procedure won’t last long, and new SDT data arrival during SDT won’t be very frequent, and nothing breaks down if RACH is triggered immediately. So we prefer a simple option.** |
| Lenovo/Motorola Mobility | Option 2 | Agree with Samsung, that frequent SR triggering is unlikely for a SDT session |
| InterDigital | Option 1 | If logicalChannelSR-DelayTimer is not configured, the LCH can constantly trigger an SR -or a RA initiated by SR trigger- repeatedly. This may create plenty of unnecessary signalling and can be detrimental to the PRACH capacity. |
| Nokia | Option 1 | Allows NW to provide UL grant within the timer run time and hence avoid unnecessary RA procedures. |
| Ericsson | Option 1 | **SR trigger is to transmit BSR (no grant) and we think data for SDT procedure trigger includes SDT data. However other cases should be handled for where this functionality may be useful. I.e this can be optionally configured** |
| Intel | Option 2 (No) | SDT sessions should be short in our view and we share the view explained by Samsung that it is not essential. However, we are open to consider it if there is majority support on this. |
| China Telecom | Option1 | **Generally, logicalChannelSR-DelayTimer is used to prevent frequent SR triggering. Without the logicalChannelSR-DelayTimer, when the BSR is triggered by SDT data (no UL grant), the SR will be triggered immediately. Since there is no SR resource configured for SDT, the RA procedure will be triggered instead. To avoid unnecessary RACH procedures, the logicalChannelSR-DelayTimer should be introduced.** |
| ASUSTeK | Option 2 |  |
| CATT | Option 2 | We don’t see the great benefits on power saving brought by introducing logicalChannelSR-DelayTimer in SDT as the whole SDT procedure will not too long. Besides, if logicalChannelSR-DelayTimer is applied to SDT, we need to reconsider the original agreement on BSR configuration, which will defer the whole SDT progress. |
| Qualcomm | Option 2 | It is not essential for SDT and may cause signaling overhead. |
| Spreadtrum | Option 1 | It can prevent frequent SR triggering during subsequent transmission. |
| vivo | Option 2 | We share a similar view with LG. |
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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 | Option1/2 | Option1 can be used for the cell where the UE is released |
| 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 ignaling. |
| NEC | Option 4 | If it has to be applied, then we prefer a solution with the least impact i.e. use the configuration in UE context. |
| InterDigital | Option 1> 4 | a non-default BSR configuration can configure for a subset of LCHs, Since the goal of BSR is to reflect buffer status of SDT DRBs only (for subsequent small data), which can be provided by the RRC release message. Option 4 is also acceptable. |
| Nokia | Option 1-4 | All can work. Slightly prefer Option 1. |
| Ericsson | Option 1/4 | If supported, optionally configured. |
| Intel | Option 1, 2, 4 | If it is agreed, we understand that dedicated ignaling could be used for Ues camping in that cell however for any UE that moves to other cells, this value would need to be provided via broadcast ignaling (understanding that its configured value may be UE specific one). |
| China Telecom | Option 1/4 | Both option1 and 4 are OK. |
| ASUSTeK | Option 1 |  |
| CATT | Option 2 |  |
| Qualcomm | Option 1 | The dedicated signaling for SDT is configured from RRC release message. |
| Spreadtrum | Option 4 |  |
| vivo | Option 1 |  |
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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 |  |
| 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. |
| NEC | Option 2 |  |
| Lenovo/Motorola Mobility | Option 2 |  |
| InterDigital | Option 2 |  |
| Nokia | Option 2 |  |
| Ericsson | Option 2 | As in legacy. |
| Intel | Option 2 |  |
| China Telecom | Option 2 |  |
| ASUSTeK | Option 2 |  |
| CATT | Option 2 |  |
| Qualcomm | Option 2 |  |
| Spreadtrum | Option 2 |  |
| vivo | Option 2 | Per MAC level, the same as legacy. |
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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 | Option2 | Mask is used for the case when the network does not want to UE to send BSR on CG but to send SR. but for CG-SDT, the type of traffic should not be that varied that all the resources should be able to be sent on CG. |
| Apple | No |  |
| Fujitsu | Option 1 |  |
| ZTE | Yes |  |
| LGE | Option 2 |  |
| Sharp | Option 2 |  |
| Xiaomi | Option 2 |  |
| OPPO | Option 1 |  |
| CMCC | Option 2 |  |
| NEC | Option 1 | logicalChannelSR-Mask is set per LCH, and it is a mandatory parameter. We need special handling if this parameter is not applied. So applying this parameter is the simplest. |
| Lenovo / Motorola Mobility | No |  |
| InterDigital | Option 1 |  |
| Nokia | ? | It is not clear what the question asks?  Does it mean that if Mask is not applied, then it is always set to *true*? Since when the Mask is set to *false*, then the SR **is triggered**.  We prefer the mask is always considered *true* and hence no SR triggered if valid CG resource is available. |
| Ericsson | Option 1 |  |
| Intel | Yes | For CG-SDT |
| China Telecom | Option 1 |  |
| ASUSTeK | Option 2 |  |
| CATT | Option 2 |  |
| Qualcomm | Option 2 | Same view with Huawei. |
| Spreadtrum | Option 2 |  |
| vivo | Option 2 |  |
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## 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 |
| NEC | Option 2 | When data volume is calculated, CCCH message is not generated by the UE, and the network is aware of the size of CCCH message and can configure data volume threshold excluding the size of CCCH message, therefore option 2 is simper for UE implementation. |
| Lenovo/Motorola Mobility | Option 1 | We think both options would work. Slight preference for Option 1 |
| InterDigital | Option 2 | Since CCCH is not data and the size of CCCH message is predictable by gNB, it should not be included in the data volume computation. |
| Nokia | Option 2 | CCCH size is known to NW and the CCCH logical channel is not associated to any LCG. Hence, Option 2 would be the legacy behaviour.  On the other hand, it should be noted that it has not even been agreed if the data volume calculation should be done only at the initiation of the SDT procedure or throughout the SDT procedure. |
| Ericsson | Option 1 |  |
| Intel | Option 2 (No) | We share the same view as explained by Samsung and ZTE above |
| China Telecom | Option 2 | CCCH message is constructed after the SDT/Non SDT selection. That is, CCCH message is generated after the SDT data volume calculation. Therefore, there is no need to consider the CCCH message size in the SDT data volume calculation. |
| ASUSTeK | Option 2 |  |
| CATT | Option 2 | We agree with the rapporteur that since the size of CCCH is constant, there is no technique issue. However, we think there is no necessity to do the calculation for CCCH to the data volume for simplicity. |
| Qualcomm | Option 2 |  |
| Spreadtrum | Option 2 | The size of CCCH message is fixed and known by network. |
| vivo | Option 1 | If we need to exclude that size, the UE needs to additionally calculate the oriented data size by subtraction of 6 Byte or 7 Byte. Without a doubt, it would increase the UE complexity and we fail to see any benefit. This is because if the network would like to precisely control the actual UP data size, it can in turn just set the data volume threshold by addition of 6 Byte or 7 Byte. The same outcome can be achieved without any spec modification. |
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## 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 |  |
| NEC | Option 1 | Regarding to OPPO’s question, we understand that since the SDT data volume calculation is only for SDT RBs, there is no need to discard the buffered data for non-SDT RBs. |
| Lenovo / Motorola Mobility | Option 1 |  |
| InterDigital | Option 1 |  |
| Nokia | Option 1 |  |
| Ericsson | Option 1 |  |
| Intel | Option 1 (Yes) |  |
| China Telecom | Option 1 |  |
| ASUSTeK | Option 1 |  |
| CATT | Option 1 | But we are wondering whether we need some enhancements to guarantee there is no buffered packets in PDCP/RLC entities that will not be transmitted during SDT procedure. |
| Qualcomm | Option 1 |  |
| Spreadtrum | Option 1 |  |
| vivo | Option 1 |  |
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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 |
| NEC | Option 1 |  |
| Lenovo/ Motorola Mobility | Option1 |  |
| InterDigital | Option 1 |  |
| Nokia | Option 1 |  |
| Ericsson | Option 1 |  |
| Intel | Option 1 (Yes) | Legacy suspend operation already captures that “indicate PDCP suspend to lower layers of all DRBs”. |
| China Telecom | Option 1 |  |
| ASUSTeK | Option 1 |  |
| CATT | Option 1 | We think if the buffered data is non-SDT, the UE will trigger non-SDT procedure. While the data is SDT, the data can be sent together in SDT procedure if the data volume is beyond the configured data volume threshold. There is no contradictory with the previous agreements. |
| Qualcomm | Option 1 |  |
| Spreadtrum | Option 1 |  |
| vivo | Option 1 |  |
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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 | Option2 | Same view as ZTE |
| 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; 2. resume SRB1; 3. 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 |  |
| NEC | Option 1 | Agree with rapporteur’s analysis. And we think this behaviour is applied for both SRB1 and SRB2, because for both SRB1 and SRB2, PDCP re-establishment is not performed when the MAC layer evaluate the SDT data volume. |
| Lenovo/ Motorola Mobility | Option1 |  |
| InterDigital | No | Agree with ZTE. We are fine with keeping the running CR as is |
| Nokia | Option 1 |  |
| Ericsson | Option 1 |  |
| Intel | More discussion is needed. | The consequences of discarding PDCP SDU for SRB (I.e., pending UL RRC/NAS messages) when the SDT session is released by the UE needs more discussion (this is different to discarding messages during a transition from CONNECTED to INACTIVE as NAS is aware of the transition). It will depend on which RRC messages are allowed during the SDT session and what would be the consequence if they are discarded or sent in the next SDT session. Take for example, there was a pending NAS positioning message in PDCP SDU buffer when network released the SDT session – this NAS message should not be flushed. |
| China Telecom | Option 1 |  |
| ASUSTeK | Option 1 |  |
| CATT | Option 1 | For SRB2, if it is not cleared, the data volume will be included in the data volume calculation which is inaccurate for SDT. |
| Qualcomm | Option 2 | We don’t understand why PDCP SDU discard is needed. |
| Spreadtrum | Option 2 | Agree with ZTE. |
| vivo | Option 2 | If there is any pending data associated with SDT-RBs, it should be calculated as well (i.e. they need to be transmitted anyway although it might be been transmitted before). |
|  |  |  |

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).**

|  |  |  |
| --- | --- | --- |
| 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 |  |
| NEC | Option 1 | Option1 is more signalling efficient. |
| Lenovo/ Motorola Mobility | Option1 |  |
| Nokia | Option 1 |  |
| Ericsson | Option 1 |  |
| Intel | Option 1 |  |
| China Telecom | Option 1 |  |
| ASUSTeK | Option 1 |  |
| CATT | Option 1 | But it should be noted that in PDCP re-establishment procedure, the UE will discard all stored PDCP SDUs and PDCP PDUs. If option 1 is adopted, some modifications for PDCP spec may need to be considered. |
| Qualcomm |  | PDCP SDU should not be discarded. |
| Spreadtrum | Option 1 |  |
| vivo | Comments | If there is any pending data associated with SDT-RBs, it should not be discarded. |
|  |  |  |

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.**

|  |  |  |
| --- | --- | --- |
| Company | Preferred option | Detailed Comments |
| Samsung | Yes |  |
| Huawei, HiSilicon | Option1 |  |
| Apple | Yes/Option 1 |  |
| Fujitsu | Option 1 |  |
| ZTE | Yes | This is the proposal in the running CR. However, currently we only e-establish the RLC entities for those RBs that are configured for SDT. However, we agree with the rapporteur that all RLC entities should be e-established (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.   1. for each of the RLC bearers ~~with the~~ *~~servedRadioBearer~~* ~~configured for SDT~~: 2. 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 |  |
| NEC | Option 1 |  |
| Lenovo/ Motorola Mobility | Option1 |  |
| InterDigital | Option 1 |  |
| Nokia | Option 1 |  |
| Ericsson | Option 1 |  |
| China Telecom | Option 1 |  |
| ASUSTeK | Option 1 |  |
| CATT | Option 1 |  |
| Qualcomm | Option 1 |  |
| Spreadtrum | Option 1 |  |
| vivo | Option 1 with comments | We are wondering why RLC re-establishment is needed for all RBs? |
|  |  |  |

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).**

|  |  |  |
| --- | --- | --- |
| 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 |  |
| NEC | Option 1 | Option 1 is more signalling efficient. |
| Lenovo/ Motorola Mobility | Option1 |  |
| InterDigital | Option 1 |  |
| Nokia | Option 1 |  |
| Ericsson | Option 1 |  |
| Intel | Option 1t |  |
| China Telecom | Option 1 |  |
| ASUSTeK | Option 1 |  |
| CATT | Option 1 |  |
| Qualcomm | Option 1 |  |
| Spreadtrum | Option 1 |  |
| vivo | Option 1 |  |
|  |  |  |

## 2.4 LCH restrictions

The related proposals in the submitted documents are captured below.

|  |
| --- |
| [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.**

|  |  |  |
| --- | --- | --- |
| Company | Preferred option | Detailed Comments |
| Samsung | Option 1 |  |
| Huawei, HiSIlicon |  | We don’t think LCH restriction is applicable for RA-SDT. We think the allowedCG-List that ZTE has mentioned is the most useful for SDT.  Option2 is redundant if we just configure the DRB as SDT DRB |
| 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 |  |
| NEC | Option 1 |  |
| Lenovo/ Motorola Mobility | Option1 |  |
| InterDigital | Option 1 | *configuredGrantType1Allowed* and *allowedCG*-*List* are obviously applicable only for CGs, just like in connected mode. |
| Ericsson | Option 1 |  |
| Nokia |  | It seems the following legacy restrictions could similarly apply to RA-SDT and the earlier agreement holds:  - *allowedSCS-List* which sets the allowed Subcarrier Spacing(s) for transmission;  - *maxPUSCH-Duration* which sets the maximum PUSCH duration allowed for transmission; |
| Intel | Option 1 | We have slightly preference to reuse existing mechanism unless a problem is identified. |
| China Telecom | Option 1 |  |
| ASUSTeK | Option 1 |  |
| CATT | Option 1 |  |
| Qualcomm | Option 1 | Slightly prefer option 1. But we think ZTE’s comments are valid. More discussions are needed. |
| Spreadtrum | Option 1 |  |
| vivo | 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 | No | Not clear what is the R2 spec impacts. This is up to R3, we have already sent them an LS. R3 is discussing this currently and something will come from them. |
| 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 |  |
| NEC | Basically Option 1, but | We understand that the ROHC continuity between different gNB is not supported by standardized interface, but it can be possible based on implementation. Anyway, there is no RAN2 impact. |
| Lenovo/ Motorola Mobility | Option1 |  |
| InterDigital | Option 1 |  |
| Nokia |  | No spec impact, this is up to NW. |
| Ericsson | Option 1 | We can of course clarify what functionality we need to RAN3. |
| Intel | Option 1 (Yes) - with comments | FFS if anything should be captured in specification as this is network implementation. |
| China Telecom | Option 1 |  |
| ASUSTeK | Option 1 |  |
| CATT | Option 1 | We share the view that if the cells in the RNA are controlled by different gNB, the UE has no idea whether context relocation happens or not for SDT initiation. Then, ROHC continuity can’t be performed in this case. |
| Qualcomm | Option 1 |  |
| Spreadtrum |  | Option 1 |
| vivo | Comments | Further RAN3 input is needed first. |
|  |  |  |

## 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 |
| NEC | Option 1 |  |
| Lenovo/ Motorola Mobility | Option1 |  |
| InterDigital | Option 1 |  |
| Nokia | Option 1 |  |
| Ericsson | Option 1 |  |
| Intel | Option 1 (yes) |  |
| China Telecom | Option 1 |  |
| ASUSTeK | Option 1 |  |
| CATT | Option 1 |  |
| Qualcomm | Option 1 |  |
| Spreadtrum | Option 1 |  |
| vivo | Option 1 | Same the LTE PUR. |
|  |  |  |

## 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. |
| NEC | Option 1 | Agree with Samsung |
| Lenovo / Motorola Mobility | Yes |  |
| InterDigital | Option 1 | Agree with Samsung |
| Nokia | Yes | Can be stopped when the NW response for the initial CG-SDT transmission is received. At this point, only legacy TAT can be used to operate the SDT procedure. |
| Ericsson | Option 1 | Same view as Samsung |
| Intel | Option 1 (yes) | We support the usage of delta configuration for SDT. Therefore CG-SDT-TAT is stopped when the timer is released or when CG-SDT resources are invalid. Regarding RRC\_CONNECTED, we understand that it can continue running but UE does not need to take any action upon its expiry (understanding that CG-SDT resources are only used when UE is in RRC\_INACTIVE configured with SDT feature) as explained in R2-2200507. |
| China Telecom | Option 1 | Same view with Samsung.  The CG-SDT-TAT should be stopped when the current SDT procedure is terminated by RRC message. |
| ASUSTeK | Option 1 | It could stop when the CG-SDT resources are released. |
| CATT | Option 1 |  |
| Qualcomm | Option 1 | When UE receives RRCResume and enters into connected state.  When legacy TAT timer starts for TA maintenance in legacy RACH or RA-SDT, CG-SDT-TAT stops. |
| Spreadtrum | Option 1 | Agree with Samsung. |
| vivo | Option 1 | It can be stopped if the legacy TAT timer is started. |
|  |  |  |

**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 | We think it can be stopped and used only for CG-SDT resources validation. Then for TA validation we can use only legacy TAT, which allows to maintain only a single TA timer at a time. When CG resource is being used, 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” ehaviour 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 |  |
| NEC | Option2 |  |
| Lenovo / Motorola Mobility | No, but | Depends also on how we specify the interaction with legacy TAT timer. It’s clear that UE should at the initiation of CG-SDT session and during the SDT session determine whether the CG-SDT resources are valid. If legacy TAT timer is not started during a CG-SDT session then CG-SDT-TAT should not be stopped at the initiation of a CG-SDT procedure |
| Ericsson | Option 2 |  |
| InterDigital | Option 2 |  |
| Nokia | What does “at initiation” here mean? | At initiation seems not to be clear in this question looking at question 16.1.1.  We prefer it is stopped when NW response to initial CG-SDT transmission is received. |
| Intel | Option 2 (No) | Our understanding is that CG-SDT-TAT is used for the management of the CG-SDT resource while Legacy TAT to maintain the UL sync. As UE can still use CG-SDT resources during an ongoing CG-SDT session, we understand that this timer does not need to be stopped, |
| China Telecom | Option 2 | At the initiation of CG-SDT procedure, the CG-SDT-TAT should be maintained for CG-SDT resources validation. |
| ASUSTeK | Option 2 | The CG-SDT resources are considered valid when the CG-SDT-TAT is running. It’s no need to stop the timer during CG-SDT. |
| CATT | Option 2 | We share the same that CG-SDT-TAT is used to maintain during the CG-SDT procedure. |
| Qualcomm | Option 2 | CG-SDT-TAT can be used for TA maintenance in CG-SDT as long as no switching to normal RACH. It depends on the interaction with legacy TAT timer as Lenovo mentioned. |
| Spreadtrum | Option 2 |  |
| vivo | Option 2 | If the UE explicitly stops the running CG-SDT-TAT, then it means NTA is not valid, which is not a fact. We feel strange. |
|  |  |  |

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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 to avoid mismatch between the timer in the UE and in the network. |
| 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” ehaviour 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. |
| NEC | Option 3 |  |
| Lenovo / Motorola Mobility | Option 3 | It should be clear that legacy TAT should be running in case CG-SDT-TAT is stopped, otherwise UE is not allowed to perform any UL transmission except RACH. |
| Nokia | Option 3 | At reception of NW response to the initial CG-SDT transmission. |
| Ericsson | Option 4 | We don’t agree to stop the CG-SDT-TAT during ongoing procedure. Our understanding is that CG-SDT resources can’t be used unless CG-SDT-TAT is running. |
| Intel | Option 1 or 3 | We understand that option 1 is applicable at any moment of the SDT session when using the CG-SDT resources (i.e. not only during the initiation of the CG-SDT procedure). However, option 3 would only be applicable if there is a majority support to stop this timer at initiation of CG-SDT procedure i.e. at reception of the acknowledgement for the 1st UL SDT msg. |
| China Telecom | Option 3 | The TAT-SDT is used for CG-SDT validation. When the NW receives the initial CG-SDT transmission successfully, the CG-SDT is proven to be valid. Therefore, the CG-SDT-TAT can be stopped. |
| CATT | Option 4 | CG-SDT-TAT is not stopped at initiation of CG-SDT procedure. |
| Qualcomm | Option 3 or 4 | If the reception of the confirmation for the first UL message is TAC, and legacy TAT is agreed to start, CG-SDT-TAT can be stopped. If the confirmation for the first UL message is not a TAC MAC CE, CG-SDT-TAT shall maintain the TA during the CG-SDT. |
| Spreadtrum | Option 4 | It can keep running during SDT procedure. |
| vivo | Option 4 | It is stopped upon its expiry. |
|  |  |  |

**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 | Option 2 |  |
| 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” ehaviour just complicates the specification. |
| Sharp | Option 2 |  |
| Xiaomi | Option 2 |  |
| OPPO | Option 1 |  |
| CMCC | Option 2 |  |
| NEC | Option 2 |  |
| Lenovo / Motorola Mobility | Option 2 | In our understanding RA-SDT cannot be performed during CG-SDT |
| InterDigital | Option 2 |  |
| Nokia | Release CG-SDT configuration | The UE will receive new *RRCRelease* message after RA-SDT procedure where the CG-SDT will need to be configured again if intended by the NW. |
| Ericsson | Option 2 |  |
| Intel | Option 2 (no) | However, it might be good to discuss/clarify what would happen to CG-SDT resources if UE has an ongoing RA-SDT session. |
| China Telecom | Option 2 |  |
| ASUSTeK | Option 2 |  |
| CATT | Option 2 |  |
| Qualcomm | Option 2 |  |
| Spreadtrum | Option 2 |  |
| vivo | 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” ehaviour 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. |
| NEC | Option 4 | When the initiation of RA-SDT procedure |
| Lenovo / Motorola mobility |  | Similar to Samsung, we also think that option 3 should be used, if CG-SDT-TAT is stopped |
| Ericsson | Option 4 | Same view as LGE. |
| Nokia | Option 4 | When RA-SDT is initiated. |
| Intel | NA | See comment in previous issue 16.2 |
| CATT | Option 4 | The UE does not stop CG-SDT-TAT at initiation of legacy RA procedure. |
| Qualcomm | Option 3 or 4 | When legacy TAT timer starts during RA-SDT, CG-SDT-TAT stops. Or option 3 |
| Spreadtrum | Option 4 | See above comments. |
| vivo | Option 4 | It is stopped upon its expiry. |
|  |  |  |

]

**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 | Option 2 | No need to relate RA procedure with this. TA can be handled with the 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” ehaviour just complicates the specification. |
| Sharp | Option 2 |  |
| Xiaomi | Option 2 |  |
| OPPO | Option 2 |  |
| NEC | Option 2 |  |
| Lenovo/Motorola Mobility | Option 2 | In general if legacy TAT is running then there is no need that CG-SDT-TAT is also running. This is because if UE is assumed to be uplink syncrhonized then also the CG-SDT resources are considered as valid (as long as no significant RSRP change) |
| InterDigital | Option 2 |  |
| Nokia |  | CG-SDT TAT should be stopped after NW response to the initial transmission, thus there should not be such case of it’s running when there is a legacy RA during CG-SDT |
| Ericsson | Option 2 |  |
| Intel | Option 2 (no) |  |
| China Telecom | Option 2 |  |
| ASUSTeK | Option 2 |  |
| CATT | Option 2 |  |
| Qualcomm | Option 2 |  |
| Spreadtrum | Option 2 |  |
| vivo | 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 | See comments above |  |
| 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. |
| NEC | Option 4 | When the initiation of legacy RA procedure |
| Lenovo/Motorola Mobility |  | If CG-SDT\_TAT is stopped then the legacy TAT timer should be started/running, e.g. by NW sending a TA command, otherwise UE cannot perform any UL transmission except RACH. |
| Nokia | See 16.3. |  |
| Ericsson | Option 4 | Same view as LGE |
| Intel | NA | See comment in previous issue 16.3 |
| CATT | Option 4 | The UE does not stop CG-SDT-TAT at initiation of legacy RA procedure. |
| Qualcomm | Option 3 or 4 | When legacy TAT timer starts during legacy RA, CG-SDT-TAT stops. or option 3 |
| Spreadtrum | Option 4 | Keep the timer running. |
| vivo | Option 4 | It is stopped upon its expiry. |
|  |  |  |

**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 | Option 3 | If RA-SDT is performed, then it mean CG-SDT was not triggered, so there is no need to restart CG-SDT-TAT. |
| 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 |  |
| NEC | Option 1 |  |
| Lenovo/ Motorola Mobility |  | RACH-SDT is not performed during CG-SDT |
| InterDigital | Option 2 |  |
| Nokia | Release CG-SDT configuration upon RA-SDT or Option 3 | See 16.2. |
| Ericsson | Option 2 |  |
| Intel | Option 2,  see comment | We understand that RAN2 should also clarify the expected operation on CG-SDT resources during an ongoing RA-SDT session. |
| China Telecom | Option 2 |  |
| ASUSTeK | Option 2 |  |
| CATT | Option 2 |  |
| Qualcomm | Option 2 |  |
| Spreadtrum | Option 2 |  |
| vivo | 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 | Option 3 | Legacy RACH should have no impact on CG-SDT-TAT. |
| 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 |  |
| NEC | Option 1 |  |
| Lenovo/Motorola Mobility |  | No need to restart since legacy TAT is running. It’s clear that when UE is UL synchronized also UE can use the CG PUSCH (SDT) resources. |
| InterDigital | Option 2 |  |
| Nokia | Release CG-SDT configuration upon RA-SDT or Option 3 | See 16.3. |
| Ericsson | Option 2 |  |
| Intel | Option 2,  see comment | We understand that RAN2 should also clarify the expected operation on CG-SDT resources when UE is in RRC\_CONNECTED. |
| China Telecom | Option 2 |  |
| ASUSTeK | Option 2 |  |
| CATT | Option 2 |  |
| Qualcomm | Option 2 |  |
| Spreadtrum | Option 2 |  |
| vivo | 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 for option 2 | We would like to understand whether Option 2 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 Option 2 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. |
| NEC | Option 2 |  |
| Lenovo/Motorola Mobility | Option 2 |  |
| InterDigital | Option 1 |  |
| Nokia | Option 2 |  |
| Ericsson | Option 2 |  |
| Intel | Clarification needed | We understand that legacy TAT operation applies as RAN2 agreed that “*no additional NTA is defined for CG-SDT procedure*”. Therefore, updated NTA should always be used when provided/ |
| China Telecom | Option 2 |  |
| ASUSTeK | Option 2 |  |
| CATT | Option 2 |  |
| Qualcomm | Option 2 | At one time only one NTA is applied. But if contention resolution is not successful, i.e, the RAR TAC is not intended to this UE. The NTA used before RAR TAC is received could be restored. |
| Spreadtrum | Option 2 |  |
| vivo | Option 2 | In our understanding, restoring a temp is not maintaining two Nta as one Nta is specified in PHY spec. |
|  |  |  |

# 3. Conclusions

To be filled later..

# 4 Contact Information

|  |  |
| --- | --- |
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|  |  |

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