**3GPP TSG-RAN2 Meeting #113-e R2-2102075**

**e-Meeting, 25 Jan - 05 Feb, 2021**

**Source: email discussion Rapporteur (ZTE Corporation)**

**Title: Offline 509 on SDT control plane and CBs**

**Agenda item:** **8.6.3**

**Document for:** **Discussion and Decision**

# Introduction

This document is the report of the following email discussion:

* [AT113-e][509][SData] Control Plane and CBs (ZTE)

**Scope:**

1. Further discussion on pending proposals (and those marked for CB) for email discussion R2-2101162

Tdoc summary and identification of possible proposals to agree/discuss for these topics

2. Discussion on Handling of non-SDT

When non-SDT bearers are resumed

 - when SDT is initiated

 - only upon RRC resume by UE

What to do when non-SDT arrive and DRBs are suspended

 - trigger legacy RRC resume procedure

 - introduce a MAC indication to indicate non-SDT arrival

2. Whether we use RRC Resume or new RRC message/indication of SDT?

3. How to handle RRC release for subsequent data – sending a release before SDT phase or RRCRelease at the end of the SDT phase.

**Intended outcome:**

* + - Agreeable proposals

 **Deadline for providing comments:**

* + - Companies comments/inputs – Feb. 1st 17:00 UTC
		- Proposals by rapporteur – Feb. 2nd

# Discussion

## RRCResume or new message with SDT indication

The following agreement was reached at RAN2#112e:

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| As a baseline, the RACH resource i.e. (RO+preamble combination) is different between SDT and non-SDT - If ROs for SDT and non SDT are different, preamble partitioning between SDT and non SDT is not needed.- If ROs for SDT and non SDT are same, preamble partitioning is needed |

Based on the above agreement, the network will know about the SDT cause after receiving msg1. This also means that the CCCH message would be the same for both SDT and non-SDT.

However some companies have said that supporting other options may be disussed further. Specifically, the following were mentioned in the tdocs:

* Option 1: Some companies said that we could just stick with this agreed baseline:
	+ E.g: (R2-2100141, P4)
* Option 2: Other companies mentioned that we could also allow common RACH pool in addition:
	+ E.g: (R2-2101204, P2)
* Option 3: Whilst there was also a proposal that the CCCH message could remain the same even if we support common pool
	+ E.g: (R2-2100367, P1&P2) – the assumption is that the MSG3/MSGA grant size will accommodate BSR (which will indicate the SDT cause)

The advantage of option 1 (i.e. the current baseline) is that the CCCH message will be common regardless of whether or not SDT or non-SDT is selected down the line (e.g. in MAC – see the discussion in section 2.4), but requires that the network can provide the resource separation (i.e. preamble + PO combination is different).

Option 3 also has similar advantages as option 1, but this comes with the requirement that the MSG3/MSGA payload size needs to accommodate at least the BSR (i.e. this has implications on coverage) – but this has no restriction on the network to provide separate preamble+PO resource pool as per option 1.

Option 2 on the otherhand might require new cause in the CCCH message and will require additional complexity and interaction between RRC and MAC in case switching/fallback to non-SDT happens in MAC. Further, the available space in the CCCH message is quite limited and reusing the code points or adding bits in this message seems to come with additional complexity/cost.

Based on the above, it seems the current baseline could be sufficient perhaps?

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| Q1: Do companies agree that option 1 is sufficient?  |
| Company | Y/N | Comments (if answer is No then please explain why other options are essential) |
| Nokia, Nokia Shanghai Bell | No | We don’t agree with rapporteur’s understanding that the CCCH message would be the same for both SDT and non-SDT, this has not been agreed.We don’t agree with rapporteur’s consideration of complexity for Option 2 and it does neither require any cause in the CCCH message.With subsequent SDT agreed, common RACH pool would seem beneficial to allow NW not to always configure SDT specific RACH resources – this would increase the possibilities to use the whole feature.Furthermore, we don’t fully understand why Msg1 indication means same CCCH message for SDT and non-SDT. |

## Timing of the RRCRelease message

There are two possible options for the RRCRelease message:

* Option 1: RRCRelease message to be sent at the end of the subsequent data transfer:
	+ E.g: (R2-2100366, P4); (R2-2101161, P4); (R2-2100283, P2)
* Option 2: RRCRelease message in the beginning before the subsequent data transfer:
	+ E.g: (R2-2100139, P11)

In general, it seems option 1 is supported by the majority of companies.

R2-2100139 mentions that the RRCRelease like message may be needed upfront for network authentication.

However, even if an RRC message is sent (by the genuine network) up front, there is no guarantee that the subsequent messages on the user plane are also from an authentic network (the only way to guarantee this would be to have DRB IP, which of course can be configured for SDT if needed). So, it seems sending an RRC message by itself is not really necessary. Of course we can send an LS to SA3 to confirm the overall procedure with them from security perspective.

Based on the above, it seems option 1 is okay:

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| Q2: Do companies agree that option 1 (i.e. RRCRelease at the end of the SDT phase including subsequent data transfer) can be assumed as the baseline from RAN2 perspective?  |
| Company | Y/N | Comments (if answer is No then please explain why option 2 is essential) |
| Nokia, Nokia Shanghai Bell | Y, but | We agree to send RRCRelease at the end of the procedure but we don’t understand what “i.e. RRCRelease at the end of the SDT phase including subsequent data transfer” means. |

## Handling non-SDT data

As noted in

The question is how to handle the data for non-SDT DRBs and this was already well discussed during the email discussion prior to the meeting and the following options have been identified:

* Option 1: Trigger a new MAC CE upon data arrival for non-SDT DRB
	+ R2-2101160, R2-2100365, R2-2100294, R2-2100282, R2-2100146
* Option 2: Trigger a new RRCResume procedure
	+ R2-2101221, R2-2101203, R2-2101176, R2-2101750
* Option 3: Leave to UE implementation
	+ R2-2100139, R2-2101370

It would be good to narrow down the options first so that we can focus the online discussion on fewer options.

In general, we don’t leave the BSR triggering or initiation of connection resume at the lower layers to UE implementation. So, the view of the rapporteur is that option 3 is not really ideal.

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| Q3: Can we exclude option 3? - i.e. we will at least specify the behaviour for data arrival for non-SDT DRBs one way or the other |
| Company | Y/N | Comments (if answer is No then please explain) |
| Nokia, Nokia Shanghai Bell | Y | Since the UE cannot determine how long the SDT procedure lasts, Option 3 is really not an option.  |

Assuming the majority view to be that we aim to specify this, we need to further disucss how options 1 and 2 work.

With option 1, a new MAC trigger is needed to indicate the data arrival for non-SDT DRBs

* This trigger needs to be defined for both when there is MCG path and there is no MCG path for the bearer

For option 2, it seems there are few issues to clarify further:

* Will NAS actually trigger a new resume when a resume procedure is ongoing? (it is unclear whether this happens, because today whilst a RRCResume procedure is happening, we don’t trigger a new RRCResume procedure even if data for some other DRBs arrive whilst the resume is ongoing)
* What resume cause will be used? – will we use a new resume cause or will NAS provide another resume cause again (seems this doesn’t happen according today?)
* How does the security work (i.e. the contents of RRCResumeRequest – specifically the security token seems to be repeated if we have to repeat the RRCResumeRequest?)

For now, to facilitate the online discussion companies are encouraged to provide views on the above and also any other considerations that could be useful for making a decision.

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| Q4: Between options 1 and 2, which option do you prefer and why?  |
| Company | Option 1/2 | Please explain how each option will work (especially please provide your views on the open issues mentioned for options above and add anything that is unclear for each option in the comments) |
| Nokia, Nokia Shanghai Bell | Option 2 | MAC solution would require NW to configure non-SDT DRBs to different LCG from SDT DRBs – this restricts NW implementation which is not OK.We don’t see reasoning for introducing new resume cause for this case.  |

## Overall procedure for SDT type selection

The discussion for overall SDT procedure happened in the email discussion prior to the meeting and a set of proposals were made in R2-2101162.

During the online discussion we have the following tentative set of agreements and comebacks:

**Agreements**

1 For RA-SDT, up to two preamble groups (corresponding to two different payload sizes for MSGA/MSG3) may be configured by the network

*2 [CB]* UE performs carrier selection as per legacy procedure and then the UE determines whether SDT can be initiated.

*3 [CB]* Upon initiating SDT, after the carrier selection, if valid CG-SDT resource exists, then CG-SDT is chosen, otherwise UE proceeds to RA-SDT procedure.

*4* If RACH procedure is initiated for SDT (i.e. RA-SDT initiated), the UE first performs RACH type selection as specified in MAC (i.e. Rel-16). FFS whether threshold is SDT specific or not

Although some discussion on this happened as part of the email discussion, during the initial online discussion, it seems some further detail on the overall procedure would help with the agreement. Based on this, the following clarifications are added to the overall procedure:

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| **Possible agreements**1FFS:RSRP threshold to select between SDT and non-SDT RA procedure. FFS whether this threshold is CG/RA-SDT specific.2    [CB]For SDT, UE performs UL carrier selection (i.e. if SUL is configured in the cell, UL carrier selected based on RSRP threshold as in legacy – FFS whether the RSRP threshold for carrier selection is common or specific to SDT)3 [CB] If CG-SDT resources are configured on the selected UL carrier and are valid, then CG-SDT is chosen. Otherwise,* If 2 step RA-SDT is configured on the UL carrier and criteria to select 2 step RA SDT is met, then 2 step RA-SDT is chosen
* else If 4 step RA-SDT is configured on the UL carrier and criteria to select 4 step RA SDT is met, then 4 step RA-SDT is chosen
* else UE does not perform SDT (i.e. perform legacy resume procedure)
* If both 2 step RA-SDT and 4 step RA-SDT are configured on the UL carrier, RA type selection is performed based on RSRP threshold as in legacy.

-           FFS whether RSRP threshold for RA type selection is common or different for SDT and non SDT. |

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| Q5: Can we take the above overall procedure as the baseline?  |
| Company | Y/N | Please clarify which aspects need modification if any and how |
| Nokia, Nokia Shanghai Bell | Y, but | However, references to legacy should be removed as they seem to create quite some confusion.For first possible agreement, the term “RA” should be removed from the first sentence. The second FFS in the first one is also confusing, could be formulated: FFS whether RSRP threshold to select between SDT and non-SDT procedure is used for CG-SDT, RA-SDT, or both and whether the RSRP threshold is the same for CG-SDT and RA-SDT.For the second one, the FFS reads oddly, could formulate: FFS whether the RSRP threshold for carrier selection is specific to SDT or common between SDT and non-SDT.For third, better to talk about 2/4-step RA-STD **resources** being configured on the UL carrier. |

# References

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# Annex (contact details for email discussions)

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