**3GPP TSG-RAN WG2 Meeting #109bis Draft R2-2003846**

**Elbonia, Online, 20 -30 April 2020**

**Agenda item: 7.3.2.2**

**Source: Intel Corporation**

**Title: Report of [AT109bis-e][206][MOB] Flagging and discussion of DAPS CP open issues for RRC (Intel)**

**Document for: Discussion and Decision**

# Introduction

This is the email discussion report on below email discussion:

* [AT109bis-e][206][MOB] Flagging and discussion of DAPS CP open issues for RRC (Intel)

Scope:

* + - Companies flagging critical DAPS CP issues requiring Web conference discussion
    - Discuss the remaining CP/RRC open issues identified in email discussion report of Post109#11 in [R2-2003371](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003371.zip).

      Intended outcome:

* + - Discussion summary document in [R2-2003846](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003846.zip), including resolutions to open issues and identification of non-critical issues that should no longer be pursued in Rel-16

            Deadlines for flagging issues for Web conference discussion:

* + - Flagging of issues for the Web conference: Tuesday 2020-04-21 10:00 UTC
    - Rapporteur summary:  Tuesday 2020-04-21 11:30 UTC

Deadlines for providing comments and for rapporteur inputs:

* + - Initial deadline (for companies' feedback):  Thursday 2020-04-23 12:00 UTC
    - Initial deadline (for rapporteur's summary in [R2-2003846](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003846.zip)):  Friday 2020-04-24 08:00 UTC
    - Proposed agreements in [R2-200384](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003842.zip)6 indicated for email agreement and not challenged until Tuesday 2020-04-28 12:00 UTC will be declared as agreed by the session chair.

Based on Chairman’s guidance, the email discussion is splited into 3 phases:

**Phase 1** : please indicate whether any issues need to be discuss in the Web conference; Tuesday 2020-04-21 10:00 UTC

**Phase 2**: please provide your comments on open issues; Thursday 2020-04-23 12:00 UTC

**Phase 3:** double check the proposed agreements; Tuesday 2020-04-28 12:00 UTC

# Phase 1- flag issues

**Below are proposals from [1]:**

**To be agreed:**

Proposal S2.4: T312 in source is stopped upon executing a reconfiguration with sync even if DAPS is configured; No specificiation impact.

Proposal S2.4: T312 in source is stopped upon executing a reconfiguration with sync even if DAPS is configured; No specificiation impact.

Proposal S2.6-5-6: Do not introduce bye message from UE to the source upon UL switching.

Proposal S3.1: LTE DAPS+ LTE RACH-less is not allowed.

**RRC impacts:**

RRC S2.2-1: Condition for *statusReportRequired* should be changed to Rlc-AM-UM “For RLC AM or RLC UM ( if dapsConfig is configured for this bearer), the field is optionally present, need R. Otherwise, the field is absent.”.

RRC S2.3-1: Do not capture in specification “stop RLM in source after RACH successful to target PCell”, and remove the EN “TBC on how/whether to capture stop RLM in source after RACH successful to target PCell”.

RRC S2.3-2: moreThanoneRLC is not applied for DAPS HO, remove the EN “FFS on moreThanonRLC in pdcp-Config” and clarify in the field description “This field is not present if dapsConfig is configured for this bearer.”

RRC S2.3-3: Agree below principle on the terminoligy and to be confirmed in ASN.1 review, e.g. whether to change source/target to source/target MCG;

**Case 1** L1 configuration: “source or target" should be used since it is cell specific configuration;

**Case** 2 MAC/RLC/PDCP (Key, security/ROHC)/SDAP configuration: “source or target" could be used since they are common for all cells of source or target;

**Case** 3 C-RNTI, timers (e.g. T301, T310, T311) and constants (e.g. N310, N311): “source/target SpCell” should be used since it is PCell configuration;

**Case** 4 BCCH/MIB (5.3.5.5.2): “source/target SpCell” should be used since it is PCell configuration;

**Case** 5 RLF, and “revert back to the configuration used in source PCell”: “source/target SpCell” should be used since we only RLF in PCell instead of SCells;

**Case** 6 “revert back to the configuration used in source PCell”: “source PCell” could be used as legacy;

**Case** 7 SRB/DRB, RRM: “source or target" could be used since they are common for all cells of source or target;

RRC S2.3-5-3: For DAPS HO, reestablishPDCP is not needed for SRB, no matter whether key is changed or not.

RRC S2.3-8-1: When resume SRB upon DAPS HO failure, the old stored RRC message if any, (i.e.. the PDCP PDUs for SRB) shall be discarded;

RRC S2.5-1: To capture RAN1 parameters p-DAPS-FR1, p-DAPS-FR2 and UplinkPowerSharingDAPS-HO-mode and name them as “p-DAPS-Source, p-DAPS-Target and UplinkPowerSharingDAPS-HO-mode”

RRC S2.5-2: powerControlMode in HO preparation message ischanged to ENUMERATED {semi-static-mode1, semi-static-mode2, dynamic }

RRC S3.3: Agree below RRC changes:

3> consider radio link failure to be detected for the source MCG i.e. source RLF;

~~4~~3> suspend all DRBs in the source;

~~4~~3> release the source connection.

RRC S3.4-1: Do not add 2> If dapsConfig is configured for any DRB when capturing UL switching indication in RRC;

RRC S3.4-2: To discuss whether to UL switching indication in RRC as

3> for each DRB configured with *dapsConfig*, request uplink data switching to the PDCP entity, as specified in TS 38.323 [5];

RRC S3.5: Do not try to align the handling of SRB and non-DAPS DRB upon receiving DAPS HO command and upon fallback;

RRC S3.6: Change the handling on SRB for DAPS based on the below order:

1. *Regardless of security key change,*

* *Establish a PDCP entity for the target with state variables continuation as specified in TS 38.323 [5], with the same configuration, the state variables and security configuration as the PDCP entity for the source;*

1. *If reestablishPDCP for SRB is configured(i.e. security key change)*

* *The state variables will be reset by PDCP re-establishement.*

1. *Otherwise, the state variables are left as those of the source due to no PDCP re-establishment and it implies the case without security key change*

RRC S3.7-1: For non-DAPS DRB handling, do not agree that PDCP only reestablishment when RACH is successfully completed in target:

**Further discussion:**

Disc S2.3-6: To be discussed whether source can provide both original and downgrade source configuration to target;

Disc S3.8: To discuss whether the coordination on maxSCH-TB-BitsDL, maxSCH-TB-BitsUL is needed for NR since for NR the supported max DL/UL data rate for each CC can be derived from the L1 parameters included in the FeatureSet (according to the calculation defined in 38.306 4.1)

RRC S3.10: To discuss whether a new bit in RRC is needed to control second PDCP status report.

RRC S3.11: To discuss whether Network can trigger the subsequent HO after a DAPS HO before source cell has been released. If yes, whether source is released in the new HO command.

**Question 2.1-1: Any issue need to be discussed in the meeting?**

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| **Company** | **Issues** | **Reason** |
| Huawei, HiSilicon | RRC S3.11 | It would be good to align companies’ understanding on subsequent RRC procedure. |
| QC | S2.3-6 | Providing only source down garded configuration to target cell means, source has to downgrade its configuration before DAPS HO (adds unnecessary signalling overhead and adds to DAPS HO delay as well) and which does not make sense if target prefers to fallback to legacy HO. If target fallsback to legacy HO, providing full source cell configuration to target cell would allow target to use delta configuration based on full source configuration and we can also avoid target using full configuration (with full config, PDCP SN continuity can not be maintained). There is no reason to limit legacy HO functionality when fallback occurs. |
| OPPO | Disc S2.3-6  RRC S3.11 | Network behavior in these two cases needs to be clarified since they may impact ASN.1. |
| Ericsson | Proposal S3.1  RRC S3.10 | The LTE RRC specification v16.0.0 already covers the case with DAPS combined with RACH-less. Not supporting this combination therefore actually involves more work since we have to explicitly forbid this combination. We see no strong need to support LTE DAPS + RACH-less but it seems unnecessary to remove this possibility given that the spec already allows it.  Regarding the control of the second PDCP status report, we think a separate flag is needed so that the second PDCP status report can be enabled only in the cases where it is useful. |
| Nokia | Proposal S3.1  Disc S2.3-6  RRC S3.11 | We are not against combining LTE RACH-less with DAPS in general. We just think there is no time in Rel-16 to design the details of such interaction (e.g. the UL switching point). Thus, we prefer to confirm Proposal S3.1  We agree RRC S3.11 and Disc S2.3-6 require further discussion, possibly during the web conference. |
| ZTE | Disc S2.3-6 | Considering it’s a critical issue for capability coordination signaling and there is no clear majority (supporting camp vs. non-supporting camp = 8 vs. 9) in the email discussion 109b#11, we think it’s better to solve this issue in the meeting. |
| LG | Disc S2.3-6  RRC S3.11 | Since there is no consensus on these issues, these two cases are needed to be aligned through online discussion having some clarification and understanding each other. |
| Intel | RRC S3.11  Disc S2.3-6  Proposal S3.1 | Agree it would be good to confirm in the meeting on RRC S3.11, Disc S2.3-6  Ok to confirm Proposal S3.1 online. |

**Question 2.1-2: Any other issues not covered in [1], and need to be discussed in the meeting?**

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| **Company** | **Issues** | **Reason** |
| LG | Align the terminology of “DAPS” between PDCP and RRC | In the current specficiation for PDCP and RRC, the terminology for “DAPS” and is not aligned between them. With this reason, we provide the contribution (r6) to clean up the terminology. We think that it should be discussed. |
| MediaTek | Actions related to dapsConfig | dapsConfig is OPTIONAL Need N, so the related action should be one-shot and the field is not stored, i.e, upon receiving dapsConfig (Need N) for a DRB, UE transforms the (normal) PDCP into DAPS PDCP, and the dapsConfig is not stored.  But in 5.3.10.3, we have:  The UE shall:  1> if *dapsConfig* is configured for any DRB:  2>  upon T310 expiry in source; or  2>  upon random access problem indication from source MCG MAC; or  2>  upon indication from source MCG RLC that the maximum number of retransmissions has been reached:  3>  consider radio link failure to be detected for the source MCG i.e. source RLF;  4> suspend all DRBs in the source;  4> release the source connection.  Considering the fact that *dapsConfig* is Need N, it seems imprecise to say “ if *dapsConfig* is configured for any DRB”  We may:  1. revise the text as “if the current UE configuration contains at least one DRB with DAPS PDCP entity”, or  2. revise the text as “if DAPS bearer is configured”, if LG’s proposal above is agreed. |
| Sharp | Handling of timers and state variables of SRB when fallback to the source (related to RRC S2.3-8-1) | It seems to be agreed When resume SRB upon DAPS HO failure, the old stored RRC message if any, (i.e.. the PDCP PDUs for SRB) shall be discarded (RRC S2.3-8-1).  Then the following handling would be required:  - For RLC enitity: all state variables should be initialized and all timers should be stoped and reset if running in order to initialize ARQ and reassembly operation  - For PDCP entity: state variables related to re-orderig should be updated so that there will be no waited PDCP SDU in the re-ordering buffer, and re-ordering timer should be stopped and reset if running |

**Summary of Phase 1 discussion:**

11 companies provided inputs, and following issues are flagged:

**Sovled in the online session:**

**Disc S2.3-6:** To be discussed whether source can provide both original and downgrade source configuration to target;

6 companies: QC, OPPO, Nokia, ZTE, LG, Intel

* We stick to legacy that source only provides one configuration to target in Rel-16.

**Proposal S3.1:** LTE DAPS+ LTE RACH-less is not allowed.

1 companies: Ericsson, Not supporting this combination therefore actually involves more work since we have to explicitly forbid this combination.

LTE DAPS+ LTE RACH-less is not allowed

**Not discussed online (continue during email in this meeting):**

**RRC S3.11:** To discuss whether Network can trigger the subsequent HO after a DAPS HO before source cell has been released. If yes, whether source is released in the new HO command.

6 companies: Huawei, HiSilicon, OPPO, Nokia, LG, Intel

**RRC S3.10**: To discuss whether a new bit in RRC is needed to control second PDCP status report.

1 company: Ericsson

Furthermore, in the email discussion, one company raised the comments that there is confliction between

RRC S3.6: Change the handling on SRB for DAPS based on the below order:

1. *Regardless of security key change,*

* *Establish a PDCP entity for the target with state variables continuation as specified in TS 38.323 [5], with the same configuration, the state variables and security configuration as the PDCP entity for the source;*

1. *If reestablishPDCP for SRB is configured(i.e. security key change)*

* *The state variables will be reset by PDCP re-establishement.*

1. *Otherwise, the state variables are left as those of the source due to no PDCP re-establishment and it implies the case without security key change*

RRC S2.3-5-3: For DAPS HO, reestablishPDCP is not needed for SRB, no matter whether key is changed or not.

In addition, one company raised issue on Align the terminology of “DAPS” between PDCP and RRC

*In the current specficiation for PDCP and RRC, the terminology for “DAPS” and is not aligned between them. With this reason, we provide the contribution (R2-2002860) to clean up the terminology. We think that it should be discussed.*

MTK commented:

dapsConfig is OPTIONAL Need N, so the related action should be one-shot and the field is not stored, i.e, upon receiving dapsConfig (Need N) for a DRB, UE transforms the (normal) PDCP into DAPS PDCP, and the dapsConfig is not stored.

But in 5.3.10.3, we have:

The UE shall:

1> if *dapsConfig* is configured for any DRB:

Considering the fact that *dapsConfig* is Need N, it seems imprecise to say “ if *dapsConfig* is configured for any DRB”

1. revise the text as “if the current UE configuration contains at least one DRB with DAPS PDCP entity”, or

2. revise the text as “if DAPS bearer is configured”, if LG’s proposal above is agreed.

RRC S2.3-8-1: When resume SRB upon DAPS HO failure, the old stored RRC message if any, (i.e.. the PDCP PDUs for SRB) shall be discarded;

Sharp commented if polling related counters and timer in RLC transmission side needs to be cleaned or not.

# Phase 2 discusion

Following issues need further discussion:

## 3.1 RRC S3.11: To discuss whether Network can trigger the subsequent HO after a DAPS HO before source cell has been released. If yes, whether source is released in the new HO command.

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| **The issue was discussed in the email discussion 109-11,** Summary: 12 companies provided inputs  **Network can trigger the subsequent HO after a DAPS HO before source cell has been released:**  **Yes: 5**  **NO:4**  **If support, explicit release by new target: 5**  RRC S3.11: To discuss whether Network can trigger the subsequent HO after a DAPS HO before source cell has been released. If yes, whether source is released in the new HO command. |

During the discussion, some companies think we do not need to restrict the network implmementation, but we have to discuss whether source cell is released by network explicitly or by UE autonomously if it is allowed.

Some companies do not see the need to do this.

Rapporteur would like to check companies’ opinion again:

**Question 3.1: which option do companies prefer?**

**Option 1: Network can trigger the subsequent HO after a DAPS HO before source cell has been released. Source cell is released by new target explicitly in the new handover command;**

**Option 2: Network can trigger the subsequent HO after a DAPS HO before source cell has been released. Source cell is released by UE autonomously;**

**Option 3: network shall release the source first before triggering the new handover procedure;**

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| **Company** | **Option 1, 2, 3** | **Remark** |
| MediaTek | 3 | We do not see the need of having such an urgent HO. However, current RRC procedure does not prohibit target node from sending HO command before source node release; if this happens, source node should be explicitly released by HO command from target node. |
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## 3.2 RRC S3.10: To discuss whether a new bit in RRC is needed to control second PDCP status report.

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| Summary: 12 companies provided inputs  **Jointly control/ individually controlled (separate bits) on second PDCP status report:**  **Jointly: 5**  **Individually:** 5  There is no clear consensus on whether we need a new bit to control second PDCP status report.  RRC S3.10: To discuss whether a new bit in RRC is needed to control second PDCP status report. |

During the discussion, companies who support separate bit think individually control can have flexibility; Companies who do not support it think it is small feature and do not need separate control.

Rapporteur would like to check companies’ opinion again:

**Question 3.2: which option do companies prefer?**

**Option 1: new bit in RRC to control second PDCP status report;**

**Option 2: same bit for second PDCP status report and legacy PDCP status report;**

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| **Company** | **Option 1, 2** | **Remark** |
| MediaTek | 2 | If this works, we don’t need to introduce a new bit. |
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## 3.3 RRC S3.6: Change the handling on SRB for DAPS based on the below order (conflict with RRC S2.3-5-3)

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| Summary: 11 companies provided inputs  **Regarding the changes:**   1. *Regardless of security key change,*  * *Establish a PDCP entity for the target with state variables continuation as specified in TS 38.323 [5], with the same configuration, the state variables and security configuration as the PDCP entity for the source;*  1. *If reestablishPDCP for SRB is configured(i.e. security key change)*  * *The state variables will be reset by PDCP re-establishement.*  1. *Otherwise, the state variables are left as those of the source due to no PDCP re-establishment and it implies the case without security key change*   **Yes: 6**  **No strong view: 3**  Rapporteur would suggest to go for majority.  RRC S3.6: Change the handling on SRB for DAPS based on the below order:   1. *Regardless of security key change,*  * *Establish a PDCP entity for the target with state variables continuation as specified in TS 38.323 [5], with the same configuration, the state variables and security configuration as the PDCP entity for the source;*  1. *If reestablishPDCP for SRB is configured(i.e. security key change)*  * *The state variables will be reset by PDCP re-establishement.*  1. *Otherwise, the state variables are left as those of the source due to no PDCP re-establishment and it implies the case without security key change* |

The RRC S3.6 conflicts with below RAN2 agreement

*RRC S2.3-5-3: For DAPS HO, reestablishPDCP is not needed for SRB, no matter whether key is changed or not.*

In [R2-2003372](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003372.zip), RRC S3.6 is captured as:

1> If *dapsConfig* is configured for any DRB:

2> for each SRB:

3> establish a PDCP entity for the target as specified in TS 38.323 [5], with the same configuration as the PDCP entity for the source;

3> if the *masterKeyUpdate* is received:

4> configure the PDCP entity with the security algorithms according to securityConfig and apply the keys (KRRCenc and KRRCint) associated with the master key ( KgNB) or secondary key (S-KgNB) as indicated in keyToUse, if applicable;

3> else:

4> configure the PDCP entity for the target with state variables continuation as specified in TS 38.323 [5], the state variables and security configuration as the PDCP entity for the source;

Rapporteur would like to check companies’ opinion:

**Question 3.3: do companies see the need to have above change?**

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| **Company** | **Yes/No?** | **Remark** |
| MediaTek | Yes | The change is needed if we keep the RAN2 agreement. |
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## 3.4 Align the terminology of “DAPS” between PDCP and RRC in R2-2002860;

The summary in R2-2002860 is

- Remove “DAPS PDCP entity” and “normal PDCP entity” from the specification.

- From the PDCP point of view, “DAPS PDCP entity” or “normal PDCP entity” are all a PDCP entity, the difference being whether the PDCP entity is configured with “DAPS”. Calling them with different names makes more confusion.

- Change “Reconfigure the PDCP entity to DAPS PDCP entity” to “Reconfigure the PDCP entity to configure DAPS”, and change “Reconfigure the PDCP entity to normal PDCP entity” to “Reconfigure the PDCP entity to release DAPS”.

- Use “DAPS bearer” in the specification.

- “DAPS bearer” is already defined in PDCP specification as “a bearer whose radio protocols are located in both the source gNB and the target gNB during DAPS handover to use both source gNB and target gNB resources”. RRC specification can also add “DAPS bearer” in the definition section and use this terminology.

- Change “for each DRB with a DAPS PDCP entity” to “for each DAPS bearer”.

- Remove the text regarding association between PDCP entity and the RLC entity.

- Such association between them was never specified before (see split bearer or duplicate bearer where the PDCP entity is associated with at least two RLC entities). We don’t see the need to specify the association only for DAPS bearer.

The proposals looks reasonable, Rapporteur would like to check companies’ opinion .

**Question 3.4-1: do companies agree the proposals in R2-2002860?**

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| **Company** | **Yes/No?** | **Remark** |
| MediaTek | Yes |  |
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**Similar issue was raised in the reflector:**

*dapsConfig is OPTIONAL Need N, so the related action should be one-shot and the field is not stored, i.e, upon receiving dapsConfig (Need N) for a DRB, UE transforms the (normal) PDCP into DAPS PDCP, and the dapsConfig is not stored.*

*But in 5.3.10.3, we have:*

The UE shall:

1> if *dapsConfig* is configured for any DRB:

Considering the fact that *dapsConfig* is Need N, it seems imprecise to say “ if *dapsConfig* is configured for any DRB”

1. revise the text as “if the current UE configuration contains at least one DRB with DAPS PDCP entity”, or

2. revise the text as “if DAPS bearer is configured”, if LG’s proposal above is agreed.

Rapporteur could see 3 options:

Option 1: revise the text as “if the current UE configuration contains at least one DRB with DAPS PDCP entity”, or

Option 2 revise the text as “if DAPS bearer is configured”, if LG’s proposal above is agreed.

Option 3: do nothing, same as existing specification.

**Question 3.4-2: Which option do companies prefer?**

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| **Company** | **Option 1, 2, 3** | **Remark** |
| MediaTek | 1 or 2 | This problem should be fixed, and we are fine with both ways. |
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## 3.5 Further details on “discard RRC in source SRB”

RAN2 has agreed

*RRC S2.3-8-1: When resume SRB upon DAPS HO failure, the old stored RRC message if any, (i.e.. the PDCP PDUs for SRB) shall be discarded;*

One company raised question, for fallback to source, in source should polling related counters and timer in RLC transmission side needs to be cleaned or not?

Rapporteur would like to check companies’ opinion:

**Question 3.5: for fallback to source, in source should polling related counters and timer in RLC transmission side needs to be cleaned or not?**

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| **Company** | **Yes/No?** | **Remark** |
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## 3.6 Disc S3.8: To discuss whether the coordination on maxSCH-TB-BitsDL, maxSCH-TB-BitsUL is needed for NR since for NR the supported max DL/UL data rate for each CC can be derived from the L1 parameters included in the FeatureSet (according to the calculation defined in 38.306 4.1)

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| **Question 3.8: For NR, should maxSCH-TB-BitsDL/** **maxSCH-TB-BitsUL be defined as relative value as current CR or absolute value? If it is absolute value, what value range should be? If it is relative value, what reference should be? (RRC impact)**  Summary: 2 companies provided inputs  **2 companies mentioned we may not need the coordination on maxSCH-TB-BitsDL, maxSCH-TB-BitsUL since for NR the supported max DL/UL data rate for each CC can be derived from the L1 parameters included in the FeatureSet (according to the calculation defined in 38.306 4.1).** |

Rapporteur would like to check companies’ opinion:

For NR,

Option 1: **should maxSCH-TB-BitsDL/** **maxSCH-TB-BitsUL be defined as relative value as current CR?**

**Option 2: should maxSCH-TB-BitsDL/** **maxSCH-TB-BitsUL be defined as absolute value? What value/value range?**

**Option 3: maxSCH-TB-BitsDL/** **maxSCH-TB-BitsUL are not needed for NR since for NR the supported max DL/UL data rate for each CC can be derived from the L1 parameters included in the FeatureSet (according to the calculation defined in 38.306 4.1)**

**Question 3.6: Which option do companies prefer?**

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| **Company** | **Option 1, 2, 3** | **Remark** |
| MediaTek | 3 |  |
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## 3.7 Any other issues?

**Question 3.7: Any other issues need to be considered?**

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| **Company** | **Remark** |
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# Conclusion

The followings are proposed:

To be agreed:

Further discussion:

# References

1. [R2-2003371](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003371.zip), Report of [Post109e#11][MOB] Resolving open issues for DAPS (Intel), Intel Corporation