3GPP TSG-RAN WG2 Meeting #119-e ***R2-22xxxxx***

Electronic Meeting, August 17 – 29, 2022

**Agenda item:** 5.3.3

**Source: Huawei, HiSilicon**

**Title:** Summary of [AT119-e][302][Sdata] UP open issues and CR to 38.321 (Huawei)

**Document for:**  Discussion

# 1. Introduction

This document summarizes the following email discussion:

* [AT119-e][302][Sdata] UP open issues and CR to 38.321 (Huawei)

UP open issues and CR capturing agreed corrections

Deadline: To be set by rapporteur aiming to have company inputs and proposals by Friday

##### References:

*2-stepRACH during CG-SDT*

[R2-2207004](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207004%C2%A0.zip) Issues for RA during CG-SDT procedure Samsung Electronics Co., Ltd     discussion Rel-17    NR\_SmallData\_INACTIVE-Core

[R2-2207359](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207359%C2%A0.zip) cg-SDT-TimeAlignmentTimer maintenance during 2-step RA   Langbo   CR  Rel-17 38.321    17.1.0     1311       -      F NR\_SmallData\_INACTIVE-Core

[R2-2208266](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2208266.zip) Correction on CG-SDT Transmisson vivo CR Rel-17 38.321 17.1.0 1377 - F NR\_SmallData\_INACTIVE-Core Late

*LCH-restriction for CG-SDT*

[R2-2207901](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207901%C2%A0.zip) LCH restrictions at SDT mode selection Nokia, Nokia Shanghai Bell, Ericsson, Huawei, HiSilicon, LGE CR  Rel-17    38.321 17.1.0     1351       -      F NR\_SmallData\_INACTIVE-Core

[R2-2208117](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2208117%C2%A0.zip) LCH restrictions for CG-SDT       Ericsson discussion     Rel-17 NR\_SmallData\_INACTIVE-Core

*cg-SDT-TAT maintenance after receiving TAC MAC CE*

[R2-2207930](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207930%C2%A0.zip) TAT maintenance for CG-SDT when receiving TAC MAC CE Huawei, Ericsson, HiSilicon, Nokia, Nokia Shanghai Bell, ZTE corporation    discussion     Rel-17 NR\_SmallData\_INACTIVE-Core

*CG-SDT retransmission on different CG configuration*

[R2-2207902](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207902%C2%A0.zip) MAC procedure issues Nokia, Nokia Shanghai Bell CR  Rel-17    38.321    17.1.0 1352       -      F NR\_SmallData\_INACTIVE-Core

[R2-2207571](file:///C%3A%5CUsers%5Cadmin%5Cdocs%5CR2-2207571.zip) Correction on SSB selection for CG-SDT        LG Electronics Inc.      discussion          NR\_SmallData\_INACTIVE-Core

[R2-2207572](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207572.zip)       CR for correction on SSB selection for CG-SDT     LG Electronics Inc.             CR        Rel-17   38.321  17.1.0   1325     -            F           NR\_SmallData\_INACTIVE-Core

*HARQ-Offset*

[R2-2207416](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207416.zip) Analysis on remaining issues for SDT CATT discussion Rel-17 NR\_SmallData\_INACTIVE-Core

*RSRP-based TA validation*

[R2-2207929](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207929.zip) Text Proposal for RSRP-based TA validation Huawei, HiSilicon discussion Rel-17 NR\_SmallData\_INACTIVE-Core

*cg-SDT-Timer handling*

[R2-2207001](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207001.zip) cg-SDT-TimeAlignmentTimer Handling Samsung Electronics Co., Ltd discussion Rel-17 NR\_SmallData\_INACTIVE-Core

*Editorials*

[R2-2208356](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2208356.zip) Correction on SR delay timer ASUSTeK discussion Rel-16 NR\_SmallData\_INACTIVE-Core

[R2-2207360](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207360%C2%A0.zip) cg-SDT-TimeAlignmentTimer handling for RA-SDT Langbo   CR  Rel-17    38.321 17.1.0     1312       -      F NR\_SmallData\_INACTIVE-Core

[R2-2207815](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207815.zip) Correction on the stored RSRP for TA validation Xiaomi draftCR Rel-17 38.321 17.1.0 F NR\_SmallData\_INACTIVE-Core

*Issues have been dicsused before*

[R2-2208660](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2208660.zip) Clarification on uci-onPUSCH for CG-SDT vivo CR Rel-17 38.331 17.1.0 3462 - F NR\_SmallData\_INACTIVE-Core

[R2-2207573](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207573.zip) Clarification of Bj increment LG Electronics Inc. discussion NR\_SmallData\_INACTIVE-Core

[R2-2207906](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207906.zip) User plane issues for SDT NEC discussion Rel-17 NR\_SmallData\_INACTIVE-Core

# 2. Discussion

## 2.1 LCH restriction

[R2-2207901](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207901%C2%A0.zip) LCH restrictions at SDT mode selection Nokia, Nokia Shanghai Bell, Ericsson, Huawei, HiSilicon, LGE CR  Rel-17    38.321 17.1.0     1351       -      F NR\_SmallData\_INACTIVE-Core

[R2-2208117](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2208117%C2%A0.zip) LCH restrictions for CG-SDT       Ericsson discussion     Rel-17 NR\_SmallData\_INACTIVE-Core

R2-2207901 proposes the following two options

**OptionA**

|  |
| --- |
| 2> if CG-SDT is configured on the selected UL carrier, and TA of the configured grant Type 1 resource is valid according to clause 5.27.2; and2> if, for each RB having data available for transmission, *configuredGrantType1Allowed* is configured with value *true* for the corresponding logical channel; and2> if at least one SSB configured for CG-SDT with SS-RSRP above *cg-SDT-RSRP-ThresholdSSB* is available:3> indicate to the upper layers that the conditions for initiating SDT procedure are fulfilled;3> perform CG-SDT procedure on the selected UL carrier according to clause 5.8.2. |

**OptionB**

|  |
| --- |
| 2> if CG-SDT is configured on the selected UL carrier, and TA of the configured grant Type 1 resource is valid according to clause 5.27.2; and2> if, for at least one RB having data available for transmission, *configuredGrantType1Allowed* is configured with value *true* for the corresponding logical channel; and2> if at least one SSB configured for CG-SDT with SS-RSRP above *cg-SDT-RSRP-ThresholdSSB* is available:3> indicate to the upper layers that the conditions for initiating SDT procedure are fulfilled;3> perform CG-SDT procedure on the selected UL carrier according to clause 5.8.2. |

**Moderator's Comments:**

The change only considered the case when the field *configuredGrantType1Allowed* is configured while does not consider the case when the LCH restriction is not applied. It also needs to consider the case when the field is not configured or the UE does not have the UE capability for LCH restriction. These issues can be fine-tuned during the CR review if companies think the change is needed.

**Question 1:** Do you agree with the proposed changes in R2-2207901 for adding LCH restriction can condition for SDT type selection? If yes, which option do you prefer?

|  |  |  |  |
| --- | --- | --- | --- |
| Company | Yes/No | Option A or B | Comments |
| LG | Yes | A > B | proponent |
| ZTE | No | - | It should be kept in mind that the CG-SDT resource is a dedicated resource. If the UE has any data and a valid dedicated resource, it should use it. This is the common principle that we use. Otherwise, the dedicated resources are are wasted. Even if the LCH restrictions prevent that all UP data can be mapped to CG resource, the UE still has data in the CCCH message which can be mapped to the CG resource. If the UE does not use the CG resource, then not only the dedicated resource is wasted, but the UE also consumes RACH, RAR, MSG3 resources all of which are redundant (since it can directly send the CCCH message in the dedicated CG resource using the valid TA instead). So, we think that the proposed change results in suboptimal performance and wastes the system resources. We also think that the CG resource should only be configured for applications that are reasonably guaranteed to generate periodic traffic at known intervals. If there are too many CG occasions where no traffic is generated, then CG-SDT is not suitable for such application anyway.  |
| Huawei, HiSilicon | Yes | A |  |
| Sony | Yes | A |  |
| Lenovo | Yes | B |  |
| Langbo | Yes | A | Agree with Moderator's Comments, the case when configuredGrantType1Allowed is not configured should also be captured. |
| Google | Yes | A |  |
| OPPO | Yes | A |  |
| NEC | No | - | Agree with ZTE. It is a waste of CG resource if it is configured but not used. |
| Sharp | Yes | A |  |
| Intel | Yes (with comment) | Slightly preferto B | The scenario discussed by ZTE was never discussed during the WI phase. However we see the benefit of using a CG for CCCH to initiate SDT when the corresponding bearer is restricted from using CG. With this approach, the UE avoids initiating RACH. The open question is whether SDT procedure can be initiated by only sending CCCH msg in the CG resource (i.e. without multiplexing any SDT data in this 1st UL SDT).  |
| CATT | No | - | This issue is similar to the issue that whether to add restriction to CG resource and a specific DRB ID, the answer is no. The CG will be configured by network based on traffic pattern, this means the CG resource will be not wasted and will be guaranteed by network as much as possible.We think some DRB/SRB data may be overlapped at some time and cannot be predicted very accurately, there is some randomness in the real world. So it is not right to restrict a CG configuration to a specific logical channel(s). Anytimes there is SDT data, it could be transmitted in the CG resource without restriction on logical channel.Generally, the network could configure the *configuredGrantType1Allowed* with value true for all logical channel for SDT, this is a kind of network implementation. |
| Nokia | Yes | Option A first, then Option B | Proponent. Without such condition, there seems to be no use case to ever configured *configuredGrantType1Allowed* restriction for any logical channel. |
| Qualcomm | Yes | A |  |
| InterDigital | Yes | B | If the *configuredGrantType1Allowed* configuration is kept after all, might as well have it useful to differentiate which DRBs can use the SDT CG. |
| Apple | Yes | A | A would be easier than B from UE implementation perspective.  |

## 2.2 TAT for CG-SDT when receiving TAC MAC CE

[R2-2207930](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207930%C2%A0.zip) TAT maintenance for CG-SDT when receiving TAC MAC CE Huawei, Ericsson, HiSilicon, Nokia, Nokia Shanghai Bell, ZTE corporation    discussion     Rel-17 NR\_SmallData\_INACTIVE-Core

**Reason for change:**

 **Issue1:** In terms of configuration, there is no dedicated configuration for the UE in RRC\_INACTIVE for TimeAlignmentTimer. There is TAT configuration in SIB1 but it is generally targeted for the use of TAT during initial access. It thus should be further confirmed on the TAT configuration

 **Issue2**: When TAT expires, it is possible that the UE is still within the CG-SDT procedure with running cg-SDT-TimeAlignmentTimer. While, when the timer expires, the following will happen. All the HARQ buffers of the UE will be cleared and configured grant resource will be discarded. This is not the intended UE behavior.

**Summary of change:**

|  |
| --- |
| 5.2 Maintenance of Uplink Time AlignmentRRC configures the following parameters for the maintenance of UL time alignment:- timeAlignmentTimer (per TAG) which controls how long the MAC entity considers the Serving Cells belonging to the associated TAG to be uplink time aligned;- inactivePosSRS-TimeAlignmentTimer which controls how long the MAC entity considers the Positioning SRS transmission in RRC\_INACTIVE in clause 5.26 to be uplink time aligned;- cg-SDT-TimeAlignmentTimer which controls how long the MAC entity considers the uplink transmission for CG-SDT to be uplink time aligned.The MAC entity shall:1> when a Timing Advance Command MAC CE is received, and if an NTA (as defined in TS 38.211 [8]) has been maintained with the indicated TAG:2> apply the Timing Advance Command for the indicated TAG;2> if inactivePosSRS-TimeAlignmentTimer is configured and there is ongoing Positioning SRS Transmission in RRC\_INACTIVE as in clause 5.25:3> start or restart the inactivePosSRS-TimeAlignmentTimer associated with the indicated TAG.2> if CG-SDT procedure triggered as in clause 5.27 is ongoing:3> start or restart the cg-SDT-TimeAlignmentTimer associated with the indicated TAG.2> else:3> start or restart the *timeAlignmentTimer* associated with the indicated TAG. |

**Question 2:** Do you agree that Legacy TAT is not started/restarted when TAC MAC CE is received during CG-SDT procedure?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| LG | No | This issue was discussed several times before, and RAN2 agreed to start/restart the legacy TAT when TAC MAC CE is received. We don’t see critical reason to revert the previous agreement.Moreover, if the legacy TAT is not started/restarted, we are wondering how the UE behaves after receiving RRCResume message. Note that the network can send RRCResume message anytime during the CG-SDT procedure. As the UE stops CG-SDT-TAT at the reception of RRCResume message, and the legacy TAT is not running, the UE cannot transmit the RRCResumeComplete message. |
| ZTE | Yes |   |
| Xiaomi | No |  |
| Huawei, HiSilicon | Yes | No need to keep two timers |
| Lenovo | Yes |  |
| Langbo | Yes |  |
| Google | Yes | To resolve the issue raised by LG, the network can send a TAC MAC CE together with the *RRCResume* message to trigger the UE to start the *timeAlignmentTimer* (i.e., the else branch). The UE stops the ongoing CG-SDT procedure upon receiving the RRCResume message and starts the *timeAlignmentTimer* upon receiving the TAC MAC CE.[LG] If a MAC PDU including TAC MAC CE and RRCResume message is received, the MAC entity does not start the legacy TAT because CG-SDT procedure is ongoing and RRCResume message is not decoded yet. Only after the RRCResume message is decoded, the UE can stop the ongoing CG-SDT procedure. |
| OPPO | Yes |  |
| NEC | Yes |  |
| Sharp | Yes |  |
| Intel | No - see comment | We understand companies concern of having to TAT and CG-SDT-TAT. However, if we decided not to (re)start legacy TAT during SDT, we wonder how it would work for the following cases:* Case 1) when UE is resumed from an ongoing SDT session as it was also explained by LG.
* Case 2) when the UE with a CG-SDT session ongoing exchanges data via DG (i.e. RACH for SR) after CG occasions become invalid (e.g. RSRP delta condition is not met). For this case 2, our understanding is that the UE should be able to continue CG-SDT session via DG and if so, legacy TAT would be used as CG-SDT-TAT is mainly tied with the usage of the corresponding CG occasions.

A potential issue pointed out in the Tdoc of using legacy TAT during SDT was that UE needs to use the value from SIB1. We understand that this is the case as UE does not restore the UE AS Inactive context fully (i.e., previous configuration of TAT value is not restored). However we do not see using the SIB value as an issue understanding that SDT sessions are meant to be short in order to get the most benefit e.g. on UE’s power saving.If majority of companies prefer not having legacy TAT running during normal SDT, we understand the two cases above would require some discussion. |
| CATT | Yes |  |
| Nokia | Yes |  |
| Qualcomm | Yes | No need to keep two timers.  |
| InterDigital | No | Agree with Intel and LG |
| Apple | Yes | One timer is sufficient.  |

## 2.3 2-step RACH during CG-SDT

[R2-2207004](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207004%C2%A0.zip) Issues for RA during CG-SDT procedure Samsung Electronics Co., Ltd     discussion Rel-17    NR\_SmallData\_INACTIVE-Core

[R2-2207359](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207359%C2%A0.zip) cg-SDT-TimeAlignmentTimer maintenance during 2-step RA   Langbo   CR  Rel-17 38.321    17.1.0     1311       -      F NR\_SmallData\_INACTIVE-Core

[R2-2208266](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2208266.zip) Correction on CG-SDT Transmisson vivo CR Rel-17 38.321 17.1.0 1377 - F NR\_SmallData\_INACTIVE-Core Late

The issue with the current spec is that SR can sent with 2-step RACH during CG-SDT procedure, while the current RACH procedure has not considered this scenario. The following text proposal has been given in both 7004 and 7359.

|  |
| --- |
| 2> if the C-RNTI MAC CE was included in MSGA:3> if the Random Access procedure was initiated for SpCell beam failure recovery or for beam failure recovery of both BFD-RS sets of SpCell (as specified in clause 5.17) and the PDCCH transmission is addressed to the C-RNTI:4> consider this Random Access Response reception successful;4> stop the *msgB-ResponseWindow*;4> consider this Random Access procedure successfully completed.3> else if the *timeAlignmentTimer* associated with the PTAG is running; or3> if CG-SDT procedure is ongoing and *cg-SDT-TimeAlignmentTimer* is running:4> if the PDCCH transmission is addressed to the C-RNTI and contains a UL grant for a new transmission:5> consider this Random Access Response reception successful;5> stop the *msgB-ResponseWindow*;5> consider this Random Access procedure successfully completed. |

**Moderators Comments:**

* The TP is correct since the previous condition with legacy *TAT* is running cannot be satisfied during 2-step RACH procedure, although for 4-step RACH, it is possible that the legacy TAT is running between msg2 repcetion and msg4.

**Question 3:** Do companies agree that for msgB reception, if the C-RNTI MAC CE was included in MSGA and if the *cg-SDT-TimeAlignmentTimer* is running and if the PDCCH transmission is addressed to the C-RNTI and contains a UL grant for a new transmission, UE considers Random Access Response reception and random access procedure successfully completed?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| LG | Yes |  |
| ZTE | Yes |  |
| Xiaomi | Yes |  |
| Huawei, HiSIlicon | Yes |  |
| Sony | Yes |  |
| Lenovo | Yes |  |
| Langbo | Yes |  |
| Google | Yes |  |
| OPPO | Yes |  |
| NEC | Yes |  |
| Sharp | Yes |  |
| Intel | Yes |  |
| CATT | Yes |  |
| Nokia | Yes |  |
| Qualcomm | Yes |  |
| InterDigital | Yes |  |
| Apple | Yes |  |

Another issue is how to start the *cg-SDT-TAT* when the 2-step RACH procedure is successful. For this issue, two options have been given

**OptionA in 7004 and 8266:**

|  |
| --- |
| 1> when an Absolute Timing Advance Command is received in response to a MSGA transmission including C-RNTI MAC CE as specified in clause 5.1.4a:2> apply the Timing Advance Command for PTAG;2> start or restart the *timeAlignmentTimer* associated with PTAG.2> if CG-SDT procedure triggered as in clause 5.27 is ongoing:3> start or restart the *cg-SDT-TimeAlignmentTimer* associated with PTAG. |

**OptionB in 7359:**

|  |
| --- |
| 1> when an Absolute Timing Advance Command is received in response to a MSGA transmission including C-RNTI MAC CE as specified in clause 5.1.4a:2> apply the Timing Advance Command for PTAG;2> if the CG-SDT procedure is ongoing:3> start or restart the *cg-SDT-TimeAlignmentTimer* associated with PTAG.2> else3> start or restart the *timeAlignmentTimer* associated with PTAG. |

**Moderator's Comments:**

- Within the two proposals, the TP from 7001 proposes to start both the legacy TAT and cg-SDT-TAT when 2-step RACH is successful. While the TP from 7359 proposes to start only the cg-SDT-TAT.

- For the current spec, for 4-step RACH, when contention resolution is successful, the *cg-SDT-TAT* is started/restarted while the legacy TAT is stopped.

- Hence, if we want to be consistent with the current spec with 4-step RACH, the legacy TAT should not be started when 2-step RACH is successful

**Question 4:** Do you agree that *cg-SDT-TimeAlignmentTimer* should be restarted at successful completion of 2-step RACH? If yes, which option do you prefer?

|  |  |  |  |
| --- | --- | --- | --- |
| Company | Yes/No | OptionA or B | Comments |
| LG | Yes | A | But selection between two options depends on the outcome of Q2. It’s better to align the behavior between 2-step and 4-step RACH. |
| ZTE | Yes | Option B | Prefer to have consistent behaviour with 4-step RACH. |
| Xiaomi | Yes | B | It seems that Option B is more aligned with 4-step RACH. |
| Huawei, HiSlicon | Yes | B |  |
| Lenovo | Yes | B |  |
| Langbo | Yes | B | As mentioned by the moderator, it is already specified that the CG-SDT-TAT is (re)started while the Legacy TAT is stopped for 4-step RACH. We prefer to keep it consistent with 4-step RACH. In addition, (re)start both the Legacy TAT and CG-SDT-TAT here will result in the issues listed in Question 2. |
| Google | Yes | B |  |
| OPPO | Yes | B |  |
| NEC | Yes | B |  |
| Sharp | Yes | B |  |
| Intel | Yes | B |  |
| CATT | Yes | B |  |
| Nokia | Yes | Option B |  |
| Qualcomm | Yes | B |  |
| InterDigital | Yes | B |  |
| Apple | Yes | B |  |

## 2.4 CG-SDT timer handling

[R2-2207001](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207001.zip) cg-SDT-TimeAlignmentTimer Handling Samsung Electronics Co., Ltd discussion Rel-17 NR\_SmallData\_INACTIVE-Core

As shown in the following figure, *cg-SDT-TimeAlignmentTimer* can expire even before the UE has transmitted the initial UL transmission including CCCH message. This can happen due to longer CG periodicity and the longer interval between the time RRC Release message is received and CG-SDT procedure initiation.

The consequence of this is that UE will enter RRC\_IDLE.

If UE has checked whether there is sufficient time available to transmit the initial UL transmission using CG resource before the cg-SDT-TimeAlignmentTimer expires, the problem could have been avoided as UE could have initiated RA-SDT instead of CG-SDT.



**Potential Solution:**

* Before initiating CG-SDT UE can check for the availability of CG occasion corresponding to a SSB with SS-RSRP above *cg-SDT-RSRP-ThresholdSSB* during the remaining time of cg-SDT-TimeAlignmentTimer. If CG occasion is not available during the remaining time of cg-SDT-TimeAlignmentTimer, UE does not initiate CG-SDT.

**Moderator's Comments:**

- it seems impossible to predict whether there is any SSB above the RSRP threshold during the remaining time of *cg-SDT-TimealignmentTimer*, unless the UE stops the transmission and wait for the timer to expire.

**Question 5:** Do you agree that before initiating CG-SDT UE checks for the availability of CG occasion corresponding to a SSB with SS-RSRP above cg-SDT-RSRP-ThresholdSSB during the remaining time of cg-SDT-TimeAlignmentTimer. If CG occasion is not available, UE does not initiate CG-SDT?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| LG | Comments | We think this issue can be solved by UE implementation. However, if companies want to clarify, we are ok to have a note something like “the UE may not initiate CG-SDT procedure if the CG occasion is not available during the remaining time of cg-SDT-TimeAlignmentTimer”. |
| ZTE | May be No | The intention is fine. However, it can be covered in the highlighted sentence (i.e. “TA of the configured grant Type 1 resource is valid” refers to the TA is valid in the occasion of the CG type 1 resource).If majoritiy companies think clarification is needed, then maybe we can try the clarification as follow2> if CG-SDT is configured on the selected UL carrier, and TA of the configured grant Type 1 resource is valid in the corresponding CG occasion according to clause 5.27.2; and |
| Xiaomi | Yes |  |
| Huawei, HiSilicon | No | Not possible to know whether there are SSBs above the thresholds |
| Sony | May be No | Agree with Huawei, taking into account the remaining time, how UE will know there will be an available SSB(s) above the threshold as measurement is not done yet? The obvious answer is not possible. But we are fine ZTE suggestion. |
| Lenovo | No | This case shouldn’t happen with proper NW configuration |
| Langbo | Comment | It may be a corner case. |
| Google | No | Agree with Huawei |
| OPPO | No |  |
| NEC | No | The channel condition could change from time to time, so it is not possible to determine whether the CG is available during the remaining CG-SDT TAT timer. |
| Sharp | No | We think the clarification from ZTE could be helpful. |
| Yes | See comment | We share the view of ZTE that the intended behaviour should be as explained by Samsung. In our understanding, a good UE implementation would check whether next CG resource is valid or not to initiate CG-SDT, and if it is not, the UE is allowed to initiate RA-SDT or legacy resume (instead of transitioning autonomously to IDLE). |
| CATT | No | We agree with HW. |
| Nokia | Yes | The evaluation of SSBs can be done when the procedure initiation is being performed and check if there is CG occasion available corresponding to such SSBs before TAT expiry. If not, should directly go to RA-SDT. |
| Qualcomm | No | It can be left for UE implementation to check whether next CG occasion is valid or not to initiate CG-SDT before CGTAT timer expiry. But no need to capture anything. |
| InterDigital | No | Seems like this is a UE implementation issue. This can be avoided by configuration of the timer to align with CG occasions. |
| Apple | No | It’s not easy for UE to predict the situation of the next CG occasion which is located far away.  |

## 2.5 TA validation for CG-SDT

[R2-2207929](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207929.zip) Text Proposal for RSRP-based TA validation Huawei, HiSilicon discussion Rel-17 NR\_SmallData\_INACTIVE-Core

This contribution discusses two issues related to TA validation for CG-SDT:

Issue1: currently the MAC spec captures the TA validation condition as follows:

|  |
| --- |
| 5.27.2 TA Validation for CG-SDTRRC configures the following parameters for validation for CG-SDT:*- cg-SDT-RSRP-ChangeThreshold*: RSRP threshold for the increase/decrease of RSRP for time alignment validation.The MAC entity shall, upon the reception of CG-SDT configuration:1> store the RSRP of the downlink pathloss reference derived based on the *measObject* configured for the Serving Cell as in TS 38.331 [5].The MAC entity shall consider the TA of the initial CG-SDT transmission with CCCH message to be valid when the following conditions are fulfilled:1> The RSRP values for the stored downlink pathloss reference and the current downlink pathloss reference are valid according to TS 38.133 [11]; and1> Compared to the stored downlink pathloss reference RSRP value, the current RSRP value of the downlink pathloss reference calculated as specified in TS 38.133 [11] has not increased/decreased by more than *cg-SDT-RSRP-ChangeThreshold*, if configured; and1> *cg-SDT-TimeAlignmentTimer* is running. |

This means that whenever the UE receives the CG-SDT configuration in RRCRelease message, the UE shall derive the pathloss reference based on the measObject. However, for the current RRC spec, only when the UE is released from RRC\_CONNECTED to RRC\_INACTIVE, the UE has the measObject configuration.

The proponent thinks that measObject configuration can be restored from the UE AS context when the CG-SDT configuration is received. The following text proposal has been given:

|  |
| --- |
| 1> if the RRCRelease includes suspendConfig:2> reset MAC and release the default MAC Cell Group configuration, if any;2> apply the received suspendConfig except the received nextHopChainingCount;2> if the sdt-Config is configured:3> for each of the DRB in the sdt-DRB-List:4> consider the DRB to be configured for SDT;3> if sdt-SRB2-Indication is configured:4> consider the SRB2 to be configured for SDT;3> for each RLC bearer that is not suspended:4> re-establish the RLC entity as specified in TS 38.322 [4];3> for SRB2 (if it is resumed) and for SRB1:4> trigger the PDCP entity to perform SDU discard as specified in TS 38.323 [5];3> if sdt-MAC-PHY-CG-Config is configured:4> restore the *measObject* configuration for the serving cell within the UE's Inactive AS context;4> if *sdt-MAC-PHY-CG-Config* was not configured before the reception of the RRCRelease message:5> configure the PCell with the configured grant resources for SDT and instruct the MAC entity to start the cg-SDT-TimeAlignmentTimer; |

**Question 6:** Do you agree that the measObject configuration should be restored when the UE derives the pathloss reference upon receiving CG-SDT configuration?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| LG | No | We think the linkage to “measObject” should be removed. This is aligned with the last meeting agreement.1. For RSRP-based TA validation that there is no need for a condition for “if measObject is configured”

Please note that positioning SRS transmission case 5.26.2 does not have such linkage to “measObject”.The MAC entity shall:1> if the UE receives configuration for SRS transmission in RRC\_INACTIVE:2> store the RSRP of the downlink pathloss reference with the current RSRP value of the downlink pathloss reference as in TS 38.331 [5]. |
| ZTE | No | For the CG SDT without cell change, we can assume the measurement object is always here.However, if RRC release is sent after cell reselection and RA-SDT, then it is possible that there is no measurement object for current serving cell since UE has never enter connected mode in current serving cell. |
| Xiaomi | No | We think that the measurement object is only used for the UE to store the RSRP when the release message is received, so that the UE does not use other RSRPs from other measurement objects (e.g. neighbour frequency). In the subsequent SDT procedure, the measurement object is not used. The current specification seems fine. |
| Huawei, HiSilicon | Yes | The issue is that, with the removal of the previous condition, the pathloss reference is always derived with the measObject configuration. But there is no measObject configuration when the UE receives the CG config in RRC\_INACTIVE. So, it has to be restored from the UE’s AS context. |
| Lenovo | No |  |
| Langbo | No |  |
| Google | No | Agree with Xiaomi |
| OPPO | No |  |
| NEC | No |  |
| Sharp | No |  |
| Intel | Not sure | We have sympathy for Huawei’s concern that measObject config. is not considered restored when UE is in RRC\_INACTIVE and needs to check the RSRP (i.e. before CG-SDT session starts and during a CG-SDT session). We are open to discuss this issue further and find an agreeable solution that specifies the expected UE behaviour.  |
| CATT | No |  |
| Nokia | No | Agree with LG |
| Qualcomm | No |  |
| InterDigital | No |  |
| Apple | No | Agree with Xiaomi |

Another issue, according to the current RRC spec, whenever *sdt-MAC-PHY-CG-Config* is received, the UE shall trigger the lower layer to start or restart the *cg-SDT-TimeAlignmentTimer*. This is needed for two cases: (a) when the UE is released from RRC\_CONNECTED to RRC\_INACTIVE; (b) when the UE is in RRC\_INACTIVE and it receives CG-SDT configuration by RRCRelease message. Hence, the UE should start the CG-SDT TAT when the CG-SDT configuration is initially received

For this issue, the following text proposal has been given:

|  |
| --- |
| 1> if the RRCRelease includes suspendConfig:2> reset MAC and release the default MAC Cell Group configuration, if any;2> apply the received suspendConfig except the received nextHopChainingCount;2> if the sdt-Config is configured:3> for each of the DRB in the sdt-DRB-List:4> consider the DRB to be configured for SDT;3> if sdt-SRB2-Indication is configured:4> consider the SRB2 to be configured for SDT;3> for each RLC bearer that is not suspended:4> re-establish the RLC entity as specified in TS 38.322 [4];3> for SRB2 (if it is resumed) and for SRB1:4> trigger the PDCP entity to perform SDU discard as specified in TS 38.323 [5];3> if sdt-MAC-PHY-CG-Config is configured:4> restore the *measObject* configuration for the serving cell within the UE's Inactive AS context;4> if *sdt-MAC-PHY-CG-Config* was not configured before the reception of the *RRCRelease* message:5> configure the PCell with the configured grant resources for SDT and instruct the MAC entity to start the cg-SDT-TimeAlignmentTimer; |

**Question 7:** Do you agree to Start/Restart the CG-SDT TAT from RRC’s perspective only when the UE initially receives the CG-SDT configuration in *RRCRelease* message?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| LG | No | RAN2 already agreed to start/restart the CG-SDT-TAT whenever RRCRelease including CG-SDT configuration is received. We don’t see the reason to revert the RAN2 agreement and limit it to only initial transition case. |
| ZTE | No | CG-SDT TAT should be started whenever CG-SDT is configured in RRC release message, even in case delta configuration is used. |
| Xiaomi | No |  |
| Lenovo | No |  |
| Langbo | No |  |
| Google | No | Same view as LG and ZTE |
| OPPO | No |  |
| NEC | No |  |
| Sharp | No |  |
| CATT | No |  |
| Nokia | No | It should be possible to reconfigure, shouldn’t depend on previously configured or not |
| Qualcomm | No |  |
| InterDigital | No |  |
| Apple | No |  |

## 2.6 CG-SDT retransmission on different CG configuration

[R2-2207902](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207902%C2%A0.zip) MAC procedure issues Nokia, Nokia Shanghai Bell CR  Rel-17    38.321    17.1.0 1352       -      F NR\_SmallData\_INACTIVE-Core

The following issue has been mentioned: In section 5.8.2: Since the NW can configure multiple CG configurations for CG-SDT, the NW can utilize different TBS in those different CG configurations and allow, e.g., different sets of LCHs access through certain configurations.

Currently, UE autonomous re-tx is allowed for initial CG-SDT transmission, however, the UE should select only the CG configuration used in the initial transmission to ensure the TBS size for the re-tx is the same as used for the initial transmission.

Based on the above, the following text proposal has been provided:

|  |
| --- |
| For an uplink grant configured for configured grant Type 1 for CG-SDT on the selected uplink carrier as in clause 5.27, when CG-SDT is triggered and not terminated, for each configured uplink grant valid according to TS 38.214 [7] for which the above formula is satisfied, the MAC entity shall:1> if, after initial transmission for CG-SDT with CCCH message has been performed according to clause 5.4.1, PDCCH addressed to the MAC entity's C-RNTI has not been received, and the SSB corresponding to the configured UL grant has the same SSB index as the SSB selected for initial transmission for CG-SDT with CCCH message (i.e., retransmission of initial transmission of CG-SDT); and1> if the configured uplink grant is the same as used for the initial transmission:2> indicate the SSB index corresponding to the configured uplink grant to the lower layer;2> consider this configured uplink grant as valid. |

**Moderator's Comments:**

* If retransmission is allowed on CG resources, it is for sure that the transmission must be performed on the resource with the same transport format. Indeed, this has not been well reflected in the current spec.
* But the current text already has similar part of spec to capture this. In section 5.4.2.2, we have the following spec originally captured for NRU. Hence from the moderator’s point of view it is better to be captured in this part of spec.

|  |
| --- |
| 5.4.2.2 HARQ processEach HARQ process is associated with a HARQ buffer.New transmissions are performed on the resource and with the MCS indicated on PDCCH or indicated in the Random Access Response (i.e. MAC RAR or fallbackRAR), or signalled in RRC or determined as specified in clause 5.1.2a for MSGA payload. Retransmissions are performed on the resource and, if provided, with the MCS indicated on PDCCH, or on the same resource and with the same MCS as was used for last made transmission attempt within a bundle, or on stored configured uplink grant resources and stored MCS when *cg-RetransmissionTimer* or *cg-SDT-RetransmissionTimer* is configured. If *cg-RetransmissionTimer* is configured, retransmissions with the same HARQ process may be performed on any configured grant configuration if the configured grant configurations have the same TBS. |

* Another issues that is worth to be discussed is the definition of “same uplink grant as used for initial transmission”. It can be open to a lot of different interpretations. From the moderator’s point of view, as long as the transport format is the same with the initial transmission and the HARQ process ID are the same, it should be allowed for the UE to transmit on this CG occasion.

**Question 8:** Do you agree that any configured uplink grant with the same transport format and the HARQ process ID as the initial CG-SDT transmission can be used for CG retransmission?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| LG | No | We are wondering why the network configures multiple CG configurations having same TBS with different periodicity using the same HARQ process.Thus, we are ok with Nokia proposal. However, Nokia proposal does not solve the problem where the CG has different SSB index from SSB index for initial CG-SDT, as explained in R2-2207571. Actual change should be discussed together with Q9. |
| ZTE | Yes | It is clear that HARQ retransmission can be performed on any configured grant configuration if the configured grant configurations have the same TBS.However, since we don’t have HARQ ID indicator in UCI, additional restriction may be required that the configured uplink grant is mapped to the same HARQ process as used for the initial CG transmission. For example:1> if, after initial transmission for CG-SDT with CCCH message has been performed according to clause 5.4.1, PDCCH addressed to the MAC entity's C-RNTI has not been received, and the SSB corresponding to the configured UL grant has the same SSB index as the SSB selected for initial transmission for CG-SDT with CCCH message (i.e., retransmission of initial transmission of CG-SDT); and1> if the configured uplink grant is mapped to the same HARQ process as used for the initial transmission: |
| Xiaomi | Yes | Agree with ZTE’s change. |
| Huawei, HiSilicon | Yes | However, on the issue with the same HARQ process, this has already been captured in section 5.4.12> else if the *cg-SDT-RetransmissionTimer* is configured and not running for the corresponding HARQ process;3> if the configured uplink grant is for the initial transmission for the CG-SDT with CCCH message (i.e., initial new transmission); or3> if the *configuredGrantTimer* is not running or not configured, and PDCCH addressed to the MAC entity's C-RNTI has been received after the initial transmission of the CG-SDT with CCCH message (i.e., subsequent new transmission):4> consider the NDI bit to have been toggled;4> deliver the configured uplink grant and the associated HARQ information to the HARQ entity.3> else if the previous uplink grant delivered to the HARQ entity for the same HARQ process was a configured uplink grant for initial transmission of CG-SDT with CCCH message or for its retransmission; and3> if PDCCH addressed to the MAC entity's C-RNTI has not been received (i.e., retransmission for initial CG-SDT transmission):4> consider the NDI bit to have not been toggled;4> deliver the configured uplink grant and the associated HARQ information to the HARQ entity.It is more suitable to capture the restriction for the same transport format at the beginning of section 5.4.2.2 as captured for the legacy NRU spec |
| Sony | Yes | Agree with the change. |
| Lenovo | Yes |  |
| Langbo | Yes |  |
| Google | Yes | The change may be misunderstood that the configured uplink grant and the previously used configured uplink grant are from the same configured grant configuration. To avoid misunderstanding, the change can be revised to “if the configured uplink grant has the same TBS as used for the initial transmission”. |
| OPPO | Yes |  |
| NEC | Yes | As Huawei commented, this is captured in 5.4.1 currently. However, it is a bit strange that a different CG is considered valid, but there is no corresponding handling at 5.4.1. So we are fine with the change in [R2-2207902](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207902%C2%A0.zip)to avoid considering a different CG as valid. |
| Sharp | Yes |  |
| Intel | Yes | OK considering also the suggested update of the TP |
| CATT | Yes |  |
| Nokia | Yes | It just needs to be fixed that UE selects only CG that can be used for re-transmission. It would be simplest to pick the same CG configuration resource, but moderator proposal could also work – likely needs more specification effort, though. |
| Qualcomm | Yes |  |
| InterDigital | Yes | Agree to make it clearer. |
| Apple | Yes |  |

[R2-2207571](file:///C%3A%5CUsers%5Cadmin%5Cdocs%5CR2-2207571.zip) Correction on SSB selection for CG-SDT        LG Electronics Inc.      discussion          NR\_SmallData\_INACTIVE-Core

[R2-2207572](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207572.zip)       CR for correction on SSB selection for CG-SDT     LG Electronics Inc.             CR        Rel-17   38.321  17.1.0   1325     -            F           NR\_SmallData\_INACTIVE-Core

It is mentioend that for retransmission of initial CG-SDT, the intended behaviour is as followings

* If initial CG-SDT has not been Acked and if the SSB corresponding to the CG grant has the same SSB index as the SSB selected for initial CG-SDT, the MAC entity shall indicate the SSB index to lower layer and consider the configured grant as valid.
* If initial CG-SDT has not been Acked and if the SSB corresponding to the CG grant does not have the same SSB index as the SSB selected for initial CG-SDT, the MAC entity does not perform anything.

Currently, however, as long as SS-RSRP of any SSB of CG is above *cg-SDT-RSRP-ThresholdSSB*, the MAC entity always indicates the SSB index of CG and considers the CG is valid.

In RAN2#116-e, RAN2 agreed that the UE is allowed to initiate subsequent UL data transmission only after the reception of confirmation of initial transmission from the gNB. Thus, if the UE has not been received the Ack for initial CG-SDT at CG#1, this behaviour is not reasonable and we don’t think this is the intended behaviour.

Based on the above, the following TP has been provided:

|  |
| --- |
| 1> if, after initial transmission for CG-SDT with CCCH message has been performed according to clause 5.4.1, PDCCH addressed to the MAC entity's C-RNTI has not been received: 2> if the SSB corresponding to the configured UL grant has the same SSB index as the SSB selected for initial transmission for CG-SDT with CCCH message (i.e., retransmission of initial transmission of CG-SDT):3> indicate the SSB index corresponding to the configured uplink grant to the lower layer;3> consider this configured uplink grant as valid. |

**Question 9:** Do you agree to separate conditions checking Ack of initial CG-SDT and checking SSB index as initial CG-SDT’s.

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| LGE | Yes | (We put “if” in front of the separated bullet)If initial CG-SDT has not been Acked and the SSB corresponding to the CG grant does not have the same SSB index as the SSB selected for initial CG-SDT, i.e., yellow condition is met but green condition is not met, the procedure enter into cyan condition. Then, if cyan condition is met, the UE performs magenta procedure. The consequence is that the MAC entity uses wrong CG grant to perform retransmission of the initial transmission.Therefore, the yellow condition and green condition should be checked separatelyAdditionally, above Nokia’s text in Q8 can be considered together with our proposal. |
| ZTE | Yes |  |
| Huawei, HiSilicon | No | No quite necessary. Even if the UE goes to the cyan branch, the two “3>” will not be satisfied and nothing goes wrong The issue has been addressed by Nokia’s TP in [R2-2207902](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207902%C2%A0.zip) by adding the condition “if SSB is selected above”. With the correction below, the spec is correct[LG] This is another method to solve the problem. We agree it also works, but we think our proposal is better, because the original intention is that if the SSB corresponding to the CG grant does not have the same SSB index as the SSB selected for initial CG-SDT, the UE does not need to check the SSB threshold. |
| Lenovo | Yes |  |
| OPPO | Yes |  |
| NEC | No | As HW commented, Nokia’s TP can correct the TS more easily. |
| Sharp | Yes |  |
| Intel | Yes | We are ok with the intention to clarify the related part in the specification, however actual TP (i.e. how it is done) could be discussed during CR review. If we are not mistaken, there were other CRs discussing inter-related updates e.g. P1 in R2-2207416 or TP-4 in R2-2207902. |
| CATT | No | We prefer Nokia’s modification. |
| Nokia | Yes |  |
| Qualcomm | Yes |  |
| InterDigital | Yes | Either TP would be okay. |
| Apple | Yes |  |

R2-2207571 also thinks that the conditions for checking availability of the SSB with SS-RSRP above cg-SDT-RSRP-ThresholdSSB are redundant, and the following TP has been given:

|  |
| --- |
| 1> else if at least one SSB corresponding to the configured uplink grant with SS-RSRP above the *cg-SDT-RSRP-ThresholdSSB* is available:2> if this is the initial transmission of CG-SDT with CCCH message after the CG-SDT procedure is initiated as in clause 5.27 (i.e., initial transmission for CG-SDT):3> select an SSB with SS-RSRP above *cg-SDT-RSRP-ThresholdSSB* amongst the SSB(s) associated with the configured grant.2> else if PDCCH addressed to C-RNTI has been received after the initial transmission of CG-SDT with CCCH message (i.e., subsequent new transmission for CG-SDT):3> if SS-RSRP of the SSB selected for the previous transmission for CG-SDT is above *cg-SDT-RSRP-ThresholdSSB* and this SSB is associated with this configured grant:4> select this SSB.3> else:4> select an SSB with SS-RSRP above *cg-SDT-RSRP-ThresholdSSB* amongst the SSB(s) associated with the configured grant.2> indicate the SSB index to the lower layer;2> consider this configured uplink grant as valid.1> else if PDCCH addressed to C-RNTI after the initial transmission of the CG-SDT with CCCH message has been received:2> initiate Random Access procedure in clause 5.1. |

**Question10:** Do you agree the conditions for checking availability of the SSB with SS-RSRP above cg-SDT-RSRP-ThresholdSSB are redundant?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| LGE | Yes | We think same conditions are checked redundantly. |
| ZTE | Yes |  |
| Xiaomi | Yes |  |
| Huawei, HiSilicon | No | The condition is needed for the final condition “else if PDCCH addressed to C-RNTI after the initial transmission of the CG-SDT with CCCH message has been received”It means that the UE should trigger RACH when none of the SSB is above the threshold, as previously agred.The two conditions are NOT the same. One is for all the SSBs, another is for the SSBs associated with this configured uplink grant[LG] Now I’m more confused. I thought that the UE triggers the legacy RA procedure when none of the SSBs associated with this CG resource is above the threshold. However, according to your explanation, the specification seems to skip the CG and not trigger RA procedure if other SSB is above the threshold. See the below example (CG1 is associated with SSB1 and CG2 is associated with SSB2). My understanding is to trigger RA procedure in the Case 1, 2, and 4. But what you say is to trigger RA procedure only in Case 4.Did we have discussion on this issue? Do we have any agreement on it?I think it is important to have common understandings between companies. |
| Lenovo | No | Agree with Huawei |
| Langbo | No | Agree with HW |
| OPPO | Yes |  |
| NEC | No | The two sentences are not redundant.But we are not sure if UE trigger RA when none of the SSBs configured for CG-SDT is above the threshold or when none of the SSBs associated with certain CG resource is above the threshold. If it is the former case, then there is change the current spec. If it is the latter case, then some change is needed. |
| Sharp | No | Agree with HW |
| Intel | Yes |  |
| CATT | No | When the first condition is not satisfied, the UE initiates RACH procedure. This is different from the second condition. |
| Nokia | No | This would possibly lead to unnecessary RA procedure if there was another configured grant with SSB with SS-RSRP above the threshold available – here, the check is performed only for the given configured grant. |
| Qualcomm | No | Agree with Huawei |
| InterDigital | No | Agree with HW |
| Apple | No | Agree with Huawei |

## 2.7 HARQ offsets

[R2-2207416](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207416.zip) Analysis on remaining issues for SDT CATT discussion Rel-17 NR\_SmallData\_INACTIVE-Core

The above contribution mentioned that in RAN2#116e-meeting [3], it was agreed that:

|  |
| --- |
| 8. The Rel-16 calculation on the HARQ process ID of the CG type-1 for licensed band is reused as the baseline for CG-SDT |

According to the agreement, the HARQ process ID for licensed band is applied for CG-SDT. Then, it should be clarified that *harq-ProcID-Offset* which is used for HARQ process ID calculation in NR-U can’t be used in CG-SDT. Otherwise, it may cause confusion especially.

For the above argument, the following text proposal has been given:



**Moderator's Comments:**

* In R16, *harq-ProcID-Offset* and *harq-ProcID-Offset2* was introduced for NRU and URLLC, respectrively, but with different purposes
* *Harq-ProcID-Offset* was introduced for NRU mainly for the purpose of configuring the CG resources with the same transport format for a certain range of HARQ process id that it allows retransmission on CG resources on these HARQ process id. While from the field description, it seems already clear that the field can only work with CGRT, which already excludes its use in SD.
* *Harq-ProcID-Offset2* was introduced for IIOT for transporting different types of services on different CG resources.

**Question 11:** Do you agree that the field *harq-ProcID-Offset* can be configured for SDT?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| LG | No | It seems that the question is written in opposite way. We think the field harq-ProcID-Offset CANNOT be configured for SDT, as proposed by CATT. |
| ZTE | Yes | Since we allow to configure multiple CG grant (e.g. to allow the configuration of multiple CG occasion within one CG period), the configuration of harq-ProcID-Offset should be allowed. |
| Xiaomi | Yes | Agree with ZTE. |
| Huawei, HiSilicon | Yes | We can configure the CG configs with the same transport format with the same groups of HARQ processes, same as what we didn in NRU |
| Lenovo | No | Same understand as LG |
| OPPO | Yes |  |
| NEC | No | NR-U related feature is not adopted for CG-SDT. And the retransmission of CG-SDT is similar to URLLC. |
| Sharp | Yes |  |
| Intel | See comment | We support CATT’s proposal that the field harq-ProcID-Offset cannot be configured for SDT. If any, we understand that harq-ProcID-Offset2 would be used instead. |
| CATT | No | For *cg-RetransmisionTimer*, it is always configured together with *harq-ProcID-Offset* based on RRC.

|  |
| --- |
| ***cg-RetransmissionTimer***Indicates the initial value of the configured retransmission timer (see TS 38.321 [3]) in multiples of *periodicity*. The value of *cg-RetransmissionTimer* is always less than or equal to the value of *configuredGrantTimer.* This field is always configured together with *harq-ProcID-Offset*. This field is not configured for operation in licensed spectrum or simultaneously with *harq-ProcID-Offset2.* |
|  |

And *harq-ProcId-Offset* is used for HARQ process ID calculation for NR-U. But, NR-U mechanism is not adopted in CG-SDT. So *cg-RetransmissionTimer* as well as *harq-ProcId-Offset* will not be configured in SDT. |
| Nokia | - | Nothing specific is needed to address NR-U or to disallow it. |
| Qualcomm | - | This is related to NR-U. No spec change is needed. |
| InterDigital | Yes | Agree with ZTE |
| Apple | - | It’s related to NR-U, no extra spec effort is expected for the SDT on NR-U. |

## 2.8 Issues have been discussed before

[R2-2207906](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207906.zip) User plane issues for SDT NEC discussion Rel-17 NR\_SmallData\_INACTIVE-Core

At RAN2 #118e, to avoid unnecessary triggering of RA when none of the SSB is above the RSRP threshold for CG-SDT SSB selection, it was agreed that when none of the SSB is above the RSRP threshold for CG-SDT SSB selection, UE triggers legacy SR/RACH only when there is UL data available:

**Agreement of RAN2 #118e**

|  |
| --- |
| 1. When none of the SSB is above the RSRP threshold for CG-SDT SSB selection, UE triggers legacy SR/RACH when there is UL data available
 |

However, the behaviour of checking whether there is UL data available is not captured in the spec:

|  |
| --- |
| 1> else if PDCCH addressed to C-RNTI after the initial transmission of the CG-SDT with CCCH message has been received:2> initiate Random Access procedure in clause 5.1. |

Based on the above, 7906 has provided the following text proposal:

|  |
| --- |
| 1> else if PDCCH addressed to C-RNTI after the initial transmission of the CG-SDT with CCCH message has been received:2> if at least one RB configured for SDT having data available for transmission:3> initiate Random Access procedure in clause 5.1. |

**Question 12:** Do you agree that the proposed changes in R2-2207906 is needed to add “at least one RB configured for SDT having data available for transmission as condition to initiate RACH?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| LG | Yes | But, not essential. |
| ZTE | Yes | The intention seems fine. Wording can be improved (e.g. “if at least one RB configured for SDT has data available for transmission”) |
| Xiaomi | Yes |  |
| Huawei, HiSIlicon | No. | But no strong view, the original reason why it was not added was because people think if there is no data anymore, the SDT procedure would already be terminated. I wonder what has changed since then |
| Sony | Yes | If no data available, there is no point to initiate Random Access procedure, so it is OK correction. |
| Lenovo | Yes |  |
| Langbo | Yes, but | We are wondering that if non-SDT data triggered UAI via SRB1 can also initiate Random Access procedure here. |
| Google | Yes |  |
| OPPO | Yes |  |
| NEC | Yes |  |
| Sharp | Yes |   |
| Intel | Maybe | No strong view as good UE implementation should not get here if there are no SDT data available. |
| CATT | Yes |  |
| Nokia | Yes | Fine to have this to avoid RA when no data available. |
| Qualcomm | Yes |  |
| InterDigital | Yes |  |
| Apple | Yes |  |

[R2-2208660](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2208660.zip) Clarification on uci-onPUSCH for CG-SDT vivo CR Rel-17 38.331 17.1.0 3462 - F NR\_SmallData\_INACTIVE-Core

This discussion points out that, in the previous RAN2 agreement, it was agreed that,

* Do not support uci-onPUSCH for SDT. Inform RAN1 this and any other agreements

However, this agreement is not captured in the RRC spec. Hence, the following chagne is proposed



**Question 13:** Do you agree that we need to capture in the RRC spec in the field description of *uci-OnPUSCH* that it cannot be configured for CG-SDT?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| LG | Yes |  |
| ZTE | Yes |  |
| Xiaomi | Yes |  |
| Huawei, HiSIlicon | Yes |  |
| Sony | No | RAN1 is discussing an issue relating *uci-OnPUSCH* which needs clarification so we can wait. |
| Lenovo | Yes |  |
| Langbo | Yes |  |
| OPPO | Yes |  |
| NEC | Yes |  |
| Sharp | Yes |  |
| Intel | Yes |  |
| CATT | Yes |  |
| Nokia | - | Same as Q11. |
| Qualcomm | - | No spec change is needed. |
| Interdigital | -  | No need to capture such restrictions in RRC |
| Apple | Yes |  |

[R2-2207573](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207573.zip) Clarification of Bj increment LG Electronics Inc. discussion NR\_SmallData\_INACTIVE-Core

This issue has been discussed in the last R2 meeting on whether a note is needed. Previously, the moderator thinks that the current note has already covered the previous issue mentioned for unnecessary Bj increment. And there is no difference for the issue mentioned here for SDT and the case of RRC\_CONNECTED.

|  |
| --- |
| NOTE: The exact moment(s) when the UE updates *Bj* between LCP procedures is up to UE implementation, as long as *Bj* is up to date at the time when a grant is processed by LCP. |

**Question 14:** Do you agree that we need to add the note for Bj increment?

* **NOTE: UE doesn’t update Bj in RRC\_INACTIVE when there is no SDT procedure ongoing.**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| LG | Yes | Proponent. |
| ZTE | Yes |  |
| Xiaomi | Yes |  |
| Huawei, HiSIlicon | No | The previous NOTE can already cover the case. Besides, there is no difference between the case here and the case when the first transmission after the UE transits to RRC\_CONNECTED |
| Lenovo | Yes | We disagree with Huawei’s comment on the meaning of the existing NOTE |
| OPPO | Yes |  |
| NEC | No strong view | The change is rather generic and not specific to SDT, and it might be better to check as common aspect |
| Sharp | Yes |  |
| Intel | See comment | It seems strange to add a note that clarifies the behaviour of a legacy UE as it says “in RRC\_INACTIVE when there is no SDT procedure ongoing”, i.e. any UE not supporting SDT would not have SDT ongoing. If any clarification is needed (which we are not sure if this is the case), we suggest at least avoiding the term “no SDT procedure” and focus on UEs configured for using SDT.  |
| CATT | Yes |  |
| Nokia | Maybe | We agree with Intel |
| Qualcomm | No | No new note is needed. |
| Interdigital | No | Agree with Intel and HW |
| Apple | No |  |

## 2.9 Editorials

[R2-2208356](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2208356.zip) Correction on SR delay timer ASUSTeK discussion Rel-16 NR\_SmallData\_INACTIVE-Core

[R2-2207360](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207360%C2%A0.zip) cg-SDT-TimeAlignmentTimer handling for RA-SDT Langbo   CR  Rel-17    38.321 17.1.0     1312       -      F NR\_SmallData\_INACTIVE-Core

[R2-2207815](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207815.zip) Correction on the stored RSRP for TA validation Xiaomi draftCR Rel-17 38.321 17.1.0 F NR\_SmallData\_INACTIVE-Core

[R2-2207902](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207902%C2%A0.zip) MAC procedure issues Nokia, Nokia Shanghai Bell CR  Rel-17    38.321    17.1.0 1352       -      F NR\_SmallData\_INACTIVE-Core

[R2-2207416](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207416.zip) Analysis on remaining issues for SDT CATT discussion Rel-17 NR\_SmallData\_INACTIVE-Core

**Moderator's Comments:**

The following tdocs mainly contain editorial issues. The moderator would recommend these issues to be covered by the CR review.

If companies think any issue needs to have more formal discussion, comments and suggestions are welcomed.

**Question 15**: Do companies agree that we can review the editorial issues in R2-2208356, R2-2207571, R2-2207572, R2-2207360, R2-2207815, R2-2207902, and R2-2207416 in the CR review?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| LG | Comments | **8356 AsusTek**We support the CR, but we think “if configured” is not needed.**7360 Langbo**Not needed.**7815 Xiaomi**Not needed. In RAN2#118e, RAN2 agreed following:*(b)  The pathloss reference for CG-SDT can be updated by any TAC received when CG-SDT is configured, even for the TAC received during RA-SDT procedure. (5/20 supports it)*=>  Not support it**7902 Nokia**The change for “logicalChannelSR-DelayTimer” is not needed, because the logicalChannelSR-DelayTimer itself is a timer.The SSB related issues are discussed in 2.6.The issues of triggering legacy RA procedure during RA-SDT procedure, we think it is not needed, because dynamic UL grant will be provided after RA completion.**7416 CATT**P1: Should be discussed in 2.6.P2: OkP3/P4: Ok.P5: Ok. (as in 2.7)P6: Ok. |
| ZTE | Yes |  |
| Xiaomi | Yes | **7815 Xiaomi**The CR is based on the RAN4 LS “2-2206953 Reply LS on TA validation for CG-SDT (R4-2211122; contact: ZTE)”. According to the RAN4 LS, the T1 timing when the reference (or stored) RSRP for TA validation includes the followings.* When changing from RRC\_CONNECTED to RRC\_INACTIVE state, T1 is the time when RRCRelease with CG-SDT configuration is received
* If TA command is received while in RRC\_INACTIVE state, T1 is the time when the latest MAC CE TA command is received

If companies does not want to support the highlighted function, we should send an LS to RAN4 to inform them the RAN2 decision. |
| Huawei, HiSIlicon | Yes | Some initial comments from my side**R2-2208356** We prefer the solution from Nokia in 7902**R2-2207360** We think the CR is reasonable, as it is possible that the cg-SDT-TAT is not configured on the UL carrier at all**R2-2207815** This has been discussed before and the previous agreement is that we don’t capture it in R2 spec as it is already captured in the R4 spec**R2-2207902** 1. Use *logicalChannelSR-DelayTimer* in the procedure and set the value based on the *sdt-LogicalChannelSR-DelayTimer* for SDT procedure.
2. Change to “else if” the previous “if” clause in the TS.

We agree with the first two cahgnes1. For initial CG-SDT re-transmission, MAC entity uses only the same configured grant configuration as used for the initial CG-SDT transmission.

This has been explained in the answer to section 2.61. Add limitation that the SSB is selected only if the previous SSB used for the CG-SDT is not above the *cg-SDT-RSRP-ThresholdSSB* threshold.

**R2-2207416**P1, not quite necessary, the action of “selecting SSB in that section is exactly to indicate the SSB index to the lower layersP2, agreeP3, agreeP4,5 dicsussed above alreadyP6, This is NBC change. Not needed |
| Langbo | Yes | **R2-2208356** Agree with the issue. We think both 8356 and P1/P2 in 7902 can solve this issue, and P1/P2 in 7902 has less impact for the current spec. We will accept the majority view.**R2-2207360** Agree.**R2-2207815** We share Moderator's comment.**R2-2207902** P1/P2, the same view as 8356.**R2-2207416**P2, agree.P3, agree.P6, agreeable. We think cg-SDT-TimeAlignmentTimer-r17 will be always configured together with SDT-MAC-PHY-CG-Config-r17. |
| NEC | Yes | Agree with Huawei’s comment. |
| Sharp | Yes |  |
| Intel | Partially | OK with the suggestion to handle editorial updates directly in the CR review, however any non-editorial update should be discussed separately over email. Some of this TDocs include both editorial and non-editorial TPs, therefore to capture a corresponding agreement out of this section, we suggest clearly stating which TP from each TDoc are considered as editorial to avoid confusions. |
| CATT | Comments | **R2-2208356/R2-2207902:**If there are two timers, i.e. *logicalChannelSR-DelayTime and sdt-logicalChannelSR-DelayTime* defined in MAC, we think the correction in 8356 is acceptable. If there is one timer but configured with different values, some revision is needed for 7902:1> if the BSR is triggered for a logical channel for which *logicalChannelSR-DelayTimerApplied* with value *true* is configured by upper layers and SDT procedure is not on-going according to clause 5.27:2> start or restart the *logicalChannelSR-DelayTimer* with the value as configured by *logicalChannelSR-DelayTimer*.1> else if BSR is triggered for a logical channel for which *logicalChannelSR-DelayTimerApplied* with value *true* is configured by upper layers and SDT procedure is on-going according to clause 5.27:2> start or restart the *logicalChannelSR-DelayTimer* with the value as configured by *sdt-LogicalChannelSR-DelayTimer*. |
| Nokia | OK |  |
| InterDigital | Yes |  |
| Apple | Comments | R2-2208356 and P1/P2 in R2-2207902: focus on the same issue, we support to resolve the issue, and either way is fine. R2-2207360: agree with it. [R2-2207815](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207815.zip): agree with the intention. If companies doesnot want to capture it in RAN2 spec, we can remove the description of the RSRP of the downlink pathloss storage in 5.27.2 from RAN2 spec (see below), and just refer to the RAN4 spec. ~~The MAC entity shall, upon the reception of CG-SDT configuration:~~~~1> store the RSRP of the downlink pathloss reference derived based on the~~ *~~measObject~~* ~~configured for the Serving Cell as in TS 38.331 [5].~~R2-2207416: P2/P3/P4/P5, support.  |

## 2.10 Triggering RACH when no SSB is above threshold

[R2-2207902](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119-e%5CDocs%5CR2-2207902%C2%A0.zip) MAC procedure issues Nokia, Nokia Shanghai Bell CR  Rel-17    38.321    17.1.0 1352       -      F NR\_SmallData\_INACTIVE-Core

It mentions that For CG-SDT, the RA procedure can be triggered in case no SSB with valid CG resource is available (above a threshold level) during the SDT procedure and this way the UE can indicate through RA procedure a new preferred DL beam throughout the SDT procedure.

In case of RA-SDT, the beam can only be indicated in the initial RA procedure and if the beam is lost, the UE cannot trigger RA procedure to indicate a new preferred DL beam as in CG-SDT procedure. Since such is specified for CG-SDT, it would seem preferrable to allow such behaviour for RA-SDT as well.

The following TP has been provided

|  |
| --- |
| If RA-SDT is selected above and after the Random Access procedure is successfully completed (see clause 5.1.6), the UE monitors PDCCH addressed to C-RNTI until the RA-SDT procedure is terminated. If CG-SDT is selected above and after the initial transmission for CG-SDT is performed, the UE monitors PDCCH addressed to C-RNTI and CS-RNTI until the CG-SDT procedure is terminated.The MAC entity shall:1> if RA-SDT procedure is ongoing and the Random Access procedure initiated for RA-SDT procedure is successfully completed (see clause 5.1); and1> if the SSB currently used for RA-SDT procedure with SS-RSRP above *SDT-RSRP-ThresholdSSB* is not available:2> initiate a Random Access procedure (see clause 5.1). |

**Question 16**: Do companies agree that we need to trigger RACH when no SSB is available for RA-SDT when none of the SSB is above the threshold?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| Sony | Yes | It seems ok to align with CG-SDT |
| LG | No | After RA completion, the UL transmission is performed using the dynamic grant. We think SSB not available for DG is very rare case. |
| NEC | No | We already have sdt-RSRP-Threshold to determine whether to perform SDT procedure, and cg-SDT-RSRP-ThresholdSSB for SSB selection for CG-SDT. This requires to introduce another new parameter SDT-RSRP-ThresholdSSB? Considering it is already CR phase, we do not support such enhancement. |
| Huawei, HiSIlicon | No | In legacy 2-step/4-step RACH, when there are no SSB above threshold, the SSB selected by UE implementation. For RA-SDT, we think the same can be applied and handled in the RA procedure sections. |
| Intel | Yes | To avoid confusions, we wonder whether the TP should be above previous paragraph that talks about UE behaviour after initiating RACH |
| CATT | No | If the RACH procedure for RA-SDT is successfully completed, the network is aware of the UE. The network can schedule the UE more precisely by DG. |
| Nokia | Yes | @Huawei: UE cannot select SSB by implementation without notifying the NW, this RA procedure is to indicate the new beam to the NW, exactly the same way as with CG-SDT when there is no SSBs above SS-RSRP threshold. |
| Qualcomm | No | If RA-SDT successfully completed, network can schedule UE by DG. |
| Interdigital | No | We rely on DG for subsequent TBs. We agreed not to use RA-SDT for subsequent TBs. |
| Apple | No | For the subsequent transmission phase of RA-SDT, it’s up to NW dynamic scheduling.  |

# 3. Summary

TBD