3GPP TSG-RAN WG3 #114-e R3-215832

1-11 Nov 2021

Online

Agenda Item: 9.3.6.1

Source: CMCC

Title: Summary of offline discussion on PDU session modification corrections

Document for: Discussion

# Introduction

This contribution provides the summary of the following email discussion,

**CB: # 29\_PDUSessModCorrections**

**- Clarify the PDU session NAS PDU Delivery handling when only the PDU Session AMBR IE is modified.**

**- Provide CR if agreeable**

(CMCC - moderator)

Summary of offline disc [R3-215832](file:///D%3A%5C%5C3gpp%E4%BC%9A%E8%AE%AE%5C%5CRAN3%5C%5CRAN3%23114%5C%5CCB%5C%5CCB%20%23%2029_PDUSessModCorrections%5C%5CInbox%5C%5CR3-215832.zip)

# For the Chairman’s Notes

Propose to capture the following:

**Proposal 1: It is a common understanding that when the NG-RAN receives a PDU Session Resource Modify Request message which only includes the PDU Session AMBR IE, NG-RAN shall send NAS-PDU to UE.**

**(More to be added, an agreed CR is expected)**

# Discussion (First round)

During this meeting, several CRs on PDU session modify have been submitted which believes the current spec is not clear enough and some clarifications are needed. And all potential options are subject to the modifications on current description in TS 38.413 below,

**<Start of quotation>**

- If the *NAS-PDU* IE is received for the PDU session, the NG-RAN node shall pass it to the UE when modifying the Data Radio Bearer configuration. The NG-RAN node does not send the NAS PDU received for the PDU session when all the QoS flows to be added or modified are failed and no QoS flow was requested to be released, even if e.g. the NG-U UP TNL modification is successful.

**<End of quotation>**

* **Case 1: PDU session modification without QoS flow to be added or modified or released.**

According to the submitted contributions, all contributions mention the case when the NG-RAN receives the PDU Session Resource Modify Request message, including:

* The NAS-PDU including the **Session AMBR**
* The ***PDU Session Aggregate Maximum Bit Rate*** IE

Under such case, [1] and [4] think that the current spec text indicates that the NAS-PDU will not be sent to the UE since there’s no Data Radio Bearer configuration modified. And [3] thinks current spec text is unclear about whether to send NAS-PDU to UE.

**Question 1: Do companies think NG-RAN shall send NAS-PDU to UE under Case 1?**

|  |  |
| --- | --- |
| Company | Comment |
| CMCC | Yes. Although NG-RAN is agnostic to the content of NAS-PDU, if NG-RAN receives a PDU Session Resource Modify Request message in which PDU Session AMBR IE is modified, it should assume that the Session AMBR parameter is also provided in NAS-PDU. In order to avoid mismatch between NG-RAN and UE, the NG-RAN shall send NAS-PDU to UE.And as witnessed in our current network, the CN may send a Modify Request message which only includes NAS-PDU and PDU Session AMBR IE for the purpose of UL rate limitation at the UE side. If the NAS-PDU is not transmitted to UE under such case, the UE is not able to perform UL rate limitation accordingly. |
| CATT | YesWhen CN send PDU Session Aggregate Maximum Bit Rate to NG-RAN node, the corresponding NAS-PDU should also be sent to UE to enable UE to update this information  |
| Ericsson | DL PDU session AMBR is enforced by the network. In this case, it does not seem necessary to update UE. |
| Nokia | Yes.  |
| Huawei | Yes.Agree with CMCC/CATT. About the Ericsson’ comment, it is specified in TS 23.501 that: - *UPF and UE perform Session-AMBR enforcement as specified in clause 5.7.1.8 and the UPF performs counting of packets for charging.*Also as mentioned in [R3-215265](file:///D%3A%5C%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5C%5CTSGR3_114-e%5C%5CDocs%5C%5CR3-215265.zip), the session-AMBR is included the PDU session level NAS-PDU signaled to the UE. |
| ZTE | Yes |
| Samsung | Yes |

Moderator’s summary:

It is a common understanding that when the NG-RAN receives a PDU Session Resource Modify Request message which only includes the PDU Session AMBR IE, NG-RAN shall send NAS-PDU to UE. So we’d like to make a proposal as such.

However, under Case 1, some company believes that the update of PDU Session AMBR IE in NG-RAN will result in the RRC reconfiguration on logical channel configuration (such as the update of the PrioritizedBitRate) for some associated DRBs over Uu, which could also be regards as ‘modifying the Data Radio Bearer configuration’.

**Question 2: Is it a common understanding that ‘modifying the Data Radio Bearer configuration’ also includes RRC reconfiguration over Uu? Companies are invited to provide comments.**

|  |  |
| --- | --- |
| Company | Comment |
| CMCC | It seems that 38413 has not provided a clear definition on ‘modifying the DRB config’, so it is at least unclear to us what is included in DRB configuration modification.Even though it also includes RRC Reconfiguration over Uu, the PriorotizedBitRate is configured in CellGroupConfig rather than RadioBearerConfig in which the DRB related information is provided. So it is quite vague to us on what is included by indicating ‘modifying DRB config’.However, we are also fine if it is the common understanding that modifying DRB config also includes RRC reconfiguration on Prioritized bit rate for a logical channel associated to the DRB; otherwise, we would like to make it clearer in the text. |
| CATT | We think it depends on the implementation. It could not be guaranteed that update of PDU Session AMBR IE in NG-RAN will always result in the RRC reconfiguration on logical channel configuration. |
| Ericsson | “modify the Data Radio Bearer configuration” includes “RRC reconfiguration over Uu” is our understanding. |
| Nokia | Agree with CATT. What happens in the gNB may depend on implementation for the scenario discussed.  |
| Huawei | We understand the current texts are that “modifying the Data Radio Bearer configuration” means the RRC reconfiguration including the DRB level parameters. And question whether “update of PDU Session AMBR IE in NG-RAN will result in the RRC reconfiguration?” our understanding is not always possible (agree with CATT) Basically, it depends on the NG-RAN’s decision of new calculated the UE-AMBR value upon receiving the update of Session-AMBR. The NG-RAN can decide whether to update DRB level parameters or not. - (note that according to TS 23.501, it is specified that “*Each (R)AN shall set its UE-AMBR to the sum of the Session-AMBR of all PDU Sessions with active user plane to this (R)AN up to the value of the UE-AMBR received from AMF*”)In addition, there are cases that the update of Session-AMBR will not result at any modifying the DRB config or RRC reconfiguration. But current procedure texts don't allow the NAS-PDU to be sent to UE in this case. We suggest to remove the **‘modifying the Data Radio Bearer configuration’ to avoid any ambiguity.**  |
| ZTE | Different interprets on “**Data Radio Bearer configuration**” ,because there is no specific definition. In order to mitigate ambiguity , suggest to remove this part. |
| Samsung | We think “the Data Radio Bearer configuration” is general description. It includes “RRC reconfiguration over Uu”. But we are also fine to make clarification if majority companies prefer. |

Moderator’s summary:

All companies agree that ‘modifying the DRB config’ is a general description, and the update of PDU Session AMBR IE may or may not result in RRC reconfiguration depending on gNB implementation. So we may keep it as a common understanding.

In addition, [1] provides additional cases, for which current spec text does not cover,

* **Case 2: Only partial QoS flows to be added or modified are failed**

Considering the following case at NG-RAN:

* + Request: QoS flow 1 and QoS flow 2 are to be added.
	+ NG-RAN Result: QoS flow 1 is added, while QoS flow 2 is failed.

And [1] believes the NAS-PDU should be sent from NG-RAN to UE under such case; however, current spec text does not mention such case, so it may lead to misunderstanding.

* **Case 3: QoS flow to be added is failed, and QoS flow to be released is successful.**

Considering the following case at NG-RAN:

* + Request: QoS flow 1 to be added, QoS flow2 to be released
	+ NG-RAN Result: QoS flow 1 is failed to be added, while QoS flow 2 release is always successful.

And [1] believes the NAS-PDU should be sent from NG-RAN to UE under such case; however, current spec text does not mention such case, so it may lead to misunderstanding.

Moreover, some company also provides the following case, for which current spec text does not cover,

* **Case 4: All QoS flows to be added or modified are failed, and PDU Session AMBR IE to be modified is successful.**

Considering the following case at NG-RAN:

* + Request: QoS flow 1 & 2 to be added, and PDU Session AMBR IE to be modified
	+ NG-RAN Result: All QoS flows to be added are failed, while update of PDU Session AMBR IE is always successful.

Under such case, it is still controversial on whether to send NAS-PDU from NG-RAN to UE.

**Question 3: Do you think it is necessary to update the current spec text regarding Case 1-4?**

|  |  |
| --- | --- |
| Company | Comment |
| CMCC | At least for Case 1 since the very issue occurs in our current network, and other cases can also be considered. |
| CATT | We think all cases i.e. case 1-4 should be considered |
| Nokia | Agree that clarification is useful. |
| Huawei | Yes. It is better to have common understanding with the finally (agreed) CR. And we can analyse the above cases respectively based on the CR in the next round.  |
| ZTE | Agree that clarification is useful. |
| Samsung | We are fine to make clarification. |

Moderator’s summary:

All participating companies agree that the current spec text needs to be updated based on Cases 1-4 identified above.

Based on the above mentioned cases, [2] [3] and [4] believe it is necessary to update the current spec text in order to make it more clear. And the proposed CRs are listed as follows,

**Option 1**- Huawei, China Unicom and Orange [2] proposes the following text which considers Case 1-3:

- If the *NAS-PDU* IE is received for the PDU session, the NG-RAN node shall pass it to the UE unless the NG-RAN reports the *PDU Session Resource Failed to Modify List* IE contained in the PDU SESSION RESOURCE MODIFY RESPONSE message for the concerned PDU session.

**Option 2** – CMCC and CATT [3] proposes the following text which considers Case 1:

- If the *NAS-PDU* IE is received for the PDU session, the NG-RAN node shall pass it to the UE when modifying the Data Radio Bearer configuration, or when the *PDU Session Aggregate Maximum Bit Rate* IE included in *PDU Session Resource Modify Request Transfer* IE is successfully modified. In case no PDU Session Aggregate Maximum Bit Rate IE is included, the NG-RAN node does not send the NAS PDU received for the PDU session when all the QoS flows to be added or modified are failed and no QoS flow was requested to be released, even if e.g. the NG-U UP TNL modification is successful.

**Option 3** - ZTE [4] proposes the following text which considers Case 1:

- If the *NAS-PDU* IE is received for the PDU session, the NG-RAN node shall pass it to the UE. The NG-RAN node does not send the NAS PDU received for the PDU session when all the QoS flows to be added or modified are failed and no QoS flow was requested to be released, even if e.g. the NG-U UP TNL modification is successful.

**Question 4: If the answer to Q3 is yes, which option do you prefer?**

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| --- | --- | --- |
| Company | Which option? | Comment |
| CMCC | Option 2 or 1 | Since the current text is unclear to us, we would like to make it more clear at least under Case 1. So Option 2.If companies identify that other cases could cause the similar unclearness as in Case 1, then Option 1 is also acceptable to us. |
| CATT | Option 2 | There is scenario that all request on QoS flow to be added or modified failed while the update of UL TNL Address is successful. In this case, the NG-RAN node would not report *PDU Session Resource Failed to Modify List*. However, it is not needed to send NAS-PDU to UE.The description in option 1 is not aligned with above scenario [Huawei reply]: For option 1 in this case, it is true that the NG-RAN will send the NAS-PDU to the UE since the NAS-PDU may carry the Session-AMBR. Then the SMF shall send another round NAS-PDU. As analysed below, option 1 is simple one for both NG-RAN and CN.  |
| Ericsson |  | We would like to propose the text as in below (it is Option 2 + Option 1 + Rewording):- If the *NAS-PDU* IE is received for the PDU session, the NG-RAN node shall pass it to the UE when modifying the Data Radio Bearer configuration or when the PDU session parameters successfully modified need to inform UE, e.g. the PDU Session AMBR modification is successful. Reasoning: * The current specification on “when not to sent NAS-PDU” is inaccurate, because if all the QoS add/mod fails, if the PDU session AMBR is included, the NAS-PDU may need to be sent to the UE;
* The specification should be made general, not only to state “PDU session AMBR”. If companies see the need to mention it, we could give it as an example, as the proposal above.
 |
| Nokia | Option 4 | After more thinking we come to the following wording:If the *NAS-PDU* IE is received for the PDU session, the NG-RAN node shall pass it to the UE regardless of the outcome of the PDU Session Resource modification. |
| Huawei | Option 1 preferred | As mentioned in 5265, option 1 has the following benefits. * Currently there exists no indication of PDU-session level NAS non-delivery to the SMF, e.g. via the NAS non-delivery. For rest options, the SMF may have to rely on the *QoS Flow Failed to Add or Modify List* IE to derive the non-delivery of NAS-PDU in the modify response. While for option 1, it can directly be aware of the non-delivery of the NAS-PDU based on the *PDU Session Resource Failed to Modify List* IE.
* The NG-RAN is designed transparent to the content of the NAS-PDU. For rest options, the NG-RAN has to ascertain the results of the QoS flow level admission control to determine the delivery of the NAS-PDU, while option 1 here can largely simplify the NG-RAN node design.

**For option 2/suggested change from Ericsson**: It may work for the Session-AMBR update case, but we need to consider those NAS-PDU Session parameters not included in the NGAP IEs e.g., RQ timer value, or QoS rules etc. as mentioned in 5265. Anyway, we may suggest to remove the **‘modifying the Data Radio Bearer configuration’** from the procedure texts to avoid any ambiguity, the same as option 3 suggested. So the removal of this wording could be seen as the first step to move forward.  |
| ZTE | Option 3 | We think options 3 cover all cases and introduce less impact on specification.The logical is clear only case A,B:A: Send the NAS PDU to UE in all cases including case 1-4 in this discussion. “If the *NAS-PDU* IE is received for the PDU session, the NG-RAN node shall pass it to the UE”.B: Not send NAS PDU to UE in only one exception :“The NG-RAN node does not send the NAS PDU received for the PDU session when all the QoS flows to be added or modified are failed and no QoS flow was requested to be released, even if e.g. the NG-U UP TNL modification is successful”.In future more feature may introduced in PDU modification message, with other options, the specification need to update again and again. |
| Samsung | Option 2 |  |

Moderator’s summary:

Companies seem to have different flavors on the rewording. So we propose to have a second round as below in order to find an acceptable rewording.

# Discussion (Second round)

According to the first round, there are basically five versions of the rewording, so it is primarily necessary to narrow down the options on the table; on the other hand, some common understandings have been achieved during the first round, so it would be beneficial to find the rewording which reflects such common understandings.

The common understanding during the first round:

1. There are cases that the DRB configuration is not modified while the NAS-PDU should be sent.

2. The spec text should be clear enough to avoid ambiguity, so clarification/update to the current spec text would be beneficial.

3. The current spec text should be updated by considering all Cases 1-4 identified.

In addition, as suggested by some companies, the updated spec text is better to be future-proof, i.e. to avoid future modifications as much as possible.

Consequently, by following the above common understandings 1&2, at least the text ‘**modifying the Data Radio Bearer configuration**’ is suggested to be removed, under the condition that 3 companies recommend to do this while other companies seem to have no objection.

Moreover, by following the common understanding 3, the above Option 2 might be de-prioritized since it only considers Case 1, although Option 2 has the most votes.

For the second sentence of the current spec text,

**<Start of quotation>**

- If the *NAS-PDU* IE is received for the PDU session, the NG-RAN node shall pass it to the UE when modifying the Data Radio Bearer configuration. The NG-RAN node does not send the NAS PDU received for the PDU session when all the QoS flows to be added or modified are failed and no QoS flow was requested to be released, even if e.g. the NG-U UP TNL modification is successful.

**<End of quotation>**

The preference on whether to keep this sentence is half-to-half; however, in order to avoid ambiguity by following the common understanding 2, at least the term ‘e.g.’ should be removed since the second sentence is only identified by the case when only the NG-U UP TNL modification is successful.

As a result, we propose the following two options by considering comments from all companies as a way forward,

Option 1:

- If the *NAS-PDU* IE is received for the PDU session, the NG-RAN node shall pass it to the UE.

Option 2:

- If the *NAS-PDU* IE is received for the PDU session, the NG-RAN node shall pass it to the UE. The NG-RAN node does not send the NAS PDU received for the PDU session when all the QoS flows to be added or modified are failed and no QoS flow was requested to be released, even if only the NG-U UP TNL modification is successful.

Note that Option 1 is simple but may contradict the current spec on the case when only the NG-U UP TNL modification is successful.

**Question: Could you accept that we only focus on the above two options for potential text update? If yes, which option (1 or 2) would you prefer? Also list the NAS-PDU delivery results for the above four cases based on your preferred option. Companies are invited to provide comments.**

|  |  |  |
| --- | --- | --- |
| Company | Which option? | Comment |
| CMCC | Option 1 | Yes. Option 1 is simplest way which will cause no ambiguity.Although the NG-RAN also needs to send NAS-PDU under the case only TNL modification is successful after the update, the Core Network is expected to understand which parameters are successfully modified and which are not, and CN is able to trigger a subsequent Downlink NAS Transport procedure if any parameter in NAS-PDU should be further updated by the UE. |
| Huawei | Still prefer the **original** option1 (Only if the PDU session modify is failed, the NAS-PDU is not delivered) | Current option 1 means the NAS-RAN under any case shall deliver the NAS-PDU to the UE? Then this means the NAS-PDU is sent even if the PDU session modify is totally failed. This is a not good approach to us, and it is a big change compared to the original descriptions. On the contrary, we are in favour of **ORIGNAL OPTION 1** that **only if the PDU session modify is failed, the NAS-PDU is not delivered; while for other cases, the NAS-PDU is delivered**. This way can be easily implemented/understood by the NG-RAN and the SMF. Then for the above four cases for this original option 1: Case 1: NAS-PDU delivered. Case 2: NAS-PDU deliveredCase 3: NAS-PDU deliveredCase 4: Up to the NG-RAN to decide* NAS-PDU delivered if replies with PDU Session Resource Setup Response List (also means the Session-MBR is updated by the NG-RAN),
* NAS-PDU not delivered if replies with the PDU Session Resource **Failed** to Setup List (also means the Session-MBR is not updated by the NG-RAN)
 |
| CATT | Still prefer the **original** option2 | For option 1, similar view as Huawei, it means that the NAS- PDU would be sent to UE in any cases even all the PDU session modification failed. This would impact the signalling exchange between UE and SMF. Currently, if the PDU SESSION MODIFICATION REQUEST initiated by UE is rejected by the network, the PDU SESSION MODIFCIATION REJECT message should be sent to UE instead of PDU SESSION MODIFICATION COMMAND. With that, we think Option1 is not aligned with current NAS signalling procedure.For the original option 1, we think there is one scenario which is not covered as below:It is possible that all the QoS flows to be added or modified are failed and no QoS flow was requested to be released. At the same time, the UL tunnel ID is updated successfully. In this case, the NG-RAN node would response in the N2 message with *PDU Session Resource Modify Response Transfer* instead of *PDU Session Resource Modify Unsuccessful Transfer.* Obviously, the NG-RAN node should not send the NAS-PDU to UE in this scenario while the statement in original option 1 said that the NAS-PDU is not delivered only PDU session modify is failed.For the current option 2,the second sentence may also miss some scenario. For example, if only the network instance or security indication is successful, the NAS-PDU also should not be sent to UE.We think the original option 2 cover all the cases so far.Although we could understand the concern for some companies to make it general and not only list “PDU SESSION AMBR”, the scenarios are complex and it is not easy to use one general sentence to summarize all scenarios. |
| Ericsson |  | The propose two Options are not entirely correct. In our view, we do not need to state “when the NAS-PDU is not sent” if we have clariid when the NAS-PDU shall be sent.There are two cases when NAS-PDU shall be sent:* When performing DRB reconfiguration;
* When the modification needs to inform UE.

**Propose to the moderator** RAN3 first agree in which cases NAS-PDU is sent. And after that, we form the accurate specification wording. |
| Nokia | Option 1 | We agree with CMCC that option 1 has the merit to be simple and covers all scenarios. We also assume like CMCC that core network should react correspondingly.  |
| ZTE | Option 1 | Share the view with CMCC & Nokia |

# Conclusion, Recommendations [if needed]

If needed

# References

|  |  |  |
| --- | --- | --- |
| [1] | [R3-215265](file:///D%3A%5C%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5C%5CTSGR3_114-e%5C%5CDocs%5C%5CR3-215265.zip) | Correction of PDU session resource modify (Huawei, China Unicom, Orange) |
| [2] | [R3-215266](file:///D%3A%5C%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5C%5CTSGR3_114-e%5C%5CDocs%5C%5CR3-215266.zip) | Correction of PDU session resource modify (Huawei, China Unicom, Orange) |
| [3] | [R3-215687](file:///D%3A%5C%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5C%5CTSGR3_114-e%5C%5CDocs%5C%5CR3-215687.zip) | Correction of NAS PDU in PDU Session Modify (CMCC) |
| [4] | [R3-215752](file:///D%3A%5C%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5C%5CTSGR3_114-e%5C%5CDocs%5C%5CR3-215752.zip) | PDU session NAS PDU Delivery (ZTE) |