**3GPP TSG-RAN2 Meeting #117- e R2-22xxxxx**

**e-Meeting, xxx, 2022**

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

**Title: CP open issues list for SDT (email: [POST116bis-e][511])**

**Agenda item:** **xxx**

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

# Introduction

This document contains summary of open issues and proposed resolutions for CP aspects of SDT:

* [POST116bis-e][511][Sdata] CP open issues (ZTE)

Scope:

- List of critical open issues to be resolved for WI completion (including UE capabilities)

- Updated CR 38.331 for information and review

NOTE: NO contributions on these critical open issues are expected

Deadline:

- Open issues list Jan. 28th

- Company inputs Feb. 14th

Proposed format for comments is as below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| # | Description | Criticality(Essential / Optional / Enhancement)  | Company comments/PreferenceCompanies can use company ID and enter comment (see example) | Proposed resolution (to be updated by Rapporteur) |
| Zxxx | XXX is missing/wrong/open etc | Essential | ZTE: We think this is not neededXXX: We agree with YYY etc | Rapp: Will be implemented in the next revision |

# Discussion

## Procedural open issues

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| # | Description | Criticality(Essential / Optional / Enhancement)  | Company comments/Preference | Proposed resolution (to be updated by Rapporteur) |
| Z001 | Field descriptions missing for some IEs | Essential |  | Rapp: Will be implemented in the next revision |
| Z002 | Running CR is not against the latest RRC spec version  | Essential |  | Rapp: Will be updated in the next revision |
| Z013 | Align the parameter names between MAC and RRC specs | Essential |  | Rapp: To be done before/during next meeting |
| Z019 | SDT specific RACH configuration is missing | Essential |  | Rapp: This will be part of the common RACH partitioning CR and hence all SDT related agreements (both in RAN2 and RAN1 – see the L1 params for SDT) would have to be included in that CR.  |

## UE capabilities

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| # | Description | Criticality(Essential / Optional / Enhancement)  | Company comments/Preference | Proposed resolution (to be updated by Rapporteur) |
| Z003 | To support Rel-17 SDT mechanism, whether UE shall always support RA-SDT (i.e. a UE supporting CG-SDT shall also support RA-SDT) | Essential | ZTE: Yes, we think RA-SDT should be supported if SDT is supported (since RACH can be initiated during CG-SDT). CG-SDT can have a separate bit. Ericsson: Yes. We think RA-SDT if part of the “core” SDT functionality and open to discuss if CG-SDT support needs a separate capability. Qualcomm: Agree RA-SDT should be supported by default if UE reporting SDT is supported. But it should be 4-step RACH SDT. A separate UE capability for 2-step RACH SDT is needed. Because supporting 2-step RACH is optional. A supporting RACH based SDT UE may not support 2-step RACH, i.e. 2-step RACH SDTCATT：Slightly prefer to have separate capability, as discussion in Z004 and Z005.Samsung: Agree that RA-SDT should be supported. CG-SDT can be optional.Xiaomi: We prefer a separate capability bit for CG-SDT, which does not rely on RA-SDT.Nokia: We think 3 different capabilities are needed: 2-step RA-SDT, 4-step RA-SDT and CG-SDT. If CG-SDT is supported then the UE shall support also 2-step RA-SDT. Additional SDT capability is not needed.[Huawei]: We see no reason to couple CG-SDT and RA-SDT capability as they can work completely independently. Thus, we believe two separate and independent capabilities are needed. Furthermore, if the UE indicated CG-SDT capability, why would the network care whether the UE also supports RA-SDT? The configuration provided from the network side will be the same and if the UE does not support RA-SDT, it would just use legacy RACH in case CG-SDT conditions are not met. RA-SDT is also in fact much more complex than CG-SDT because of RACH partitioning etc. |  |
| Z004 | whether to define a new UE capability for RA-SDT as ‘optional with capability signalling’, per UE and without a need of xDD and FRx differentiation | Essential | ZTE: We think SDT capability implicitly should indicate support for RA-SDT as noted above. CG-SDT capability can be added on top. No need for xDD and FRx differentiation. Ericsson: Agree w ZTE, see also comment above.Qualcomm: A separate 2-step RACH SDT is needed. A UE supporting RA-SDT may or may not support 2-step RACH which is optional. The capability should be per band instead of per UE. Because considering FR2 and NR-UCATT: Support.Samsung: Agree with ZTE.Xiaomi: AgreeNokia: 2-step RA-SDT and 4-step RA-SDT is needed.[Huawei]: Agree with the description, i.e. **RA-SDT** capability can be per UE with no xDD and FRx differentiation. |  |
| Z005 | whether To define a new UE capability for CG-SDT as ‘optional with capability signalling’, per UE and without a need of xDD and FRx differentiation | Essential | ZTE: AgreeEricsson: Open to have CG-SDT supported by asingle SDT capability, but ok to have CG-SDT optional w Capability signaling.Qualcomm: Agree. But the capability should be per band instead of per UE. Because considering FR2 and NR-UCATT: Support.Samsung: Same view as EricssonXiaomi: AgreeNokia: Agree, but UE supporting CG-SDT shall support also 2-step RA-SDT[Huawei]: Agree to have CG-SDT as a separate (and independent) capability. We also think there is a need to have FRx differnation for CG-SDT as due to no beam management for SDT as such, operating CG-SDT in FR2 may be more complex as the UE may need to indicate its preferred DL beam quite often. |  |
| Z006 | Any pre-Rel-17 features (e.g. 2-step RACH or SUL) requires additional/separate UE capabilities when used in combination to Rel-17 SDT mechanism | Essential | ZTE: We don’t think this is needed. Ericsson: No. Qualcomm: 2-step RACH is optional capability, at least need to have 2-step RACH SDT in case UE does not support 2-step RACH.CATT: There is no special handling when SUL feature is used in combination to Rel-17 SDT mechanism. So no additional/separate UE capability is needed for SUL feature with Rel-17 SDT mechanism.But for 2-step RACH SDT, the UE needs to monitor separate search space which is different from legacy 2-step RACH. So prefer to have additional UE capability for 2-step RA-SDT.Samsung: NoXiaomi: No. We can reuse the legacy 2-step RACH capability indication and the RA-SDT capability indication together to indicate the support of the 2-step RA-SDT.Nokia: No[Huawei]: The issue description is quite broad, but we focus on two items that mentioned explicitly:* 2-step RACH – we agree 2-step RA-SDT is optional for the UE, but we see no need of additional capability as RA-SDT is only used by UE’s in RRC IDLE/INACTIVE. There is no use for the network of knowing 2-step RA capability (for legacy, this was because can use 2-step RACH in RRC Connected which is not the case for SDT). If UE does not support 2-step RA, it will not use 2-step SDT, it will just 4-step SDT.
* SUL – SUL is just another band supported by the UE. If the UE supports SUL bands then it should support all ‘per UE’ features on this band as well. SDT seems no different and we do not see the need for separate capability.
 |  |
| Z007 | Whether to indicate bandwidth, and the supported MIMO layers within UE´s capabilities related to SDT | Essential | ZTE: We don’t think this capability is needed. May be the discussion is for CG-SDT to see if MIMO capability can be used in this case. But, even if this is the case, then we think the connected mode capability can be reused. Ericsson: Agree w ZTEQualcomm: Not needed.Samsung: Not needed.Xiaomi: Not needed.Nokia: Not needed[Huawei]: For bandwidth, we are not clear what is meant. The UE will just use the initial BWP. For MIMO, in our understanding, only a single layer transmission is supported for SDT as there was no conlusion in RAN1 to support MIMO. We should then clarify in the specifications that MIMO is not used during SDT. There is no need for related capability. |  |
| Q001 | Whether to define a separate UE capability for resuming/transmitting SRB (control data, NAS message) for Rel-17 NR SDT in RRC\_INACTIVE | Essential | ZTE: We don’t think a separate capability is needed for SRB. But we are happy to hear UE vendor views on this aspect. Ericsson: Not neededQualcomm: As a UE vendor it is important to have separate capability to differentiate user-plane SDT vs control-plane SDT, i.e. SRB SDT in Rel-17. The SRB SDT capability indicates that UE supports transmit NAS signaling to handle such as positioning reporting service. It indicates that UE is able to resume SRB2 at the SDT initiation and supports to transmit / receive NAS signaling in UL/DL during SDT. If a UE does not report SRB SDT capability, it implies that UE does not support to transmit/receive NAS signaling, i.e. positioning reporting in SDT. Thus, some UEs may only support user plane data over SDT, i.e., DRB SDT which could be by default if UE supports SDT.CATT: No strong view. But wonder if there are different requirements for supporting SRB SDT and DRB SDT.Samsung: Not needed.Xiaomi: Not needed.Nokia: Not needed, we think that UE supporting SDT shall support both SRB SDT and DRB SDT.[Huawei]: From SDT point of view, there is no additional complexity of supporting SDT for SRB2 on top of DRBs as this is simply just another logical channel. But we understand this is also discussed in positioning WI, so there can actually be an additional capability for on whether the UE is capable of positioning data transmission/reception in RRC INACTIVE. |  |
| H004 | Whether to have a separate capability for multiple configured/active configured grants for SDT | Essential | [Huawei]: Since CG design over SDT is different from legacy CG desing (e.g. using mapping between CG and SSBs), we think there should be a separate UE capability to tell whether multiple CG configurations over SDT are supported by the UE.ZTE: No strong view. We can discuss this based on UE Vendor input. Ericsson: To us this is part of the core functionality for CG-SDT and should not have an additional capabilityQualcomm: A separate UE capability can be specified to support multiple CG configurations for CG-SDTCATT: Support to have a separate capability for multiple configured/active configured grants for SDT.Samsung: Not needed. In our view it is essential.Xiaomi: Yes, as this requires extra UE complexity.Nokia: We agree with Ericsson.[Huawei2]: The feature can work with a single CG-SDT as well, so we do not see this as a core functionality. Even for IIOT multiple CG configuration are optional. |  |
| H008 | UE capability for receiving DRB in msg4 and msgB | Essential | [Huawei]: Previously, for the UE in:* RRC\_CONNECTED, contention resolution in msg4/B is by network scheduling UL new transmission with PDCCH addressed to C-RNTI. Hence, there is no DL data in msg4/msgB
* RRC\_INACTIVE/IDLE, network can only send SRB1 in msg4/B and cannot send DL data in msg4/B

For SDT, this will be a new requirement for the UE to receive DL data in msg4/B. Furthermore, since subsequent data can be delivered via dynamic scheduling after successful contention resolution, having data in msg4/msgB is not essential anyway. Hence, we think this should be an optional UE capability.[Samsung]: Not needed.Xiaomi: No needed.Nokia: Not needed |  |

## CP/RRC open issues

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| # | Description | Criticality(Essential / Optional / Enhancement)  | Company comments/Preference | Proposed resolution (to be updated by Rapporteur) |
| Z009 | Editor’s Note: FFS on SDT TAT and its interaction with the normal TAT and a separate section to capture the release of CG-SDT resources upon receiving such request from lower layers | Essential | Rapp: Seems we made a few more agreements on this. Wait for the MAC spec to be finalized and then we can capture corresponding procedure in RRC if needed. CATT: Agree with Rapp’s suggestion.Samsung: Agree with Rapp.Xiami: Agree with Rapp’s view.Nokia: Agree to wait for the MAC spec to be finalized and to see whether anything needs to be captured for this. |  |
| Z010 | TBD whether the expiry of the new SDT timer related actions can be integrated into section 5.3.13.5 or not | Essential | Rapp: Propose to integrate as currently in the running CR (i.e. remove the EN in 5.3.13.5)[LGE] We think introducing a new section for SDT failure handling is more clear. The trigger for SDT failure handling is not limited to NewSDTTimer expiry and integrity check failure, but also should cover other cases, e.g. RLC max number of retransmission, max number of RA preamble transmission, max number of CG-SDT transmission, etc.ZTE: We slightly prefer to merge it with existing section, no strong view.Ericsson: As the timer handling at expiery etc aligns with legacy, we see no strong reason not to integrate.CATT: Agree with Rapp’s suggestion.Samsung: No strong view. We are fine either way.Xiami: Agree with Rapp’s view.Nokia: No strong view[Huawei] We do not think the existing section can be reused. Failure due to SDT should be distinguishable from connection establishment failure as these cases are quite different and network may need to optimize other parameters (e.g. if many SDT failures occur, then perhaps SDT failure should be shorter etc.). Furthemore, new timer applies also to CG-SDT and then some parts of the procedure will not be applicable at all, e.g.:3> set *perRAInfoList* to indicate the performed random access procedure related information as specified in 5.7.10.5;We could discuss some modificaitons to this procedure, but at this stage it may be simplest not to apply this procedure for SDT failure timer expiry. |  |
| Z011 | How to suppress RNAU whilst SDT is ongoing? | Essential | Rapp: Propose to add a condition that RNAU is only initiated if neither T319 nor Txxx are running (see running CR – section 5.3.13.8). Alternative is to add a note to capture this. Both can work – comments welcome.[Intel] We support the intention of the TP however we suggest avoiding the word “neither” in an IF condition and the check for legacy T319 in relation to the new SDT operation. We suggest updating the related TP as follow: “if ~~neither T319 nor~~ Txxx(NewSDTTimer) is not ~~are~~ running:”[Huawei] We agree with the comment from Intel. We should not modify legacy behaviour and focus only on SDT operation, as per the agreement.[LGE] Agree with Intel. We should not change the legacy behavior.[ZTE] Legacy behaviour has also been clarified already as captured in chairman’s notes. See the conclusion for R2-2102715 (RAN2#113-bis): “=> [006] The UE should not start the 2nd RRC resumption procedure when there is a RRC resumption procedure ongoing”. It might be worth capturing this also. But no strong view. Ericsson: Agree w, Intel. In addition, we think it is of value to clarify that the UE should not start the 2nd RRC resumption procedure when there is a RRC resumption procedure ongoing.CATT: Agree to apply to SDT operation only.Samsung: Agree with Ericsson and ZTE.[NEC] In addition to the agreements of RAN2#113bis-e as pointed out by ZTE, CRs have also been discussed and RAN2 agreed no spec change is needed at RAN2 #114e:R2-2106192 Clarification of initiation of RRC resume procedure Huawei, HiSilicon CR Rel-15 38.331 15.13.0 2682 - F NR\_newRAT-CoreR2-2106193 Clarification of initiation of RRC resume procedure Huawei, HiSilicon CR Rel-16 38.331 16.4.0 2683 - A NR\_newRAT-Core**[004] both not pursued****[004] The UE should not start the 2nd RRC connection establishment procedure when there is a RRC connection establishment procedure ongoing. (only capture in chairman notes, no spec change is required)**We think there is no need to capture anything for SDT either, since the previous agreement also applied for SDT. If companies want to add something in the spec, a note (similar to the agreement of RAN2 #113bise) would be sufficient.Xiami: Agree with Rapp’s view.Nokia: We agree to fix this issue for SDT. We agree with Intel’s view that this should apply to SDT operation only i.e. not for legacy. We agree that RNAU shall not be initiated if SDT procedure is ongoing i.e. if Txxx(NewSDTTimer) is running. |  |
| Z012 | RRCReject handling | Essential | Rapp: Propose to follow same procedure as legacy (which is also the case in EDT). [Huawei] Please see H004, we think we cannot reuse legacy behaviour 1:1 when the UE is configured with CG-SDT.[ZTE] It seems the question in H004 is whether the CG configuration is kept or not. However, our understanding is that upon MAC reset, the CG configuration is kept (only MAC level CG resources are released). So, at the next resume the actual UE configuration is not impacted anyway. So, it seems legacy procedure can be followed then. Ericsson: It seems we do not need any specific handling for a CG-SDT configuration with more than suspending radio bearers configured for SDT (current draft v00)Samsung: Agree with Ericsson.[NEC] We have concerned on the security key reuse issue.After reception of RRCRecject during SDT, if UE initiates a second RRC Resume procedure later in the same cell, the same security key will be generated and PDCP COUNT value will be reset, but the packtes can be different. However, ciphering different packtets using same key same COUNT value is not allowed. At RAN2 #115e, in EDT session, it was agreed that “RAN2 assumes that UE should avoid a consecutive EDT or PUR transmission with a different payload but same security key”. So we also need to address this issue in SDT.Xiami: Agree with Rapp’s view.Nokia: Legacy procedure seems sufficient.[Huawei2] We think the issue raised by NEC is indeed correct. Should we in this case clarify that when receiving RRCReject in response to SDT attempt, the UE should simply go RRC IDLE. In any other case (ewven if the UE triggers legacy RACH), the issue will occur. |  |
| Z014 | Is Logged measurement procedure (5.5a) applicable during SDT | Optional | Rapp: Propose to not support this[ZTE] Agree with rappEricsson: NoCATT] We think it is not an optimization but a co-exist problem with SDT feature and logged MDT feature. It is similar to the discussion of on-demand system. It’s not clear enough what ‘not support’ means. Does it mean that 1)Logged MDT feature will not configured if SDT is configured, or 2)Logged measurement is not allowed during SDT?Samsung: NoXiaomi: NoNokia: Agree with rapporteur.[Huawei]: Rapporteur’s suggestion is a bit unclear. Is the proposal to capture that UE during SDT does not perform measurements logging or the network is forbidden from providing SDT together with logged measurements? Or is the proposal not to introduce any changes to measurement logging? We prefer the latter. |  |
| Z015 | Are Idle/inactive measurements continued during SDT (5.7.8) | Optional | Rapp: Propose to not support this [ZTE] Agree with rappEricsson: NoCATT: We think it is not an optimization but a co-exist problem with SDT feature and logged MDT feature. It is similar to the discussion of on-demand system. It’s not clear enough what ‘not support’ means. Does it mean that 1)Logged MDT feature will not configured if SDT is configured, or 2)Logged measurement is not allowed during SDT?Samsung: NoXiaomi: NoNokia: Yes: Idle/inactive measurements and reporting shall be continued during SDT, because NW may transition the UE which has SDT procedure ongoing to CONNECTED. In this case it would be beneficial to configure proper CA/DC configuration based on EMR reporting immediately without additional RRC Re-configurations.[Huawei]: Same as above, rapporteur’s suggestion is a bit unclear. Is the proposal to capture that UE during SDT does not perform Idle/inactive measurements or is the proposal not to introduce any changes to this section? We prefer the latter and this is also somehow aligned with the agreement that we had previously: “Confirm that cell selection mechanism is not modified”. |  |
| Z016 | What are the values for sdt-DataVolumeThreshold | Essential | ZTE] We propose to reuse the 5 bit field aligned with the BSR values for 5 bit format in MAC, as follows: Table 6.1.3.1-1: Buffer size levels (in bytes) for 5-bit Buffer Size field

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Index | BS value | Index | BS value | Index | BS value | Index | BS value |
| 0 | 0 | 8 | ≤ 102 | 16 | ≤ 1446 | 24 | ≤ 20516 |
| 1 | ≤ 10 | 9 | ≤ 142 | 17 | ≤ 2014 | 25 | ≤ 28581 |
| 2 | ≤ 14 | 10 | ≤ 198 | 18 | ≤ 2806 | 26 | ≤ 39818 |
| 3 | ≤ 20 | 11 | ≤ 276 | 19 | ≤ 3909 | 27 | ≤ 55474 |
| 4 | ≤ 28 | 12 | ≤ 384 | 20 | ≤ 5446 | 28 | ≤ 77284 |
| 5 | ≤ 38 | 13 | ≤ 535 | 21 | ≤ 7587 | 29 | ≤ 107669 |
| 6 | ≤ 53 | 14 | ≤ 745 | 22 | ≤ 10570 | 30 | ≤ 150000 |
| 7 | ≤ 74 | 15 | ≤ 1038 | 23 | ≤ 14726 | 31 | > 150000 |

Ericsson: We are fine to reuse the 5-bit field. However, the BSR may be more useful if having a higher granularity up to a likely max SDT DVT threshold (>2000 or similar). Then also a finer grant allocation can improve the performance of SDT.Samsung: ok with Rapp’s suggestionXiaomi: Xiami: Agree with ZTE.Nokia [Potentially new issue needed]: It would be beneficial to have minimum and maximum buffer size levels. Minimum buffer size would prohibit too frequent SDT sessions. We are ok to have 5-bit field for maximum buffer size, values 0 and infinity needs to be supported for the cases when SDT is temporarily not allowed and when NW prefers the UE to start always with SDT procedure.[Huawei]: We are not sure whether the very low values are really useful, so we would propose starting from something that can cover reasonably SDT use cases (such as IM messages), e.g. ~350bytes (e.g. BSR index 12). We also think the maximum value could be a bit larger than 150 kBytes, e.g. up to 500kBytes. Value 0 is not really useful as the NW can disable SDT by removing SDT configuration from SIB1 completely. |  |
| Z017 | What are the values for txxx (newSDTTimer) | Essential | **[Intel] [Potentially new issue needed]** We suggest discussing whether this as well as other SDT related configurations are all defined following delta configurationEricson: Very large values are not so useful but should be sufficiently long to cover retransmissions and subsequent Tx.[ZTE2] We agree very large values are useless as noted by Ericsson. With regards to the actual values may be again we can follow LTE baseline. However anything more than 10 sec is really not so useful. So, we propose: t3XX ENUMERATED {ms100, ms200, ms300, ms400, ms600, ms1000, ms2000, ms3000, ms6000, ms10000, spare6, spare5, spare4, spare3, spare2, spare1}Samsung: Agree with ZTE2Xiami: Agree with ZTE.Nokia: [New issue required] We are ok with values proposed by rapporteur. In addition we propose to have value of infinity for the long SDT sessions e.g. for stationary UEs. However, the timer operation needs generally to be agreed first. Most of the companies preferred to restart the timer upon DL/UL transmission in which case not very long values are needed. New issue for this needs to be put in place.[Huawei]: We propose, e.g.: {ms100, ms200, ms400, ms600, ms1000, ms2000, ms4000, ms6000}. But if we’d like to have some spare values then ZTE’s suggestion is also fine. |  |
| Z018 | Should DataVolumeThreshold be also configured in SIB1? Should this be only configured in SIB1 and not in RRCRelease? | Optional | Rapp: Think UE specific signalling (in RRCRelease) is sufficient. **[Intel]** We understand that this issue should be marked for discussion as it does not seem an optimization [Rapp] Marked as optional (i.e. not essential for the feature to work, but happy to add based on the support level… Issue is open for commentsEricsson: We think this has the greatest use in SIB as the configuration is rather per cell not per UE. If also in RRCRelease, then the configurations need to be consistent. [ZTE2] If we include this in SIB and RRCRelease then we need to discuss how they interact (i.e. will the dedicated signalling – potentially coming from a different cell – take precedence? If this is the case, then SIB indication anyway seems useless). No strong view, but seems it is an optimization to configure it in SIB and RRCRelease. Samsung: SIB1 configuration is sufficient.Xiaomi: SIB1 only.Nokia: SIB1 only.[Huawei]: UE specific configuration seems sufficient. |  |
| Z020 | sdt-SSB-PerCG-PUSCH-r17 ENUMERATED {one, two, four, eight,sixteen} FFS from RAN1 on {1/8,1/4,1/2}  | Essential |  | Rapp: wait for RAN1 input |
| Z021 | Configuration of common search space for SDT is open | Essential |  | Rapp: This shold be part of common RACH partitioning CR.  |
| Z023 | Do we need to discard PDCP SDUs of SRBs upon reception of RRCRelease with SDT config? | Essential | **[Intel]** Considering latest agreements, we understand that the FFS is only for SRBs:*“2. For DRBs configured with SDT, PDCP suspend is performed upon reception of RRCRelease message including suspendConfig so that PDCP PDUs are discarded, and PDCP SDUs already stored are considered in SDT data volume calculation. No specification change is needed.* *16. FFS for SRBs, whether to discard PDCP SDUs upon reception of RRCRelease message including suspendConfig*”*[Rapp] Agree! Updated.* [ZTE] We don’t think PDCP SDUs are discarded.Ericsson: Also discussed in UP. We think it can be resolved there.Samsung: Yes. When SDT procedure is initiated, PDCP SDUs for SRBs are discarded during the PDCP entity re-establishment procedure. If SRB 2 is configured as SDT RB, the old PDCP SDUs of SRB 2 should not be used in SDT data volume calculation as they are discared upon ST initiation. In order for these old PDCP SDUs of SRB2 to be not counted in SDT data volume calculation, it would be simple to re-establish PDCP entity of SRB 2 (if configured as SDT RB) upon receiving RRC Release with suspend configuration[NEC] Yes. This is also discussed in the UP open issue offline. And we agree that for SRB configured with SDT, PDCP SDU discard should be performed upon reception of RRCRelease message. The purpose is to clear the buffered data which will not be transmitted during SDT before SDT data volume calculation.Xiaomi: YesNokia: We agree with Ericsson.[Huawei]: We think we do not have to address this case, i.e. no changes to PDCP/RRC specs are needed. |  |
| Z024 | How to support delta signalling for CG-SDT?Option 1: Delta signalling is based on configuration in BWP-dedicated for initial BWO in connected modeOption 2: Delta signalling is based on the previous SDT configuration (i.e. only applicable to SDT operation and will be released when the UE moves to connected)If we want to support option 1, we need to clarify the relation between the configuration in connected mode and the configuration in SDT for the CG type 1 resources. (e.g. are the CG type 1 resources in SDT valid also in connected? Will the PDCCH/PDSCH configuration impact the connected mode configuration? Etc. this also needs to be clarified in case of cell change. It seems option 2 is simpler. Companies can comment.  | Essential | **[Intel]** Regarding the Z024 question here and the proposed option 1 & 2, we understand we should follow legacy delta operation which is aligned to the description in option 2. We understand that option 1 is an optimization and there might not be time to discuss the correspondign implications considering that there is only 1 meeting left to complete the WI.**[Intel] [Potentially new issue needed]** We see beneficial to support delta configuration for both RA-SDT and CG-SDT understanding that UE could also initiate RA-SDT procedure in same cell where the UE AS Context is stored large number of times. Therefore if there is no technical concern, we suggest changing all SDT related confirmations to “need M” (including e.g. the parameters defined in *SDT-Config*). **[Intel] [Potentially new issue needed]** Dedicated configuration should avoid using “need S”, we suggest updating it to follow the delta configuration. sdt-DRB-List-r17 SEQUENCE (SIZE (1..maxDRB)) OF DRB-Identity OPTIONAL, -- Need S[Rapp] Let us discuss overall delta signallling framework here. ASN.1 issues like above can be fixed directly in the running CR (otherwise the issue list may be huge). ZTE: prefer option 2. In this case, the UE shall release the SDT CG configuration when moving to connected. Delta signalling still applies between successive SDT sessions and we think this is sufficient for now.Ericsson: Prefer option 2. This question can be discussed a bit more though.CATT]: Agee with Intel, prefer to support option 2 as legacy delta operation.Samsung: Support option 2Xiaomi: Prefer Option 2.Nokia: Since delta configuration is optimization, we are ok not to support it in case it introduces any controversial discussions. [Huawei]: We prefer option 2. It is most important to be able to avoid having to reconfigure SDT for each SDT procedure when the UE does not transition to RRC Connected state. We also need to make sure MAC specifications allows for this delta configuration, e.g. to make sure that MAC does not celar the CG-SDT configurations upon reception of RRCRelease (this is related to the following open issue for UP: “Do companies agree to consider cg-SDT-TimeAlignmentTimer to be expired and perform the procedure in 5.2 (Maintenance of uplink time alignment) at MAC reset”. In general, we could agree that CG-SDT is not released upon CG-SDT-TAT expiry, which would allow to perform delta configuration also in this case. |  |
| Z025 | In case of SDT, carrier selection is performed before selecting the CG resource. For this, we use *sdt-RSRP-ThresholdSSB-SUL.* However, it is unclear how this IE is configured. Is it configured commonly to all RACH partitions? Or is it configured separately for SDT (e.g. in SDT-ConfigCommonSIB)? If it is configured separately for SDT, then the carrier should be selected before SDT is initiated and the selected carrier should be informed to MAC (e.g. for RACH partition selection). * Note this may be some how related to RACH partition discussion too.
 | Essential | ZTE: For SDT, once the carrier is selected, it can be fixed. RRC can indicate the selected carrier directly to MAC for RACH partition selection procedure (if SDT is a triggering feature).Samsung: Agree with ZTE. Note that we do something similar for Msg1 based SI request.“1> if *SIB1* includes *si-SchedulingInfo* containing *si-RequestConfigSUL* and criteria to select supplementary uplink as defined in TS 38.321[13], clause 5.1.1 is met:2> trigger the lower layer to initiate the Random Access procedure on supplementary uplink in accordance with [3] using the PRACH preamble(s) and PRACH resource(s) in *si-RequestConfigSUL* corresponding to the SI message(s) that the UE requires to operate within the cell, and for which *si-BroadcastStatus* is set to *notBroadcasting*; “Xoap,o: Agree with ZTE.Nokia: We think we don’t need separate threshold for SDT and non-SDT since this complicates things unnecessarily (and not for any clear reason). |  |
| X001 | It is not clear how the RACH failure in the subsequent SDT phase is handle, according to our paper [R2-2201378](file:///C%3A%5Cevutukuri%5Cwork%5C5G%5CRAN2%5Cdocs%5CR2-2201378.zip). | Essential | Xiaomi: Propose to let the UE enter RRC\_IDLE as the handling of other failures during the subsequent SDT phase.According to the RAN2#115-e meeting discussion, RAN2 made the following agreements to handle various connection failure during the ongoing SDT session:* Events that trigger a termination or failure of an ongoing SDT session 1) cell reselection, 2) expiry of the SDT failure detection timer, 3) the UE does when Max retx is reached in RLC. RLC AM max retransmission functionality remains unchanged.
* When a UE detects a failure of an ongoing SDT session, UE transitions autonomously into RRC\_IDLE (as baseline solution). If time allows or have a ready solution we can consider further optimizations.

[Rapp] Understanding is that any such error would lead to transition to IDLE mode. This can be clarified. [LGE] We think a SDT failure handling procedure should cover all failure cases during SDT procedure. [ZTE] We agree that the RLC failure handing is currently missing. This should be added. [Samsung]: We do not agree with the proposal. In RRC INACTIVE, upon reaching max preamble transmission, no action is taken by RRC, UE continue RA preamble transmission. So no action specific to this is needed for SDT. UE will transition to idle if SDT timer expires.[NEC] we agree to have the same handling as other cases, e.g. RLC max retransmission time reached.Nokia: Similar to other error cases.[Huawei]: Agree this should be handled as all other failure cases. |  |
| X002 | The detailed issue is provided in our paper R2-2201376.According to the running RRC CR, when the value of “sdt-DRB-ContinueROHC” is set to “rna”, the cell for ROHC continuity belongs to the RNA, in which the RRCRelease message has to be transmitted via a cell of this RNA. According to the running RRC CR, when the value of “sdt-DRB-ContinueROHC” is set to “cell”, the cell for ROHC continuity is where the UE receives the RRCRelease message.However, according to the legacy procedure, the cell where the RRCRelease message is transmitted may not be the RNA cell. The RRCRelease message with segments can be transmitted via more than one cells. | Optimisation | Xiaomi: We have the following proposals:The cell where the ROHC continuity is applied is indicated via an explicit cell identity in RRCRelease message.The RNA where the ROHC continuity is applied is the same RNA as indicated via ran-NotificationAreaInfo in RRCRelease message, same as legacy.[Rapp] Looks like an optimisation since the UE should know which cell it is connected to when receiving the RRCRelease message. Companies can comment[ZTE] Perhaps the issue is that there is ambiguity in case of CA (i.e. it may be received on SCell)? We could clarify that “the cell for ROHC continuity is the PCell where the UE receives the RRCRelease message”. Xiaomi: Yes, this is in the case of CA. We can accept the above clarification provided by ZTE.Nokia: OK with using PCell.[Huawei] We can clarify that the cell for ROHC continuity is UE’s PCell at the time of RRCRelease reception, to avoid any confusion. No additional indication is needed. |  |
| E001 | Introduction of Release Assistance Information (RAI) for SDT. | Essential? | As discussed in previous contributions e.g. [R2-2200811](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200811.zip) and [R2-2200727](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200727.zip), some sort of assistance information to help network to decide whether to release the UE is necessary for efficient implementation of SDT. One option is to have EDT as base-line for the discussion/decision. RRC or MAC could be used for this.[Huawei]: We agree this is essential for the network to operate SDT properly, not only to know when to release the UE but also to make a decision on whether to relocate the anchor or not. We agree EDT RAI can be reused to a large extent with the main difference being that subsequent transmissions are allowed in NR so the UE could additionally indicate whether single/multiple packets are expected.[Rapp] Can discuss, but it is not clear why it is essential for the feature to work. [LGE] We don’t think this is essential issue. Moreover, we don’t have time to discuss this issue. [ZTE] Agree with LG. Network can also know this by other means. No need to optimize this. Samsung: Not needed/essential. [NEC] agree with LG.Xiaomi: Not essential.Nokia: NW need to know whether UE prefers SDT or not anymore. Otherwise UE may be configured with SDT unnecessarily. We don’t quite understand how the NW would know this otherwise if RRC connection is not setup? |  |
|  |  |  | [Rapp] Agree with the issue but it is duplicate of Z017 above.  |  |
| E003 | What are the values for CG-SDT periodicity | Essential | In the discussion RAN2 concluded that here is no restriction on the candidate values of CG period. In NR connected mode, the maximum periodicity configurable for CG Type 1 is 640ms. It can be assumed that longer values are needed to cover additional use cases such as those that were considered for e.g. LTE-PUR (up to minutes, hours)[Rapp] I am assuming RAN1 will come with these values since we indicated no restriction from our side?? ZTE: We are okay to have longer values as proposed, but we are not sure if this will impact the mapping in RAN1. Wonder if Ericsson could provide these values to RAN1 so, that these could be checked? Nokia: We also hope that values comes from RAN1.[Huawei]: We are not sure whether RAN1 is going to propose any additional values, but we strongly support having longer periodicities, in particular for stationary IOT services. In addition to the existing values we could also add e.g. the values similar as for LTE PUR:{1.28s, 2.56s, 5.12s, 10.24s, 8x10.24s. 16x10.24s, 32x10.24s, …., 8192x10.24s} If we introduce longer values, we should also consider using a new parameter for CG-SDT-TAT, as for the legacy TAT the maximum value is 10.24s (and then infinity). We can consider coupling CG-SDT-TAT value with CG-SDT periodicity, as in LTE PUR.  | [Rapp] Wait for RAN1 input |
| NEC001 | Based on R2-2109308 Reply LS from CT1 on non-SDT arrivaling “if new UL data or NAS message becomes available for which non-SDT radio bearers are not established, the current behaviour (of NAS in 5GMM\_CONNECTED mode with inactive indication) applies, i.e. any new pending UL data associated with a PDU session with no suspended user plane resources, will require the Service Request procedure to be initiated and NAS will need to provide UAC parameters based on the reason for that Service Request.” And according to the 38.331, if UE receives UAC parameters, the UE shall performs UAC. The issue is if the UE need to indicate arrivaling of access attempt of the non-SDT data is barred. | Essential? | [NEC] we think If the access attempt for the new UL data is barred, there is no need to indicate the non-SDT arrival to the network. Otherwise the network may transmit RRC setup/resume to the UE, but there is no non-SDT data allowed to be transmitted.[Rapp] Related to the CT1 LS. Wait for the input from CT1. [ZTE] We don’t agree with the understanding that new UAC will be triggered. Non-SDT data indication should be allowed since SRB1 is resumed anyway. We can wait for CT1 reply in any case. Samsung: Agree with ZTE[NEC] The LS to CT1 of last meeting is only about resumeCause, we don’t think the next LS from CT can provide any useful information. The previsou LS reply from CT1 R2-2109308 has already provided answer. The current behavior of UAC is upon receiving UAC parameter from upper layer, the AS layer shall perform UAC, we don’t understand why UAC is not triggered. Note that UAC can be triggered as long as requested by upper layer, even for CONNECTED state UE. For the SDT case, if the new non-SDT data of for which non-SDT radio bearers are not established, the NAS layer will provide UAC to AS, and if the access attempt is barred, it means the corresponding access category/identity are not allowed by the network. Therefore there is no need to indicate non-SDT arrival to network,Xiaomi: Agree with ZTE.Nokia: We should wait CT1 reply. |  |
| Q002 | CG resource request message. UE is allowed to request or indicate the preferred CG resource to network regarding the CG resource configuration. | Essential? | [QC] Indicate UE preferred CG resource to network so that network is able to configure tha appropriate CG resource configuration to UE. Could be either RRC or MAC message or reusing UAI framework.[Huawei]: We agree such knowledge is essential for the network to provide the UE with a properly configured CG-SDT resources. We can reuse the structure from PUR and it can be put, e.g. in UE Assistance info as mentioned by QCM.[Rapp] okay to disucss, but it is not clear that this is essential feature. [LGE] We don’t think this is essential issue. Moreover, we don’t have time to discuss this issue. [ZTE] Agree with LG. Similar comment as above that this is an optimization. We don’t think this is essential.Ericsson:Agree w LG. Also, we think this has been briefly discussed before and was not pursued then.Samsung: Not needed/essential.This has been discussed previously and not agreed.[NEC] agree with LGXiaomi: Not essential.Nokia: Not essential, can be handled by NW implementation |  |
| H002 | RAN 3 during RAN3#114 e discussed how to handle the DL non-SDT data/signalling arrival during SDT procedure. During this discussion they also considered how to trigger UE to re-initiate another RRC Resume procedure, two possible options were discussed in RAN3:- Option 1: Use RAN paging to trigger the following-up RRC resume procedure after UE is moved to Inactive state.- Option 2: Add specific cause value or Indication in RRCRelease message to indicate UE to trigger the follow-up resume procedure.- Option 3: Release with redirection to be used (i.e. the anchor gNB can release the UE and indicate redirection to the target gNB so that the UE immediately preforms new resume without need for paging).  | Essential | Option 2 has a clear advantage that it can1. Eliminate false paging for the other UEs within the cell or RNA and hence is in line with the enhanced powersaving work item which reduces the false paging
2. Eliminates the need to for the anchor/ last serving gNB to to perform paging.
3. Reduces the latency to transfer critical DL non-SDT data by bypassing the paging procedure.

Considering these advantages and very minor update required to include the indication in the RRCRelease message, option 2 should be adopted for the handling DL non-SDT data/signalling arrival during on going SDT procedure while anchoring. So that the UE can initiate a new resume procedure right-away.[Rapp] Ideally we should wait for RAN3 input on this. But if companies want to discuss, then I have added one more option (which needs no changes to the current release message). [LGE] We don’t understand why this is an issue. If DL non-SDT is generated during SDT procedure, the network can send RRCResume or RRCSetup to the UE to move the UE to RRC\_CONNECTED.[ZTE] We don’t think this is essential. There may be some optimization possible for the case of no anchor relocation, but we think existing options work equally fine (i.e. option 1 and option 3) – these will require no changes and are sufficient. Ericsson: Agree with LG. Also for the case for no anchor relocation, this seems like a really rare use-case and can be handled already without optimizations.CATT: RAN3 had already discussed how to handle DL non-SDT data/signaling arrival in case of SDT with/without anchor relocation.For DL non-SDT data/signaling arrival in case of SDT with anchor relocation, RAN3 had already agreed that the target gNB (i.e. the receiving gNB) sends the UE to RRC\_CONNECTED state directly by sending the RRCResume message, when the target gNB receives DL non SDT data or signalling from core network during SDT procedure.For DL non-SDT data/signaling arrival in case of SDT without anchor relocation, RAN3 had agreed that in this case the anchor gNB could move the UE back to RRC Inactive by using RRCRelease message during SDT without anchor relocation. Then, the UE should re-initiate a new RRC Resume procedure (i.e. UE will be resumed to RRC\_CONNECTED) for follow-up DL non-SDT data/signalling transmission. However, RAN3 assume both option 1 and option 2 are feasible and request RAN2 to further check the options (LS in R2-2202144).Option 2 has a clear advantage as mentioned by HW:1. Eliminating false paging and power consumption for other UEs within the cell or RNA 2. Eliminates the signaling overhead at Uu and Xn interfaces by avoiding the need for the anchor/ last serving gNB to perform paging.3. Reduces the latency to transfer of (potentially critical) DL non-SDT data by bypassing the paging procedure.And option 2 has minimal impact on specifications.For option 3, we think it is similar as option 2 and specification impact is still needed with option 3. As the UE may not trigger follow-up resume procedure if it doesn’t have any pending UL data/signaling to be transmitted in this SDT procedure, the anchor gNB has to trigger RAN paging to ensure DL non-SDT data/signaling transmission.Hence, we support option 2 to handle DL non-SDT arrival during SDT without anchor relocation. Besides, it is a real case happed in SDT procedure, so we think it is eseential.[NEC] Agree with ZTE the existing options work equally fine (i.e. option 1 and option 3), it can up to network implementation.Xiaomi: Agree with ZTE.Nokia: Agree with LGE, nothing is needed.[Huawei2]: The case described by LGE is not the case that is discussed by RAN3 and described by this issue, which is to handle DL non-SDT data arrivcal in non-anchor relocation case. This now requires the network to send the UE to RRCRelease and then send Paging to it (RRCResume cannot be sent directly). As clarified above by CATT and by us, this is very inefficient from both UE (power consumption is impacted for both SDT UE and other UEs monitoring Paging) and network perspective ( additional overhead due to Paging) as well as for overall performance (delay to non-SDT data, which is very likely to be more important than SDT data). Since the solution is extremely simple, we think we should support it. |  |
| H003 | When the UE is configured with SDT Configuration, only non time critical procedures such as UE initiated LCS can be transferred while the UE remains in RRC\_INACTIVE. For the transmission of other type of time critical NAS messages such as emergency call establishment, PDU session establishment/ modification, the UE should first transition to RRC\_CONNECTED state and then transfer these NAS Message in RRC\_CONNECTED State.When the UE is configured with SDT Configuration, the NAS layer needs to indicate to RRC layer whether the UL NAS message can be transmitted in RRC\_INACTIVE state or not. | Essential  | When the UE is configured with SDT Configuration, Time critical NAS procedures signaling such as emergency call establishment, MO-MMTEL-voice/video-call initiation, establishment/modification of a new/existing PDU session, should not be initiated using SDT Mechanism in INACTIVE State as the SDT procedure will have to be terminated and the UE will have to be transitioned to RRC\_CONNECTED State in the middle of the NAS procedure followed by a RRCReconfiguration procedure needed for DRB establishment/ reconfiguration which will cause additional delay that will not be acceptable for high priority call such as an emergency call.Furthermore, if these time critical NAS procedure is initiated using RACH based SDT procedure and if the last gNB decides to anchor the SDT session, the last serving gNB will then have to release the UE to RRC INACTIVE and the whole NAS procedure will have to be started again in the receiving gNB from the beginning after the UE context is relocated from the last serving gNB.[Rapp] Can discuss. But if SRB2 is configured then NAS procedures will be allowed and if it is not configured, then non-SDT data indication will be needed. So, seems nothing more is needed. [ZTE] We don’t think it is essential. If SRB2 is not configured for SDT then non-SDT data procedure will be invoked automatically. If there is a pending NAS procedure when the UE is released, NAS will trigger another resume procedure automatically. We don’t think any other mechanism is necessary to optimize this. Ericsson: Agree with ZTE.Samsung: Agree with ZTEXiaomi: Agree with ZTE.Nokia: Time critical NAS procedures signaling such as emergency call establishment should trigger regular Resume procedure instead of SDT procedure. If SDT procedure is already ongoing new resume procedure needs to be initiated for critical NAS procedures.[Huawei2]: The problem is that in case we treat all NAS procedures in the same way, then we will have an major issue, e.g. for emergency/high priority data, especially in case of RA procedure with no anchor relocation. I.e. if the NAS procedure was, e.g. to initiate an emergency call, the network will only realize this while SDT is ongoing and the network will have to release the UE to RRC INACTIVE and make it establish a new connection (according to one of the options in H002 for example). Effectively it would mean that emergency/high priorty will always fail at a very late stage (at the time of DRB establishment) when the SDT session is anchored. This will cause extensive delays and have a big impact on emergency/high priorty traffic handling as the whole NAS and DRB establishment procedure for emergency call will have to be repated again after the new connection is established and UE context is relocated. The overall time delay for a Rel 17 UE to establish an emergency call during the ongoing SDT session will be significantly worse than the legacy UE which is rather unacceptable from the viewpoint of such services. |  |
| H004 | How to handle CG-SDT configuration upon RRCReject reception  | Optimisation? | Currently, MAC reset will be performed when UE receives RRCReject. Then, CG-SDT configurations will be released if we consider the cg-sdt-TAT to be expired, but that is not necessary, so the behaviour upon RRCReject reception should be modified to allow the UE to keep CG-SDT configuration as it can be still valid for the next resume attempt.[Rapp]: Seems optimization (since UE Can use RA-SDT anyway for next resume). CG is not mandatory. But companies can comment on the proposed option. [NEC] We have concerned on the security key reuse issue.After reception of RRCRecject during SDT, if UE initiates a second RRC Resume procedure later in the same cell, the same security key will be generated and PDCP COUNT value will be reset, but the packtes can be different. However, ciphering different packtets using same key same COUNT value is not allowed. At RAN2 #115e, in EDT session, it was agreed that “RAN2 assumes that UE should avoid a consecutive EDT or PUR transmission with a different payload but same security key”. So we also need to address this issue in SDT.[LGE] This proposal is an optimization. It would be simple to just follow legacy behavior.[ZTE] With regards to HW comment, our understanding is that CG resources at RRC level are not released in this case (of course MAC reset will clear any MAC level UL grants). So, we agree with HW comment, but we think this is automatically guaranteed. With regards to NEC comment, we think the issue is not new and we can follow the EDT approach i.e. legacy behaviour as LG points out. Agree with ZTE.Samsung: Agree with ZTE[NEC] For the security issue after a second resume procedure after RRC reject, we don’t understand how does “legacy behavior” can solve the key stream reuse issue. Can companies think the legacy hehavior is OK can explain how does it solve the problem? For EDT, to solve the issue, “RAN2 assumes that UE should avoid a consecutive EDT or PUR transmission with a different payload but same security key”, do you mean SDT also follow this?Xiaomi: Agree with ZTE.Nokia: It seems reasonable to release the resources in case of RRCReject, hence, we can keep the current principles.[Huawei2]: As calrified in Z012, we acknowledge te issue from NEC, so probably the UE should go to IDLE when receving an RRCReject for SDT connection attempt. Or we can just clarify RRCReject is not used for SDT access attempt actually. |  |
| H005 | It needs to be clarified in specs which of the configurations stored in UE AS INactive context the UE uses when performing SDT | Essential | At least PDCP and RLC contexts have to be used, but we also agreed to reuse some MAC level configuration, e.g. LCH restrictions.[ZTE] We agree to clarify this. However, LCH restrictions are LCH level configuration (i.e. in LogicalChannelConfig). So, these are stored in the UE SDT configuration in AS context in INACTIVE.Xiaomi: Agree with ZTE.Nokia: Needs to be clarified. |  |
| H006 | How to configure CG to LCH mapping restrictions for SDT. | Essential | For LCH restrictions, it should also be clarified that at least LCH to CG mapping from inactive context cannot be used and we should have a separate LCH to CG mapping for SDT.It may also be handled as part of UP issues.[Rapp] please see the current implementation in the running CR and comment. [ZTE] In the current implementation separate LCH restrictions for CG is allowed to be configured by the network. We think this is sufficient. Nokia: We have agreed these follow the legacy signaling.[Huawei2]: The proposal in the running CR looks OK to us. We will just have to clarify the the CG index refers to the CG SDT configurations in the field description, to avoid any confusion. |  |
| H007 | How is the RSRP used for SDT threshold evaluation derived exactly. | Essential | Clarify that cell level RSRP of the downlink pathloss reference, as specified in TS 38.331 section 5.3.3.3, is used (a) to select between SDT and non-SDT procedure and; (b) to select an UL carrier for SDT transmission.[Rapp] should this be in MAC or RRC?[ZTE] we agree with the general comment above from Huawei. We think it is already clear in MAC spec though??[Samsung]: We do not agree to clarify as suggested by HW.‘The RSRP of the downlink pathloss reference’ is used for carrier selection as specified in TS 38.321 in R15/16. We have also agreed to apply the same for SDT/Non SDT procedure selection. Xiaomi: We are open to clarify the RSRP. However as indicated by Samsung, “the RSRP of the downlink pathloss reference” seems sufficient since Rel-15.Nokia: Ok to clarify which RSRP is used[Huawei2]: You are right this should probably be captured in MAC specifications. But we can gather views here as the issue is not part of UP open issues. |  |
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# Conclusion and proposals

# References

1. R2-2201664, Report for Rel-17 Small data, URLLC/IIoT and RACH partitioning

# Annex (contact details for email discussions)

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