3GPP TSG-RAN WG3 #116-e R3-223696

9th – 19th May 2022

Online

Agenda Item: 9.1.9.1

Source: ZTE (moderator)

Title: Summary of Offline Discussion on CB: # SDT1\_Common

Document for: Approval

# Introduction

**CB: # SDT1\_Common**

**- Check the incoming LS from RAN2 and identify standard impact if any**

**- Check details of stage2/3 updates for both RACH based SDT and CG based SDT**

**- Provide CRs if agreeable**

(ZTE - moderator)

Summary of offline disc [R3-223696](file:///C:\Users\pgodin\Desktop\philipDocuments\a_ran3new2\ran3116\meeting\CB%20%23%20SDT1_Common\Inbox\R3-223696.zip)

# For the Chairman’s Notes

<TBD>

# Discussion- Second round

<TBD>

# Discussion-First round

## Modification to TS 38.300

In this meeting, we have received a reply LS from RAN2 [1].

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| **1. Overall Description:**  RAN2 thanks RAN3 for the LS on handling of DL non-SDT during SDT procedure. If DL non-SDT data/signalling arrive during SDT without anchor relocation, RAN2 confirms that anchor gNB could move the UE back to RRC Inactive by using *RRCRelease* message. Then, the UE re-initiates a new RRC Resume procedure (and the network can move the UE to RRC\_CONNECTED) for follow-up data transmission.  On how to trigger UE to re-initiate another RRC Resume procedure, RAN2 discussed the two options mentioned in the RAN3 LS in R2-2202144 and has reached the following agreement:   |  | | --- | | As a baseline, for handling the DL non-SDT data/signalling arrival during SDT procedure without anchor relocation: network uses RAN paging to trigger the following-up RRC resume procedure after UE is moved to Inactive state. | |

According to the reply LS, it means that RAN3 does not need to enhance its signaling for this use case.

In [2], it suggests to add the corresponding description in TS38.300, as below.

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| --- |
| NOTE 3: In case DL non-SDT data or DL non-SDT signalling arrives, the last serving gNB moves the UE back to RRC\_INACTIVE by sending *RRCRelease* message. To transfer the DL non-SDT data or DL non-SDT signalling, the last serving gNB may use RAN paging to trigger the following-up RRC resume procedure from the UE. |

**Question 1: Do companies agree with the following suggestions according to the reply LS [1]?**

* Suggestion 1: Do not need to enhance RAN3 signalling.
* Suggestion 2: Capture the related despription in 38.300, as proposed in [2], [R3-223501](file:///D:\会议硬盘\TSGR3_116-e\Docs\R3-223501.zip).

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| --- | --- | --- |
| **Company** | **Suggestion 1**  **Suggestion 2** | **Comment** |
| ZTE | Agree with suggestion 1  Not agree with suggestion 2 | In the suggestion 2, the change seems RAN2 issue. If needed, RAN2 can capture it into 38.300. |
| Lenovo | Yes for both | The same change is also proposed by [R3-223280](file:///D:\会议硬盘\TSGR3_116-e\Docs\R3-223280.zip). |
| CATT | Yes for both | We agree to have it.  This is also discussed in the “CB # SDT3\_RACHbased”. And a new “draftCR” merged all agreeable companies’ changes for RA-SDT to TS 38.300 is provided by the moderator for further check. Thus, it seems better to take care of it there for full picture of the RA-SDT. |
| Nokia | Yes for both |  |
| Google | Yes for both |  |
| Huawei | Yes for 1  No for 2 | There is not needed to update stage2. |
| E/// | Yes for 1  No for 2 | The initial intention of the LS was to clarify with RAN2 whether existing paging mechanism can be reused or not. Now the conclusion is yes. If RAN2 thinks it is important to be captured in stage-2, they would have done that. |
| China Telecom | Yes for 1  No for 2 | No need to update stage 2 |
| Qualcomm | Yes for both, but | Agree to suggestion 1. For suggestion 2, we think it is sufficient to add it in Section 18.1. Section 18.3 updates may not be needed. In Section 18.3 Note3 is added under Step 6 which denotes arrival of non-SDT after SDT completion. However non-SDT may arrive anytime during SDT.  We also suggest rewording the sentence to something like - “In order to transfer the DL non-SDT data or DL non-SDT signalling, the last serving gNB ~~may~~ initiates the RAN paging procedure to trigger ~~following-up~~ RRC resume ~~from the UE~~.  [may seems to imply that there is another way] |
| Samsung | Yes for 1 | Suggestion 2 can be considered if we confirm that RAN2 is not intend to do such clarification in stage 2. Shall we check RAN2 discussion first? |
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## Modification to TS 38.401

### Fallback from CG-SDT to non-SDT or RA-SDT

In the previous RAN3 meeting, we have the following agreement for this use case.

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| **In case that UE and gNB has configured CG-SDT but the UE decides to initiate RA-SDT or non-SDT procedure.**   * 1. **gNB-DU sends INITIAL UL RRC MESSAGE TRANSFER message to gNB-CU with a new gNB DU UE F1AP ID.**   2. **gNB-CU sends UE CONTEXT SETUP REQUEST message to gNB-DU with the new gNB DU UE F1AP ID and including old gNB-DU UE F1AP ID as new optional IE in the message.**   3. **gNB-DU find the stored CG-SDT configuration via old gNB-DU UE F1AP ID**   4. **gNB-DU sends UE CONTEXT SETUP RESPONSE message to gNB-CU with new gNB DU UE F1AP ID.**   5. **No consensus to include old gNB-CU F1AP UE ID included in the UE CONTEXT SETUP REQUEST message. It can be revisited in future release.** |

In [4], it suggests to add the procedure in TS38.401 for the fallback from CG-SDT to RA-SDT or non-SDT.

**Question 2: Do companies agree to add the procedure in TS38.401 for the fallback from CG-SDT to RA-SDT or non-SDT, as proposed in [4], R3-223071? If agreed, do you have additional suggestion in [4]?**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| ZTE | Yes | It is reasonable to capture the agreement into 38.401. |
| Lenovo |  |  |
| CATT | Yes, small comment | Should the category of the CR category be “B” not “F”? |
| Nokia | Yes but | The text needs modification because the handling of addresses is not correct. Please circulate an update of 3071 for comments ane corrections. |
| Google | Yes | OK to reflect the agreements |
| Huawei | Yes |  |
| E/// | Yes with comments | Generally OK, but since there is a proposal to include old gNB-CU F1AP UE ID in the UE CONTEXT SETUP REQUEST message, then step 5 will need to be revised based on the outcome of that CR.  Prefer to check details in second round. |
| China Telecom | Yes | fallback from CG-SDT to RACH-SDT/non-SDT is a typical scenario in SDT operation. It is reasonable to capture the above agreements into 38.401 |
| Qualcomm | Yes | Ok to add the text in 38.401. Prefer to check details in second round. |
| Samsung | Yes | “fallback” is a suitable wording? This is from CG-SDT to non-SDT or RA-SDT. How about “Transition from CG-SDT to non-SDT or RA-SDT”? |
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### Clarification within [3], R3-223070

In [3], some proposals are listed as below.

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| --- |
| **Issue 1:** small errors in RACH based SDT Section 8.18.1  **Proposal 1: Section 8.18.1, Step 3, editorial udpate by removing the “with” before “including”. Note 2: Clarify which gNB-CU-CP is the “other gNB-CU-CP” in Note2.**  **Issue 2:** section 8.20.2, The UE’s state in step 0 is incompleted.  **- Issue description:**  It is possible that UE is in RRC\_INACTIVE mode rather than in RRC\_CONNECTED when gNB-CU-CP decides to release UE with CG-SDT configurations, e.g., at the end of an RA-SDT procedure. Hence in Figure 8.20.2-1, the step 0 “UE in RRC\_CONNECTED mode” should be removed or updated to “UE in RRC\_CONNECTED or RRC\_INACTIVE mode”. Correspondingly in step 1, the “change” should be updated to “move” since UE may remain in RRC\_INACTIVE and its mode is not changed.  **proposal 2: Update step 0 in Figure 8.20.2-1 to “UE in RRC\_CONNECTED or RRC\_INACTIVE mode”, and update the “change” in step 1 to “move”.**  **Issue 3:** Whether gNB-DU buffers the UL SDT data and/or UL SDT signalling in CG-SDT.  **- Issue description:**  Despite of having the F1 tunnel information in CG-SDT, the gNB-DU should still buffer the UL SDT data, not sending it to the gNB-CU-UP, until gNB-CU-CP verifies UE successfully. First, the data transmission over F1-U is always performed after the successful UE verification in current systems, and it is better to follow the legacy way. Besides, it is safer and more reliable since we can avoid delivering the data of unverified UEs in the network. Similarly, UL SDT signalling should also be buffered at gNB-DU rather than be sent to gNB-CU-CP directly.  When it is gNB-DU to buffer the UL SDT data and/or UL SDT signalling, gNB-CU-CP should send the UE CONTEXT MODIFICATION REQUEST message to gNB-DU. Then, gNB-DU can send the buffered UL SDT data and/or UL SDT signalling to gNB-CU-UP and gNB-CU-CP, respectively. These steps should be captured in Figure 8.20.2-1.  **proposa 3: gNB-DU should buffer the UL SDT data and/or UL SDT signalling until receiving the UE CONTEXT MODIFICATION REQUEST message from gNB-CU-CP. These steps should be added in Figure8.20.2-1.**  **Isseu 4:** need to move 8.20.2 to be a subsection of 8.18  **- Issue description:**  The section 8.18.1 RACH based SDT and section 8.20.2 CG based SDT should be introduced as two subsections of the same section, but currently they are located in wrong places.  **Proposal 4: change 8.20.2 to 8.18.2, and void 8.20.** |

Moderator think Issue 3/Proposal 3 is related to the CB: # SDT2\_CGbased, so companies can focus on Issue 1/Proposal 1, Issue 2/Proposal 2 and Issue 4/Proposal 4.

**Suggestion: Agree with following change based on Proposal 1/Proposal 2/Proposal 4, within [3],** **R3-223070.**

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| 3. The step 3 is as defined in step 4 in clause 8.6.2, including an indication of SDT access. The gNB-DU may also provide SDT assistance information.  <Skip unchanged part>  NOTE 2: In case that only partial UE context for SDT including F1-U UL TEIDs is retrieved from another gNB-CU-CP as specified in TS 38.300 [2], the gNB-CU-CP uses those F1-U UL TEIDs for steps 4-5, and the subsequent steps 6-7 are not executed. In addition, the UL SDT data, if any, is forwarded from the gNB-DU to the gNB-CU-UP of the other gNB-CU-CP for which the partial context is retrieved, and the UL signalling, if any, is forwarded from the gNB-CU-CP to the other gNB-CU-CP for which the partial context is retrieved via the XnAP RRC TRANSFER message.  <Skip unchanged part>  -------------------------------------------Change 2------------------------------------------- 8.20 void -------------------------------------------Change 3------------------------------------------- 8.18.2 CG based SDT The procedure for CG based small data transmission in RRC Inactive is shown in Figure 8.18.2-1. |

**Question 3: Do companies agree with above suggestion to TS38.401?**

**(i.e., agree with following change based on Proposal 1/Proposal 2/Proposal 4, within [3], R3-223070)**

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| --- | --- | --- |
| **Company** | **P1, P2, P4** | **Comment** |
| ZTE | Agree with all proposals |  |
| Lenovo | Yes |  |
| CATT | Agree,but | and the UL signalling, if any, is forwarded from the gNB-CU-CP to the other gNB-CU-CP for which the partial context is retrieved via the XnAP RRC TRANSFER message.  I’m afraid whether the new texts may cause some confusion? E.g. someone may reads “…partial context is retrieved via the XnAP RRC TRANSFER message”.  Should we revise the new added texts, e.g. change it to “(the last serving gNB-CU-CP)”? |
| Nokia | OK but | Avoid the change “for which partial ue context is retrieved” as commented by CATT. |
| Google | OK but | Agree with CATT |
| Huawei | ok |  |
| E/// | Yes with comments | What’s the specific reason for adding “for which the partial context is retrieved”? The proposed changes look verbose and confusing. |
| China Telecom | OK |  |
| Qualcomm | Ok but | Agree with CATT |
| Samsung | OK for P1, and P4 | For P2, some clarificaitons are needed.  With this change, it means that the gNB-CU can query CG-SDT from gNB-DU during RRC\_INACTIVE status. To us, the following cases may be applicable:   * Case 1: the UE performs RA-SDT at the same gNB-DU sending CG configure when releasing UE to RRC\_INACTIVE status * Case 2: the UE performs RA-SDT with context relocation at new serving gNB-DU * Case 3: the UE performs RA-SDT without context relocation at new serving gNB-DU   For case 1&2, the above procedure may be applicable. For case 3, the existing design may not be applicable since the CG configure is from new serving gNB-DU, while the last serving gNB-CU needs configure the CG configuration to UE.  Thus, before adding RRC\_INACTIVE in step 0, we need confirm **whether the CG configuration can be configured to the UE during RRC\_INACTIVE status** . After that, we need discuss how to support the above three cases. |
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### Clarification within [7], R3-223249

In [7], it is unclear how the gNB-CU and gNB-DU interact when the SDT transmission is completed and it may not be the same as legacy RRC inactive to other states transition where the DL RRC Message Transfer message is used. So, it suggests to add following clarification in the TS38.401.

**Suggestion: Agree with following change within [7],** **R3-223249.**

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| * After UE initiates RACH based SDT, the gNB-CU shall transmit the UE Context Release Command message to the gNB-DU when the SDT transmission is completed. If CG-SDT is (re-)configured, the gNB-CU shall request the gNB-DU to keep CG-SDT configuration and resources in the UE Context Release Command message. * After UE initiates CG based SDT, if CG-SDT is re-configured, the gNB-CU shall request the gNB-DU to keep CG-SDT configuration and resources in the UE Context Release Command message. Otherwise, a normal UE Context Release Command message is used. |

**Question 4: Do companies agree with above suggestion to TS38.401?**

**(i.e., agree with following change within [7], R3-223249)**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| ZTE | Nor sure | Not strong view. |
| Lenovo | Yes | It is worthy to have such kind of clarifications. |
| CATT | Yes, see comment | No harm to have it.  Just wondering do we need to update the figures accordingly, i.e. adding the UE Context Release procedure after SDT transmission is completed? |
|  |  |  |
| Nokia | OK | Not essential but OK. |
| Google | Yes | Proponent |
| Huawei | Neutral | No strong view, not essential, but nothing wrong. |
| E/// | Neutral | We understand the intention, but we should not use “shall” wording in informative text (NOTE). We need to revisit the wording to be less restrictive. |
| China Telecom | Yes,but | Agree with E///, the wording “shall” can be changed to ”may” |
| Qualcomm | Neutral | Agree with E///, informative Note need not have “shall” |
| Samsung | Neutral | Share the view of E///. |
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## Modification to TS 38.420

In [5], some alignments are listed to TS38.420, as below.

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| 1. The text on SDT function added in 17.0.0 has created a hanging paragraph. 2. The procedure list creates an ambiguity as two of the procedures mentioned support the SDT functionality but are not SDT specific (and so far such reuse is not usually listed as part of the supporting procedures) |

**Question 5: Do companies agree with the change to TS38.420 within [5]?**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| ZTE | Yes | Agree with these change. |
| Lenovo | Yes |  |
| CATT | Yes |  |
| Nokia | OK |  |
| Google | Yes |  |
| Huawei | Yes or No | Not essential, no strong view.  Btw, do we need to add Retrieve UE Context and UE Context Release here? |
| E/// | Ok |  |
| China Telecom | YES |  |
| Qualcomm | OK |  |
| Samsung | Yes |  |
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## Modification to TS 38.473

In [6], it indicates the following issues.

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| **Issue 1:** during UE Context Release procedure, if the *CG-SDT Kept Indicator* IE is received, the gNB-DU shall store lots of UE context and release others, but currently it is said that the DU shall store xxx while releasing the UE context, it should be updated to “while releasing the other UE context”,  **Issue 2:** it was agreed that the receiving gNB needs to inform the last serving gNB about termination of SDT. To inform termination of SDT, the existing F1AP UE INACTIVITY NOTIFICATION message is reused on the F1 interface and the existing XnAP RETRIEVE UE CONTEXT CONFIRM message is reused on the Xn interface.  To reflect the latter part of the agreement, it was agreed to capture for RA-based SDT without UE context relocation procedure in 38.300 - “The receiving gNB may send the RETRIEVE UE CONTEXT CONFIRM message to request the termination of SDT session”. However similar description is missing and needs to be added for UE Inactivity Notification Procedure to capture former part of the agremeent in the specification.  Without this clarification added in the procedural text, there is no way to know that the UE Inactivity Notification Procedure shall also be used for the termination of the SDT session on F1 interface.  **Issue 3:** it was agreed that when the TAT-SDT expires, the gNB-DU initiates the UE Context Release Request procedure, including a new Cause value TAT-SDT expiry, which has been captured in TS 38.473 as below:   |  |  | | --- | --- | | **Transport Layer cause** | **Meaning** | | TAT-SDT expiry | The UE context release is requested from the gNB-DU due to the expiry of the Timing Advance timer for CG-SDT. |   However, according to the following agreements from RAN2, when TAT-SDT expires during the subsequent transmission phase of an on-going CG-SDT, UE will trigger RACH procedure with a C-RNTI MAC CE instead of RRCResumeRequest multiplexed in Msg3/MsgA. In such case, gNB-DU should not trigger the UE Context Release Request procedure, otherwise the RACH procedure would fail since gNB-DU has no information about UE’s C-RNTI.  Therefore we should modify the meaning of the cause value TAT-SDT expiry to exclude the case where TAT-SDT expires during the subsequence CG transmission phase.  **Issue 4:** Besides, the timer TAT-SDT is used to check whether it is uplink time aligned and in TS 38.321, the definition of this timer is specified as follows:   |  | | --- | | *cg-SDT-TimeAlignmentTimer* which controls how long the MAC entity considers the uplink transmission for CG-SDT to be uplink time aligned. |   Hence, it is needed to change “the Timing Advance timer for CG-SDT” to “the Timing **Alignment** timer for CG-SDT” for embodying the function of this timer more clearly and for aligning with RAN2. |

Based on this issue, it suggest to have the following changes in TS38.473.

**Change 1**: Updated to “while releasing the other UE context” in UE Context Release procedural text,

**Change 2:** Add the description in the procedural text for UE Inactivity Notification Procedure to clarify that in case of SDT, this procedure is also used by the gNB-DU to initiate the termination of the ongoing SDT session

**Change 3:** Modify the meaning of the cause value TAT-SDT expiry.

**Question 6: Do companies agree with above changes in [6],** [**R3-223534**](file:///D:\会议硬盘\TSGR3_116-e\Docs\R3-223534.zip)**?**

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| **Company** | **Yes/No** | **Comment** |
| ZTE | Partly Yes | Agree with Change 1 and Change 3.  Not sure with Change 2. |
| Lenovo | Change 1&3: OK  Change 2: Partly yes | Change 2 is covered by [R3-223306](file:///D:\会议硬盘\TSGR3_116-e\Docs\R3-223306.zip) |
| CATT | Yes for 1&3 | Not sure with the change 2, which is linked to [R3-223306](file:///D:\会议硬盘\TSGR3_116-e\Docs\R3-223306.zip). |
| Nokia | OK | Overlap with 3306 indeed. |
| Google | OK | Change 2 is covered by [R3-223306](file:///D:\会议硬盘\TSGR3_116-e\Docs\R3-223306.zip) |
| Huawei | ok |  |
| E/// | Clarification is needed | Change 1: what does “other context” refer to here?  Change 2: we prefer the changes proposed in Lenovo’s contribution  Change 3: It is fine to align the naming for TAT-SDT. But, the proposed modification on meaning in Issue 3 causes confusion, for example, what does “next CG-SDT access” exactly mean? |
| China Telecom | yes |  |
| Qualcomm | Ok but | “Other context” does not have any description  “next CG-SDT access” can be renamed to “subsequent CG-SDT” access |
| Samsung | Yes for Change 3 | Change 1: the current text seems to be clear enough now.  Change 2: it can be addressed in **CB: # SDT2\_CGbased** |
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## Other corrections, if any

**Question 7: If companies think other corrections are needed, please input here.**

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| **Company** | **Yes/No** | **Comment** |
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# Conclusion, Recommendations [if needed]

# References

1. [R3-223019](D:\\会议硬盘\\TSGR3_116-e\\Docs\\R3-223019.zip) Reply LS on handling of DL non-SDT during SDT procedure (RAN2)
2. [R3-223501](file:///D:\会议硬盘\TSGR3_116-e\Docs\R3-223501.zip) Correction for Rel-17 RA-SDT on DL non-SDT data/signalling handling during SDT procedure (Intel Corporation)
3. [R3-223070](file:///D:\会议硬盘\TSGR3_116-e\Docs\R3-223070.zip) Correction on RACH based SDT and CG based SDT (Huawei, China Telecom, China Unicom, ZTE)
4. [R3-223071](file:///D:\会议硬盘\TSGR3_116-e\Docs\R3-223071.zip) Correction on Fallback from CG-SDT to non-SDT or RA-SDT (Huawei, China Telecom, China Unicom, ZTE, Lenovo, Motorola Mobility)
5. [R3-223097](file:///D:\会议硬盘\TSGR3_116-e\Docs\R3-223097.zip) Alignment with rel-17 changes in XnAP (Qualcomm Incorporated)
6. [R3-223534](file:///D:\会议硬盘\TSGR3_116-e\Docs\R3-223534.zip) Correction on SDT in F1AP (Huawei, China Telecom, China Unicom)
7. [R3-223249](file:///D:\会议硬盘\TSGR3_116-e\Docs\R3-223249.zip) Correction to SDT completion (Google Inc.)