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

Electronic Meeting, 17 – 25 January 2022

**Agenda item: 8.8.1**

**Source: CMCC**

**Title: Report for [AT116bis-e][240][Slicing] Remaining details for slice groups (CMCC)**

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

**Document for: Discussion and Decision**

# Introduction

This document aims at address the remaining details for slice groups

* [AT116bis-e][240][Slicing] Remaining details for slice groups (CMCC)

Scope: Discuss the slice group aspects: 1) discuss what should be the definition of slice group (based on latest RAN2 and SA2 agreements)? 2) how to resolve the TA boundary aspects? 3) does UE select different slice group if no cell supporting that slice group is available?

Intended outcome: Discussion summary in R2-2201708.

Deadline: Deadline 3

Comment deadline: Thursday W1, 1600 UTC (for collecting views)

Rapporteur proposals: Friday W1, 0900 UTC (proposed resolution of issues)

Document deadline: Monday W2, 1200 UTC (report or agreed CRs)

**Contact List**

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# Discussion

***Open issue 1: Definition of slice grouping***

Previous agreements in RAN2#116-e:

* A network slice can be associated to none or only one slice group.

Since SA2 hasn’t reached agreement on the definition of slice grouping, RAN2 can try to define one based our understanding. A candidate definition is shown below:

**Slice group: A group which is associated with one or multiple slices. And a slice is associated to none or only one slice group.**

**Q1.1: Do you agree with the above definition for slice group? Other suggestions are also welcome.**

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Regarding to the maximum number of slice groups, the contributions [19, 30, 47] suggested the maximum number of slice groups as at most 16 slice groups, or as less as possible (e.g. 3 slice groups representing for high/medium/low degree of importance). While, [5] suggested to postpone the decision on maximum number of slice grouping configured by Network after it is clear what dedicate configurations can be configured for one slice group.

**Q1.2: What is the maximum number of slice group?**

**Option 1: 16**

**Option 2: other numbers.**

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***Open Issue 2: TA boundary***

Previous agreements in RAN2#116-e

* 3: Working assumption: The granularities of the slice groups for cell reselection are per TA. FFS on the details (e.g. how to resolve TA boundaries).

A number of contributions [4, 16, 19, 25, 30, 49] see issues for TA boundary and suggested to resolve the issues, while the contributions [22, 48] thought that there is no issue and no spec impacts on TA boundary.

The first open issue is that, when UE is checking whether the highest ranked cell support the highest priority slice, how the UE is aware of the slice supported by the neighbouring cell belonging to other TA?

According to the contributions, there are several potential solutions for resolving the TA boundary issue.

**Q2.1: How UE can know the supported slice for neighbouring cell at TA boundary?**

**Option A: The gNBs exchange the supported slices (S-NSSAI/NSSAI) through Xn interface, then serving gNB can map the slices supported by neighbour cells to slice groups based on the slice group mapping relationship in current TA and broadcast it to the UEs. [19]**

**Option B: As assistance information, an optional PCI list is introduced to indicate the cells supporting one slice group in a new SIB. 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. [4]**

**Option C: Add the association of slice group IDs and their valid TACs in the slice-specific cell reselection info for inter-TA cell reselection. The UE can determine whether to camp on the highest ranked cell based on the TAC received in its SIB1.[30]**

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The contribution [19, 12] pointed out the case that the neighbour cell supports a slice which cannot be mapped into any current slice group and suggested to handle this issue. There are several potential solutions for this issue:

**Q2.2: How to handle the case if the gNB doesn’t support the slice group mapping for the slice of the neighbouring cell? Do we need to send LS to RAN3/SA2?**

**Option 1: The gNB can request CN to update the mapping to involve the new slice.[19]**

**Option 2: The gNB can request RAN OAM to update the mapping to involve the new slice.**

**Option 3: Restrict that one slice is mapped to only one slice group. [12]**

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***Open issue 3: Consider low priority slice or not***

The contribution [8, 19] have proposed that low priority slice is considered with iteration but needs to some enhancements, for example, reuse the immediate past measurements, or set the maximum number of iterations, or set a timer for iteration, etc. Another contribution [30] proposed that RAN can indicate the UE whether to perform Step 7 or the limit times of iterations.

On the other hand, the contribution [35, 37] proposed new algorithm on frequency priority handling, in which the low priority slice is considered without iteration.

Some contributions [4, 16, 11, 33, 41] suggested to only consider the highest priority slice.

**Q3: Does UE select different slice if no cell supporting that slice is available, which option do the companies prefer?**

**Option A1: Low priority slice is considered with iteration. [8, 19, 44, 45]**

**Option A2: Low priority slice is considered, but without iteration. [35, 37]**

**Option B: Only highest priority slice considered. [4, 16, 11, 33, 41]**

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# Summary

# References

1. R2-2200043 [Post116-e][242][Slicing] Slice-based cell re-selection algorithm Ericsson
2. R2-2200044 Running 38.304 CR for RAN slicing Ericsson
3. R2-2200055 List of open issues for RAN slicing WI CMCC
4. R2-2200179 Remaining issues on slice specific cell reselection Qualcomm Incorporated
5. R2-2200180 Remaining issues on slice specific RACH Qualcomm Incorporated
6. R2-2200181 Further discussion on UE capability related to RAN slicing enhancement Qualcomm Incorporated
7. R2-2200406 Optimizations for signalling Slice Information Lenovo, Motorola Mobility
8. R2-2200407 RAN Slicing CR to 38.304 Lenovo, Motorola Mobility
9. R2-2200408 Triggers for initiating RAN slicing based cell reselections Lenovo, Motorola Mobility
10. R2-2200409 Principles of Slice based reselection Lenovo, Motorola Mobility
11. R2-2200416 Discussion on Slice based Cell Reselection CATT
12. R2-2200417 Analysis on issues of slice groups at TA boundaries CATT
13. R2-2200418 Analysis on UE capability for RAN slicing enhancement CATT
14. R2-2200510 Further considerations of slice based cell reselection Intel Corporation
15. R2-2200511 UE capability for Slicing enhancement Intel Corporation
16. R2-2200636 Consideration on slice based cell reselection Spreadtrum Communications
17. R2-2200697 Considerations on UE capability for RAN slicing Beijing Xiaomi Software Tech
18. R2-2200844 Open issues list for RAN Slicing CMCC
19. R2-2200845 Discussion on open issues for slice based cell reselection CMCC
20. R2-2200846 Discussion on open issues for slice based RACH configuration CMCC
21. R2-2200847 Discussion on UE capability for RAN slicing enhancement CMCC
22. R2-2200929 Consideration on slice-specific cell reselection OPPO
23. R2-2200930 Consideration on slice-specific RACH OPPO
24. R2-2200931 Consideration on UE capability for Slicing OPPO
25. R2-2200947 Considerations on slice groups Nokia, Nokia Shanghai Bell
26. R2-2200948 Text Proposals for the draft 38.304 PCR Nokia, Nokia Shanghai Bell
27. R2-2200949 Cell reselection delay for option B and option C Samsung R&D Institute India
28. R2-2200972 Report of [Post116-e][243][Slicing] Running NR RRC CR for RAN slicing (Huawei) Huawei
29. R2-2200973 Running NR RRC CR for RAN slicing Huawei, HiSilicon
30. R2-2200974 Discussion on slice based cell reselection under network control Huawei, HiSilicon
31. R2-2200975 Discussion on slice based RACH configuration Huawei, HiSilicon
32. R2-2200976 Discussion on UE capabilities for RAN slicing Huawei, HiSilicon
33. R2-2201005 Leftover issues in slice based cell reselection ZTE corporation, Sanechips
34. R2-2201050 Detailed RRC signalling for RACH prioritization configuration Nokia, Nokia Shanghai Bell
35. R2-2201110 Text proposal for slice based cell reselection under NW control Apple
36. R2-2201111 Slice based RACH configuration Apple
37. R2-2201169 On slice-based cell re-selection TP for 38.304 Ericsson
38. R2-2201170 RACH for RAN slicing enhancement Ericsson
39. R2-2201171 UE Capabilities for Slice- based Cell re-selection Ericsson
40. R2-2201190 Slice-Info provision NEC Telecom MODUS Ltd.
41. R2-2201192 Slice-based cell re-selection TP for solution 4C NEC Telecom MODUS Ltd.
42. R2-2201200 Slice information provided by RRCRelease Sharp
43. R2-2201208 Discussion on signalling slice information LG Electronics UK
44. R2-2201209 Discussion on slice based cell reselection LG Electronics UK
45. R2-2201389 A couple of FFS for Cell Reselection Kyocera
46. R2-2201406 Discussion on Slice Aware UL BSR RadiSys, Reliance JIO
47. R2-2201409 Considerations on remaining issues for slice based RACH Beijing Xiaomi Software Tech
48. R2-2201410 Resolving the common issues in slice based cell reselection Beijing Xiaomi Software Tech
49. R2-2201417 Further consideration on slice specific RACH ZTE corporation, Sanechips
50. R2-2201418 TP for system information and slice based reselection priority handling ZTE corporation, Sanechips
51. R2-2201422 On selection of Solution 4 Option A, B and C Samsung R&D Institute UK
52. R2-2201443 Remaining Issues on Slice Information Samsung R&D Institute UK
53. R2-2201475 Remaining issues on slice based RACH prioritization LG Electronics Inc.
54. R2-2201536 38.321 running CR for RAN Slicing OPPO