**3GPP TSG-RAN2 Meeting #120 *R2-221***

**Toulouse, France, 14th – 18th November, 2022**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
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|  | **38.321** | **CR** | 1451 | **rev** | **1** | **Current version:** | 17.2.0 |  |
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| *For* [***HELP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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| ***Title:***  | Correction to MAC spec for Small Data Transmission  |
|  |  |
| ***Source to WG:*** | Huawei, HiSilicon, Google, Samsung, NEC, VIVO |
| ***Source to TSG:*** | RAN2 |
|  |  |
| ***Work item code:*** | NR\_SmallData\_INACTIVE-Core |  | ***Date:*** | 2022-11-14 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-17 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
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| ***Reason for change:*** | **Issue1,** In R2#119bis, one CR [R2-2210676](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_119bis-e%5CDocs%5CR2-2210676.zip) has been proposed mentioning the issue on the missing cg-SDT-CS-RNTI in the declaration. But this can be jointly considered with issue11.**Issue2,** It is possible that cg-sdt-RetransmissionTimer is not configured. When saying start/restart the timer, another condition should be that the timer is configured.**Issue3,** The current spec is not clear about the configured uplink grant is not valid after CG occasion determination and SSB selection. **Issue4,** The current spec description is not clear regarding the condition for cancellation of the triggered PHRs during the SDT procedure. *This issue is obviated during the offline dicsussion during R2#120 and not reflected in this version of CR.**Changes made during R2#120***Issue5**, the following change is agreed and merged to the Rapp CR[R2-2211174](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_120%5CDocs%5CR2-2211174.zip) Corrections for RA during CG-SDT procedure Samsung Electronics Co., Ltd draftCR Rel-17 38.321 17.2.0 NR\_SmallData\_INACTIVE-Core**Issue6**, it is agreed that for SDT, we follow the same wording as positioning SRS transmission in RRC\_INACTIVE for the pathloss derivation when RRCRelease message with CG-SDT configuration is received***The following editorials are made:***[R2-2211175](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_120%5CDocs%5CR2-2211175.zip) Miscellaneous Corrections for SDT operation Samsung Electronics Co., Ltd draftCR Rel-17 38.321 17.2.0 NR\_SmallData\_INACTIVE-Core**Issue7**: The procedure in section 5.27.1 uses phrase ‘the Serving Cell for SDT’. The meaning of this is not clear. It seems to suggest that there are multiple serving cells and one of them is for SDT. However in RRC\_INACTIVE there is only one serving cell i.e. cell on which UE is currently camped. Suggest to replace the phase with either ‘current Serving Cell’ or ‘Serving Cell’**Issue8**: The procedure in section 5.27.1 uses the phrase ‘TA of the configured grant Type 1 resource’. TA is maintained for a cell in RRC\_INACTIVE for CG-SDT procedure. It is not per CG resource. So suggest to replace the phrase with ‘TA for CG-SDT’**Issue9**, The procedure in section 5.27.1 specifies that “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.” It’s not clear which RNTI is used as C-RNTI during the above operation. In our understanding the C-RNTI stored in Inactive UE AS context should be used for CG-SDT and C-RNTI received in random access response should be used for RA-SDT. This should be clarified.**Issue10**, The procedure in section 5.27.1 checks for validtity of TA at the first available CG occasion. However, in our understanding it should be the first available CG occasion for the initial CG-SDT transmission with CCCH message. it is better to clarify this. [R2-2211469](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_120%5CDocs%5CR2-2211469.zip) Bj Parameter and time T Ericsson discussion Rel-17 NR\_SmallData\_INACTIVE-CoreThis issue has been discussed serveral time and during the last R2 meeting, most of the companies suggest not to change it. Hence, nothing is changed and no chagne is made.[R2-2211882](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_120%5CDocs%5CR2-2211882.zip) Corrections on RNTI usage for SDT NEC draftCR Rel-17 38.321 17.2.0 F NR\_SmallData\_INACTIVE-CoreThis is partially overlap with the current Rapp CR on the use of cg-SDT-CS-RNTI. **Issue11**: Currently, this is not well reflected in the spec how it is used. Our thinking is that we can learn from what we have done for MCS-C-RNTI that CG-SDT-CS-RNTI is the same as CS-RNTI when there is an CG-SDT procedure ongoing.  |
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| ***Summary of change:*** | **Change1,** add cg-SDT-CS-RNTI in the declaration in section 5.8.2**Change2,** Add in the spec when the configured uplink grant is not valid.**Change3**, Clarify in the section 5.27.2 that this section specifies TA validation for CG-SDT rather than validation for SDT.**Change5**, the change in R2-2211174 has been merged**Change6**, Align the wording for pathloss reference derivation with positioning SRS transmission in RRC\_INACTIVE.For [R2-2211175](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_120%5CDocs%5CR2-2211175.zip)**Change7**: Phrase ‘the Serving Cell for SDT’ is changed to ‘Serving Cell’**Change8**, Phrase ‘TA of the configured grant Type 1 resource’ is changed to ‘TA for CG-SDT’;**Change9**, Clarified the C-RNTI’s used during the SDT procedure.**Change10**, clarify that the first available CG occasion is for the initial CG-SDT transmission.**Change11**, clarify with a note that the CG-SDT-CS-RNTI is used the same way as CS-RNTI when there is an ongoing CG-SDT procedure. also add DTCH for TC-RNTI for subsequent DL data transmission in msg4 |
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| ***Consequences if not approved:*** | Without the change other than change5, there will be editorial issues in the specWithout change5, UE can not receive the timing info during the RA-procedure while CG-SDT is ongoing and cg-SDT-TimeAlignmentTimer has expired**Impact analysis****Impacted 5G architecture options:**SA**Impacted functionality:**Small Data Transmission**Inter-operability analysis for changes:**If the UE is implemented according to the CR while the network is not, there is no inter-operability issueif the network is implemented according to the CR while the UE is not, there is no inter-operability issue |
|  |  |
| ***Clauses affected:*** | 5.1.4a, 5.8.2, 5.27.1, 5.27.2, 7.1 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ... |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** | Ver0 in RAN2#120: R2-2211263Ver1 in RAN2#120: R2-211 |

=================================== CHANGE BEGIN================================

5.1.4a MSGB reception and contention resolution for 2-step RA type

Once the MSGA preamble is transmitted, regardless of the possible occurrence of a measurement gap, the MAC entity shall:

1> start the *msgB-ResponseWindow* at the PDCCH occasion as specified in TS 38.213 [6], clause 8.2A;

1> monitor the PDCCH of the SpCell for a Random Access Response identified by MSGB-RNTI while the *msgB-ResponseWindow* is running;

1> if C-RNTI MAC CE was included in the MSGA:

2> monitor the PDCCH of the SpCell for Random Access Response identified by the C-RNTI while the *msgB-ResponseWindow* is running.

1> if notification of a reception of a PDCCH transmission of the SpCell is received from lower layers:

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; or

3> 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.

3> else:

4> if a downlink assignment has been received on the PDCCH for the C-RNTI and the received TB is successfully decoded:

5> if the MAC PDU contains the Absolute Timing Advance Command MAC CE:

6> process the received Timing Advance Command (see clause 5.2);

6> consider this Random Access Response reception successful;

6> stop the *msgB-ResponseWindow*;

6> consider this Random Access procedure successfully completed and finish the disassembly and demultiplexing of the MAC PDU.

2> if a valid (as specified in TS 38.213 [6]) downlink assignment has been received on the PDCCH for the MSGB-RNTI and the received TB is successfully decoded:

3> if the MSGB contains a MAC subPDU with Backoff Indicator:

4> set the *PREAMBLE\_BACKOFF* to value of the BI field of the MAC subPDU using Table 7.2-1, multiplied with *SCALING\_FACTOR\_BI*.

3> else:

4> set the *PREAMBLE\_BACKOFF* to 0 ms.

3> if the MSGB contains a fallbackRAR MAC subPDU; and

3> if the Random Access Preamble identifier in the MAC subPDU matches the transmitted *PREAMBLE\_INDEX* (see clause 5.1.3a):

4> consider this Random Access Response reception successful;

4> apply the following actions for the SpCell:

5> process the received Timing Advance Command (see clause 5.2);

5> indicate the *msgA-PreambleReceivedTargetPower* and the amount of power ramping applied to the latest Random Access Preamble transmission to lower layers (i.e. (*PREAMBLE\_POWER\_RAMPING\_COUNTER* – 1) × *PREAMBLE\_POWER\_RAMPING\_STEP*);

5> if the Random Access Preamble was not selected by the MAC entity among the contention-based Random Access Preamble(s):

6> consider the Random Access procedure successfully completed;

6> process the received UL grant value and indicate it to the lower layers.

5> else:

6> set the *TEMPORARY\_C-RNTI* to the value received in the Random Access Response;

6> if the Msg3 buffer is empty:

7> obtain the MAC PDU to transmit from the MSGA buffer and store it in the Msg3 buffer;

6> process the received UL grant value and indicate it to the lower layers and proceed with Msg3 transmission.

NOTE: If within a 2-step RA type procedure, an uplink grant provided in the fallback RAR has a different size than the MSGA payload, the UE behavior is not defined.

3> else if the MSGB contains a successRAR MAC subPDU; and

3> if the CCCH SDU was included in the MSGA and the UE Contention Resolution Identity in the MAC subPDU matches the CCCH SDU:

4> stop *msgB-ResponseWindow*;

4> if this Random Access procedure was initiated for SI request:

5> indicate the reception of an acknowledgement for SI request to upper layers.

4> else:

5> set the C-RNTI to the value received in the *successRAR*;

5> apply the following actions for the SpCell:

6> process the received Timing Advance Command (see clause 5.2);

6> indicate the *msgA-PreambleReceivedTargetPower* and the amount of power ramping applied to the latest Random Access Preamble transmission to lower layers (i.e. (*PREAMBLE\_POWER\_RAMPING\_COUNTER* – 1) × *PREAMBLE\_POWER\_RAMPING\_STEP*).

4> deliver the *TPC*, *PUCCH resource Indicator*, *ChannelAccess-CPext* (if indicated), and *HARQ feedback Timing Indicator* received in successRAR to lower layers.

4> consider this Random Access Response reception successful;

4> consider this Random Access procedure successfully completed;

4> finish the disassembly and demultiplexing of the MAC PDU.

1> if *msgB-ResponseWindow* expires, and the Random Access Response Reception has not been considered as successful based on descriptions above:

2> increment *PREAMBLE\_TRANSMISSION\_COUNTER* by 1;

2> if *PREAMBLE\_TRANSMISSION\_COUNTER* = *preambleTransMax* + 1:

3> indicate a Random Access problem to upper layers;

3> if this Random Access procedure was triggered for SI request:

4> consider this Random Access procedure unsuccessfully completed.

2> if the Random Access procedure is not completed:

3> if *msgA-TransMax* is applied (see clause 5.1.1a) and *PREAMBLE\_TRANSMISSION\_COUNTER* = *msgA-TransMax* + 1:

4> set the *RA\_TYPE* to *4-stepRA*;

4> perform initialization of variables specific to Random Access type as specified in clause 5.1.1a;

4> if the Msg3 buffer is empty:

5> obtain the MAC PDU to transmit from the MSGA buffer and store it in the Msg3 buffer;

4> flush HARQ buffer used for the transmission of MAC PDU in the MSGA buffer;

4> discard explicitly signalled contention-free 2-step RA type Random Access Resources, if any;

4> perform the Random Access Resource selection procedure as specified in clause 5.1.2.

3> else:

4> select a random backoff time according to a uniform distribution between 0 and the *PREAMBLE\_BACKOFF*;

4> if the criteria (as defined in clause 5.1.2a) to select contention-free Random Access Resources is met during the backoff time:

5> perform the Random Access Resource selection procedure for 2-step RA type Random Access (see clause 5.1.2a).

4> else:

5> perform the Random Access Resource selection procedure for 2-step RA type Random Access (see clause 5.1.2a) after the backoff time.

Upon receiving a fallbackRAR, the MAC entity may stop *msgB-ResponseWindow* once the Random Access Response reception is considered as successful.

==================================NEXT CHANGE======================================

### 5.8.2 Uplink

There are two types of transmission without dynamic grant:

- configured grant Type 1 where an uplink grant is provided by RRC, and stored as configured uplink grant;

- configured grant Type 2 where an uplink grant is provided by PDCCH, and stored or cleared as configured uplink grant based on L1 signalling indicating configured uplink grant activation or deactivation.

Type 1 and Type 2 are configured by RRC for a Serving Cell per BWP. Multiple configurations can be active simultaneously in the same BWP. For Type 2, activation and deactivation are independent among the Serving Cells. For the same BWP, the MAC entity can be configured with both Type 1 and Type 2.

Only configured grant Type 1 can be configured for CG-SDT. CG-SDT can only be configured on initial BWP.

RRC configures the following parameters when the configured grant Type 1 is configured:

- *cs-RNTI*: CS-RNTI for retransmission;

- *cg-SDT-CS-RNTI*: CS-RNTI for CG-SDT retransmission;

- *cg-SDT-RSRP-ThresholdSSB*: an RSRP threshold configured for SSB selection for CG-SDT;

- *periodicity*: periodicity of the configured grant Type 1;

- *timeDomainOffset*: Offset of a resource with respect to SFN = *timeReferenceSFN* in time domain;

- *timeDomainAllocation*: Allocation of configured uplink grant in time domain which contains *startSymbolAndLength* (i.e. *SLIV* in TS 38.214 [7]) or *startSymbol* (i.e. *S* in TS 38.214 [7]);

- *nrofHARQ-Processes*: the number of HARQ processes for configured grant;

- *harq-ProcID-Offset*: offset of HARQ process for configured grant configured with *cg-RetransmissionTimer* for operation with shared spectrum channel access;

- *harq-ProcID-Offset2*: offset of HARQ process for configured grant not configured with *cg-RetransmissionTimer*;

- *timeReferenceSFN*: SFN used for determination of the offset of a resource in time domain. The UE uses the closest SFN with the indicated number preceding the reception of the configured grant configuration.

RRC configures the following parameters when the configured grant Type 2 is configured:

- *cs-RNTI*: CS-RNTI for activation, deactivation, and retransmission;

- *periodicity*: periodicity of the configured grant Type 2;

- *nrofHARQ-Processes*: the number of HARQ processes for configured grant;

- *harq-ProcID-Offset*: offset of HARQ process for configured grant configured with *cg-RetransmissionTimer* for operation with shared spectrum channel access;

- *harq-ProcID-Offset2*: offset of HARQ process for configured grant not configured with *cg-RetransmissionTimer*.

RRC configures the following parameter when retransmissions on configured uplink grant is configured:

- *cg-RetransmissionTimer*: the duration after a configured grant (re)transmission of a HARQ process when the UE shall not autonomously retransmit that HARQ process;

- *cg-SDT-RetransmissionTimer*: the duration after a configured grant (re)trasnmission of a HARQ process of the initial CG-SDT transmission with CCCH message when the UE shall not autonomously retransmit the HARQ process.

Upon configuration of a configured grant Type 1 for a BWP of a Serving Cell by upper layers, the MAC entity shall:

1> store the uplink grant provided by upper layers as a configured uplink grant for the indicated BWP of the Serving Cell;

1> initialise or re-initialise the configured uplink grant to start in the symbol according to *timeDomainOffset*, *timeReferenceSFN*, and *S* (derived from *SLIV* or provided by *startSymbol* as specified in TS 38.214 [7]), and to reoccur with *periodicity*.

After an uplink grant is configured for a configured grant Type 1, the MAC entity shall consider sequentially that the Nth (N >= 0) uplink grant occurs in the symbol for which:

 [(SFN × *numberOfSlotsPerFrame* × *numberOfSymbolsPerSlot*)
 + (slot number in the frame × *numberOfSymbolsPerSlot*) + symbol number in the slot] =
 (*timeReferenceSFN* × *numberOfSlotsPerFrame* × *numberOfSymbolsPerSlot*
 + *timeDomainOffset* × *numberOfSymbolsPerSlot* + S + N × *periodicity*)
 modulo (1024 × *numberOfSlotsPerFrame* × *numberOfSymbolsPerSlot*)

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:

2> 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> select this SSB;

3> indicate the SSB index corresponding to the configured uplink grant to the lower layer;

3> consider this configured uplink grant as valid.

1> else if at least one SSB configured for CG-SDT with SS-RSRP above *cg-SDT-RSRP-ThresholdSSB* is available:

2> if at least one SSB corresponding to the configured uplink grant with SS-RSRP above the *cg-SDT-RSRP-ThresholdSSB* is available:

3> 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):

4> select an SSB with SS-RSRP above *cg-SDT-RSRP-ThresholdSSB* amongst the SSB(s) associated with the configured uplink grant.

3> 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):

4> 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 uplink grant:

5> select this SSB.

4> else if SS-RSRP of the SSB selected for the previous transmission for CG-SDT is not above *cg-SDT-RSRP-ThresholdSSB*:

5> select an SSB with SS-RSRP above *cg-SDT-RSRP-ThresholdSSB* amongst the SSB(s) associated with the configured uplink grant.

3> if SSB is selected above:

4> indicate the SSB index to the lower layer;

4> consider this configured uplink grant as valid.

1> else:

2> consider this configured uplink grant as not valid.

2> if PDCCH addressed to C-RNTI after the initial transmission of the CG-SDT with CCCH message has been received:

3> if there is data available for transmission for at least one RB configured for SDT:

4> initiate Random Access procedure in clause 5.1.

After an uplink grant is configured for a configured grant Type 2, the MAC entity shall consider sequentially that the Nth (N >= 0) uplink grant occurs in the symbol for which:

 [(SFN × *numberOfSlotsPerFrame* × *numberOfSymbolsPerSlot*)
 + (slot number in the frame × *numberOfSymbolsPerSlot*) + symbol number in the slot] =
 [(SFNstart time × *numberOfSlotsPerFrame* × *numberOfSymbolsPerSlot*
 + slotstart time × *numberOfSymbolsPerSlot* + symbolstart time) + N × *periodicity*]
 modulo (1024 × *numberOfSlotsPerFrame* × *numberOfSymbolsPerSlot*)

where SFNstart time, slotstart time, and symbolstart time are the SFN, slot, and symbol, respectively, of the first transmission opportunity of PUSCH where the configured uplink grant was (re-)initialised.

If *cg-nrofPUSCH-InSlot* or *cg-nrofSlots* is configured for a configured grant Type 1 or Type 2, the MAC entity shall consider the uplink grants occur in those additional PUSCH allocations as specified in clause 6.1.2.3 of TS 38.214 [7].

NOTE: In case of unaligned SFN across carriers in a cell group, the SFN of the concerned Serving Cell is used to calculate the occurrences of configured uplink grants.

When the configured uplink grant is released by upper layers, all the corresponding configurations shall be released and all corresponding uplink grants shall be cleared.

The MAC entity shall:

1> if at least one configured uplink grant confirmation has been triggered and not cancelled; and

1> if the MAC entity has UL resources allocated for new transmission:

2> if, in this MAC entity, at least one configured uplink grant is configured by *configuredGrantConfigToAddModList*:

3> instruct the Multiplexing and Assembly procedure to generate a Multiple Entry Configured Grant Confirmation MAC CE as defined in clause 6.1.3.31.

2> else:

3> instruct the Multiplexing and Assembly procedure to generate a Configured Grant Confirmation MAC CE as defined in clause 6.1.3.7.

2> cancel all triggered configured uplink grant confirmation(s).

For a configured grant Type 2, the MAC entity shall clear the configured uplink grant(s) immediately after first transmission of Configured Grant Confirmation MAC CE or Multiple Entry Configured Grant Confirmation MAC CE which confirms the configured uplink grant deactivation.

Retransmissions use:

- repetition of configured uplink grants; or

- received uplink grants addressed to CS-RNTI; or

- configured uplink grants with *cg-RetransmissionTimer* or *cg-SDT-RetransmissionTimer* configured.

==================================NEXT CHANGE======================================

### 5.27.1 General

The MAC entity may be configured by RRC with SDT and the SDT procedure may be initiated by RRC layer. The SDT procedure can be performed either by Random Access procedure with 2-step RA type or 4-step RA type (i.e., RA-SDT) or by configured grant Type 1 (i.e., CG-SDT).

RRC configures the following parameters for SDT procedure:

- *sdt-DataVolumeThreshold*: data volume threshold for the UE to determine whether to perform SDT procedure;

- *sdt-RSRP-Threshold*: RSRP threshold for UE to determine whether to perform SDT procedure;

- *cg-SDT-RSRP-ThresholdSSB*: an RSRP threshold configured for SSB selection for CG-SDT.

The MAC entity shall, if initiated by the upper layers for SDT procedure:

1> if the data volume of the pending UL data across all RBs configured for SDT is less than or equal to *sdt-DataVolumeThreshold*; and

NOTE: For SDT procedure, the MAC entity also considers the suspended RBs configured with SDT for data volume calculation. It is up to the UE's implementation how the UE calculates the data volume for the suspended RBs. Size of the CCCH message is not considered for data volume calculation

1> if the RSRP of the downlink pathloss reference is higher than *sdt-RSRP-Threshold*; or

1> if *sdt-RSRP-Threshold* is not configured:

2> if the Serving Cell is configured with supplementary uplink as specified in TS 38.331 [5]; and

2> if the RSRP of the downlink pathloss reference is less than *rsrp-ThresholdSSB-SUL*:

3> select the SUL carrier.

2> else:

3> select the NUL carrier.

2> if CG-SDT is configured on the selected UL carrier, and TA for CG-SDT is valid according to clause 5.27.2 in the first available CG occasion for initial CG-SDT transmission with CCCH message according to clause 5.8.2; and

2> if, for each RB having data available for transmission, *configuredGrantType1Allowed*, if configured, is configured with value *true* for the corresponding logical channel; and

2> 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.

2> else if a set of Random Access resources for performing RA-SDT are selected according to clause 5.1.1b on the selected UL carrier:

3> if *cg-SDT-TimeAlignmentTimer* is running, consider *cg-SDT-TimeAlignmentTimer* as expired and perform the corresponding actions in clause 5.2;

3> indicate to the upper layers that the conditions for initiating SDT procedure are fulfilled.

2> else:

3> indicate to the upper layers that the conditions for initiating SDT procedure are not fulfilled.

1> else:

2> indicate to the upper layers that the conditions for initiating SDT procedure are not fulfilled.

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 received in random access response 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 as stored in UE Inactive AS context as specified in TS 38.331 [5] and CS-RNTI until the CG-SDT procedure is terminated.

====================================NEXT CHANGE====================================

5.27.2 TA Validation for CG-SDT

RRC configures the following parameters for TA 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 with the current RSRP value of the downlink pathloss reference 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]; and

1> 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; and

1> *cg-SDT-TimeAlignmentTimer* is running.

==============================NEXT CHANGE=========================================

7.1 RNTI values

RNTI values are presented in Table 7.1-1.

**Table 7.1-1: RNTI values.**

|  |  |
| --- | --- |
| **Value (hexa-decimal)** | **RNTI** |
| 0000 | N/A |
| 0001–FFF2 | RA-RNTI, MSGB-RNTI, Temporary C-RNTI, C-RNTI, CI-RNTI, MCS-C-RNTI, CS-RNTI, TPC-PUCCH-RNTI, TPC-PUSCH-RNTI, TPC-SRS-RNTI, INT-RNTI, SFI-RNTI, SP-CSI-RNTI, PS-RNTI, SL-RNTI, SLCS-RNTI SL Semi-Persistent Scheduling V-RNTI, AI-RNTI, G-RNTI, G-CS-RNTI, and CG-SDT-CS-RNTI. |
| FFF3–FFFB | Reserved |
| FFFC | PEI-RNTI |
| FFFD | MCCH-RNTI |
| FFFE | P-RNTI |
| FFFF | SI-RNTI |

**Table 7.1-2: RNTI usage.**

|  |  |  |  |
| --- | --- | --- | --- |
| **RNTI** | **Usage** | **Transport Channel** | **Logical Channel** |
| P-RNTI | Paging and System Information change notification | PCH | PCCH |
| SI-RNTI | Broadcast of System Information | DL-SCH | BCCH |
| RA-RNTI | Random Access Response | DL-SCH | N/A |
| MSGB-RNTI | Random Access Response for 2-step RA type | DL-SCH | CCCH, DCCH |
| Temporary C-RNTI | Contention Resolution(when no valid C-RNTI is available) | DL-SCH | CCCH, DCCH, DTCH |
| Temporary C-RNTI | Msg3 transmission | UL-SCH | CCCH, DCCH, DTCH |
| C-RNTI, MCS-C-RNTI | Dynamically scheduled unicast transmission | UL-SCH | DCCH, DTCH |
| C-RNTI | Dynamically scheduled unicast transmission | DL-SCH | CCCH, DCCH, DTCH |
| MCS-C-RNTI | Dynamically scheduled unicast transmission | DL-SCH | DCCH, DTCH |
| C-RNTI | Triggering of PDCCH ordered random access | N/A | N/A |
| C-RNTI | Dynamically scheduled PTP retransmission for initial PTM transmission for multicast MBS. | DL-SCH | MTCH |
| CG-SDT-CS-RNTI | Dynamically scheduled unicast transmission(retransmission) | UL-SCH | CCCH, DCCH, DTCH |
| CS-RNTI | Configured scheduled unicast transmission(activation, reactivation and retransmission) | DL-SCH, UL-SCH | DCCH, DTCH |
| CS-RNTI | Configured scheduled unicast transmission(deactivation) | N/A | N/A |
| CS-RNTI | Configured scheduled unicast transmission(PTP retransmission for initial PTM transmission) | DL-SCH | MTCH |
| CS-RNTI | Configured scheduled unicast transmission(MBS SPS deactivation) | N/A | N/A |
| G-CS-RNTI | Configured scheduled multicast transmission(activation, reactivation and retransmission) | DL-SCH | MTCH |
| G-CS-RNTI | Configured scheduled multicast transmission (deactivation) | N/A | N/A |
| TPC-PUCCH-RNTI | PUCCH power control | N/A | N/A |
| TPC-PUSCH-RNTI | PUSCH power control | N/A | N/A |
| TPC-SRS-RNTI | SRS trigger and power control | N/A | N/A |
| INT-RNTI | Indication pre-emption in DL | N/A | N/A |
| SFI-RNTI | Slot Format Indication on the given cell | N/A | N/A |
| SP-CSI-RNTI | Activation of Semi-persistent CSI reporting on PUSCH | N/A | N/A |
| CI-RNTI | Cancellation indication in UL | N/A | N/A |
| PS-RNTI | DCP to indicate whether to start *drx-onDurationTimer* for associated DRX cycle | N/A | N/A |
| SL-RNTI | Dynamically scheduled sidelink transmission | SL-SCH | SCCH, STCH |
| SLCS-RNTI | Configured scheduled sidelink transmission(activation, reactivation and retransmission) | SL-SCH | SCCH, STCH |
| SLCS-RNTI | Configured scheduled sidelink transmission(deactivation) | N/A | N/A |
| SL Semi-Persistent Scheduling V-RNTI (NOTE 2) | Semi-Persistently scheduled sidelink transmission for V2X sidelink communication(activation, reactivation and retransmission) | SL-SCH | STCH |
| SL Semi-Persistent Scheduling V-RNTI(NOTE 2) | Semi-Persistently scheduled sidelink transmission for V2X sidelink communication(deactivation) | N/A | N/A |
| AI-RNTI | Availability indication on the given cell | N/A | N/A |
| G-RNTI | Dynamically scheduled MBS PTM transmission | DL-SCH | MTCH |
| MCCH-RNTI | Dynamically scheduled MCCH signalling and MCCH change notification | DL-SCH | MCCH |
| PEI-RNTI | Paging Early Indication | N/A | N/A |
| NOTE 1: The usage of MCS-C-RNTI is equivalent to that of C-RNTI in MAC procedures (except for the C-RNTI MAC CE).NOTE 2: The MAC entity uses SL Semi-Persistent Scheduling V-RNTI to control semi-persistently scheduled sidelink transmission on SL-SCH for V2X sidelink communication as specified in clause 5.14.1.1 of TS 36.321 [22].NOTE 3: The usage of CG-SDT-CS-RNTI is equivalent to that of CS-RNTI when there is an CG-SDT procedure ongoing. |

=========================== END OF CHANGES =======================================