3GPP TSG-RAN WG2 Meeting #117-e R2-2203509

Electronic Meeting, 21 February – 3 March, 2022

**Agenda item: 8.8.2**

**Source: CMCC**

**Title: Report for [Pre117-e][240][Slicing] Summary of slice-specific cell reselection (CMCC)**

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

**Document for: Discussion and Decision**

# Introduction

In RAN2#116bis-e, the following agreements have been reached:

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| * Working assumption: We go with proposal A without formula, e.g. as proposed by Samsung or Apple. Exact details to be worked out for the next meeting. * No change to previous agreement that there can be different slice groups for RACH and reselection. Align with SA2 (if they tell us differently). * 2.1: Among multiple TAs in the same RA, RAN2’s understanding is that the configuration on slice grouping should be homogeneous. * 2.2: 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. |

After RAN2#116bis-e, the email discussion [Post116bis-e][203][Slicing] Open issues for RAN slicing (CMCC) collected remaining critical open issues (needed to close the WI) for the RAN slicing WI in R2-2201730 [1].

This document provides the summary of all the contributions submitted to 8.8.2 agenda item (RAN slicing - Cell reselection) of RAN2#117-e meeting and address the open issues of this item listed in R2-2202616 (is revised of R2-2201730) [1]. The following categorization has been used in this document.

* **Cat-a-Proposal:** a potential easy agreement, e.g. Proposals which could reach quick and straightforward agreement.
* **Cat-b-Proposal:** need further discussion. These should be tagged with e.g. [FFS]. The issue may have more than one option with almost equivalent supporters or may need more clarification before reaching the agreement.
* **Cat-c-Proposal:** candidate other than Cat-a and Cat-b which may be postponed for the moment. The issue may require other WG discussions or is contentious such that it is unlikely to converge at e-Meeting.

# Discussion

## List of 38.304 open issues

### OI 3.1: Details for option A without formula

***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***

Working assumption in RAN2#116bis-e:

* Working assumption: We go with proposal A without formula, e.g. as proposed by Samsung or Apple. Exact details to be worked out for the next meeting.

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| **TDoc** | **Source** | **Proposals** |
| R2-2202416 | Spreadtrum | Proposal 1: The frequencies that support higher priority slices have higher slice based frequency priority. And among the frequencies that support the same highest priority slice, the slice based frequency priority order is determined by the frequency priority of the supported highest priority slice provided in SIB or RRC signaling.  Proposal 2: It is part of UE implementation to make sure that the frequencies that support higher priority slices have higher slice based frequency priority.  Proposal 3: When checks whether the highest ranked cell on the target frequency supports the selected slice, UE should regard the highest priority slice supported on the target frequency as the selected slice. |
| R2-2202514 | Apple | Proposal 2: UE creates the candidate frequency pool for all intended slices. The same frequency can be duplicated multiple times for different slices it supports.   |  | | --- | | Per slice priority or slice group priority provided by NAS, UE creates a frequency ranking list based on the frequencies supported by the slice where the list of highest prioritized slice or slice group has priority over the next prioritized slice or slice group, and so on. The frequencies in the frequency ranking list are ordered by priority where the highest priority is ranked first, the second highest priority is ranked second, and so on. A final single frequency ranked list to be considered by the UE is created from the concatenation of each individual slice or slice group frequency ranked list. The final frequency ranked list may contain the same frequency more than once. Per slice or slice group, the priority of each frequency is determined by the slice frequency priority for NR frequencies received in *RRCRelease* or in the system information messages.  UE performs cell evaluation starting from highest ranked frequency to lowest ranked frequency list, and camps on the highest ranked and suitable cell if it supports the highest priority slice on that frequency rank.  Note 1: Among the frequencies supporting the same slice(s) or slice group(s) with same frequency priority, the frequency supporting maximum intended slices may be prioritized.  Note 2: The frequencies configured in legacy manner are considered to be in the last rank. When UE performs cell search on frequencies in this rank, legacy cell re-selection procedure should be followed. | |
| R2-2202617 | CMCC | Observation 1: Alt 1 and Alt 2 share similar behaviour that UE can generate a frequency priority list. The main difference between Alt 1 and Alt 2 are whether each frequency is sorted only once and how to rank the equal priority frequencies for a given slice.  Proposal 1: Alt 1 and Alt 2 is taken as baseline, i.e., the UE generates a frequency priority list according to the slice priority. The same frequency can be sorted multiple times in the list. FFS how to rank the equal priority frequencies for a given slice. |
| R2-2202640 | Intel | Observation #1: Proposal A approach has least impact to the current specifications conceptually, in terms of implementation and testing, and also in terms of the specification changes needed.  Observation #2: The formula in proposal A can be replaced by corresponding text that provides an ordered list of frequencies based on the frequency priority and ordered list of slice priority.  Proposal #1: Agree on working assumption to adopt Proposal A without the formula. |
| R2-2202690 | CATT | Proposal 1: Solution A without formula can be adopted as baseline for slice based cell reselection.  Proposal 2: When UE receives the slice priority and slice or slice group specific frequency priority, it can be left to UE implementation to determine the slice based cell reselection priority for each frequency.  Proposal 3: RAN2 to agree on the TP in Annex A for slice based cell reselection.   |  | | --- | | The slice-based cell reselection procedure is the following:  ~~- The UE selects the slice group with highest priority slice.~~  - The UE assigns the slice based cell reselection priority for each frequency according to slice priority received from NAS and the slice specific frequency priorities received from system information or *RRCRelease* Message. ~~The UE assigns the slice frequency priority corresponding to the selected slice group for NR frequencies received in~~ *~~RRCRelease~~* ~~or in the system information messages.~~  - The UE performs measurements and selects the highest ranked and suitable cell as candidate for camping according to clauses 5.2.4.2, 5.2.4.3, 5.2.4.4, 5.2.4.5, 5.2.4.6 using the above slice based cell reselection priorities. ~~the slice group specific NR frequency priorities.~~  - If the highest ranked and suitable cell supports the selected slice, then the UE camps on the cell.  Editor's Note: FFS: How the UE determines whether the highest ranked cell supports the selected slice.  ~~Editor' Note: It is FFS whether the UE should select another slice group and perform cell reselection with the priorities of that slice group if no suitable cell supporting the selected slice group is found.~~  Editor' Note: It is up to the UE implementation to decide how to assign the slice based cell reselection priority for each frequency. When the UE assign the slice based cell reselection priority, UE should consider all frequencies. The frequencies supporting higher priority slice have higher slice based cell reselection frequency priority and the priority of frequencies not supporting the intended slices should be lower than the frequencies supporting intended slices.  Editor note: It is FFS what is the UE’s behaviours when the highest ranked cell does not support the intended slices.  ~~- If no suitable cell is found using slice group specific frequency priorities, then the UE continues to perform cell reselection according to clause 5.2.4 without considering slice group specific frequency priorities.~~ | |
| R2-2203018 | Huawei, HiSilicon | Step 1: Firstly, consider the slice priority, i.e. preferentially add the frequencies supporting the slice with a higher slice priority to the frequency set.  Step 2: Secondly, consider the cell reselection priority of frequencies which can support the specific slice, i.e. preferentially add the frequency with a higher cell reselection priority.  Step 3: At last, add the legacy frequencies to the end of the candidate frequency set and the permutation order is similar with Step 2.  Proposal 4: It is proposed that the candidate frequency set should be generated according to the above principle.  Proposal 5: It should be allowed that the frequency(ies) supporting multiple slices should be kept (more than once) in the generated candidate frequency set, and the frequency(ies) shall be measured according to one certain value of cell reselection priority, but all the PCI Lists associated with this frequency need to be considered when evaluating the highest ranked cell. |
| R2-2203071 | Nokia, Nokia Shanghai Bell | Proposal 1: For slice-based cell reselection the cell reselection priorities are calculated in the following way (see TPs in the Annex):  a) For frequencies with a slice group specific frequency priority for at least one slice group in the list received from NAS, the reselection priority is set to slice group specific CellReselectionPriority of the frequency given to the highest priority value of the highest priority slice groups in the list received from NAS. If no priorities are included in the slice group information, then all slice groups are considered as slice groups with the highest priority.  b) For frequencies with no slice group specific frequency priority for any slice group included in the list received from NAS, the reselection priority is set to the CellReselectionPriority of the frequency. |
| R2-2203086 | LG Electronics UK | Proposal. For slice based cell reselection, the following rules are applied to determine the cell reselection priorities.   1. The frequencies that support slices configured for the UE have higher cell reselection priorities than the ones supporting none of the slices. 2. The frequencies that support slices used for ongoing services in RRC\_INACTIVE have higher cell reselection priorities than others. 3. The frequencies that support a larger number of slices configured for the UE have higher cell reselection priorities than others if the slice specific frequency priority is the same. |
| R2-2203150 | China Telecom | Observation 1: UE perform RRM measurement on all the candidate frequencies with requested slice sets will increase the latency.  Observation 2: Solution4 (option A) can be addressed if the candidate frequency with slice priorities is provided in advance.  Proposal 1: Candidate frequency and slice lists can be gathered before cell reselection. Then the slice-based cell reselection can be performed using candidate frequency and slice priorities lists.  Proposal 2: Reselection on multiple same priority frequencies supporting one slice is up to UE implementation. |
| R2-2203179 | Samsung R&D Institute UK | Observation 1: There are multiple methods for implementing Option A without formula.  Proposal 1: Specification needs to define the rules for prioritization and leave the issue of how the prioritization is realized to the UE implementation.  Proposal 2: RAN2 is kindly asked to agree the proposed TP for 38.304 in [3]. |
| R2-2203183 | Lenovo, Motorola Mobility | Proposal 1: Working assumption is reverted and Proposal B (Solution 4) is used for further work in RAN2.  Proposal 2: The reselection priority of a NR frequency (current or inter-frequency) is defined as the frequency priority from slice reselection information corresponding to the UE’s highest priority slice or slice group available in the neighborhood.  Proposal 3: If the slice based reselection does not lead to reselection, fallback to legacy reselection is used.  Proposal 4: Slice based reselection resumes again if the slice reselection information or a change in UE’s slices occurs or due to UE’s mobility. |
| R2-2203234 | NEC Telecom MODUS Ltd. | Proposal2: Cell reselection to a cell supported the selected slice group shall take precedence over a cell does not support the selected slice group if multiple cells of same/different priority frequencies fulfil the cell reselection criteria  Proposal 3: RAN2 consider that cell reselection to a cell supporting additional slice(s) of UE for cell reselection other than selected slice takes precedence. |
| R2-2203266 | Samsung R&D Institute UK, QC | Observation 1: In existing TS 38.304, basic principle of cell reselection prioritisation is that UE should be able to identify the relatively priority between any two frequencies unambiguously based on the absolute frequency priority provided by the Network.  Observation 2: With the absolute frequency priority provided by the Network, existing TS 38.304 don’t specify the procedure how the UE realizes frequency prioritisation, i.e., it is up to UE implementation how to calculate the relatively priority between any two frequencies (e.g., using an internal priority list or a Matrix).  Observation 3: There are multiple methods for implementing proposal A without formula (e.g. using an internal priority list or a Matrix). Choosing a specific method is an implementation problem rather than a specification problem  Proposal 2: RAN2 is kindly asked to confirm WA on proposal A without formula.  Proposal 3: RAN2 is kindly asked to agree the proposed TP for 38.304 in [2]. |
| R2-2203271 | Samsung R&D Institute UK, QC, OPPO | Proposal 1: RAN2 is kindly asked to agree the proposed TP against the running CR for 38.304 (Annex A).   |  | | --- | | The UE applies slice based cell reselection prioritisation using the following rules:  1. The UE considers a frequency supporting a slice or slice group with a higher *slicePriority* as higher priority than any other frequency supporting only slices or slice groups with lower *slicePriority*.  2. If there are multiple frequencies supporting a slice or slice group with the same *slicePriority*, then the UE applies the *sliceSpecificFrequencyPriority* among such frequencies for slice-based cell reselection prioritization. The UE considers any frequency present in *sliceInfo* without *sliceSpecificFrequencyPriority* as lowest priority frequency among frequencies supporting that slice or slice group for Slice-based cell reselection prioritization.  3. The UE considers a frequency not supporting any slice or slice group for which *slicePriority* is available as a frequency of a priority lower than any other frequency supporting a slice or slice group for which *slicePriority* is available. When there are multiple frequencies not supporting any slice or slice group, the UE applies the relative priority among such frequencies as per the *CellReselectionPriority* of the frequency.  Note: It is up to the UE implementation how the UE realises the above rules for prioritisation.  Editor’s Note: *slicePriority* is the slice or slice group priority provided by NAS. *sliceInfo* is slice specific cell reselection information used by the UE provided in SIB or RRC release message. *sliceSpecificFrequencyPriority* is the absolute priority for NR frequency with respect to a slice or slice group. After their definitions are agreed, they will be captured in Section 5.2.4.7.0. | |
| R2-2203387 | ZTE corporation, Sanechips | Proposal 4: Frequencies supporting a higher priority slice should be prioritized over frequencies supporting a lower priority slice.  Proposal 5a: For frequencies supporting the same slice or slice group, if configured with slice specific reselection priority, UE should follow the slice specific reselection priority.  Proposal 5b: For frequencies supporting the same slice or slice group but not configured with slice specific reselection priority, UE should treat them as lower priority than frequencies supporting the same slice or slice group and configured with slice specific reselection priority. |
| R2-2203412 | Ericsson | Proposal 6: Accept the TP for section 5.2.4.x provided in Appendix for the running CR.   |  | | --- | | If the UE is configured with more than one slice group ID’s for a slice, and it has received slice information for more than one of these slice groups, it shall use the slice information related to the slice group ID that was first in the list from NAS.  In order to derive the Slice-Based Reselection Priority, the UE shall   * compile a list of NR frequencies that have a *SliceSpecificFrequencyPriority* for the highest prioritised slice group by NAS, in the order of the *SliceSpecificFrequencyPriority* of that slice group, * append to this list NR frequencies that are yet not in the list, and have a *SliceSpecificFrequencyPriority* for the next highest prioritised slice group by NAS, in the order of the *SliceSpecificFrequencyPriority* of that slice group, and so on, until all frequencies that have a *SliceSpecificFrequencyPriority* for some slice group prioritised by NAS have been appended to the list, * append to this list NR frequencies with no *SliceSpecificFrequencyPriority* for any slice group prioritised by NAS and Inter-RAT frequencies, in the order of the *CellReselectionPriority* of each frequency, * assign a SliceBasedReselectionPriority to each NR/Inter-RAT frequency in the list, with highest priority to the first frequency in the list. | |

**Rapporteur summary:**

From the above proposals, 4 out of 16 companies (Intel, CATT, Samsung, Qualcomm) definitely propose to confirm the working assumption on option A without formula. 13/16 companies give the details for option A without formula although they don’t definitely propose to confirm WA. Only one company (Lenovo) propose to use Proposal B (Solution 4) for further work.

Hence, rapporteur suggests to follow the majority view to confirm WA firstly.

**(15/16) Cat-a-Proposal 1: RAN2 confirm the working assumption on option A without formula.**

For details of option A without formula:

1. **The rules for slice specific frequency priority:**

Rapporteur try to summary some common rules from companies’ contributions.

* 1. Considering the slice/slice group priority provided by NAS, the frequencies that support higher priority slice/slice group have higher slice based frequency priority than the frequencies that support lower priority slice/slice group; (7 companies, Spreadtrum, Apple, CMCC, CATT, Huawei, ZTE, Ericsson)
  2. Among the frequencies supporting a slice/slice group with the same priority, the UE should follow the slice specific frequency priority received in SIB or RRCRelease (if configured); (9 companies, Spreadtrum, Apple, CMCC, Huawei, Samsung, QC, OPPO, ZTE, Ericsson)
  3. Among the frequencies supporting the same slice/slice group, the frequency not configured with slice specific reselection priority should be considered as lowest priority; (4 companies, Samsung, QC, OPPO, ZTE)
  4. The frequencies that support any slice/slice group have higher slice based frequency priority than the frequencies that support none of slice/slice group; (10 companies, Apple, CMCC, CATT, Huawei, LG, NEC, Samsung, QC, OPPO, Ericsson)
  5. For the frequencies that not support any slice/slice group, the UE should follow the legacy CellReselectionPriority received in SIB or RRCRelease; (8 companies, Apple, CMCC, Huawei, Nokia, Samsung, QC, OPPO, Ericsson)

There are some rules without consensus:

1. The same frequency can be sorted only one time or multiple times, in other words, whether a frequency can be checked only one time or multiple times in slice based cell reselection procedure.
   * 1. Only one time; (Samsung, QC, Ericsson)
     2. It can be multiple times; (Apple, CMCC, Huawei)
2. Among the frequencies supporting the same slice/slice group with same frequency priority, how to handle the frequency priority:
3. the frequency supporting maximum intended slices may be prioritized; (Apple, LG)
4. they are considered as equal priority; (Samsung, QC)
5. Up to UE implementation; (China Telecom)
6. **How to keep the frequency priority:**

4 companies (Apple, CMCC, Huawei, China Telecom) propose to generate a candidate frequency pool/list, but 4 companies (CATT, Samsung, QC, OPPO) proposes that it is up to UE implementation how the UE realises the rules (e.g. using an internal priority list or a Matrix).

Hence, the following proposal can be summarized to follow majority views:

**Cat-a-Proposal 2: The UE should determine the slice specific frequency priority according to the following rules:**

* 1. **Considering the slice/slice group priority provided by NAS, the frequencies that support higher priority slice/slice group have higher slice based frequency priority than the frequencies that support lower priority slice/slice group;**
  2. **Among the frequencies supporting a slice/slice group with the same priority, the UE should follow the slice specific frequency priority received in SIB or RRCRelease (if configured);**
  3. **Among the frequencies supporting the same slice/slice group, the frequency not configured with slice specific reselection priority should be considered as lowest priority;**
  4. **The frequencies that support any slice/slice group have higher slice based frequency priority than the frequencies that support none of slice/slice group;**
  5. **For the frequencies that not support any slice/slice group, the UE should follow the legacy CellReselectionPriority received in SIB or RRCRelease;**

**Cat-b-Proposal 3: The following rules can be discussed online:**

1. **Whether a frequency can be sorted only one time or multiple times, in other words, whether a frequency can be checked only one time or multiple times in slice based cell reselection procedure;**
2. **How to handle the frequency priority among the frequencies supporting the same slice/slice group with same frequency priority;**

**Cat-b-Proposal 4: RAN2 discuss how the UE realises the above rules, e.g. generate a candidate frequency pool/list or it is up to UE implementation.**

### OI 3.2: UE behaviour if the prioritised slice is not supported in the highest ranked cell

***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?***

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| **TDoc** | **Source** | **Proposals** |
| R2-2202416 | Spreadtrum | Proposal 4: If prioritized slice is not supported in the highest ranked cell on the target frequency, UE should check the best ranked cell on the next highest priority frequency. |
| R2-2202514 | Apple | Proposal 1: In case prioritized slice is not supported in the highest ranked cell on the target frequency, UE continues with the slice based cell re-selection procedure to next frequency. |
| R2-2202617 | CMCC | Proposal 2: If the prioritised slice is not supported in the highest ranked cell on the target frequency, the UE will continue to check the next frequency in the list, and no need to change the frequency priority. |
| R2-2202640 | Intel | Proposal #4: If cell level slice information is available and the highest expected slice on the highest frequency is not available in the highest ranked cell of that frequency, rearrange the frequency in the ordered list according to the frequency priority order for highest priority slice actually available on the cell.  Proposal #5: UE shall re-assign the default frequency priority order for that frequency according to the highest priority slice available on the frequency after 300s. |
| R2-2202690 | CATT | Proposal 4: When the prioritized slice is not support in the highest ranked cell on the target frequency, UE will use legacy frequency priority for this frequency.  Proposal 5: When the highest ranked cell changes or the slice priority changes, UE can reuse the slice specific frequency priority for slice based cell reselection. |
| R2-2203018 | Huawei, HiSilicon | Proposal 6: If the highest ranked cell on the target frequency cannot support the selected slices, it means this target frequency belongs to t the frequencies without any sliceinfo, and the UE should camp on this cell. |
| R2-2203071 | Nokia | Proposal 2.3: If the highest ranked cell does not support the slice group used to rank the cell (see proposal 2.1 and 2.2), then the frequency priority of the band of the cell is changed to the "normal" (non-slice-based) cell reselection priority for a maximum of 300 seconds and ranking of the cells is updated based on the changed frequency priority. (See TPs in the Annex.) |
| R2-2203179 | Samsung | Proposal 3: In case prioritised slice is not supported in the highest ranked cell on the target frequency, the UE should use the slice priority of the highest priority slice supported by highest ranked cell.  Proposal 4: If the priority reduction leads to a higher priority frequency becoming an equal priority or lower priority frequency or if an equal priority frequency becomes a lower priority frequency, the UE needs to re-evaluate the cell reselection criteria with the reduced priority before performing the cell reselection. |
| R2-2203412 | Ericsson | Proposal 8 Accept the TP for section 5.2.4.5 provided in Appendix. Close the Open Issue 3.2.   |  | | --- | | If the UE supports slice-based cell reselection, and a cell fulfils the above criteria for cell reselection based on *SliceSpecificFrequencyPriority* for a prioritized slice, but the cell according to neighbouring cell information does not support this slice, the UE shall derive temporary Slice-Based Reselection Priorities, as described in section 5.2.4.X, but only using *SliceSpecificFrequencyPriorities* for slices supported by this cell for this frequency. These temporary priorities are used as reselection priorities until the highest ranked cell changes on the frequency, or new slice priorities are received from NAS. | |

**Rapporteur summary:**

Four basic approaches are depicted in the proposals submitted to this meeting:

1. No change to the frequency priority and the UE will continue to check the next frequency: (Spreadtrum, Apple, CMCC)
2. Recalculate the frequency priority: (Intel, Samsung, Ericsson)
3. Use the legacy frequency priority: (CATT, Nokia)
4. the UE should camp on this cell because it means that the highest ranked cell belongs to the frequencies without any sliceinfo: (Huawei)

Hence, there is no consensus on this issue:

**Cat-b-Proposal 5: RAN2 discuss the UE behaviour if the prioritised slice is not supported in the highest ranked cell:**

* **(3/7) Option 1: No change to the frequency priority and the UE will continue to check the next frequency;**
* **(3/7) Option 2: Recalculate the frequency priority;**
* **(2/7) Option 3: Use the legacy frequency priority;**
* **(1/7) Option 4: the UE should camp on this cell because it means that the highest ranked cell belongs to the frequencies without any sliceinfo;**

### OI 3.3: Whether additional exit condition needed for fallback to legacy cell reselection

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| **TDoc** | **Source** | **Proposals** |
| R2-2202187 | Qualcomm | Proposal 3: No need to add additional exit condition for fallback to legacy cell reselection. |
| R2-2202416 | Spreadtrum | Proposal 5: There is no additional exit condition for fallback to legacy cell reselection. |
| R2-2202617 | CMCC | Proposal 7: The issue “whether additional exit condition needed for fallback to legacy cell reselection” does not exist anymore if we approve the Alt 1 or Alt 2. |
| R2-2202690 | CATT | Observation 1: If the determination of slice based cell reselection for each frequency is left to UE implement, the fallback between slice based cell reselection and legacy cell reselection can be avoided.  Proposal 7: For fall back from slice based cell reselection to legacy cell reselection, the failure of slice based cell reselection can be the natural exit condition if Solution B or C is adopted. |
| R2-2203018 | Huawei, HiSilicon | The fallback will not happen based on Option A without formula unless a timer of the cell reselection is expired so that the UE need to skip the measurement or evaluation of the remaining slice specific frequencies and perform on the legacy frequencies. |
| R2-2203179 | Samsung | Observation 2: For the proposed solution 4 - Option A without formula [3], the UE does not fallback to legacy cell reselection, as cell reselection becomes a continuous operation with legacy frequency priorities considered as lower priorities than slice specific frequency priorities.  Proposal 5: For option A without formula, the UE does not fallback to legacy cell reselection and legacy frequency priorities are considered as lower priorities than slice specific frequency priorities during slice based cell reselection. |
| R2-2203412 | Ericsson | In the TP in Appendix, all frequencies are considered without iterations, so there is no need for fallback to legacy cell reselection, and therefore also no trigger is needed for going back to slice-based cell reselection.  Proposal 9: Close the Open Issues 3.3 and 3.4 |

**Rapporteur summary:**

From the above proposals, 4 out of 7 companies (CMCC, Huawei, Samsung and Ericsson) propose that the fallback will not happen based on Option A without formula because all frequencies are considered, 2 out of 7 companies (Qualcomm, Spreadtrum) propose that there is no need to add additional exit condition because it is the natural exit condition to fallback to legacy cell reselection if the UE has checked all the frequencies who have slice based frequency priority and no suitable cell is found. Only one company (CATT) proposes that the failure of slice based cell reselection can be the natural exit condition if Solution B or C is adopted.

Rapporteur understand that if all frequencies are considered for OI 3.1, this issue will not exist, and if the legacy frequencies are not considered in slice-based cell reselection, there is no need to add additional exit condition. Anyway, this issue does not need to be discussed and can be closed.

**Cat-a-Proposal 6: RAN2 confirm the following understanding and close OI 3.3:**

**If all frequencies are considered in slice-based cell reselection, the fallback to legacy cell reselection will not happen, i.e., no additional exit condition to fallback to legacy cell reselection.**

### OI 3.4: The next trigger of slice-based cell reselection after the UE fallbacks to legacy cell reselection

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| **TDoc** | **Source** | **Proposals** |
| R2-2202187 | Qualcomm | Proposal 4: Because RAN2 agreed the solution without formula which makes UE to perform cell reselection in a continuous way, it is not necessary to discuss the trigger condition for slice-based cell reselection after fallback to legacy cell reselection. |
| R2-2202416 | Spreadtrum | Proposal 6: UE could perform slice based cell reselection when triggering the next cell reselection. |
| R2-2202617 | CMCC | Proposal 8: The issue “the next trigger condition for slice-based cell reselection after the UE fallbacks to legacy cell reselection” does not exist anymore if we approve the Alt 1 or Alt 2. |
| R2-2202690 | CATT | Observation 1: If the determination of slice based cell reselection for each frequency is left to UE implement, the fallback between slice based cell reselection and legacy cell reselection can be avoided.  Proposal 6: For fall back from legacy cell reselection to slice based cell reselection, the highest ranked cell changing or the slice priority changing can be the exit condition if Solution B or C is adopted. |
| R2-2203018 | Huawei, HiSilicon | As we analysed in [8] for Proposal 8 and OI 3.3, when the RRC status of the UE returns to Idle or Inactive, the UE is going to start slice based cell reselection again.  [8] Regarding to UE behaviour of “fallback to legacy reselection”, we think that after the fallback, the UE will perform legacy cell reselection and select a suitable cell, so this cell reselection is over. When the RRC status of the UE returns to Idle or Inactive, the UE is going to start slice based cell reselection again. |
| R2-2203412 | Ericsson | In the TP in Appendix, all frequencies are considered without iterations, so there is no need for fallback to legacy cell reselection, and therefore also no trigger is needed for going back to slice-based cell reselection.  Proposal 9: Close the Open Issues 3.3 and 3.4 |

**Rapporteur summary:**

From the above proposals, 3 companies (QC, CMCC, Ericsson) propose to not need to discuss this issue based on option A without formula, but 2 companies (Speadtrum and Huawei) propose that the UE could perform slice based cell reselection when triggering the next cell reselection.

Similar to OI 3.3, rapporteur understand if all frequencies are considered for OI 3.1, this issue will not exist. And if the legacy frequencies are not considered in slice-based cell reselection, the UE will perform legacy cell reselection and select a suitable cell, so this cell reselection is over. When triggering the next cell reselection, it is natural for the UE to perform slice based cell reselection. Anyway, this issue does not need to be discussed and can be closed.

**Cat-a-Proposal 7: RAN2 confirm the following understanding and close OI 3.4:**

**If all frequencies are considered in slice-based cell reselection, this issue will not happen, i.e. it is natural for the UE to perform slice based cell reselection when triggering the next cell reselection.**

### 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

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| **TDoc** | **Source** | **Proposals** |
| R2-2202187 | Qualcomm | Proposal 5: The legacy procedure (i.e., UE first enters any cell selection state and performs cell selection) should be reused when the UE cannot find a suitable cell if the UE is configured with slice based dedicated priority. |
| R2-2202617 | CMCC | Proposal 9: The legacy procedure should be reused and there is no spec impact when the UE cannot find a suitable cell if the UE is configured with slice based dedicated priority. |
| R2-2203018 | Huawei, HiSilicon | Similar to OI 3.3, unless a timer of the cell reselection configured for dedicated signaling is expired. |
| R2-2203179 | Samsung | Observation 3: Based on RAN2 agreement, only one of sliceInfo or legacy dedicated priority can be configured in RRC Release. As per existing cell reselection principles, if priorities are provided in dedicated signaling, all the broadcast priorities are ignored.  Proposal 6: If the UE is configured with slice based dedicated priority, the UE doesn’t consider legacy NR priorities.  Proposal 7: RAN2 to discuss whether inter-RAT cell reselection priorities can be included independently from dedicated signaling of slice based priorities. |
| R2-2203412 | Ericsson | Proposal 10: If slice specific frequency priorities are sent in RRC release, but no legacy priorities are included, the UE shall use broadcasted legacy priorities from the cell it is camping in.  Proposal 11: Accept the TP for section 5.2.4.1 provided in Appendix for the running CR and close the Open Issue 3.5   |  | | --- | | If cell reselection priorities are provided in dedicated signalling, the UE shall ignore all the priorities provided in system information, including slice group specific frequency priorities. If slice group specific frequency priorities are provided in dedicated signaling, the UE shall ignore all slice group specific frequency priorities provided in system information. | |

**Rapporteur summary:**

From the above proposals, QC and CMCC suggest to reuse the legacy procedure (i.e., UE first enters any cell selection state and performs cell selection) when the UE cannot find a suitable cell if the UE is configured with slice based dedicated priority, and in legacy procedure, if priorities are provided in dedicated signalling, the UE shall ignore all the priorities provided in system information. Samsung and Huawei's view are similar. But Ericsson proposes that the UE shall use broadcasted legacy priorities if slice specific frequency priorities are sent in RRC release, but no legacy priorities are included.

Hence, rapporteur suggests to confirm the following understanding firstly:

**Cat-a-Proposal 8.1: RAN2 confirm that if the UE is configured with slice specific dedicated priority, the UE shall ignore all the priorities provided in system information.**

If the proposal 8.1 is agreed, for OI 3.5, rapporteur suggests to follow majority view to reuse the legacy procedure.

**Cat-a-Proposal 8.2: The legacy procedure (i.e., UE first enters any cell selection state and performs cell selection) should be reused when the UE cannot find a suitable cell if the UE is configured with slice based dedicated priority.**

### OI 3.6: Whether the inter-RAT frequency should be considered in slice-based cell reselection

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| **TDoc** | **Source** | **Proposals** |
| R2-2202187 | Qualcomm | Proposal 2: Clarify that slice specific frequency priority values are not assigned to inter-RAT frequencies. |
| R2-2202416 | Spreadtrum | Proposal 7: Inter-RAT frequency should not be considered in slice-based cell reselection. |
| R2-2202617 | CMCC | From the perspective of operator, network would not configure slice info in the inter-RAT frequency.  Proposal 10: The inter-RAT frequency should not be considered in slice-based cell reselection. |
| R2-2202640 | Intel | Proposal #2: Frequencies and inter-RATs are considered at the bottom of the list (lower priority than the frequencies that have a slice based priority) in the order of legacy priority.  Proposal #3: If proposal #2 is agreed, legacy frequency priority in SIB should is still considered when slice based priority is provided in SIB or dedicated signalling. |
| R2-2203179 | Samsung | Observation 4: There will not be any associated slice for inter-RAT frequencies and they will be considered as lower priority than frequencies associated to a slice.  Proposal 8: Inter-RAT frequency can be considered in slice-based cell reselection with legacy priorities.  Proposal 9: On performing inter-RAT cell reselection, the UE deletes dedicated slice information and doesn’t perform slice aware cell reselection. |
| R2-2203412 | Ericsson | Proposal 12: Inter-RAT frequencies are considered at the same time as LTE frequencies without slice specific frequency priorities, based on the cellReselectionPriority.  Proposal 13: The TP for section 5.2.4.x in Appendix is accepted, and the open issue 3.6 is closed. |

**Rapporteur summary:**

From the above proposals, QC and CMCC propose that slice specific frequency priority values are not assigned to inter-RAT frequencies, 3 companies (Intel, Samsung, Ericsson) propose to consider the inter-RAT frequency at the bottom of list with legacy priority, and Spreadtrum proposes inter-RAT frequency should not be considered in slice-based cell reselection.

This issue is also related to OI 3.1, rapporteur suggests the following proposal:

**Cat-a-Proposal 9: Inter-RAT frequencies are not configured with slice specific frequency priority, but inter-RAT frequencies can be considered in slice based cell reselection based on legacy frequency priority** **after all frequencies that support any slice/slice group.**

### OI 3.7: The definition of slice group

***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.***

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| --- | --- | --- |
| **TDoc** | **Source** | **Proposals** |
| R2-2202417 | Spreadtrum | Proposal 1: The definition of slice group could be: A group which is associated with one or multiple slices. And a slice is associated to none or one slice group. |
| R2-2202690 | CATT | Proposal 8: A slice is not allowed to associate to multiple slice groups. |
| R2-2203070 | Nokia | Proposal 2: Relax the limitation that a slice can at most belong to a single slice group by allowing that a slice may belong to multiple slice groups. Inform SA2 about the change in the assumptions for slice groups. |
| R2-2203179 | Samsung | Observation 5: no clear reason for changing RAN2 agreement so that a slice could be associated to more than one slice groups.  Proposal 10: RAN2 to keep its previous agreement on slice group definition “A group which is associated with one or multiple slices. And a slice is associated to none or only one slice group.” |
| R2-2203412 | Ericsson | Proposal 2: A slice may be part of multiple slice groups. The first listed slice group ID’s in the UE’s slice group definitions received over NAS, have precedence over later listed slice group ID’s for the same slice. |

**Rapporteur summary:**

From the proposals, 3 companies (Spreadtrum, CATT, Samsung) propose to keep previous agreement on slice group definition, but 2 companies (Nokia and Ericsson) propose that a slice may belong to multiple slice groups.

**Cat-c-Proposal 10: FFS a slice is associated to multiple slice groups.**

### OI 3.9: The granularities of the slice groups

***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.***

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| --- | --- | --- |
| **TDoc** | **Source** | **Proposals** |
| R2-2202350 | Xiaomi | Proposal 6: RAN2 confirms that the granularity of the slice groups for cell reselection is per TA. |
| R2-2202690 | CATT | Proposal 9: The granularities of the slice groups are per TA. |
| R2-2203070 | Nokia | Observation 1.1: The RAN2 assumption that the configuration on slice grouping should be homogeneous in TAs of a RA requires SA2 specification.  Observation 1.2: The RAN2 assumption that the configuration on slice grouping should be homogeneous in TAs of a RA introduces additional limitations in slice grouping and RA creation.  Proposal 1: RAN2 should not assume that the configuration on slice grouping is homogeneous in TAs of a RA without a confirmation from SA2. |
| R2-2203179 | Samsung | Proposal 11: RAN2 to postpone discussion on the slice group granularity pending further input from SA2. |
| R2-2203412 | Ericsson | Proposal 15 The slice groups are defined per PLMN. An LS is sent to SA2 to inform them of RAN2’s opinion. |

**Rapporteur summary:**

From the proposals, 2 companies (Xiaomi, CATT, Samsung) propose the granularity of the slice groups for cell reselection is per TA, but Ericsson supports per PLMN, Nokia and Samsung think this issue should be confirmed by SA2.

**Cat-c-Proposal 11: FFS to confirm the granularities of the slice groups for cell reselection are per TA.**

### OI 3.10: The slice info is slice or slice group specific

***Whether the slice specific cell reselection information provided by the network in SIB or RRCRelease message is slice or slice group specific***

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| **TDoc** | **Source** | **Proposals** |
| R2-2202187 | Qualcomm | Observation 2: The slice grouping is introduced to reduce payload size related to slice specific frequency priority including related PCI list, because they are broadcast in SIB.  Proposal 6: RAN2 confirm that slice specific frequency priority is slice group specific, and slice priority is slice specific. |
| R2-2202350 | Xiaomi | Proposal 1: The slice specific cell reselection info provided by the network in SIB is provided per slice group.  Proposal 2: The slice specific cell reselection info provided by the network in RRCRelease message can be either per slice or per slice group. |
| R2-2202417 | Spreadtrum | Proposal 3: Slice specific cell reselection information provided by the network in SIB is slice group specific, but it could be slice or slice group specific in RRCRelease message. |
| R2-2202617 | CMCC | Proposal 11: The slice info provided in SIB should be slice group specific, and the slice info provided in RRCRelease can be slice or slice group specific. |
| R2-2202690 | CATT | Proposal 10: The slice specific cell reselection information provided by the network in SIB or RRCRelease message is slice group specific. |
| R2-2203018 | Huawei, HiSilicon | Proposal 7: The slice specific cell reselection information provided by the network in SIB or RRCRelease message is slice group specific. |
| R2-2203071 | Nokia | Observation 3.1: Only slice group specific frequency priorities are provided to the UE.  Proposal 3.1: "slice or slice group specific frequency priorities" is to be changes to "slice group specific frequency priorities" in the running CR. (See TPs in the Annex.)  Observation 3.2: Slice groups and slice group specific priorities are provided to the AS layer in the UE.  Proposal 3.2: "slice group priorities" is to be used in the running CR instead of "slice priorities". (See TPs in the Annex.) |
| R2-2203235 | NEC | Proposal 6: slice specific cell reselection configuration in RRCRelease is per slice group, i.e., same IE SliceInforlist can be used |
| R2-2203412 | Ericsson | Proposal 16: Slice specific cell reselection information is slice group specific.  Proposal 17: Close open issue 3.10. |

**Rapporteur summary:**

For slice info provided in SIB, all companies (9/9) agree that it should be slice group specific.

For slice info provided in RRCRelease, 6/9 companies (Qualcomm, CATT, Huawei, Nokia, NEC, Ericsson) propose that it should be slice group specific, but 3/9 companies (Xiaomi, Spreadtrum, CMCC) propose that it can be either slice or slice group specific.

Hence, the following proposals are suggested to reach:

**(9/9) Cat-a-Proposal 12: The slice specific cell reselection information provided by the network in SIB is slice group specific.**

**Cat-b-Proposal 13: The slice specific cell reselection information provided by the network in RRCRelease is slice group specific (6/9) or it can be either slice specific or slice group specific (3/9).**

## List of RRC open issues

### OI 1.1: How to handle the TA boundary issue

***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.***

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| **TDoc** | **Source** | **Proposals** |
| R2-2202187 | Qualcomm | Proposal 7: Whether slice grouping is mapped by the mapping relationship in current RA or not should be discussed in RAN3.  Observation 3: The concerned scenario (i.e., different cells in same frequency support different slices) can only happen in TA boundary in this release. Thus, the slice support info of neighbor cell is just an assistance information for the UE to check in best ranked cell.  Proposal 8: As assistance information, an optional PCI list is introduced to indicate the cells supporting one slice group. And if NW don’t provide such info on the best ranked cell, the UE may skip the checking on slice support in best ranked cell (i.e., the UE regards the slice or slice group is supported in best ranked cell). |
| R2-2202350 | Xiaomi | Proposal 4: For purpose of UE checking supported slices on the highest ranked cell at TA/RA boundary, PCI list and/or TAC per slice group can be provide to UE.  Proposal 5: In order to support the checking on whether the slice groups of neighbouring cell includes its intended slices, following options can be considered:  • The slice mapping per adjacent TA as well as the intended slices are provide to UE AS layer from NAS layer.  • The slice group per adjacent TA which the intended slices are mapped into is provided to UE AS layer from NAS layer. |
| R2-2202417 | Spreadtrum | Proposal 5: It is not RAN2 scope to discuss how to revert the slice mapping of neighbor RA to the slice mapping of current RA.  Proposal 6: For the purpose of UE checking supported slices on the highest ranked cell, serving cell should provide supported slice info of neighbor cells with PCI list and TAC per slice group.  Proposal 7: If gNB doesn’t provide supported slice group info on the best ranked cell, UE should skip the cell or bar the cell and check the best ranked cell on the next highest priority frequency. |
| R2-2202439 | OPPO | Proposal 1: To cover the RA border case, the optional PCI list is introduced to indicate the slice support of the neighbour cells.  Proposal 2: The cell identity is included in the PCI list only when the slice info supported by the cell associated with this cell identity is different from the one supported by the frequency associated with this cell. Otherwise, the cell identity is absent.  Proposal 3: If the cell identity of the best ranked cell is not included in the PCI list, the UE considers that the best ranked cell supports the corresponding slice.  Proposal 4: In case the best ranked cell of one frequency does not support the selected slice, the UE may use the legacy frequency priority for that frequency at least when no UE intended slice is supported on that cell.  Proposal 5: From the UE perspective, even if the UE is moving across the RA border, the UE uses the slice group mapping which the UE receives in the current RA until the mobility registration.  Proposal 6: From the network perspective, at the TA/RA border, how to map the slice group that is supported by these neighbour cells and broadcasted by the serving cell depends on the gNB implementation. |
| R2-2202617 | CMCC | Proposal 3: The slices supported by neighbour cells are mapped into slice groups by the mapping relationship in current RA.  Proposal 4: An optional PCI list may be provided to indicate the cells supporting one slice group.  Proposal 5: If system information doesn’t provide supported slice group info on the best ranked cell, the UE will skip this frequency and check the next frequency whether supports the selected slice. |
| R2-2202690 | CATT | Proposal 11: Only the mapping relationship for slice groups in current RA is signalled to the UE.  Proposal 12: PCI list per slice group is provided to the UE by the serving cell.  Proposal 13: TAC per slice group signaled in the neighbor cell is not suitable for slice based cell reselection. |
| R2-2203018 | Huawei, HiSilicon | Proposal 1: The following information are needed for the UE to be aware of the supported slice for neighbour cells at TA boundary:   * NAS Information: the mapping relationships of slice groups and their valid TACs in the current and adjacent TAs by the CN; * AS Information: the optional PCI List for supporting certain slice/slice group. If the PCI list is absent for a certain slice on a certain frequency, it means that all neighbour cells belonging to the frequency are able to support the associated slice/slice groups in the slice specific cell reselection information.   Observation 1: The option based on the Xn interface may inevitably bring further discussions which are difficult for RAN2 to handle with.  Proposal 2: RAN2 should decide on the solution from the following two solutions:   * Explicit Solution: The gNB provides the association of slice group IDs with their valid TACs in the slice specific cell reselection information. * Implicit Solution: The OAM ensures that the slice group IDs are different among the adjacent TAs. |
| R2-2203071 | Nokia | Proposal 2.1: The gNB may provide slice group specific PCI lists (either list of allowed or forbidden cells). If slice group specific PCI list is provided associated to the slice group used to select the frequency (i.e., the slice group whose slice group specific priority used for the frequency), then it is used to check if the highest ranked cell supports the slice group used to select the frequency. (See TPs in the Annex.)  Proposal 2.2: If no slice group specific PCI list is provided then the UE checks if the TAC of the highest ranked cell is the TAC associated to the slice group used to rank the cell. (See TPs in the Annex.)  Proposal 2.3: If the highest ranked cell does not support the slice group used to rank the cell (see proposal 2.1 and 2.2), then the frequency priority of the band of the cell is changed to the "normal" (non-slice-based) cell reselection priority for a maximum of 300 seconds and ranking of the cells is updated based on the changed frequency priority. (See TPs in the Annex.) |
| R2-2203150 | China Telecom | Proposal 3: Slice group is mapped by the mapping relationship in current RA. |
| R2-2203235 | NEC | Observation 1: A PCI list indicating cells are not supporting the corresponding slice group is more signalling efficient for real homogeneous slice deployment scenario.  Observation 2: In practice it is possible that only minority of neighbouring cells support a given slice group, hence a PCI list indicating cells are supporting the corresponding slice group is more signalling efficient.  Proposal 5: clarify that SliceCellInfoNR-r17 indicates the cells not supporting the slice group, and if the IE does not present, UE assume all neighbouring cells support the slice group. |
| R2-2203412 | Ericsson | Proposal 3: If slice specific frequency priority is provided for a slice, but no slice support information is included, the UE may assume that the slice is supported on all cells of the frequency. |

**Rapporteur summary:**

***1st FFS: FFS if the slice group is mapped by the mapping relationship in current RA or not.***

Qualcomm, Spreadtrum thought this issue should be discussed by RAN3;

CMCC and China Telecom support the FFS proposal.

OPPO proposed that from the UE perspective, even if the UE is moving across the RA border, the UE uses the slice group mapping which the UE receives in the current RA until the mobility registration. And how the network map the slice group depends on gNB implementation.

CATT proposed that only the mapping relationship for slice groups in current RA is signalled to the UE.

Considering this topic has RAN3 impact, rapporteur suggest to prior to dicuss other topics. If time allows, OPPO and CATT’s proposals can be discussed.

**Cat-c-Proposal 14: Postpone the discussion on whether the slice group is mapped by the mapping relationship in current RA or not.**

***2nd FFS: FFS PCI list and/or TAC per slice group are provided.***

Support to provide PCI list: 8 companies (Qualcomm, Xiaomi, Spreadtrum, OPPO, CMCC, CATT, Huawei, Nokia)

Support to provide TAC: 4 companies (Xiaomi, Spreadtrum, Huawei, Nokia)

In case of gNB doesn’t provide slice info on the best ranked cell, 3 companies (Qualcomm, OPPO, Huawei) thought the UE regards the slice is supported on the cell, while 2 companies (Spreadtrum and CMCC) thought the UE regards the slice is not supported on the cell.

NEC proposed that SliceCellInfoNR-r17 indicates the cells NOT supporting the slice group, and if the IE does not present, UE assume all neighbouring cells support the slice group.

Majority companies are supportive to provide PCI list, while the UE behaviour if not provided still need further discuss.

**(8/11) Cat-a-Proposal 15: PCI list per slice group is provided in system information.**

**Cat-b-Proposal 16: FFS in case of gNB doesn’t provide slice info on the best ranked cell, whether the UE considers the cell support the slice or not.**

### OI 1.3: Whether to introduce a T320-like timer

***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.***

Previous agreements in RAN2#113bis-e

Agreements

5 UE is only configured with either the existing dedicated priority configuration or the slice info in RRC Release.

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| **TDoc** | **Source** | **Proposals** |
| R2-2202187 | Qualcomm | Observation 1: It was agreed that RRC release message can’t include both legacy priority and slice specific frequency priority. Thus, if slice specific frequency priority is included in RRC release, gNB can configure a suitable value via legacy T320 timer.  Proposal 1: Legacy T320 timer is applied to slice specific frequency priority |
| R2-2202417 | Spreadtrum | Proposal 4: Current T320 timer is reused. |
| R2-2203018 | Huawei, HiSilicon | If the meaning of “existing dedicated priority configuration” covers the IE freqPriorityListUTRA, we prefer Option 2. |
| R2-2203235 | NEC | Proposal 7: legacy T320 is applied to slice specific frequency priority provided in RRC Release. |
| R2-2203412 | Ericsson | Proposal 5：Clarify that T320 is also used for slice specific priorities and close the Open Issue 1.3. |

**Rapporteur summary:**

From the above proposals, all companies (6/6) support to reuse the legacy T320 timer for slice specific frequency priority in RRCRelease.

There is a consensus to agree the following proposal:

**(6/6) Cat-a-Proposal 17: Reuse the legacy T320 timer for slice specific frequency priority in RRCRelease.**

### OI 1.4: Which SIB to broadcast slice info

***OI 1.4: FFS in which SIB to broadcast slice info for the purpose of inter-frequency reselection, SIB4 or new SIB.***

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| **TDoc** | **Source** | **Proposals** |
| R2-2202187 | Qualcomm | Observation 4: The payload size of slice info in SIB can be 2048bit (if without PCI info) or 22528bit (if with PCI info), while the maximum size of one SI message is just 2976 bit.  Proposal 9: Introduce a new SIB to provide slice cell reselection information (i.e., SliceInfoList-r17) |
| R2-2202417 | Spreadtrum | Proposal 2: SIB4 could be used to broadcast slice info for the purpose of inter-frequency reselection. |
| R2-2202439 | OPPO | Proposal 7：RAN2 confirms that SIB2 contains the slice-specific frequency priority of the serving frequency, and SIB4 contains the slice-specific frequency priority of other NR frequencies and the slice support of neighbouring cells related to the other NR frequencies. |
| R2-2202690 | CATT | Proposal 15: Define a new SIB to broadcast the slice info (slice -> frequency (ies) -> absolute priority of each of the frequency) and slice support information. |
| R2-2203018 | Huawei, HiSilicon | As we analysed in [8] for Proposal 6, we suggest to include it in legacy SIBs. |
| R2-2203235 | NEC | Proposal 3: Introduce a new SIB for providing slice cell reselection information |
| R2-2203387 | ZTE | Proposal 1: The SliceInfoList is broadcast in SIB2 (for intra-frequency) and SIB4 (for inter-frequency) in a per frequency manner. |

**Rapporteur summary:**

7 companies contributed to OI 1.4. And no majority view is shown.

Support new SIB: 3 companies (Qualcomm, CATT, NEC)

Support legacy SIB (e.g. SIB2 for serving frequency, SIB4 for inter-frequency): 4 companies (Spreadtrum, OPPO, Huawei, ZTE)

Rapporteur suggests to keep it open and to be decided during stage 3 ASN.1 phase.

**Cat-c-Proposal 18: FFS in which SIB to broadcast slice info for the purpose of inter-frequency reselection, SIB4 or new SIB. This issue will be addressed during stage 3 ASN.1 phase.**

### OI 1.9: Whether to support RAN sharing

***FFS RAN sharing for slice-based cell re-selection and slice-based RACH.***

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| --- | --- | --- |
| **TDoc** | **Source** | **Proposals** |
| R2-2202187 | Qualcomm | Observation 5: In legacy cell reselection, cell ID, TAC and ranac are PLMN specific, but frequency priorities are not PLMN specific, which means MNOs sharing the same RAN should coordinate the values of frequency priorities broadcast in SIB.  Proposal 12: Slice specific cell reselection reuse the same mechanism of RAN sharing as legacy, i.e., slice specific frequency priorities are not PLMN specific while cell ID, TAC and ranac are PLMN specific. And whether to allow slice specific PLMN selection should be decided by SA2/CT1. |
| R2-2202617 | CMCC | Proposal 6.1: Considering the limited time, RAN2 is suggested not to discuss RAN sharing case in R17.  Proposal 6.2: In case majority companies want to support RAN sharing in this release, we should lower the complexity and limit that the different TAs in one cell should share the same slice group mapping relationship. |
| R2-2203018 | Huawei, HiSilicon | Proposal 3: RAN Sharing is intuitively supported both for slice based cell reselection and slice based RACH via the network implementation. |
| R2-2203411 | Ericsson | Proposal 1 RAN slicing enhancements should support RAN sharing.  Proposal 2 RAN2 to discuss and agree whether RAN-sharing solution based on dedicated signalling or SIB signalling shall be used.  Proposal 3 For Slice-specific RA in RAN sharing, use sliceGroupID together with the index of the PLMN selected by the UE as signalled in RRCSetupComplete. |

**Rapporteur summary:**

4 Companies commented on OI 1.9.

3 companies support RAN sharing in R17. 1 company worry about the complexity and propose to limit that the different TAs in one cell should share the same slice group mapping relationship.

**(3/4) Cat-b-Proposal 19: RAN sharing can be supported for slice based cell reselection and RACH, but the complexity should be kept low. Details are FFS.**

# Summary

Based on the discussion in the previous sections, the following Cat-a proposals were identified:

**(15/16) Cat-a-Proposal 1: RAN2 confirm the working assumption on option A without formula.**

**Cat-a-Proposal 2: The UE should determine the slice specific frequency priority according to the following rules:**

1. **Considering the slice/slice group priority provided by NAS, the frequencies that support higher priority slice/slice group have higher slice based frequency priority than the frequencies that support lower priority slice/slice group;**
2. **Among the frequencies supporting a slice/slice group with the same priority, the UE should follow the slice specific frequency priority received in SIB or RRCRelease (if configured);**
3. **Among the frequencies supporting the same slice/slice group, the frequency not configured with slice specific reselection priority should be considered as lowest priority;**
4. **The frequencies that support any slice/slice group have higher slice based frequency priority than the frequencies that support none of slice/slice group;**
5. **For the frequencies that not support any slice/slice group, the UE should follow the legacy CellReselectionPriority received in SIB or RRCRelease;**

**Cat-a-Proposal 6: RAN2 confirm the following understanding and close OI 3.3:**

**If all frequencies are considered in slice-based cell reselection, the fallback to legacy cell reselection will not happen, i.e., no additional exit condition to fallback to legacy cell reselection.**

**Cat-a-Proposal 7: RAN2 confirm the following understanding and close OI 3.4:**

**If all frequencies are considered in slice-based cell reselection, this issue will not happen, i.e. it is natural for the UE to perform slice based cell reselection when triggering the next cell reselection.**

**Cat-a-Proposal 8.1: RAN2 confirm that if the UE is configured with slice specific dedicated priority, the UE shall ignore all the priorities provided in system information.**

**Cat-a-Proposal 8.2: The legacy procedure (i.e., UE first enters any cell selection state and performs cell selection) should be reused when the UE cannot find a suitable cell if the UE is configured with slice based dedicated priority.**

**Cat-a-Proposal 9: Inter-RAT frequencies are not configured with slice specific frequency priority, but inter-RAT frequencies can be considered in slice based cell reselection based on legacy frequency priority** **after all frequencies that support any slice/slice group.**

**(9/9) Cat-a-Proposal 12: The slice specific cell reselection information provided by the network in SIB is slice group specific.**

**(8/11) Cat-a-Proposal 15: PCI list per slice group is provided in system information.**

**(6/6) Cat-a-Proposal 17: Reuse the legacy T320 timer for slice specific frequency priority in RRCRelease.**

Based on the discussion in the previous sections, the following Cat-b proposals were identified:

**Cat-b-Proposal 3: The following rules can be discussed online:**

1. **Whether a frequency can be sorted only one time or multiple times, in other words, whether a frequency can be checked only one time or multiple times in slice based cell reselection procedure;**
2. **How to handle the frequency priority among the frequencies supporting the same slice/slice group with same frequency priority;**

**Cat-b-Proposal 4: RAN2 discuss how the UE realises the above rules, e.g. generate a candidate frequency pool/list or it is up to UE implementation.**

**Cat-b-Proposal 5: RAN2 discuss the UE behaviour if the prioritised slice is not supported in the highest ranked cell:**

* **(3/7) Option 1: No change to the frequency priority and the UE will continue to check the next frequency;**
* **(3/7) Option 2: Recalculate the frequency priority;**
* **(2/7) Option 3: Use the legacy frequency priority;**
* **(1/7) Option 4: the UE should camp on this cell because it means that the highest ranked cell belongs to the frequencies without any sliceinfo;**

**Cat-b-Proposal 13: The slice specific cell reselection information provided by the network in RRCRelease is slice group specific (6/9) or it can be either slice specific or slice group specific (3/9).**

**Cat-b-Proposal 16: FFS in case of gNB doesn’t provide slice info on the best ranked cell, whether the UE considers the cell support the slice or not.**

**(3/4) Cat-b-Proposal 19: RAN sharing can be supported for slice based cell reselection and RACH, but the complexity should be kept low. Details are FFS.**

Based on the discussion in the previous sections, the following Cat-c proposals were identified:

**Cat-c-Proposal 10: FFS a slice is associated to multiple slice groups.**

**Cat-c-Proposal 11: FFS to confirm the granularities of the slice groups for cell reselection are per TA.**

**Cat-c-Proposal 14: Postpone the discussion on whether the slice group is mapped by the mapping relationship in current RA or not.**

**Cat-c-Proposal 18: FFS in which SIB to broadcast slice info for the purpose of inter-frequency reselection, SIB4 or new SIB. This issue will be addressed during stage 3 ASN.1 phase.**

# References

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