3GPP TSG-RAN WG3 #119bis-e R3-231895

17th – 26th April 2023

Online

Agenda Item: 20.2

Source: ZTE (moderator)

Title: Summary of Offline Discussion on CB: SDT\_MTSDT

Document for: Approval

# Introduction

**CB: # SDT\_MTSDT**

**- Continue to discuss the open issues from last meeting**

**- The issue on DL Non-SDT data arrival during MT-SDT procedure?**

**- Stage2/stage3 TPs if agreeable and check details, split work**

**- Capture agreements and open issues**

(moderator - ZTE)

Summary of offline disc [R3-231895](file:///D:\3GPPmeeting\202304%20RAN3%20%23119bis\Inbox\R3-231895.zip)

Please provide your views by **13:00 UTC Thursday April 20,** so that we can make the 2nd round email discussion before the online session.

# For the Chairman’s Notes

<TBD>

# Discussion- Second round

<TBD>

# Discussion-First round

## Background

In the last RAN3 #119 meeting, MT-SDT WID has been discussed and has made much progress.

|  |
| --- |
| **MT-SDT can be triggered by DL SDT user data and/or DL SDT signalling.**  **Upon reception of DL SDT user data, the gNB-CU-UP may include the assistance information (e.g., Data size) in E1AP DL Data Notification message to gNB-CU-CP.** **FFS on MT-SDT indicator.**  **When receiving DL SDT data, the anchor gNB may send MT-SDT information IE to the neighbour gNBs within the RNA, via XnAP RAN paging message.**  **The encoding and the name of MT-SDT information IE is FFS.**  **The gNB that receives MT-SDT information within the RNA takes into account this information received in the XnAP RAN PAGING message from the anchor gNB to decide whether to trigger MT-SDT Uu paging.**  **Upon reception of MT-SDT information via XnAP RAN paging message from the anchor gNB-CU, the gNB-CU may send F1 MT-SDT information to the gNB-DU via F1AP Paging message.**  **FFS on F1AP MT-SDT information**  **FFS: whether Data volume should also be provided from the CU to the DU in F1AP PAGING message.**  **FFS: whether and how XnAP RTRV UE CTXT REQ message (that carries MT-SDT resume indication)**  **FFS: whether MT-SDT support indication in E1 Bearer Context procedure should be defined to enable the gNB-CU-UP to include the DL data size in the E1AP DL DATA NOTIFICATION message.**  **FFS: whether receiving gNB-CU or receiving gNB-DU decides MT-SDT Uu paging, if we agree that it is the receiving gNB to make the final decision on triggering MT-SDT Uu paging.**  **FFS: MT-SDT assistance information sent from the anchor in the XnAP: RAN paging message and other alignment with RAN2 progress.** |

Meanwhile, RAN2 #121 meeting also made some agreement.

|  |
| --- |
| Agreement:  1. Include a one-bit indication in paging to trigger MT-SDT. We will ensure that the CCCH message can be transmitted over CG.  2. Indication is per UE. FFS on signaling.  3. In case condition for paging triggered MT-SDT is not fulfilled the UE initiates RRC Resume procedure. Resume cause FFS  4. Upon receiving MT-SDT trigger, the UE shall initiate SDT procedure if the following checks are satisfied (all these same as Rel-17)  - FFS 3a: Check for DVT (if UL data becomes available in UL)  - 3b: Check for SDT RSRP threshold  - 3c: Check for TA validation before selecting CG (if applicable)  - 3d: Check for SSB level RSRP threshold for CG resource (if applicable)  5. When UE resumes for MT-SDT, UE resumes all RBs configured for SDT  6. RBs configured for SDT are common for MO-SDT and MT-SDT  7. If there is valid CG-SDT resources, the UE should use CG-SDT to transmit the response. FFS on whether we need to optimize for case when CG periodicity is too long  8. To confirm that when SDT is initiated due to MT-SDT, UE can exchange subsequent DL/UL SDT data on the resumed RBs. This clarifies the RB behaviour of related RAN2#120 agreement. |

|  |
| --- |
| Agreements  1. Specify a RRC procedure for RRCResume for MT-SDT initiation without checking for availability of UL data (i.e. if MT-SDT is initiated first the resume cause will be set to MT-SDT)  2. UE is allowed to initiate either MO-SDT based resume or non-SDT based resume at any point (before imitation RRCResumeRequest for MT-SDT) using separate procedures  3. If MT-SDT procedure is initiated, for RACH during subsequent data transfer (i.e. RACH triggered due to SR), UE uses only the non-SDT RACH resources (i.e. like legacy) |

## XnAP impact

**Issue 1: The encoding and the name of MT-SDT information IE in XnAP: RAN Paging message**

**When receiving DL SDT data, the anchor gNB may send MT-SDT information IE to the neighbour gNBs within the RNA, via XnAP RAN paging message.**

**The encoding and the name of MT-SDT information IE is FFS.**

**The gNB that receives MT-SDT information within the RNA takes into account this information received in the XnAP RAN PAGING message from the anchor gNB to decide whether to trigger MT-SDT Uu paging.**

**FFS: whether receiving gNB-CU or receiving gNB-DU decides MT-SDT Uu paging, if we agree that it is the receiving gNB to make the final decision on triggering MT-SDT Uu paging.**

**FFS: MT-SDT assistance information sent from the anchor in the XnAP: RAN paging message and other alignment with RAN2 progress.**

Many contributions (e.g., [3], [4], [6], [8], [11], [12], [14], [16], [19]) address on this issue.

**Option 1:** [3], [6], [14]

9.2.3.xxx MT-SDT Information

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description |
| MT-SDT indicator | M |  | ENUMERATED (true,…) |  |
| MT-SDT Data Size | O |  | INTEGER (0…65535, …) | Indicates the total data size for all SDT bearers. Unit: byte. |

Editor’s note: MT-SDT Data Size is one kind of MT-SDT assistance information, the value is FFS. MT-SDT Data volume as another kind of MT-SDT assistance information is not included.

**Option 2:** If MT-SDT indicator exists, it is MT-SDT SRB, if MT-SDT Data Size exists, it is MT-SDT DRB [11], and otherwise, it is the MT-SDT SRB.

9.2.3.xxx MT-SDT Information

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description |
| MT-SDT indicator | O |  | ENUMERATED (true,…) |  |
| MT-SDT Data Size | O |  | INTEGER (0…65535, …) | Indicates the total data size for all SDT bearers. Unit: byte. |

Editor’s note: MT-SDT Data Size is one kind of MT-SDT assistance information, the value is FFS. MT-SDT Data volume as another kind of MT-SDT assistance information is not included.

**Option 3:** In this case, the MT-SDT indicator is implicitly indicated [12].

9.2.3.xxx MT-SDT Information

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description |
| MT-SDT Data Size | M |  | INTEGER (0…65535, …) | Indicates the total data size for all SDT bearers. Unit: byte. |

Editor’s note: MT-SDT Data Size is one kind of MT-SDT assistance information, the value is FFS. MT-SDT Data volume as another kind of MT-SDT assistance information is not included.

**Option 4:** In this case, the MT-SDT indicator is implicitly indicated [4]. If MT-SDT Data Size exists, it is the MT-SDT DRB, otherwise, it is the MT-SDT SRB.

9.2.3.xxx MT-SDT Information

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description |
| MT-SDT Data Size | O |  | INTEGER (0…65535, …) | Indicates the total data size for all SDT bearers. Unit: byte. |

Editor’s note: MT-SDT Data Size is one kind of MT-SDT assistance information, the value is FFS. MT-SDT Data volume as another kind of MT-SDT assistance information is not included.

**Option 5:** MT-SDT Data Size is not needed.

9.2.3.xxx MT-SDT Information

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description |
| MT-SDT indicator | M |  | ENUMERATED (true,…) |  |

Moderator thinks option 2 is not suitable, because RAN2 agreed not to differentiate SDT DRB and SDT SRB.

Moderator thinks option 3 and option 4 are very similar to option 1. But in order to align to MO-SDT indicator (seen as below), we prefer to explicitly introduce the MT-SDT indicator as that in MO-SDT.

/////////////////////////////////TS 38.423//////////////////////////////////////////

#### 9.2.3.163 SDT Support Request

This IE indicates that the UE requested for SDT and may include additional assistance information.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description |
| SDT Indicator | M |  | ENUMERATED (true,…) |  |
| SDT assistant information | O |  | ENUMERATED (single packet, multiple packets, …) | “Single packet” indicates no subsequent SDT transmission is expected;  “Multiple packets” indicates subsequent SDT transmission is expected. |

/////////////////////////////////TS 38.423//////////////////////////////////////////

Moderator thinks option 5 is incomplete, because according to our previous agreement, the MT-SDT Data Size is useful for receiving gNB to make good decision on MT-SDT Uu paging triggering.

Moderator thinks option 1 has the following benefit.

1. Aligning with MO-SDT information specified in the current specification.
2. Easy to be extended.
3. For SDT SRB, data size can be not introduced.

Based on the above analysis, moderator provides the following proposal.

**Proposal 1: Agree option 1 as below to be the encoding and the name of MT-SDT information IE.**

9.2.3.xxx MT-SDT Information

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description |
| MT-SDT indicator | M |  | ENUMERATED (true,…) |  |
| MT-SDT Data Size | O |  | INTEGER (FFS) | Indicates the total data size for all SDT bearers. Unit: byte. |

Editor’s note: MT-SDT Data Size is one kind of MT-SDT assistance information, the value is FFS. MT-SDT Data volume as another kind of MT-SDT assistance information is not included.

**Question 1: Do companies agree to P1, or do you prefer other option?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| Lenovo | Yes with comments | The presence of MT-SDT Data Size should be mandatory. Otherwise, how to comprehend the case that the IE is absent. |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**Issue 2: Whether and how to carry MT-SDT resume indication into the XnAP Retrieve Context Request message.**

**FFS: whether and how XnAP RTRV UE CTXT REQ message (that carries MT-SDT resume indication)**

Many contributions agree to carrier MT-SDT resume indication into the XnAP Retrieve Context Request message.

**Option 1:** Introduce a new IE (e.g., MT-SDT Support Request) to carrier MT-SDT resume indication.

#### 9.1.1.8 RETRIEVE UE CONTEXT REQUEST

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| Message Type | M |  | 9.2.3.1 |  |
| <Skip unchanged part> | | | | |
| RRC Resume Cause | O |  | 9.2.3.61 | In case of RNA Update, contains the cause value provided by the UE in the *RRCResumeRequest* or the *RRCResumeRequest1* message, as defined in TS 38.331 [10],  or in the *RRCConnection ResumeRequest* message, as defined in TS 36.331 [14]. |
| SDT Support Request | O |  | 9.2.3.163 |  |
| MT-SDT Support Request | O |  | 9.2.3.yyy |  |

**Option 2:** Introduce a new Cause value to carrier MT-SDT resume indication.

#### 9.1.1.8 RETRIEVE UE CONTEXT REQUEST

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| Message Type | M |  | 9.2.3.1 |  |
| <Skip unchanged part> | | | | |
| RRC Resume Cause | O |  | 9.2.3.61 | In case of RNA Update and MT-SDT, contains information provided in the *resumeCause* by the UE in the *RRCResumeRequest* or the *RRCResumeRequest1* message, as defined in TS 38.331 [10],  or information provided in the *resumeCause-r15* in the *RRCConnection ResumeRequest* message, as defined in TS 36.331 [14]. |
| SDT Support Request | O |  | 9.2.3.163 |  |

**Option 3:** Reuse current existing IE (i.e., SDT Support Request) to carrier MT-SDT resume indication.

But one contribution thinks it is not needed to carrier MT-SDT resume indication.

Moderator thinks based on RAN2 agreement, RAN3 shall agree that the receiving gNB shall also transfer receiving MT-SDT resume indication to the anchor gNB via XnAP Retrieve Context Request message. More, RAN2 has also agreed not to differentiate either MO-SDT or MT-SDT. RAN3 can reuse the existing IE (i.e., SDT Support Request) to carrier MT-SDT resume indication.

**Proposal 2: Agree to reuse existing IE (i.e., SDT Support Request) within the XnAP Retrieve Context Request message, to carrier MT-SDT resume indication, then enhancement is not needed.**

**Question 2: Do companies agree to P2, or do you prefer other option?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| Lenovo | No | Since whether to perform regular paging or MT-SDT paging is decided by the receiving gNB, the receiving gNB needs to indicate it decision to the last serving gNB so that the last serving gNB can decides whether anchor relocation is needed. For regular paging, anchor relocation is mandatory following Rel-17 procedure but for MT-SDT paging anchor relocation is optional. If RAN2 decides a new RRC Resume cause, it can be reused in Xn-AP interface. Otherwise, a new indication is needed. |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

## F1AP impact

**Upon reception of MT-SDT information via XnAP RAN paging message from the anchor gNB-CU, the gNB-CU may send F1 MT-SDT information to the gNB-DU via F1AP Paging message.**

**FFS on F1AP MT-SDT information**

**FFS: whether Data volume should also be provided from the CU to the DU in F1AP PAGING message.**

**FFS: whether receiving gNB-CU or receiving gNB-DU decides MT-SDT Uu paging, if we agree that it is the receiving gNB to make the final decision on triggering MT-SDT Uu paging.**

**Option 1:** This is the similar to XnAP signaling. When receiving MT-SDT Information from anchor gNB, the receiving gNB can further decide to trigger MT-SDT procedure. In case of split gNB, the gNB-CU sends MT-SDT Indicator and optional MT-SDT Data Size to gNB-DU. Then the gNB-DU can finally decide to encode MT-SDT Uu paging based on its implementation.

9.3.1.XX MT-SDT Information

This IE indicates MT-SDT information.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE Type and Reference** | **Semantics Description** |
| MT-SDT Indicator | M |  | ENUMERATED (true, ...) |  |
| MT-SDT Data Size | O |  | INTEGER (1..96000, …) | The Unit is: byte. |

Editor’s note: MT-SDT Data Size is one kind of MT-SDT assistance information, the value is FFS. MT-SDT Data volume as another kind of MT-SDT assistance information is not included.

**Option 2:** This option is similar to option 1, but MT-SDT indicator is implicit then is not included.

9.3.1.XX MT-SDT Information

This IE indicates MT-SDT information.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE Type and Reference** | **Semantics Description** |
| MT-SDT Data Size | M |  | INTEGER (1..96000, …) | The Unit is: byte. |

Editor’s note: MT-SDT Data Size is one kind of MT-SDT assistance information, the value is FFS. MT-SDT Data volume as another kind of MT-SDT assistance information is not included.

**Option 3:** In this option, only MT-SDT indicator is needed.

9.3.1.XX MT-SDT Information

This IE indicates MT-SDT information.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE Type and Reference** | **Semantics Description** |
| MT-SDT Indicator | M |  | ENUMERATED (true, ...) |  |

Editor’s note: MT-SDT Data Size is one kind of MT-SDT assistance information, the value is FFS. MT-SDT Data volume as another kind of MT-SDT assistance information is not included.

Moderator thinks both option 1 and option 2 are similar, but referring to existing F1AP, MO-SDT includes explicit MO-SDT indicator, as below, it is straightforward to explicitly introduce MT-SDT indicator.

/////////////////////////////////TS 38.473//////////////////////////////////////////

#### 9.3.1.262 SDT Information

This IE is used to indicate an SDT transaction and to provide the assistant information from the UE.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description |
| SDT Indicator | M |  | ENUMERATED (true,…) |  |
| SDT Assistant Information | O |  | ENUMERATED (single packet, multiple packets, …) | “single packet” indicates no subsequent SDT transmission is expected.  “multiple packets” indicates subsequent SDT transmission is expected. |

/////////////////////////////////TS 38.473//////////////////////////////////////////

Moderator also thinks option 3 is not complete, because it is DU to encode the Uu paging and it is better to provide assistant information to DU to make good decision.

**Proposal 3: Agree option 1(as below) including MT-SDT indicator and optional MT-SDT Data size within F1AP MT-SDT information to the gNB-DU via F1AP Paging message.**

9.3.1.XX MT-SDT Information

This IE indicates MT-SDT information.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE Type and Reference** | **Semantics Description** |
| MT-SDT Indicator | M |  | ENUMERATED (true, ...) |  |
| MT-SDT Data Size | O |  | INTEGER (FFS) | The Unit is: byte. |

Editor’s note: MT-SDT Data Size is one kind of MT-SDT assistance information, the value is FFS. MT-SDT Data volume as another kind of MT-SDT assistance information is not included.

**Question 3: Do companies agree to P3, or do you prefer other option?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| Lenovo | Option 3 | For F1-AP, it is straight forward that it is up to gNB-CU to decide whether to perform regular RAN paging or MT-SDT RAN paging. In this case, it is not needed to provide data volume information to the gNB-DU. The gNB-CU only needs to include MT-SDT indication to gNB-DU so that the gNB-DU can include it in RAN paging message to UE. |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

## E1AP impact

**MT-SDT can be triggered by DL SDT user data and/or DL SDT signalling.**

**Upon reception of DL SDT user data, the gNB-CU-UP may include the assistance information (e.g., Data size) in E1AP DL Data Notification message to gNB-CU-CP.** **FFS on MT-SDT indicator.**

**FFS: whether MT-SDT support indication in E1 Bearer Context procedure should be defined to enable the gNB-CU-UP to include the DL data size in the E1AP DL DATA NOTIFICATION message.**

In [19], it suggests to discuss which node (CU-CP v.s. CU-UP) to decide whether to trigger MT-SDT, however, as usually, we shall allow each node to decide MT-SDT configuration by its implementation. In the last meeting, we have agreed that, when gNB-CU-UP receives DL data/DL NAS signaling, it can decide to trigger MT-SDT procedure, by sending MT-SDT information via E1AP DL DATA NOTIFICATION message. Then, gNB-CU-CP can further decide whether to trigger MT-SDT procedure.

/////////////////////////////////BLCR TS 37.483//////////////////////////////////////////

9.2.2.13 DL DATA NOTIFICATION

This message is sent by the gNB-CU-UP to provide information about the DL data detection to the gNB-CU-CP.

Direction: gNB-CU-UP → gNB-CU-CP

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| Message Type | M |  | 9.3.1.1 |  |
| gNB-CU-CP UE E1AP ID | M |  | 9.3.1.4 |  |
| gNB-CU-UP UE E1AP ID | M |  | 9.3.1.5 |  |
| Paging Priority Indicator (PPI) | O |  | 9.3.1.55 |  |
| **PDU Session To Notify List** | O |  |  |  |
| **>PDU Session To Notify Item** |  | *1..<maxnoofPDUSessionResource>* |  |  |
| >>PDU Session ID | M |  | 9.3.1.21 |  |
| >>QoS Flow List | M |  | 9.3.1.12 |  |
| MT-SDT Information | O |  | 9.3.1.xxx |  |

/////////////////////////////////BLCR TS 37.483//////////////////////////////////////////

Both [3] and [7] suggest to introduce the MT-SDT Indicator and optional MT-SDT Data Size within the MT-SDT information, which is similar to XnAP and F1AP.

In [4], [10], [14] and [16], they think MT-SDT Data Size is needed, but MT-SDT indicator is not needed due to implicit method.

In [7], [10] and [16], considering that R17 gNB-CU-UP can only support MO-SDT, it suggests to a new explicit indicator in E1AP Bearer Context procedure to indicate whether MT-SDT is enabled.

**Option 1:** Introduce MT-SDT Indicator and optional MT-SDT Data Size within the MT-SDT information

9.3.1.xxx MT-SDT Information

This IE provides the assistant information for MT-SDT.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE Type and Reference** | **Semantics Description** |
| MT-SDT Indicator | M |  |  |  |
| MT-SDT Data Size | O |  | INTEGER (1..96000, …) | The Unit is: byte.  The downlink data size for SDT bearers buffered in CU-UP |

Editor’s note: MT-SDT Data Size is one kind of MT-SDT assistance information, the value is FFS. MT-SDT Data volume as another kind of MT-SDT assistance information is not included.

**Option 2:** MT-SDT Data Size is needed, but MT-SDT indicator is not needed

9.3.1.xxx MT-SDT Information

This IE provides the assistant information for MT-SDT.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE Type and Reference** | **Semantics Description** |
| MT-SDT Data Size | O |  | INTEGER (1..96000, …) | The Unit is: byte.  The downlink data size for SDT bearers buffered in CU-UP |

Editor’s note: MT-SDT Data Size is one kind of MT-SDT assistance information, the value is FFS. MT-SDT Data volume as another kind of MT-SDT assistance information is not included.

**Option 3:** A new explicit indicator in E1AP Bearer Context procedure to indicate whether MT-SDT is enabled

#### 9.2.2.4 BEARER CONTEXT SET UP/MODIFICATION REQUEST

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| Message Type | M |  | 9.3.1.1 |  |
| gNB-CU-CP UE E1AP ID | M |  | 9.3.1.4 |  |
| gNB-CU-UP UE E1AP ID | M |  | 9.3.1.5 |  |
| <Skip unchanged part> | | | | |
| MT-SDT indication |  |  | ENUMERATED (true, …) | Indication on whether MT-SDT is enabled |

9.3.1.xxx MT-SDT Information

This IE provides the assistant information for MT-SDT.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE Type and Reference** | **Semantics Description** |
| MT-SDT Indicator | M |  |  |  |
| MT-SDT Data Size | O |  | INTEGER (1..96000, …) | The Unit is: byte.  The downlink data size for SDT bearers buffered in CU-UP |

Editor’s note: MT-SDT Data Size is one kind of MT-SDT assistance information, the value is FFS. MT-SDT Data volume as another kind of MT-SDT assistance information is not included.

**Option 4:** A new explicit indicator in E1AP Bearer Context procedure to indicate whether MT-SDT is enabled.

#### 9.2.2.4 BEARER CONTEXT SET UP/MODIFICATION REQUEST

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| Message Type | M |  | 9.3.1.1 |  |
| gNB-CU-CP UE E1AP ID | M |  | 9.3.1.4 |  |
| gNB-CU-UP UE E1AP ID | M |  | 9.3.1.5 |  |
| <Skip unchanged part> | | | | |
| MT-SDT indication |  |  | ENUMERATED (true, …) | Indication on whether MT-SDT is enabled |

9.3.1.xxx MT-SDT Information

This IE provides the assistant information for MT-SDT.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE Type and Reference** | **Semantics Description** |
| MT-SDT Data Size | M |  | INTEGER (1..96000, …) | The Unit is: byte.  The downlink data size for SDT bearers buffered in CU-UP |

Editor’s note: MT-SDT Data Size is one kind of MT-SDT assistance information, the value is FFS. MT-SDT Data volume as another kind of MT-SDT assistance information is not included.

Moderator thinks MT-SDT indicator within E1AP Bearer Context request message are not needed, because gNB-CU and gNB-DU have already acknowledged per node’s capability by OAM. Moreover, SDT information (i.e., ResumeforSDT) is already included in the existing E1AP Bearer Context request message as below [1], and RAN2 agreed not to differentiate MO-SDT and MT-SDT, so that, moderator thinks it is not needed to introduce a new IE (e.g., MT-SDT indicator) in the E1AP Bearer Context request message again.

/////////////////////////////////TS 37.483//////////////////////////////////////////

|  |  |  |  |
| --- | --- | --- | --- |
| Bearer Context Status Change | O | ENUMERATED (Suspend, Resume, …, ResumeforSDT) | Indicates the status of the Bearer Context.  *NOTE: This IE is not applicable to eNB-CP/eNB-UP and ng-eNB-CU-CP/ng-eNB-CU-UP* |

/////////////////////////////////TS 37.483//////////////////////////////////////////

For moderator’s view, option 2 is very similar to option 1. However, moderator suggests to introduce an explicit indictor, which is already used in MO-SDT configuration in XnAP and F1AP.

In [1], it suggests to introduce Data Size and MT-SDT of each DRB, but RAN2 has agreed to configure all SDT DRB and SRB (*RAN2: When UE resumes for MT-SDT, UE resumes all RBs configured for SDT).* So it is suitable to configure MT-SDT Data Size for sum of SDT DRBs and one MT-SDT indicator.

**Proposal 4: Agree option 1(as below) which includes MT-SDT indicator and optional MT-SDT Data size within MT-SDT information via E1AP DL DATA NOTIFICATION message.**

9.3.1.xxx MT-SDT Information

This IE provides the assistant information for MT-SDT.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE Type and Reference** | **Semantics Description** |
| MT-SDT Indicator | M |  |  |  |
| MT-SDT Data Size | O |  | INTEGER (**FFS**) | The Unit is: byte.  The downlink data size for SDT bearers buffered in CU-UP |

Editor’s note: MT-SDT Data Size is one kind of MT-SDT assistance information, the value is FFS. MT-SDT Data volume as another kind of MT-SDT assistance information is not included.

**Question 4: Do companies agree to P4, or do you prefer other option?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| Lenovo | Yes with comments | Same with Q1, the MT-SDT Data Size should be mandatory. |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

## Stage 2 issue

**Issue 1: DL Non-SDT data arrival during MT-SDT procedure**

In [6], it states this new issue, the detail is as below.

|  |
| --- |
| While the MT-SDT procedure is ongoing, if DL non-SDT data/signalling arrives, the network can straightaway move the UE to RRC\_CONNECTED state by sending the RRCResume message if the UE responds to paging and resumes in the last serving gNB.  However, since both with and without UE context relocation procedures will be supported for MT-SDT, and if the DL non-SDT data arrives in the last serving gNB while it is anchoring the MT-SDT procedure, it will not be able to move the UE to RRC\_CONNECTED state straight away by sending RRCResume message. Instead, the gNB will have to send RRCRelease message to the UE to terminate the ongoing MT-SDT procedure and then again perform paging in the RNA. When the UE responds to Paging, the UE’s context will be relocated and the UE will be moved to RRC\_CONNECTED state and only then the new serving gNB will be able to send the DL non-SDT data to the UE. Such procedure will clearly lead to unnecessary signaling overhead and latency in sending, time critical, DL data.  To avoid this, it would be worth allowing the last serving gNB to include an indication in the RRCRelease message informing the UE it should initiate a new resume procedure right-away.  When the UE initiates a new legacy resume procedure, the UE context can be relocated form the last serving gNB to the receiving gNB and the UE can be transitioned to the RRC\_CONNECTED state by reusing the legacy procedure. Hence, we propose the following.  **Proposal 4: When DL non-SDT data arrives during the ongoing MT-SDT procedure, the last serving gNB shall end the ongoing SDT procedure by sending *RRCRelease* message to the UE with an indication to initiate a new Resume procedure to avoid paging there by reducing the signaling overhead and latency for time critical DL non-SDT data transfer.** |

Moderator’s view, this is issue has already been discussed in Rel-17 MO-SDT, but RAN2 does not agree to introduce a new IE in the RRCRelease message.

/////////////// R3-223019//////////////////

**1. Overall Description:**

RAN2 thanks RAN3 for the LS on handling of DL non-SDT during SDT procedure. If DL non-SDT data/signalling arrive during SDT without anchor relocation, RAN2 confirms that anchor gNB could move the UE back to RRC Inactive by using *RRCRelease* message. Then, the UE re-initiates a new RRC Resume procedure (and the network can move the UE to RRC\_CONNECTED) for follow-up data transmission.

On how to trigger UE to re-initiate another RRC Resume procedure, RAN2 discussed the two options mentioned in the RAN3 LS in R2-2202144 and has reached the following agreement:

|  |
| --- |
| As a baseline, for handling the DL non-SDT data/signalling arrival during SDT procedure without anchor relocation: network uses RAN paging to trigger the following-up RRC resume procedure after UE is moved to Inactive state. |

/////////////// R3-223019//////////////////

Then, RAN3 in #116e meeting made the following agreement.

**According to the reply LS [R3-223019], it is agreed not to enhance stage 3 specs.**

**Question 5: For the issue on DL non-SDT data arrives during the ongoing MT-SDT procedure, which option do companies prefer?**

**Option 1: It is the same as DL non-SDT data arrives during ongoing MO-SDT procedure. So, no enhancement is needed.**

**Option 2: The last serving gNB shall end the ongoing SDT procedure by sending RRCRelease message to the UE with an indication to initiate a new Resume procedure to avoid paging there by reducing the signalling overhead and latency for time critical DL non-SDT data transfer.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Option 1**  **Vs**  **Option 2** | **Comment** |
| Lenovo | Option 2 | We see some benefits of option2 to reduce the legacy. Otherwise, the last serving gNB have to buffer the data for a large time taking MT-SDT paging into account. |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

In [8], it states this new issue, the detail is as below.

|  |
| --- |
| In Rel-17, in case DL non-SDT data or DL non-SDT signalling arrives, or the UE assistance information (i.e. UL non-SDT data arrival indication) is received from the UE, the receiving gNB may decide to directly send the UE to RRC\_CONNECTED state by sending the RRCResume message or the last serving gNB completes the SDT procedure and directs the UE to continue in RRC\_INACTIVE state by sending the RRCRelease message.  Compared with Rel-17, there is a new case for DL non-SDT data arrival. The DL non-SDT data arrives at the last serving gNB following the MT-SDT paging procedure before receiving UE Context Retrieval Request message. There are several possibilities to handle the DL non-SDT data:  **Option 1:** The last serving gNB triggers regular paging upon receiving the DL non-SDT data following the MT-SDT paging. It may cause overriding issue since both MT-SDT paging and regular paging are performed at the same time.  **Option 2:** The last serving gNB buffers the DL non-SDT data. If there is no response of the MT-SDT paging for a defined time, the last serving gNB triggers regular paging. Otherwise, the last serving gNB decides to perform SDT with UE context relocation procedure and forwards the DL non-SDT data to the receiving gNB. Upon receiving the forwarded DL non-SDT data, the receiving gNB may send RRCResume message for UE entering RRC\_CONNECTED state.  Option 1 has large impact that is not preferred. For option 2, some clarification on stage 2 may be needed. As further enhancement, DL non-SDT data arrival indication may be added in Retrieval UE Context Response message so that the receiving gNB does not need to wait for data forwarding for triggering RRCResume message for UE entering RRC\_CONNECTED state.   1. The last serving gNB buffers the DL non-SDT data when the DL non-SDT data arrives at the last serving gNB following the MT-SDT paging procedure before receiving UE Context Retrieval Request message. 2. A DL non-SDT data arrival indication may be added in Retrieval UE Context Response message for the last serving gNB triggering RRCResume message earlier. |

**Question 6: For the issue on DL non-SDT data arrives at the last serving gNB following the MT-SDT paging procedure before receiving UE Context Retrieval Request message, which option do companies prefer?**

**Option 1: It is left to gNB implementation.**

**Option 2：The last serving gNB buffers the DL non-SDT data when the DL non-SDT data arrives at the last serving gNB following the MT-SDT paging procedure before receiving UE Context Retrieval Request message, and/or A DL non-SDT data arrival indication may be added in Retrieval UE Context Response message for the last serving gNB triggering RRCResume message earlier.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Option 1**  **vs**  **Option 2** | **Comment** |
| Lenovo | Option 2 | As proponent:  At least, some clarifications on stage 2 are needed.  As further enhancement, DL non-SDT data arrival indication may be added in Retrieval UE Context Response message so that the receiving gNB does not need to wait for data forwarding for triggering RRCResume message for UE entering RRC\_CONNECTED state. |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**Issue 2: TP for 38.300**

Some contributions (e.g., [3], [6], [15], and [17]) provide the TS38.300 procedure.

All of them are the same from step 1 to step 3 as below.

Step 1: Last serving gNB receives DL SDT data/DL SDT signalling.

Step 2: Last serving gNB sends XnAP RAN paging including MT-SDT Information.

Step 3: Receiving gNB triggers Uu MT-SDT Paging.

From step 4, [6], [15] and [17] suggest to reuse MO-SDT. But [3] provides detail steps based on the RAN2 agreement.

In other word, [3] introduce step 4, step 5 and step 6 which are different from MO-SDT and which are agreed by RAN2.

**Step 4: UE decides to initiate MT-SDT procedure.**

Note: It is different from MO-SDT, UE does not need to pre-configure RA-SDT resource and/or CG-SDT resource

RAN2 agreement: 4. Upon receiving MT-SDT trigger, the UE shall initiate SDT procedure if the following checks are satisfied (all these same as Rel-17)

**Step 5: UE sends an RRCResumeRequest for MT-SDT to the receiving gNB.**

Note: It is different form MO-SDT, UE shall send a bit indicator within RRCResumeRequest.

RAN2 agreement: 7. New Resume cause in RRC resume will be introduced, one code point MT-SDT indication

**Step 6: Receiving gNB sends Retrieve UE context request including resume indicator to anchor gNB.**

Note: It is FFS that the resume indicator is either reuse existing SDT indicator or a new MT-SDT indicator or a new Cause value.

Step 7: The same as legacy MO-SDT procedure.

Moderator thinks at least step 4 and step 5 as above are different from MO-SDT procedure, it is suggested to describe at least step 4 and step 5 in the overall MT-SDT procedure.

|  |
| --- |
| 18.X MT-SDT with/without UE context relocation The overall procedure for MT-SDT procedure with/without UE context relocation is illustrated in the figure 18.X-1.    Figure 18.X-1. MT-SDT with/without UE context relocation  1. DL data and/or DL NAS signalling are received at the last serving gNB for the UE in RRC\_INACTIVE state.  2. When receiving DL SDT user data and/or DL SDT NAS signalling, the last serving gNB may send MT-SDT information IE to the neighbour gNBs within the RNA, via XnAP RAN paging message.  *Editor’s Note: FFS on MT-SDT indicator.*  3. The gNB that receives MT-SDT information within the RNA takes into account this information received in the XnAP RAN PAGING message from the last serving gNB to decide whether to trigger MT-SDT Paging.  4. The UE decides to initiate MT-SDT procedure.  5. The UE sends an RRCResumeRequest for MT-SDT to the receiving gNB.  Editor’s note: Based on RAN2 agreement: New Resume cause in RRC resume will be introduced, one code point MT-SDT indication  6. The receiving gNB identifies the last serving gNB using the I-RNTI and retrieves the UE context by means of Xn-AP Retrieve UE Context procedure. The receiving gNB indicates that the UE request is for an MT-SDT.  Editor’ note:  *Editor’s note: It is FFS whether to reuse existing SDT indicator for receiving gNB to indicate that the UE request is for an MT-SDT.*  7. The following steps are the same as Figure 18.2-1/18.3-1 from step 3. Except that the first SDT user data/NAS signalling is DL SDT data and/or DL SDT NAS signalling |

**Question 7: Do companies agree that at least step 5 and step 6 are different from MO-SDT procedure and shall be described in the overall MT-SDT? If yes, do companies agree with overall MT-SDT as above?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| Lenovo | Yes |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**Issue 2: TP for 38.420**

|  |
| --- |
| 5.2.11 Small data transmission function5.2.11.1 General This function supports small data transmission sessions in RRC\_INACTIVE both with and without anchor relocation. 5.2.11.2 Partial UE Context Transfer function The Partial UE Context Transfer function is used for the last serving NG-RAN node to provide part of the UE Context to the receiving gNB. 6.2.12 Small data transmission procedures - Partial UE Context Transfer: enables exchange of information between NG-RAN nodes for SDT transmission without anchor relocation  Small data transmission is also supported by the following procedures:  - RRC Transfer  - Retrieve UE Context Confirm  - RAN Paging |

**Question 8: Do companies agree with the 38.420TP within [8], as above?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| Lenovo | Yes |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

## Other Issues

**Question 9: Do companies have other issues to be discussed? If any, please input them.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

# Conclusion, Recommendations

# References

1. [R3-231186](D:\\会议硬盘\\TSGR3_119bis-e\\Docs\\R3-231186.zip) Signaling enhancements to enable MT-SDT for RRC\_INACTIVE UEs. (Qualcomm Incorporated) discussion
2. [R3-231233](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231233.zip) Introduction of MT-SDT (ZTE, China Mobile, China Telecom) draftCR
3. [R3-231234](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231234.zip) (TP to 38.423, 38.473, 37.483) Introduction of MT-SDT (ZTE) other
4. [R3-231285](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231285.zip) (TP for TS 38.423) Discussion on MT-SDT Open Points (Nokia, Nokia Shanghai Bell, Orange) other
5. [R3-231286](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231286.zip) (TP for TS 37.483) Support of Paging Triggered MT-SDT (Nokia, Nokia Shanghai Bell, Orange) other
6. [R3-231395](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231395.zip) (TPs to TS 38.300, 38.423 BL CRs) Consideration on MT-SDT (Huawei) other
7. [R3-231396](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231396.zip) (TPs to TS 38.401, 38.473 and 37.483 BL CRs) MT-SDT in disaggregated architecture (Huawei) other
8. [R3-231451](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231451.zip) (TP to TS 38.420) Support for Paging-Triggered SDT (Lenovo) other
9. [R3-231527](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231527.zip) Discussion on leftover issues of MT-SDT (Xiaomi) discussion
10. [R3-231581](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231581.zip) Support of MT-SDT in Split Architecture (China Telecom) discussion
11. [R3-231582](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231582.zip) Discussion on MT-SDT Procedure (China Telecom) discussion
12. [R3-231639](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231639.zip) Discussion on MT-SDT open issues (Ericsson) discussion
13. [R3-231640](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231640.zip) (TP to TS 38.473 BL CR for MT-SDT): Support of MT-SDT Paging (Ericsson) other
14. [R3-231671](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231671.zip) Further discussion on MT-SDT (CATT) discussion
15. [R3-231672](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231672.zip) (TP for MT-SDT BL CR to TS 38 300) Support of MT-SDT (CATT) other
16. [R3-231695](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231695.zip) (TP to TS 38.423, 38.473 and 37.483) Support of MT-SDT (LG Electronics) other
17. [R3-231696](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231696.zip) (TP to TS 38.300 and 38.401) MT-SDT Support (LG Electronics) other
18. [R3-231785](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231785.zip) (TP for MT-SDT BLCR to TS 38.401) UE reaction to the Paging (Google Inc.) other
19. [R3-231838](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231838.zip) Discussion of remaining issues on MT-SDT (Samsung) discussion