**3GPP TSG-RAN3 Meeting #123 *R3-240917***

**Athens, Greece, 26th Feb 2024 - 1st Mar 2024**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **38.401** | **CR** | **0331** | **rev** | **1**  | **Current version:** | **18.0.0** |  |
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| *For* [***HE******LP***](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 |  | Radio Access Network | **X** | Core Network |  |

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| ***Title:***  | Add a new trigger condition for MT-SDT in TS38.401 |
|  |  |
| ***Source to WG:*** | ZTE, China Telecom, Huawei, Ericsson, Nokia, Nokia Shanghai Bell, Lenovo |
| ***Source to TSG:*** | R3 |
|  |  |
| ***Work item code:*** | NR\_MT\_SDT-Core, NR\_redcap\_enh-Core |  | ***Date:*** | 2024-02-10 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-18 |
|  | *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:*** | SA2 has agreed to support redcap with SDT in Rel-18, seen incoming LS R3-240026 . In case of split gNB deployment, when gNB-CU-CP receives NGAP: RAN paging request message including DL data size, the gNB-CU-CP may initiate MT-SDT paging within RNA paging area. |
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| ***Summary of change:*** | * It shall be clarified that gNB-CU-CP may receive NGAP: RAN paging request message including DL data size, and then initiate MT-SDT paging.
* Merge R3-240216
* Merge R3-240271 without the added paragraph in Section 8.18.4
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| ***Consequences if not approved:*** | It is not clear whether redcap with SDT is supported in case of split gNB deployment. |
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| ***Clauses affected:*** | 8.18 |
|  |  |
|  | **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:*** | Rev0: R3-240193  |

============================== The Start of Change =======================================

## 8.18 Overall procedure for Small Data Transmission during RRC Inactive

### 8.18.1 RACH based SDT

The procedure for RACH based small data transmission in RRC Inactive is shown in Figure 8.18.1-1.



Figure 8.18.1-1: RACH based Small Data Transmission in RRC Inactive state.

1. The UE in RRC Inactive sends the *RRCResumeRequest* message together with UL SDT data and/or UL SDT signalling.

2. The gNB-DU buffers the UL SDT data and/or UL SDT signalling.

3. The step 3 is as defined in step 4 in clause 8.6.2, including an indication of SDT access. The gNB-DU may also provide SDT assistance information.

4-5. If UE context is successfully retrieved as specified in TS 38.300 [2], the steps 4-5 are as defined in steps 6-7 in clause 8.9.6.2. The UL SDT data, if any, is forwarded to the gNB-CU-UP, and the UL signalling, if any, is forwarded to the gNB-CU-CP via the UL RRC MESSAGE TRANSFER message, in which any UL NAS PDU is delivered to AMF.

NOTE 1: In case that full UE context is retrieved from another gNB-CU-CP as specified in TS 38.300 [2], the gNB-CU-CP first establishes the UE context in the gNB-CU-UP via the Bearer Context Setup procedure and F1-U UL TEIDs are retrieved before step 4. The BEARER CONTEXT SETUP REQUSET message may include an indication to suspend non-SDT bearers, and in this case, the BEARER CONTEXT MODIFICATION REQUEST message in step 6 does not include resume indication for SDT DRBs.

NOTE 2: In case that only partial UE context for SDT including F1-U UL TEIDs is retrieved from another gNB-CU-CP as specified in TS 38.300 [2], the gNB-CU-CP uses those F1-U UL TEIDs for steps 4-5, and the subsequent steps 6-7 are not executed. The F1-U DL TEIDs received from the gNB-DU in step 5 should be forwarded to the other gNB-CU-CP, to be used for transferring of the DL SDT data. In addition, the UL SDT data, if any, is forwarded from the gNB-DU to the gNB-CU-UP of the other gNB-CU-CP for which the partial context is retrieved, and the UL signalling, if any, is forwarded from the gNB-CU-CP to the other gNB-CU-CP (the last serving gNB-CU-CP) via the XnAP RRC TRANSFER message.

NOTE 3: The other gNB-CU-UP may need to buffer the UL SDT data if received before the SDT bearer(s) are resumed.

6. The gNB-CU-CP sends the BEARER CONTEXT MODIFICATION REQUEST message including an resume indication for SDT DRBs. The gNB-CU-CP also includes the F1-U DL TEIDs received from the gNB-DU in step 5.

7. The gNB-CU-UP responds with the BEARER CONTEXT MODIFICATION RESPONSE message.

NOTE 4: void.

Upon receiving the UE INACTIVITY NOTIFICATION message without SDT volume threshold crossed indication from the gNB-DU, the gNB-CU, if serving the UE and deciding to terminate the ongoing SDT procedure, shall transmit the UE CONTEXT RELEASE COMMAND message to the gNB-DU.

If CG-SDT is (re-)configured, the gNB-CU may request the gNB-DU to keep CG-SDT configuration and resources in the UE CONTEXT RELEASE COMMAND message.

NOTE 5: void.

Upon receiving BSR from the UE, in case that UL SDT data size in the BSR is larger than the threshold configured from the gNB-CU-CP, the gNB-DU sends the UE INACTIVITY NOTIFICATION message with the SDT volume threshold crossed indication to the gNB-CU-CP. Upon receiving such indication, the gNB-CU-CP may terminate the ongoing SDT procedure, by sending the *RRCResume* message to move the UE to RRC\_CONNECTED, or by sending the *RRCRelease* message to move the UE to RRC\_INACTIVE.

Upon receiving non-SDT data, the gNB-CU-UP shall send the DL DATA NOTIFICATION message to the gNB-CU-CP. The gNB-CU-CP shall terminate the ongoing SDT procedure as specified in TS 38.300 [2].

If the amount of the received DL SDT data is above the data size threshold configured by the gNB-CU-CP, the gNB-CU-UP shall send the DL DATA NOTIFICATION message with the SDT data size threshold crossed indication. The gNB-CU-CP may terminate the ongoing SDT procedure.

### 8.18.2 CG based SDT

The procedure for CG based small data transmission in RRC Inactive is shown in Figure 8.18.2-1.



Figure 8.18.2-1: CG based Small Data Transmission in RRC Inactive state.

1. The gNB-CU decides to move UE into RRC\_INACTIVE state.

2. The gNB-CU-CP decides to configure CG-SDT, it sends UE CONTEXT MODIFICATION REQUEST message including a query indication for CG-SDT related resource configuration associated with the information of SDT Radio Bearer(s).

3. The gNB-DU sends the UE CONTEXT MODIFICATION RESPONSE message including the CG-SDT related resource configurations for the requested SDT Radio Bearer(s) within the *DU to CU RRC Information* IE.

4. The gNB-CU-CP sends the BEARER CONTEXT MODIFICATION REQUEST towards the gNB-CU-UP, with the suspend indication.

5. The gNB-CU-UP sends the BEARER CONTEXT MODIFICATION RESPONSE towards the gNB-CU-CP.

6. The gNB-CU-CP sends the UE CONTEXT RELEASE COMMAND message to the gNB-DU including an *RRCRelease* message to the UE with the CG-SDT information within suspend configuration. The gNB-CU notifies the gNB-DU to keep the SDT RLC config, F1-U tunnels, F1AP UE association, and store the CG resource for SDT when the UE is entering RRC\_INACTIVE state with an explicit CG-SDT kept indicator.

7. The gNB-DU sends the *RRCRelease* message to UE.

8. The gNB-DU sends UE CONTEXT RELEASE COMPLETE message. The gNB-DU keeps the SDT RLC config, F1-U tunnels, F1AP UE association, and stores the CG resource for SDT when the UE entering RRC\_INACTIVE. The gNB-DU also stores the C-RNTI, CG-SDT-CS-RNTI, and which bearers are CG-SDT bearers.

After a period of time of the UE being in RRC\_INACTIVE state.

9. The UE decides to perform CG based SDT procedure, it sends the *RRCResumeRequest* message together with UL SDT data/UL NAS PDU.

10. The gNB-DU sends the UL RRC MESSAGE TRANSFER message including the *RRCResumeRequest* message to indicate the access due to CG-SDT.

11/12. If UE context is successfully retrieved as specified in TS 38.300 [2], the gNB-CU-CP initiates the BEARER CONTEXT MODIFICATION procedure to resume SDT DRBs.

13 – 13a. The gNB-DU sends the UL SDT data, if any, to the gNB-CU-UP, and/or sends the UL signalling, if any, to the gNB-CU-CP via the UL RRC MESSAGE TRANSFER message, in which any UL NAS PDU is delivered to AMF.

NOTE 1: void.

Upon receiving the UE INACTIVITY NOTIFICATION message without SDT volume threshold crossed indication from the gNB-DU and deciding to terminate the ongoing SDT procedure, the gNB-CU shall transmit the UE CONTEXT RELEASE COMMAND message to the gNB-DU.

NOTE 2: void.

Upon receiving BSR from the UE, in case that UL SDT data size in the BSR is larger than the threshold configured from the gNB-CU-CP, the gNB-DU sends the UE INACTIVITY NOTIFICATION message with the SDT volume threshold crossed indication to the gNB-CU-CP. Upon receiving such indication, the gNB-CU-CP may terminate the ongoing SDT procedure, by sending the *RRCResume* message to move the UE to RRC\_CONNECTED.

If CG-SDT is re-configured, the gNB-CU may request the gNB-DU to keep CG-SDT configuration and resources in the UE CONTEXT RELEASE COMMAND message.

Upon receiving non-SDT data, the gNB-CU-UP shall send the DL DATA NOTIFICATION message to the gNB-CU-CP. The gNB-CU-CP shall terminate the ongoing SDT procedure as specified in TS 38.300 [2].

If the amount of the received DL SDT data is above the data size threshold configured by the gNB-CU-CP, the gNB-CU-UP shall send the DL DATA NOTIFICATION message with the SDT data size threshold crossed indication. The gNB-CU-CP may terminate the ongoing SDT procedure as specified in TS 38.300 [2].

### 8.18.3 RA-SDT or non-SDT with CG-SDT configuration

The procedure for the case where the UE has CG-SDT resource configurations but decides to perform RACH based small data transmission in RRC Inactive or to perform RACH procedure to transit to RRC Connected (see TS 38.321 [30] clause 5.27) is shown in Figure 8.18.3-1.



Figure 8.18.3-1: RA-SDT or non-SDT with CG-SDT configuration.

1. The UE in RRC Inactive sends *RRCResumeRequest* message. If the UE decides to perform RACH based SDT procedure, it also sends UL SDT data and/or UL SDT signalling.

2. The gNB-DU buffers the UL SDT data and/or UL SDT signalling.

3. The gNB-DU sends the INITIAL UL RRC MESSAGE TRANSFER message to the gNB-CU-CP, including a new gNB-DU UE F1AP ID, and in case of RACH based SDT access, the gNB-DU provides an indication of SDT access and may also the SDT assistance information.

4. If UE context is successfully retrieved as specified in TS 38.300 [2], the gNB-CU-CP sends the UE CONTEXT SETUP REQUEST message with the stored (or retrieved from the last serving gNB) F1 UL TEIDs and the new gNB-DU UE F1AP ID received in step 3.

In case that the gNB-DU is the one that sent the *RRCRelease* message with CG-SDT resource configurations to the UE, the gNB-CU-CP also includes the old gNB-DU UE F1AP ID and the old gNB-CU F1AP UE ID within the *Old CG-SDT Session Info* IE of the UE CONTEXT SETUP REQUEST message.

In case that the gNB-CU-CP is the one that generated the *RRCRelease* message with CG-SDT resource configurations but the gNB-DU is not the old gNB-DU that sent the *RRCRelease* message to the UE, the gNB-CU-CP initiates the UE Context Release procedure by sending the UE CONTEXT RELEASE COMMAND message to the old gNB-DU.

In case that the UE accesses a gNB other than the last serving gNB, upon receiving the RETRIEVE UE CONTEXT REQUEST message from the receiving gNB-CU-CP, the last serving gNB-CU-CP initiates the UE Context Release procedure by sending the UE CONTEXT RELEASE COMMAND message to the last serving gNB-DU.

5. The gNB-DU sends the UE CONTEXT SETUP RESPONSE message with the new gNB-DU UE F1AP ID. In case the old gNB-DU UE F1AP ID is received within the *Old CG-SDT Session Info* IE in step 4, the gNB-DU retrieves the stored CG-SDT resource configurations and UE context based on the *Old CG-SDT Session Info* IE, if any, and associates them with the new gNB-DU F1AP UE ID.

### 8.18.4 MT-SDT

The procedure for mobile terminated small data transmission in RRC Inactive is shown in Figure 8.18.4-1.



Figure 8.18.4-1: Mobile Terminated Small Data Transmission in RRC Inactive state.

1. During the setup or modification of the bearer context as specified in 8.9.2, the gNB-CU-CP requests the gNB-CU-UP to provide MT-SDT information.

2a-0. The gNB-CU-UP receives DL data for the UE in RRC Inactive on NG-U interface.

2a-1. The gNB-CU-UP sends DL DATA NOTIFICATION message to the gNB-CU-CP. If determining that DL data packets are only mapped to SDT bearers, as requested in step 1, the gNB-CU-UP includes the MT-SDT information in the DL DATA NOTIFICATION message.

2b. The gNB-CU-CP receives DL NAS signalling or RAN PAGING REQUEST message with DL signalling indication over NGAP.

2c. The gNB-CU-CP receives the MT-SDT information in XnAP RAN PAGING message.

3. After 2a or 2b or 2c, the gNB-CU-CP sends PAGING message to the gNB-DU. The MT-SDT indication may be included in the PAGING message.

4. The gNB-DU sends the *Paging* message to the UE. In case the MT-SDT indication is received in step 3, the gNB-DU includes the MT-SDT indicator in the *Paging* message.

5. If the UE has been successfully reached, it initiates the RRC connection resume procedure as described in 8.6.2 or 8.9.6.2, or initiates the SDT procedure as described from step 1 in 8.18.1 or from step 9 in 8.18.2 or from step 1 in 8.18.3 with the following difference:

 - In case SDT procedure is initiated, the UE may indicate MT-SDT in the RRCResumeRequest, which may be without UL data.

============================== The End of Change =======================================