3GPP TSG-RAN WG2 Meeting #121bis-e R2-230xxxx

17 – 26 April 2023

**Agenda item: 6.1.3.3**

**Source: Nokia (Rapporteur)**

**Title: Report from [AT121bis-e][012][NR17] Slicing Corrections (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:

* [AT121bis-e][012][NR17] Slicing Corrections (Nokia)

 Scope: Treat R2-2303900, R2-2302861, R2-2302862, R2-2302983, R2-2303637, R2-2303638, R2-2303740, R2-2304039, R2-2304041
Ph1: Determine agreeable parts and prepare on-line CB points if any. Ph2: For agreeable parts, if any, reflect these in agreeable CRs.

 Intended outcome: Report, If applicable: In-Principle-Agreed CRs

 Deadline: Schedule 1

 A first round with **Deadline W1 Thursday April 21th 1200 UTC** to settle scope what is agreeable etc

 A final round with **Final deadline W2 Wednesday April 26th 1000 UTC (EOM)** to settle details / agree CRs etc.

The following input papers are considered:

[R2-2302861](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302861.zip) Relation between slice-based reselection information provided in dedicated signalling and SIB16 Nokia, Nokia Shanghai Bell discussion Rel-17 NR\_slice-Core

[R2-2302862](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302862.zip) Addition of slice-based cell re-selection parameters Nokia, Nokia Shanghai Bell CR Rel-17 38.304 17.4.0 0330 - F NR\_slice-Core

[R2-2302983](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302983.zip) Discussion on reselection priorities in dedicated and broadcast signalling CATT discussion Rel-17 NR\_slice-Core

[R2-2303637](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303637.zip) Slice-based re-selection based on dedicated signalling only Ericsson discussion Rel-17 NR\_slice-Core

[R2-2303638](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303638.zip) Slice-based re-selection based on dedicated signalling only Ericsson CR Rel-17 38.304 17.4.0 0336 - F NR\_slice-Core

[R2-2303740](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303740.zip) Essentiality of SIB16 in RAN Slicing Apple, OPPO discussion Rel-17 NR\_slice-Core

[R2-2303900](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303900.zip) Discussion on remaining issues for RAN Slicing Huawei, HiSilicon discussion Rel-17 NR\_slice-Core

[R2-2304039](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2304039.zip) Correction on handling on slice availabiliy in SIB16 in TS 38.304 CATT CR Rel-17 38.304 17.4.0 0337 - F NR\_slice-Core

[R2-2304041](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2304041.zip) Availability of NSAG-Frequency pair present only in dedicated signaling Samsung R&D Institute India discussion

# 2 Contact Points

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

|  |  |  |
| --- | --- | --- |
| Company | Name | Email Address |
| Nokia (Rapporteur) | Gyuri Wolfner | gyorgy.wolfner@nokia.com |
| Samsung | Hyunjeong Kang | hyunjeong.kang@samsung.com |
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| Huawei, HiSilicon | Jun Chen | jun.chen@huawei.com |
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# 3 Discussion

## 3.1 Relation of SIB16 and slice-based cell reselection in dedicated signalling

There are the following proposals that aims to clarify the relation between SIB16 and the applicability of slice-based cell reselection information received in dedicated signalling:

[R2-2302861](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302861.zip)

Proposal 1: Not to introduce any new limitations for the use of slice-based cell reselection received in dedicated signalling. This requires no changes in the specifications; however, some clarifications may be added to avoid misinterpretations.

Proposal 2: If proposal 1 is agreed, then RAN2 discuss the clarifications proposed in the Annex.

[R2-2302983](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302983.zip) and [R2-2304039](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2304039.zip)

Proposal 1: RAN2 stick to the previous agreements, i.e., when the NSAG-Frequency pair configured in dedicated signalling is not available in the SIB16, UE doesn’t use the NSAG-Frequency pair for deriving slice based cell reselection priority in the cell.

Proposal 2: Add a note in TS38.304 to reflect the previous agreement.

Proposal 3: It is kindly to ask RAN2 to agree on the CR to TS 38.304 in [4]:

Add one note in reselection priority handling procedure to clarify that
When the frequency configured in dedicated signalling is not available in the SIB16, UE doesn’t use the frequency for deriving slice based cell reselection priority in the cell.

[R2-2303637](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303637.zip) and [R2-2303638](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303638.zip)

Proposal 1 : UE shall derive reselection priorities provided via dedicated signalling also in case SIB16 is not broadcast in the camped cell

A note is added to indicate that UE applies slice-based reselection also in case SIB16 is not broadcast in the camped cell.

[R2-2303740](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303740.zip)

Proposal: Keep current understanding that SIB16 is essential for UE to enable slice specific cell reselection

[R2-2303900](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303900.zip)

Proposal 1: It is proposed RAN2 to confirm that SIB16 is mandatory for applying slice-based cell reselection.

[R2-2304041](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2304041.zip)

Proposal 1: When the NSAG-Frequency pair configured in dedicated slice information is not available in the SIB16, UE behavior is option A from observation 1, as agreed in RAN2#120. Adapt TP in section 5 to capture this agreement

**Rapporteur’s summary:** There are different divergent views on the relation between SIB16 and the applicability of slice-based cell reselection information received in dedicated signalling. Rapporteur’s has identified 3 different approaches:

1. There is no relation between SIB16 and the applicability of slice-based cell reselection information received in dedicated signalling, i.e., slice-based cell reselection information received in dedicated signalling can be applied even if SIB16 is not present ([R2-2302861](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302861.zip), [R2-2303637](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303637.zip)).
2. The presence of SIB16 is mandatory to enable slice specific cell reselection in a cell, but the content is not considered to limit the application of NSAGs and frequency priorities. ([R2-2303740](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303740.zip), [R2-2303900](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303900.zip)).
3. When priority for an NSAG-Frequency pair is configured in dedicated signalling, but it is not available in the SIB16, the UE doesn’t use the given NSAG-Frequency pair for deriving slice based cell reselection priorities in the cell ([R2-2302983](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302983.zip), [R2-2304041](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2304041.zip)).

The proponents of the approaches think that simple clarification(s) can make the situation unambiguous, but before discussing the actual clarification the selection from the above approaches is needed.

**Question 1**: Which option do you prefer, and which option(s)s can you accept from the options below?

1. There is no relation between SIB16 and the applicability of slice-based cell reselection information received in dedicated signalling, i.e., slice-based cell reselection information received in dedicated signalling can be applied even if SIB16 is not present ([R2-2302861](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302861.zip), [R2-2303637](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303637.zip)).
2. The presence of SIB16 is mandatory to enable slice specific cell reselection in a cell, but the content is not considered to limit the application of NSAGs and frequency priorities. ([R2-2303740](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303740.zip), [R2-2303900](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303900.zip)).
3. When priority for an NSAG-Frequency pair is configured in dedicated signalling, but it is not available in the SIB16, the UE doesn’t use the given NSAG-Frequency pair for deriving slice based cell reselection priorities in the cell ([R2-2302983](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302983.zip), [R2-2304039](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2304039.zip), [R2-2304041](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2304041.zip)).

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| --- | --- | --- | --- |
| Company | Preferred option | Acceptable option(s) | Technical Arguments |
| Samsung | 3 |  | Option 1 or Option 2 will lead to incorrect slice based prioritization as UE may prioritize frequencies which don’t really support higher priority NSAGs. Especially, when new slices are deployed or when new frequencies are deployed, both option 1 and option 2 may not work correctly. Additionally when a new cell is deployed, option 1 can have issues. Option 3 (which also implies SIB16 is mandatory to enable slice specific cell reselection, the first part in option 2) is the cleanest option, and is similar to the legacy cell reselection principles. |
| Vodafone | 3 |  | In my view the SIB16 is kind of mandatory if we read 38.331:“The UE in RRC\_IDLE and RRC\_INACTIVE shall ensure having a valid version of (at least)…. *SIB16* (if the UE is configured for slice specific cell reselection information). I also have a sympathy for the argument that UE may move for a long distance…  |
| Apple | 2) 3) | 2) 3) | 1) Normally when NW enables a feature, NW indicates it to UE. In RAN slicing, our view is absence of SIB16 is interpretated by UE as RAN slicing is not enabled.2) If we change the UE behaviour as elaborated in 1), how could UE differentiate the cells supporting RAN slicing from legacy cells not supporting RAN slicing? If RAN slicing capable UE keeps performing slice specific cell reselection on legacy cells, does it violate the network intention? This problem gets severe in future release when slicing deployment is not unique in a TA.3) For NSAG+valid TAI scenario, when UE moves from one TA to another TA when the slicing to NSAG mapping is different, if UE only follows the dedicated config, UE would get stuck in wrong cell re-selection as no TAU is performed (so UE cannot get a new config). |
| Huawei, HiSilicon | 3) |  | In our paper R2-2303900, our preference is aligned with 3). The reason is that we have the following text (for frequency priority based cell reselection) in TS 38.304, and we think the slice based cell reselection should follow the same principle:The UE shall only perform cell reselection evaluation for NR frequencies and inter-RAT frequencies that are given in system information and for which the UE has a priority provided.In our opinion, it is left to the network implementation to **ensure that the dedicated slice info is valid and can be used as much as possible**. The UE only gets dedicated slice based cell reselection priority mostly due to camping on a cell of non-deployment of NSAGs, so it is reasonable for the UE not to perform slice-based cell reselection until camping on another cell which can support NSAG feature again. |
| Xiaomi | 3 |  | For 1), we agree with VDF that current RRC spec has clearly specified the SIB16 is mandatory for UE to perform the slice based cell reselection.For 2), firstly, we wonder why a NSAG-Frequency pair is only visible to some dedicated UEs rather than all UE as it is not UE-specific information. The scenario needs to be further checked.Besides, if the UE has moved a long distance, the NSAG-Frequency in dedicate signalling received before may be inaccurate for the cell reselection at the present time, in this case, the SIB16 content of the serving cell is necessary to limit the application of NSAGs and frequency priorities provided in dedicated signalling. |
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**Summary**: TBD.

**Proposal**: TBD.

## 3.2 Other slice-based cell reselection issues

There are the following proposals related to slice-based cell reselection

[**R2-2302862**](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302862.zip) **CR with two proposals:**

1. The Editor’s Note is removed (from 5.2.4.7.0 of 38.304):

##### 5.2.4.7.0 General reselection parameters

Cell reselection parameters are broadcast in system information and are read from the serving cell as follows:

2. The missing slice-based cell reselection parameters are added in a new subclause (in 38.304)

##### 5.2.4.7.X Slice-based cell reselection parameters

Slice-based cell reselection parameters are broadcast in system information and are read from the serving cell as follows:

**nsag-CellReselectionPriority**

This specifies the priority for NR frequency when the given NSAG ID is used to set the frequency priority.

**nsag-CellReselectionSubPriority**

This specifies the fractional priority value added to *nsag-CellReselectionPriority* when the given NSAG ID is used to set the frequency priority.

[**R2-2303900**](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303900.zip) **Proposal 2 It is proposed RAN2 to agree on capturing the UE behaviour in TS 38.300:**
when the UE AS doesn’t receive any NSAG information for cell reselection, the UE will not apply slice-based cell reselection.

**Rapporteur’s summary:** the views of other companies on the proposals and on the corresponding text proposals are to be checked.

**Question 2.1**: Do you agree to remove the Editor’s Note from 5.2.4.7.0 of 38.304 as it is proposed in [R2-2302862](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302862.zip)?

**Question 2.2**: Do you agree to add missing slice-based cell reselection parameters as it is proposed in [R2-2302862](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302862.zip)?

**Question 2.3** Do you agree to capture the UE behaviour in TS 38.300 as proposed in proposal 2 of [R2-2303900](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303900.zip)?

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| Company | Q2.1Yes/No | Q2.2Yes/No | Q2.3Yes/No | Technical Arguments |
| Samsung | Yes | Yes | Yes |  |
| Apple | Yes | Yes | No strong view | For P2 in R2-2303900, it seems current text (see below) somehow also implies this understanding. If “no NSAG” is provided, there would be “no slice-based cell reselection information”. But we are open to go with majority view.*When no slice-based cell reselection information is provided for any NSAG that was determined to be considered during cell reselection (as specified in TS 23.501 [3]), then the UE uses the general cell reselection information, i.e., without considering the NSAG(s) and their priorities.* |
| Huawei, HiSilicon | Yes | Yes | Yes |  |
| Xiaomi | Yes | Yes |  Yes, but |  Prefer to have further clarification on the NSAG information as follows as there is no definition in TS 38.300.when the UE AS doesn’t receive any NSAG information from NAS for cell reselection(see TS 23.501 [3], TS 24.501 [2]), the UE will not apply slice-based cell reselection. |
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**Summary**: TBD.

**Proposal**: TBD.

## 3.3 Slice-based RA issues

The following proposal and text proposal are related to slice-based RACH configuration:

[**R2-2303900**](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303900.zip) **Proposal 3:** It is proposed to clarify that “apply the NSAG with highest NSAG priority among the NSAGs that are included in SIB1 (i.e., in FeatureCombination and/or in RA-PrioritizationSliceInfo)”.

*<Start>*

#### 5.3.3.2 Initiation

The UE initiates the procedure when upper layers request establishment of an RRC connection while the UE is in RRC\_IDLE and it has acquired essential system information, or for sidelink communication as specified in clause 5.3.3.1a.

……

1> if the upper layers provide NSAG information and one or more S-NSSAI(s) triggering the access attempt (TS 23.501 [32] and TS 24.501 [23]):

2> apply the NSAG with highest NSAG priority among the NSAGs that are included in *SIB1* (i.e., in *FeatureCombination* and/or in *RA-PrioritizationSliceInfo*)*,* and that are associated with the S-NSSAI(s) triggering the access attempt, in the Random Access procedure (TS 38.321 [3], clause 5.1);

*<Next modification>*

5.3.13.2 Initiation

The UE initiates the procedure when upper layers or AS (when responding to RAN paging, upon triggering RNA updates while the UE is in RRC\_INACTIVE, for NR sidelink communication/discovery/V2X sidelink communication as specified in clause 5.3.13.1a) requests the resume of a suspended RRC connection or requests the resume for initiating SDT as specified in clause 5.3.13.1b.

……

1> else if the resumption of the RRC connection is triggered by upper layers:

2> if the upper layers provide an Access Category and one or more Access Identities:

3> perform the unified access control procedure as specified in 5.3.14 using the Access Category and Access Identities provided by upper layers;

4> if the access attempt is barred, the procedure ends;

2> if the upper layers provide NSAG information and one or more S-NSSAI(s) triggering the access attempt (TS 23.501 [32] and TS 24.501 [23]):

3> apply the NSAG with highest NSAG priority among the NSAGs that are included in *SIB1* (i.e., in *FeatureCombination* and/or in *RA-PrioritizationSliceInfo*), and that are associated with the S-NSSAI(s) triggering the access attempt, in the Random Access procedure (TS 38.321 [3], clause 5.1);

*<End>*

**Rapporteur’s summary:** the views of companies on the proposal and on the corresponding text proposal are to be checked.

**Question 3.1**: Do you agree with the concept of proposal 3 of [R2-2303900](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303900.zip)?

**Question 3.2** If yes, then do you agree with the text proposals that can be found in the Annex of [R2-2303900](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303900.zip)?

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| --- | --- | --- | --- |
| Company | Q3.1Yes/No | Q3.2Yes/No | Technical Arguments |
| Samsung | Yes | Yes |  |
| Apple | Yes | Yes |  |
| Huawei, HiSilicon | Yes | Yes |  |
| Xiaomi | Yes | Yes |  |
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**Summary**: TBD.

**Proposal**: TBD.

There are the following additional proposals on slice-based RA procedure:

[**R2-2303900**](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303900.zip) **Proposal 4:** If both FeatureCombination and RA-PrioritizationSliceInfo are configured, it is proposed RAN2 to discuss the following understandings and possible specification impacts:

Alt#1: The UE applies the NSAG ID with highest NSAG priority that is configured both in FeatureCombination and in RA-PrioritizationSliceInfo

Alt#2: The UE applies the NSAG ID with highest NSAG priority that is configured either in FeatureCombination or in RA-PrioritizationSliceInfo

[**R2-2303900**](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303900.zip) **Proposal 5:** It is proposed RAN2 to agree on capturing the UE behaviour in TS 38.300: when the UE AS doesn’t receive any NSAG information for Random Access, the UE will not apply slice-based Random Access.

**Rapporteur’s summary:** the views of other companies on these proposals are to be checked.

**Question 3.3**: Which alternative of proposal 4 of [R2-2303900](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303900.zip) do you agree?

**Question 3.4**: Do you agree with proposal 5 (capturing this in 38.300) of [R2-2303900](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303900.zip)?

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| Company | Q3.3Alt1/Alt2 | Q3.4Yes/No | Technical Arguments |
| Samsung | No strong view but Alt#1 is preferred. | Yes | Regarding Q3.3, for scenario 3 we think that the assumption i.e., different NSAG priorities for prioritization and feature combination (access resource) is a bit unrealistic since scenario 1 or scenario 2 can cover the cases of different NSAG priorities are configured for the two IEs. But we understood that the assumed case may give gNB some flexibility for the IE configuration. |
| Vodafone | No strong view either | Yes | My feeling is that Alt#1 give a bit more predictable behaviour. |
| Apple | Alt2 | No strong view | For P4, we think it should be Alt2. What matters here is UE should consider the highest NSAG ID, and then checks the config and selects the corresponding RACH resource and/or prioritization factor. It should not be the other way around.For P5, similar view as above in Q 2.3. |
| Huawei, HiSilicon | Slightly prefer Alt#2 | Yes | Both alternatives can work.As discussed in our paper, with Alt#1, the UE may not apply any NSAG in some cases, but Alt#2 can give the UE a chance to use RA resource. |
| Xiaomi | Alt#2 | Yes, but | For Q3.3, we have agreed that RAN2 confirms that RA prioritization and RA partitioning work independently.For Q3.4, similar comments as above in Q 2.3.when the UE AS doesn’t receive any NSAG information from NAS for Random Access(see TS 23.501 [3], TS 24.501 [2]), the UE will not apply slice-based Random Access. |
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# 4 Conclusion

TBD.