**[RAN94e-R18Prep-26] SDT (small data transmission) - Version 0.0.4**
**RAN**

3GPP TSG RAN#94e RP-212686

Electronic Meeting, December 06 - 17, 2021

Agenda Item: 8A.1

Source: RAN2 VC (Nokia)

Title: Moderator's summary for discussion [RAN94e-R18Prep-26] SDT (small data transmission)

Document for: Discussion

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# 1 Introduction

## 1.1 Outcome of previous R18 scope discussion

The scope of Small Data Transmission (SDT) (WI) was discussed in the discussion, with the conclusions of that shown in RP-211666 (https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_93e/Docs/RP-211666.zip). The below shows the final status of that discussion.

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The first objective, support for MT SDT, seems agreeable. Other remaining objectives below have Support and some Opposition. Note that there may be points not included below that may warrant further discussion.

Small Data Transmission (SDT) (WI) Areas / Scope:

1. For UEs in RRC INACTIVE State: Support of MT-triggered SDT, Including the procedure to trigger the SDT for MT use case, e.g. enhanced paging [**RAN2**]
2. Backhaul signalling improvements of RA-SDT (to avoid unnecessary UE context fetch and improve the SDT without anchor relocation) [**RAN3**, RAN2]
3. Leftover issues from Rel-17 (likely not be part of Rel-17) [**RAN2**]
    a) Enhancements to prevent data loss and/or out of order delivery of data to upper layers in case of abrupt termination of SDT session (including cell reselection, other radio level failure events such (RLC) retransmission failure etc)
    b) RRC-less SDT (i.e. SDT without the RRC message included in the first UL message)

Note:

- Justifications: 1) enable use of SDT (and related overhead and power consumption benefits) for also MT use cases. 2) reduce backhaul relocation signalling, 3a) enable the use of SDT (and related overhead and power consumption benefits) for services with reliability requirements. 3b) Reduce overhead, possibly for UEs in a single cell.

- Contentious points (observation): The benefits vs complexity of all points except 1 are challenged by multiple (more than 1) companies.
- Priority: If further prioritization is needed among areas above, points 2 and 3b has lowest priority.

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In addition, within the RedCap discussion, there were questions from several companies on whether SDT should work in the same way for normal UEs and RedCap UEs. Whether such considerations are needed has also been added under this discussion.

## 1.2 Scope of the discussion

The goal of the discussion is to understand the nature of the project:

- Clarify the intent of the proposed objectives (i.e. What is the problem an objective aims to solve? What is the scope of the objective in solving the problem?)
- Clarify the size and responsibilities of each objective (i.e. how much effort does each objective require and in which WGs? Who leads the work? Are there any linkages to SA/CT?)
- Determine which objectives could be prioritized if SDT work item would be agreed to Rel-18 (i.e. which objective(s) are the most important ones?)

Some of the above questions may not be treated in each round: The intent of each round is as follows:

- Initial round: Clarify the objective descriptions and the justification for each. Confirm affected WGs.
- Intermediate round: Determine priorities for the objectives, including proposed size of the each objective (in terms of needed TUs) and the support level for the work.
- Final found: Finalize draft WI description, including justification, objectives, affected WGs, TUs, identification of SA/CT impacts (if any).

The remainder of the document is structured according to objectives, and the commenting rounds are handled under each objective.

# 2 Objectives of the proposed work

## 2.1 MT-SDT

### 2.1.1 Initial Round

The objective for MT-SDT was last seen as shown in the introduction:

- *For UEs in RRC INACTIVE State: Support of MT-triggered SDT, Including the procedure to trigger the SDT for MT use case, e.g. enhanced paging [**RAN2**]*

Justification for this was to enable use of SDT (as specified for Rel-17) and related overhead and power consumption benefits for also MT use cases.

Companies are requested to provide feedback for 1) the the justification, 2) objective wording and 3) affected WGs.

**Feedback Form 1: Justification of the objective: What does this objective aim to do?**

**1 – Samsung Electronics Co.**

MT use case was not discussed in Release 17. MT-SDT can have similar benefits (e.g. reduced overhead, power consumption) as MO-SDT.

**2 – Rakuten Mobile**

MT-SDT would be beneficial in cases of enhanced paging which could reduce user latency.

**3 – HUAWEI TECHNOLOGIES Co. Ltd.**

Huawei, HiSilicon MT use case (e.g. for positioning) has similar benefits as the MO use case.

**4 – Motorola Mobility France S.A.S**

**Lenovo, Motorola Mobility**

Since MT SDT is not supported in Rel-17, the UE has to resume the connection with the network (i.e. move to RRC_CONNECTED state) for any DL data triggered transmission (MT), which will lead to unnecessary power consumption and signalling overhead in particular for cases where NW sends small and infrequent DL data packets. MT-SDT can provide similar benefits in terms of power consumption, signalling overhead reduction as MO-SDT. Therefore, support of MT-SDT can be based on MO-SDT feature to enable the complete SDT operation in RRC_INACTIVE state for NR.

**5 – LG Electronics Inc.**

MT-SDT is essential feature to support in R18. It is beneficial from power consumption and signaling overhead point of view, especially for bidirectional communication, e.g. chatting message.

**6 – Asia Pacific Telecom co. Ltd**

Similar to Rel-17 UL(MO) case, if no support of SDT for DL(MT), the NW has to resume the connection of UE (i.e. move to RRC_CONNECTED). Connection setup and subsequently release to RRC_INACTIVE happens for each data transmission where small and infrequent the data packets are. This results in unnecessary power consumption and signalling overhead.

**7 – Spreadtrum Communications**

MT-SDT has the similar benefit as MO-SDT, and it benefits for the UEs with infrequent and periodically data transmission. It can enhance the paging procedure and reduce delay for MT data transmission.

**8 – CATT**

If MT-SDT is supported in Rel-18, it can help to save singaling and ue power consumption as UE does not need to go to connected state first for the data reception.

**9 – Beijing OPPO Com. corp.**

The benefits to support MT-SDT are similiar as MO-SDT, e.g., reducing signalling overhead and power comsumption.

**10 – vivo Mobile Communication Co.**

We agree with Moderator that MT-SDT has similar benefit for MO-SDT, i.e. overhead reduction and power saving.

**11 – LG Uplus**

We agree with the proposal from moderator.

**12 – MediaTek Inc.**

MT-SDT has similar benefit as MO SDT.

**13 – NEC Corporation**

MT-SDT is intended for data transmission without entering of CONNECTED state which triggered by arriving of DL data. It is beneficial for signalling overhead and UE power.

**14 – Ericsson LM**

- Delivery of small DL data from RRC-INACTIVE without transitioning to RRC-CONNECTED to reduce signaling overhead and UE energy consumption.
- Subsequent UL and DL transmissions to support at least application-layer ACK (e.g.: TCP ACK)
- This topic was thourougly discussed for MT-EDT in Rel-16 LTE, and that discussion of the various solutions should be the starting point for the MT-SDT discussion (see e.g. R2-1910420).

**15 – Fujitsu Limited**

MT-SDT has benefits including reduction of signaling overhead, NW and UE power consumptions, and fast DL data transmission.

**16 – Nokia Corporation**

We see that MT-SDT provides similar overhead and power consumption benefits as MO-SDT and MT-SDT should be addressed in Rel-18. MT-SDT would also enable the SDT benefits for new use cases, e.g. network-initiated positioning.

**17 – ZTE Corporation**

We agree with the views expressed above.

MT-SDT is equally important as MO-SDT as other companies explained. Without MT-SDT, the UE has to move to full connected state even for small data packets and incur the additional signalling overhead and power consumption penalties. Thus, the justification is clear and is fully aligned with the MO-SDT work which is part of Rel-17.

**18 – QUALCOMM JAPAN LLC.**

We support this objective.

**19 – Sony Europe B.V.**

It is beneficial to support MT SDT as well, for the sake of reducing power consumption and signaling overhead.

**20 – Philips International B.V.**

We agree with the moderator in that MT-SDT should reduce the overhead and energy consumption of the UE

**21 – Facebook**

We agree with the moderator's proposals on MT-SDT.

**22 – InterDigital**

DL small data was not considered in R17, and support for it should also reduce power consumption and state transitions. DL small data or TCP ACKs can be common in response to UL small data.

**23 – Intel**

Rel-17 SDT enables a mechanism for a UE to initiate SDT when it detects UL data available for SDT configured RBs (i.e. MO kind of traffic). For same reasons (e.g. reduction on signaling overhead, UE's power consumption and latency), we support enabling the mechanism for the network to initiate SDT when it detects DL data available for SDT configured RBs (i.e. MT kind of traffic).

**24 – Apple Computer Trading Co. Ltd**

Similar as the R17 MO-SDT, support of the MT-SDT can bring the benefit of reducing signalling overhead reducing UE power.

**Feedback Form 2: Wording of objective: What should be the scope of this objective?**

**1 – Samsung Electronics Co.**

For UEs in RRC INACTIVE State: Support of MT-triggered SDT, Including the procedure to trigger the SDT for MT use case, e.g. enhanced paging

**2 – HUAWEI TECHNOLOGIES Co. Ltd.**

Huawei, HiSilicon We are fine with above objective as proposed by the moderator.

**3 – Motorola Mobility France S.A.S**

Lenovo, Motorola Mobility

We are also fine with the proposed objective

**4 – LG Electronics Inc.**

We are fine with the objective proposed by moderator.

**5 – Asia Pacific Telecom co. Ltd**

The proposed objective for MT-SDT looks fine to us.

**6 – Spreadtrum Communications**

We are fine with the proposed objective.

**7 – CATT**

The wording from moderator is fine.

**8 – Beijing OPPO Com. corp.**

We are fine with the wording as proposed.

**9 – China Mobile Com. Corporation**

It is beneficial to support MT-SDT in R18.

**10 – vivo Mobile Communication Co.**

We are fine with the objective proposed by moderator.

**11 – LG Uplus**

Also fine with the proposal.

**12 – MediaTek Inc.**

We are also fine with current wording

**13 – NEC Corporation**

We are fine with the current wording.

**14 – Ericsson LM**

”Enhanced paging” should be removed as its meaning is not clear.

Given the discussion on the MT-EDT solution in Rel-16 LTE it is proposed to have a study phase for MT-SDT, not to specify a solution with questionable gains, or severe issues related to e.g. security.

Proposed objectives:

- Study, and specify if found beneficial, downlink initiated transmission of small data (MT-SDT) in RRC_INACTIVE through a RACH-based (e.g.: using MsgB or Msg4) or alternative schemes.
    - The best solution should be determined based on a tradeoff between gains and specification impact/complexity. [RAN2]

- KPIs should include at least the following: signaling reduction in terms of number of message exhanges, UE energy consumption reduction, security, system overhead, downlink latency.
- The release and termination of the procedure should be taken into account, and any assistance information for such (e.g. Release Assitence Indication).
- Subsequent SDT data should only be introduced if clearly beneficial compared to moving the UE to RRC_CONNECTED, in particular in case of an application-layer ACK (e.g.: TCP ACK)

- Trigger of the MT-SDT procedure. [RAN3, RAN2]

**15 – Fujitsu Limited**

We have had also concern to say ”enhanced paging”. Having said that, if this is the only way to develop the WID description, we understand the situation.

**16 – Nokia Corporation**

The moderator’s scope proposal is OK. We would just like to propose small clarification for the objective to make it clear that both RA-SDT and CG-SDT are part of the objective:

*For UEs in RRC INACTIVE State: Support of MT-triggered SDT, Including the procedure to trigger the SDT for* RA-SDT and CG-SDT *MT use case, e.g. enhanced paging [**RAN2**]*

**17 – ZTE Corporation**

We are fine with the proposed wording of the objective (including the clarification from Nokia above).

**18 – QUALCOMM JAPAN LLC.**

We see the clarification from Nokia is useful.

**19 – Sony Europe B.V.**

We are ok with the proposed wording by the moderator.

**20 – Philips International B.V.**

We agree with the proposed wording from the moderator

**21 – Facebook**

We are ok with the proposed wording by the moderator and Nokia’s additional clarification

**22 – InterDigital**

We are fine with the objective wording proposed by moderator with the clarification from Nokia.

No need to include examples of solution details in the objective ”e.g. enhanced paging”

**23 – Intel**

In general, we support current objective and wording. However, we propose to the text that seems redundant and to remove the example part as the word "enhanced Paging" in NR could mean different solutions. That is, as shown below

*"For UEs in RRC INACTIVE State: Support of MT-triggered SDT procedure ~~, Including the procedure to trigger the SDT for MT use case, e.g. enhanced paging~~ [RAN2]"*

**24 – Apple Computer Trading Co. Ltd**

We are fine with above objective as proposed by the moderator. We are also fine with clarification from Nokia which can make it clear.

**Feedback Form 3: Affected WGs: Which WGs (in RAN/SA/CT) would need to work on this objective?**

**1 – Samsung Electronics Co.**

RAN2 and RAN3. Note that some work will be needed in RAN3 for paging enhancement.

**2 – HUAWEI TECHNOLOGIES Co. Ltd.**

Huawei, HiSilicon : [RAN2-led, RAN3]. RAN paging message needs to be transferred from anchor gNB to receiving gNB.

**3 – Motorola Mobility France S.A.S**

Lenovo, Motorola Mobility

RAN2 and RAN3

**4 – LG Electronics Inc.**

RAN2-led, RAN3 secondary

**5 – Asia Pacific Telecom co. Ltd**

RAN2 lead. RAN3 can be involved.

**6 – Spreadtrum Communications**

RAN2 leading, RAN3 maybe involved.

**7 – CATT**

RAN2-led, RAN3 can be secondary.

**8 – Beijing OPPO Com. corp.**

RAN2 and RAN3

**9 – China Mobile Com. Corporation**

Leading WG: RAN2

Secondary WG: RAN3

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|---|
| **10 – vivo Mobile Communication Co.**<br>RAN2(-led) and RAN3 |
| **11 – LG Uplus**<br>RAN2(leading) and RAN3 |
| **12 – MediaTek Inc.**<br>RAN2-led and RAN3 also included |
| **13 – NEC Corporation**<br>RAN2 (leading) and RAN3. |
| **14 – Ericsson LM**<br>RAN 2 (Lead), RAN3, SA3 (security aspects), SA2 |
| **15 – Nokia Corporation**<br>RAN2 leading |
| **16 – ZTE Corporation**<br>RAN2 (leading) and RAN3. We don't think there is or there should be any impact to SA groups. It should be clear that this is for INACTIVE state (i.e. RAN paging is the relevant part). |
| **17 – QUALCOMM JAPAN LLC.**<br>RAN2-led + RAN3 |
| **18 – Sony Europe B.V.**<br>Mainly RAN2 will lead the WI, and RAN3 should also be involved as needed. |
| **19 – InterDigital**<br>RAN2-led, RAN3 secondary if needed |
| **20 – Intel**<br>We support putting only RAN2 as the impacted WG as we have not identified any significant impact to RAN3 (or other WGs). If RAN2 identifies candidate solutions during the initial study phase with impact on other WGs (e.g. RAN3, SA2/CT1), those WGs could be contacted via an LS. If needed a general note can be added at the end on this regard. |
| **21 – Apple Computer Trading Co. Ltd**<br>RAN2-led and RAN3 |

**Summary:** All (24) companies responding support this objective if the WI will happen.

**Justification:** The common view is that MT-SDT objective useful because it allows to

- Reduce signalling overhead by not requiring RRC_CONNECTED for every small DL packet (i.e. remove RRC frequent state transitions)
- Reduce power consumption by reducing the time spent in RRC_CONNECTED
- Reduce latency by allowing fast transmission of (small and infrequent) packets, e.g. for positioning

**Objective:** Companies are fine with the moderator version but 1) some companies would like not to point out solutions (e.g. ”enhanced paging”). 2) some companies would like to clarify that RA-SDT and CG-SDT are both in the scope and 3) some companies would like a study phase.

Whether study phase is needed will affect objective wording only slightly (the wording will indicate ”study, and specify if seen beneficial”): Without study phase, the following encompasses the company comments:

- *Specify the support for DL-triggered SDT (MT-SDT) procedure [**RAN2**, RAN3]*
    - *MT-SDT triggering mechanism for UEs in RRC_INACTIVE;*
    - *Both RA-SDT and CG-SDT are considered;*

If study phase is needed, the following is proposed:

- *Study, and specify if found beneficial, DL-triggered SDT (MT-SDT) procedure, including [**RAN2**, RAN3]*
    - *MT-SDT triggering mechanism for UEs in RRC_INACTIVE;*
    - *Both RA-SDT and CG-SDT are considered;*

**Lead and impacted WGs:** all companies agree that RAN2 is the leading WG, with RAN3 as secondary. Some companies consider that there could be SA2/SA3/CT1 impacts, but the impacts are not clear and need to be discussed in the intermediate round.

**Conclusion 1:** The MT-SDT objective is planned for the Rel-18 SDT scope.

### 2.1.2 Intermediate Round

The intermediate round focuses on determining the following for each objective:

1. Priority
2. Estimated TUs
3. Objective finalization

The proposed objective wording with and without study phase are shown in Table 1 below

**Table 1: Proposed objective wording with/without study phase**

| **Without study phase** | **With study phase** |
|---|---|
| – Specify the support for DL-triggered SDT (MT-SDT) procedure [**RAN2**, RAN3]<br>∘ MT-SDT triggering mechanism for UEs in RRC_INACTIVE;<br>∘ Consider both RA-SDT and CG-SDT; | – Study, and specify if found beneficial, DL-triggered SDT (MT-SDT) procedure, including [**RAN2**, RAN3]<br>∘ MT-SDT triggering mechanism for UEs in RRC_INACTIVE;<br>∘ Consider both RA-SDT and CG-SDT |

Companies are requested to indicate whether the above cases are acceptable, and whether a study phase is needed.

**Feedback Form 4: Finalization of the objective: Does the objective require a study phase? Is the objective wording (from above) acceptable?**

**1 – Samsung Electronics Co.**

”Consider both RA-SDT and CG-SDT” - Does it refer to R17, RA-SDT and CG-SDT procedure? or does it refer to MT-SDT based on a) RACH and b) RACH less using CG resources?

In our view RACH based with initial DL data in Msg4/MsgB and subsequent DL data using DG would be sufficient for MT-SDT.

So suggest to reword the objective as follows:

Specify the support for DL-triggered SDT (MT-SDT) ~~procedure~~ [**RAN2**, RAN3]

- MT-SDT triggering mechanism for UEs in RRC_INACTIVE;
- MT-SDT procedure for initial DL data reception in Msg4/MsgB and subsequent DL data using DG in RRC_INACTIVE ~~Consider both RA-SDT and CG-SDT~~;

**2 – Nokia Corporation**

Quick reply to Samsung’s question on ”Consider both RA-SDT and CG-SDT”. It refers to MT SDT using RACH or CG in UL response (i.e. both would be supported in the specs).

**3 – ZTE Corporation**

The current wording of the objective (without study phase) looks fine to us.

Same view as Nokia that both RA-SDT and CG-SDT should be supported. We think this is obvious because anyway, CG-SDT will be supported from Rel-17 onwards.

Then, we don’t think there is any need split this work item into study phase and work phase as the justification and the solution space seems to be clear (i.e., define the triggering mechanism to support both RA-SDT and CG-SDT based MT traffic for SDT).

**4 – Sierra Wireless**

We feel a study phase is necessary because in Rel 16 MT-EDT was studied but a feasible/ beneficial solution could NOT be agreed which could be the outcome for this NR MT-SDT study as well.

As with Samsung, the wording "Both RA-SDT and CG-SDT are considered;" is also unclear to us. We would not want to make it normative at this point that e.g., CG-SDT is utilized and specified for MT-SDT. A better wording could be:

"At least, study the following random-access methods for possible use with MT-SDT: CFRA, 2-step RA, RA-SDT, and CG-SDT"

**5 – LG Electronics Inc.**

First, we think study phase is not needed. The justification and benefit of MT-SDT are clear.. no need to study more.

Regarding objectives (without study phase), the moderator proposal is fine. One minor clarification may be added "Consider both RA-SDT and CG-SDT **as a UL response**"

**6 – Spreadtrum Communications**

The current objective is fine to us. We support the objective without study phase.

**7 – China Mobile Com. Corporation**

It can be started from WI. The current objective is acceptable for us, and we also support the clarification of LG, "Consider both RA-SDT and CG-SDT **as a UL response**"

**8 – Apple Computer Trading Co. Ltd**

we donot think study phase is needed due to the obvious benefits listed in the justification part. The current description is fine to us.

**9 – Beijing OPPO Com. corp.**

We do not see the necessity of a study phase. Current wording with LG's comments is fine to us.

**10 – Intel**

We prefer not to have "study, and specify if found beneficial" as all companies agree on the benefit of the feature. While we agree that evaluation of the solutions and target scenarios is needed, this can be done within the WI. Therefore **we support the 1st option** but if this is not acceptable to majority of companies, we suggest updating the objective as follow:

"*Evaluate solutions and specify the support for DL-triggered SDT (MT-SDT) procedure [**RAN2,** RAN3]*

**11 – QUALCOMM JAPAN LLC.**

We do not think study is needed and the work can directly addressed by a WI.

On RA-SDT and CG-SDT, we share the same understanding as Nokia.

**12 – Motorola Mobility France S.A.S**

Lenovo/Motorola Mobility

Firstly we think that both RACH-SDT and CG-SDT should be considered for MT-SDT. We don't think that we should exclude potential solutions already at this stage also considering that CG-SDT mechanism is already supported in Rel-17.

Regarding the need for a SI, we don't have a strong opinion whether this is required or not. We would be OK to have a short SI phase if this is preferred by the majority of companies.

**13 – Asia Pacific Telecom co. Ltd**

We also don't consider the study phase is needed since the MT-SDT could be an extension to Rel-17 RA-SDT, CG-SDT, and subsequent transmission. RAN2 could directly discuss the mechanism to trigger the MT-SDT procedure in WI phase.

**14 – Nokia Corporation**

We support work item without study phase with the following updates to the objective text:

Specify the support for paging~~DL~~-triggered SDT (MT-SDT) procedure [**RAN2**, RAN3]

- MT-SDT triggering mechanism for UEs in RRC_INACTIVE;
- ~~Consider~~ Supporting both RA-SDT and CG-SDT procedure for responding paging;

**15 – HUAWEI TECHNOLOGIES Co. Ltd.**

Huawei, HiSilicon We think the moderator wording without a study phase is good. Similar thinking as Nokia, ZTE, etc. We are fine also with the wording improvement from LGE, it would be helpful to have it.

**16 – NEC Corporation**

We don't think a study phase is needed for this objective. For now, it is hard to say if CG-SDT is supported for MT-SDT, we agree with Samsung that it is better that"Consider both RA-SDT and CG-SDT" is removed.

**17 – Ericsson LM**

We don't think MT-SDT will be as beneficial as companies seem to think and we don't see the commercial value (cf. MT-EDT). Therefore, if anything, a study phase is needed to evaluate the feature properly before considering a WI. We earlier referred to Rel-16 discussions on MT-EDT and if similar solutions need to be discussed during Rel-18 we think a study phase is needed in order to evaluate the feasibility and performance of the solutions.

Although the justification for this objective is clear, not all possible solutions that conform to such constraints are necessarily beneficial. For instance, the justifications focus much on not spending time in RRC_CONNECTED, but a potential solution may behave inefficiently while staying in RRC_INACTIVE, thus conforming to the justifications does not imply that MT-SDT is more efficient than the legacy behavior.

Neither the justifications or the proposed objective say anything regarding the details of the procedure or procedures to be defined (e.g.: in which message DL data will be transmitted?) so it cannot be concluded that there is a benefit in specifying any MT-SDT solution without a proper study first.

If it is agreed not to have a study phase first, we should aim to specify a simple solution based on triggering the existing RA-SDT and using Msg4, MsgB and/or subsequent packet transmissions to deliver DL data, based on the conclusions of the Rel-16 MT-EDT work. We agree with Samsung that RA-SDT is sufficient for MT-SDT, so CG-SDT can be excluded from the objective and any other option should be discussed and evaluated first.

**18 – CATT**

We think there is no need for a study phase.

We tend to agree with some previous comment that wording ”both RA-SDT and CG-SDT” can be dropped for now.

**19 – vivo Mobile Communication Co.**

We also think the study phase is not needed, as the motivation and benefit for MT-SDT are clear.

**20 – Rakuten Mobile**

- We Support both RA-SDT & CG -SDT but we should not have study phase .
- Also we feel synch between MO-SDT & MT-SDT should be part of objective to have complete SDT procedure to work in RRC-Inactive state

**21 – Philips International B.V.**

We do not have a strong opinion as to whether a study phase is needed but if there are some discussions about whether to consider CG-SDT or DG-SDT a study phase may be worthwhile to align all companies

As for the wording of the objectives we propose to add some sub bullets points underneath “Consider both RA-SDT and CG-SDT” based on the comment made by Ericsson in the first round: “*The best solution should be determined based on a tradeoff between gains and specification impact/complexity. [RAN2]*

- *KPIs should include at least the following: signaling reduction in terms of number of message exhanges, UE energy consumption reduction, security, system overhead, downlink latency.*
- *The release and termination of the procedure should be taken into account, and any assistance information for such (e.g. Release Assitence Indication).*

*o Subsequent SDT data should only be introduced if clearly beneficial compared to moving the UE to RRC_CONNECTED, in particular in case of an application-layer ACK (e.g.: TCP ACK)”*

It’s also clear this objective has the most support, so it should be the first priority. Companies are requested to provide TU estimate needed for the work.

**Feedback Form 5: How many TUs would be needed for this objective?**

**1 – Samsung Electronics Co.**

For the revised objective as above 3 TUs can be sufficient.

**2 – ZTE Corporation**

6 TUs. Stage 2 design work for 3 meetings, stage-3 CR and finalisation (3 meetings).

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| **3 – ZTE Corporation**<br>RAN2 (leading) and RAN3 |
| **4 – LG Electronics Inc.**<br>At least 6 TUs.. 1 TU / meeting and 6 meetings are needed |
| **5 – Intel**<br>0.5TU/meeting |
| **6 – QUALCOMM JAPAN LLC.**<br>0.5TU/meeting can be a starting point for discussion. |
| **7 – Asia Pacific Telecom co. Ltd**<br>Agree with ZTE. 6 TUs may be better. |
| **8 – Nokia Corporation**<br>We estimate approximately 4-5 TU for RAN2 and 2-3 TU for RAN3 are needed for this (roughly 1 TU per meeting for RAN2 and roughly 0.5 TU per meeting for RAN3). |
| **9 – HUAWEI TECHNOLOGIES Co. Ltd.**<br>Huawei, HiSilicon We think in total this could require around 6 TUs (e.g. 1 TU per meeting, 6 meetings...or 1.5 TUs distributed on 4 meetings). |
| **10 – Ericsson LM**<br>This depends on whether there is a study phase and what is the intended scope. If a WI with a simple solution (Msg4-based) is agreed, then e.g. 1 TU for 4-5 meetings should be sufficient. |
| **11 – CATT**<br>There shoudld be R3 involvment. For R2 it seems 0.5TU per meeting would be sufficient. |

**Summary:** Most companies prefer WI without study phase, with some companies expressing reservations. Since MO-SDT is already being specified, proceeding with WI directly seems possible. Around 0.5-1 TUs / meetuing for RAN2 are needed, with potentially 0-0.5 TU / meeting for RAN3.

**Objective wording:** Many companies support the moderator version but many had also some modification proposals. Most companies think that both MO-SDT (i.e. either RA-SDT and CG-SDT) could be used as response to the MT-SDT triggering, some don't want to mention those, and some think only RA-SDT is needed. However, as some companies commented, both RA-SDT and CG-SDT will be supported in Rel-17 so precluding them could require additional Rel-17 changes. As this has cause so much discussion, it's better to indicate both are supported as the UL response. It was also proposed to clarify that the mechanism for data reception and subsequent data is included, and "DL paging-triggered" is proposed instead of "DL-triggered" to clarify the WI scope. The moderator proposal is shown below:

- *Specify the support for DL paging-triggered SDT (MT-SDT) [**RAN2**, RAN3]*

- *MT-SDT triggering mechanism for UEs in RRC_INACTIVE, supporting RA-SDT and CG-SDT as the UL response;*
- *MT-SDT procedure for initial DL data reception and subsequent DL data in RRC_INACTIVE;*

This wording is the moderator compromise proposal to accommodate comments from multiple companies.

**TU allocation and leading WG:** Everyone agreed in the initial round already that RAN2 would be the leading WG, with some impacts likely in RAN2. For RAN2, 0.5-1 TU / meeting for 4-6 meetings is required. For RAN3, 0-0.5 TU / meeting is proposed, but there is no clear consensus on the RAN3 part. Moderator proposes to clarify this in the final round.

**Conclusion 5:** Adopt the MT-SDT scope as proposed above (with fine-tuning discussed in the Final round) with RAN2 as leading WG and RAN3 as secondary. For TUs, RAN2 will require 0.5-1 TU / meeting and RAN3 0-0.5 TU / meeting (exact proposal to be finalized in the final round).

### 2.1.3 Final round

Based on the intermediate round conclusion, the following is proposed as justification and objective of the WI:

**Justification**

*Rel-16 specified MO-SDT to allow small packet transmission for UL-oriented packets. For DL, MT-SDT (i.e. DL-triggered small data) allows similar benefits, i.e. 1) reducing signalling overhead by not requiring RRC_CONNECTED for every small DL packet (i.e. remove RRC frequent state transitions), 2) reducing UE power consumption by reducing the time spent in RRC_CONNECTED and 3) reducing latency by allowing fast transmission of (small and infrequent) packets, e.g. for positioning.*

**Objective**

- *Specify the support for DL paging-triggered SDT (MT-SDT) [**RAN2**, RAN3]*
  - *MT-SDT triggering mechanism for UEs in RRC_INACTIVE, supporting RA-SDT and CG-SDT as the UL response;*
  - *MT-SDT procedure for initial DL data reception and subsequent DL data in RRC_INACTIVE;*

If companies have any final comments to the justification or objective wording, those can be provided here. Please try to provide exact text to be proposed, and avoid repeating the same arguments.

**Feedback Form 6: Finalization of the justification of the MT-SDT objective**

| |
|---|
| **1 – ZTE Corporation**<br>We would like to thank the moderator! and from our perspective, this objective and justification seems good. |
| **2 – Ericsson LM**<br>The justification is fine in general, but we prefer to emphasize that the overall efficiency of the proce- |

dure (i.e..: gain when comparing to legacy resume) is more important than how much time is spent in RRC_CONNECTED as not spending time in RRC_CONNECTED doesn't necessarily mean the procedure is more efficient.

*Rel-16 specified MO-SDT to allow small packet transmission for UL-oriented packets. For DL, MT-SDT (i.e. DL-triggered small data) allows similar benefits, i.e. 1) reducing signalling* ***w.r.t. legacy Resume Procedure****, 2) reducing UE power consumption* ***by reducing the number of messages exchanged and their duration w.r.t. legacy Resume Procedure*** *and 3) reducing latency by delivering (small and infrequent) packets* ***earlier than it would be possible compared to legacy Resume Procedure****.*

**3 – Sierra Wireless**

Support Ericsson's proposed changes to justification text to make it clear what the base line is.

**4 – LG Electronics Inc.**

We support the moderator's proposal rather than Ericsson proposal. We think MT-SDT may not be related to RRCResume procedure, and don't want to address RRCResume procedure in the objective.

**5 – CATT**

We are generally fine with the bullets.

A minor suggestion to the 2nd sub-bullet is to change to 'subsequent DL/UL data' or 'subsequent data', as it seems no need to restrict in this case only to one direction for the subsequent data.

**6 – CATT**

Please ignore the previous post, as that should be for objs. The justification part looks good to us.

**7 – Asia Pacific Telecom co. Ltd**

We support moderator's proposal instead of Ericsson's one. We think moderator's proposal is clear enough. It seems no need to mention too many details.

**8 – Nokia Corporation**

We support the moderator's proposal.

**9 – Intel**

We think the term "paging-triggered" should not be used in the objective and use instead "MT-SDT" as the actual mechanism of trigger should be discussed in the WG. In addition, the "triggering mechanism" seems to be already implicitly cover as part of the "MT-SDT procedure". On other hand, we should not limit the scope by adding "*supporting RA-SDT and CG-SDT as the UL response*". Therefore we suggest the following update:

"*Specify the support for MT-SDT procedure to convey DL SDT data optionally followed by subsequent UL/DL SDT data in RRC_INACTIVE supporting at least RA-SDT and CG-SDT as the UL response. [****RAN2****, RAN3]*"

**10 – Intel**

We are ok with moderator's suggestion on the justification

**11 – Spreadtrum Communications**

We are fine to moderator's proposal.

**12 – vivo Mobile Communication Co.**

We are fine with moderator's proposal. Just one typo should be fixed: "Rel-16" -> "Rel-17".

**13 – Motorola Mobility France S.A.S**

Lenovo/Motorola

We are fine with the moderator's proposal

**14 – Beijing OPPO Com. corp.**

We support the moderator's proposal.

**15 – HUAWEI TECHNOLOGIES Co. Ltd.**

Huawei, HiSilicon

For benefit 2) in justification, actually we did not get the point very well how it can reduce the time spent in RRC_CONNECTED. Perhaps it is more reasonable to say "reducing power consumption by not transitioning to RRC_CONNECTED". Apart from that, it may be not proper to say "every small DL packet" since small packets from non-SDT RBs are not allowed to use SDT procedure.

Given the above, we have the following wording suggestions:

*Rel-16 specified MO-SDT to allow small packet transmission for UL-oriented packets. For DL, MT-SDT (i.e. DL-triggered small data) allows similar benefits, i.e. 1) reducing signalling overhead and UE power consumption by not transitioning to ~~requiring~~ RRC_CONNECTED for ~~every~~ small DL packets (i.e. remove RRC frequent state transitions), ~~2) reducing UE power consumption by reducing the time spent in RRC_CONNECTED~~ and ~~3)~~ reducing latency by allowing fast transmission of (small and infrequent) packets, e.g. for positioning.*

**16 – ZTE Corporation**

We just wanted to add that the minor edits to the justification provided by Huawei and Ericsson also seem to be fine from our perspective. In any case, the justification of this work could in theory copy the agreed justification text from the SDT Rel-17 WI too. So, final fine tuning of this text can be left to the later stage. It seems anyway there is consensus on the justification of the work and that could be noted along with some basic text as proposed by moderator with some minor edits as suggested by other companies.

**17 – Philips International B.V.**

We agree with the proposed text

**Feedback Form 7: Finalization of the MT-SDT objective wording.**

**1 – ZTE Corporation**

The proposal from the moderator looks good to us. Thank you!

**2 – Ericsson LM**

In general the objectives lacks details on how the procedure is expected to work. In the current version there is still a large number of possibilities that need to be reduced before starting a work phase. Thus, we still think there is a need for a study phase to discuss the options, and down-select. The intention of what should be specified is not clear from the currently listed objectives.

However, if it is clear that data is included in Msg4/B of the SDT procedure, then we are fine with starting with work phase from the beginning.

Legend:

**Added**

~~Removed~~

- *Specify the support for DL paging-triggered SDT (MT-SDT) [RAN2, RAN3]*
  - *MT-SDT triggering mechanism for UEs in RRC_INACTIVE, supporting RA-SDT and CG-SDT ~~as the UL response~~;*
  - *MT-SDT procedure for initial DL data reception* ***during RA-SDT by including data in Msg4/MsgB***
  - ***MT-SDT procedure for reception*** *of subsequent DL data* ***and transmission of UL data*** *in RRC_INACTIVE*
  - ***Conditions for which the MT-SDT procedure guarantees a more efficient transaction compared to the legacy resume procedure.***

**3 – Sierra Wireless**

Agree with Ericsson that the moderators proposed objectives are too vague if we go directly to WI. We need to define where the DL data will be sent e.g. in Msg4 or Msg B [or CG-SDT] but precludes it in the page msg. I think we also need to consider if CFRA (contention free RA) with RA-SDT is supported or not.

**4 – LG Electronics Inc.**

We support the moderator's proposal rather than Ericsson proposal. We think MT-SDT may not be related to RRCResume procedure, and don't want to address RRCResume procedure in the objective. In addition, DL data reception may not be limited to RA-SDT, and we don't want to limit the DL reception to RA-SDT.

**5 – CATT**

We are generally fine with the bullets.

A minor suggestion to the 2nd sub-bullet is to change to 'subsequent DL/UL data' or 'subsequent data', as it seems no need to restrict in this case only to one direction for the subsequent data.

**6 – Asia Pacific Telecom co. Ltd**

We support moderator's proposal instead of Ericsson's one. We think moderator's proposal is clear enough. It seems no need to mention too many details.

**7 – Nokia Corporation**

We support the moderator's proposal.

**8 – Intel**

We think the term "paging-triggered" should not be used in the objective and use instead "MT-SDT" as the actual mechanism of trigger should be discussed in the WG. In addition, the "triggering mechanism" seems to be already implicitly cover as part of the "MT-SDT procedure". On other hand, we should not limit the scope by adding "*supporting RA-SDT and CG-SDT as the UL response*". Therefore we suggest the following update:

*Specify the support for MT-SDT procedure to convey DL SDT data optionally followed by subsequent UL/DL SDT data in RRC_INACTIVE supporting at least RA-SDT and CG-SDT as the UL response. [**RAN2**, RAN3]*

**9 – Spreadtrum Communications**

We are fine to moderator's proposal.

**10 – vivo Mobile Communication Co.**

We think the moderator's proposal is clear enough. One suggestions on 2nd bullet is UL case should also be considered based on the discussion, i.e. "subsequent DL data" -> "subsequent DL and UL data".

**11 – NEC Corporation**

We still think it is too early to conclude that both RA-SDT and CG-SDT are supported as the UL response. This can be decided during the WI. So we prefer to change it to something like "supporting RA-SDT and/**or** CG-SDT" or "decide whether to support both RA-SDT and CG-SDT or RA-SDT only as the UL response".

**12 – HUAWEI TECHNOLOGIES Co. Ltd.**

Huawei, HiSilicon

We should stick to the moderator baseline version.

We only have minor improvement suggestions on that:

Paging is always DL. Also we need to consider the UL subsequent data (e.g. TCP ACK) as they can be the response to initial DL data.

Given the above, the wording suggested is:

*Objective*

*§ Specify the support for ~~**DL**~~ paging-triggered SDT (MT-SDT) [RAN2, RAN3]*

*o MT-SDT triggering mechanism for UEs in RRC_INACTIVE, supporting RA-SDT and CG-SDT as the UL response;*

*o MT-SDT procedure for initial DL data reception and subsequent **UL/** DL data **transmissions** in RRC_INACTIVE;*

**13 – Beijing OPPO Com. corp.**

We also think 'subsequent DL data' shall be rephrased to 'subsequent DL and UL data' in the second bullet.

**14 – ZTE Corporation**

Looking at the comments, we wanted to clarify the following:

- It should be noted that once paged, the UE will respond in UL using RA or CG (depending on conditions that are satisfied at that point as per the Rel-17 baseline). So we shouldn't discuss or preclude

CG response in UL artificially (since this would be a valid response from Rel-17 onwards). So, from this perspective, the current wording from moderator (with some minor editorial updates as suggested by Ericsson or Huawei seems fine).

Then, we are not sure what this objective text would mean "***Conditions for which the MT-SDT procedure guarantees a more efficient transaction compared to the legacy resume procedure***". We think the conditions for SDT should already be clear from the justification part (i.e. it should be used for small data packet in DL and for infrequent data use case). So, given that this is for DL, we think the conditions will be checked by the network side and we think this should all be clear from the justification part. So, if there is anything needed for the justification, we should rather add it to that part than having some objective for this. So, for this, we think the baseline from moderator seems like a good one.

Again, we also think that some minor adjustments can still be made to clarify further justification/objective details. But generally, we think the moderators summary is fairly stable.

**15 – Ericsson LM**

From the replies it seems majority of companies are fine with the current formulation - however it is not acceptable to us to argue a study is not needed when the actual solution which we are to specify is not clear. The current objective is very open and can be interpreted to cover many kinds of solutions, such as sending data earlier than Msg4 for example with CG-SDT. It is not clear how such solution would work (and there is no LTE equivalent solution).

As a reminder, MO-EDT was specified in Rel-15. Then in Rel-16 MT-EDT (at least) three different solutions were discussed: downlink data in paging, data in Msg2 and data in Msg4. All of these have different benefit, complexity and specification impact, and notably different impact in SA2/SA3 and core network in general. It took RAN2 six meetings (from RAN2#103bis to RAN2#107) to converge to specify only data in Msg4 after basically running out of time to consider anything else. And then few more meetings to actually specify the Msg4-based solution.

Therefore, we have a concern with the open interpretation of the current objective formulation, especially if there is no study phase of any kind.

**Final WI Justification wording:** Based on the company comments, the justification was stable for the most part but small clarifications seemed reasonable. As ZTE commented, the main thing should be that the justification is correct and captures the essential aspects. The moderator thinks the following (mostly based on the Huawei proposal) captures the comments from companies:

*Rel-17 specified MO-SDT to allow small packet transmission for UL-oriented packets. For DL, MT-SDT (i.e. DL-triggered small data) allows similar benefits, i.e. 1) reducing signalling overhead and UE power consumption by not transitioning to RRC_CONNECTED and reducing latency by allowing fast transmission of (small and infrequent) packets, e.g. for positioning.*

**Final WI objective wording:** Based on the company comments, most companies were already fine with the moderator proposal but there were some slightly controversial parts. On the study phase, some companies still think studies are needed but moderator thinks that since the MT-EDT has already been done, that will cut down the time and the major alternatives are already known. As most companies anyway agree WI can be done, it is assumed that the options can be determined at WI phase (just like is done for all other WIs with similar objectives). Overall, the moderator thinks that the Huawei proposal seems like the best compromise and captures all the main aspects that are intended in this WI:

*Specify the support for paging-triggered SDT (MT-SDT) [RAN2, RAN3]*

- *MT-SDT triggering mechanism for UEs in RRC_INACTIVE, supporting RA-SDT and CG-SDT as the*

*UL response;*

- *MT-SDT procedure for initial DL data reception and subsequent UL/DL data transmissions in RRC_INACTIVE;*

As this is well-aligned with the moderator proposal that was also acceptable to most companies, the moderator proposes to go with this as the conclusion of this discussion. As ZTE stated, this is not yet the the ”final WI” anyway and minor edits can still be discussed during RAN#94e.

**Conclusion 8:** The WI justification text for the Rel-18 SDT work is proposed as: ”*Rel-17 specified MO-SDT to allow small packet transmission for UL-oriented packets. For DL, MT-SDT (i.e. DL-triggered small data) allows similar benefits, i.e. 1) reducing signalling overhead and UE power consumption by not transitioning to RRC_CONNECTED and reducing latency by allowing fast transmission of (small and infrequent) packets, e.g. for positioning.*”

**Conclusion 9:** The WI objective text for the Rel-18 SDT work is proposed as: ”*Specify the support for paging-triggered SDT (MT-SDT) [RAN2, RAN3]:*

*MT-SDT triggering mechanism for UEs in RRC_INACTIVE, supporting RA-SDT and CG-SDT as the UL response;*

*MT-SDT procedure for initial DL data reception and subsequent UL/DL data transmissions in RRC_INACTIVE”*

## 2.2 Backhaul Signalling enhancements

### 2.2.1 Initial Round

- Backhaul signalling improvements of RA-SDT (to avoid unnecessary UE context fetch and improve the SDT without anchor relocation) [**RAN3**, RAN2]

Justification for this was to reduce backhaul relocation signalling,

Companies are requested to provide feedback for 1) the the justification, 2) objective wording and 3) affected WGs.

**Feedback Form 8: Justification of the objective: What does this objective aim to do?**

| |
|---|
| **1 – Samsung Electronics Co.**<br>This was already discussed in Release 17 and not agreed. So we do not see any need to discuss this again in Release 18. |
| **2 – Rakuten Mobile**<br>SDT without Anchor relocation involves security concerns which was sent by SA3. However there is motivation to reduce backhaul relocation signaling but need to asses impact on user latency. |

**3 – HUAWEI TECHNOLOGIES Co. Ltd.**

Huawei, HiSilicon This was discussed and agreed not to be supported in Rel-17. It was proved to be not essential and there is no need to discuss it again in Rel-18.

**4 – Motorola Mobility France S.A.S**

Lenovo, Motorola Mobility

Since this was already discussed in Rel-17 and not considered as an essential functionality, we also don't see a big motivation to re-discuss it in Rel-18

**5 – LG Electronics Inc.**

We think this is not an essential objective.

**6 – Asia Pacific Telecom co. Ltd**

This issue was discussed in Rel-17 but no consensus and without enough time to have the enhancement. Moreover, this issue has impacts on other WGs. We tend to not re-discuss it again in Rel-18.

**7 – Spreadtrum Communications**

It was discussed in R17 and no consensus was reached. We are not sure what further enhancement can be done in R18.

**8 – CATT**

No clear benefit based on Rel-17 discussions. So it seems not justified to be part of Rel-18.

**9 – Beijing OPPO Com. corp.**

We also agree that it is not an essential feature. We are neutral to discuss as an optimization for anchor without relocation solution.

**10 – China Mobile Com. Corporation**

It has been discussed in R17 and concluded as unessential objective, so we prefer not to repeat similar discussion in R18.

**11 – MediaTek Inc.**

No strong view but it seems not essential to have this.

**12 – NEC Corporation**

We do not see strong need for such enhancement. We think this can be down prioritized.

**13 – Ericsson LM**

In Rel-17 network solutions are being discussed to figure out how to fetch full or partial UE context from the anchor gNB when the anchor is not relocated. In Rel-18, we foresee some benefit by considering a simpler way to support RA-SDT in case of non-anchor relocation.

**14 – Fujitsu Limited**

This was already discussed in Rel-17 and there were no consensus. We wonder how much progress RAN3/2 can make if this topic would be re-discussed.

**15 – Nokia Corporation**

We see backhaul signaling improvements beneficial as without these enhancements UE context fetch will fail if Xn connectivity is missing and UE moves to IDLE. UE context fetch adds latency to the SDT procedure and is power consuming for the UE. Hence unnecessary context fetch should be avoided. Also, SDT without anchor relocation is not likely to be optimized in Rel-17.

**16 – ZTE Corporation**

We agree with Nokia and Ericsson. However, it seems it is hard to get a consensus on this objective unfortunately!

**17 – QUALCOMM JAPAN LLC.**

We do not think this is an essential enhancement.

**18 – Sony Europe B.V.**

We see the benefit to reduce Core network signaling, and think this should be studied by RAN2 and RAN3.

**19 – InterDigital**

This was already discussed in R17 and not included. We don't think this is essential to include it.

**20 – Intel**

In our view this objective is the lowest priority as pointed by other companies this topic was discussed in Rel-17 and the conclusion was not enabled due to the expected impact and the doubts on its actual usefulness.

**21 – Apple Computer Trading Co. Ltd**

The potential benefit is on the network backhaul, e.g. signaling overhead reduction. It could be useful for the one-shot data transmission.

**Feedback Form 9: Wording of objective: What should be the scope of this objective?**

**1 – Ericsson LM**

Not clear what "unnecessary" UE context fetch means. If the intention is to avoid any UE context fetch then the "unnecessary" should be removed.

- Identify the benefits of no UE context fetch in the scenario of without anchor relocation.
  - Specify mechanism to support the above with minimized network efforts

| |
|---|
| **2 – Nokia Corporation**<br>The scope in the moderator summary above is ok in our view. We could also add "to facilitate multi-hop context fetch" like discussed earlier. |
| **3 – ZTE Corporation**<br>We think the existing wording from moderator is okay in case we pursue this. |
| **4 – Sony Europe B.V.**<br>Study and specify enhancements to support signaling parameters to avoid unnecessary anchor relocation. |
| **5 – Intel**<br>Our preference is not to include this objective for Rel-18. However, if majority of companies support including it, we suggest adding a note indicating that it is a lowest priority one to be address if time permits. |
| **6 – Apple Computer Trading Co. Ltd**<br>We are fine with the objective description as proposed by the moderator. |

**Feedback Form 10: Affected WGs: Which WGs (in RAN/SA/CT) would need to work on this objective?**

| |
|---|
| **1 – Ericsson LM**<br>RAN3 (Lead), RAN2, SA3 |
| **2 – Nokia Corporation**<br>This should be RAN3-led, some potential impacts in RAN2 too |
| **3 – ZTE Corporation**<br>This should be RAN-3 led with potential input from RAN2. No impact fore seen on any other groups. |
| **4 – Sony Europe B.V.**<br>RAN2, RAN3, and potentially SA2 |
| **5 – Intel**<br>If majority of companies support including this objective, we are OK having RAN3 and RAN2 as impacted WGs. Further, we think SA3 would also need to work on this objective. For this scenario where anchor relocation is performed in the middle of an ongoing SDT procedure, which is very likely to be needed to make this objective useful, the summary of the email discussion 507 (R2-2107292) captured that SA3 needs to be contacted to check if the security key needs to be updated in order to meet SA3 requirement that the same security key is not re-used in two nodes or not. |
| **6 – Apple Computer Trading Co. Ltd**<br>RAN3-led + RAN2 |

**Summary:** Slightly more than half of companies responding (12 vs. 9) see this objective as not needed

(repeating Rel-17 discussions) or not essential for Rel-18. The supporting companies see it mainly as network-side enhancement, i.e. RAN3-only topic, but with some RAN2 impacts. Given that the objective has very strong opposition, the moderator proposes to either consider it as RAN3-only topic (if there are TUs for it), or completely drop it from Rel-18 work.

**Justification:** Based on the comments (from proponents), the following is seen as justification for this objective:

*If UE context fetch fails (e.g. due to missing Xn connectivity), UE moves to IDLE. which adds latency and power consumption to the SDT. Network solutions to allow full or partial UE context from anchor gNB (without anchor relocation) could be beneficial.*

**Objective:** The proposed objective wording is shown below:

- *Identify the benefits of avoiding UE context fetch in the scenario of without anchor relocation and specify mechanism to support it [**RAN3**]*

**Lead and impacted WGs:** The objective should be limited to RAN3 only.

**Conclusion 2:** Discuss whether RAN3-only backhaul signalling enhancements can be planned for the Rel-18 SDT scope.

### 2.2.2 Intermediate Round

Companies are requested to provide views on whether RAN3-only backhaul signalling enhancements for SDT can be considered, or whether it's better to just drop the topic entirely.

**Feedback Form 11: Do companies support backhaul enhancements for SDT be considered for Rel-18 as RAN3-only work?**

| |
|---|
| **1 – Samsung Electronics Co.**<br>We prefer to not discuss this again in R18. |
| **2 – ZTE Corporation**<br>Depends on the majority view and the availability of TUs in RAN3. We are generally supportive of this objective. |
| **3 – Spreadtrum Communications**<br>We think it is not an essential enhancement and prefer to not support it in R18. |
| **4 – Apple Computer Trading Co. Ltd**<br>No context fetch procedure can reduce the latency in the one-shot transmission scenario. We are fine to have it as the RAN3-only work. |
| **5 – Beijing OPPO Com. corp.**<br>It is a feature for optimization and we prefer to drop it from R18 SDT. |

**6 – LG Electronics Inc.**

We think this objective is not essential, but don't have strong view. If this objective is pursued, RAN3-only work is fine.

**7 – Intel**

In our understanding it is difficult to limit the scope to RAN3 e.g. the solution/issues discussed in Rel-17 also had RAN2 impact, as well as other WGs e.g. SA3. Our preference is not to include it but as there is some support to include it, our suggestion is to treat any RAN2 impacting solutions with lower (or second) priority.

**8 – QUALCOMM JAPAN LLC.**

We do not support this to be worked on. Our proposal is to target a small/focused WI only covering MT-SDT.

**9 – Motorola Mobility France S.A.S**

Lenovo/Motorola Mobility

We prefer not to re-discuss this in Rel-18

**10 – Asia Pacific Telecom co. Ltd**

We prefer not to re-discuss this issue since it's more like an optimization.

**11 – Nokia Corporation**

In our view backhaul signalling enhancements would be beneficial and could be limited to RAN3-only objective.

**12 – NEC Corporation**

We are not fine to have this in Rel-18 scope. If some companies want to include it as one low priority objective, it can be RAN3-only and should not introduce a solution having RAN2 impact (if it can be avoided by another solution).

**13 – HUAWEI TECHNOLOGIES Co. Ltd.**

Huawei, HiSilicon We are indeed surprised to have a Intermediate round of discussion on this proposed objective. From the first round of comments, the support was limited to around (or less then) 30% of the companies only. We think the purpose of this objective is unclear and comments from different companies prove they interpret it differently. In general, if there is no Xn interface, then there is no context fetch, neither for SDT nor for normal resume. This has nothing to do with SDT and should not be included in this WID.

**14 – Ericsson LM**

We do not think the use case mentioned in the justification is a realistic one (e.g. absence of Xn connectivitiy during the time frame when R18 enhancements would be implemented is doubtful). Also, we do not think the impact would be contained only to RAN3 for this objective. We support dropping this form Rel-18 scope.

| |
|---|
| **15 – CATT**<br>As previously commented, we do not see this essential for Rel-18. |
| **16 – Rakuten Mobile**<br>Yes we agree that this belongs RAN3 only. |

If there is sufficient support, the estimated amount of (RAN3) TUs should also be understood.

**Feedback Form 12: How many TUs would be required for this objective (in RAN3)?**

| |
|---|
| **1 – ZTE Corporation**<br>3 TUs in RAN3 |
| **2 – Nokia Corporation**<br>We estimate 2-3 TU for RAN3 are needed for this ( roughly 0.5 TU per meeting for RAN3) |

**Summary:** There is more opposition (11) less support (5) for the RAN3-only objective than in the initial round. Hence, there is no consensus to include this objective so moderator proposes not to consider this for the Rel-18 scope (also to keep the WI scope manageable).

**Conclusion 6:** The backhaul signalling enhancements are not planned for the Rel-18 SDT scope.

### 2.2.3 Final Round

If companies have any final comments to the conclusion 6, those can be provided here.

**Feedback Form 13: Comments to the proposed conclusion to not consider backhaul signalling enhancements in the Rel-18 SDT scope?**

| |
|---|
| **1 – ZTE Corporation**<br>Given the status of the level of support, we accept the moderator's way forward. |
| **2 – Sierra Wireless**<br>Support moderators way forward |
| **3 – CATT**<br>We support the moderator's suggestion. |
| **4 – LG Electronics Inc.**<br>We support moderator proposal |

| |
|---|
| **5 – Nokia Corporation**<br>We support the moderator's proposal. |
| **6 – Intel**<br>We are ok with moderator's suggestion. |
| **7 – Spreadtrum Communications**<br>Agree with moderator's proposal. |
| **8 – Asia Pacific Telecom co. Ltd**<br>We support moderator's proposal |
| **9 – Motorola Mobility France S.A.S**<br>Lenovo/Motorola Mobility<br>We support conclusion from moderator |
| **10 – HUAWEI TECHNOLOGIES Co. Ltd.**<br>Huawei, HiSilicon We agree with the moderator proposed conclusion |
| **11 – Beijing OPPO Com. corp.**<br>We support moderator's proposal. |

**Summary:** All responding companies can accept the moderator proposal.

## 2.3 R17 SDT leftover topics

### 2.3.1 Initial Round

- *Leftover issues from Rel-17 (likely not be part of Rel-17) [**RAN2**]*

  a) *Enhancements to prevent data loss and/or out of order delivery of data to upper layers in case of abrupt termination of SDT session (including cell reselection, other radio level failure events such (RLC) retransmission failure etc)*
  b) *RRC-less SDT (i.e. SDT without the RRC message included in the first UL message)*

Justification for this was to allow continuing work on topics that didn't finalize in Rel-17. The specific justifications were:

a) Enable the use of SDT (as specified for Rel-17) and related overhead and power consumption benefits for services with reliability requirements.
b) Reduce signalling overhead, possibly for UEs in a single cell.

Companies are requested to provide feedback for 1) the the justification, 2) objective wording and 3) affected WGs.

**Feedback Form 14: Justification of the objective: What does this objective aim to do?**

**1 – Samsung Electronics Co.**

Prevention of data loss was already discussed in Release 17 and not agreed. In our view this has limited benefits and not essential to repeat the discussion again in Release 18.

RRC-less SDT was prioritized in Release 17. RRC-less is intended to reduce signaling overhead for low mobility UEs. However, Release 17 already support CG-SDT for low mobility UEs. So another solution is not essential for Release 18.

**2 – Rakuten Mobile**

We do see benefits of prevention of data due to anchor relocation in Rel18.
We agree with Samsung's feedback that CG-SDT is sufficient counter RRC-less SDT.

**3 – HUAWEI TECHNOLOGIES Co. Ltd.**

Huawei, HiSilicon Both a) and b) were discussed and agreed not to be supported in Rel-17. They were proved to be not essential and there is no need to discuss them again in Rel-18.

**4 – Motorola Mobility France S.A.S**

Lenovo, Motorola Mobility

We see some benefits for the support of RRC-less SDT in terms of reduced signaling. Therefore we agree to include this in Rel-18.

Prevention of data loss provides in our understanding only limited benefits and hence we don't see a big motivation to re-discuss it in Release 18.

**5 – LG Electronics Inc.**

We are neutral on this. The a) could be considered in R18 with second priority after MT-SDT, if TU allows.

**6 – Asia Pacific Telecom co. Ltd**

We support to further discuss RRC-less SDT in Rel-18. In Rel-17, RRC-less SDT was de-prioritized due to lack of time. However, we see the benefit from introducing RRC-less SDT, such as signalling overhead reduction.

**7 – Spreadtrum Communications**

There are not enough time to discuss the two objectives in R17, but they benefit for data loss, reduce data transmission delay and signalling overhead for the SDT procedure. We support to further study a) and b) in Rel-18.

**8 – CATT**

For a and b we do not see a strong need as those has been discussed but not included in R17.

We think one Rel-17 left-over issue that can be considered is to support anchor relocation during SDT procedure. The Rel-17 mechanism is suboptimal as in the case UE just ends the SDT procedure, goes back to idle, and triggers RRC Resume procedure again. This can be improved by just using a message from the network to move UE to the connected state directly. The benefits include saving Uu overhead as well as reducing the latency. It would be good to get companies' view on this potential work.

**9 – Beijing OPPO Com. corp.**

For the enhancements related to prevent data loss, we do not think it is a leftover from R17 since it has been resolved, e.g., UE goes to IDLE. For RRC-less solution, we are netural to continue the discussion in R18, maybe in lower priority.

**10 – NEC Corporation**

We think it is reasonable to work on these leftovers from Rel-17. For a) there is interest from companies to support in Rel-17 discussion, however not supported due to lack of time, so it is fair to continue. Regarding b) RRC-less SDT, we would like to evaluate the benefit and effort first before deciding whether to support it. We are fine to mark this as low priority but want to keep it.

**11 – MediaTek Inc.**

For ”Prevention of data loss”, we also see limit benefit to have it. We do have some sympathy on RRC-less solution and fine to support this if TU is enough.

**12 – Ericsson LM**

In general both a) and b) were considered not essential in Rel-17 so no need to prioritize them in Rel-18. There are already two flavors of SDT specified in Rel-17 and we do not see motivation to add yet another.

If time allows a) can be investigated to avoid fallback to RRC_IDLE in case of an abrupt termination of the SDT session (e.g.: if UE does cell reselection, it should continue/resume the SDT session in the new cell while staying in RRC_INACTIVE)

**13 – Fujitsu Limited**

The main reason that RRC-less was de-prioritized in Rel-17 was due to lack of time for standardization, meaning detailed technical discussion was not actually taken. It is good to include this topic in Rel-18.

**14 – ZTE Corporation**

We agree with the justifications mentioned by the moderator above. However, given that we need to finalise the Rel-18 objectives soon, and given the feedback above, it seems it is hard to garner enough support for this.

We agree with Ericsson that if time allows the objective to avoid fallback to RRC_IDLE is worth pursuing.

**15 – QUALCOMM JAPAN LLC.**

We do not see this is an essential enhancement.

**16 – Sony Europe B.V.**

How to prevent data loss was discussed in Rel-17, but due to lack of time the issue has not been addressed sufficiently. We think there is a room for enhancement to avoid the data loss, for example *cell reselection (i.e. to avoid fallback to RRC_IDLE).*

For RRC-less, the gain is marginal as CG-SDT can be used instead.

**17 – InterDigital**

We see benefits to prevent small data loss upon mobility or link failures. We also see benefits in reducing the SDT PDU overhead, as RRC messageis required in each transmission. These can be included in the WI if time allows.

**18 – Intel**

We support these objectives. For the justification part, we suggest adding further details from R2-2104221 on "Discussion on the support of the RRC-less SDT" (which was also cosigned by Xiaomi Communications, Intel Corporation, ASUSTeK, Fujitsu, MediaTek, Apple, Spreadtrum Communications). For example the following part:

*"Identified advantages of the RRC-less solutions are:*

- *Latency reduction: The UE can send data directly in the CG without any signalling. The data can be processed immediately and sent to UPF by the gNB. In case of CU-DU split, data can be sent directly to CU-UP immediately upon receipt in DU as the network would not need to establish a new UE context in DU or the tunnels between the DU and CU-UP (i.e. they could be maintained while UE is in RRC_INACTIVE).*
- *Signaling reduction: RRCResumeRequest or RRCRelease messages are not exchanged for every SDT session. This also reduces the overhead in the CG allowing bigger payload to be sent. In case of CU-DU split, there is minimal CU-CP involvement or signalling when doing SDT.*
- *Power/processing saving: The user plane protocol stack can be re-used, (including both configurations and instances) potentially without re-establishment. The UE power consumption due to the companion L1/L2 signalling (including DCI for scheduling, UCI for HARQ feedback, RLC ACK) for the DL confirmation message can be avoided when the L1 ACK is used."*

In addition, RRC-less can be applied with first objective of MT-SDT to bring further benefits.

**19 – Apple Computer Trading Co. Ltd**

We support both leftover issues since they were excluded from R17 scope just due to lack of time.

Prevention of the data loss during the mobility and SDT failure can also bring the benefit on 1) the interruption time (due to mobility and SDT failure) reduction and 2) the signaling reduction. If UE doesnot fallback to IDLE mode, the NAS signaling and CN signaling can be avoided).

RRC-less SDT can bring the benefit of latency reduction, signaling overhead reduction and UE power saving.

**Feedback Form 15: Wording of objective: What should be the scope of this objective?**

**1 – ZTE Corporation**

Current wording from moderator looks fine.

**2 – Sony Europe B.V.**

Current wording for a) is fine.

| |
|---|
| **3 – Intel**<br>We support keeping both objectives a) and b) and the wording seems ok. |
| **4 – Apple Computer Trading Co. Ltd**<br>We are fine with the current description of both objectives a) and b) as proposed by moderator. |

**Feedback Form 16: Affected WGs: Which WGs (in RAN/SA/CT) would need to work on this objective?**

| |
|---|
| **1 – Ericsson LM**<br>RAN2 (Lead), RAN3, SA3 (security) |
| **2 – ZTE Corporation**<br>RAN2(lead), RAN3 and solution may need to be checked with SA3 (similar to how we have it in Rel-17) |
| **3 – Sony Europe B.V.**<br>RAN2 will lead the WI. RAN3 and SA3 will be involved as well. |
| **4 – InterDigital**<br>RAN2-led, RAN3 and SA3 secondary if needed |
| **5 – Intel**<br>Lead WG should be RAN2 for both objectives a) and b). Other impacted WGs: RAN3 should be added for objective a).<br>Furthermore, for objective a), this scenario where remains in RRC_INACTIVE upon detecting a failure of the SDT procedure, the summary of the email discussion 507 (R2-2107292) captured multiple inter-dependencies with SA3 and CT1 to be addressed which could be worked via LSs. |
| **6 – Apple Computer Trading Co. Ltd**<br>RAN2-led + RAN3 |

**Summary:** Many companies (15 vs. 4) could support some part of the objective but the views are split on which part of the objective.

**Justification:** For the RRC-less, the justification (from http://3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_113bis-e/Docs/R2-2104221.zip) is stated below:

*The RRC-less solutions are beneficial for*

- *Latency reduction: The UE can send data directly in the CG without any signalling. The data can be processed immediately and sent to UPF by the gNB. In case of CU-DU split, data can be sent directly to CU-UP immediately upon receipt in DU as the network would not need to establish a new UE context in DU or the tunnels between the DU and CU-UP (i.e. they could be maintained while UE is in RRC_INACTIVE).*

- *Signaling reduction: RRCResumeRequest or RRCRelease messages are not exchanged for every SDT session. This also reduces the overhead in the CG allowing bigger payload to be sent. In case of CU-DU split, there is minimal CU-CP involvement or signalling when doing SDT.*
- *Power/processing saving: The user plane protocol stack can be re-used, (including both configurations and instances) potentially without re-establishment. The UE power consumption due to the companion L1/L2 signalling (including DCI for scheduling, UCI for HARQ feedback, RLC ACK) for the DL confirmation message can be avoided when the L1 ACK is used."*

**Objective:** The objectives proposed seen mostly agreeable. Several companies indicate that having these as secondary priorities could be acceptable, hence that is proposed explicitly:

- *As secondary priority: Leftover issues from Rel-17 [**RAN2**, RAN3]*
  - *Enhancements to prevent data loss and/or out of order delivery of data to upper layers in case of abrupt termination of SDT session (e.g. avoid fallback to RRC_IDLE)*
  - *RRC-less SDT (i.e. SDT without the RRC message included in the first UL message)*

**Lead and impacted WGs:** all companies agree that RAN2 is the leading WG, with RAN3 as secondary. SA3 involvement may also be needed, similar as for the MT-SDT objective.

**Conclusion 3:** Discuss further whether some R17 leftovers can be considered in the Rel-18 SDT scope.

### 2.3.2 Intermediate Round

The intermediate round focuses on determining the following for each objective:

- Priority
- Estimated TUs
- Objective finalization

The proposed objective wording is shown below:

- *As secondary priority: Leftover issues from Rel-17 [**RAN2**, RAN3]*
  - *Enhancements to prevent data loss and/or out of order delivery of data to upper layers in case of abrupt termination of SDT session (e.g. avoid fallback to RRC_IDLE)*
  - *RRC-less SDT (i.e. SDT without the RRC message included in the first UL message)*

Companies are requested to indicate whether the above cases are acceptable, and if not, which would be acceptable parts.

**Feedback Form 17: Is the objective wording acceptable or any changes required?**

**1 – Samsung Electronics Co.**

As indicated in initial round, in our view these objective are not essential for R18.

**2 – ZTE Corporation**

We support this work and the wording seems fine (especially the objective on data loss prevention), however, it is important to understand the level of support for this work before deciding whether to proceed.

**3 – Sierra Wireless**

In general setting priorities within a WI is not a good way to go as it is difficult for WG to manage those priorities, so it is better to have a WI which fits the TUs without prioritization.

To accomplish this our compromise proposal is to:

· Keep the data loss objective – as more companies supported this

· Drop the RRC-less SDT objective – as other have mentioned, the performance improvement over Rel17 CG-SDT is marginal.

**4 – Spreadtrum Communications**

We support this objective and the wording is fine to us.

**5 – Apple Computer Trading Co. Ltd**

We are fine with the current objective wording.

**6 – Beijing OPPO Com. corp.**

It has been agreed that UE would go RRC_IDLE for abrupt termination of SDT, so we suggest to remove the '*e.g. avoid fallback to RRC_IDLE* ' from the first bullet.

**7 – Intel**

We are ok with current wording and suggestion considering companies' views provided during the 1st phase. Minor editorial, we suggest changing the wording of "*secondary priority*" to "*lower priority (i.e. dependent on time/progress)*". In addition, we understand that there is larger support for RRC-less SDT mechanism.

**8 – LG Electronics Inc.**

We are neutral on this objective.

Regarding data loss objective, if it is included, we prefer to remove "out of order delivery" as follows.

*Enhancements to prevent data loss ~~and/or out of order delivery of data to upper layers~~ in case of abrupt termination of SDT session (e.g. avoid fallback to RRC_IDLE)*

**9 – QUALCOMM JAPAN LLC.**

We do not support any additional work from this category.

| |
|---|
| **10 – MediaTek Inc.**<br>We do NOT support the data loss objective |
| **11 – Motorola Mobility France S.A.S**<br>Lenovo/Motorola<br>We would support to discuss/study at least RRC-less SDT in Rel-18 |
| **12 – Nokia Corporation**<br>The moderator's proposal is acceptable for us although this is not high priority objective in our view. |
| **13 – Asia Pacific Telecom co. Ltd**<br>We only support further discuss RRC-less SDT in Rel-18. |
| **14 – NEC Corporation**<br>We are with the current wording. |
| **15 – NEC Corporation**<br>We are fine with the current wording. |
| **16 – HUAWEI TECHNOLOGIES Co. Ltd.**<br>Huawei, HiSilicon As indicated in first round, these objectives are not essential and should not be included in the WID. Repetitive discussion should be avoided. If something requires SI phase, then this is RRC-less SDT. Neither feasibility nor gains were proven in Rel-17 as there was no time to discuss it, so it's hard to say it is a "Rel-17 leftover" because of this. There can also be other ways of decreasing overhead of CG-SDT, other than RRC-less SDT. |
| **17 – Ericsson LM**<br>We are OK with the data loss objective.<br><br>For RRC-less, as stated earlier, we think this is yet another solution for SDT where we already specify two solutions during Rel-17. We also think RRC-less has more impact that has been brought up and that the relative gains on top of the existing mechanisms are not worth the effort. Thus, we don't support this objective. |
| **18 – CATT**<br>As previously commented, we do not see these essential for Rel-18. |
| **19 – Rakuten Mobile**<br>We support defined objectives .However please remove "out of order delivery". If required we can add Data duplication . |

Additionally, the TU estimate for this objective should be understood, including how it could be done: Since it's proposed as a second priority, would it be only done after the other objectives are completed?

**Feedback Form 18: How many TUs would be needed for this objective? Would the work be done in parallel with other objectives or after the other objectives?**

| |
|---|
| **1 – ZTE Corporation**<br>For the data loss prevention, 1.5 additional TUs in RAN2 and 1 additional TU in RAN3 may be required to accommodate this in addition to the MT-SDT objective. |
| **2 – Intel**<br>Companies already provided impact on the solution preference/direction e.g. as part of email discussion 507 (R2-2107292) for objective a) and as part of companies TDocs e.g. R2-2104221 for objective b). Therefore the required TUs might not be as high. For example 0.5TU/meeting for each topic at the beginning and when the solution details are more clear 0.25TU/meeting |
| **3 – LG Electronics Inc.**<br>For the data loss objective, 3 TUs are needed.. 1 TU / meeting and 3 meetings. |
| **4 – Nokia Corporation**<br>We estimate 2-5 TUs for RAN2 and 1-3 TU for RAN3 for these (depending on the scope, roughly 0.5-1 TU per meeting for RAN2 and roughly 0-0.5 TU per meeting for RAN3). |
| **5 – NEC Corporation**<br>We think 3 TUs for RAN2 are required for this objectives. This could be done in parallel with other objectives. |

**Summary:** There is support (11) for both objectives (with modifications) but also strong opposition (7) to include this objective. Some supporting companies (5) only support one of the objectives and not the other, so attempting to remove either would be controversial. There is also not a great deal of inputs given to the TU estimations. Given the same discussion repeated during the initial round and the level objections increased, there is no clear consensus to include this objective and moderator proposes not to consider it for Rel-18 SDT scope.

**Conclusion 7:** Neither the RRC-less SDT nor avoiding data loss with SDT is planned in the Rel-18 SDT scope.

### 2.3.3 Final Round

If companies have any final comments to the conclusion 7, those can be provided here.

**Feedback Form 19: Comments to the proposed conclusion to not consider R17 leftover topics in the Rel-18 SDT scope?**

| |
|---|
| **1 – ZTE Corporation**<br>Given the level of support, we can accept the moderator's proposed conclusion. |

| |
|---|
| **2 – Sierra Wireless**<br>Support moderators way forward |
| **3 – CATT**<br>We support the moderator's suggestion. |
| **4 – LG Electronics Inc.**<br>We are ok with moderator proposal |
| **5 – KT Corp.**<br>Considering the number of supporting companies, we are fine with moderator's proposal. |
| **6 – Nokia Corporation**<br>We can accept the moderator proposal. |
| **7 – Intel**<br>Considering the views provided in the initial and intermediate phase, we understand that there is a larger interest to enable RRC-less SDT mechanism. We suggest including this as a low priority objective and with an initial evaluation phase to discuss the concerns raised by not supportive companies |
| **8 – Spreadtrum Communications**<br>We can accept the moderator's proposal, if not enough companies support it. But we agree with Intel's suggestion to have a lower priority objective for it. |
| **9 – Asia Pacific Telecom co. Ltd**<br>We support this conclusion. |
| **10 – HUAWEI TECHNOLOGIES Co. Ltd.**<br>Huawei, HiSilicon We agree with the moderator proposed conclusion |
| **11 – Beijing OPPO Com. corp.**<br>We support moderator's proposal. |

**Summary:** Most responding companies can accept the moderator proposal. One company still wanted to have RRC-less SDT as low priority objective, but moderator thinks there isn't enough support for that so the conclusion stands.

## 2.4 SDT with RedCap

### 2.4.1 Initial Round

The discussion under RedCap thread in RAN#93e seemed to be about whether RedCap UEs could use SDT differently than normal UEs. The justification and objective for this should be clarified as it was not discussed

before in details.

Companies are requested to provide feedback for 1) the the justification, 2) objective wording and 3) affected WGs.

**Feedback Form 20: Justification of the objective: What does this objective aim to do?**

| |
|---|
| **1 – Samsung Electronics Co.**<br>In our understanding RedCap UEs can use the SDT procedure defined in Release 17. |
| **2 – HUAWEI TECHNOLOGIES Co. Ltd.**<br>Huawei, HiSilicon SDT design is common between normal UEs and RedCap UEs, i.e. there is no restriction about which type of UE uses SDT. Except for reusing the existing SDT procedure, we did not see any essential special enhancements that are required for RedCap UEs. |
| **3 – Motorola Mobility France S.A.S**<br>Lenovo, Motorola Mobility<br>We also agree with others that RedCap UEs can also use SDT (Rel-17). |
| **4 – LG Electronics Inc.**<br>We don't understand what this objective for. The SDT design should be common to all UEs, including REDCAP UEs. We don't see any need to have a REDCAP specific objective here. |
| **5 – Asia Pacific Telecom co. Ltd**<br>We are wondering whether RedCap UE can trigger "RA-SDT" or not. In our understanding, RACH resources may be separated into "Redcap" purpose and "SDT" purpose respectively. If the Redcap UE initiates a RA with "Redcap" RA resource, it may not be able to initiate RA-SDT. RACH partitioning is still discussing in RAN2, probably we should wait the progress of that to know whether this can be supported in Rel-17. |
| **6 – Spreadtrum Communications**<br>From our understanding, RedCap UE can perform SDT. Not sure what can be further studied in Rel-18 for RedCap SDT. |
| **7 – CATT**<br>It is unclear what is the gap with redcap UE. |
| **8 – Beijing OPPO Com. corp.**<br>RedCap UEs can use the SDT procedure defined in Release 17. |
| **9 – vivo Mobile Communication Co.**<br>We donot see any difference for RedCap UEs to use SDT from non-RedCap UEs. The current Rel-17 and potential Rel-18 SDT procedure could used by RedCap naturally. |

**10 – NEC Corporation**

We do not see need of specific handling for SDT with RedCap, compared to normal UEs. RedCap UEs can apply, if supported, SDT similar to the normal UE. One possible difference is how to indicate SDT with RedCap via Msg1, but this is to be clarified under discussions on common RACH configuration for partitioning in Rel-17.

**11 – MediaTek Inc.**

We are not sure what is proposed here. We understand that R17 SDT procedure could also be used for Redcap UE.

**12 – Ericsson LM**

In our understanding there is no good reasons for RedCap UEs to use SDT differently compared to non-RedCap UEs.

**13 – Fujitsu Limited**

Our understanding is that SDT is feature thar is applicable to both normal UE and RedCap UE without any restrictions.

**14 – Nokia Corporation**

In our view it is important to check and ensure SDT compatibility for RedCap UEs. For instance, in Rel17 different conditions (RSRP threshold, data volume threshold etc) will be specified for SDT validity check. In our view the same threshold values are not suitable for RedCap and non-RedCap due to RedCap limitations. In addition, based on SA2 agreements it seems that SDT will work only with eDRX cycle less than 10.24.

**15 – QUALCOMM JAPAN LLC.**

It is our understanding that SDT is applicable also to RedCap UEs already in release-17. If any blocking issue, it should be addressed in release-17 based on company contributions.

**16 – Philips International B.V.**

We agree with others in that the Rel-17 SDT can be used for Redcap. We do not see the need of a specific objective for Redcap

**17 – Facebook**

Agree with the others that Rel-17 SDT should be applicable for RedCap.

**18 – InterDigital**

RedCap UEs can use SDT feature as well in R17, just like other UEs

**19 – Intel**

We understand that Rel-17 designs of RedCap and SDT are still open in some parts. Therefore, it might be too early to know whether this needs to be addressed or not in Rel-18. For example, if it is agreed that Rel-17 RedCap UEs needs to optionally support Rel-17 SDT feature, any adjustment required might already be done as part of the ongoing Rel-17 RedCap WI.

**20 – Apple Computer Trading Co. Ltd**

In our understanding the RedCap UE can support R17 SDT feature. We donot think any RedCaps specific SDT procedure is needed.

**Feedback Form 21: Wording of objective: What should be the scope of the objective?**

**1 – Nokia Corporation**

In our view the following objective could be used for the SDT compatibility for RedCap:

Validate and ensure Rel-17 SDT compatibility for RedCap [RAN2]

**Feedback Form 22: Affected WGs: Which WGs (in RAN/SA/CT) would need to work on this objective?**

**1 – Nokia Corporation**

RAN2-led

**Summary:** Most companies (16 vs. 4) think nothing is needed for RedCap and Rel-17 SDT is already supported with RedCap without need for additional enhancements. Some companies indicate that Rel-17 progress might clarify this further. Given the support level, moderator proposes not to consider this objective further in the further rounds as it has the least amount of support among all the objectives discussed.

**Conclusion 4:** No RedCap-specific enhancements are planned for Rel-18 SDT scope.

# 3 Organizational aspects

## 3.1 WGs impacted and estimated TUs

### 3.1.1 Final round

The following shows the proposal from moderator on TU allocation for RAN2 and RAN3, using 6 meetings as the WI timeline.

**Table 2: Estimated TUs for RAN2 and RAN3 (for MT-SDT)**

| RAN2/RAN3 meeting | RAN2 TUs | RAN3 TUs |
|---|---|---|
| R2#119, R3#117 (08/22) | 1 | 0 |
| R2#119b, R3#117b (10/22) | 1 | 0.5 |
| R2#120, R3#118 (11/22) | 1 | 0.5 |
| R2#121, R3#119 (2/23) | 1 | 0.5 |

| | | |
|---|---|---|
| R2#121b, R3#119 (4/23) | 1 | 0.5 |
| R2#122, R3#120 (5/23) | 1 | 0.5 |

Companies are requested to provide comments to the proposed TU allocation (if any).

**Feedback Form 23: Comments to the proposed RAN2/3 TU allocation?**

**1 – QUALCOMM JAPAN LLC.**

In general, we think the proposed TU allocation is good starting point towards overall release-18 package discussion. A few additional thoughts from our side below.

- RAN2 TUs looks more than enough to us. We think further reduction can be accepted if needed.
- RAN3 TUs is just right amount and further reduction makes the project unrealistic.
- On the proposed one meeting shift for RAN3: Necessary RAN3 design highly depends on the Uu procedure for MT-SDT (e.g. procedure timeline for data transfer). The question is if RAN2 can already decide on high level procedure in one meeting to give sufficient guidance for RAN3 design.

**2 – Nokia Corporation**

From moderator: The main topic in the TU would be that we need some

**3 – Nokia Corporation**

**Moderator comment** (previous comment was accidentally sent prematurely): The main topic for TU is the shift between RAN2 and RAN3 starting points. The exact TU allocations can be finalized later on, now it would be just good to understand if the ballpark is correct. So it's good if companies have thoughts on how the RAN2/RAN3 interactions should be organized (as QC already commented).

**4 – ZTE Corporation**

We think at this stage the general idea of total number of TUs is enough and from this perspective, the overall number of TUs seem as proposed looks good to us.

With respect to the staggering, we think it would be good if RAN3 TUs are loaded towards the end of the stage-2 design in RAN2. So, we think a delay of 3 meetings might be a good starting point (i.e. 3 meetings to finalise the stage-2 design in RAN2). But we think this detail can be finalised later.

**5 – Ericsson LM**

Assuming we do not need lengthy discussion on which option to specify (cf. Rel-16 MT-EDT discussion we referred to in initial phase), then we agree with comments from Qualcomm. However, if multiple meetings are needed before we have settled with an alternative to specify, then more time may be needed.

**6 – LG Electronics Inc.**

We support moderator proposal.

**7 – CATT**

With the current objective we think the TU table looks good, or it can be even smaller if R2 keeps the discussion focused and constructive. Regarding R3 and R2 coordination, we think a similar practice as in Rel-17 can be used, i.e., R3 can start 2-3 meetings later than R2 so that R2 finished the discussions on basic procedure.

**8 – Samsung Electronics Co.**

We have similar view to Qualcomm on RAN2 TU: given the final scope for this topic, we think the RAN2 TUs are a bit over-allocated, and it can be e.g. 6-month project.

**9 – Nokia Corporation**

We think roughly 1 TU/meeting for RAN2 is needed, but the exact level can be discussed later on. For RAN3 staggering, we agree with ZTE that having only one RAN2 meeting will not allow RAN3 work to start. We think RAN3 could have roughly 0.5-1 TU / 3 meetings instead, as ZTE also proposed.

**10 – Intel**

We are ok with suggested TUs (including if RRC-less mechanism were to be included after MT-SDT one progresses)

**11 – vivo Mobile Communication Co.**

We are generally fine with moderator's proposal, or the TU could be further reduced, considering the overall RAN2 load. Regarding Shift between RAN2 and RAN3, we agree with ZTE that RAN3 could start after 2-3 meetings after RAN2 finishing the stage-2 design.

**12 – Asia Pacific Telecom co. Ltd**

We are generally fine with total TUs in RAN2 and RAN3. However, how to allocate the total TUs for each meeting could be finalized in RAN#94.

**13 – HUAWEI TECHNOLOGIES Co. Ltd.**

Huawei, HiSilicon Given the final scope of the WI, we think that the TUs allocation is a bit overestimated.

We think further reduction is possible, e.g. reduce Stage 2 discussions to 0.5 TU. The reason is MT-SDT would be complementary feature to MO-SDT, so it may not take too much time to achieve Stage 2 principles. We can also try to do it with 0.5 TUs for 6 meetings or a compressed 1 TUs for 3 (or 4) meetings. Also not clear why so many TUs needed in RAN3.

**14 – Ericsson LM**

(as reference, Rel-16 MT-EDT discussions took 6 RAN2 meetings to converge on the solution which we specified. Granted, it was not MT-EDT only WI but if we need to discuss and converge between multiple different solutions, the initial convergence will take several meetings)

**Summary:** Most companies think RAN3 work should start only after 2-3 RAN2 meetings as the RAN3 aspects heavily depend on RAN2 progress. There is some variance as to how many meetings are required, with answers ranging from 3-6 meetings. The amount of TUs proposed by moderator should be sufficient and could perhaps be even reduced, but companies think the exact TUs will anyway be only decided in RAN#94e so as the estimate, 0.5-1 TU / RAN2 meeting and 0-0.5 TU / RAN3 meeting are sufficient.

**Conclusion 10:** RAN2 Rel-18 SDT work is estimated to require 4-6 meetings, with RAN3 work starting after 2-3 RAN2 meetings. Rouhgly 0.5-1 TU / RAN2 meeting is required, with roughly 0-0.5 TU / RAN3 meeting.

# 4 Summary and conclusions

## 4.1 Summary of initial round

As conclusions from the initial round, the objectives on MT-SDT is planned as part of the Rel-18 SDT scope. The backhaul signalling and R17 SDT leftovers are considered further, but SDT with RedCap is not planned for Rel-18 SDT.

**Conclusion 1:** The MT-SDT objective is planned for the Rel-18 SDT scope.

**Conclusion 2:** Discuss whether RAN3-only backhaul signalling enhancements can be considered for the Rel-18 SDT scope.

**Conclusion 3:** Discuss further whether some R17 leftovers can be considered in the Rel-18 SDT scope.

**Conclusion 4:** No RedCap-specific enhancements are planned for Rel-18 SDT scope.

## 4.2 Summary of intermediate round

As conclusions from the intermediate round, there is only consensus on the MT-SDT objective. Other objectives are not planned as part of the Rel-18 SDT scope. The proposed MT-SDT objective scope is shown below:

- *Specify the support for DL paging-triggered SDT (MT-SDT) [**RAN2**, RAN3]*
    - *MT-SDT triggering mechanism for UEs in RRC_INACTIVE, supporting RA-SDT and CG-SDT as the UL response;*
    - *MT-SDT procedure for initial DL data reception and subsequent DL data in RRC_INACTIVE;*

**Conclusion 5:** Adopt the MT-SDT scope as proposed above (with fine-tuning discussed in the Final round) with RAN2 as leading WG and RAN3 as secondary. For TUs, RAN2 will require 0.5-1 TU / meeting and RAN3 0-0.5 TU / meeting (exact proposal to be finalized in the final round).

**Conclusion 6:** The backhaul signalling enhancements are not planned for the Rel-18 SDT scope.

**Conclusion 7:** Neither the RRC-less SDT nor avoiding data loss with SDT is planned in the Rel-18 SDT scope.

## 4.3 Summary of final round

Both the justification and objective text as per initial and intermediate round were mostly agreeable with some minor alterations. The rough TU estimates and WI timeline were also discussed, with 4-6 meetings for RAN2

and 2-3 meetings for RAN3 were considered sufficient. The TU estimates were 0.5-1 TU / RAN2 meeting and 0-0.5 TU / RAN3 meeting (with more detailed allocations expected to be discussed at RAN#94e).

**Conclusion 8:** The WI justification text for the Rel-18 SDT work is proposed as: "*Rel-17 specified MO-SDT to allow small packet transmission for UL-oriented packets. For DL, MT-SDT (i.e. DL-triggered small data) allows similar benefits, i.e. 1) reducing signalling overhead and UE power consumption by not transitioning to RRC_CONNECTED and reducing latency by allowing fast transmission of (small and infrequent) packets, e.g. for positioning.*"

**Conclusion 9:** The WI objective text for the Rel-18 SDT work is proposed as: *"Specify the support for paging-triggered SDT (MT-SDT) [RAN2, RAN3]:*

- *MT-SDT triggering mechanism for UEs in RRC_INACTIVE, supporting RA-SDT and CG-SDT as the UL response;*
- *MT-SDT procedure for initial DL data reception and subsequent UL/DL data transmissions in RRC_INACTIVE"*

**Conclusion 10:** RAN2 Rel-18 SDT work is estimated to require 4-6 meetings, with RAN3 work starting after 2-3 RAN2 meetings. Rouhgly 0.5-1 TU / RAN2 meeting is required, with roughly 0-0.5 TU / RAN3 meeting.

The draft WI based on these conclusions can be found in RP-212726.

## 4.4 Conclusions

**Proposal 1: Rel-18 SDT would be RAN2-lead WI, with RAN3 as secondary affected group.**

**Proposal 2: The Rel-18 SDT WI scope as per below justification and scope.**

- **Justification text:** ***Rel-17 specified MO-SDT to allow small packet transmission for UL-oriented packets. For DL, MT-SDT (i.e. DL-triggered small data) allows similar benefits, i.e. 1) reducing signalling overhead and UE power consumption by not transitioning to RRC_CONNECTED and reducing latency by allowing fast transmission of (small and infrequent) packets, e.g. for positioning.***
- **Objective text:** ***Specify the support for paging-triggered SDT (MT-SDT) [RAN2, RAN3]***
  - ***MT-SDT triggering mechanism for UEs in RRC_INACTIVE, supporting RA-SDT and CG-SDT as the UL response;***
  - ***MT-SDT procedure for initial DL data reception and subsequent UL/DL data transmissions in RRC_INACTIVE;***

**Proposal 3: RAN2 Rel-18 SDT WI is estimated to require 4-6 meetings, with RAN3 work starting after 2-3 RAN2 meetings. Roughly 0.5-1 TU / RAN2 meeting is required, with roughly 0-0.5 TU / RAN3 meeting.**

**Proposal 4: Further discussion on Rel-18 SDT WI should be based on the draft WI in RP-212726.**