3GPP TSG-RAN WG2 Meeting #116bis Electronic R2-220xxxx

Elbonia, 17 – 25 January 2022

**Agenda item: 8.6.3**

**Source: Nokia (Rapporteur)**

**Title: Report of [Post116-e][510][SDT] CCCH and DCCH (Nokia)**

**WID/SID: NR\_SmallData\_INACTIVE - Release 17**

**Document for: Discussion and Decision**

# 1 Introduction

This document is the report of the following email discussion:

* [Post116-e][510][SDT] CCCH and DCCH (Nokia)

 Scope: Aim to have CRs describing each solution and discuss technical points on the two solution such that a decision can take place next meeting.

 Deadline: Long

# 2 Contact Points

Respondents to the email discussion are kindly asked to fill in the following table.

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| --- | --- | --- |
| Company | Name | Email Address |
| Nokia (Rapporteur) | Samuli Turtinen | samuli.turtinen@nokia.com |
| ZTE | He Huang | Huang.he4@zte.com.cn |
| Samsung | Anil Agiwal | anilag@samsung.com |
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# 3 Discussion

Agreeing on a solution option between CCCH- and DCCH-based solution for the non-SDT data arrival during SDT procedure has been challenging and open for several meetings already. Details of the solutions and related issues have been discussed, e.g., in [1-7] in the previous RAN2#116-e meeting.

The intention of this discussion is to gather companies’ views on the presented issues for both solutions to guide the discussion on agreeing on a solution basis for the long-lasting issue.

Since solution opponents for both solutions provided specific issues of the solutions, it seems fair to ask what companies think about these issues as online discussion was mainly about debating that there are open issues in both solutions without solid answers if the issues were actually meaningful in terms of specification effort. The intention would be also to describe how the issue is solved in the solution option, ie., more details of each solution should be described.

Even though both solutions on high level have been clear for pretty much everyone, they are shortly recapped hereinafter for convenience:

 When SDT procedure is ongoing (ie., SDT has been initiated by RRC layer) and data arrives into a buffer of at least one SRB/DRB not configured for SDT, the UE

* DCCH solution: triggers a transmission of an RRC message over SRB1 (tbc.) indicating the availability of data in the buffer of the SRB(s)/DRB(s) not configured for SDT. The RRC message is transmitted as SDT data in the SDT procedure. Based on the RRC message, the NW may bring the UE into CONNECTED mode.
* CCCH solution: terminates the SDT procedure and triggers an RRC resume procedure (non-SDT). Based on the *RRCResumeRequest*, the NW may bring the UE into CONNECTED mode.

## 3.1 Questions on DCCH based solution

[2, 6] provides a set of open issues wrt. DCCH-based solution. These issues are discussed hereinafter.

Firstly, it should be discussed whether a new resume cause is needed, e.g. if non-SDT is triggered by RNA update or signalling while SDT was triggered for data etc. The CT1 reply on this aspect provided in [8] is not completely clear but seems to assume that for suspended resources, NAS will require Service Request procedure to be initiated and NAS will need to provide UAC parameters based on the reason for that Service Request. This may need to be further clarified from CT1.

**Question 1**: Do you agree that resume cause needs to be indicated in the RRC message for non-SDT data indication for DCCH based solution? Further, should this be confirmed from CT1 with an LS?

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| Answers to Question 1 |
| Company | Yes/No | CT1 LS: Yes/No | Technical Arguments |
| ZTE | No | No | Firstly, we think this discussion is common to CCCH and DCCH solutions. We need to design the solution to work independent of NAS triggers for both CCCH and DCCH case. Then, we want to point out that none of this is new (i.e., even in legacy resume, new data or new NAS procedure can arrive whilst T319 is running). The current behaviour is that once a resume procedure is initiated (i.e. T319 is running), AS doesn’t respond to any new triggers from NAS except NAS abort procedure. This legacy behaviour should not be changed in Rel-17 just for SDT! If we change this behaviour for SDT, then we will have two procedures in AS (when SDT is running, AS will respond to new triggers from NAS whilst when SDT is not running, AS will continue with existing resume procedure and such a situation is not good). Hence, the non-SDT data arrival indication should be fully handled within AS without any need for NAS triggers both for CCCH and DCCH solutions.  Thus, for non-SDT data arrival, we don’t think the resume cause is needed in the DCCH message. In our view, non-SDT data arrival indication is a RAN level indication used to indicate to the network that there is new data which is for non-SDT RBs. This is consistent with the feedback from CT1 [8] that “once small data transmission is initiated the UAC parameters (access category and access identity) for subsequent UL data for non-SDT DRBs to use will be the same as those for UL data for SDT DRBs”, it seems the resume cause will not change during the SDT, thus there is no need to include the resume cause again in the DCCH message.Even further, we think if there is some ambiguity here, we should actually clarify it for legacy resume first! But, we think the AS procedure here is fairly clear (i.e. once there is an ongoing resume procedure, AS doesn’t respond to any further triggers from NAS until the previous resume procedure is complete and this legacy behvaiour should not be changed).  |
| Samsung | No | No | We do not see any need to indicate resume cause. |
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**Summary 1**: TBD.

**Proposal 1**: TBD.

Regardless of the responses to Question 1, the details of the content of the RRC message for non-SDT data indication should be discussed. For instance, is there a need to include further information on top of the indication, like SRB(s)/DRB(s) information with data, *resumeCause* (see previous question), amount of data, etc.

**Question 2**: What information should be included in the RRC message for non-SDT data indication for DCCH based solution?

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| Answers to Question 2 |
| Company | Technical Arguments |
| ZTE | Since UE only needs to inform NW the arrival of non-SDT data, we don’t see the need to have any extra information besides the message itself (i.e. an empty message as proposed in [4] is sufficient). |
| Samsung | Non SDT data indication is sufficient. |
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**Summary 2**: TBD.

**Proposal 2**: TBD.

Another issue is whether a new UL RRC message would be defined, or an existing UL RRC message (like *UEAssistanceInformation*) could be utilized for the purpose.

**Question 3**: Do you prefer to introduce a new UL RRC message for the non-SDT data indication for DCCH based solution? If not, which existing UL RRC message is preferred to be utilized and why?

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| Answers to Question 3 |
| Company | Yes/No | Technical Arguments |
| ZTE | Yes, but no strong view | We have slight preference to use a new DCCH message, which can minimize the impact on specs. But if majority want to use the existing message, it is also fine. We don’t think this is a critical issue, and we can simply follow the majority view. |
| Samsung | Yes but | Slightly prefer new message as it has less overhead. However, if majority view is to use legacy message, we are ok to use *UEAssistanceInformation* |
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**Summary 3**: TBD.

**Proposal 3**: TBD.

The error recovery for DCCH based solution is also unclear, unlike in CCCH based solution where T319 is started when the resume procedure is initiated. While the details of the SDT failure timer are yet unclear, generally it has been agreed to be longer than T319 to account the unknown time required to complete the SDT procedure. Hence, the SDT failure timer applicability for non-SDT data arrival is questionable, for instance, in case the non-SDT data is high priority traffic, e.g. an emergency call.

**Question 4**: Do you agree the SDT failure timer is not sufficient for error handling in case of non-SDT data indication for DCCH based solution? If yes, what should be the UE behaviour in case the network is not responding for the DCCH based non-SDT data indication?

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| Answers to Question 4 |
| Company | Yes/No | Technical Arguments |
| ZTE | No | We think SDT failure timer is sufficient.First of all it is unclear why the UE aborting the ongoing connection and initiating a new RACH procedure (which may or may not succeed) has a better chance of success than UE sending a DCCH message using dedicated resources in the ongoing connection (radio conditions won’t change just because UE decides to ignore dedicated resources such as dedicated UL grant etc). The point is that if there is some problem on the Uu, (and hence the UE finds itself in a condition where UL DCCH message is not going through), initiating a new RACH procedure (which then relies on RACH, RAR, contention resolution and then providing the same information as the original information seems to provide no advantage at all! Hence, we don’t think any additional mechanism is needed. RLC retransmission can ensure the DCCH message can reach NW successfully, and we can rely on the NW to ensure the DCCH message can be treated correctly.  |
| Samsung | No | Share ZTE’s views |
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**Summary 4**: TBD.

**Proposal 4**: TBD.

For CCCH based solution, the NW can respond with existing RRC messages as specified. For DCCH based solution, however, this is not completely clear. For instance, can the NW respond with *RRCReject* based on the RRC message for the non-SDT data indication and would the UE go to RRC\_INACTIVE mode based on it? Furthermore, would the UE terminate the ongoing SDT procedure or continue with it?

**Question 5**: Do you agree that the NW can respond with *RRCReject* for the RRC message for the non-SDT data indication? If yes, what should be the UE behaviour in this case?

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| Answers to Question 5 |
| Company | Yes/No | Technical Arguments |
| ZTE | No | The UE has already sent an RRCResumeRequest message. So, if the network may have already retrieved the UE context and once the UE context is available, there is actually no need to use RRCReject anymore. The purpose of RRCReject is when the UE context is not yet retrieved. Of course, if the UE context has not been retrieved (or network is unable to identify the UE etc, then the network can send RRCReject to the UE – this is legacy behaviour). So, whether or not RRCReject is used depends on whether or not network is able to retrieve the UE context. This has nothing to do with CCCH or DCCH solution to be used! The actual UE behaviour upon receiving the RRCReject is also the same as legacy and needs no changes (as this can only happen in case UE context is not retrieved).  |
| Samsung | No | Share ZTE’s views |
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**Summary 5**: TBD.

**Proposal 5**: TBD.

Another case described in [6] is in case the NW initiates the transmission of *RRCRelease* message before receiving the RRC message for non-SDT data indication from the UE, what would be the UE behaviour. Naturally, the UE does not know if the NW received the non-SDT data indication before or after triggering the RRC Release.

**Question 6**: What should be the UE behaviour in case it receives *RRCRelease* message after transmitting the RRC message for non-SDT data indication to NW?

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| Answers to Question 6 |
| Company | Technical Arguments |
| ZTE | No matter non-SDT data indication has been send or not, once RRC release message is received and there is data still buffered on UE side, the UE will initiate another resume procedure accordingly, which is the same as the current resume procedure triggered by DL Non-SDT data in case SDT without anchor relocation.By the way this exact case can happen today in connected mode as pointed out multiple times! i.e. UE is in connected mode, new pending data or NAS procedure is initiated, but, network sends RRCRelease to the UE (before the new procedure is completed). Then what is the UE behaviour in the above case? The same behaviour would also apply for this case too.  |
| Samsung | UE will process the RRC Release in same manner irrespective of whether it has send non-SDT data indication or not. After processing the RRC Release, if there is data in buffer, UE will initiate resume procedure as usual. |
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**Summary 6**: TBD.

**Proposal 6**: TBD.

RAN3 has agreed that the last serving gNB decides whether to relocate the UE context or not when the SDT procedure is initiated. However, in case the RRC message for non-SDT data indication is received by the receiving gNB, the context shall be transferred to the receiving gNB in case the UE is brought into RRC\_CONNECTED mode. This would be no longer a decision of the last serving gNB.

**Question 7**: Do you agree that the receiving gNB shall be able to indicate to the last serving gNB and force UE context relocation in case of RRC message for non-SDT data indication is received by the receiving gNB (ie., against current RAN3 agreement)?

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| Answers to Question 7 |
| Company | Yes/No | Technical Arguments |
| ZTE | No/Question is based on wrong assumption | The question seems to be based on wrong assumption that there will be context relocation in this case. But, we already agreed that this will not happen. The anchor gNB in this case will not relocate the context, but will simply send RRCRelease message (per the agreement below). So, we should not discuss this again (note there is nothing against RAN3 agreement here because the anchor gNB is still in-charge but it just sends the UE back to INACTIVE in this case). * “No new solution is defined to prevent data loss or duplication for the scenario where the anchor relocation is required in the middle of an SDT session, i.e. network can release UE back into RRC\_INACTIVE”
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| Samsung | No | As already agreed context relocation is not performed in the middle of the SDT procedure.  |
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**Summary 7**: TBD.

**Proposal 7**: TBD.

Finally, DCCH based solution is described to overperform CCCH based solution since the link between the UE and the NW is already “available”. However, since the SDT procedure is considered to be fairly short, the likelihood that the RA procedure for initial SDT transmission has not been completed upon the non-SDT data arrival into the UE buffer can be regarded also meaningful, ie., most of the time in the SDT procedure is spent in the RA procedure in case the SDT data can be included in the MSGA/Msg3 completely. Same applies for CG-SDT transmission, ie., NW may have not responded to the UE (or the UE even transmitted the initial CG transmission) before the non-SDT data arrival. Since the payload size of SDT Msg3/MsgA/CG is generally thought to be larger, the probability for it to succeed compared to regular RA procedure Msg3/MsgA could be thought to be lower – also since the UE may be moving away from cell centre.

**Question 8**: Do you agree CCCH solution would generally outperform DCCH solution when RA procedure for RA-SDT is not completed or when no response is received for initial CG-SDT transmission?

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| Answers to Question 8 |
| Company | Yes/No | Technical Arguments |
|  | No | Since RACH procedure has already been initiated, we don’t see any benefit to cancel the ongoing RACH/CG transmission and initiate another RACH procedure. Furthermore, in case of legacy RACH procedure, we don’t do this. i.e. if the RRC has initiated a RACH procedure for resume, and then if some other trigger comes from higher layer (before RACH procedure is completed), RRC doesn’t abort the ongoing RACH procedure. So, is the intention of the moderator to make the SDT procedure somehow different to the legacy RACH procedure? Seems if we go this way, we should also discuss the legacy RACH procedure then and to us it seems strange (otherwise, we will have different UE behaviour for RACH completion with and without SDT and this is not good). In addition, a new CCCH procedure will interrupt the ongoing SDT data transmission, which will lead to the lost of data over Uu and waste of resource (i.e. new CCCH is not aware of DU, and DU will schedule UE continuously for retransmission). |
| Samsung | No | First we do not agree that non SDT data indication will occur often while the initial RA procedure for SDT is ongoing. Even if it occurs, continuing RA procedure is better than terminating and initiating a new RACH procedure. |
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**Summary 8**: TBD.

**Proposal 8**: TBD.

## 3.2 Questions on CCCH-based solution

[5] lists number of issues for CCCH based solution. These issues are discussed hereinafter.

Firstly, security issues are described. [5] indicates that UE autonomous horizontal key derivation when switching from SDT procedure to RRC resume procedure would violate security principles. This may need to be clarified from SA3.

**Question 9**: Do you see a concern in UE autonomous horizontal key derivation when switching from SDT procedure to RRC resume procedure? Further, should this be confirmed from SA3 with an LS?

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| Answers to Question 9 |
| Company | Yes/No | SA3 LS: Yes/No | Technical Arguments |
|  | Yes | Yes | Firstly the key derivation during RRCResume is specified in SA3 specs. There will be changes needed in this procedure (please see some details provided below in section 3.3 – for draft CRs required). So, at least to get these changes done on SA3 side, we should send an LS to SA3 (otherwise, it is unclear how SA3 will update their specs).Then, we do have concern on the UE autonomous horizontal key derivation based solution since SA3 have said such autonomous horizontal key derivation is not allowed in case of reestablishment – of course they might conclude this case is different but we are not sure if RAN2 can simply make such assumption and proceed. What we want to avoid is that we proceed with this assumption when companies block this solution in SA3! This is the main reason whey we are a bit concerned about proceeding with CCCH only approach. Then, we need to agree the following details first and we are not sure which group should agree these (these details are captured in SA3 spec (see 33.501 – extract below in section 3.3). * How to understand the UE autonomous horizontal key derivation here. Whether the UE autonomous horizontal key derivation will be made based on the key stored in INACTIVE UE context (the one used before UE enter INACTIVE state), or the new one derived in the SDT operation.
* How to handle the mismatch between UE side and NW side in case the original CCCH has not been confirmed before the new CCCH procedure is initiated.
* Which NW entity will do the UE verification and key derivation in case the UE context has been relocated in SDT operation, whether new RAN3 procedure will be required?
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| Samsung | Yes | Yes | RAN2 cannot decide this aspect. This should be discussed in SA3 |
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**Summary 9**: TBD.

**Proposal 9**: TBD.

[5] further indicates that same security key would be used by two NW nodes in case the KgNB used to cipher the UL data during the SDT procedure is used as input key for the *resumeMAC-I* generation for the *RRCResumeRequest* used for the non-SDT data indication. This may need to be clarified from SA3.

**Question 10**: Do you see a concern in using the same KgNB used to cipher the UL data during SDT procedure for *resumeMAC-I* generation for the *RRCResumeRequest* used for non-SDT data indication? Further, should this be confirmed from SA3 with an LS?

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| Answers to Question 10 |
| Company | Yes/No | SA3 LS: Yes/No | Technical Arguments |
|  | Yes | Yes | We presume this question is about the key reuse issue identified with horizontal key derivation. From what we understand, the CCCH proponents are arguing that although the same key is used in two different nodes, it is okay because one key is used just for resumeMAC-I verification in the anchor node whilst the same key is used for integrity protection in the other node. May be this argument can satisfy SA3, but may be this won’t. From our side the main concern is that if we rule out DCCH solution (which will of course have no such issues), and if SA3 says that this is not allowed, then we will be in a situation where we have nothing for this! This situation should be avoided. In any case, SA3 should be consulted on the overall new security framework regardless of what we decide (not only to check it but also to implement it as noted above).  |
| Samsung | Yes | Yes | Whether same key can be used in two different nodes should be be discussed in SA3 |
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**Summary 10**: TBD.

**Proposal 10**: TBD.

On the other hand, it was not completely clear if the horizontally generated key would be used for the *resumeMAC-I* generation for the *RRCResumeRequest* used for non-SDT data indication. Or whether another solution is intended.

**Question 11**: What key should be used and which input parameters for the *resumeMAC-I* generation for the *RRCResumeRequest* used for non-SDT data indication?

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| Answers to Question 11 |
| Company | Yes/No | Technical Arguments |
|  | TBD | Firstly different solutions will have different consequences and different implications on other groups. Unless we have a fixed solution on the table that we can all agree on as the CCCH candidate, it is impossible to evaluate all implications. Our main concern is that we are now running out of time to discuss all solutions. So, we think we should just stick with one flavour (perhaps the horizontal key derivation one) and check if this works or not.  |
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**Summary 11**: TBD.

**Proposal 11**: TBD.

Next issue described is that the security keys between UE and network may go out of sync (e.g. if the 2nd *RRCResumeRequest* used for non-SDT data indication using the new key is sent before the contention resolution of the 1st *RRCResumeRequest* is completed, ie., in the SDT procedure). On the other hand, it seems the UE could take this into account already when terminating the SDT procedure and initiating the RRC resume procedure for non-SDT data indication in which case it could use the initial key which should work as in legacy.

**Question 12**: Do you agree the UE can use the initial key (the same key used for *resumeMAC-I* for the *RRCResumeRequest* in SDT procedure) for deriving the *resumeMAC-I* for the *RRCResumeRequest* used for non-SDT data indication in case the RA procedure of the SDT procedure is not completed?

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| Answers to Question 12 |
| Company | Yes/No | Technical Arguments |
|  | No | Since RRC layer has no idea whether the RACH procedure is completed in MAC or not. Even in case the RACH procedure is still ongoing, UE has no idea whether first CCCH message has been received by NW successfully or not.In addition, SA3 highlight in the LS that such kind of repetition should be avoided. Hence, we think the UE behaviour should be independent of the success or failure of the previous RACH procedure. So, UE should always derive a new key after sending RRCResumeRequest first time. Of course the consequence of this is that if the first CCCH message is not received, then the resume may not succeed. This is a suboptimality that we need to live with in case we go this way.  |
| Samsung | No | Prefer to have same solution irrespective of whether RA procedure is completed or not. |
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**Summary 12**: TBD.

**Proposal 12**: TBD.

Data loss is indicated in [5] to be a bigger concern compared to DCCH based solution as the NW may be transmitting DL SDT data and UL SDT data in the UE could be lost. While the DL data is more for NW implementation to handle, the UL data loss should be discussed. Currently, the UE discards all stored PDCP PDUs upon suspend procedure while the PDCP SDUs should be kept. In that sense, it seems the UL data loss should be less of an issue.

**Question 13**: Do you agree the PDCP entity retains the PDCP SDUs in the buffer upon PDCP entity suspend and, hence, the data loss in UL should basically not happen in case of CCCH based solution? Do you see a concern in DL data handling?

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| Answers to Question 13 |
| Company | UL data Yes/No | DL data Yes/No | Technical Arguments |
| ZTE | No | No | One issue is whether the COUNT value will be reset or not in PDCP suspend operation. If PDCP Count is reset (current behaviour in PDCP suspend operation), then there is no way to ensure the lossless transmission since there is no way to ensure the in order transmission without redundant packet. In addition, the data packet for UM DRB will be lost. Although the data lost in UM DRB is allowed, it should be avoided as much as possible. |
| Samsung |  |  | In DL data loss can occur for UM DRBs. In UL, whether to reset COUNT or not should be discussed. |
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**Summary 13**: TBD.

**Proposal 13**: TBD.

Another issue is how the NW would identify the *RRCResumeRequest* used for non-SDT data indication, e.g., in the case the NW did not know the UE attempted SDT before the RRC resume procedure. For instance, is there a need to specify a new *resumeCause* for the purpose, does the UE indicate this in an LCID in the MAC layer (similarly to RedCap identification indication), is the UE provisioned with different I-RNTI to use in this case, or is this left to NW implementation.

**Question 14**: Do you agree the UE shall indicate to NW the *RRCResumeRequest* is used for non-SDT data indication? If yes, which solution should be specified for this purpose?

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| Answers to Question 14 |
| Company | Yes/No | Technical Arguments |
| ZTE | Depends | It depends on the detailed solution. If the existing CCCH procedure can be reused as it is, then there is no need to indicate this; otherwise, if different CCCH approach is expected from legacy resume procedure, then NW has to distinguish the two cases. From our point of view, the main intention of CCCH solution is to reuse the existing CCCH approach. If we introduce a new CCCH procedure, then the benefit of CCCH solution is gone and we are just left with all the disadvantages (such as lost data over Uu, extra latency in providing non-SDT data arrival indication etc). |
| Samsung |  | Prefer to reuse the existing procedure. |
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**Summary 14**: TBD.

**Proposal 14**: TBD.

Similarly to DCCH based solution wrt. Question 7, some RAN3 impact may be foreseen when the new *RRCResumeRequest* used for non-SDT data indication is received by the NW. For instance, whether the UE context shall not be released by the last serving gNB only after the SDT procedure for the UE is completed (either by moving the UE into CONNECTED mode or directing back to INACTIVE mode). On the other hand, if the context was already relocated, would it not be possible for the receiving gNB to perform the UE integrity check in this case; while, in case the context was not already relocated, then the last serving gNB obviously has the context and could do the check.

**Question 15**: Do you see that there may be some RAN3 impact with the CCCH solution? If yes, what impact is foreseen, and do you see a concern with it?

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| Answers to Question 15 |
| Company | Yes/No | Technical Arguments |
| ZTE | Yes | We need to first decide which node performs the verification. Since IRNTI will be used, our assumption is that the verification of the second CCCH message is done by the old anchor gNB. Then when there was anchor relocation up front, there will be some impacts to RAN3 in this case as noted above. Moderator seems to indicate that the new target gNB can do the verification, may be this is possible, but this also needs some changes in RAN3 since we assume the old I-RNTI always points to the old anchor gNB. If we want the target gNB to verify the new resumeMAC-I, then it seems we need some new behaviour here (also some restriction is needed in the network to say that the I-RNTI shall not be reused until the UE is released). Seems this is needs some RAN3 discussion.  |
| Samsung | Yes | As per current procedure resumeMAC-I is always verified by old anchor gNB. If same is followed for resume for non SDT data indication, UE context needs to be stored in old anchor gNB even after the context is transferred to serving gNB during the SDT procedure. If resumeMAC-I is verified by new GNB , this is a new behaviour and needs to be discussed and specified by RAN3. |
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**Summary 15**: TBD.

**Proposal 15**: TBD.

Last question in [5] considers cell re-selection during SDT procedure. This should generally not be the decision point to select between DCCH and CCCH based solution since regardless of the CCCH solution, the cell re-selection case may not be specified. However, it would be good to get an understanding if companies would prefer this case to be specified in case the CCCH solution is selected.

**Question 16**: Would you agree to specify to specify solution based on the CCCH based solution for cell re-selection during SDT procedure (in case CCCH based solution is agreed to be specified)?

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| Answers to Question 16 |
| Company | Yes/No | Technical Arguments |
|  | No | Our concern is that this is now getting too late to specify this solution in Rel-17 in any case and there seems to be no willingness to specify this in the first place unfortunately. We thought we could do this in Rel-18 but seems this will not happen either. Overall, we think companies believe that this is not important anymore. Hence, we are concerned that it is too late now to consider this case. Then, if majority of companies prefer to now also cover this solution for cell reselection, then we could use CCCH solution only for cell reselection. If it is only the cell re-selection, then we can simply reuse the same key for the previous RRC Resume Request to derive the resume MAC-I for the second CCCH, and there will be no security issues for such case (since the cell ID will be different). However, RAN3 impact will still be there, and more discussion is required to understand the whole picture of the solution. We are not sure if this is really feasible now with the time left.  |
| Samsung | No | We have already agreed that UE transition to RRC\_IDLE upon cell reselection. No need to re-open this discussion.  |
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**Summary 16**: TBD.

**Proposal 16**: TBD.

## 3.3 Draft CRs

In the previous meeting, [2] (Annex) and [4] presented initial RRC CRs for the CCCH based solution and DCCH based solution, respectively. Given the above issues not resolved, complete CRs could not be presented before the issues are resolved. However, companies are being asked if the above CR drafts can be used as baseline for both of the solutions and start from those when further details are clarified based on the questions.

**Question 17**: Do you agree to use [2] (Annex) and [4] CR drafts as baseline CRs for the CCCH based solution and DCCH based solution, respectively? If not, what are the issues?

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| Answers to Question 17 |
| Company | CCCHYes/No | DCCHYes/No | Technical Arguments |
|  | Further changes needed (see comments) | Yes | We are fine with the DCCH CR and if any updates are needed based on the majority views above, this can be done within RAN2 for this approach. For the CCCH CR, further discussion is needed for the following aspect:* Since the PDCP suspend operation is performed for each DRB, lossless transmission can not be ensured (out of order packet and redundant packet can not be avoided).
* The security part need to be confirmed by SA3 first.
* Since NAS layer will not distinguish the SDT DRB and Non-SDT DRB, the triggering of second CCCH procedure should be captured in RAN (e.g. the second CCCH shall only be triggered in case there is data available for non-SDT DRB).

We also think the CR needs some further changes as noted below: Then for SA3 specs, we need to change the following too and there may be other changes need… (up to SA3). The actual changes will depend on the solution chosen… for the horizontal key derivation, we need SA3 to modify the following procedure (assuming SA3 are okay with this).  |
| Samsung | No | Yes | Agree with changes suggested by ZTE for RRC CR. Security aspects and related impact to SA3 spec can be discussed by SA3. |
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**Summary 17**: TBD.

**Proposal 17**: TBD.

## 3.4 Preferred option(s) & possible compromise

The selection process between DCCH and CCCH based solutions have been in a deadlock for a while and a compromise proposal to specify both solutions was presented in the previous meeting. For instance, such that the CCCH based solution is used in case the RA procedure for the SDT procedure has not been completed or no NW response has been received for the initial CG-SDT transmission; and DCCH based solution is used after this point. Naturally, this would require more discussion after the above issues are resolved if the compromise would be preferred by most of the companies.

In the following, companies are asked still to provide their preferred option(s) from the following:

 - Option 1: DCCH solution

 - Option 2: CCCH solution

 - Option 3: Compromise solution (ie., both)

If you are OK with both options individually **but not with compromise solution** please indicate Option 1/2.

**Question 18**: Which option(s) do you prefer?

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| Answers to Question 18 |
| Company | Option(s) | Technical Arguments |
|  | Option 1 | Option 1 should be adopted for Non-SDT data arrival. Option 3 can be considered for cell re-selection case, but only if we have a consensus to support this (this is probably too late otherwise). |
| Samsung | Option 1 |  |
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**Summary 18**: TBD.

**Proposal 18**: TBD.

# 4 Conclusion

TBD.

# References

[1] [R2-2109617](file://D://__%E4%BC%9A%E8%AE%AE%5C2021%5C202111_RAN2%5CTSGR2_116-e%5CDocs%5CR2-2109617.zip) DCCH-based indication of non-SDT data arrival, Intel Corporation, ZTE corporation, Sanechips, Samsung, CMCC, Qualcomm, OPPO, Sharp, Xiaomi, Sony, CATT, FGI, Asia Pacific Telecom, Radisys

[2] [R2-2110596](file:///C%3A%5Cevutukuri%5Cwork%5C5G%5CRAN2%5Cdocs%5CR2-2110596.zip) Non-SDT data arrival, Huawei, HiSilicon, InterDigital, LGE, Ericsson, ASUSTeK, Nokia, Nokia Shanghai Bell, Google, Rakuten Mobile, Fujitsu, NEC

[3] [R2-2109619](file://D://__%E4%BC%9A%E8%AE%AE%5C2021%5C202111_RAN2%5CTSGR2_116-e%5CDocs%5CR2-2109619.zip) DCCH vs CCCH based approach for indication of non-SDT data arrival, Intel Corporation, ZTE corporation, Sanechips, Samsung, Qualcomm, OPPO, Sharp, Xiaomi, Sony, CATT, Apple

[4] [R2-2109618](file://D://__%E4%BC%9A%E8%AE%AE%5C2021%5C202111_RAN2%5CTSGR2_116-e%5CDocs%5CR2-2109618.zip) Draft CR for introduction of DCCH solution for non-SDT data arrival, ZTE corporation, Sanechips, Intel Corporation, Samsung, CMCC, Qualcomm, OPPO, Sharp, Xiaomi, Sony, CATT, FGI, Asia Pacific Telecom, Radisys

[5] [R2-2111275](file://D://__%E4%BC%9A%E8%AE%AE%5C2021%5C202111_RAN2%5CTSGR2_116-e%5CDocs%5CR2-2111275.zip) Comments on the proposed CCCH solution for non-SDT data arrival, Intel Corporation, Apple, ZTE

[6] [R2-2111509](file://D://__%E4%BC%9A%E8%AE%AE%5C2021%5C202111_RAN2%5CTSGR2_116-e%5CDocs%5CR2-2111509.zip) Further clarifications on non-SDT arrival solutions, Huawei, HiSilicon, InterDigital, LGE, Ericsson, ASUSTeK, Nokia, Nokia Shanghai Bell, Google, NEC, Fujitsu, Rakuten Mobile

[7] [R2-2111523](file://D://__%E4%BC%9A%E8%AE%AE%5C2021%5C202111_RAN2%5CTSGR2_116-e%5CDocs%5CR2-2111523.zip) Comments to [R2-2111509](file://D://__%E4%BC%9A%E8%AE%AE%5C2021%5C202111_RAN2%5CTSGR2_116-e%5CDocs%5CR2-2111509.zip) for non-SDT data arrival, Intel Corporation, ZTE corporation, Sanechips, Samsung, Xiaomi, Qualcomm, Apple, Radisys

[8] [R2-2109308](file:///C%3A%5Cevutukuri%5Cwork%5C5G%5CRAN2%5Cdocs%5CR2-2109308.zip), Reply LS on Small data transmission, Source: CT1