3GPP TSG-RAN WG3 #110-e R3-206901

2-12 November 2020

Online

Agenda Item: 17.1

Source: CMCC

Title: Summary of offline discussion on RAN slicing workplan and TR skeleton

Document for: Approval

# Introduction

This contribution provides email discussion for the following,

**CB: # RANSlicing1-Workplan\_TRSkeleton**

**- check work plan, revise** [**R3-206792**](file:///C:\Users\llopes\OneDrive%20-%20Qualcomm\Documents\3%20RAN3\RAN3%20110\Inbox\Drafts\CB%20%23%20RANSlicing1-Workplan_TRSkeleton\Docs\R3-204643.zip) **if needed**

**- check the details of TR38.832 skeleton, and revise** [**R3-206735**](file:///C:\Users\llopes\OneDrive%20-%20Qualcomm\Documents\3%20RAN3\RAN3%20110\Inbox\Drafts\CB%20%23%20RANSlicing1-Workplan_TRSkeleton\Docs\R3-204643.zip) **if needed**

**- LS reply to SA2 for R3-206840**

(CMCC - moderator)

Summary of offline disc [R3-206901](file:///C:\Users\llopes\OneDrive%20-%20Qualcomm\Documents\3%20RAN3\RAN3%20110\Inbox\Drafts\CB%20%23%20RANSlicing1-Workplan_TRSkeleton\Inbox\R3-206901.zip)

Note that this CB is planned to be carried out in two phases:

**Phase 1**: Check the proposed work plan and draft TR, and collect opinions on LS from SA2 in R3-206840 (Till 2000UTC, Thursday, Nov. 5th)

**Phase 2**: Continue to check the proposed work plan and draft TR, and prepare potential reply LS to SA2 for R3-206840

# For the Chairman’s Notes

Propose the following:

Propose to capture the following:

# Discussion

The following contributions are captured in this section,

|  |  |  |
| --- | --- | --- |
| [R3-206735](file:///C:\Users\llopes\OneDrive%20-%20Qualcomm\Documents\3%20RAN3\RAN3%20110\Inbox\Drafts\CB%20%23%20RANSlicing1-Workplan_TRSkeleton\Docs\R3-206735.zip) | Draft TR 38.832 (CMCC, ZTE) | draft TR |
| [R3-206792](file:///C:\Users\llopes\OneDrive%20-%20Qualcomm\Documents\3%20RAN3\RAN3%20110\Inbox\Drafts\CB%20%23%20RANSlicing1-Workplan_TRSkeleton\Docs\R3-206792.zip) | Updated work Plan for RAN Slicing (CMCC, ZTE) | Work Plan |
| [R3-206840](file:///C:\Users\llopes\OneDrive%20-%20Qualcomm\Documents\3%20RAN3\RAN3%20110\Inbox\Drafts\CB%20%23%20RANSlicing1-Workplan_TRSkeleton\docs\R3-206840.zip) | LS on restricting the rate per UE per network slice (SA WG2) | LS in  Move to 17.1  resp in [R3-206867](file:///C:\Users\llopes\OneDrive%20-%20Qualcomm\Documents\3%20RAN3\RAN3%20110\Inbox\Drafts\CB%20%23%20RANSlicing1-Workplan_TRSkeleton\docs\R3-206867.zip), [R3-206868](file:///C:\Users\llopes\OneDrive%20-%20Qualcomm\Documents\3%20RAN3\RAN3%20110\Inbox\Drafts\CB%20%23%20RANSlicing1-Workplan_TRSkeleton\docs\R3-206868.zip) |
| [R3-206841](file:///C:\Users\llopes\OneDrive%20-%20Qualcomm\Documents\3%20RAN3\RAN3%20110\Inbox\Drafts\CB%20%23%20RANSlicing1-Workplan_TRSkeleton\docs\R3-206841.zip) | LS Reply on Enhancement of RAN Slicing (SA WG2) | LS in  Move to 17.1 |
| [R3-206567](file:///C:\Users\llopes\OneDrive%20-%20Qualcomm\Documents\3%20RAN3\RAN3%20110\Inbox\Drafts\CB%20%23%20RANSlicing1-Workplan_TRSkeleton\Docs\R3-206567.zip) | RAN impact of restricting the rate per UE per network slice (Nokia, Nokia Shanghai Bell) | discussion  Move to 17.1  resp in [R3-206871](file:///C:\Users\llopes\OneDrive%20-%20Qualcomm\Documents\3%20RAN3\RAN3%20110\Inbox\Drafts\CB%20%23%20RANSlicing1-Workplan_TRSkeleton\docs\R3-206871.zip) |
| [R3-206568](file:///C:\Users\llopes\OneDrive%20-%20Qualcomm\Documents\3%20RAN3\RAN3%20110\Inbox\Drafts\CB%20%23%20RANSlicing1-Workplan_TRSkeleton\Docs\R3-206568.zip) | Reply LS on restricting the rate per UE per network slice (Nokia, Nokia Shanghai Bell) | LS out  Move to 17.1 |

## Updated work plan and draft TR

Regarding the updated work plan, please provide comments in the following table, if any,

|  |  |
| --- | --- |
| Company | Comment |
|  |  |
|  |  |
|  |  |

Regarding the draft TR, please provide comments in the following table, if any,

|  |  |
| --- | --- |
| Company | Comment |
|  |  |
|  |  |
|  |  |

## LS reply to SA2 for R3-206840

An LS from SA2 has been received on restricting the rate per UE per network slice. As indicated by SA2, a KI#3 has been studied in TR 23.700-40 on how to rate limit the aggregate of all the QoS flows/PDU sessions associated with a specific network slice for a single UE, irrespective of the resource type of the QoS flows. Three related solutions have been figured out which have RAN impacts. And RAN3 is asked to provide feedback regarding these 3 solutions. The following quoted paragraphs are captured in 6840 [1],

*Within the study and among the solutions, there are 3 solutions which have RAN impacts*

1. *Solution 22 propose to send maximum rate UL/DL for the slice for the UE (identified as SMBR – Slice MBR) over NG when the UE context is passed to the RAN. The RAN uses this parameter for two simultaneous purposes:*
2. *Rate limit the aggregate of the UL/DL traffic for an S-NSSAI. During the rate-limit enforcement no GBR traffic shall be dropped or delayed.*
3. *Ensure that the sum of all the admitted QoS flows GFBR of GBR resource type QoS flows is not exceeding the maximum rate per slice UL/DL for the UE. So, the admission control takes this parameter into account.*
4. *Solution #37 proposes to signal Slice-MBR to RAN, not for enforcement but may be used to calculate the UE-AMBR value. This solution seems to impact existing UE-AMBR definition, and also interfere with the existing one if one is provided for the UE, but SA2 would like to obtain feedback as to whether such approach should be considered.*
5. *Solution #43, related to solution #22, proposes that RAN notifies the AMF (for notification purposes only) when the Slice-MBR is reached. SA2 would like to know whether this is an infrequent event or can be frequent and cause excessive load. SA2 has not determined if this solution should be considered or not for further development.*

So far, 3 discussion/response papers has discussed potential RAN impact on these solutions, and gives observations as follows,

* Regarding Solution#37,

**-R3-206567 [2]:**

**Observation 1**: the solution 37 does not respect the contract with the customer and the concept of session-AMBR. Indeed, session-AMBR is a subscription value and it should be still allowed when no competing traffic constrains the rate of the session. In principle the customer could complain that a PDU session is over-limited compared to its contract.

**Observation 2**: if solution 37 modifies UE-AMBR calculation this would severely impact NG-RAN release 15 legacy enforcement of traffic.

**-R3-206867 [3]:**

**Observation 2**: Solution#37 brings impact on legacy UE-AMBR definition which will bring NBC issue.

**-R3-206871 [4]:**

**Conclusion 3**: Regarding Solution #37, RAN3 agrees that if the RAN can derive and enforce the UE AMBR, there is no need to signal to the RAN the S-MBR.

**Q1: Whether Solution#37 should still be considered?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| Huawei | No | For the UE-AMBR calculation, we agree there is no need to use the Slice-MBR for this purpose.  For the observation 1 in 206567, in principle we agree, but final decision should leave to SA2 to determine. |
| Qualcomm | No | We see no need to duplicate (or complicate) existing functionality for UE-AMBR in the RAN, so from that point of view the solution seems not needed. |
| China Telecom | Yes | Solution #37 seems to be feasible and it may be achieved with limited/no impact on the RAN side. |
| Ericsson | Yes | Solution #37 does not modify how the RAN operates. The solution description says (see TR23.700-40):  *Session-AMBR for each PDU session is determined with consideration of Slice-MBR and status of all PDU sessions associated with the S-NSSAI. The Session-AMBR for each PDU session is signalled to RAN and UPF accordingly. Figure 6.37.2-2 shows data rate control per network slice at RAN and UPF. For downlink/uplink data rate control per network slice at RAN, the RAN performs UE-AMBR enforcement as it is. For downlink data rate control per network slice at UPF, the UPF performs Session-AMBR enforcement as it is.*  Hence, the solution is feasible at RAN level as it does not change any RAN behavior. We only wonder whether anything new needs to be signaled to the RAN for solution 37, as the RAN only needs the Session-AMBR, which is already signaled. |
| Samsung | Yes | Solution #37 is a CN solution, please let SA2 to decide whether need it or not.  From RAN3 point of view, we just conclude there is no need to use S-MBR for UE-AMBR calculation. |
| Nokia | No | Solution#37 is ambiguous whether it sends or not S-MBR to RAN.  If it sends it to modify UE-AMBR calculation, there is severe impact, is not backwards compatible and is technically not correct because it newly mix GBR and non-GBR flows in UE AMBR calculation.  If it does not send S-MBR to NG-RAN, solution 37 is a partitioning of the slice resource a priori (i.e. because there is even traffic) in 5GC. This means, as explained in detail in tdoc R3-206567, that solution 37 does not respect the contract with the customer and the concept of session-AMBR. Indeed, session-AMBR is a subscription value and it should be still allowed when no competing traffic constrains the rate of the session. In principle the customer could complain that a PDU session is over-limited compared to its contract. |
| ZTE | No decision in RAN3,but express RAN3’s concern. | RAN3 are not the group to decide which solution in SA2 should be consider or not.  From the description of TR 23.700-40, there is no description that Slice-MBR should be transfer to RAN side.  While in the LS , it is clear that Slice-MBR will transfer to RAN and may impact UE-AMBR concept.  Therefore, what RAN3 can do is to answer RAN3 does not accept the impact on UE-AMBR concept when introduce Slice-MBR. |
| CATT |  | If the S-MBR sent to RAN for UE-AMBR calculation, the solution may not need to be considered. But we need consider the S-MBR for rate limited as mentioned in sol#22 |

Companies are invited to provide feedback on the above question.

Conclusion: To clarify, as indicated in SA2 LS ‘*SA2 would like to obtain feedback as to whether such approach should be considered.*’, it is why Q1 is asked.

We receive responses from 8 companies. 4 with NO, 3 with YES and 1with blank. However, 7 companies (including 2 with YES) see no need to signal slice-MBR to RAN for UE-AMBR calculation; while 1 company thinks it can be achieved with limited/no impact to RAN.

Therefore, we would suggest to follow the majority view, and try to propose to reply to SA2 that for solution#37, RAN3 sees no need to signal slice-MBR to RAN for UE-AMBR calculation.

* Regarding Solution#22,

**-R3-206567 [2]:**

**Observation 3:** Solution 22 is aligned with current UE-AMBR principles and can fulfil SLA requirements of S-MBR per UE without unnecessary limitation of the bit rate of PDU sessions.

**-R3-206867 [3]:**

**Observation 1**: Main difference of SMBR in solution 22 from the existing UE-AMBR is that SMBR applies for both GBR and NON-GBR. Therefore, it is possible to reuse the similar signalling handling of UE-AMBR for SMBR.

**-R3-206871 [4]:**

**Conclusion 1:** When multi connectivity configurations are used, solution 22 is is not able to exploit the full S-MBR allowed. In principle the customer could complain that a PDU session is over-limited compared to its contract.

Moreover Solution 22 incurs in considerable RAN impact due to signaling between MN and SN of split S-MBR values.

**Conclusion 2:** Solution 22 has an impact on the L2 and on the UE for enforcement of the S-MBR in UL

**Q2: Is it feasible for Solution#22? Does it cause any additional issues compared to current UE-AMBR principles in multi-connectivity configurations?**

|  |  |  |  |
| --- | --- | --- | --- |
| Company | Feasible?  (Yes/No) | Additional  issues?  (Yes/NO) | Comment |
| Huawei | Yes for DL, pending for UL | No | The NG-RAN shall enforce the slice-MBR similar to the enforcement of the UE-AMBR for downlink. And for dual connectivity, the MN can split the DL slice-MBR into the MN slice-MBR, and SN slice-MBR, which are enforced respectively, which is similar to the handling of UE-AMBR.  For UL, the NG-RAN may have to rely on the LCP and L2 scheduling for enforcement. RAN2 is more appropriate to answer. |
| Qualcomm | Yes for DL, pending for UL | No | Agree with Huawei – DL enforcement should follow established principles including DC handling, just at a different granularity. For the UL side, for sure RAN can do admission control, but dynamic enforcement should be considered by RAN2 first. |
| CMCC | Yes | No | In our opinion, the enforcement for S-MBR is similar to the enforcement for UE-AMBR in both single and multi connectivity scenarios. |
| China Telecom | No |  | Solution #22 have a high impact on the RAN, it is unclear the benefit to deal with in RAN. For UL, it should be considered by RAN2. |
| Ericsson | No | Yes | Solution 22 has a considerable impact on RAN. In DL solution 22 impacts the efficiency of S-MBR utilization because it requires to split the S-MBR between MN and SN. Additionally to UE-AMBR, the solution limits throughput for GBR too, which implies a totally different admission control mechanism at the RAN, e.g. a GBR bearer needs to be admitted also on the basis of S-MBR. In UL, the solution requires a total redesign of MAC and channel prioritization because it is not possible to assign UL grants on a per slice basis, hence it is not possible to rate control in UL on a per slice basis. |
| Samsung | No | Has RAN impact | Agreed with CT and E/// |
| Nokia | Yes | No | Solution 22 is aligned with current UE-AMBR principles and can fulfil SLA requirements of S-MBR per UE without unnecessary limitation of the bit rate of PDU sessions like solution 37 has.  The impact to RAN is similar to when UE AMBR solution was designed in release 15 which was accepted at that time. Therefore, it is abusive to call that impact “considerable” otherwise 3GPP would not have accepted UE AMBR in release 15.  About the split between MN and SN, the impact is even more severe with solution 37 which reproduces this split two times (additionally in the 5GC).  There is no re-design needed for UL, there is no MAC impact if the proper configuration of LCH prioritization is used. See discussion in RAN2. |
| ZTE | No decision in RAN3,but express RAN3’s observation. | No | In addition of GBR, the behavior of S-MBR in solution 22 is similar to UE-AMBR. Evern take for GBR impact, the signalling is same.  The concerns raised e.g MAC behavior, is not the scope of RAN3 ,but in RAN2.  From the signalling point of view, there is no issue to see for impact on interface from signalling point of view. |
| CATT | Yes | Yes | The admission control should be impacted. SMBR split between MN and SN should introduce complex |

Companies are invited to provide feedback on the above question.

Conclusion: For UL, most of the companies propose to decide by RAN2; while for DL, 4 companies think it feasible, 3 companies think it infeasible, and 1 company proposes to take no decision in RAN3. There’s no majority view for DL S-MBR RAN enforcement. As a summary, we propose to provide RAN3’s observations for DL, and up to RAN2 to decide for UL, in reply LS regarding solution#22.

Ericsson: While it is true that there is no consensus on whether Solution #22 is feasible for UL, there are 3 companies that actually think the solution is unfeasible and 3 that RAN2 should check this, i.e. they cannot cast an opinion on whether the solution is feasible. Hence, it is not correct that there is a majority that wants RAN2 to check. It is however fair to state that for UL, there is not consensus in RAN3 regarding whether Soltuion #22 is feasible.

Nokia: for UL the point is not about whether there is majority in RAN or what are opinions in RAN3. The point is that this is a RAN2 matter. Therefore, RAN3 cannot say anything, not even that there is no consensus.

For DL, note that solution #22 is not like the UE-AMBR enforcement. Solution #22 aims at limiting GBR bearers too. Hence it cannot be extrapolated that “if it works for UE-AMBR, then it works for Solution #22 as well”. There will be an impact on RAN due to enforcement of bit rates including GBR bearers, and a loss of efficiency dur to the split of the S-MBR between MN and SN.

These points should be reflected in te LS back to SA2

Nokia: we disagree. Solution 37 has the same issues. The split between MN and SN is therefore not related.

* Regarding Solution#43,

**-R3-206567 [2]:**

**Observation 4**: Solution 43 could lead to intensive signaling load.

**-R3-206867 [3]:**

**Observation 3**: Solution#43 needs to introduce a new message or new IE in legacy messages (e.g Notify message ) which will bring additional signaling overhead over interfaces.

**-R3-206871 [4]:**

**Conclusion 4:** In order to avoid potential signalling overloads at the RAN, it is suggested to avoid adoption of Solution #43

**Q3: Is it feasible for Solution#43? Does it cause any additional issues besides additional signaling overhead?**

|  |  |  |
| --- | --- | --- |
| Company | Feasible?  (Yes/No) | Comment |
| Huawei | Yes for DL, pending for UL | It is feasible for RAN to notify the AMF when DL slice-MBR is reached. But for UL, this may dependent on the answer to Q2.  We see benefits about the notification, but also agree that the overhead issue should be considered. |
| Qualcomm | Can discuss | Until now, we have avoided any such notifications (both towards the CN and intra-RAN) for similar aspects. Practically this would require some heavy filtering and may not even be meaningful. From RAN3 perspective, maybe we should just explain that this could be a highly dynamic indicator and also implementation dependent unless e.g. reporting criteria were defined. |
| CMCC | Yes | We can point out the overhead issue in the potential reply LS. |
| China Telecom | No | We should avoid potential signaling overloads at the RAN. |
| Ericsson | No | Solution 44 may generate signaling overloads at RAN |
| Samsung | No | Agree with QC and CT |
| Nokia | No | Solution 44 leads to high signaling for uncertain benefit. |
| ZTE | Yes | The signalling overhead of interface following the working scope of RAN3.  As we express in the response contribution, the solution may raise signalling overhead.  RAN3 need inform SA2 the observation on solution 47. |
| CATT | Yes | No additional issue can be introduced. Benefit is foreseen for load control |

Companies are invited to provide feedback on the above question.

Conclusion: All companies acknowledge the overhead issue, and we propose to provide RAN3’s observations in reply LS regarding solution#43.

## Reply LS from SA2 in R3-206841

Last meeting RAN3 sent an LS to SA2 in R3-205802 to indicate the captured scenarios in TR 38.832 v0.2.0. Before this meeting, a reply LS from SA2 has been received in R3-206841 saying that [5],

*SA2 thanks RAN3 for sharing the use cases for studying the RAN part of slicing service continuity support.*

*SA2 has reviewed the scenarios RAN3 is considering and*

*SA2 kindly requests RAN3 to inform SA2 on the potential solution(s) to address the scenarios, should RAN3 consider them valid, before concluding on the study for these scenarios if they have any system level impact (i.e. they are impacting also the CN). SA2 will then examine the identified candidate solutions and provide the assessment on the ones entailing core network impact, if any is foreseen. It should be noted a Network Slice has end to end significance, hence this should be kept into account in the development of solutions.*

The current status is that RAN3 is asked to provide potential solutions to SA2. Since whether and how to send LS is dependent on our discussion which is more relevant to solutions and evaluations, after coordination with the moderator of CB\_RANslicing2, further discussion on R3-206841 will be carried out in **CB: # RANSlicing2-Slice\_Solutions\_and\_Evaluation.**

## Others

Please provide comments in the following table, in case there’s any other issue which is not mentioned but is suggested to be discussed in this CB,

|  |  |
| --- | --- |
| Company | Comment |
| Qualcomm | Yes this is fine – what we can take from this is that expected CN dependencies need to be made clear in the solutions. |
| Ericsson | We need to capture in RAN3 agreements that, as stated in the LS in R3-206841, “*a Network Slice has end to end significance, hence this should be kept into account in the development of solutions*”. Namely, there is no solution or scenario where the re-mapping of an S-NSSAI does not have an impact on the CN because an S-NSSAI represents a network slice, which has an end to end significance. |
| ZTE | Just kind to remind that SA2 waiting for the response for the end of the SI. The Response will not late than the end of the meeting.  To be construction, ZTE already provide the LS response in R3-206868.  Just provide observations and concerns from RAN3 point of view and waiting for your suggestion. |

# Conclusion, Recommendations

**After the first round**

Regarding the reply LS to SA2 for 6840. For each solution, we give following conclusions:

Solution#37:

Conclusion: To clarify, as indicated in SA2 LS ‘*SA2 would like to obtain feedback as to whether such approach should be considered.*’, it is why Q1 is asked.

We receive responses from 8 companies. 4 with NO, 3 with YES and 1with blank. However, 7 companies (including 2 with YES) see no need to signal slice-MBR to RAN for UE-AMBR calculation; while 1 company thinks it can be achieved with limited/no impact to RAN.

Therefore, we would suggest to follow the majority view, and try to propose to reply to SA2 that for solution#37, RAN3 sees no need to signal slice-MBR to RAN for UE-AMBR calculation.

Solution#22:

Conclusion: For UL, most of the companies propose to decide by RAN2; while for DL, 4 companies think it feasible, 3 companies think it infeasible, and 1 company proposes to take no decision in RAN3. There’s no majority view for DL S-MBR RAN enforcement. As a summary, we propose to provide RAN3’s observations for DL, and up to RAN2 to decide for UL, in reply LS regarding solution#22.

Solution#43:

Conclusion: All companies acknowledge the overhead issue, and we propose to provide RAN3’s observations in reply LS regarding solution#43.

And we would like ZTE to draft a reply LS based on R3-206868 taking into account above conclusions.

# Refs

[1] R3-206840, SA2

[2] R3-206567 Nokia, Nokia Shanghai Bell

[3] R3-206867 ZTE

[4] R3-206871 Ericsson

[5] R3-206841. SA2