3GPP TSG-RAN WG2 #115e R2-210xxxx

Electronic Meeting, 16 – 27 August 2021

Agenda Item: 8.2.2.1

Source: Samsung

Title: [AT115-e][220][R17 DCCA] Bearer handling of SCG deactivation (Samsung)

WID/SID: LTE\_NR\_DC\_enh2-Core

Release: Rel-17

Document for: Discussion and Decision

# 1 Introduction

This document is to handle the following email discussion:

* [AT115-e][220][R17 DCCA] Bearer handling of SCG deactivation (Samsung)

Scope:

* + - Discuss the Bearer handling of SCG (de)activation based on online discussion

Intended outcome: Report

* + - Discussion summary in [R2-2108862](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_115-e/Docs/R2-2108862.zip) (by email rapporteur).

Deadline for providing comments, for rapporteur inputs, conclusions and CR finalization:

* + - Initial deadline (for company feedback): 1st week Fri, UTC 0900
    - Initial deadline (for rapporteur summary): 2nd week Mon, UTC 1000

The following document is to be treated in this email discussion:

Web Conf (Tuesday 1st week), Bearer handling (1)

UP details: Bearer handling for SCG deactivation

[R2-2107669](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_115-e/Docs/R2-2107669.zip) Bearer handling for SCG deactivation Samsung discussion Rel-17 LTE\_NR\_DC\_enh2-Core

* Discuss bearer handling in deactivated SCG (e.g. proposals in [R2-2107669](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_115-e/Docs/R2-2107669.zip)) in offline [220] (Samsung)

2 Contact Information

The rapporteur encourages the delegates who provide input to provide their contact information in the below table:

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| --- | --- |
| Company | Contact: Name (E-mail) |
| LG | Soo Kim (soo.kim@lge.com) |
| MediaTek | Felix Tsai (chun-fan.tsa@mediatek.com) |
| Ericsson | Zhenhua Zou; zhenhua.zou@ericsson.com |
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# 3 Discussion

## 3.1 SRB3 handling for deactivated SCG

For deactivated SCG, it is straightforward to maintain SRB1 for MCG link. However, we may need to discuss whether to keep SRB3 or not, if configured. Considering the previous agreements, keeping SRB3 alive would not have any benefit. In this regard, it would be reasonable to suspend SRB3 upon SCG deactivation.

**Proposal 1. SRB3 is suspended upon SCG deactivation, if configured.**

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| --- | --- | --- |
| Company | Agree/Disagree | Comments |
| LG | Disagree | We don’t see the need to suspend RBs (including SRBs and DRBs) at SCG deactivation, because the UE anyway cannot transmit the data to SCG. It does not give any harm to keep the SRB3 alive. |
| MediaTek | Agree | We don’t why keeping SRB3 active while actually it cannot transmit/receive. There should be no case that UE has to trigger SCG activation due to data arrival from SRB3? |
| Ericsson | Disagree | It is not clear what it means here: PDCP entity associated with SRB3 is suspended or the SCG transmission is suspended as in SCG failure information procedure. Since PDCP entity suspend (which initializes the counter) would lead to keystream re-use issue (see questions related with from P6 to P9 below), we prefer to have a precise wording. In this case, it should be  suspend SCG transmission for all DRBs/SRBs as in SCG failure information procedure. |
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One thing is to be noted that RRC messages may be generated to be transmitted via SRB3 before the reception of SCG deactivation indication. In this case, they may be transmitted later upon SCG activation, which should be avoided. The network may release SRB3 upon SCG deactivation. However, mandating the network to release it would not be a good way. This issue is about the case that SRB3 is suspended.

**Proposal 2. For SRB3, the old RRC message is discarded upon SCG deactivation, if any.**

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| Company | Agree/Disagree | Comments |
| LG | Agree | Agree, however, we think this issue is not related to SRB suspension. The PDCP SDUs/PDUs of SRBs can be discarded by discard timer or request by RRC, even if the PDCP entity is not suspended. |
| MediaTek | Agree |  |
| Ericsson | Disagree | The principle looks okay for UE-initiated RRC message, like measurement report.  Question is whether this is needed to be agreed and if so, how to capture in the spec. There can be many corner cases due to race conditions. Our view is that there is no need to specify and can be left for UE implementations to discard. |
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## 3.2 DRB handling for deactivated SCG

For split DRB and duplication DRB, SCG RLC bearer would not be used for data transmission and reception when SCG is deactivated and thus it seems straightforward to suspend SCG RLC bearers of split DRB and duplication DRB, if configured, while the PDCP entities associated to such DRBs continue to perform transmit/receive operation to maintain MCG RLC bearers. Other than spilt DRB and duplication DRB, the normal SCG DRBs would be suspended upon SCG deactivation. The network may release the SCG RLC bearers and SCG DRBs upon SCG deactivation. However, mandating the network to release them would not be a good way.

**Proposal 3. The SCG RLC bearer of split DRB and duplication DRB is suspended upon SCG deactivation, if configured.**

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| Company | Agree/Disagree | Comments |
| LG | Disagree | Same comment as in our response for P1.  Suspension/resumption is not needed since RAN2 already agreed that the UE can initiate SCG activation if needed. In addition, if we agree to suspend split DRB/ duplication DRB, the UE may need to perform autonomous bearer relocations whenever there is UL data to transmit via the split DRB/ duplication DRB until SCG is activated. However, this isn’t needed since RAN2 already agreed that the UE can initiate SCG activation if needed.  We don’t see the need to suspend RBs (including SRBs and DRBs) at SCG deactivation, because the UE anyway cannot transmit the data to SCG. It does not give any harm to keep the SRB3 alive. |
| MediaTek | Agree | We assume suspend here only imply that no data transmission to SCG RLC bearer for split/duplication DRB. UE initiated SCG activation is still under discussion. We think that data arrival in duplication DRB does not trigger the UE initiated SCG activation procedure. |
| Ericsson | Disagree | We can use the same formulation as during SCG failure, i.e., SCG transmission of split DRBs is suspended.  The intention is to re-use the existing procedure and minimize spec impacts. Additionally, it is not clear what it means by RLC bearer suspension and there is no need to consider the duplication DRB which is a subcase of split DRB. |
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**Proposal 4. The normal SCG DRB is suspended upon SCG deactivation, if configured.**

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| Company | Agree/Disagree | Comments |
| LG | Disagree | Same comment as in our response for P1 |
| MediaTek | To Discuss | If SCG DRB is still configured after SCG deactivation, we need discuss how to handle this while there is UL data arrival. |
| Ericsson | Disagree | Whether the SCG DRB would be supported or not is still under discussion. If it were supported, then the principle makes sense, but we have the comments as above that it is the transmission on SCG that is suspended not the bearer itself. |
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## 3.3 PDCP operation for deactivated SCG

If the network always updates the security key upon SCG activation from deactivation, i.e. sk-counter, there would be no security issue and RLC/PDCP re-establishment would be triggered accordingly, which makes PDCP operation simple. However, there seems no reason to mandate the security key update for SCG activation case, given that the security key update is optional in NR handover unlike LTE handover.

**Proposal 5. The security key update is up to network implementation upon SCG activation from deactivation.**

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| Company | Agree/Disagree | Comments |
| LG | Agree |  |
| MediaTek | Agree |  |
| Ericsson | Agree |  |
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If we apply the same principle as that of legacy handover to SCG deactivation/activation, it seems straightforward to handle DRB based on the security key update as follows:

**Proposal 6. The normal SCG DRB is resumed after RLC/PDCP re-establishment upon SCG activation, if security key is updated.**

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| Company | Agree/Disagree | Comments |
| LG | Disagree | As explained in P1, we don’t see the need to suspend RBs (including SRBs and DRBs) at SCG deactivation. Then, there is no need to resume DRBs. |
| MediaTek | To Discuss | We would like to clarify that whether the NW will set the re-establishment flag (*reestablishPDCP* and *reestablishRLC*) in this case (Assuming YES). Or the UE has to perform the re-establishment no matter the flag is set or not? |
| Ericsson | Disagree | We believe that there is no need to suspend DRB/SRBs and so there is no need to agree on the resume part.  In addition, it is already agreed that key refresh requires PDCP/RLC re-establishment and valid for all DRBs. |
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**Proposal 7. The normal SCG DRB is resumed without RLC/PDCP re-establishment upon SCG activation, if security key is not updated.**

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| Company | Agree/Disagree | Comments |
| LG | Disagree | As explained in P1, we don’t see the need to suspend RBs (including SRBs and DRBs) at SCG deactivation. Then, there is no need to resume DRBs. |
| MediaTek | To Discuss | We would like to clarify that whether the NW will set the re-establishment flag (*reestablishPDCP* and *reestablishRLC*) in this case (Assuming NO). |
| Ericsson | Disagree | See above, even though we agree that RLC/PDCP re-establishment is not needed if security key is not updated (which is already agreed before). |
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When UE receives the indication of SCG deactivation, the transmitting PDCP entity with PDCP discard timer configured with infinity may still have PDCP PDUs which have not been acknowledged by lower layers. In this case, such old PDCP PDUs may not be discarded until released and retransmitted later upon SCG activation.

In the early stage of NR, RAN2 had similar discussion for the case that UE goes to RRC INACTIVE state and finally specified the corresponding behavior in 38.323 as follows:

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| 5.1.4 PDCP entity suspend  When upper layers request a PDCP entity suspend, the transmitting PDCP entity shall:  - set TX\_NEXT to the initial value;  - discard all stored PDCP PDUs; |

**Proposal 8. The transmitting PDCP entity of the normal SCG DRB discards PDCP PDUs upon SCG deactivation.**

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| Company | Agree/Disagree | Comments |
| LG | Disagree | We think PDCP operation should not be affected by SCG deactivation. There is no harm to keep the PDCP entity alive. |
| MediaTek | To Discuss | It seems that a little bit strange to put SCG to deactivated state while there data ongoing on SCG DRB. But if yes, we think this is correct behavior. |
| Ericsson | Disagree | We consider this as a corner case and no need to discuss.  This is for SCG DRBs, and so the network would not de-activate the SCG unless it is certain that there is no ongoing data transmission from the SCG. In other words, there won’t be any PDCP PDUs which have not been acknowledged by lower layer.  Also, it is not clear for us if the proposal also means that the TX counter is reset. If so, then there is the key stream re-use issue. The proposal seems to be related with RRC\_INACTIVE which, upon resume, requires key update and so no key stream re-use issue. |
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When UE receives SCG deactivation indication, the receiving PDCP entity may have stored PDCP SDUs (i.e. out-of-order PDCP SDUs) and t-Reordering may be still running. In this case, it should wait for the expiry of t-Reordering to deliver them to upper layer, which can cause unnecessary delay. To resolve this, we can stop t-Reordering and deliver the stored PDCP SDUs to upper layer, if any.

In the early stage of NR, RAN2 had similar discussion for the case that UE goes to RRC INACTIVE state and finally specified the corresponding behavior in 38.323 as follows:

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| 5.1.4 PDCP entity suspend  …  When upper layers request a PDCP entity suspend, the receiving PDCP entity shall:  - if t-*Reordering* is running:  - stop and reset *t-Reordering*;  - deliver all stored PDCP SDUs to the upper layers in ascending order of associated COUNT values after performing header decompression;  - set RX\_NEXT and RX\_DELIV to the initial value. |

**Proposal 9. The receiving PDCP entity of the normal SCG DRB stops t-Reordering if running and deliver the stored PDCP SDUs to upper layer upon SCG deactivation.**

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| Company | Agree/Disagree | Comments |
| LG | Disagree | We think PDCP operation should not be affected by SCG deactivation. There is no harm to keep the PDCP entity alive. |
| MediaTek | To Discuss | It seems that a little bit strange to put SCG to deactivated state while there data ongoing on SCG DRB. But if yes, we think this is correct behavior. |
| Ericsson | Disagree | See above for proposal 8. |
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# Conclusion

**TBD**