**3GPP TSG-RAN WG2 Meeting #112 Electronic R2-201XXXX**

**02 – 13 November 2020**

**Agenda item: 8.8.1**

**Source: Nokia**

**Title: Summary of [AT112-e][250][Slicing] LS replies to SA2 and RAN3 (Nokia)**

**WID/SID: FS\_NR\_slice - Release 17**

**Document for: Decision**

# 1 Introduction

This document is the summary of the following email discussion:

* [AT112-e][250][Slicing] LS replies to SA2 and RAN3 (Nokia)

Scope:

* + - Attempt to create LS reply to the SA2 LSs

Intended outcome:

* + - Discussion summary in [R2-200xxxx](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_112-e/Docs/R2-200xxxx.zip) (by email rapporteur).

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

* + - Deadline for companies' feedback: Friday morning 2nd week

Providing comments which answers should be used as baseline.Deadline: Thursday 12 November, 11:00 UTC

# 2 Discussion

## 2.1 Reply LS for [R2-2008759](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_112-e/Docs/R2-2008759.zip): LS on Cell Configuration within TA/RA to Support Allowed NSSAI

The following draft Reply LSs drafted to this meeting:

**[R2-2010488](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_112-e/Docs/R2-2010488.zip) Reply LS on Cell Configuration within TA/RA to Support Allowed NSSAI Qualcomm Incorporated**

**Q1: In Rel-15 and 16, is it expected that each cell in the tracking area supports the same S-NSSAI(s)? (or, said otherwise, do all cells advertising the same TAC support the same set of S-NSSAIs?).**

Clause 16.3.1 of TS 38.300 states that “it is assumed that the slice availability does not change within the UE’s registration area”, and it follows that the same assumption applies to a tracking area. Therefore, RAN2 believes that a cell broadcasting TAI X shall normally be able to provide appropriate slice resources for all slices associated with TAI X. Whether this implies that the resources must be owned by that cell requires further discussion since no specific normative statement exists to that effect.

The same clause also states that “Admission or rejection of access to a slice may depend by factors such as support for the slice, availability of resources, support of the requested service by NG-RAN”. RAN2 thinks that, due to resource shortage, it is possible that a slice may not be available in a cell of TAI X even if declared in the list associated with TAI X by the respective RAN node.

**Q2a: Can RAN WGs and CT1 explain if it can happen that a UE, e.g. due to local radio conditions, can only use a cell in the TA where not all S-NSSAIs are present in the Allowed NSSAI it received (and that the TA supports), and can RAN WGs and CT1 explain how it is handled today in rel-15/16?**

Assuming that all RAN nodes involved are within the same tracking area, this could happen in rel15/16 due to e.g. resource shortage. Resource shortage can impact handover or context / session establishment as well as normal operation of a previously admitted PDU session. In such case, HO/redirection may be required when S-NSSAI associated with the arriving traffic is not available in current cell.

**Q2b: If an S-NSSAI can be rejected depending on which cell the UE camps on even though it is supported in the TA, for the reason that it is not supported in the cell, is there in rel-15/16 a CT1 error code to handle this case (i.e. can a S-NSSAI be rejected, with a suitable cause code, depending on which cell of the TA the UE camps on, even though this S-NSSAI is known to be supported in the TA, for the reason that this S-NSSAI is actually not supported in the cell of the TA)? Is there any provisions in the RAN or CT1 specifications to handle this case?**

From RAN2 point of view, except for the resource congestion scenario, the case described above should not normally happen in rel15/16, since the slice support is TA-homogenous, and involved nodes exchange information on slice support via configuration exchange procedures. If support does change, the configuration should be updated.

**[R2-2010646](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_112-e/Docs/R2-2010646.zip) Draft reply LS on Cell Configuration within TA/RA to Support Allowed NSSAI ZTE corporation, Sanechips**

1. *In Rel-15 and 16, is it expected that each cell in the tracking area supports the same S-NSSAI(s)? (or, said otherwise, do all cells advertising the same TAC support the same set of S-NSSAIs?).*

**Answer**: From RAN2’s perspective, it is not expected that each cell in the tracking area supports the same S-NSSAI(s).

*If the answer is "no":*

*2a) Can RAN WGs and CT1 explain if it can happen that a UE, e.g. due to local radio conditions, can only use a cell in the TA where not all S-NSSAIs are present in the Allowed NSSAI it received (and that the TA supports), and can RAN WGs and CT1 explain how it is handled today in rel-15/16?*

*2b) If an S-NSSAI can be rejected depending on which cell the UE camps on even though it is supported in the TA, for the reason that it is not supported in the cell, is there in rel-15/16 a CT1 error code to handle this case (i.e. can a S-NSSAI be rejected, with a suitable cause code, depending on which cell of the TA the UE camps on, even though this S-NSSAI is known to be supported in the TA, for the reason that this S-NSSAI is actually not supported in the cell of the TA)? Is there any provisions in the RAN or CT1 specifications to handle this case?*

**Answer:** From RAN2’s perspective, it is possible that UE selects a cell not supporting the UE intended slice due to local radio conditions (e.g. the best cell does not support the intended slice but it is selected by UE following the cell reselection rules). In this case, the R15/R16 mechanism (e.g. CA/DC, HO, release with redirection and UE specific cell reselection priority) can be used to guide UE to a cell supporting the intended slice. It is also possible that UE camp on a cell not supporting the UE intended slice while all the other cells in the TA are not available. UE may initiate service for the intended slice on this cell but the PDU session will

not be set up successfully and a cause “slice(s) not supported” will be reported to the core network.

**Summary from Rapporteur: the most important is to agree in the answer for Question 1:**

1) According to R2-2010488 **RAN2 assumes** that all cells advertising the same TAC support the same set of S-NSSAIs in Rel-15 and 16 (see text highlighted by yellow).

2) According to R2-2010646 **RAN2 does not assume** that all cells advertising the same TAC support the same set of S-NSSAIs in Rel-15 and 16 (see text highlighted by cyan).

**Q1.1: Do you agree that RAN2 assumes that all cells advertising the same TAC support the same set of S-NSSAIs in Rel-15 and 16?**

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| **Company** | **Answer** | **Comment** |
| Qualcomm | Yes  (but please see comments) | We need some clarifications on Rapporteur’s description. First, please note that in our drafted LS, the highlighted part by Rapporteur has a word of “normally”:  *Therefore, RAN2 believes that a cell broadcasting TAI X shall normally be able to provide appropriate slice resources for all slices associated with TAI X.*  And in the followed paragraph, it also described that some exceptional case (e.g. resource shortage for slice in some cell) may happen in deployment, which is not a normal case.  *The same clause also states that “Admission or rejection of access to a slice may depend by factors such as support for the slice, availability of resources, support of the requested service by NG-RAN”. RAN2 thinks that, due to resource shortage, it is possible that a slice may not be available in a cell of TAI X even if declared in the list associated with TAI X by the respective RAN node.*  In simple word, our view is summarized as:   1. RAN2 should follow the principle that slice uniform availability in TA (or RA) defined in Rel-15/Rel-16. 2. RAN2 also needs to indicate SA2 that it is possible that a slice may not be available in a cell (e.g. due to resource shortage) in deployment, i.e. an S-NSSAI in the Allowed NSSAI may not be always available in every cell of the TA/RA. 3. For Q1 of SA2 LS, RAN2 don’t need to explicitly say “Yes” or “No”, but just need to inform SA2 the above 2 RAN2 understandings. |
| Nokia | YES | According to the citation from 38.300 subclause 16.3.1, it is clear that this is a RAN level assumption. |
| ZTE | No | We understand that the target is that the allowed slice are available within the TA but can be achieved in various ways.  One possible deployment is to let all the cells within a TA support the same slice.  Another possible deployment is to deploy cells supporting different slices with overlapped coverage. For example, in the NG-ENDC scenario, some slices are supported via the NR SCG cells with same coverage as the LTE PCell but the LTE PCell itself does not support such a slice. If it is assumed that each cell in the same TA supports the same slice, it would not be possible to support some slice via NG SCG in NG-ENDC scenarios.  As shown in the following figure, different cells on different frequency layer supporting different slices may be deployed with the same coverage. Since slice 1 and 2 can be supported within the coverage of TA#1, they can be configured as allowed NSSAI.  IMG_256  Figure: Example of deployment scenario  In such deployment scenario, the allowed NSSAI is available within the TA but not all the cells in this TA are required to support slice 1and 2.  Thus, we do not think there is need to have such restriction on the deployment. |
| OPPO | Yes | According to TS 38.300, it is assumed that the slice availability does not change within the UE's registration area. From our perspective, it implicitly indicates each cell in one registration area supporting the same S-NSSAI(s), otherwise the slice availability can not be fulfilled. Thus, we prefer to simply respond a positive answer to SA2. |
| CMCC | No | We agree with ZTE’s comment.  “The slice availability does not change” in TS 38.300 doesn’t mean that all the cells should support the same slices. We don’t think RAN2 spec prevent the case that overlapping frequencies supporting different slices can be configured with the same TA, especially when the frequencies are co-site deployed. All the gNB inside the TA should support the same slices, but it’s unnecessary for each frequency to support the same slices. The reason behand that is due to the different numerology and SCS on each frequency, the frequencies are naturally fit for different kind of slices, e.g. higher frequency for URLLC and lower frequency for eMBB.  In addition, the principle of homogeneous slice within TA is too much restriction for TA area planning. In LTE, the TA is deployed based on geographical location. Different frequency in the same location is always configured with the same TA. This is beneficial to avoid frequently TAU. In the same geographical location, if different frequency supporting different slices, operator have to be configured the cells with different TA or RA, it is too much restriction for TA planning and may result to TAU much more frequently. |
| Xiaomi | Yes | In addition to specified in TS30.300 that slice availability does not change within the UE’s registration area, in TS23.501 clause 5.15.8, it is specified that the slice availability in a TA is derived by using the S-NSSAIs supported per TA in 5G-AN, the S-NSSAIs supported in the AMF and operator policies per TA in the NSSF. In other words, TA level slice availability is also support by RAN.  For the deployment scenario ZTE mentioned, it requires UE with EN-DC capability. And we think slice availability should be decoupled with other UE capabilities.  Thus in our view, in Rel-15/16, from RAN perspective, slice support is TA-homogeneous and each cell in the same TA should support the same set of slices. |
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**Q1.2a: If you said YES to Q1.1, then do you have any comments (e.g. wording, comments on the answer to question Q2) on the answers in R2-2010488?**

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| **Company** | **Comment** |
| Qualcomm | No |
| Nokia | The answer for Q1 should be simplified, the 2nd paragraph is not needed. Our view is that that supporting a S-NSSAI in a cell does not mean that resources are available for that slice all the time. The answer could also start with "Yes" to be clearer with the message.  As answers for Q2 are only requested "If the answer is "no"" for Q1, the answers for Q2 are not needed. |
| OPPO | As we understood, SA2’s question is more related to deployment. We agree that sometimes some slice may not be available due to resource shortage, but it is a temporary resource reservation issue but not a deployment issue. Thus, we tend to agree with Nokia and maybe simply answer "Yes" to Q1. Accordingly, there is no need to answer Q2, since it is only requested if the answer to Q1 is "No". |
| Xiaomi | Agree with Nokia, and in fact we think resource shortage is not related to the support of slices in a cell and can be solved by access control or network scheduling.  For the answer of Q1 is yes, the subsequent question is invalid and need not to reply. |
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**Q1.2b: If you said NO to Q1.1, then do you have any comments (e.g. wording, comments on the answer to question Q2) on the answers in R2-2010646?**

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| **Company** | **Comment** |
| ZTE | Comments from other companies are also welcome. |
| CMCC | We think there is no problem in RAN2 spec to support overlapping frequencies supporting different slices can be configured with the same TA, especially when the frequencies are co-site deployed. |
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## 2.2 Reply LS for [R2-2010694](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_112-e/Docs/R2-2010694.zip): LS on restricting the rate per UE per network slice

The following draft Reply LSs drafted to this meeting:

**[R2-2010184](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_112-e/Docs/R2-2010184.zip) Draft reply LS on restricting the rate per UE per network slice Huawei**

RAN2 discussed listed 3 solutions and replies as follows.

* **For Solution #22:**The purpose of SMBR signalled over the NG interface from AMF to RAN is for SMBR enforcement. From RAN2 perspective, RAN is able to perform DL SMBR enforcement by scheduling. However, it may need some enhancement for RAN to perform UL SMBR enforcement due to RAN’s unawareness of the UL data volume of the UE in a certain slice and the UE-level UL grant allocation currently. We expect it to be further evaluated by RAN in a future SLA related topic.
* **For Solution #37:**According to the definition of SMBR, the session AMBR is calculated based on the SMBR. UE AMBR accounts for the sum of all session AMBR of all PDU sessions. Therefore, it is useless providing SMBR to RAN for UE AMBR calculation in this solution.
* **For Solution #43:**This solution is for KI #4 “*Support for network slice quota event notification in a network slice*”, not for KI #3.  
    
  Solution #43 is based on solution#22, i.e., SMBR should first be signalled to RAN over NG interface. After that, the notification of the reached SMBR from RAN to AMF is feasible, which will also have RAN3 impact.  
    
  The frequency of the SMBR notification depends on the network slice planning and the traffic pattern of the UE.

Note that discussion paper in [R2-2010183](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_112-e/Docs/R2-2010183.zip) provides additional background information

**[R2-2010987](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_112-e/Docs/R2-2010987.zip) [DRAFT] Reply LS on restricting the rate per UE per network slice Nokia**

RAN2 provides the following feedback on the solutions listed in the LS:

**1) Solution #22**

In this solution RAN enforces uplink and downlink SMBR of UEs. This is a similar function as UE-AMBR enforcement at slice level. With proper configuration (LCG and LCH restrictions), the RAN is able to obtain and control the UL data volume of a slice. Therefore, RAN2 understanding is that this solution can be supported without changes in RAN2 specifications.

**2) Solution #37**

In this solution the CN calculates the UE-AMBR considering SMBR and RAN should enforce the UE-AMBR. RAN2 does not see any impacts of this solution to RAN2 specifications.

**3) Solution #43**

In this solution the RAN can send notifications when UE SMBR reached. This solution requires the RAN to be able to detect when the uplink data volume per slice per UE exceeds a limit. RAN2 does not see any impacts of this solution to RAN2 specifications.

**Summary from Rapporteur: the main points the draft reply LSs are the following:**

1) According to R2-2010184 (text highlighted by yellow):

1. Solution #22 may require some enhancements in RAN2 specifications.
2. Solution #37 has no RAN2 impact (as "it is useless providing SMBR to RAN for UE AMBR calculation in this solution".
3. Solution #43 the notification of the reached SMBR from RAN to AMF is feasible, but the frequency of the notifications cannot be predicted.

2) According to R2-2010987 (text highlighted by cyan):

1. Solution #22 can be supported without RAN2 impacts
2. Solution #37 has no RAN2 impacts
3. Solution #43 has no RAN2 impacts

**Q2.1: Which answer (R2-2010184 or R2-2010987) do you prefer to be used as a baseline for the answer on Solution#22?**

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| **Company** | **Answer** | **Comment** |
| Qualcomm | R2-2010987 | For Solution#22, R2-2010184 seems to think some LCG enhancement is required for UL. We do not agree. We believe that via Network implementation (LCG config or LCP restriction), one LCG is NOT expected to include LCHs mapped to different slices with different SMBR. Thus, no enhancement in RAN2 is required. However, we think there may be a minor issue: there is an upper limit of LCGs (8) and if a higher number of slices are used simultaneously for one UE, we are not sure whether it can work well. |
| Nokia | R2-2010987 | We can change the answers in R2-2010184 the following way to make acceptable from our side:  The purpose of SMBR signalled over the NG interface from AMF to RAN is for SMBR enforcement. From RAN2 perspective, RAN is able to perform DL SMBR enforcement by scheduling and UL enforcement is feasible with proper configuration (LCG and LCH restrictions). |
| ZTE | [R2-2010987](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_112-e/Docs/R2-2010987.zip) from Nokia | 1. We share similar understanding with Nokia that there is not any RAN2 spec impact of these solutions and a simple and high-level response to SA2 would be helpful for them to progress. 2. Regarding the concern raised in R2-2010184, we understand the UL enforcement would be left to NW implementation without spec impact in RAN2. |
| OPPO | R2-2010987 | For Solution#22, we think that SMBR can be fulfilled with the functions/operations similar as UE-AMBR enforcement. Namely, obtaining SMBR is valuable to gNB side, and the network can configure or adjust a proper LCG/LCH configuration based on SMBR requirement. Thus, more enhancement in RAN2 seems unnecessary. |
| CMCC | [R2-2010987](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_112-e/Docs/R2-2010987.zip) | No strong view. |
| Xiaomi | R2-2010987 | Agree with Qualcomm that the LCG enhancement of UL mentioned in R2-2010184 can be achieved by well network implementation and there is no impact on RAN2 spec.  For the concern of Qualcomm, we think the number of LCGs(8) is enough as currently UE can use maximum of 8 slices simultaneously. |
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**Q2.2: Which answer (R2-2010184 or R2-2010987) do you prefer to be used as a baseline for the answer on Solution#37?**

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| **Company** | **Answer** | **Comment** |
| Qualcomm | R2-2010987 | For Solution #37, we think we can only reply SA2 that there is no RAN2 impacts because SA2 didn’t request RAN2 to provide analysis. What SA2 asked is just “check the impacts” and “feasibility” |
| Nokia | R2-2010987 | We are also OK with the answer from R2-2010184 after some rewording:  According to the definition of SMBR, the session AMBR is calculated based on the SMBR. UE AMBR accounts for the sum of all session AMBR of all PDU sessions. Therefore, from RAN2 perspective providing SMBR to RAN for UE AMBR calculation is not needed. |
| ZTE | [R2-2010987](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_112-e/Docs/R2-2010987.zip) from Nokia | We understand that there is not any RAN2 spec impact of these solutions and a simple and high-level response to SA2 would be helpful for them to progress. |
| OPPO | R2-2010987 | Solution#37 is related to UE-AMBR calculation which is not in RAN2 scope. Thus, we can simply respond "No RAN2 impact".  But, technically, our understanding is that UE AMBR accounts for the sum of all session AMBR of all PDU sessions, thus we have negative views on SMBR provided to RAN for UE AMBR calculation. From this aspect, R2-2010184 is also acceptable to us, i.e. there is no need of providing SMBR for UE AMBR calculation. |
| CMCC | R2-2010987 | Looks fine. |
| Xiaomi | R2-2010987 | It is obviously that provided SMBR to RAN to calculate UE-AMBR value is needless as UE-AMBR is calculated by CN and RAN just enforces UE-AMBR provided from CN. And in fact, as solution#37 is not depend on RAN actually, we can just response simply to SA2 that “Solution#37 has no impact on RAN2” |
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**Q2.3: Which answer (R2-2010184 or R2-2010987) do you prefer to be used as a baseline for the answer on Solution#43?**

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| **Company** | **Answer** | **Comment** |
| Qualcomm | R2-2010987 | For Solution #43, we think we can only reply SA2 that there is no RAN2 impacts because SA2 didn’t request RAN2 to provide analysis. What SA2 asked is just “check the impacts” and “feasibility” |
| Nokia | R2-2010987 | We can also accept the answer from R2-2010184 |
| ZTE | [R2-2010987](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_112-e/Docs/R2-2010987.zip) from Nokia | We understand that there is not any RAN2 spec impact of these solutions and a simple and high-level response to SA2 would be helpful for them to progress. |
| OPPO | R2-2010987 | Solution#43 is related to RAN3 and no RAN2 work is required. Thus, it is preferred to simply respond "No RAN2 impact". |
| CMCC | R2-2010987 | For solution #43, we are not clear with the motivation for RAN to send notifications when UE SMBR is reached. Isn’t it quite normal the SMBR can be reached if the condition is good? That may be kind of signalling overhead. |
| Xiaomi | R2-2010987 | In our view, we think that it may be related to RAN3 and has no impact on RAN2 spec. |
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# 3 Conclusions

# Annex: contact person(s) for each participating company

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| --- | --- | --- |
| Company | Name | Email address |
| Nokia | Gyorgy Wolfner | gyorgy.wolfner@nokia.com |
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