3GPP TSG-RAN WG2 Meeting #118 Electronic R2-22XXXXX

Elbonia, 09 – 20 May 2022

**Agenda item: 6.8.1 Organizational**

**Source: Huawei (Rapporteur)**

**Title: Report of [AT118-e][240][Slicing] Finalizing RRC for RAN slicing (Huawei)**

**WID/SID: NR\_slice-Core**

**Document for: Discussion and Decision**

# 1 Introduction

This document is the report of the following email discussion:

* [AT118-e][240][Slicing] Finalizing RRC for RAN slicing (Huawei)

      Scope: Finalize RRC CR for RAN slicing based on meeting decisions.

Intended outcome: Discussion report in [R2-220xxxx](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-220xxxx.zip) and agreeable CR in [R2-2206172](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2206172.zip).

Deadline: Deadline 5

**Deadline 5 (discussions for 2nd week Thu/Fri online):**

* **Comment deadline:** Wednesday W2, 0400 UTC (for collecting views)
* **Rapporteur proposals:** Wednesday W2, 0800 UTC (proposed resolution of issues)
* **Document deadline:** Wednesday W2, 1600 UTC (report or agreed CRs)
  + No extensions to this deadline for regular discussions. Discussions handling CRs may continue to short post-meeting email (based on chair decision).

# 2 Contact Points

Respondents to the email discussion are kindly asked to fill in the following table.

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| --- | --- | --- |
| Company | Name | Email Address |
| Huawei, HiSilicon | Jun Chen | jun.chen@huawei.com |
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# 3 Discussion

Based on [1], RAN2 agreed to continue discussing open RILs in this email discussion. The details of these RILs can be found in [2][3], and the sections below just show the information from the excel file in [1].

In the following tables, the column TDoc has been updated by adding the relevant RIL contributions.

## 3.1 H502

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| **ID** | **TDoc** | **Description** | **Proposed Change** |
| H502 | R2-2205495, R2-2205737 | In section 6.2.2 (RRCRelease message), the slice info (i.e. freqPriorityListNRSlicing-r17) was introduced. RAN2#113b-e agreed that UE is only configured with either the existing dedicated priority configuration or the slice info in RRC Release. However, there is no such definition in ASN1. | It is proposed to add some clarifications in the field descriptions. For example: - for freqPriorityListEUTRA/freqPriorityListNR, it is configured only if freqPriorityListNRSlicing is not configured - for freqPriorityListNRSlicing, it is configured only if freqPriorityListEUTRA/freqPriorityListNR is not configured |

**Question 1: Do companies agree with H502?**

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| Company | Yes/No | Comments |
| Huawei, HiSilicon | Yes | The intention of this RIL is to make sure that the previous RAN2 agreement has been correctly captured in specs, and we are open for improving the wording. |
| Lenovo | No | We would indeed request RAN2 to re-discuss to see if there’s any value in restricting the network to configure either the existing dedicated priority configuration or the slice info in RRC Release. |
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## 3.2 B003

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| **ID** | **TDoc** | **Description** | **Proposed Change** |
| B003 | None | Extension marker should not be used in list elements if they are broadcast in SIB since it costs approx. 3 bytes overhead per list element. Future extensions should be introduced using parallel lists (same approach as used in SIB3/SIB4). | Remove extension marker from IE SliceInfo-r17. |

**Question 2: Do companies agree with B003?**

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| Company | Yes/No | Comments |
| Huawei, HiSilicon |  | No strong opinon on the extension marker in FreqPriorityNRSlicing-r17. For the extension marker in SliceInfo-r17, we think it may be beneficial to keep it as it will be easy to add some slice group specific info later. |
| Lenovo |  | Here we can use the general principle that would be accepted for other work items as well. |
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## 3.3 N033

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| **ID** | **TDoc** | **Description** | **Proposed Change** |
| N033 | R2-2205494 | FreqPriorityListNRSlicing field descriptions: in the field description fields from other IEs are described, separate table for SliceInfo would be required. | As this IE is expected to be changed at RAN2#118 due to open issues, it is proposed to handle this issue at the RAN2#118 with a separate tdoc in the slicing WI session. |

**Question 3: Do companies agree with N033?**

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| Company | Yes/No | Comments |
| Huawei, HiSilicon |  | No strong views. |
| Lenovo | Yes |  |
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## 3.4 E140

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| **ID** | **TDoc** | **Description** | **Proposed Change** |
| E140 | R2-2205972 | Freq list in SIB16 for slicing | The freq list with sliceinfo in SIB16 should preferably have 1-1 mapping (list size and indexes of entries) to the InterFreqCarrierFreqList in SIB4. Should avoid current skewed linking between SIB4 and SIB16 lists. Slice info for the current freq should have separate fields outside the freq list. List size 0 should not be used, see no reason. Max list size maxfreq (8) will be correct, currently 1+8=9 would be needed? Further (editorial comment), text that describes IE FreqPriorityListNRSlicing should be placed under the IE section header, not among FreqPriorityListNRSlicing field descriptions |

**Question 4: Do companies agree with E140?**

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| Company | Yes/No | Comments |
| Huawei, HiSilicon | Yes for P1, P2 and P3 in R2-2205972 | For P4, we think it is simple that SIB16 can contain information of the current frequency, otherwise, we need to impact some legacy SIBs.  **P4: RAN2 to discuss whether FreqPriorityListNRSlicing should contain information for the current frequency or not.** |
| Lenovo |  | We think the existing IE FreqPriorityListNRSlicing is fine with the clarification that the first entry/ element (for ‘0’) applies to serving frequency. |
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## 3.5 Z325

For the RIL Z325, the proposed change is included in the description.

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| **ID** | **TDoc** | **Description** | **Proposed Change** |
| Z325 | R2-2205568 | The FreqPriorityListNRSlicing is used to configure cell reselection priorities for slicing in SIB16 and RRCRelease message. But it is not clear whether the cell reselection priorities for slicing in SIB16 and RRCRelease message can only configured for frequencies listed in SIB2 and SIB4. For example, in the existing cell reselection priority configuration, the “network may assign dedicated cell reselection priorities for frequencies not configured by system information.” If network is allowed to configure cell reselection priorities for slicing for frequencies not listed in SIB2 and SIB4, we understand the frequency band indicator should be provided. |  |

**Question 5: Do companies agree with Z325?**

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| Company | Yes/No | Comments |
| Huawei, HiSilicon |  | In our opinion, RAN2 did not discuss the scenario before, and S254 seems to be related to this RIL (from solution’s point of view).It would be helpful to check operators’ views on this scenario. |
| Lenovo | Partially | This can be allowed for RRCRelase message only. |
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## 3.6 S252, S253

S252 and S253 are about intra-frequency PCI list for RAN slicing purpose. During the email discussion **[Pre118-e][202][Slicing] 38331 CR and rapporteur resolutions (Huawei)**, some companies provided technical comments directly in their emails and companies can also check them.

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| **ID** | **TDoc** | **Description** | **Proposed Change** |
| S252 | None | We should restrict that sliceAllowCellListNR is provided only for inter-frequency cells to be inline with 5.2.4.5 of TS 38.304; UE checks whether the cell supports slicegroup only during inter-frequency cell reselection. | Indicates the list of allow-listed neighbouring cells for slicing. If present, cells not listed in this list do not support the corresponding sliceGroup-frequency pair. gNB includes only inter-frequency cells in sliceAllowCellListNR. |
| S253 | None | We should restrict that sliceExcludeCellListNR is provided only for inter-frequency cells to be inline with 5.2.4.5 of TS 38.304; UE checks whether the cell supports slicegroup only during inter-frequency cell reselection. | Indicates the list of exclude-listed neighbouring cells for slicing. If present, cells not listed in this list do not support the corresponding slice sliceGroup-frequency pair. gNB includes only inter-frequency cells in sliceExcludeCellListNR. |

**Question 6: Do companies agree with S252 and S253?**

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| Company | Yes/No | Comments |
| Huawei, HiSilicon | No | In our paper, we support to allow including the PCI list for the serving frequency, and we share similar view as Apple’s comments in the email discussion [Pre118-e][202][Slicing] 38331 CR and rapporteur resolutions (Huawei).  However, if majority view is to disallow including the PCI list for the serving frequency, we can be fine. |
| Lenovo | No | The cell list for serving frequency is also important as the UE would need to compare what (slice group) is supported by the best serving cell Vs. what slice groups are supported by neighbouring frequencies. |
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## 3.7 H505

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| **ID** | **TDoc** | **Description** | **Proposed Change** |
| H505 | R2-2206097,  R2-2205495, R2-2205693 | There is one FFS: FFS if the field can be provided in RRCRelease. | This should be addressed in a separate TDOC |

Based

* Option 1: Cell lists (Allow and Exclude) for RAN slicing can not be provided in RRCRelease message (R2-2206097, R2-2205693)
* Option 2: Cell lists (Allow and Exclude) for RAN slicing can be provided in RRCRelease message (R2-2205495)
  + **Proposal 2.1: The *RRCRelease* message can contain the same type of PCI lists for slice aware cell reselection as a SIB message.**
  + **Proposal 2.2 Only the PCI lists provided *RRCRelease* message are used when priorities from the *RRCRelease* message is used for slice aware cell reselection.**

**Question 7: For H505, which of options is preferred? E.g. option 1, option 2, or others if any.**

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| Company | Preferred options | Comments |
| Huawei, HiSilicon | Option 1 | In the current RRCRelease message, the network only provides priorities values for cell reselection purpose, and there are no PCI lists in the message.  Besides, the UE can retain the PCI lists provided in SIB16 and then use it even receiving RRCRelease message. Hence, we prefer Option 1. |
| Lenovo | Option 1 | We do not expect that there could be any “UE-specific cell list” and therefore we do not see the need to include cell lists in RRCRelease message. Additionally, it is clear that the broadcast must include such cell list (if any) to enable slice based cell reselection for UEs that entered in the cell in the Idle state. So, a double signalling of cell lists can be and should be avoided. |
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## 3.8 X802, X804

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| **ID** | **TDoc** | **Description** | **Proposed Change** |
| X802 | R2-2205365 | The applicable RACH configuration of this parameter is still under discussion. | Problem: We can note that parameters in RACH-configCommon can also be reused to apply for AdditionalRACH-ConfigCommon-r17( including the slice-specific RACH configuration), which means that the ra-PrioritzationForSlicing-r17 can be applied for legacy 4-step RACH configuration and 4-step slice-specific RACH configuration. However, in last meeting, RAN slicing only agreed that this parameter can work with RACH partition independently, but how to work is still under discussion, in other words, we have not decided this parametes can be applied for legacy RACH configuration or slice-specific RACH configuration or both. Solution: Add an Editor’Note as follows: Editor’Note: FFS on which RACH configuration (i.e. legacy RACH configuration or slice-specific RACH configuration or both) the ra-PrioritizationForSlicing can be applied for. |
| X804 | R2-2205365 | The applicable RACH configuration of this parameter is still under discussion. | Problem: We can note that parameters in RACH-configCommonTwoStepRA can also be reused to apply for AdditionalRACH-ConfigCommon-r17( including the slice-specific RACH configuration), which means that the ra-PrioritzationForSlicing-r17 can be applied for legacy 2-step RACH configuration and 2-step slice-specific RACH configuration. However, in last meeting, RAN slicing only agreed that this parameter can work with RACH partition independently, but how to work is still under discussion, in other words, we have not decided this parametes can be applied for legacy RACH configuration or slice-specific RACH configuration or both. Solution: Add an Editor’Note as follows: Editor’Note: FFS on which RACH configuration (i.e. legacy RACH configuration or slice-specific RACH configuration or both) the ra-PrioritizationForSlicing can be applied for. |

Since the Tdoc R2-2205365 is for RILs X802 and X804, it is proposed to discuss the following proposals:

**Proposal 1: As baseline, the slice-specific RA prioritization parameters can be applied for the legacy RACH resource without associated with any feature combination.**

**Proposal 2: The necessary to configure the additional slice-specific RA prioritization parameters on the basis of slice-specific RACH resource needs to be further confirmed.**

**Proposal 3: Considering the payload size of SIB1, the additional slice-specific RA prioritization parameters on the basis of slice-specific RACH resource should be avoided if there is not too much benefits.**

**Proposal 4: There is no need to configure the slice-specific RA prioritization parameters with feature combination specific RACH resource without the same slice group info.**

**Question 8: For the RILs X802 and X804, do companies agree with P1, P2, P3 and P4 in R2-2205365?**

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| Company | Yes/No | Comments |
| Huawei, HiSilicon | Yes | We think that there is no need to restrict the association between slice-specific RA prioritization and slice-specific RACH resource. If all proposals above are agreeable, we think it is just network implementation and thus there should be no specification impacts. |
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## 3.9 S254

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| **ID** | **TDoc** | **Description** | **Proposed Change** |
| S254 | R2-2205619 | FreqPriorityNRSlicing is configured related to the position of frequencies in SIB. This is inefficient when slice information list is broadcasted in SIB16. The current structure and description may not be suitable when FreqPriorityListNRSlicing is included in RRC Release. | Include Frequency-index in FreqPriorityNRSlicing to provide the linking between SIB16 list and SIB2/SIB4 list. FreqPriorityListNRforSlicing should not be linked with SIB2/SIB4 in RRC Release. A contribution will be submitted in RAN2#118e. |

**Question 9: Do companies agree with S254?**

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| Company | Yes/No | Comments |
| Huawei, HiSilicon | Yes | Considering the case that the UE in RRC\_IDLE or RRC\_INACTIVE selects an inter-frequency cell to camp on, the frequencies provided in RRCRelease message may be inconsistent with the SIB4 for the current cell, the above RIL and the TP in R2-2205619 are reasonable. |
| Lenovo | No | The UE can always remember and store the index values (i.e., the ARFCN-ValueNR) from the source cell. |
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## 3.10 C154

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| **ID** | **TDoc** | **Description** | **Proposed Change** |
| C154 | R2-2205468 | The SliceGroupID appears in multiple IEs in the specification. So it is needed to create a new IE for SliceGroupID. | Creat a new IE for SliceGroupID. A contribution will be submitted in RAN2#118e. |

**Question 10: Do companies agree with C154?**

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| Company | Yes/No | Comments |
| Huawei, HiSilicon | Yes | We are ok with the RIL.  In addition, in the SA2 LS R2-2204526, they are using NSAG (Network Slice AS Group), and the terminology may be utilized in RRC specs for the alignments. This wording improvement could be discussed during the CR discussion, if needed. |
| Lenovo | No | Does not seem necessary. |
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## 3.11 B206

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| **ID** | **TDoc** | **Description** | **Proposed Change** |
| B206 | R2-2205615 | 32 PCIs might be repeated in at least 16\*8 entries (based on the assumption now, which may grow depending on the length of total Slice Group and size of max cells for any slice). This is hugely signalling inefficient. | A new structure that utilizes ordinal signalling needs to be used. A TP for affecting this change will be submitted. |

The TP in R2-2205615 shows more details.

**Question 11: Do companies agree with B206?**

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| Company | Yes/No | Comments |
| Huawei, HiSilicon | No | We should just follow the structure of *interFreqExcludedCellList* IE in SIB4. And currently the the slice cell list is using PCI-Range which can also reduce the signalling overhead.  SliceCellListNR-r17 ::= SEQUENCE (SIZE (1..maxCellSlice-r17)) OF PCI-Range |
| Lenovo | Yes | We think repetition of PCIs should be avoided as this does not bring any gains but only overhead.  The PCI-Range is not suited for this purpose as it is highly unlikely that cells supporting the same slice (across different frequencies) will be allocated PCIs in an increasing order. |
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## 3.12 B205

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| **ID** | **TDoc** | **Description** | **Proposed Change** |
| B205 | R2-2205693 | It needs to be added that “Slice Group supported by any cell on a frequency is included in the SliceInfoList for that frequency.” Otherwise UE is not sure if it has an exhaustive list or if it needs to read SI of the highest priority neighbouring cell. | Add the said text in the description field “Slice Group supported by any cell on a frequency is included in the SliceInfoList for that frequency.” |

**Question 12: Do companies agree with B205?**

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| Company | Yes/No | Comments |
| Huawei, HiSilicon |  | Not very clear about the issue. In our understanding, for a specific frequency and a specific slice group, if PCI list is not included, it means all cells on this frequency should support the slice group. Otherwise, the network can send PCI list to indicate some of cells for supporting the slice group. |
| Lenovo | Yes | The current procedure in section 5.2.4.5 (please see below) assumes that a UE knows slice group(s) supported by “this” cell say cell C1 on frequency f1), however since the signalling from the network (RRCRelease or broadcast) is from “slice perspective”, the UE either needs to acquire SI of cell C1 or, put together the already available information.    We think acquiring SI of a neighbour cell is not acceptable, as RAN2 confirmed before. The main question is if the network provided slice information for a frequency is really exhaustive? Or are there slice groups supported by C1 but not by other cells on f1? We think, for this to work, network needs to ensure that slice information is really exhaustive, to the extent possible. |
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# 4 Conclusion

TBD.

# 5 References

[1] R2-2205082 Discussion on RIL list for RAN slicing Huawei, HiSilicon discussion Rel-17 NR\_slice-Core Late

[2] R2-2205969 NR Rel-17 ASN1 review file Ericsson discussion Rel-17 TEI17 Late

[3] R2-2205970 NR Re-17 RIL list Ericsson discussion Rel-17 TEI17 Late