3GPP TSG-RAN WG2 Meeting #118 Electronic R2-2206184

09 – 20 May 2022

**Agenda item: 6.8.1**

**Source: Nokia (Rapporteur)**

**Title: Report from [AT118-e][241][Slicing] Finalizing Stage-2 for RAN slicing (Nokia)**

**WID/SID: NR\_Slice -Core - Release 17**

**Document for: Discussion and Decision**

# 1 Introduction

This document is the report of the following email discussion:

* [AT118-e][241][Slicing] Finalizing Stage-2 for RAN slicing (Nokia)

      Scope: Finalize Stage-2 CR for RAN slicing based on meeting decisions.

      Intended outcome: Discussion report in [R2-2206184](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2206184.zip) and agreeable CR in [R2-2205491](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205491.zip).

      Deadline: Deadline 5

This email discussion covers the changes from the following tdocs:

[R2-2205975](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205975.zip) Resolving open issues Ericsson draftCR Rel-17 38.300 17.0.0 NR\_slice-Core

[R2-2205492](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205492.zip) Clarifications on slice groups and other corrections Nokia, Nokia Shanghai Bell draftCR Rel-17 38.300 17.0.0 NR\_slice-Core

[R2-2205077](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205077.zip) Corrections on TS 38.300 for RAN Slicing Huawei, HiSilicon CR Rel-17 38.300 17.0.0 0454 - F NR\_slice-Core

(**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.

|  |  |  |
| --- | --- | --- |
| Company | Name | Email Address |
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|  |  |  |

# 3 Discussion

## 3.1 Introduction of NSAG terminology

It is proposed to introduce "NSAG" in [R2-2205975](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205975.zip) and in [R2-2205492](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205492.zip):

NSAG Network Slice AS Group

**Rapporteur's comments:** It is desired to harmonize terminology in 38.300 with SA2 specifications.

**Question 1**: Do you agree to use "NSAG" for slice groups in 38.300? (This impacts other changes below.)

|  |  |  |
| --- | --- | --- |
| Company | YES/NO | Comments |
| LGE | Yes | Agree with Rapporteur’s comment. |
| OPPO | Yes | Agree with Rapporteur’s analysis. |
| Xiaomi | Yes | Agree with Rapporteur’s comment. |
| Apple | Yes |  |
| Huawei, HiSilicon | Yes |  |
| NEC | Yes |  |
| Samsung | Yes (with comments) | SA2 defines NSAG as “Network Slice AS Group”, while NSAG is defined as “Network Slice Access stratum Group” in the current 38.300 (draft under review).  We suggest to align the NSAG definition in 38.300 with that in SA2 specifications. |
| CATT | Yes |  |
| Nokia | Yes | On Samsung's comment: as AS means "Access Stratum", I see no difference, both versions are acceptable. |
| Intel | Yes |  |
| Spreadtrum | Yes |  |
| Qualcomm | Yes | Agree with Rapporteur’s comment. |
| Lenovo | Yes |  |
|  |  |  |

**Summary 1: TBD**

## 3.2 Correction in 7.3.1

The following is proposed in [R2-2205492](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205492.zip):

- *SIB16* contains slice specific cell reselection information;

**Rapporteur's comments:** description of SIB16 is missing from 38.300.

**Question 2**: Do you agree to add the missing SIB16 description into 7.3.1?

|  |  |  |
| --- | --- | --- |
| Company | YES/NO | Technical Arguments |
| LGE | Yes | Agree with Rapporteur’s comment. |
| OPPO | Yes | Agree with Rapporteur’s analysis. |
| Xiaomi | Yes | Agree with Rapporteur’s comment. |
| Apple | Yes | Same as above. |
| Huawei, HiSilicon | Yes |  |
| NEC | Yes |  |
| Samsung | Yes |  |
| CATT | Yes |  |
| Nokia | Yes |  |
| Intel | Yes |  |
| Spreadtrum | Yes |  |
| Qualcomm | Yes |  |
| Lenovo | Yes |  |
|  |  |  |

**Summary 2: TBD**

## 3.3 Clarification in 8.2

The following is proposed in [R2-2205492](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205492.zip):

- Network Slice Access stratum Group (NSAG): identifies a set of S-NSSAI within a Tracking Area that can be used for slice specific cell reselection or slice specific RACH configuration.

**Rapporteur's comments:** this clarification is useful in 38.300.

**Question 3**: Do you agree to add this clarification into 8.2?

|  |  |  |
| --- | --- | --- |
| Company | YES/NO | Technical Arguments |
| LGE | Yes | Agree with Rapporteur’s comment. |
| OPPO | Yes | Agree with Rapporteur’s analysis. |
| Xiaomi | Yes | Agree with Rapporteur’s comment. |
| Apple | Yes |  |
| Huawei, HiSilicon | Yes |  |
| NEC | Yes |  |
| Samsung | Yes (with comments | We propose two updates to the above text:   1. Align NSAG definition in 38.300 with that in SA2 specifications; 2. NSAG is a group of slices rather than a group of slice identifiers (S-NSSAI(s)) as captured in 38.300.   So according to the above, we propose the following updated text:   * Network Slice AS Group (NSAG): identifies a set of slice(s) within a Tracking Area that can be used for slice specific cell reselection or slice specific RACH configuration. |
| CATT | Yes |  |
| Nokia | Yes |  |
| Intel | Yes |  |
| Spreadtrum | Yes |  |
| Qualcomm | Yes |  |
| Lenovo | Yes |  |
|  |  |  |

**Summary 3: TBD**

## 3.4 Clarification in 9.2.1.2

The following clarification is proposed in [R2-2205077](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205077.zip):

- Slice specific cell reselection information can be provided to facilitate the UE to reselect a cell that supports specific slice group(s).

**Rapporteur's comments:** Even if the cell reselection information is slice group specific, the purpose of the enhancement is to facilitate the reselection of a cell that support some specific slice(s).

**Question 4**: Do you agree with this change in 9.2.1.2?

|  |  |  |
| --- | --- | --- |
| Company | YES/NO | Technical Arguments |
| LGE | No | Agree with Rapporteur’s comment. |
| OPPO | No | Agree with Rapporteur’s analysis. |
| Xiaomi | Yes with NSAG | As there are many similar wording issues in the TS 38.300, We propose to agree on a principle to align the clarifications. And we prefer to use “slice” in general description, e.g. slice specific cell reselection info, and use the “NSAG” in the details, e.g. supports specific NSAG(s). |
| Apple | No strong view | Since the slice priority is provided per NSAG, the change is technically correct. We are fine to follow majority view. |
| Huawei, HiSilicon | Yes | Proponent. We think that UE AS just knows about slice groups and all relevant parameters are related to slice group(s) or NSAG(s), so it is more reasonable to use slice group(s). Otherwise, it may lead to some confusions that UE AS will use slice(s) to correlate some parameters. |
| NEC | No strong opinion | If we keep use slice, maybe we should change “slices” into “slice(s)” |
| Samsung | Yes (with NSAG) | If the use of NSAG(s) (instead of slice group(s)) is accepted, then in our understanding, the above clarification text should be ok with the following update:  Slice specific cell reselection information can be provided to facilitate the UE to reselect a cell that supports specific NSAG(s). |
| CATT | Yes | As the NSAG will be introduced in RAN2, we agree with Xiaomi that NSAG can be used in details. So this TP seems reasonable. |
| Nokia | No, but comment | Acceptable if most of the companies support this change. |
| Intel | No | Agree with rapporteur that what UE is actually doing is slice based reselection. The grouping is just a signalling reduction mechanism. Especially as “groups” are TA specific, this addition makes it more confusing. |
| Spreadtrum | Yes | We are fine to use slice group. |
| Qualcomm | Yes |  |
| Lenovo | No | Agree with Rapporteur’s comment. |

**Summary 4: TBD**

## 3.5 Clarifications in 16.3.1

The following clarification is proposed in [R2-2205077](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205077.zip):

**Resource isolation between slices**

- The NG-RAN supports resource isolation between slices. NG-RAN resource isolation may be achieved by means of RRM policies and protection mechanisms that should avoid that shortage of shared resources in one slice breaks the service level agreement for another slice. It should be possible to fully dedicate NG-RAN resources to a certain slice. Some RACH resources can be associated to specific slice group(s). Other aspects how NG-RAN supports resource isolation is implementation dependent.

**Rapporteur's comments:** This clarification is useful as RACH resources are associated to slice groups. If the use of NSAG is accepted, then the rapporteur proposes to use NSAG instead of "slice groups" here.

**Question 5a**: Do you agree with this change in 16.3.1?

|  |  |  |
| --- | --- | --- |
| Company | YES/NO | Comments |
| LGE | Yes | We also agree with the Rapporteur’s comment to use NSAG instead of “slice group” |
| OPPO | Yes | Agree with the intention and also agree to use NSAG instead. |
| Xiaomi | Yes | Agree to use the NSAG(s) instead of slice group(s) here. |
| Apple | Yes | Agree with rapporteur. |
| Huawei, HiSilicon | Yes | Agree to use NSAG instead. |
| NEC |  | We agree to use NASG(s) as suggested by Rapporteur |
| Samsung | Yes |  |
| CATT | Yes |  |
| Nokia | Yes | We think that NSAG(s) should also be used here. |
| Intel | Yes | Agree with rapporteur’s suggestion. |
| Spreadtrum | Yes | Agree with rapporteur. |
| Qualcomm | Yes | Agree with rapporteur. |
| Lenovo | Yes |  |

**Summary 5a: TBD**

The following clarification is proposed in [R2-2205975](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205975.zip)

**Slice Availability**

- Some slices may be available only in part of the network, within one or a few TAs, while other slices may be available in the entire network. The NG-RAN supported S-NSSAI(s) is configured by OAM. Awareness in the NG-RAN of the slices supported in the cells of its neighbours may be beneficial for inter-frequency mobility in connected mode. It is assumed that the slice availability does not change within the UE's registration area.

**Rapporteur's comments:** This clarification is not directly connected to the enhancements introduced in RAN slicing.

**Question 5b**: Do you agree to add this clarification into 16.3.1?

|  |  |  |
| --- | --- | --- |
| Company | YES/NO | Comments |
| LGE | Yes | Seems useful (at least the part “while other slices may be available in the entire network) |
| OPPO | See comments | Not sure if we need this clarification, this part is more related to the R15/R16 feature, especially if we combined the first sentence and the last sentence “It is assumed that the slice availability does not change within the UE's registration area.” To us, the last sentence somehow contradicts R17 SA2 CR? |
| Xiaomi | No | Agree with Rapporteur’s comment. |
| Apple | Yes | Good to have. As OPPO spotted, the last sentence of the paragraph should be also updated or removed. |
| Huawei, HiSilicon | Yes | There may exists the case that some slices are available in the entire network, e.g. the whole PLMN. |
| NEC | No | We prefer to not have it. because “may” means one possibility, it does not exclude other possibilities, also because this is general description of slice deployment and not specifically for this feature |
| Samsung | See comments | We do not think this change is critical or needed.  For example, it is not clear why to add the part “within one or a few TAs”, which is not aligned with the existing sentence “It is assumed that the slice availability does not change within the UE's registration area.” |
| CATT | No | Agree with Rapporteur’s comment. |
| Nokia | No, but comment | Acceptable if most of the companies support this change |
| Intel | No, with comments | The current text (“some slices may be available only in part of the network) is already clear to us that some other slices may be available in the entire network. But we are OK to go with majority. |
| Spreadtrum | No | Agree with Rapporteur. |
| Qualcomm | Yes | The proposal provides more information about “part of the network”, with this, readers will be more clear. |
| Lenovo | Yes |  |

**Summary 5b: TBD**

## 3.6 Clarifications/corrections in 16.3.3.1

The following changes are proposed in [R2-2205077](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205077.zip):

Slice group specific RACH configuration for RA partitioning and prioritization can be included in SIB1 message. The slice specific RACH configurations are associated to specific slice groups, and if not provided for a slice group that UE considers for selecting the RACH configuration, then the UE does not consider the slice(s) for selecting the slice specific RACH configuration, i.e., the UE uses the common RACH configuration. In the UE, NAS provides the slice group information to be considered during RA to AS.

Editor's Note: Details of slice grouping and how it is provided to the UE are FFS, depends on SA2.

The following changes are proposed in [R2-2205492](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205492.zip):

Slice specific RACH configuration for RA isolation and prioritization can be included in SIB1 messages. The slice specific RACH configurations are associated to specific Network Slice AS Groups (NSAGs), and if not provided for a NSAG that UE considers for selecting the RACH configuration, then the UE does not consider the slice(s) for selecting the slice specific RACH configuration, i.e., the UE uses the common RACH configuration. In the UE, NAS provides the NSAG to be considered during RA to AS.

The following changes are proposed in [R2-2205975](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205975.zip)

Slice specific RACH configuration for RA isolation and prioritization can be included in SIB1 messages. The slice specific RACH configurations are associated to specific slice groups, and if not provided for a slice or slice group that UE considers for selecting the RACH configuration, then the UE does not consider the slice(s) for selecting the slice specific RACH configuration, i.e., the UE uses the common RACH configuration. In the UE, NAS provides the NSAGs to be considered during RA to AS.

UE is configured with NSAG mappings per TA for some or all configured slices.

Editor's Note: Details of slice grouping and how it is provided to the UE are FFS, depends on SA2.

**Rapporteur's comments:**

* If the use of NSAG is accepted, then it is proposed to use NSAG here.
* The Editor's Note can be removed, as clarification from SA2 has been received.
* The added sentence in [R2-2205975](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205975.zip) is a clarification.

**Question 6**: Which proposals do you support/accept from the following changes in 16.3.3.1?

A) Using NSAG instead of slice groups

B) Changing "RA isolation" to "RA "partitioning"

C) Removing the Editor's Note

D) Adding the clarification "UE is configured with NSAG mappings per TA for some or all configured slices"

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Company | Support | Accept | Not Accept | Comments |
| LGE | A, B, C |  | D | For D) configuration of NSAG is not limited to RACH partitioning but also applicable slice-specific cell reselection, hence it is better to specify the similar text in D in 16.3.1. |
| OPPO | A, C | B | D | Not sure if the change is needed since the definition of NSAG(related to Q3) seems sufficient to us. Also, it is not the correct place to have it since it is not only for RACH but for cell reselection. |
| Xiaomi | A, C |  | B D | For B), as there some corrections on the naming of partitioning raised in the RACH common session, we prefer to wait for the decision and get align with RACH common session to have a clear clarification on the RA partitioning.  For D), we agree with LGE that NSAG mapping is also for slice based cell reselection. |
| Apple | A, B, C |  | D |  |
| Huawei, HiSilicon | A, B, C |  | D | For D), we share the similar views as LGE. |
| NEC | A, C | B | D | Agree the comments from other companies that D may not be needed or at least should not be here. |
| Samsung | A,B,C |  | D |  |
| CATT | A,B,C |  | D | Same view as above. |
| Nokia | A, C | B, D |  |  |
| Intel | A, B, C | D |  | We agree with other’s comments that D should be moved to a section common for reselection and RACH. |
| Spreadtrum | A, B, C |  | D | Share similar view as above. |
| Lenovo | A B C |  |  |  |
|  |  |  |  |  |

**Summary 6: TBD**

## 3.7 Clarifications/corrections in 16.3.3a

**The following changes are proposed in** [**R2-2205077**](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205077.zip)**:**

Slice group specific cell reselection information can be included in SIB messages and in *RRCRelease* message. The slice group specific cell reselection information provides information about the frequencies where slice group(s) are supported. It may include reselection priorities per slice group per frequency and corresponding list(s) of cells where the slice group(s) are supported or not supported. In the UE, NAS provides the slice(s) or slice group(s) and their priorities to be considered during cell reselection.

When a UE supports slice aware cell reselection, and when slice specific cell reselection information is provided to the UE, then the UE uses the slice specific cell reselection information. Valid cell reselection information provided in *RRCRelease* always has a priority over cell reselection information provided in SIB messages. When no slice specific reselection information is provided for any slice or slice group that UE AS received from NAS to be considered during cell reselection, then the UE uses the general cell reselection information, i.e., without considering the slice priorities.

Editor's Note: Details of slice grouping and how it is provided to the UE are FFS, depends on SA2.

**The following changes are proposed in** [**R2-2205492**](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205492.zip)**:**

Slice specific cell reselection information can be included in SIB16 and in *RRCRelease* messages. The slice specific cell reselection information may include reselection priorities per NSAG(s) per frequency and corresponding list(s) of cells where the NSAG(s) are supported or not supported. In the UE, NAS provides the NSAG(s) and their priorities to be considered during cell reselection.

When a UE supports slice aware cell reselection, and when slice specific cell reselection information is provided to the UE, then the UE uses the slice specific cell reselection information. Valid cell reselection information provided in *RRCRelease* always has a priority over cell reselection information provided in SIB messages. When no slice specific reselection information is provided for any NSAG(s) that UE AS received from NAS to be considered during cell reselection, then the UE uses the general cell reselection information without considering the NSAG(s) and their priorities.

**The following changes are proposed in** [**R2-2205975**](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205975.zip)

Slice specific cell reselection information can be included in SIB messages and in *RRCRelease* message. The slice specific cell reselection information provides information about the frequencies where slice group(s) are supported. It may include reselection priorities per slice group per frequency and corresponding list(s) of cells where the slice group(s) are supported or not supported. The UE is over NAS provided with slice group mappings and priorities. The UEs NAS layer provides the slice group(s) and their priorities to be considered during cell reselection.

When a UE supports slice aware cell reselection, and when slice specific cell reselection information is provided to the UE, then the UE uses the slice specific cell reselection information. Valid cell reselection information provided in *RRCRelease* always has a priority over cell reselection information provided in SIB messages. When no slice specific reselection information is provided in SIB or *RRCRelease* message for any slice group that UE AS received from NAS to be considered during cell reselection, then the UE uses the general cell reselection information, i.e., without considering the slice priorities.

Editor's Note: Details of how the UE’s slice priorities are provided to the RAN are FFS, depends on RAN3 and SA2.

**Rapporteur's comments:**

* Removing "slice" from "slice or slice group" is necessary as only slice groups as used. If the use of NSAG is accepted, then it is proposed to use NSAG here.
* The Editor's Note can be removed, as clarification from SA2 has been received. Adding a new Editor's is not needed.
* Other proposed clarifications may be useful

**Question 7**: Which proposals do you support/accept from the following changes in 16.3.3a?

A) Removing "slice" from "slice or slice group"

B) Using NSAG instead of slice groups

C) Removing details on slice specific cell reselection information ""

D) Adding clarification "The UE is over NAS provided with slice group mappings and priorities."

E) Adding clarification " is provided in SIB or *RRCRelease* message for any"

F) Removing the Editor's Note

G) Adding the new Editor's Note "Details of how the UE’s slice priorities are provided to the RAN are FFS, depends on RAN3 and SA2"

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Company | Support | Accept | Not Accept | Comments |
| LGE | A, B, C, D, E, F |  |  | C is useful to avoid duplicated text.  E is useful to make it clear that the slice specific reselection information refers to AS configuration. |
| OPPO | A,B,C,  D,F,G | E |  |  |
| Xiaomi | A, B, C, D, F, G | E |  | For the slice or slice group or NSAG, as we reply to Q4, we’d like to have a principle to align the clarifications, and prefer to use “slice” in general description, e.g. slice specific cell reselection info, and use the “NSAG” in the details, e.g. supports specific NSAG(s). |
| Apple | All |  |  |  |
| Huawei, HiSilicon | All |  |  |  |
| NEC | A,B,F | C | D, E,G | We think C is still useful information and can be kept.  D is duplicate with following sentence?  E is not needed since it is clear from previous text that it is provided by SIB16 and RRCRelease, no need to repeat it everywhere.  With G, we are confused about the intention of the additional note, why does RAN (i.e. gNB) need “UE’s slice priorities “ , or do you mean UE NAS provides “UE’s slice priorities “ to AS ? it sounds a RAN3 issue, so RAN2 does not need to take care it. |
| Samsung | All (except G) |  | G | G is not needed. |
| CATT | A, B, C, D, E, F |  | G | This issue was also discussed in RAN3. But there is no agreement on that the CN delivers the slice group priority to UE. So we think the Editor’s Note can be revised as:  Editor's Note: ~~Details of~~ whether and how the UE’s slice group priorities are provided to the RAN are FFS, depends on RAN3 and SA2 |
| Nokia | A, B, C, F | D, E | G | Comment on G): We cannot see any reason to add the new Editor's Note, and thus it is not acceptable |
| Intel | A, B, C, D (with comment, E | G |  | We suggest an alternative wording for D:  "The UE is ~~over NAS~~ provided with slice group mappings and priorities over NAS."  We don’t see a need for G at this time – expect RAN3 will provide some update. |
| Spreadtrum | A,B,C,E,F | D,G |  | Agree the modification for D from Intel and the revised version for G from CATT. |
| Qualcomm | All except G |  | G | This is not RAN2 business, no needed. |
| Lenovo | All except G |  |  |  |

**Summary 7: TBD.**

# 4 Conclusion

TBD.