3GPP TSG-RAN WG3 #114bis-e R3-221084

17-26 Jan 2022

Online

Agenda Item: 24.2

Source: ZTE (moderator)

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

Document for: Approval

# Introduction

**CB: # SDT2\_RACHbased**

**- How to enhance RNA update without UE context relocation procedure for RA-SDT without anchor relocation case?**

**- The details of SDT assistance information?**

**- How to transfer SRB via SDT?**

**- How to transfer the first SRB/DRB?**

**- Whether to include other SDT Assistance Information?**

**- LS to SA2?**

**- Capture agreements and open issues, provide TPs if agreeable**

(ZTE - moderator)

Summary of offline disc [R3-221084](file:///D:\3GPPmeeting\202201%20RAN3%20114bis%20e\Inbox\R3-221084.zip)

Please provide your views by **6:00 UTC Friday January 21** so that they may be taken into account during the online session.

# For the Chairman’s Notes

<TBD>

# Discussion- Second round

<TBD>

# Discussion-First round

## How to enhance RNA update without UE context relocation procedure for RA-SDT without anchor relocation case

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| **Enhance RNA update without UE context relocation procedure for RA-SDT without anchor relocation case**  **FFS: If agreed to enhance Periodic RNA update without UE context relocation procedure, whether it is acceptable to use the Retrieve UE context failure message to send SDT related UE context information** |

### Candidate solutions

**Solution 1:**



**Figure 1: Solution 1 overall procedure**

**Solution 2:**



**Figure 2: Solution 2 overall procedure**

**Solution 3:**



**Figure 3: Solution 3 overall procedure**

**Solution 4:**



**Figure 4: Solution 4 overall procedure (From figure-wise, Figure 4 seems no different to Figure 2)**

### Analysis on the candidate solutions (detail in [3])

**Analysis on Solution 1**:

1. **Impact on the following XnAP messages.**
   * + RETRIEVE UE CONTEXT FAILURE
     + XN-U ADDRESS INDICATION
     + UE CONTEXT RELEASE
2. **Break the original usage of legacy flow (RANAU)**
   * + RETRIEVE UE CONTEXT FAILURE has to establish UE SDT RLC context and UE associated XnAP signalling connection
     + 🡺 **We don't agree the Solution 1 breaks the legacy. What we should honor is the original design (i.e. functionality) of a procedure. This class-1 UE Context Retrieval procedure is to support INACTIVE mobility over Xn when the UE resumes on another gNB. With this design principle being honored, it is typical that the corresponding messages carry some IEs for specific usages (that doesn’t go beyond the functionality of the procedure).**
     + **What we should avoid is to block proposals based on argument that the messages should be limited based on the existing usages already in place. If so, then there is nothing we can do other than keep adding new procedures/messages, because everyone should stick to the existing usages already specified.**
     + UE CONTEXT RELEASE has to be sent from anchor gNB other than receiving gNB.
     + **🡺 Same reason: the purpose of UE CONTEXT RELEASE to release UE context in the other node. This is the legacy. So far, it has been issued from new gNB to the anchor, only when context is relocated. Enhancing it to be issued from anchor to new gNB for SDT without anchor relocation falls under this fundamental functionality and doesn't break the legacy.**

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| **TS 38.423**  **RETRIEVE UE CONTEXT FAILURE**  If the old NG-RAN node is not able to identify the UE context by means of the UE Context ID, or if the integrity protection contained in the RETRIEVE UE CONTEXT REQUEST message is not valid, or, if it decides not to provide the UE context to the new NG-RAN node, it shall respond to the new NG-RAN node with the RETRIEVE UE CONTEXT FAILURE message.  **UE CONTEXT RELEASE**  The UE Context Release procedure is initiated by the new NG-RAN node. By sending the UE CONTEXT RELEASE message the new NG-RAN node informs the old NG-RAN node of RRC connection reestablishment success or RRC connection resumption success and triggers the release of resources. |

**Analysis on Solution 2**:

1. **Introduce a new Class 1 procedure**
   * + Request message (transfer SDT information Transfer- serving->anchor)
     + Request message (transfer SDT information Transfer- serving->anchor) **🡺 BTW, why the same request message for class 1??**
2. **No impact on existing XnAP message 🡺 This is not true. The solution replaces the Xn-U ADDRESS INDICATION message which has been the fundermantal step from new gNB to anchor gNB to provide DL forwarding info during INACTIVE mobility. Moreover, like Huawei mentioned, RETRIEVE UE CONTEXT FAILURE message should be enhanced to release the established Xn association.**

**Analysis on Solution 3**:

1. **Introduce a new Class 2 procedure (**transfer SDT context and UL address from serving to anchor)
2. **Enhance Xn-U address indication message** (transfer SDT related DL address)
3. **Like Huawei mentioned, RETRIEVE UE CONTEXT FAILURE message should be enhanced to release the established Xn association.**

**Analysis on Solution 4**:

1. **Introduce a new Class 2 procedure**
   * + Transfer SDT context and UL address from anchor to serving nodes
     + Transfer SDT related DL address from serving to anchor nodes
2. **No impact on existing XnAP message 🡺 This is not true. The solution replaces the Xn-U ADDRESS INDICATION message which has been the fundermantal step from new gNB to anchor gNB to provide DL forwarding info during INACTIVE mobility. Moreover, like Huawei mentioned, RETRIEVE UE CONTEXT FAILURE message should be enhanced to release the established Xn association.**

Additional, solution 2/3/4 use a nested procedure within XnAP UE Context Retrieval class-1 procedure.

In [17], it states that we don't know how long the SDT session would last. However, moderator does not think it is a problem. In RAN2, it is agreed that UE (via *NewSDTTimer*) shall receive RRCRelease/RRCResume message after sending RRCResumeRequest message, no matter how long the SDT session is. Similarly, the receiving gNB can keep waiting RETRIEVE UE CONTEXT FAILURE message until SDT termination by e.g., restarting timer TXnDCoverall upon handling SDT. Both RAN2 and RAN3 have the same requirement for the SDT feature.

**This argument is also not acceptable as the solutions 2/3/4 keeps making "exception" to make it work. For a class-1 procedure triggered from new gNB, it is better to always "properly" close the class-1 procedure without making "exception" to the timer handling only for SDT.**

**Observation 1: Solution 1 has more specification effort than other solutions and needs to extend the original purpose of both RETRIEVE UE CONTEXT FAILURE message and UE CONTEXT RELEASE message.**

**Observation 2: Solution 2/3/4 use a nested procedure. It is not a problem for the receiving gNB how long to wait for RETRIEVE UE CONTEXT FAILURE message until a SDT termination.**

**Proposal 1: Solution 1 shall be excluded.**

**Question 1: Do you agree with above observation 1/2 and proposal 1?**

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| **Observation 1: Solution 1 has more specification effort than other solutions and needs to extend the original purpose of both RETRIEVE UE CONTEXT FAILURE message and UE CONTEXT RELEASE message.**  **Observation 2: Solution 2/3/4 use a nested procedure. It is not a problem for the receiving gNB how long to wait for RETRIEVE UE CONTEXT FAILURE message until a SDT termination.**  **Proposal 1: Solution 1 shall be excluded** | | |
| **Company** | **Yes/No**  **(O1, O2, P1)** | **Comment** |
| ZTE | Yes for all | Sol 1 breaks the original usage of legacy signalling/procedure.  Sol2/3/4 keep the original usage of the legacy signalling/procedure, and has less spec effort than sol1. |
| Huawei | Yes for P1 | Ok to exclude P1.  For O1, 2, for solution 2, 3, 4, these solutions also impact the existing XnAP: RETRIEVE UE CONTEXT FAILURE message, i.e. enhance it to remove the established XnAP association, which is currently not supported. |
| Intel Corporation | No for all | From the tone and analysis above for Q1, we are sorry to say but we would like to express concerns that the moderation for Q1 is biased!  First, it is not fair to say that Solution 1 breaks the legacy. What we should honor is the original design (i.e. functionality) of a procedure. This class-1 UE Context Retrieval procedure is to support INACTIVE mobility over Xn when the UE resumes on another gNB. Solution 1 falls under this functionality. With this design principle being honored, it is typical that the corresponding messages carry some IEs for specific usages (that doesn’t go beyond the functionality of the procedure).  What we should avoid is to block proposals based on argument that the messages should be limited based on the existing usages already in place. If so, then there is nothing we can do other than keep adding new procedures/messages, because everyone should stick to the existing usages already specified.  Moreover, one of the fundamental questions we should discuss is whether Xn-U ADDRESS INDICATION should be replaced only for SDT without anchor relocation. But please note that SDT works under INACTIVE framework. We see no reason to replace this fundamental step of Xn-U ADDRESS INDICATION message to provide DL forwarding info, by other message, only for SDT without anchor relocation.  Another fundamental question we should discuss is whether SDT data handling between gNBs should be per DRB (not per PDU session), which different to the fundamental NR mobility design. The INACTIVE has been working with per PDU session basis so far. As we discussed in our paper, in fact, all the basic mobility and dual connectivity related procedure messages defined in XnAP between source and target or between MN and SN have been "per PDU session basis" from day 1. Even for SN terminated MCG bearer (or MN terminated SCG bearer), the relevant XnAP messages communicated between MN and SN carry Xn-U DL/UL forwarding TNLs "per PDU session" basis. We think there is no reason not to break this fundamental principle and make execption only for SDT without anchor relocation. |
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**Class 1 (sol 2) vs Class 2 (sol 3/4)**

If we are agreed to exclude Solution 1, we will further select to introduce either a new class 1 procedure (sol 2) or a new class 2 procedure (sol 3/4).

In some papers (e.g., [8], [11], they think class 2 procedure is simpler and better than class 1, because the DL data forwarding should be optional, the receiving gNB only needs to provide DL data forwarding address when the last serving gNB proposes to do it.

However, moderator wonders how the anchor gNB decide not to transfer DL SDT/DL NAS PDU when a SDT procedure starts. When the DL SDT/DL NAS PDU is sent from UPF/AMF, if no DL address provided by receiving gNB, it cannot be forwarded from anchor gNB to receiving gNB. More, it is sure that UE always needs to receive DL RLC packet for e.g., RLC acknowledge.

**Observation 3: The receiving gNB shall provide SDT DL address to the anchor gNB, because the anchor gNB cannot judge whether subsequent DL small data/DL NAS PDU comes from 5GC during a SDT period.**

In the consigned paper [3], it prefers to introduce class 1 procedure (e.g., sol 2), since the RLC configurations are essential information for SDT, the anchor gNB shall be acknowledged that the SDT RLC config is either successful or failure.

In detail, there is a “failure use case” for class 1. For example, if at the outset the new gNB had some sort of issue with Xn resources and it does not support the "no anchor relocation" scenario which requires quite different behaviours and data handling than the legacy NR INACTIVE, then prefers to go for a full context transfer / path switch. Then we could use the class 1 procedure to enable a failure message. Although it is agreed that the anchor gNB decides to either with or without anchor relocation, the anchor gNB can receive failure message from the new gNB (if not agreed with partial Context transfer), then it understands that this mode of operation is not possible, and reverts back to normal Context transfer. In fact this type of scenario (it makes sense) is a reasonable justification for nesting within the Retrieve Context Request.



**Figure 5: RA-based SDT from without UE context relocation fall back to with UE context relocation**

In conclusion, during a SDT procedure, the anchor gNB shall be acknowledged whether the SDT RLC context transfer is successful or not. If failure, the anchor gNB shall revert to RA-SDT with UE context relocation procedure (as legacy to transfer full UE context).

**Observation 4: The RLC configurations are essential information for SDT, the anchor gNB shall be acknowledged that the SDT RLC config is either successful or failure. If failure, RA-based SDT without anchor relocation shall revert to RA-based SDT with UE context relocation. Details can be further checked once the solution is chosen.**

**Proposal 2: A new class 1 procedure shall be introduced for RA-based SDT without UE context relocation.**

**Question 2: Do you agree with above observation 3/4 and proposal 2? If not, do you prefer either sol 3 or sol 4?**

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| **Observation 3: The receiving gNB shall provide SDT DL address to the anchor gNB, because the anchor gNB cannot judge whether subsequent DL small data/DL NAS PDU comes from 5GC during a SDT period.**  **Observation 4: The RLC configurations are essential information for SDT, the anchor gNB shall be acknowledged that the SDT RLC config is either successful or failure. If failure, RA-based SDT without anchor relocation shall revert to RA-based SDT with UE context relocation. Details can be further checked once the solution is chosen.**  **Proposal 2: A new class 1 procedure shall be introduced for RA-based SDT without UE context relocation.** | | |
| **Company** | **Yes/No**  **(O3, O4, P2)** | **Comment** |
| ZTE | Yes for all | We prefer to class1procedure, because we can consider failure case then let SDT procedure fallback to RA-SDT with anchor relocation. However, we are also fine with Class 2 (slightly prefer 4) if it is preferred by majority companies. |
| Huawei | FFS for O3.  No for O4, P2 | For Q3, similar to CIoT discussion, it is propablly in many cases (traffic model) to only have one or two UL small packets, without any downlink data, in such case the class2 design is much more slim and efficient. And even if DL address has to be provided, class2 design can also support it.  We do not agree with the statements about Ob4 and P2, the SDT RLC context will be designed with criticaility reject, if the peer node does not support SDT/without anchor rellcoation, the error indication will be triggered. Do not forseen other failure case. |
| Intel Corporation | No for all | Please see above.  For the argument that the nested class-1 procedure is required because new gNB may not support no anchor relocation, we think this is not a valid argument. We don't need such post mess clean-up. The right way should be to make new gNB indicate its support (of no anchor relocation) when it sends RTRV UE CTXT REQ message from the beginning, so that the anchor can choose the right procedure to go with. |
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## The detailed SDT related UE context

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| **FFS: The detail information included in SDT related RLC bearer configuration to be transferred from anchor gNB to receiving gNB in case of SDT without anchor relocation.** |

According to some company’s contributions, it seems that the following IE structure can be introduced.

**IE structure for DL: The SDT configuration (from anchor gNB to receiving gNB)**

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| 9.2.3.XX SDT Configuration  This IE includes necessary configuration information to process RLC PDUs related to SDT (small data transmission)   |  |  |  |  |  | | --- | --- | --- | --- | --- | | IE/Group Name | Presence | Range | IE type and reference | Semantics description | | SDT Configuration (old -> new) |  |  |  |  | | > SDT DRB To Be Setup List |  | 1 |  |  | | >> SDT DRB To Be Setup Item |  | 1,,< maxnoofDRBs > |  |  | | >>> DRB ID | M | 9.2.3.33 |  |  | | >>> UL TNL address | M |  | UP Transport Layer Information 9.2.3.30 |  | | >>> RLC Bearer Configuration | M |  | OCTET STRING | RLC-BearerConfig IE defined in subclause 6.3.2 of TS 38.331 | |

**IE structure for UL: The SDT Data Forwarding (from receiving gNB to anchor gNB)**

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| 9.2.3.XY SDT Data Forwarding  This IE includes necessary data forwarding information related to SDT (small data transmission)   |  |  |  |  |  | | --- | --- | --- | --- | --- | | IE/Group Name | Presence | Range | IE type and reference | Semantics description | | SDT Data forwarding (new -> old) |  |  |  |  | | > SDT DRB Admitted List |  | 1 |  |  | | >> SDT DRB Admitted Setup Item |  | 1,,< maxnoofDRBs > |  |  | | >>> DRB ID | M | 9.2.3.33 |  |  | | >>> UL TNL address | M |  | UP Transport Layer Information 9.2.3.30 |  | | >>> RLC Bearer Configuration | M |  | OCTET STRING | RLC-BearerConfig IE defined in subclause 6.3.2 of TS 38.331 | |

Meanwhile, some contributions also suggest to introduce the following IEs into above ***SDT configuration structure*** (from anchor gNB to receiving gNB).

**Other IEs for DL**

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| 1. DRB QoS (QoS Flow Level QoS Parameters 9.2.3.5) 2. S-NSSAI 3. RLC Mode 4. PDCP SN Length 5. DL Forwarding (9.2.3.34) or Packet Data Indication (Indicates downlink data available) 6. PDU Session ID |

**Question 3: Do you agree to introduce above “IE structure for DL/UL”? And do you agree with full/partial “Other IEs for DL” included in the “IE structure for DL”?**

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| **Company** | **Yes/No**  IE structure/Other IE | **Comment** |
| ZTE | Yes for IE structure DL and IE structure for UL | We can leave “other IEs for DL” open. |
| Huawei | Yes for all,  With comments to the information provided from new serving to last serving gNB | For the information provided from the new serving gNB to the last serving gNB, DL TNL address should be provided instead of UL, and why you include “RLC Bearer Configuration”??  The other IEs for DL part, (1,2,3,4) has to be provided, (5) optional, (6) is not useful, but it is ok to include (6) if Xn-U Address Indication message is used.  For (1, 2, 3,4) they shall be provided, to enable the new serving gNB to setup UE context at the new serving gNB-DU via existing F1AP Context Setup procedure, otherwise the solution does not work. |
| Intel Corporation | Yes for all (including PDU session handling for both UL/DL) | Before going into details, the fundamental question we should discuss is whether SDT data handling between gNBs should be per DRB (not per PDU session), which is different to the fundamental NR mobility design.  The purpose of SDT is to allow small data transfer under INACTIVE framework. We think we should not break the principle from day 1 that all the basic mobility and dual connectivity related procedure messages defined in XnAP between source and target or between MN and SN have been "per PDU session basis". |
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## How to transfer SRB PDCP PDU

In RAN2#113 e-meeting, working assumption on support of SRB transmission using SDT was agreed:

***Working assumption***

1. *Support configuring of SRB1 and SRB2 for small data transmission for carrying RRC and NAS messages.*
2. *Upon initiating RRC Resume procedure for SDT initiation (i.e. for first SDT transmission), the UE shall also resume SRB2 that is configured for SDT, in addition to SDT DRBs that are configured for SDT*
3. *RAN2 recommends to include SRB2 in WID*

In the last RAN3 #114 emeeting, we have the following progress.

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| **During SDT procedure, SRB PDCP PDU (FFS on the first SDT payload) shall be transferred between new gNB and anchor gNB, either via extending the XnAP RRC TRANSFER message or via defining a new XnAP class-2 procedure.**  **FFS: How to transfer SDT SRB PDCP PDU**  **Extending the XnAP: RRC TRANSFER message or defining a new XnAP class-2 procedure** |

Based on the above progress in the last meeting, we further down-select from the following options.

* **Option 1: Extend the XnAP: RRC TRANSFER message, to forward the UL/DL SRB PDCP PDU during SDT procedure between new gNB and anchor gNB?**
* **Option 1A: Define new XnAP class-2 procedure to carry SRB PDCP-C PDU during SDT procedure between new gNB and anchor gNB.**
* **Option 2: Additionally, Extend the RETRIEVE UE CONTEXT REQUEST message, to forward the first SRB PDCP PDU from new gNB to anchor gNB**

In our view, because SRB PDCP PDU can be transmitted during the SDT procedure, solution 1/1A is always needed, so the option 2 shall be rule out.

**Proposal 3: Option 2 shall be excluded. RAN3 shall downselect either option 1 or option 1A.**

**Question 4: Do you agree with Proposal 3. If yes, do you prefer either option1 (i.e., RRC Transfer message) or option1A (i.e., new Class 2 message)?**

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| **Company** | **Yes/No**  **(Option 1/1A)** | **Comment** |
| ZTE | Slighter prefer option 1 | Option 1A is also fine to us. |
| Huawei | Option 1 | Existing message can be easily extended, do not see the need for option 1A, but it is also acceptable to us.  Disagree with option 2, see answer to question 5. |
| Intel Corporation | Option 1A | Both Option 1 and Option 1A works.  Only concern for Option 1 is that RRC TRANSFER has been designed for Dual Connectivity with carrying not only SRB PDCP-C PDUs but also other RRC Container IEs and thus extending RRC TRANSFER is a bit messy. So, we prefer Option 1A which is cleaner.  Option 2 can be technically feasible but we see it is not essential at this moment. Given we have a short time left, we prefer to down-prioritize it and comeback later when we have spare time. |
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## How to transfer the first SRB/DRB

This issue shall be discussed based on the following progress in the last meeting.

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| **UL data for SDT is buffered at the receiving node in the successful context retrieval procedure. For other cases, the common understanding is that UL data may need to be buffered as well, details are pending.**  **During SDT procedure, SRB PDCP PDU (FFS on the first SDT payload) shall be transferred between new gNB and anchor gNB, either via extending the XnAP RRC TRANSFER message or via defining a new XnAP class-2 procedure.**  **FFS: whether to allow optional transport of first DRB payload in the RETRIEVE UE CONTEXT REQUEST message.** |

For the first SRB/DRB payload conveyed on RRCresumeRequest message, if it is transferred via RETRIEVE UE CONTEXT REQUEST message, it is benefit to avoid time delay. However, this method has the following disadvantage.

1. The first SRB/DRB will be transferred to multiple candidate anchor gNBs, as well as multiple RETRIEVE UE CONTEXT REQUEST messages.
2. If the anchor gNB decides to relocate anchor node, the first SRB/DRB shall be turn back to the serving gNB.
3. SDT feature does not have latency requirement, so that the gain is not essential.

Currently, in case of RA-SDT without anchor relocation, at least for the subsequent SDT SRB/DRBs, they shall be transferred after UE verified successfully, via the established F1-C tunnel and F1-U tunnel for new gNB to the anchor gNB. It seems that additional normative effort is not needed for the first SRB/DRB transfer.

However, [14] provides a different view as below.

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| **The following view captured from the [14]**  **Observation 1: For the first uplink data, latency reduction can be significant (e.g. ≥ 50%) but becomes smaller in disaggregated scenarios.**  **Proposal 1: Further study the possible support of transport of initial data payload in the first CP message subject to the following principles:**  - Feature is optional, and SDT generic flow shall not be impacted by lack of support in either anchor or serving gNB  - No support for this functionality is provided in F1AP (i.e. no support if either anchor or serving gNB is disaggregated)  **Observation 2: Simple additions to the signalling and behaviour in Xn-C can achieve the proposed principles, and fallback to normal operation is easy to achieve if either node does not support or does not want to proceed with data processing for any reason.**  **Proposal 2: To support the principles of P1, serving gNB always buffers data regardless of whether it sends it to the anchor in the first Xn-c message.**  **Proposal 3: To support the principles of P1, the anchor gNB can ignore and fallback to either RLC or full context relocation.** |

**Question 5: Do you prefer either to**

**Option 1：Transfer the first SRB/DRB transfer as the same method as the subsequent SRB/DRB transfer,**

**Option 2：Agree with above proposals suggested in [14]?**

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| **Company** | **Option1 vs Option2** | **Comment** |
| ZTE | Option 1 | We think using the same method can decrease normative work. |
| Huawei | Option 1 | As shown in Figure 3 of R3-220424, in option 2, the last serving gNB-DU is unnecessarily involved, e.g. for the first SDT DRB, the last serving gNB-CU-CP will need to forward the received RLC PDU towards the last serving gNB-DU, and the last serving gNB-DU will proceed the packet and send PDCP PDU towards the last serving gNB-CU-UP, which is quite a complex and unexpected handling. |
| Intel Corporation | Option 1 | Agree with Huawei.  Again, this is not essential and we can revisit later if the time allows. |
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## Additional SDT assistant information

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| **For RA-SDT, “SDT Indicator” is introduced in RETRIEVE UE CONTEXT REQUEST message, and the message may include other SDT Assistance Information.** |

RAN2 has agreed that it is the UE to decide whether to initiate RA-SDT/CG-SDT procedure. Moreover, it is RAN3 scope that anchor gNB decides whether to relocate UE context or not relocate UE context.

Although the essential IE “SDT Indicator” has been introduced, some companies think it is not sufficient for anchor gNB to make good decision on anchor relocation, since the last serving gNB has no idea whether there are the subsequent small data transmission. It is suggested to introduce additional SDT assistant information as below.

**(1) RRC Resume Cause**

Currently the RRC Resume Cause IE is defined as ENUMERATED (rna-Update ...), and limited to the case of RNA update. Considering that the RACH based SDT supports data delivery via DRB and via SRB (NAS PDU for Positioning), it is better to inform such difference to the last serving gNB, it may be needed to extend the RRC Resume Cause IE to include mo-data and mo-signalling.

* May extend RRC Resume Cause IE to include mo-data and mo-signalling, to be used in case of SDT.

**(2) Single or multiple packets (similar to single shot or multiple shot)**

It should be useful for the last serving gNB to know whether the UE has only one packet or multiple packets to be transmitted, and then makes the decision on with or without anchor relocation, e.g. if the number of UL packets to be transmitted are less, there is a larger possibility that the last serving gNB will anchor the SDT session using without anchor relocation procedure. Whether and how the new gNB gets such information is up to RAN2 discussion, e.g. via BSR, RAI.

* Add single/multiple packets indication or signal/multiple shot indication

**(3) Buffered Data size at new gNB**

The new gNB may also provide the buffered data size to the last serving gNB in the assistance information, especially in case of multiple packets, it could be used by the last serving gNB to estimate the data volume of the consequent packets.

* Provide buffered data size or data volume information or BSR.

**(4) Anchor relocation Preference**

Indicates that the new NG-RAN node prefers to keep the UE context in the old NG-RAN node or to relocate the context.

In [18], it states that according to RAN2, currently, once the last serving gNB decided not to relocate the context, relocation in the middle of SDT session is not allowed at least for Rel-17. So, it is better to provide the preference at the beginning of the SDT procedure. Then, there may be a case that the new gNB (capable of SDT) does not support the "no anchor relocation" scenario which requires quite different behaviors and data handling than the legacy NR INACTIVE. In this case, new gNB should be able to indicate its preference of "relocation", to prevent decision at the last serving gNB to keep the anchor role as much as possible.

On the other hand, new gNB may not want to take the anchor role for the UE, if e.g. too many UEs are under its connection management. In this case, new gNB should be able to indicate its preference of "no relocation" to be taken into account by the last serving gNB's decision. The UE who initiated SDT is generally expected to exchange only small amount of data and shortly go back to dormancy, and thus such preference of "no anchor relocation" makes perfect sense.

* Provide anchor relocation Preference indication (e.g., (no relocation, relocation, …)

**Question 6: Do you agree to add additional assistant information? If yes, which one or more IEs as above do you prefer?**

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| --- | --- | --- |
| **Candidate IE 1:** Extend RRC Resume Cause IE  **Candidate IE 2:** Add single/multiple packets indication or signal/multiple shot indication  **Candidate IE 3:** Add buffered data size or data volume information or BSR  **Candidate IE 4:** anchor relocation Preference indication  **Candidate IE 5:** other if any | | |
| **Company** | **Yes/No** | **Comment** |
| ZTE | No. | We think none is essential.  But if majority companies prefer to introduce assistant information for anchor gNB to make a good decision, we slightly prefer IE3 (i.e., BSR) as optional IE. |
| Huawei | Yes for 1, 2, 3 | We think IE1, 2, 3 are helpful for the anchor gNB to makes decision at the begininig or during SDT. |
| Intel Corporation | Yes for 4.  Others, no strong preference | SDT without anchor relocation requires new special data handling from both new gNB and anchor gNB. Therefore, whether new gNB supports or not is critical in making SDT feature successful, so it should be indicated to the anchor as a preference so that anchor can choose the right procedure to go with. |
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## Sending LS to other groups

### Sending LS to SA2

In [13], it states that we understand that whether a bearer can be considered as a SDT bearer or not depends on the traffic feature. Considering the SDT bearer may aggregate multiple QoS flows, the SDT bearer determination should consider the QoS flow feature. Since the QoS information of each QoS flow comes from core network, it is better to let AMF determines whether a QoS flow can be applicable for SDT or not, and then the gNB can determine the SDT bearer. However, at this moment, we are open for discussion on this issue.

Thus, it proposes that RAN3 discusses whether AMF needs to indicate a QoS flow which is applicable for SDT.

RAN2 has already agreed that

5 SDT is transparent to NAS layer (i.e. NAS generates one of the existing resume causes and AS decides SDT vs non-SDT access)

### Sending LS to RAN2

In the draft LS [16], it request RAN2 to define a RRC container to include the RLC bearer configuration for SDT SRB/DRB(s). If any other information should be included in the RRC container is pending to RAN2.

**Question 7: Do you think RAN3 needs to send LS to SA2/RAN2? If yes, which content (e.g., [13], [16]) shall be included in the LS out?**

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| **Company** | **Yes/No** | **Comment** |
| ZTE | No LS to SA2  Maybe LS to RAN2 | We wonder whether AMF needs to be involved into SDT procedure, or it is up to RAN to determine whether a DRB is applicable to SDT or not.  We think whether LS to RAN2 is needed, depending on the progress on section 4.2. |
| Huawei | FFS | Can be futhter discussed. |
| Intel Corporation | LS to SA2: Yes  LS to RAN2: No | For how gNB determines which bearer can be considered as a SDT bearer, we think it is worth getting consultation from SA2.  For LS to RAN2, we see no reason. *CellGroupConfig* IE has been the RRC container to transfer lower layer configurations between nodes and the anchor can always include necessary ones (SRB1 RLC + SDT DRB RLCs) for SDT without anchor relocation. |
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## Other cases

### Case 1: Termination of the RA-SDT procedure

In [1], it states that when DU detects that no more packet is to be sent, the DU can send the F1 Inactivity Notification to target CU CP. Then for target CU CP to inform over XnAP the anchor CU CP there are two possible options:

* **Option A:** target CU CP sends a Retrieve UE Context Request message including a “last packet” indication to anchor CU CP, the anchor CU CP includes the RRC Release in the Retrieve UE Context Failure message. The RRC Release is sent to the UE.
* **Option B:** introduce a new Xn message for target CU CP to send the “last packet” indication message to anchor CU CP. Then Anchor CU CP sends an Xn Release message as a reply which includes an RRC Release message.

### Case 2: Cell reselection during SDT procedure

In [6], it states that in this case, the UE context is possibly lost due to context relocation to another gNB, while the new RRCResumeRequest message is routed to the old anchor gNB. The scenario will be that the context which is originally stored in the last serving gNB, now is relocated to the cell where the UE starts its SDT procedure, i.e., cell A, by sending RRCResumeRequest message. If the UE does a cell re-selection, i.e., to cell B before the SDT procedure is completed, it may start a new SDT procedure in the new cell. Then the new SDT procedure will try to fetch the UE context from the last serving cell, but at this point the context has been relocated to cell-A, and the fetch procedure and hence the SDT procedure will fail. We need to figure out a way to store the UE context properly when the UE is kept in the INACTIVE state. Figure 2 gives an example on the procedure.

Then, it proposals RAN3 to consider above procedure for cell reselection during ongoing SDT if time allows.

### Case 3: Enhancement on TS38.425

In [9], TS38.425 is suggested to be enhanced. It states that apart from the initial SDT stage, we consider if the data volume of the SDT RB become quite larger during the SDT procedure, it’d better timely end the SDT session from point of transmission efficiency. Then, it proposes to add available data volume from UE in the NR UP: ASSISTANCE INFORMATION DATA (PDU Type 2).

**Question 8: Do you think RAN3 shall study one or more cases as above?**

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| **Company** | **Yes/No**  **(Case 1/2/3)** | **Comment** |
| ZTE | No | We think these cases are not essential, we wonder if RAN3 has time to study them in Rel-17. But we can follow majority company’s view. |
| Huawei | Yes for 3 | 3 can be used by the last serving gNB to determine whether to end the ongoing SDT without anchor relocation. |
| Intel Corporation | Yes for 1 | For SDT without anchor relocation, how new gNB initiates termination of SDT looks essential and is worth investigating in the next meeting. There could be other options than the listed.  Other enhancements don't seem critical at this stage. We can revisit if time permits later. |
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# Conclusion, Recommendations [if needed]

If needed

# References

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2. [R3-220204](file:///D:\会议硬盘\TSGR3_114bis-e\Docs\R3-220204.zip) (TP for TS 38.473) Support of RACH-based SDT (Nokia, Nokia Shanghai Bell)
3. [R3-220214](file:///D:\会议硬盘\TSGR3_114bis-e\Docs\R3-220214.zip) (TP for RA-SDT BLCR to TS 38.300) Overall procedure for RA-SDT without anchor relocation case (ZTE, Samsung, Ericsson, Lenovo, China Telecom, CATT, Qualcomm Incorporated)
4. [R3-220215](file:///D:\会议硬盘\TSGR3_114bis-e\Docs\R3-220215.zip) (TP for RA-SDT BLCR to TS 38.423) Support of RA-SDT (ZTE, China Telecom)
5. [R3-220248](file:///D:\会议硬盘\TSGR3_114bis-e\Docs\R3-220248.zip) RACH based SDT discussion (NEC)
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10. [R3-220497](file:///D:\会议硬盘\TSGR3_114bis-e\Docs\R3-220497.zip) On RACH based SDT (Lenovo, Motorola Mobility)
11. [R3-220550](file:///D:\会议硬盘\TSGR3_114bis-e\Docs\R3-220550.zip) Discussion on support of RA-SDT (LG Electronics)
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14. [R3-220612](file:///D:\会议硬盘\TSGR3_114bis-e\Docs\R3-220612.zip) Handling of first UL data in RA-SDT without anchor relocation (Qualcomm Incorporated)
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16. [R3-220721](file:///D:\会议硬盘\TSGR3_114bis-e\Docs\R3-220721.zip) Draft LS on define a RRC container for SDT related RLC bearer config (CATT) LS out To: RAN2 CC:
17. [R3-220839](file:///D:\会议硬盘\TSGR3_114bis-e\Docs\R3-220839.zip) (TP for RA-SDT BL CR for TS 38.423) Discussion on RACH based SDT (Intel Corporation)
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