**3GPP TSG-RAN2 Meeting #116eR2-210**

**Electronic, 1st– 12th December, 2021**

**Source: Email discussion Rapporteur (Huawei, HiSilicon)**

**Title: Summary of [Post115-e][507][SDT] MAC running CR update (Huawei) review issue list**

**Agenda item:** **8.6.1**

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

# General

This document contains the list of comments made during the review of the MAC CR for SDT in the email discussion [Post115-e][507][SDT] MAC running CR update (Huawei).

For the issue found in the draft CR under Please fill in the form according to the following:

* On the column of index, fill in an index with the company initial letter + discussion number + issue number by increasing order.
  + For example, for the discussion in Post114ePhaseI, for an issue from Huawei, HiSilicon, one can fill in “H (company initial letter) + 0 (discussion number for Post114e)+ 00 (Issue number)”=> H000
  + Please use 1 for Post115e
* On the column of brief description of the issue, as the name suggests, please give a description on the issue
* On the column of suggested change/company comment, please give the proposed change on the draft spec based on the description on the issue. Companies can also give comments on the proposed change in this column by adding a marking of [Company] in this column
* On the column of proposed way forward by rapporteur, please leave it empty at the time of email discussion. At the conclusion of the discussion, email discussion rapporteur would give a way forward according to the inputs from different companies on the issue.

On the section of “Any Other Clause”, if a certain issue is found under a Clause in the spec that has not been listed, please fill the issue in the form under this section.

Please edit the document in draft view (View -> Draft) to view the entire table.

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# Post115e

## 3.1 Definitions

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| # | Brief description of the issue | Suggested change/company comments | Proposed way forward by rapporteur |
| Z000 | **Msg3**: Message transmitted on UL-SCH containing a C-RNTI MAC CE or CCCH/DTCH/DCCH SDU(s), submitted from upper layer and associated with the UE Contention Resolution Identity, as part of a Random Access procedure.  Comment: It is already possible that DTCH/DCCH SDU(s) are included in Msg3 (e.g. in connected mode). So, isn’t it a bit misleading to say that the above change is part of SDT? | Remove the change and if seen necessary this can be clarified in a clarification CR for Rel-16 for instance. |  |
| L100 | Same comment as ZTE | Remove the change. |  |

### 5.1.2 Random Access Resource selection

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
| I100 | Editor’s Note: FFS on the necessity for introducing a new RACH type for RA-SDT for 2-step RACH and 4-step RACH. We may come back to this when common RACH CR has a unified solution for all types of RACHes introduced in R17  We don’t see the need to define a separate (4-step RA-SDT type). We have not agreed on separate RA parameters (e.g. target receive power, backoff) for RA-SDT, so there is no reason to complicate and duplicate the spec for now. | Remove “RA SDT type” and the duplicated text around it from 5.1.x sections. Remove the related editor’s note. If needed to differentiate, the same syntax used in 5.8.2 can be used, e.g. “initiate Random Access procedure for SDT”  For the group A/B determination, a note can be added to clarify that RA-SDT is not initiated for a CCCH logical channel, and current specs can be reused.  For measurement gaps, we don’t think any changes are needed since measurement gaps are not applicable in INACTIVE and the spec already says “the MAC entity **may** take into account the possible occurrence of measurement gaps when …”; so if there are no measurement gaps applicable, the MAC entity won’t take them into account. |  |
| I101 | Editor’s Note: FFS support of RA-SDT for unlicensed spectrum  Per the WID, “Focus of the WID should be on licensed carriers and the solutions can be reused for NR-U if applicable.” | Remove the editor’s note. |  |
| Z001 | We agree with I100 and I101. As already noted previously, introducing new RACH type for each feature will be cumbersome. Note that in theory, one could argue that each feature (e.g. SDT, RedCap, Slicing etc) would need a RACH resource. Further the feature combination will also require a RACH resource. If we start defining new RACH type based on the feature selected (or the feature combination selected), then there will be an explosion of RACH types within MAC spec. So, this should be avoided.  The existing RACH types should stay as they are (i.e. there is just 2-step and 4-step RA type as already defined in Rel-16) and these RA types can be used by a given feature/feature combination and the RA procedure uses RACH resources based on the selected feature combination. So, this selection mechanism should be properly initialized (along with the necessary RACH variables), but there should be no subsequent need to define feature/feature combination specific RA-type. | Same as I100 and I101 |  |
| Z002 | As noted above, once the RA type for SDT is removed, we can also remove these changes. i.e. the variables such as rsrp-ThresholdSSB are correctly initialized (based on the feature/ feature combination), then these changes also should not be necessary.  The problem with changing these variables like this is that not only new variables are need for SDT, but in theory, we need such variables for each feature, but also we will need such variable for each feature combination. Defining such a large number of variables is neither practical nor future proof. | Undo these changes (with the assumption that the RACH procedure related variables will be initialized based on the selected feature/feature combination) and will be used in the rest of the procedure. |  |
| L101 | Agree with InterDigital and ZTE that defining a new RA-type for SDT is not needed. The specificaation should be future-proof even when a new feature-specific RA is introduced.  In our view, it is enough to rely on legacy RA procedure, with addressing feature-specific RA parameters. The feature-specific RA parameters can be specified in one place, e.g. in a new paragraph or new section. In this way, we can avoid duplicated texts, and maintain the specification clean even with other feature-specific RA.  If a new behavior is needed for RA-SDT, we can say “if the RA procedure is initialized for SDT”. However, we haven’t identified any new behavior for SDT except using RA-SDT specific RA parameters.  This comment applies to all the RA related sections, 5.1.x. | Undo all changes in 5.1 Random Access procedure.  Add a new paragraph or a new section to describe RA-SDT specific RA parameters.  “If RA procedure is initiated for SDT, following parameters are used:” |  |
| N000 | Agree with others. The RA procedure itself is common for all the triggers. We have different triggers in legacy as well for HO, for UL data arrival, for SI etc. We never define them as different types.  Any special handling for each feature can be captured in the procedure and parameter part case by case whenever needed. | Remove the new terms of 4-stepRA-SDT/2-stepRA-SDT and related changes. |  |

### 5.1.2a Random Access Resource selection for 2-step RA type

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
| Z003 | For the above change and other changes related to “RA-SDT” type introduction in this sub-clause, the same comment as Z002/Z001 apply | Same comments as Z002 |  |

### 5.1.3 Random Access Preamble transmission

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
| Z004 | Same comment as Z002/Z001 | Same comments as Z002 |  |
| N001 | RAN1 agreed power control parameters are common for SDT and non-SDT which conflict with RAN2 agreement?   * “For RA-SDT in shared ROs and separate ROs with non-SDT, the power control parameters follow those for non-SDT,   + i.e. preambleReceivedTargetPower and power ramping setting follow those for non-SDT.”   Should add an EN that it is to be revisited | Add EN whether power control parameters are SDT specific is to be revisited based on the RAN1 LS R1-2108533. |  |

### 5.1.3a MSGA transmission

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
| Z005 | Same comment as Z002/Z001 | Same comments as Z002 |  |
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### 5.1.4a MSGB reception and contention resolution for 2-step random access

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
| Z006 | Same comments as Z002 for the changes | Same comments as Z002 |  |
| N004 | This has not been discussed in RAN2? “Editor’s Note: FFS Whether it is OK for the legacy UE transmitting 2-step RACH to receive msgB intended for the UEs transmitting msgA for SDT when RO is shared between 2-step RA and 2-step RA-SDT.” | Remove the EN |  |

### 5.1.5 Contention Resolution

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
| Z007 | Same comments as Z002 for the changes | Same comments as Z002 |  |

## 5.2 Maintenance of Uplink Time Alignment

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
| Z008 | We have the following agreement which needs to be reflected in this sub-clause:  **Agreement**  TAT-SDT is started upon receiving the TAT-SDT configuration from gNB, i.e. RRCrelease message, and can be (re)started upon reception of TA command. | Update the section to restart the SDT-TAT when TA command is received. |  |
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### 5.3.1 DL Assignment reception

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
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#### 5.3.2.1 HARQ Entity

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
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5.3.2.2 HARQ process

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
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### 5.4.1 UL Grant reception

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
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#### 5.4.2.1 HARQ Entity

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
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#### 5.4.2.2 HARQ process

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
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### 5.4.4 Scheduling Request

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
| I102 | For a logical channel serving a radio bearer configured with SDT, no PUCCH resource for SR is configured.  a LCH can be configured with PUCCH resources for SR in Connected mode, even if that LCH is configured for SDT. This does not capture the original intention of the agreement “SR resource is not configured for SDT.” | Reword to:  For a logical channel serving a radio bearer configured with SDT, PUCCH resource for SR is not used in INACTIVE state. |  |
| Z009 | Agree with I102. | Either remove the new sentence or change as proposed by I102 above. |  |
| L102 | Agree with I102. | We prefer a more general text.  “The MAC entity is not configured with SR configuration in INACTIVE state.” |  |

### 5.4.6 Power Headroom Reporting

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
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### 5.8.2 Uplink

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
| Z010 | Currently the above text seems to be written with the view that there may be switching between CG and RA during subsequent transmission. This is being currently discussed in the CG- email discussion.  If there is no such switching, then this update is not needed. Instead, we can simply specify that no UL grant is provided to the HARQ entity when there is no valid CG resource/ or no valid SSB etc and then automatically SR should be triggered. We think we can revist this section once we make the final agreement regarding switching etc. | For now, we suggest to add an FFS that this section can be revisited once the agreements regarding switching between CG and RA SDT are clear. |  |
| Z011 | It is not clear why we need a separate threshold for “Increase” and “Decrease”. We only agreed to have one “delta” threshold which should be the same in both directions (i.e. the TA change either in positive or negative direction would have equally disruptive impact on the gNB receiver). | Replace cg-SDT-RSRP-ChangeThresholdIncrease and cg-SDT-RSRP-ChangeThresholdDecrease with something like *cg-SDT-RSRP-ChangeThreshold* |  |
| L103 | This section describes the UE behavior when the CG-SDT is triggered. Whether to trigger CG-SDT or RA-SDT, or normal RA is already determined in 5.x. Thus, checking the conditions “1> if at least one SSB with SS-RSRP above cg-SDT-RSRP-ThresholdSSB amongst the associated SSBs is available; and 1>if the configured grant type 1 resource is valid according to clause 5.8.2.x:” is not needed in this section.  Moreover, switching from CG-SDT to RA-SDT or normal RA has not been agreed. Thus, the related texts should be removed. | Proposed changes based on the rapporteur’s update.  When CG-SDT is triggered as in clause 5.x, the MAC entity shall:  1> select an SSB with SS-RSRP above *rsrp-ThresholdSSB*;  1> select the configured grant type 1 configuration for CG-SDT on BWP of the selected UL carrier associated with the selected SSB;  1> select the CG occasioncorresponding to the selected SSB and the selected configured grant type 1 configuration for CG-SDT;  1> indicate the SSB index to the lower layer. |  |
| N005 | Agree with ZTE and LG. |  |  |

### 5.8.2.x Validation for CG-SDT

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
| Z012 | Same comment as Z011 |  |  |

## 5.15 Bandwidth Part (BWP) operation

### 5.15.1 Downlink and Uplink

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
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## 5.16 SUL operation

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
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## 5.x Small Data Transmission

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
| I103 | It seems like the conditions for initiating an SDT is split between RRC and MAC specs. Just reading this part of the MAC spec, it gives the impression that the UE is allowed to initiate an SDT procedure, even if there is non-SDT data (i.e. SDT PDU can contain data from SDT DRBs and non-SDT DRBs). However. This condition is captured in RRC spec, as: 5.3.13.1b Conditions for resuming RRC Connection for SDT A UE in RRC\_INACTIVE initiates the resume procedure for SDT when all of the following conditions are fulfilled:  1> the upper layers request resumption of RRC connection; and  1> the UE supports SDT; and  1> *SIB1* includes *sdt-ConfigCommon*; and  1> all the pending data in UL is mapped to the radio bearers configured for SDT; and  1> lower layers indicate that conditions for initiating SDT as specified in TS 38.321 [3] are fulfilled.  This creates an issue in the scenario where there is pending data form non-SDT DRB, as there can be conflicting instructions within the UE:   * MAC initiates a RA/CG-SDT on the selected UL carrier, according to this part in section 5.x, even though there is not CCCH message from upper layers. * RRC does not initiate a resume procedure for SDT, according to section 5.3.13.1b of the RRC spec | Either:   * Move this condition from the RRC to TS 38.321 section 5.x; Or * Add the following in to section 5.x:   The MAC entity shall:  1> if the data volume of the pending UL data accorss all logical channels configured for SDT according to the data volume calculation procedure in TSs 38.322 [3] and 38.323 [4] (The size of the RLC headers and MAC subheaders are not considered in the data volume computation.) is less or equal than *sdt-DataVolumeThreshold*; and  1> if the RSRP of the downlink pathloss reference is higher than *sdt-RSRP-Threshold*:  2> if the Serving Cell for SDT is configured with supplementary uplink as specified in TS 38.331 [5]; and  2> if the RSRP of the downlink pathloss reference is less than *sdt-RSRP-ThresholdSSB-SUL*:  3> select the SUL carrier.  2> else:  3> select the NUL carrier.  Editor’s NOTE: FFS the procedure when *sdt-RSRP-ThresholdSSB-SUL* is not configured  Editor’s Note: FFS whether the RSRP threshold for UL carrier selection is common for both CG and RA-SDT.  2> if CG-SDT is configured on the selected UL carrier, and the configured grant type 1 resource is valid according to clause 5.8.2.x; and  2> if at least one of the SSBs with SS-RSRP above *cg-SDT-RSRP-ThresholdSSB* is available:  3> indicate to the upper layer that conditions for initiating SDT are fulfilled;  3> initiate CG-SDT on the selected UL carrier according to clause 5.8.2 when the upper layers initiate an RRC resume procedure for SDT.  2> else if RA-SDT is configured on the selected UL carrier:  3> indicate to the upper layer that conditions for initiating SDT are fulfilled;  3> initiate RA-SDT on the selected UL carrier according to clause 5.1 when the upper layers initiate an RRC resume procedure for SDT.  3> else:  4> indicate to the upper layer that the conditions to initiate SDT are not fulfilled;  1> else:  2> indicate to the upper layer that the conditions to initiate SDT are not fulfilled.  3> else:  4> indicate to the upper layer that the conditions to initiate SDT are not fulfilled; |  |
| I104 | 3> else:  4> indicate to the upper layer that the conditions to initiate SDT are not fulfilled;  Small typo with numbering/adjustment | It should be 2>, 3> |  |
| I105 | 1. if the data volume of the pending UL data accorss all logical channels configured for SDT | Small typo “accorss” should be “across” |  |
| Z013 | Agree with I103.  i.e. MAC should not initiate the procedure without the RRC triggering it. For now the change proposed by I103 seems to work. We may have to clean-up this section once we have the final agreements on switching between CG and RA-SDT | Agree with I103. |  |
| L104 | Agree with I103, I104, I105, with small modifications. | The MAC entity shall:  …  2> if CG-SDT is configured on the selected UL carrier, and the configured grant type 1 resource is valid according to clause 5.8.2.x; and  2> if at least one of the SSBs with SS-RSRP above *cg-SDT-RSRP-ThresholdSSB* is available:  3> indicate to the upper layer that conditions for initiating CG-SDT are fulfilled;  3> initiate CG-SDT on the selected UL carrier according to clause 5.8.2 when requested by the upper layersso.  2> else if RA-SDT is configured on the selected UL carrier:  3> indicate to the upper layer that conditions for initiating RA-SDT are fulfilled;  3> initiate RA-SDT on the selected UL carrier according to clause 5.1 when requested by the upper layerso.  2> else:  3> indicate to the upper layer that the conditions to initiate SDT are not fulfilled; |  |
| N006 | Agree with others the interaction between RRC and MAC should be made clear. |  |  |

### 6.1.5a MAC PDU (MSGB)

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
| Z014 | Just wondering how to handle this Editor’s Note. Either we can delete the DTCH addition or we need some agreement on this. |  |  |

# 7 Variables and constants

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
| L105 | Same comment as L101. It is better not to define a new RA type for SDT. | Undo the addition of “2-step RA SDT type”. |  |

## Any Other Clause

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
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# Post114e

## 3.2 Definitions

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| # | Brief description of the issue | Suggested change/company comments | Proposed way forward by rapporteur |
| Z000 | CG-SDT Configured Grant type 1-based Small Data Transmission  Since SDT is also defined separately, we could avoid using the full expansion and use the SDT abbreviation here already. | CG-SDT Configured Grant type 1-based ~~Small Data Transmission~~ SDT | [Rapp] Corrected |
| Z001 | Same as Z000 for RA-SDT | RA-SDT Random Access-based ~~Small Data Transmission~~ SDT | [Rapp] Corrected |
| N000 | CG-SDT Configured Grant type 1-based Small Data Transmission  Enough to say “Configured Grant-based SDT” without “type 1” since what CG type is supported is clear from the procedure and configuration and stage 2.  Agree with ZTE001. | CG-SDT Configured Grant ~~type 1~~-based ~~Small Data Transmission~~ SDT | [Rapp] Corrected |

### 5.1.1 Random Access procedure initialization

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
| Z002 | *prach-ConfigurationIndex*  These are also applicable to Msg1 in 4-step RA-SDT type if the PRACH occasions are shared between 4-step RA type and 4-step RA-SDT type. These are also applicable to the Random Access Preamble for MSGA in 2-step RA-SDT type if the PRACH occasions are shared between 4-step RA type and 2-step RA-SDT type  General Comment: Do we really need to define new 4-step-RA-SDT type? With the above sentence, it seems we need to define “*4-step RA-SDT type*” and “2-step RA-SDT type”. However, since the RA type itself is not changed due to introduction of SDT. We could refer to existing RA types with and without SDT. Please see the suggested rewording.  On the other hand if we do define a new RA type, perhaps this needs to be defined (e.g. in stage-2) etc. Also there will be other changes needed in MAC spec in other sections too in this case since we use checks such as “if *RA\_TYPE* is set to *2-stepRA*” etc elsewhere and we need to now redefine all these with new RA types etc. It would be preferable to avoid a new RA type if possible to avoid such changes. | - *prach-ConfigurationIndex*: the available set of PRACH occasions for the transmission of the Random Access Preamble for Msg1. These are also applicable to Msg1 for RA-SDT if the PRACH occasions are shared between Random Access procedures with and without SDT for 4-step RA type.  These are also applicable to the MSGA PRACH if the PRACH occasions are shared between 2-step and 4-step RA types. These are also applicable to MSGA PRACH for RA-SDT if the PRACH occasions are shared between 4-step RA type and 2-step RA type with SDT. | [Rapp] Thanks for the comments @ ZTE.  On the new RACH type, the main reasons that why it is introduced are that   * In section 5.1.1a for initialization of parameters, I suspect certain parameters would be different from the legacy types of RACHs, e.g., preambleTransMax, etc. (but of course this is subject to further discussion) If such differences do exist, introducing a new RACH type to the UE variable RA\_TYPE fits better with the current framework * For RACH resource selection, the procedure will for sure be different between SDT and nonSDT. For example, preamble group selection, RACH occasion selection (as the current running CR puts it), etc. The solution in R16 2-stepRACH was to introduce a new chapter, i.e., Clause 5.1.2a. But I think for SDT, we can use the existing chapters and then, use the new RACH type to differentiate the procedures for the SDT RACH and non-SDT RACH for 2-step RACH and 4-step RACH * In the previous meeting, we have agreed to allow for fallback from SDT to non-SDT. Introducing a new RACH type is compatible with the procedures in the above two sections   I think we can keep the RACH type as it is for now and we can come back to this later to further examine its necessity.  I have put an editor note here to mark it as FFS. |
| Z003 | *msgA-PRACH-ConfigurationIndex*  Similar comment as Z002 (please see the corresponding suggestion). Further, it is not clear why these occasions should be shared with MSG1 in 4-step RA type with SDT as defined in the new definition. In case of shared occasions between 2-step and 4-step, these should be signalled via prach-CongurationIndex-SDT. | - *msgA-PRACH-ConfigurationIndex*: the available set of PRACH occasions for the transmission of the Random Access Preamble for MSGA in 2-step RA type. These are also applicable to MSGA PRACH for RA-SDT if the PRACH occasions are shared between Random Access procedures with and without SDT for 2-step RA type. | [Rapp] For the previous agreement, I think it does not really forbid RACH occasion sharing between 2-step RACH and 4-step RACH with SDT.   |  | | --- | | RAN2#112e  10: 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  FFS if common configuration should be allowed |   I have put an editor note here to mark it as FFS. |
| Z004 | *prach-ConfigurationIndex-SDT and msgA-PRACH-ConfigurationIndex-SDT*  Similar comment as Z002 | - *prach-ConfigurationIndex-SDT*:the available set of PRACH occasions for the transmission of the Random Aceess Preamble for Msg1 in 4-step RA type with SDT;  - *msgA-PRACH-ConfigurationIndex-SDT*: the available set of PRACH occasions for the transmission of the Random Access Preamble for MSGA in 2-step RA type with SDT;  - *sdt-MSGA-RSRP-Threshold*: an RSRP threshold for selection between 2-step RA type with SDT and 4-step RA type with SDT when both 2-step and 4-step RA type Random Access Resources for SDT are configured in the UL BWP; | [Rapp] Ref to the previous comments |
| Z005 | Similar comments as Z002 apply also to the definitions of groupB-Configured-SDT and *groupB-ConfiguredTwoStepRA-SDT* |  | [Rapp] Ref to the previous comments |
| Z006 | 1> if the Serving Cell for the Random Access procedure is configured with supplementary uplink as specified in TS 38.331 [5]:  2> if the Random Access procedure was initiated for Small Data Transmission as specified in clause 5.x:  3> set the *PCMAX* to PCMAX,f,c of the selected UL carrier.  2> else if the RSRP of the downlink pathloss reference is less than *rsrp-ThresholdSSB-SUL*:  3> select the SUL carrier for performing Random Access procedure;  3> set the *PCMAX* to PCMAX,f,c of the SUL carrier.  2> else:  3> select the NUL carrier for performing Random Access procedure;  3> set the *PCMAX* to PCMAX,f,c of the NUL carrier.  Comment: It seems we could simplify the changes a bit by existing condition about signalled carrier… Please see the proposed alternative. Both can work though, so no strong view. | 1> if the carrier to use for the Random Access procedure is explicitly signalled or determined as specified in subclause 5.x for SDT:  2> select the signalled or determined carrier for performing Random Access procedure;  2> set the *PCMAX* to PCMAX,f,c of the selected carrier.  1> else if the carrier to use for the Random Access procedure is not explicitly signalled; and  1> if the Serving Cell for the Random Access procedure is configured with supplementary uplink as specified in TS 38.331 [5]; and  1> if the RSRP of the downlink pathloss reference is less than *rsrp-ThresholdSSB-SUL*:  2> select the SUL carrier for performing Random Access procedure;  2> set the *PCMAX* to PCMAX,f,c of the SUL carrier.  1> else:  2> select the NUL carrier for performing Random Access procedure;  2> set the *PCMAX* to PCMAX,f,c of the NUL carrier. | [Rapp]  I have adopted the proposed solution, which is quite concise, but may lack some readability on the other side.  One issue that remains to be resolved is that for subsequent CG-SDT transmission, whether UL carrier selection needs to be performed again. The way the current spec is specified is to assume that (a) the UL carrier selection is only performed for initial CG transmission; (b) the RSRP threshold is the same between RA\_SDT and CG\_SDT. These issues need to be further addressed. However, if we finally agree that for subsequent CG-transmission, UL carrier selection needs to be done again and the threshold can be different between CG and RACH, it is better to move the carrier selection for SDT from subclause 5.x to RA and CG.  From this aspect, it is better to keep the previous chunk of procedure as it is as suggested by ZTE  I have also added the following Editor’s Note per discussion above.  Editor’s Note: FFS whether UL carrier selection is performed for both initial and subsequent UL for CG-SDT and whether the RSRP threshold is common for both CG and RA-SDT. |
| Z100 | General comment to section 5.1.1:  A number of changes to this section will likely overlap with similar changes coming from other WIs that require RACH partitioning. We need to understand how we could integrate these changes. For instance, the statements such as “These are also applicable to Msg1 for RA-SDT if the PRACH occasions are shared between Random Access procedures with and without SDT for 4-step RA type” etc which exist in this section may not be exclusive to this WI. i.e. these preambles or ROs may also be shared by other features requiring the RACH partitioning and such statement above may need to be updated to cover all such cases. We hence need a general discussion on how to combine these features. Perhaps we could even have to think about a common MAC CR for overlapping WIs in this case. Something we need to discuss further at the next meeting. |  | [Rapp]  Agree with the observation from ZTE that this needs to be considered in conjunction with the other WIs that may proposed to introduce RACH changes in this release. And we also need to consider for forward compatibility in the future releases which may further increase the cases for RACH. The current way to capture the procedure does not quite seem to be forward-compatible. |
| N001 | The additions to *prach-ConfigurationIndex*and*msgA-PRACH-ConfigurationIndex* do not seem to be needed. | Remove the addition to *prach-ConfigurationIndex* and *msgA-PRACH-ConfigurationIndex* description. It should be made clear in RRC field description if anything needed. | [Rapp]  This is to align with the similar description with the RACH resource sharing in 2-step RACH. If this is not technically wrong, I think we can keep it as it is. |
| N002 | In the Editor’s NOTE, we do not see why this is up to RAN1 to decide: “Editor’s NOTE: FFS whether there can be separate configurations for related to the configuration of Random Access Preambles group B for RA-SDT , which is up to RAN1 to decide.” | Remove “which is up to RAN1 to decide” or remove the Editor’s NOTE. | [Rapp]  I can remove the note but keep in mind during R16 for the discussion in 2-step RACH, it is RAN1 that makes the decision to use mask index for RACH occasion sharing. It still might not be RAN2’s call to do that.  Remove up to RAN1 to decide |
| N003 | We should not define terms 2/4-step SDT-RA type which makes the spec very confusing and is essentially not true since still we perform the same actions as with 2-step and 4-step RA. It should be noted that Stage-2 would not define such types and to keep the specs consistent, such terms shall not be defined.  This is also inconsistent to what is said in 5.x:  ”Small Data Transmission can be performed either by Random Access procedure with 2-step RA type or 4-step RA type (i.e., RA-SDT)”  Can just use, e.g., “2/4-step RA type for SDT” | Use ” 4-step RA type for SDT” and “2-step RA type for SDT” instead of defining new RA types which is not true. | [Rapp]  Please see the replies to Z002.  IMHO, without the RA type, the spec will look more confusing. Not clear to me what will be the difference between another RA type and RA type for SDT |

### 5.1.1a Initialization of variables specific to Random Access type

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
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### 5.1.2 Random Access Resource selection

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
| Z007 | 1> else if an SSB is selected above:  2> if the selected RA type is set to *4-stepRA-SDT*:  3> determine the next available PRACH occasion from the PRACH occasions corresponding to the selected SSB (the MAC entity shall select a PRACH occasion randomly with equal probability amongst the consecutive PRACH occasions according to clause 8.1 of TS 38.213 [6], corresponding to the selected SSB).  2> else:  3> determine the next available PRACH occasion from the PRACH occasions corresponding to the selected SSB permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex* if configured or indicated by PDCCH (the MAC entity shall select a PRACH occasion randomly with equal probability amongst the consecutive PRACH occasions according to clause 8.1 of TS 38.213 [6], corresponding to the selected SSB; the MAC entity may take into account the possible occurrence of measurement gaps when determining the next available PRACH occasion corresponding to the selected SSB).  Comment: It is unclear why the highlighted part is needed. Isn’t the existing text sufficient? | Delete the newly added text | [Rapp] The reason is that   * For RA for SDT, we don’t need to consider the measurement gap, since it is in RRC\_INACTIVE * We don’t need to consider ra-ssb-OccasionMaskIndex either, since it cannot be CFRA   We can add some conditions to the previous text to rule out the above cases for SDT, but I think a cleaner solution would be add a new sentence to dedicatedly address the case of RA-SDT |
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### 5.1.2a Random Access Resource selection for 2-step RA type

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
| Z008 | 1> if the selected RA type is set to *2-stepRA-SDT*:  2> determine the next available PRACH occasion from the PRACH occasions corresponding to the selected SSB (the MAC entity shall select a PRACH occasion randomly with equal probability amongst the consecutive PRACH occasions according to clause 8.1 of TS 38.213 [6], corresponding to the selected SSB).  1> else:  Same comment as Z007 |  | [Rapp] Ref to the above comment |
| Z101 | NOTE1: Based on the agreement in RAN2#113bis-e: “Switching from SDT to non-SDT is supported”.  The agreement “switching from SDT to non-SDT is supported” doesn’t mean we will support fallback from SDT RACH resource to non-SDT RACH resource within one RACH procedure or PRACH retransmission attempt. The switching can be triggered e.g. by either a DCCH message or new CCCH procedure (FFS) and may also be triggered by network (e.g. by sending RRCResume etc). So, we are not sure if we need changes in this section and this note can be deleted. |  | [Rapp]  I can remove this editor note and put it under issue list  We have agreed on the following for the fallback  11 UE switches from SDT to non-SDT in following cases:  - Case 1 (27/0): UE receive indication from network to switch to non-SDT procedure.  - Network can send RRCResume. FFS whether network can send indication in RAR/fallbackRAR/DCI to switch to non-SDT procedure.  - FFS Case 2 (18/9): Initial UL transmission (in msgA/Msg3/CG resources) fails configured number of times  In section 5.1.4, we have  Editor’s Note: FFS RACH procedure trigger for SR for small data  In sectin 5.1.4a, we have  Editor’s Note: FFS fallback from 2-stepRA-SDT to 4-stepRA-SDT and non-SDT  In section 5.1.5, we have  Editor’s Note: FFS fallback from 2-stepRA-SDT to 4-stepRA-SDT  So, these editor notes correspond to the case when the fallback happen for RACH re-transmission as you have mentioned. If fallback within one RACH procedure is not supported, these section will not be affected. |
| N004 | Agree with ZTE101. Not sure what is the intention of the Editors note on the supported fallbacks. We do not see this impact MAC as it should be rather a RRC procedure upon reception of the resume RRC msg from the NW: “NOTE1: Based on the agreement in RAN2#113bis-e: “Switching from SDT to non-SDT is supported”.” | Remove the NOTE. | [Rapp]  Please see the reply above |

### 5.1.3 Random Access Preamble transmission

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
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### 5.1.3a MSGA transmission

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
| L000 | We don't understand why "or for Scheduling Request in Small Data Transmission in clause 5.x" is included. | [LG] Remove the sentence | [Rapp] Thanks for the comments @LGE  In the previous RAN2 meeting, we have agreed on the following for the SR for subsequent UL based on DG  6 SR resource is not configured for SDT. When the BSR is triggered by SDT data, the UE will trigger RA because SR resource is not available, same as legacy  While different from the legacy RACH procedure in RRC\_IDLE/INACTIVE, for SR in RRC\_INACTIVE, the UE may not need to carry CCCH message and should include a RNTI, similar to the connected mode scenario.  The reason why I made this change previously was I thought it is quite straightforward. I can remove this and put it under editor note |
| Z009 | We agree with L000 comment |  | [Rapp] See comments above. |
| N005 | Agree with L000 |  |  |

### 5.1.4a MSGB reception and contention resolution for 2-step random access

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
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### 5.1.5 Contention Resolution

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
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### 5.1.6 Completion of the Random Access procedure

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
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## 5.2 Maintenance of Uplink Time Alignment

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
| Z010 | 1> when the *cg-SDT-TimeAlignmentTimer* expires:  2> notify RRC to release configured grant type 1 configuration(s) for Small Data Transmission.  The notification should only be that the CG-TAT has expired or not running etc. In RRC the actions can be taken based on this indication (e.g. release the CG resources at the next RRC Resume or release it if there is an ongoing SDT etc)… | 1> when the *cg-SDT-TimeAlignmentTimer* expires:  2> notify RRC that the *cg-SDT-TimeAlignmentTimer* has expired. | [Rapp] Thanks for the comments.  I am not quite sure why the RRC layer should release the source at the next RRC resume, since both the network and the UE are maintaining this timer and the network does not need another RRC resume to notify the network (Different from cell reselection in RRC\_INACTIVE and RSRP change beyond a certain threshold?)  Also, the legacy spec for PUCCH and SRS has directly indicated to the RRC layer to release the resource instead of indicating the expiry of the TAT.  1> when a *timeAlignmentTimer* expires:  2> if the *timeAlignmentTimer* is associated with the PTAG:  3> flush all HARQ buffers for all Serving Cells;  3> notify RRC to release PUCCH for all Serving Cells, if configured;  3> notify RRC to release SRS for all Serving Cells, if configured;  3> clear any configured downlink assignments and configured uplink grants;  3> clear any PUSCH resource for semi-persistent CSI reporting;  3> consider all running *timeAlignmentTimer*s as expired;  3> maintain NTA (defined in TS 38.211 [8]) of all TAGs. |
| X001 | When the UE initiate the RACH procedure, the UE would receive the TAC from the Msg2. It is not clear how/whether the TAC from the Msg2 impacts the validation of the CG resource for SDT. | RAN2 should discuss whether the cg-SDT-TimeAlignmentTimer can be affected by any TAC. | [Rapp] Thanks for your comments @Xiaomi  Agree with Xiaomi’s comment. I have added the following editor’s note  Editor’s Note: FFS the interplay between the legacy TAT and cg-SDT-TAT when legacy RACH is initiated |

### 5.3.1 DL Assignment reception

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
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#### 5.3.2.1 HARQ Entity

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
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5.3.2.2 HARQ process

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
| Z102 | 1> if the *timeAlignmentTimer*, associated with the TAG containing the Serving Cell on which the HARQ feedback is to be transmitted, is stopped or expired, and;  1> if the transmission for the HARQ process is initiated for CG-SDTand *cg-SDT-TimeAlignmentTimer* is stopped or expired:  Comment: The interaction between the regular TAT and the cg-SDT-TimeAlignmentTimer is a bit unclear from the above.  i.e.:  - Is the UE considered to be time aligned only if both TAT and the cg-SDT-TimeAlignmentTimer are both running? The “and” in the above seems to suggest this but this is probably not the common understanding.  - Also, if the above is true then we also need to understand the interaction between TAC and the cg-SDT-TimeAlignmentTimer.  Further, the following agreement is not yet implemented:  5. TAT-SDT is started upon receiving the TAT-SDT configuration from gNB, i.e. RRCrelease message, and can be (re)started upon reception of TA command.  Assuming that the CG-SDT-TAT can be restarted upon TA command, there seems to be no need for checking both regular TAT and CG-SDT-TAT for CG-SDT transmissions?? |  | [Rapp]  This is also related to the comment above in X001, which has been addressed by the editor’s note.  From my side, it seems that the legacy TAT is only applicable when legacy RACH is initiated during the RACH procedure and where the UE variable NTA should be kept independently. TAT can control whether PUSCH and PUCCH can be sent during RACH. When contention resolution is successful, the UE should stop the TAT, similar to the way we treat RACH for on-demand SI request. At this time, the NTA obtained by RACH can be applied to the NTA for CG-SDT.  On the previous agreement on TAC, my previous thinking was that it should be further determined how this is conveyed to the UE, e.g., whether by DCI or MAC CE.  I have put the following FFS for the TA command:  Editor’s Note: FFS how the TA command is conveyed to the UE for cg-SDT-TAT |

### 5.4.1 UL Grant reception

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
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#### 5.4.2.1 HARQ Entity

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
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#### 5.4.2.2 HARQ process

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
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### 5.4.4 Scheduling Request

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
| Z011 | For a logical channel serving a radio bearer configured with SDT, no PUCCH resource for SR is configured.  Comment: The above sentence is not needed and seems not correct in any case. Note that the RB will be the same in connected mode too (and in connected mode, the RB may be configured with SR resources). | Delete the sentence “For a logical channel serving a radio bearer configured with SDT, no PUCCH resource for SR is configured.” | [Rapp]  This was based on the previous agreement, that no SR-PUCCH resource is configured for SR  6 SR resource is not configured for SDT. When the BSR is triggered by SDT data, the UE will trigger RA because SR resource is not available, same as legacy  On how to treat the relationship between the connected mode configuration and the UE configuration in INACTIVE for SDT, the following note has been captured.  Editor’s Note: How to handle the connected mode configuration in the RRC\_INACTIVE UE context e.g., logical channel configuration.  I think we need to further clarify that for SDT, the connected mode configuration is only kept in the UE context but not applied to the UE. INACTIVE mode UE for SDT can have a separate set of configurations. |
| N006 | Agree with Z011 |  | [Rapp]  See the reply above |

### 5.8.2 Uplink

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
| Z012 | When CG-SDT is triggered, the MAC entity shall:  1> if at least one of the SSBs with SS-RSRP above *cg-SDT-RSRP-ThresholdSSB* is available:  2> select an SSB with SS-RSRP above *cg-SDT-RSRP-ThresholdSSB*;  2> select the configured grant type 1 configuration on BWP of the selected UL carrier associated with the selected SSB;  2> select the CG occasion corresponding to the selected SSB and the selected configured grant type 1 configuration.  1> else if RA-SDT is configured:  2> initiate Random Access procedure on the selected UL carrier for Small Data Transmission according to clause 5.1;  1> else:  2> initiate Random Access procedure in clause 5.1 for CCCH logical channel (i.e., not for Small Data Transmission).  Comment: Firstly, switching between CG-SDT and RA-SDT has not yet been agreed. We only agreed that if none of the SSBs are above the threshold for initial CG transmission, then UE is not allowed to select any SSB. Instead, UE will select RA-SDT directly before transmitting the first initial message. However, since the initial UL message has not yet been sent, this doesn’t constitute a switching from CG-SDT to RA-SDT. For the subsequent CG transmissions, we need further discussion on how to handle the transmissions/retransmissions. So, for this change, we will likely need separate description for the initial CG-SDT transmission and the subsequent data transmission with CG resource during CG SDT.  For the initial SDT type selection, I guess we can have a separate section (e.g. 5.x) instead of the section for CG transmission.  For the subsequent data transmission with CG, I guess the SSB quality check can be captured in section 5.4.1 UL Grant reception (e.g. only deliver the UL grant to HARQ process in case the RSRP of the SSB associated to the UL grant is qualified). The understanding is that if there is no UL grant then RACH will be triggered (but this is normal RACH, not RA-SDT). |  | [Rapp]  In the last meeting RAN2#114e, we have agreed on the following:   1. For initial CG transmission, UE does not select any SSB if none of the SSBs’ RSRP is above the RSRP threshold. FFS if re-evaluation for every CG transmission is necessary   If you remember during the online discussion, there was an FFS for when none of the SSBs’ RSRP is above the threshold, what shall the UE do. Then, a comment from Huawei and Nokia proposed that this FFS should be removed because it is clear that if none of the SSB’s RSRP is above the threshold, the UE has no option but to do RACH.  The only remaining issue is: when the UE is configured with RA-SDT, whether the UE is allowed to do RA-SDT  Note that the MAC PDU still has not been built yet, hence there is no issue of MAC PDU rebuilding here.  I can put the following Editor’s Note here, but the current text can be kept as it is, unless people disagree to fallback to RA-SDT after discussion.  Editor’s Note: FFS whether CG-SDT can fallback to RA-SDT if none of the SSB’s RSRP is above the threshold for initial CG transmission.  Please note that this is only for initial transmission, for subsequent uplink this is still FFS per the agreement above.  On the organization of clauses, this is a bit complex but my understanding is that it is not quite proper to put the things related to SSB selection for CG and CG resource selection to section 5.4.1. Section 5.4.1 is used by multiple procedures as a common procedure and it is only related to processing UL grant, i.e., process the UL grant and deliver HARQ information and UL grant to HARQ entities.  For the subsequent UL transmission, as long as the CG configuration for SDT is initialized, by initial CG transmission, for subsequent transmission, when CG occasions come, the UE can process the CG occasion and deliver the UL grant to UL grant reception section 5.4.1 (if the SSB selection is not performed for subsequent uplink).  From my perspective, the current formulation is fine. |
| N007 | Why put the CG-SDT/RA-SDT selection in this section? Should be in section 5.X as part of CG validation. | Move the RSRP validation for CG-SDT and the CG/RA-SDT selection to section 5.X | [Rapp]  Please see my comments above |

## 5.14 Handling of measurement gaps

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
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## 5.15 Bandwidth Part (BWP) operation

### 5.15.1 Downlink and Uplink

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
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## 5.16 SUL operation

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
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## 5.x Small Data Transmission

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
| L001 | The selection of BWP configured for SDT should be considered on SDT procedure. This is because a separate BWP for SDT can be configured, and we think it is also possible to configure multiple separate BWPs for SDT. | [LG] BWP switching from initial BWP to separate BWP for SDT should be considered when SDT procedure is initiated. BWP switching amongst separate BWPs configured for SDT is also considered. | [Rapp] Thanks for your comments @LGE  I have put the following editor note for the issues raised by LGE. We can discuss on this in the future meetings, since the agreements we have now may not be enough for the correction here.  Editor’s Note: FFS BWP switching when multiple BWPs are configured for CG-SDT |
| Z014 | General comment:  Replace all occurrences of Small Data Transmission with SDT (except in the subclause heading). | Replace all occurrences of Small Data Transmission with SDT. | [Rapp] Corrected |
| N010 | 4> initiate Random Access procedure in clause 5.1 for CCCH logical channel (i.e., not for Small Data Transmission);   This cannot be done without RRC intervention as the RRC procedure shall also change, we need only an indication to RRC that SDT cannot be initiated. | Should indicate to RRC layer other than just initiating non-SDT procedure by MAC when SDT verification fails which is not possible given the RRC procedure needs to change as well. | [Rapp]  Thanks for the comment.  I agree that based on the result of the email discussion, only an indication to the RRC of the non-SDT selection, is needed. After that the RRC will trigger legacy RACH like normally.  Corrected the sentence to “indicate to the upper layer that the conditions to initiate SDT cannot be fulfilled” |
| N011 | For Small Data Transmission procedure, the MAC entity considers the suspended radios bearers configured with Small Data Transmission for data volume calculation.  If RRC resumes the SDT bearers already, they are not suspended anymore. Furthermore, rather RRC shall do the data volume calculation before requesting MAC anything. | Remove the sentence. | [Rapp]  I understand there is no pervious explicit agreement on this, but I think this is already implied the current MAC/RRC modeling, otherwise how can the UE do the SDT/non-SDT selection. If people still want to spend time to confirm on this, I am fine with it.  Removed |

## 5.x.1 Validation for Small Data Transmission using CG

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
| L002 | The expression "the time alignment value for SDT using CG type 1 to be valid " is not familiar. | [LG] The Text could be changed to  " The MAC entity shall consider CG-SDT resource is valid when the following conditions are fulfilled:" | [Rapp] Corrected |
| L003 | TA timer should also be considered for validation for CG-SDT. | [LG] Add "1> cg-SDT-TimeAlignmentTimer is configured and running;" | [Rapp] Thanks for the comment. The condition cg-SDT-TAT is running is already implicit included here, since in Section 5.x.1, we have the condition “ if CG-SDT is configured on the selected UL carrier”. If cg-SDT-TAT is not running, there would be no CG-SDT resource configured |
| Z016 | For L003, please also see our comment above in Z102. To us it seems more discussion is needed to understand how the normal TA and the CG-SDT-TAT interact. |  | [Rapp] We can have more discussion on the interplay of CG-TAT and legacy TAT as discussed. |
| N012 | Why do we need a separate sub-section for this? | Could just be listed as conditions in section 5.x | [Rapp]  Do we need to perform validation for every CG transmission? if yes, we need to keep this section separate; if no, as you said, we can put it under section 5.x.  This is already reflected by the following editor’s Note, in case you have not read it  Editor’s NOTE: FFS whether RSRP change would affect the TA valididation for DG. FFS whether the TA validation is only for initial CG-SDT transmission  Keep it as it is |

### 6.1.5a MAC PDU (MSGB)

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
| Z017 | - a MAC subheader and MAC SDU for CCCH or DCCH or DTCH;  Comment: Why was the DTCH added here. i.e. which agreement is this based on? Our understanding is that we did not agree any changes to MSGB format. | Remove the DTCH | [Rapp] This is from the WID that subsequent DL transmission is supported for all types of SDT.  No new RRC state should be introduced in this WID. Transmission of smalldata in UL, subsequent transmission of smalldata in DL and the state transition decisions should be under network control.  This would also include msgB for SDT based on 2-step RACH and implies a change to the msgB format. |
| N013 | Agree with Z017 |  | [Rapp]  Please see the comments above |

## Any Other Clause

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| # | Brief description of the issue | Suggested resolution/company comments | Proposed way forward by rapporteur |
| N014 | Lots of Editor’s notes not based on any meeting FFS is added | Remove all the Editor’s notes that are not based on any discussions so far. | [Rapp]  One important thing of doing this practice of running CR is that it can help us discover the remaining issues in time. This helps promote the progress of the topic.  If there is any editor’s note people do not find suitable, you can point it out directly, just like thing s have been done above. |