3GPP TSG-RAN WG2 Meeting #116bis-e R2-22xxxx

Electronic Meeting, 17 – 25 January 2022

**Agenda item: 8.8.1**

**Source: CMCC**

**Title: List of open issues for RAN slicing WI**

**WID/SID: FS\_NR\_slice**

**Document for: Discussion and Decision**

# Introduction

This document aims at summarizing critical open issues that need to be addressed for RAN slicing WI by RAN2, including open points captured in the running CRs for RAN2 specifications.

As per chairman guidelines, this discussion shall propose the pre-discussions for next meeting.

* **Each open issue** should be associated with **suggested treatment/handling**.
  1. **Simple issues, Company input into Pre117-e-offline**
  2. Company tdocs invited.
  3. CR rapporteur handled issue (CR rapporteur will propose resolution as input to next meeting).
  4. Other, e.g. immature area, reference to dependency, unclear status etc.

Rapporteur has provided suggested treatment for each OI with colored index.

To make it easier to find the correct contact delegate in each company for potential follow-up questions, the rapporteur encourages the delegates who provide input to provide their contact information in this table:

|  |  |
| --- | --- |
| **Company and Name** | **Contact E-mail** |
| CMCC, Ningyu Chen | chenningyu@chinamobile.com |
| Qualcomm, Peng Cheng |  |
| Huawei, HiSilicon, Jun Chen | jun.chen@huawei.com |
| Intel, Seau Sian Lim | seau.s.lim@intel.com |
| Nokia, Gyuri Wolfner | gyorgy.wolfner@nokia.com |
| Ericsson, Håkan Palm | hakan.l.palm@ericsson.com |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

## List of RRC open issues (as captured in the RRC running CR [1])

|  |  |  |  |
| --- | --- | --- | --- |
| **Issue** | **Relevant section in TS 38.331** | | **Suggested handling** |
| OI 1.1: RAN2 assumes that for purpose of UE checking supported slices on the highest ranked cell at TA/RA boundary, gNB can provide in SIB the slice group that supported by these neighbour cells. If this conflicts with SA2, RAN2 will align with SA2.  FFS if the slice group is mapped by the mapping relationship in current RA or not.  FFS PCI list and/or TAC per slice group are provided.  FFS what is the UE behaviour if gNB doesn’t provide supported slice group info on the best ranked cell. | Chairman notes | | Company tdocs with additional details are invited. |
|  |  | |  |
| OI 1.3: Whether to introduce a T320-like timer for slice-based cell reselection priorities in dedicated signalling, and if needed, there are two options:  Option 1: introduce a new T320-like timer which is independent from the current T320 timer.  Option 2: re-use the current T320 timer. | 5.3.8.3 | | Company input into Pre117-e-offline |
| OI 1.4: FFS in which SIB to broadcast slice info for the purpose of inter-frequency reselection, SIB4 or new SIB. | 6.3.1 | | Immature stage 3 details can be left for later phase. |
| Q 1.5: Whether to support dedicated RACH resources and RACH prioritization parameters in dedicated signalling. | 6.2.2 | Company input into Pre117-e-offline | |
| Q 1.6: *FFS what’s the maximum number for slice group* |  | Immature ASN.1 details can be left for later phase. | |
| OI 1.7: Whether an entry in RA-Prioritization (set of RA-prioritization parameters) configuration is per slice group ID or per slice groups (IDs); | 6.3.2 | Stage 3 issues | |
| OI 1.8: How many different RA-Prioritization parameters sets (backoff timer, power ramping step) can be configured? | 6.3.2 | Stage 3 issues | |
| OI 1.9: FSS RAN sharing for slice-based cell re-selection and slice-based RACH |  | Company tdocs with additional details are invited. | |

**Q1: Do you agree with above essential open issue list and the suggested handling? Is there any other essential open issues need to be handled for close of this WI?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Qualcomm | We agree with Rapporteur’s plan, and have below comments:  First, it is not clear whether we will have Pre117-e-offline. We think it is necessary to complete all remaining issues (at least for some issues with majority view but no time to treat online). It is better that Rapporteur can confirm we have such offline.  Then, for OI 1.1, it should also be treated in Pre1170-e-offline (if any), right? |
| Huawei, HiSilicon | We think that the slice group definitions are still open, e.g. RAN2 discussed the following proposal but no agreements were made:  *Proposal 1.2: The working assumption is that the maximum of slice group is 16. FFS whether it is to be updated.*  We note that OI 3.7 is for the above open issues and it can be also put to above open issue list table or we add a note for OI 3.7 (e.g. the issue is also valid for RRC CR).  We share similar views as Qualcomm that Pre117-e-offline should be confirmed, and we do think that the offline is necessary and important for progressing on these open issues. |
| Intel | Not sure where to put the UE cap open issue.    We think for UE cap, there are the following open issues:    For slice based cell reselection, we think there are the following open issues:  FFS on the need of an optional without capability signalling for UE using only slice info in the SIB for slice based cell reselection in idle and inactive mode (i.e. there is no need for gNB to know such UE).  FFS if there is a need to know such UE, whether same capability signalling as with slice info in RRC Release or a separate one is needed?    For sliced based RACH, there is the following open issues:  FFS on whether to separate the support of slice based RACH prioritization and slice based RACH partitioning  FFS on whether to support dedicated RACH resources (RACH prioritization) – if so, there is a need for the gNB to know the capability. |
| Nokia | **OI 1.1:** It is not a simple issue, and thus we agree with the rapporteur's proposal to treat it via company papers.  **OI 1.4:** We think that this decision should happen after the actual solution is selected and agreed. As this is just a stage 3 issue, we propose to postpone the decision on this open issue.  **OI 1.2:** We believe RA-prioritization should be independent from RA type selection, i.e. applicable to both 2-step RACH and 4-step RACH. Thus, no need to differentiate further the RA-prioritization parameters sets, i.e. no need for the O.I.2. We failed to find such open point noted in the Chair minutes, thus we believe this isn’t a critical issue to solve, but optimization. The same comment was provided to the RRC CR after RAN2#116-e (R2-2111444). Alternatively, we believe the RA-Prioritization applicability (i.e. not differentiation) could be clarified.  Instead, the following new O.I. for RA-prioritization should be noted (according to the running RRC CR FFSs):  **OI 1.X:** Whether an entry in RA-Prioritization (set of RA-prioritization parameters) configuration is per slice group ID or per slice groups (IDs); section in the running CR 6.3.2  **OI 1.Y:** How many different RA-Prioritization parameters sets (backoff timer, power ramping step) can be configured? section in the running CR 6.3.2 |
| Ericsson | We would like to raise that RAN2 should consider Slice-based cell re-selection and Slice-based RA in a shared RAN scenario (the cell is shared by multiple PLMNs). We are not sure if we discussed this earlier. Slice identities and (we assume also) slice groups are PLMN specific.  For existing/legacy cell re-selection, PLMN-specific cell re-selection priorities are assumed to be provided to UE via dedicated signalling (RRCRelease). Whether this is feasible also for this WI need to be discussed by RAN2, e.g. in a **OI 1.x “FSS RAN sharing for slice-based cell re-selection and slice-based RACH”.** |
| CMCC Rapp | Johan shared his plan for open issue in “[AT116bis-e][000] R17 Open Issues” email. He plans to have a pre-meeting offline for next meeting. I will further check with Tero whether and when we will have an offline.  To Huawei, Q1.6 is added. Since this is not so urgent, it can be left for later phase.  To Intel, a new section for UE capabilities open issues is added at the end of this email discussion. Regarding to your comments, would you please clarify further on:“FFS if there is a need to know such UE, whether same capability signalling as with slice info in RRC Release or a separate one is needed? ” I didn’t understand what capability it refers to.  OI 1.2: As Nokia pointed out, it seems the WI can work even without OI 1.2. So it is removed, unless other companies have a strong motivation.  OI 1.7 and OI 1.8 are added according to Nokia’s comments. It seems they belongs to stage 3 issues and can be handled later. |
|  |  |
|  |  |
|  |  |
|  |  |

## List of MAC open issues (as captured in the MAC running CR [2])

|  |  |  |
| --- | --- | --- |
| **Issue** | **Relevant section in TS 38.321** | **Suggested handling** |
| OI 2.1: FFS whether RA prioritization and RA partitioning will work independently or RA prioritization and RA partitioning should configure/work simultaneously for a specific slice group. | 5.1.1a | Company input into Pre117-e-offline (i.e. no company tdocs) |
| OI 2.2: The parameters should be aligned with RRC spec, e.g., *ra-PrioritizationForSlicing*, *ra-PrioritizationForSlicingTwoStep*, *enableRA-PrioritizationForSlicing*, *ra-Prioritization*, *RACH-ConfigCommon* and *RACH-ConfigCommonTwoStepRA* for Slicing. | 5.1.1a | To be updated by CR rapporteur to align with RRC CR. |
| OI 2.3: FFS on the impact of RA fallback from 2-step Slicing RA to 4-step Slicing RA or 4-step common RA. | 5.1.3a, 5.1.4a, 5.1.5 | To be updated later by CR rapporteur to align with common RACH decision. |
| OI 2.4: To be updated to align with common RACH decision and general MAC CR, if needed. |  | To be updated later by CR rapporteur to align with common RACH decision. |

**Q2: Do you agree with above essential open issue list and the suggested handling? Is there any other essential open issues need to be handled for close of this WI?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Qualcomm | We agree Rapporteur’s plan.  It seems one issue on EN of 38.321 is missed:  Editor’s Note: To be updated to align with common RACH decision and general MAC CR, if needed.  We think it can be handled by CR rapporteur. |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

## List of 38.304 open issues (as captured in the 38.304 running CR [3])

|  |  |  |
| --- | --- | --- |
| **Issue** | **Source or Relevant section in TS 38.304** | **Suggested handling** |
| OI 3.1: Option A without formula: Solution 4, all NAS-prioritised slices with frequency priorities as well as legacy frequency priorities are considered, without iteration, without formula | Chairman notes | Top priority  Suggest to have both offline and online discussion. Company tdocs with additional details are invited. |
| OI 3.2: In case prioritised slice is not supported in the highest ranked cell on the target frequency, what’s the UE behaviour, e.g., uses legacy frequency priority or recalculate frequency priority? | Email discussion [Post116-e][242][Slicing] | Suggest to have both offline and online discussion. Company tdocs with additional details are invited. |
| OI 3.3: Whether additional exit condition needed for fallback to legacy cell reselection. | Email discussion [Post116-e][242][Slicing] | Proposed in comments of [242] email discussion and can be discussed based on company contributions. |
| OI 3.4: After the UE fallbacks to legacy cell reselection, the next trigger of slice-based cell reselection. | Email discussion [Post116-e][242][Slicing] | Proposed in comments of [242] email discussion and can be discussed based on company contributions. |
| OI 3.5: If the UE is configured with slice based dedicated priority, but the UE cannot find a suitable cell, whether and how to fallback to legacy cell reselection. | Email discussion [Post116-e][242][Slicing] | Proposed in comments of [242] email discussion and can be discussed based on company contributions. |
| OI 3.6: Whether the inter-RAT frequency should be considered in slice-based cell reselection. | Email discussion [Post116-e][242][Slicing] | Proposed in comments of [242] email discussion and can be discussed based on company contributions. |
| OI 3.7: The definition of slice group is FFS.  *A group which is associated with one or multiple slices. And a slice is associated to none or one slice group. FFS associated to multiple slice groups.* | 3.1 | If no agreement achieved in SA2, RAN2 can make decision then informs SA2. |
| OI 3.8: Slice specific cell reselection parameters. | 5.2.4.7.0 | CR rapporteurs to update aligned with RRC spec. |
| OI 3.9: Whether to confirm the granularities of the slice groups for cell reselection are per TA.  Whether AS is aware of the TA or TAs where a specific slice group is used. | Chairman notes | If no agreement achieved in SA2, RAN2 can make decision then informs SA2. |
| OI 3.10: whether the slice specific cell reselection information provided by the network in SIB or *RRCRelease* message is slice or slice group specific. | May impact 38.304 and 38.300 | Company tdocs are invited. |

**Q3: Do you agree with above essential open issue list and the suggested handling? Is there any other essential open issues need to be handled for close of this WI?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Qualcomm | We agree with Rapporteur’s plan, but have below comments:   1. For OI 3.1 and OI 3.2, it is suggested to include it in Pre117-e-offline. And it is better if two or more candidate CRs can be identified in offline for further down-select during online discussion. 2. Also suggest to include 3.3-3.6 in Pre117-e-offline because they are detailed issues and it is better to identify candidate solutions or get a majority in offline if possible |
| Huawei, HiSilicon | As we commented in section 1.1, OI 3.7 is also valid for RRC CR. In addition, we think that the size of slice group id can be an open issue. Regarding which of WGs should solve OI 3.7, we think that RAN2 can discuss and solve the issues, and then RAN2 informs SA2. |
| Nokia | **OI 3.1-OI 3.6:** We think that these issues are not independent. We agree with the rapporteur's proposal that a short offline is not appropriate to handle them.  **OI 3.9:** I think this is strongly related to OI 3.7. Therefore, we think they should be merged, and wait for SA2 agreements on slice grouping. We also propose to add the issue whether AS is aware of the TA or TAs where a specific slice group is used.  **New OI 3.X:** whether the slice specific cell reselection information provided by the network in SIB or *RRCRelease* message is slice or slice group specific. (Note that this also has 38.300 impacts.) |
| CMCC Rapp | OI 3.1 and 3.2 are the most important issue for next meeting. And it seems OI 3.3~3.6 can only be discussed after 3.1 and 3.2 are addressed.  I marked with “Suggest to have both offline and online discussion” for QI 3.1 and 3.2, because they are the most essential and fundamental stage 2 issues that RAN2 should address in the next meeting to close the WI.  Regarding to OI 3.7 and 3.9, since SA2 sent LS to ask RAN2 about the per TA or per PLMN granularities for slice grouping, it is highly probability that SA2 will not make the decision and just apply our decision in the Reply LS. So waiting for SA2’s decision may raise the risk for delay of the WI. The safest way is that RAN2 can make the Working Assumptions and draft CR based on the WA. So I propose to mark them as If no agreement achieved in SA2, RAN2 can make decision then informs SA2. |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

## List of 38.300 open issues (as captured in the stage-2 running CR [4])

|  |  |  |
| --- | --- | --- |
| **Issue** | **Relevant section in TS 38.300** | **Suggested handling** |
| OI 4.1: Details of slice grouping and how it is provided to the UE are FFS, depends on SA2 | 16.3.3, 16.3.X | CR rapporteur to update based on further RAN2 agreements or SA2 further agreements. |

**Q4: Do you agree with above essential open issue list and the suggested handling? Is there any other essential open issues need to be handled for close of this WI?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

## List of UE capability open issues

Here captures the open issues for UE capabilities that need to be handled before close of this WI. The capabilities may have impact on 38.331 and 38.306

|  |  |  |
| --- | --- | --- |
| **Issue** | **Source or Relevant section in TS** | **Suggested handling** |
| FFS on the need of an optional without capability signalling for UE using only slice info in the SIB for slice based cell reselection in idle and inactive mode (i.e. there is no need for gNB to know such UE).  FFS if there is a need to know such UE, whether same capability signalling as with slice info in RRC Release or a separate one is needed? |  | Company tdocs invited or offline discussion |
| FFS on whether to separate the support of slice based RACH prioritization and slice based RACH partitioning |  | Company tdocs invited or offline discussion |
| FFS on whether to support dedicated RACH resources (RACH prioritization) – if so, there is a need for the gNB to know the capability. |  | Company tdocs invited or offline discussion |

**Q5: Do you agree with above essential open issue list and the suggested handling? Is there any other essential open issues need to be handled for close of this WI?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

# References

1. R2-2200973 Running RRC CR for RAN slicing (Huawei)
2. R2-2201536 Running MAC CR for RAN slicing (OPPO)
3. R2-2200044 Running 38.304 CR for RAN slicing (Ericsson)
4. R2-2111400 Running Stage-2 CRs for RAN slicing (Nokia)