**3GPP TSG-RAN WG3 #111-e R3-211050**

**25 January – 4 February 2021**

Title: Summary of offline discussion for LS on Small Data Transmission

Source: Ericsson

Agenda Item: 8.1

Document for: Approval

# Introduction

**CB: # 82\_SDT\_LS**

**- no showstopper in RAN3**

**- need to clarify where RLC is processed? (to clarify further RAN3 work, if agreeable)**

**- clarify case for non-SD data coming?**

**- any clarifications to ask RAN2? (including e.g. assistance info?)**

**- clarify security concerns; if needed, add SA3 to LS**

**- should leave details to basket CB; concentrate on reply LS; no TUs for this topic at this meeting!**

**- merge if needed from other papers, LSs**

(E/// - moderator)

Summary of offline disc [R3-211050](file:///C:\Users\pgodin\Desktop\philipDocuments\a_ran3new2\ran3111\meetings\TSGR3_111-e\Inbox\Drafts\TSGR3_111-e\Inbox\Drafts\CB%20%23%2082_SDT_LS\Inbox\R3-211050.zip)

0500 rev in [R3-211051](file:///C:\Users\pgodin\Desktop\philipDocuments\a_ran3new2\ran3111\meetings\TSGR3_111-e\Inbox\Drafts\TSGR3_111-e\Inbox\Drafts\CB%20%23%2082_SDT_LS\Inbox\R3-211051.zip)

# For the Chairman’s Notes

Propose the following:

R3-211051 – agreed

# Discussion

## Issue 1

Confirm no issue is foreseen from RAN3’s point of view to support anchor relocation scenario for small data transmission, by reusing the legacy context fetch procedure.

|  |  |
| --- | --- |
| Company | Comment |
| E/// | Yes |
| CMCC | Yes |
| Qualcomm | yes |
| CATT | Yes |
| NEC | Yes |
| ZTE | Yes |
| Nokia | Yes. But still some IEs to be added. |
| Samsung | Yes |
| LGE | Yes |
| Lenovo, Motorola Mobility | Yes |
| Intel | Yes |
| Huawei | Yes |

1. Companies agree the legacy context fetch procedure can be reused as a baseline to support anchor relocation scenario for SDT. Any enhancement will be discussed later.
2. Inform RAN2 of reusing the existing context fetch procedure with some enhancements.

## Issue 2

To support non-anchor relocation case, RAN3 needs further discussion on the detailed solutions. Before that, we need to figure out if any impact is foreseen from RAN2’s agreement and assumption.

RAN2 has agreed that RLC configuration is stored in the UE context. Based on that, RAN3 would consider how to handle the data properly, i.e., normal context fetch as for anchor relocation case, partial context fetch (e.g., including RLC config and etc), or no context fetch. The feasibility and complexity of solutions should be analyzed after WI starts in RAN3.

At the same time, in the LS there is one assumption that RLC handling will be processed in the receiving gNB. Considering the openness of RAN3 solutions, should we reply to RAN2 that we prefer no restriction on which node to handle the RLC config and wait for further comparison?

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| --- | --- |
| Company | Comment |
| E/// | In RAN2 there was no detailed discussion and analysis of clear benefits by capturing this. RAN3 needs to discuss all the possible solutions after checking the pros and cons. Reply to RAN2 that there should not be any restriction on which node to handle RLC config. We assume RLC handling can either reside in the receiving gNB or the last serving gNB. |
| CMCC | The same view as Ericsson, since the analysis on all the candidate solutions will be done when the WI in RAN3 starts, we should reply to RAN2 and indicates no RAN3 restrictions on which node to handle RLC configuration. |
| Qualcomm | Actually, we don’t even think there was an agreement in RAN2 related to where the RLC layer is (the LS does not say it either), For now we should reply as indicated by Ericsson. |
| CATT | Similar view with E///.  We could indicate RAN2 that how to proceed with RLC handling for SDT need to be further discussed. |
| NEC | Regarding the RLC configuration used for the SDT DRB data, it will be stored in UE context at the last serving gNB. Hence, RAN3 should discuss whether UE context or at least RLC configuration should be moved to the new gNB.  As for the RLC handling, according to RAN2 LS ([R3-210029](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_111-e/Docs/R3-210029.zip)):  *RAN2 assumption is that the RLC PDU will be processed in the receiving gNB.*  So, in our understanding, the above is not an actual agreement but merely an assumption.  No strong view on requesting further clarification on this point from RAN2. |
| ZTE | Agree with NEC, we can ask RAN2 to confirm it. |
| Nokia | Agree with ZTE and NEC but disagree with Ericsson. We can ask RAN2 whether their assumption is confirmed or not, but it is not up to RAN3 to tell about any RAN3 assumption where the RLC handling is best done or should be done! This is RAN2 decision how and where RLC is handled. |
| Samsung | At this moment, we couldn’t make any conclusion on where the RLC is handled. Moreover, the LS just mentions that RAN2 assumes the RLC processing is located at the receiving gNB. Thus, we agree with Nok, we can ask RAN2 whether the RLC handling at the receiving gNB is confirmed or not.  On the other hand, as mentioned in our contribution, if RLC handling is located at the receiving gNB, we need RAN2’s feedback on whether logical channel configuration is also needed at the receiving gNB in order to perform the RLC handling.  We understanding that RLC handling and logical channel configuration should be discussed in RAN2. From RAN3 point of view, we need show our unclearness based on the existing LS and ask for clarification since this is related to RAN3 design. |
| LGE | Agree with NEC and ZTE, we can ask RAN2 to confirm it. |
| Lenovo, Motorola Mobility | We share the same view with Ericsson: Reply to RAN2 that there should not be any restriction on which node to handle RLC config. How to handle RLC config between receiving gNB and last serving gNB can be discussed later in RAN3. |
| Intel | Same view as ZTE, NEC, and Nokia – this should be RAN2 decision. |
| Huawei | RAN2 already said that the stored RLC configuration is used, and RAN2 assumes that it is the new serving gNB to process RLC, RAN3 can further analyses and reply RAN3 preference to RAN2, instead of asking RAN2 to confirm again. |

1. The discussion is divided into two camps. A few companies prefer that there is no restriction on which node to handle RLC configuration and RAN3 should figure out when finalizing the solution. A majority of companies prefer to confirm this assumption with RAN2.
2. Include RAN3’s discussion for RLC handling in the reply LS. Ask RAN2 if previous RAN2 assumption is now confirmed.

## Issue 3

Which node will be the decision maker for with or without anchor relocation?

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| --- | --- |
| Company | Comment |
| E/// | The last serving gNB who has the UE context. |
| CMCC | The anchor gNB, i.e., the last serving gNB. |
| Qualcomm | As a “working assumption”, the last serving gNB/anchor. |
| CATT | The anchor gNB, i.e., the last serving gNB. |
| NEC | The last serving gNB/anchor can decide, based on assistant information from the new gNB. For example, as explained in [R3-210243](https://www.3gpp.org/ftp/tsg_ran/WG3_Iu/TSGR3_111-e/Docs/R3-210243.zip), the new gNB could send to the last serving gNB, assistant information, such as the type of transmission (SDT or not-SDT, other) and whether the SDT is only one-shot or potentially multiple transmissions. This information would help the last serving gNB in its decision whether to relocate the full UE context, i.e. in case of multiple SDT transmissions, or at least send partial UE context (e.g. RLC configuration), in case of one-shot SDT, to the new gNB. |
| ZTE | The anchor gNB, i.e., the last serving gNB. |
| Nokia | The new gNB will receive the assistance information in first from UE (SDT, non-SDT, multiple transmission SDT, expected volume (BSR)) then two possible options: either the new gNB transfers all this assistance information to anchor gNB, or it could also not transfer it and indicate instead a guidance whether relocation is desired/recommended or not based on the received assistance information: this would avoid sending all the time the assistance information over Xn. Please note that BSR can evolve over time in the case of multiple transmissions and it is cumbersome to transfer this all the time to anchor gNB. We should also consider that if multiple transmissions the relocation could happen after a few transmissions, not necessarily at the beginning. Due to the above new gNB sending guidance to anchor gNB may be better than sending raw assistance data (i.e. assistance information as received from UE). The nature of the signaling sent from new gNB to anchor gNB (assistance or guidance derived from assistance) can be evaluated when work starts in RAN3. So far LS can make a generic answer on that. |
| Samsung | Anchor node (i.e., last serving gNB) makes the decision |
| LGE | The anchor gNB, i.e., the last serving gNB based on assistant information from UE |
| Lenovo, Motorola Mobility | Should be anchor gNB if we follow the same principle as legacy. However, it is not related with the reply LS. It is not urgent to make a conclusion this meeting. |
| Intel | We are fine with the majority view that this should be the last serving gNB, but also agree with Lenovo that this goes a bit beyond the scope of the email discussion.  That being said, if there is consensus, no reason not to have some progress. |
| Huawei | Anchor gNB makes decision, and the new serving gNB can provide assistance information. |

1. Majority of the companies agree that the anchor gNB, i.e., the last serving gNB, will be the decision maker for anchor relocation/non-relocation with some assistance or guidance from new gNB.
2. Try to make a generic assumption as one of RAN3’s initial progress in the reply LS.

## Issue 4

How to handle the first UL message containing DRB data for SDT?

* For anchor relocation case, the data can be buffered until the context fetch procedure is completed.
* For non-anchor relocation, the process has dependency on the final solution. Either the data is buffered in the receiving gNB until possible full/partial context fetch is done, or encapsulated and transferred to the last serving gNB after arrival.

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| Company | Comment |
| E/// | From RAN3 point of view, the network solutions work no matter the data is buffered or not. Since the anchor gNB may decide whether to relocate the anchor or not, it is reasonable to buffer the data until the UE context retrieval procedure is completed. |
| CMCC | Yes for anchor relocation case, but for the non-anchor relocation case, it depends on the solutions which need further discussion. |
| Qualcomm | Agree with Ericsson and CMCC. Actually even for non-anchor relocation, buffering may be required – it depends on the final solution. |
| CATT | Agree with E///, CMCC, QC.  For non-anchor relocation case:   * The data may need to be buffered in the receiving node if the RLC handling is in the receiving node. * The data could be provided to the anchor timely, e.g. included in the Retrieve UE Context Request if RLC handling is proceed in the anchor. |
| NEC | Agree that it depends on the solution.  This issue could be discussed further at a later stage when discussing potential solution(s). |
| ZTE | Agree with E///, CMCC, QC. Moreover, we shall ask RAN2 if SDT has latency requirement, which is essential for the final solution decision. |
| Nokia | Agree with the above that it needs further discussion. And support ZTE proposal and analysis to ask whether latency really matters or not. That could help if we have the answer when we start investigating in Q4/21. |
| Samsung | This needs further discussion in RAN3 based on RAN2 progress. At this stage, we cannot say anything about this for the Reply LS. |
| LGE | Supports ZTE’s proposal to ask RAN2 whether SDT has latency requirement for non-anchor relocation |
| Lenovo, Motorola Mobility | Support ZTE’s proposal to check the latency requirement on SDT. |
| Intel | It seems a bit premature to make this decision. |
| Huawei | Agree that the new serving gNB needs to buffer the data first, and then next step is pending to the decision of with or without anchor relocation. |

1. Some companies see the natural possibility to buffer data for non-anchor relocation case. Some companies prefer to check latency requirement with RAN2 if any.
2. Inform RAN2 about buffering as part of our initial discussion. Ask if any consideration on latency.

## Issue 5

If the conclusion to issue 3 is the last serving gNB, RAN3 may consider the introduction of UE assistance information to help the last serving gNB to make decision whether to relocate the anchor. Several options are on the table, i.e., BSR, traffic pattern, or a simple indicator to indicate single or multiple data.

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| --- | --- |
| Company | Comment |
| E/// | The proposed assistance info may be beneficial. Final solution depends on how to interpret the information from UE. For now we don’t have to ask RAN2 for feedback unless any action of alignment is required. Instead, we can inform them that RAN3 is going to discuss this point. |
| CMCC | Yes, we can inform RAN2 assistance information is needed, details need further discussion. |
| Qualcomm | Agree with CMCC |
| CATT | Agree with CMCC. |
| NEC | Agree to inform RAN2 that assistant information is needed. As we explained in our answer to Issue 3, example of assistant information could be the type of transmission (SDT or not-SDT, other) and whether the SDT is only one-shot or potentially multiple transmissions. |
| ZTE | Agree with CMCC. |
| Nokia | Agree to inform RAN2 that we will work on which information/guidance new gNB will send to anchor gNB. However, everything should be open at this stage i.e. not necessarily the “raw assistance information” (i.e. what has been received from UE) but could also/instead be some guidance derived by new gNB from the assistance information that new gNB has received to avoid the full transfer. See answer to issue 3. |
| Samsung | We agree to provide the assistant information to the last serving gNB at this stage. However, everything else should be open. Moreover, in our understanding, the assistant information should be generated based on UE’s input, which needs RAN2’s progress.  In the Reply LS, we can inform RAN2 that RAN3 agree that assistant information for the receiving gNB is needed for the last serving gNB to make decision. |
| LGE | Agree with CMCC. |
| Lenovo, Motorola Mobility | Agree with CMCC. We need to inform RAN2 that some assistant information is needed from UE in order that the anchor gNB decides whether relocation is needed, even whether the UE needs go to RRC\_CONNECTED. |
| Intel | Agree with CMCC |
| Huawei | Better to update “UE assistance information” to “assistance information”, as the assistance information can include information from UE and also can include information stored at the anchor gNB, e.g. UE history, the UE subscription, etc. |

1. Majority agree to inform RAN2 that assistance information or guidance could be useful for the last serving gNB to decide whether to relocate the anchor. Details are withheld pending further investigation.
2. Include assistance information or guidance provided by new gNB as part of initial discussion in RAN3.

## Issue 6

Is there any scenario needs to be addressed without anchor relocation? For example, should the UE stay in INACTIVE or change to CONNECTED state if there is arrival of upcoming non-SDT data after SDT?

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| --- | --- |
| Company | Comment |
| E/// | Leave to future discussion on scenarios. |
| CMCC | Seems not need to touch this aspect at this reply LS |
| Qualcomm | No need to discuss this for now. |
| CATT | Non business with the incoming LS, it could be discussed later. |
| NEC | Agree with E///. This point could be postponed until future discussion on SDT topic in RAN3. |
| ZTE | We suggest to ask RAN2 to confirm this scenario. |
| Nokia | If non-SDT data comes and requires UE to move to connected state, then context should be relocated. |
| Samsung | We can discuss this in the future. Moreover, we believe RAN2 should discuss this first. |
| LGE | Same view with Ericsson |
| Lenovo, Motorola Mobility | Same view with ZTE. We can ask RAN2 to confirm the issue. |
| Intel | It is premature to make such agreements |
| Huawei | Leave to future discussion on scenarios. |

**Conclusion: Leave for future discussion.**

## Issue 7

In case of non-anchor relocation, if the newly arrived encrypted small data needs to be decoded in the receiving gNB, will it be any security issue since both nodes will be able to see the same data? Do we need to send this LS also to SA3?

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| --- | --- |
| Company | Comment |
| E/// | Yes. Check with SA3. |
| CMCC | Yes |
| Qualcomm | Yes we mentioned this also – two nodes operating with same keys potentially. Whether we trigger SA3 now or later can be discussed. |
| CATT | No matter RLC handling is preceded in the receiving node or the anchor gNB, we assume the PDCP handling should be preceded in the anchor gNB definitely.  Therefore, we do not see any need to decode the encrypted data in the receiving node in case of non-anchor relocation.  In our understanding, following the security strategy of SA3, the same keys could not be used in different nodes. |
| NEC | Yes. We could check SA3. |
| ZTE | We are fine to check it with SA3. However, we shall clarify the scenario, i.e., in case of non-anchor relocation, then no path switch and PDCP/SDCP is kept at the anchor node. |
| Nokia | Same view as CATT. PDCP decoding is assumed to be in anchor gNB only. |
| Samsung | The PDCP decoding should be located at the anchor node. Based on this, we don’t know what should be checked with SA3. In addition, even some checking is needed, RAN2 should be responsible to send this LS to SA3 since we didn’t even official start this WI in RAN3. |
| LGE | Agree with CATT, Nokia, and Samsung.  The data should be decoded in the last serving gNB. |
| Lenovo, Motorola Mobility | Agree with CATT. The PDCP should be anchored in the last serving gNB. If so, no need to check with SA3. |
| Intel | If there are security concerns, even potential concerns (depending on the solution to be defined), it is better to clarify them with SA3. The LS text can be formulated to reflect that RAN3 is asking SA3 feedback for a potential issue. |
| Huawei | The PDCP handling is located at anchor gNB for sure, therefore we do not see the scenario mentioned in this question, no need to check with SA3 for an invalid scenario. |

1. There are different opinions on potential security issue. Some companies see the benefits to check with SA3 on potential impact which may impact RAN3’s solution. Some companies think no security impact and no need to check at this point.
2. No agreement to send an LS for now at this stage.

## Issue 8

How the DRB data is included in the first UL message? Either in RRCResumeRequest message or MAC SDU? Will this impact RAN3’s solution? Do we need to ask RAN2?

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| --- | --- |
| Company | Comment |
| E/// | Wait for RAN2’s discussion in parallel. |
| CMCC | Monitor RAN2 progress, in our view, it is concatenated with the MAC SDU which carries RRCResumeRequest message |
| Qualcomm | This seems a useful thing to know, but we can leave to RAN2 to work on. |
| CATT | Internal checked with RAN2 colleague, it should be the separate MAC-SDU, not included in the RRCResumeRequest message. |
| NEC | We can wait for RAN2 decision on this point. |
| ZTE | We shall ask RAN2. |
| Nokia | There are two schemes in RAN2: RRC-based SDT and non-RRC based SDT. RRC-based SDT is the main solution currently studied by RAN2. In RRC-based SDT the DRB data is not in the RRC message itself but set aside in the same MAC SDU. Whether non RRC-based SDT is also to be supported could be asked to RAN2 as presumably this could actually have different impact on our RAN3 solution. |
| Samsung | It seems that companies think that DRB should be in a separate MAC-SDU from the RRC message, which is also our understanding.  If this is the common understanding in the RAN3 group, we can make this as agreement. However, in LS, it is clearly mentioned that “RAN2 also agreed that the first UL message (i.e. MSG3 for 4-step RACH and MSGA for 2-step RACH) may contain DRB data from one or more DRBs which are configured by the network for SDT” . The highlighted part seems to be not aligned with our understanding. Since this is RAN2 issue, it is no harm to mention this clarification in the reply LS, rather than waiting RAN2 progress. |
| LGE | Wait for RAN2 decision |
| Lenovo, Motorola Mobility | It should be a separate MAC SDU. No strong opinion whether to check with RAN2. |
| Intel | RAN2 decision |
| Huawei | Agree with CATT, we also think it has to be a MAC-SDU, instead of piggyback in the *RRCResumeRequest* message. Anyway, it is up to RAN2, not a RAN3 topic, no need to ask. |

**Conclusion: Leave to RAN2 for decision.**

## Issue 9

Do we need to ask RAN2 whether the logical channel configuration is required at the receiving gNB when derive the RLC PDU?

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| --- | --- |
| Company | Comment |
| E/// | No. It depends on which solution RAN3 will go for. |
| CMCC | Depends on solutions |
| Qualcomm | Not for now. |
| CATT | Pending to the solution decided for non-anchor relocation case. |
| NEC | Depends on solutions. |
| ZTE | Agree with NEC |
| Nokia | Not for now. |
| Samsung | We understand that at this moment, we cannot decide anything since the solutions are still open. However, our reply LS should be based on the content of RAN2 LS.  In RAN2 LS, it is read that “The RLC configuration used for the SDT DRB data will be based on a UE stored configuration. RAN2 assumption is that the RLC PDU will be processed in the receiving gNB.” The highlight part shows some unclearness on RAN2’s assumption, i.e., how to process RLC PDU at the receiving gNB with RLC configuration? Does it mean the logical channel configuration is not needed? Apparently, RAN3 is not a suitable group to figure them out.  So, in the reply LS, we need ask RAN2 provide some clarifications for their assumption. We understand that their assumption may not be the final solution, and we are not intending to determine any solutions. |
| LGE | Not for now |
| Lenovo, Motorola Mobility | Depends on Solutions. |
| Intel | Not for now |
| Huawei | Not for now. |

**Conclusion: Companies don’t see the need to ask for now.**

## Issue 10

Which node will determine the SDT bearer type (i.e., CG-SDT bearer and RACH-SDT bearer). Whether one DRB can be CG-SDT bearer and RACH-SDT or not?

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| --- | --- |
| Company | Comment |
| E/// | Wait for progress in RAN2. |
| CMCC | RAN2 topic |
| Qualcomm | Can be left to RAN2. |
| CATT | Pending to RAN2. |
| NEC | Wait for progress in RAN2. |
| ZTE | RAN2 topic |
| Nokia | Well, this cannot be the AMF! |
| Samsung | Since this is RAN2 issue, it is no harm to raise this question in the Reply LS. |
| LGE | Pending to RAN2 decision |
| Lenovo, Motorola Mobility | Wait for RAN2 input |
| Intel | RAN2 decision |
| Huawei | Agree with Nokia☺ |

**Conclusion: Leave to RAN2 for decision.**

## Issue 11

Although CG-SDT is not within RAN3’s scope for SDT WI, some companies brought potential impacts by supporting CG-SDT over F1 interface. Do we need to ask RAN2 for any clarification?

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| --- | --- |
| Company | Comment |
| E/// | No. F1 impacts should be discussed in RAN3. |
| CMCC | RAN3 could do the work on F1 impacts. RAN2 is not the WG to clarify the WI scope. CG-SDT is in the scope, if F1 impact is found, we can do the job |
| Qualcomm | Seems no need to ask for clarification: once we have actual TUs, this can be discussed based on proposals / analysis in RAN3. |
| CATT | No need to ask RAN2, the potential F1 impact could be further discussed in RAN3. |
| NEC | This could be discussed in RAN3 at a later stage. |
| ZTE | Agree with CATT and NEC |
| Nokia | Impact is clear. Agree with CATT, NEC and ZTE. |
| Samsung | We agree F1 impact should be discussed in RAN3. Our intention is to inform RAN2 that CG-SDT may also have impact to RAN3, although WID does not mention it. With this information, RAN2 can start to include any related CG-SDT agreements to RAN3 in the following-up LS(es) in the future. |
| LGE | Agree with CATT, NEC |
| Lenovo, Motorola Mobility | Pure RAN3 issue. |
| Intel | Agree with others, no need to ask RAN2 |
| Huawei | CG-SDT have F1 impact, no need to ask RAN2, we need to work on that for sure. |

**Conclusion: No need to ask RAN2 about CG-SDT. F1 impacts is within RAN3’s scope.**

# Conclusion, Recommendations

Draft of reply LS R3-211051 has been uploaded.

[Summary 1 Companies agree the legacy context fetch procedure can be reused as a baseline to support anchor relocation scenario for SDT. Any enhancement will be discussed later.](#_Toc62820947)

[Proposal 1 Inform RAN2 of reusing the existing context fetch procedure.](#_Toc62820948)

[Summary 2 The discussion is divided into two camps. Some companies prefer to inform RAN2 that there is no restriction on which node to handle RLC configuration and RAN3 should figure out when finalizing the solution. Some companies prefer to confirm this assumption with RAN2.](#_Toc62820949)

[Proposal 2 Include RAN3’s discussion for RLC handling in the reply LS. Clarify with RAN2 if any issue is foreseen.](#_Toc62820950)

[Summary 3 Majority of the companies agree that the anchor gNB, i.e., the last serving gNB, will be the decision maker for anchor relocation/non-relocation.](#_Toc62820951)

[Proposal 3 Try to make a generic assumption as one of RAN3’s initial progress in the reply LS.](#_Toc62820952)

[Summary 4 Some companies see the natural possibility to buffer data for non-anchor relocation case. Some companies prefer to check latency requirement with RAN2 if any.](#_Toc62820953)

[Proposal 4 Inform RAN2 about buffering as part of our initial discussion. Ask if any consideration on latency.](#_Toc62820954)

[Summary 5 Majority agree to inform RAN2 that assistance information could be useful for the last serving gNB to decide whether to relocate the anchor. Details are withheld pending further investigation.](#_Toc62820955)

[Proposal 5 Include assistance information as part of initial discussion in RAN3.](#_Toc62820956)

[Summary 6 There are different opinions on potential security issue. Some companies see the benefits to check with SA3 on potential impact which may impact RAN3’s solution. Some companies think no security impact.](#_Toc62820957)

[Proposal 6 Formulate the LS text to describe the concern on potential issue if agreeable.](#_Toc62820958)

# References

1. R3-21151,